Volume 1: Overview and General Information

ENBRIDGE NORTHERN GATEWAY PROJECT

Sec. 52 Application

May 2010

Preface to Volume 1

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

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

The pipelines will be built in a common right-of-way (RoW) between an initiating pump station near Bruderheim, Alberta and the Kitimat Terminal near Kitimat, British Columbia. The marine terminal will accommodate transfer of oil into, and condensate out of, tankers.

These project components and activities are referred to collectively as the Enbridge Northern Gateway Project (the Project).

This volume introduces the Project and outlines:

- general project information, including project need and purpose, project alternatives and economic feasibility
- the regulatory framework
- land requirements, rights and acquisitions
- Enbridge management policies
- the structure of the Application, including a summary of each volume in the Application

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1 Introduction

To facilitate increased access to new, large and growing markets, Northern Gateway Pipelines Limited 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 (the Kitimat Terminal) to be located near Kitimat, British Columbia

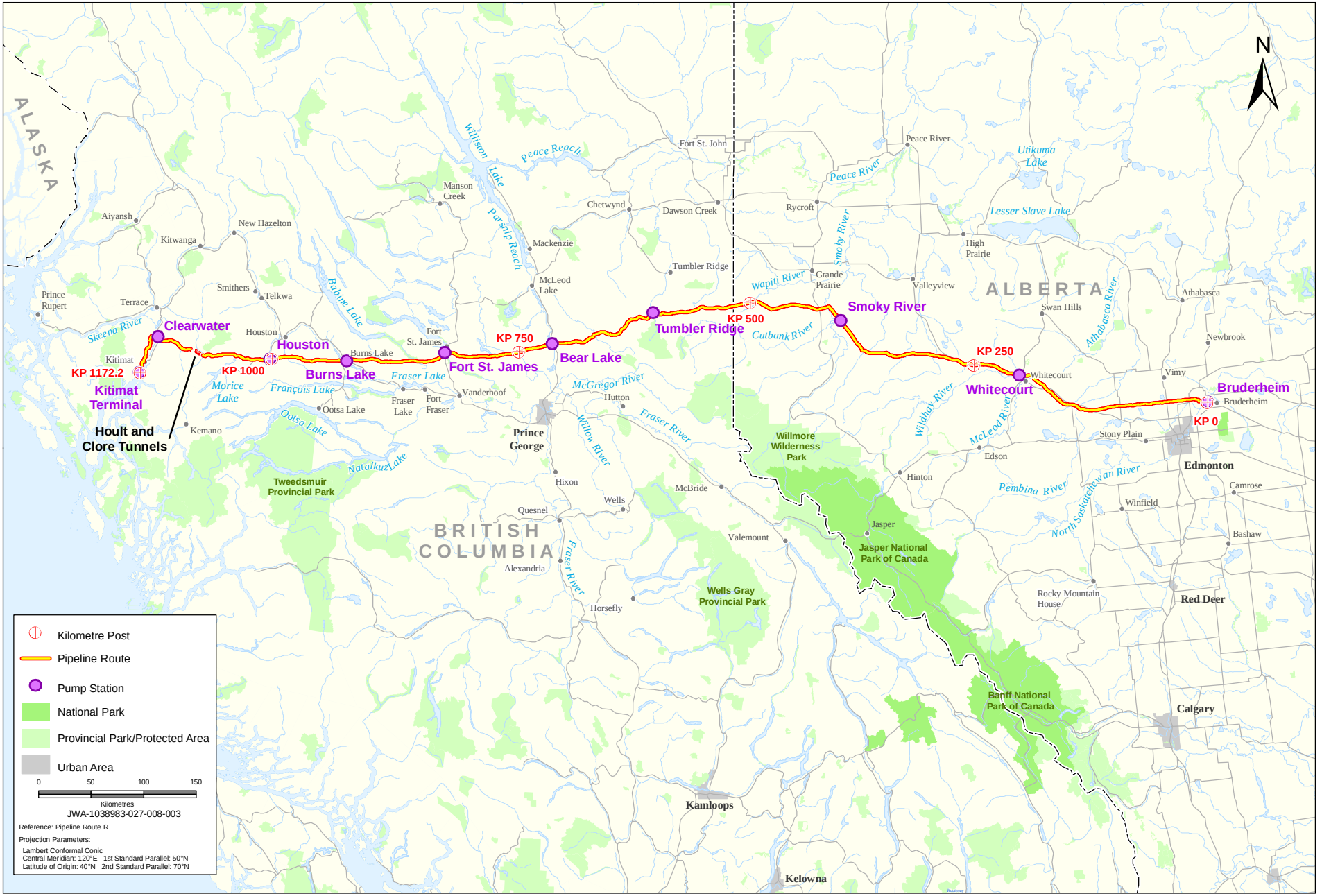
These project components and activities are collectively referred to as the Enbridge Northern Gateway Project (the Project). The Project will involve transporting oil from Alberta near Bruderheim (NE-4-56-21 W4M) to the Kitimat Terminal (UTM Zone 9 Easting 518436, Northing 5977703) for shipping to world markets. The terminal will also be the site for the import of condensate. The marine terminal will accommodate the transfer of oil into, and condensate out of, tankers.

1.1 Project Overview

In 1998, Enbridge Inc. (Enbridge) began an analysis of the need for, and feasibility of, a pipeline to meet the long-term needs of Western Canadian oil 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 Asia-Pacific Rim countries and in the western United States. 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 and for a pipeline to transport condensate to markets in Alberta progressed. Within two years, the Project was formally announced (see Figure 1-1 for the currently proposed route).

Since 2002, Enbridge has furthered project development at a technical and commercial level, with the support of potential Canadian and international shippers.

The oil pipeline is designed for an average annual throughput capacity of 83,400 m^3 (525,000 barrels) per day, and will have an outside diameter (OD) 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 m^3 (193,000 barrels) per day and will have a 508 mm OD (NPS 20).



CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: ENBRIDGE NORTHERN GATEWAY

ENBRIDGE NORTHERN GATEWAY PROJECT

Pipeline Route, Alberta and British Columbia

FIGURE NUMBER:	DATE:
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PROJECTION: LCC	DATUM: NAD 83

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Oil sourced from the Alberta oil sands and other production sources in the Western Canadian Sedimentary Basin (WCSB) will be delivered to the Kitimat Terminal for marine transportation to international overseas markets and will be available for 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 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 oil to large and growing international markets, comprising existing and future refiners in Asia and the United States West Coast. Providing new pipeline transportation service to tidewater will allow Canada to diversify its market for oil production and, conversely, will allow Pacific Rim refiners to consistently access Canadian oil supply and 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 in Canada's energy sector. A secondary purpose of the Project is to provide for the construction of a condensate import pipeline.

1.3 Project Benefits

Canada is dependent on a single market for exports of its oil. Demand for oil in the United States has peaked and is expected to steadily decline.

The Project is needed to diversify markets for Canadian oil by connecting Canadian oil supply to rapidly growing markets in northeast Asia and elsewhere, which are driving increasing global demand for oil. The Project allows Canada to increase the security of its markets and add significantly to the benefits that Canadians derive from oil exports.

Likewise, the Project creates the opportunity to diversify and significantly expand sources of condensate supply and availability. Historically, shortages of condensate supply have created risks and additional costs for Canadian oil sands producers. NEB forecasts for condensate requirements suggest that there might be future shortages of condensate import capacity. The Project's condensate line is capable of meeting this forecast need.

By diversifying their markets, Canadian oil producers will substantially increase the netback price for all Canadian production. Muse Stancil was retained to provide an independent assessment of the net benefits that would accrue to the Candian oil industry as a result of the Project proceeding. Over the 10 years after project start-up, Muse Stancil estimates that:

- sweet synthetic crude prices will rise, on average, $2.04/bbl more if the Project were to proceed
- Athabasca dilbit prices will similarly increase, on average, by $3.00/bbl

Significant volumes of synthetic oil and blended bitumen (diluted bitumen) will flow to markets in northeast Asia. Initially, almost half of the exports will be synthetic oil. Assuming no change to the upgrading capacity in Alberta, diluted bitumen volumes will increase over time as the total supply of diluted bitumen increases relative to that of synthetic oil.

Increased prices for Canadian oil would result in annual producer revenues increasing by $2.39 billion in the first full year of operations and growing to over $4.47 billion by 2025. When adjusted for transportation tolls on Northern Gateway, and after taking into account increased unit transportation costs on the Enbridge Mainline System, as well as increased Canadian refinery feedstock costs resulting from the Project, the net benefit to the Canadian oil industry would be $28 billion over the Project's first 10 years of operations.

Although the net benefits to the Canadian oil industry resulting from the Project are very large, total benefits flowing to all Canadians are greater. Wright Mansell Research was retained to provide an independent assessment of the benefits of the Project from a Candian public interest perspective. Over a 30-year operating period, Canadian gross domestic product (GDP) would increase by $270 billion. Additional labour income would be $48 billion, as a result of an additional 558,000 person years of employment. Federal and provincial governments could collect an additional $81 billion in revenue.

The Project has an estimated capital cost of about $5.54 billion (Q4 2009 Canadian dollars) plus allowance for funds used during construction (AFUDC). This investment alone will generate substantial economic benefits at local, regional, provincial and national levels.

The socio-economic effects of the Project, including national and provincial economic effects, are addressed in Volume 6 C. The Project will generate revenue by way of property taxes and corporate income taxes. In Alberta and British Columbia, annual property taxes for the oil and condensate pipelines and related facilities are estimated to total $36 million. Annual corporate income taxes are estimated to be $33 million. The Project will provide employment opportunities as long as it operates and will generate revenue for businesses by way of sale of goods and services. Government revenue from pipeline operations will exceed $85 million per annum.

Estimates of employment (direct, indirect and induced) generated during project constructiontotal about 62,700 person-years. About 57% of the employment will be in British Columbia, 24% will be in Alberta and the remaining 19% will be in the rest of Canada. Direct, indirect and induced labour income related to project construction is estimated at about $4.3 billion (Q4 2009 Canadian dollars), with a similar pattern of distribution between provinces. The direct, indirect and induced impact on Canadian GDP (value-added) is expected to total about $6.3 billion, distributed as 55% British Columbia, 29% Alberta and 16% for the rest of Canada. Taxes paid during construction are estimated to exceed $913 million.

On a broader scale, access to Pacific Rim markets for Canadian oil production will create numerous and sustaining benefits for all of Canada, while providing secure and essential energy supplies to nations such as China and South Korea. These economic benefits are described in Volume 2 and are discussed in reports prepared by Muse Stancil and Wright Mansell Research Ltd. (see Volume 2, Appendix A and Appendix B). Natural resource development and marketing is a fundamental driver of the Canadian economy. Transportation infrastructure is essential to that activity and, by extension, is essential for Canadians to continue to enjoy, and continue to afford, sustainable economic, environmental and social progress.

At the local level, Northern Gateway has sought to establish positive relationships with communities and Aboriginal groups along the route, including developing a number of initiatives designed to build long-term, sustainable relationships with communities and participating Aboriginal groups. Northern

Gateway will continue Enbridge's partnerships with, and support of, organizations that contribute to the economic and social development of communities where people live and work.

Northern Gateway is also developing an equity investment option so that participating Aboriginal groups can financially benefit from the Project. Northern Gateway will also develop initiatives that allow participating Aboriginal groups to:

- complete their own analysis of Northern Gateway's plans
- develop programs to provide medium-term and long-term opportunities in areas such as employment, training, business procurement and environmental protection

1.4 Sustainable Development

The JRP agreement for the Project states that "the objective of sustainable development is to achieve a balance between preserving environmental integrity, ensuring social equity and improving economic efficiency." It further states that "the proponent shall strive to integrate and balance this objective within its application, and clearly outline how it has been incorporated."

Northern Gateway's approach to project development is grounded on achieving a fair and sustainable balance between project effects and benefits. Sustainability is an integral component of the public interest mandate conferred upon the NEB and concurs with Enbridge's Corporate Social Responsibility commitments.

The design and operational measures proposed for the Project are consistent with past industry practices and lessons learned—they address issues listed in the NEB Filing Manual and they meet or exceed operational standards. The measures are described in detail throughout this multi-volume Application and will mitigate adverse environmental and socio-economic effects to levels considered to be not significant. Design and operational measures include:

- rigorous, multi-disciplinary route selection process designed to identify a corridor that will achieve an acceptable balance of engineering, environmental and economic considerations, and which will conform with land use and protected area plans in Alberta and British Columbia
- a model of world-class standards for:
    - engineering, design and materials procurement
    - the design, operation and maintenance of terrestrial and marine terminal facilities
    - tanker vetting and marine operational protocols and emergency response capability, training and execution
    - terrestrial emergency response capability, training and execution
- commitment to identify, mitigate and proactively manage potential project effects on the environment, including sensitive species such as caribou, grizzly bear and marine mammals
- commitment to mitigate project effects on traditional use throughout project design, construction, operations and decommissioning

- compensation for individuals and businesses incurring losses attributable to project construction and operations, including compensation to trappers and guide-outfitters for losses incurred because of construction activities and losses to fishers because of potential interference with fishing activities by project-related tankers
- commitment to no-net-loss of fish habitat

Although committed to limiting adverse environmental effects, Northern Gateway acknowledges that no project of this magnitude can be constructed and operated without creating some level of environmental disturbance, and without creating a measure of risk in terms of accidents and malfunctions. Northern Gateway also recognizes that potential adverse effects from routine operations, and potential accidents and malfunctions, should be counterbalanced by lasting benefits for communities along the pipeline route, and in coastal areas close to project-related shipping. Therefore, Northern Gateway has developed a range of community investment initiatives with a goal of building long-term sustainable relationships with communities and participating Aboriginal groups. Concepts considered and confirmed to date are discussed below (see also Volume 4, Section 3.1.3 and Section 3.6 and Volume 5A, Section 3.1.2 and Section 3.2).

Enbridge Northern Gateway Investment in Building Sustainable Communities

Northern Gateway will support community projects or programs in education, health and safety, culture and community leadership, and the environment during project development and operations. Northern Gateway expects to work with a community advisory board, made up of northern residents, which will make recommendations on how the funds can be best allocated to meet the priorities of local communities.

Aboriginal Equity Investment

Northern Gateway will offer Aboriginal communities the opportunity to invest in 10% of the Project through equity participation. This will be an open opportunity for Aboriginal groups to become active business partners in the Project. Northern Gateway will work with each community that elects to execute an equity option to help facilitate the financial means to obtain the equity. The risk and cost of permitting, design and construction will be borne by Northern Gateway.

Environmental Research

Northern Gateway is prepared to fund a series of initiatives aimed at improving knowledge and research on the marine and terrestrial environment. Northern Gateway has initiated discussions with several coastal Aboriginal organizations to undertake cooperative marine research in support of the environmental and socio-economic assessment (ESA), as well as to provide an enhanced knowledge base for detailed design and operational planning and readiness. Initiatives that have been discussed include:

- providing additional information for revising the Coastal Operations and Sensitivity Mapping Technical Data Reports (TDRs) (Polaris 2010a, b)
- coordinating cooperative and independent marine research by coastal Aboriginal groups to support the ESA, associated local community information needs and future environmental monitoring

- involving coastal Aboriginal communities in the identification of important sites and response priorities as part of the development of site-specific, first-response plans
- investing in salmon enhancement projects

Employment and Training Initiatives

Northern Gateway is committed to employment and skills development in the communities along the project route and continues to develop initiatives related to:

- individualized employment and training workshops and programs for local communities and participating Aboriginal groups
- pre-employment training programs specific to the pipeline industry
- tools to enable communities and Aboriginal groups to establish baseline data on local skills, education and businesses
- participation in skill and career development workshops, events and meetings in communities throughout northern British Columbia and Alberta
- apprenticeship opportunities during construction

Business Development Initiatives

Northern Gateway places an emphasis on business development opportunities for communities and Aboriginal groups. Northern Gateway will focus on engagement with established businesses and those businesses that might need support through the business development phase. Initiatives include:

- conducting a business asset evaluation on First Nation reserves and Métis communities to identify future opportunities using established businesses and those operations that might meet the needs of the Project
- establishing progressive local employment and contracting targets for all northern communities to enhance local participation in terrestrial and marine operations
- ensuring an investment is made for a dedicated and improved first response marine infrastructure to improve the safety and security of communities on the north coast. It is the intent of Northern Gateway to make this an educational, training and employment opportunity for coastal First Nations.

Contracting Opportunities for Aboriginal Groups

Northern Gateway places an emphasis on contractual opportunities for Aboriginal groups. Northern Gateway will set aside scopes of work from major contractor bid packages and provide sole-sourcing[1] opportunities to qualified Aboriginal businesses and joint venture companies who meet the required safety qualifications and offer regionally competitive pricing.

[1] Enbridge may offer sole-sourced contracting opportunities to qualified Aboriginal suppliers and contractors, where appropriate. Such sole-sourcing may be subject to competition among qualified Aboriginal providers and to bids reflecting regionally competitive rates.

Greening Initiatives

Northern Gateway is developing a greening initiative, which, if the Project receives regulatory approval, would offset the footprint of the Project. Through this initiative, Northern Gateway would work with communities and Aboriginal groups to identify opportunities. Examples of greening initiatives contemplated include:

- expansion of community forests
- biomass energy projects
- installation of a geothermal heating system in a new community facility
- support of local community investments in environmental projects

Enbridge Community Investment Initiatives

Enbridge community investment initiatives will also be available for the Project, including the Enbridge Natural Legacy Program, the Enbridge Safe Community Program and the Enbridge School Plus Program.

Natural Legacy Program

The Enbridge Natural Legacy Program is an opportunity to demonstrate Enbridge's ongoing commitment to environmental stewardship, and habitat remediation and protection through initiatives such as elementary educational programs and the planting and care of native trees and plants throughout urban and rural areas along Enbridge rights-of-way. The Natural Legacy Program has involved collaboration with organizations such as the Nature Conservancy of Canada, Ducks Unlimited, Trout Unlimited and Tree Canada, as well as local schools, educators and volunteers.

Safe Community Program

The Enbridge Safe Community Program is designed to provide monetary grant support for first responders, police agencies, fire-fighters, emergency medical services and other related health providers who would respond to emergency situations along any of Enbridge's pipelines in nearby communities throughout the Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario and Quebec. The grant support provided by the Canadian program will help eligible organizations acquire new safety-related equipment, obtain professional training and deliver safety education programs in their communities.

School Plus Program

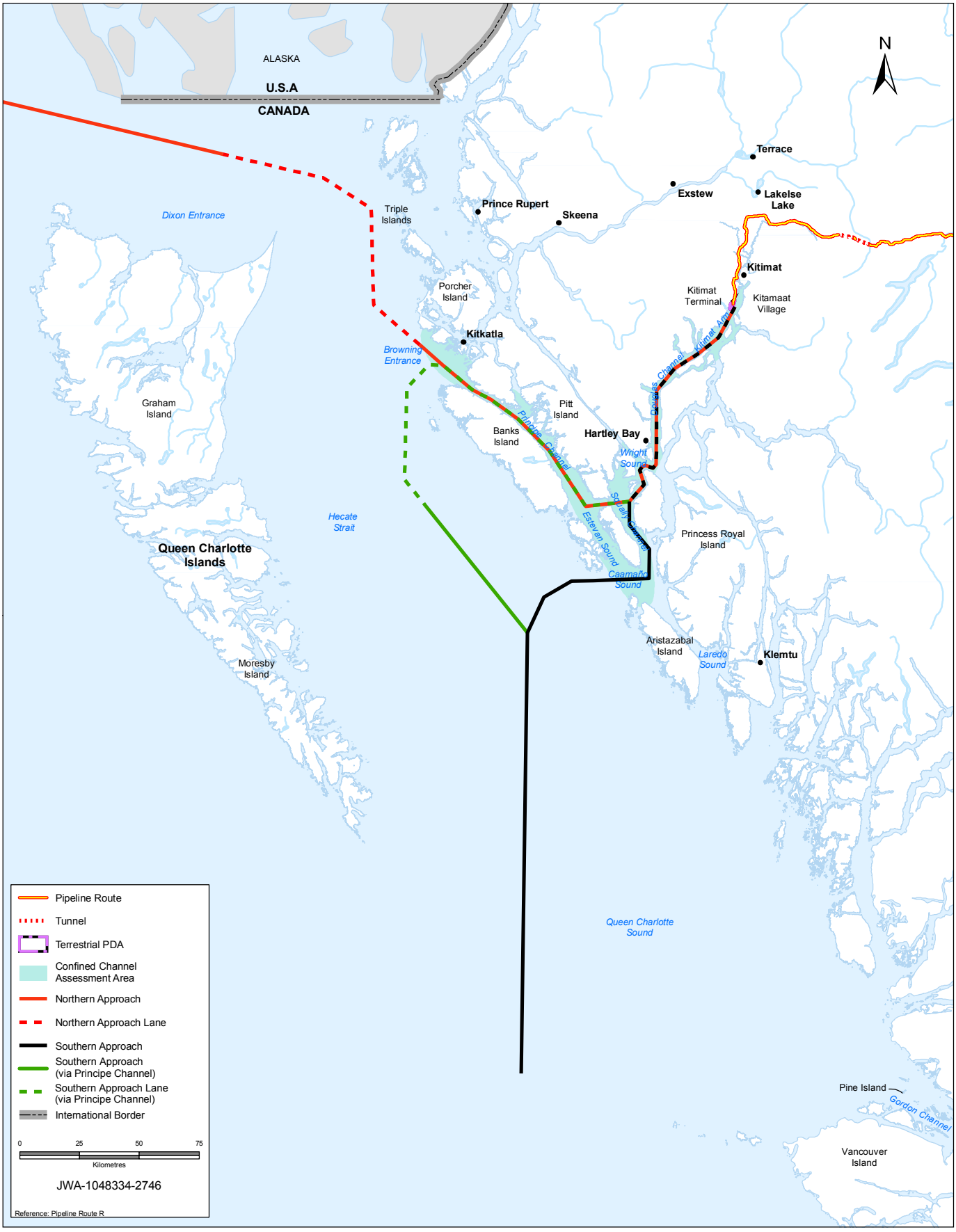
The Enbridge School Plus Program was established by Enbridge in partnership with the Assembly of First Nations to encourage First Nations youth to stay in school. Near major Enbridge pipeline routes, the program provides financial support to First Nations schools that wish to undertake programs and activities that are not fully funded as part of each school's standard curriculum. Teachers are eligible to receive financial support for programs such as cultural camps, sports activities, traditional arts and crafts instruction and native language preservation. The program also funds the purchase of valuable instructional technology such as computers, SMART Boards and audiovisual equipment.

Improvements in Navigational Safety

Important measures to improve navigational safety being developed by Northern Gateway include:

- using a tethered escort tug and close escort tug for laden tankers, and close escort tugs for those in ballast
- using enhanced navigational aids as proposed by British Columbia Coastal Pilots
- installing radar along important sections of the Northern and Southern Approaches in the confined channel assessment area (CCAA, see Figure 1-2) where vessels will be transiting
- installing increased emergency response capacity
- using an Electronic Chart Display and Information System (ECDIS) together with standalone personal pilot units (PPUs), with a navigation capability independent of the vessels' navigations systems
- vetting all tankers and assuring compliance with Canadian regulations and International Maritime Organization (IMO) standards (e.g., ECDIS on oil tankers, watch-keeping certification and port control inspections)
- reducing speed in the CCAA to 10 to 12 knots and, in certain areas, to 8 to 10 knots
- observing weather restrictions for entry of vessels into the CCAA and for berthing at the Kitimat Terminal

For discussions regarding these and other navigational measures, see Volume 8A.



CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 1-2		DATE: 20100326
PREPARED BY: gem	Confined Channel Assessment Area	SCALE: 1:2,200,000	AUTHOR: NP	APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83	

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1.5 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. (Enbridge), as limited partner, and Northern Gateway Pipelines Inc., as general partner. The partnership is offering an equity position to participating Aboriginal groups.

Enbridge operates—in Canada and the United States—the world's longest oil and liquids pipeline system. Enbridge also owns Canada's largest natural gas distribution company.

Enbridge has unique and extensive experience developing, managing, operating and optimizing liquids and natural gas pipelines, 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
- terrestrial and marine terminal operations (Colombia and Venezuela)

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.

1.6 Action Sought by Applicant

Northern Gateway hereby respectfully requests:

- a Certificate of Public Convenience and Necessity pursuant to Section 52 of the *National Energy Board Act* (*NEB Act*), authorizing the construction and operation of the oil pipeline and associated facilities, including tankage and terminalling at Kitimat
- a Certificate of Public Convenience and Necessity pursuant to Section 52 of the *NEB Act*, authorizing the construction and operation of the condensate pipeline and associated facilities, including tankage and terminalling at Kitimat
- an order pursuant to Part IV of the *NEB Act* approving the toll principles applicable to service on each of the oil and condensate pipelines, including tankage and terminalling at Kitimat
- such further and other related relief as Northern Gateway may request or the NEB may deem appropriate pursuant to Section 20 of the *NEB Act*

1.7 Contact Information

All notices and communications concerning this Application should be directed to:

Richard Neufeld, Q.C.
Barrister & Solicitor
Fraser Milner Casgrain
15th Floor,
850 – 2nd Street SW
Calgary, Alberta T2P 4X7
Facsimile: 403-268-3100
richard.neufeld@fmc-law.com

Kenneth MacDonald
VP, Law and Regulatory Affairs
Northern Gateway Pipelines Inc.
30th Floor,
425 – 1st Street SW
Calgary, Alberta T2P 0X8
Facsimile: 403-718-3525
kenneth.macdonald@enbridge.com

Abby Dorval
Manager, Regulatory Affairs
Northern Gateway Pipelines Inc.
30th Floor,
425 – 1st Street SW
Calgary, Alberta, T2P 0X8
Facsimile: 403-718-3525
abby.dorval@enbridge.com

1.8 References

1.8.1 Literature Cited

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Canadian Environmental Assessment Agency (CEA Agency) and the National Energy Board (NEB). 2009. *Joint Review Panel Agreement*. 4 December 2009. Canadian Environmental Assessment Agency, Ottawa, ON. National Energy Board, Calgary, AB.

Polaris Applied Science Inc. 2010a. *Coastal Operations and Sensitivity Mapping for the CCAA Technical Data Report.* Prepared for Northern Gateway Pipelines Inc. Calgary, AB.

Polaris Applied Science Inc. 2010a. *Coastal Operations and Sensitivity Mapping for the Open Water Area Technical Data Report.* Prepared for Northern Gateway Pipelines Inc. Calgary, AB.

2 Project Description

The Project includes constructing, operating and decommissioning two pipelines, associated facilities and the Kitimat Terminal. An overview is provided below; details are provided in Volume 3.

Marine transportation associated with the Project is described briefly in Section 2.6.3. Additional information is provided in Volume 8A.

2.1 Pipelines

Northern Gateway is applying for approval to install the pipelines within a 1-km wide corridor, which is approximately 1,172 km long. The pipelines will be located in a common, permanent 25-m wide right-of-way (RoW), extending from the initiating station near Bruderheim to the Kitimat Terminal.

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 m^3 (525,000 barrels) per day
- a condensate import pipeline, 508 mm OD (NPS 20), designed for an average annual throughput capacity of 30,700 m^3 (193,000 barrels) per day

The delineation of the pipeline RoW in the applied-for corridor will be finalized in the NEB detailed route approval process. This delineation will incorporate:

- detailed engineering, construction and operations considerations
- further site-specific constraint mapping
- results of Aboriginal traditional knowledge community reports and further field investigations
- input from:
    - Aboriginal groups and communities
    - landowners
    - the public
    - other interested parties
    - government agencies

2.2 Pump Stations

Electric-powered pump stations at 10 locations will be required to operate the pipelines, including the initiating stations near Bruderheim (for oil) and Kitimat (for condensate) (see Table 2-1). The oil and condensate pumps are rated at 4,290 kW (5,750 hp). Intermediate pump station sites will occupy 4 ha. The site for the initiating station near Bruderheim will occupy about 2 ha. The condensate initiating site is located in the Kitimat Terminal. Power lines will be constructed to connect to existing transmission systems. In British Columbia, Northern Gateway will be responsible for supplying connection facilities to BC Hydro. In Alberta, utility providers will supply the connection facilities.

Table 2-1 Pump Station Locations

Station	Location (kilometre post [KP])	Purpose
Bruderheim	0	Oil
Whitecourt	203.2	Oil/condensate
Smoky River	400.6	Oil/condensate
Tumbler Ridge	598.1	Oil/condensate
Bear Lake	716.0	Oil/condensate
Fort St. James	824.5	Oil/condensate
Burns Lake	925.5	Oil/condensate
Houston	1,002.0	Condensate
Clearwater	1,124.7	Condensate
Kitimat	1,172.2	Condensate

2.3 Clore and Hoult Tunnels

Crossing the coastal mountains will require constructing two tunnels through the mountains between Clore River valley (KP 1072.9) and Hoult Creek valley (KP 1086.8) (see Figure 2-1). The Clore Tunnel will be approximately 6.5 km long and the Hoult Tunnel will be approximately 6.6 km long.

2.4 Valves and Scraper Trap Facilities

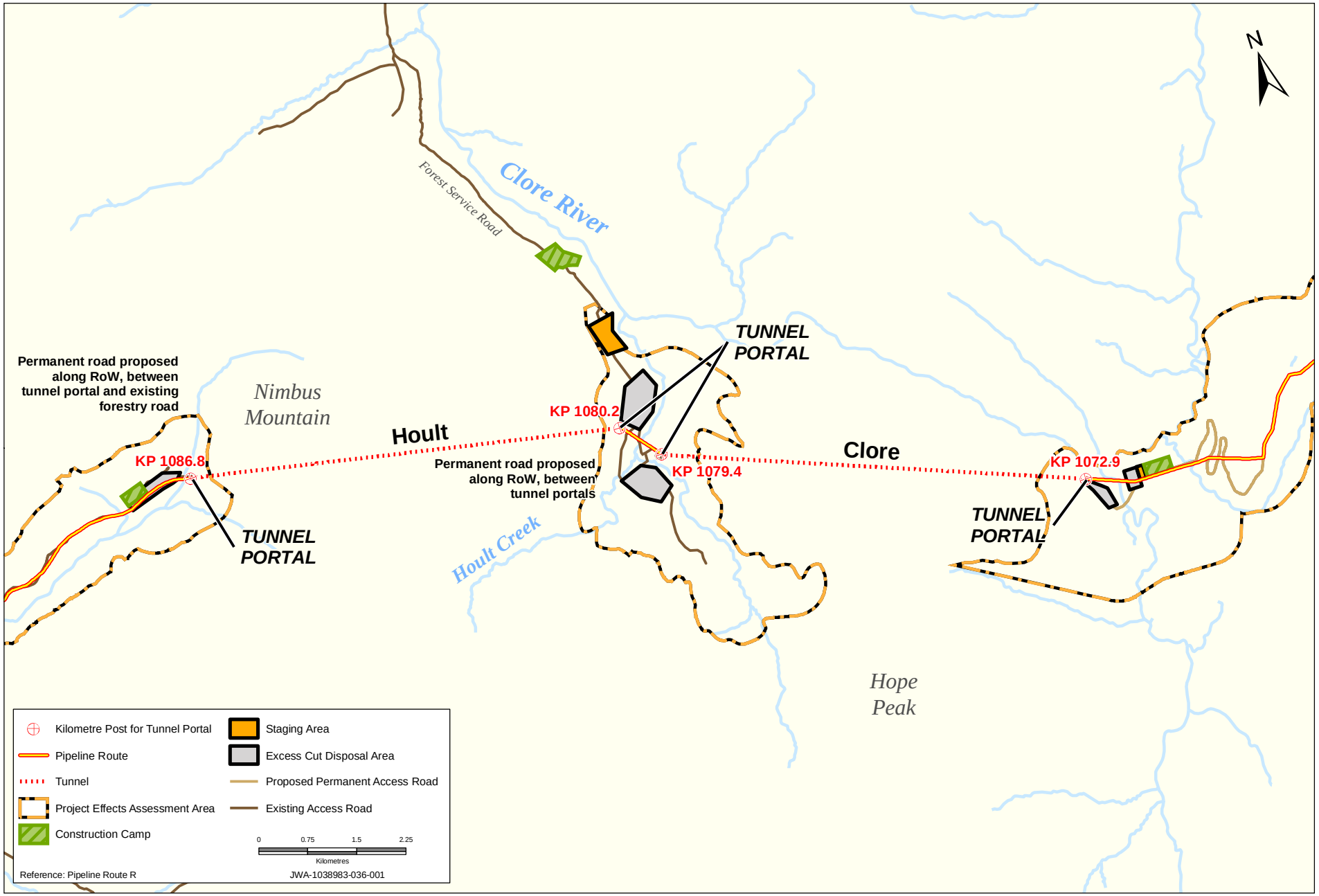
Remotely operated pipeline block valves will be installed in the RoW at strategic locations, including pump stations and major watercourse crossings. The exact location of these valves will be finalized during detailed engineering design. Electrical power for the block valves will be provided by commercial or alternate power sources. A combination of wide area network, telephone lines and satellite and radio communication circuits will provide main and backup communication systems. Details on the required infrastructure, including radio towers, will be determined during detailed engineering studies.

Scraper trap facilities will be installed at both ends of the pipelines and at selected intermediate pump stations. Because these facilities will be in the pump stations, no additional land is required.

2.5 Kitimat Terminal

The Kitimat Terminal is on the west side of Kitimat Arm (see Figure 2-2) and refers to the tank terminal (the area inside the security fence) and the marine terminal (see Figure 2-3), as well as the undeveloped area outside the security fence that also includes the excess cut disposal area.

The Kitimat Terminal will include oil and condensate tanks, pump facilities, other associated facilities, two tanker berths and one utility berth (see Figure 2-4).



CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway

ENBRIDGE NORTHERN GATEWAY PROJECT

Clore and Hoult Tunnels

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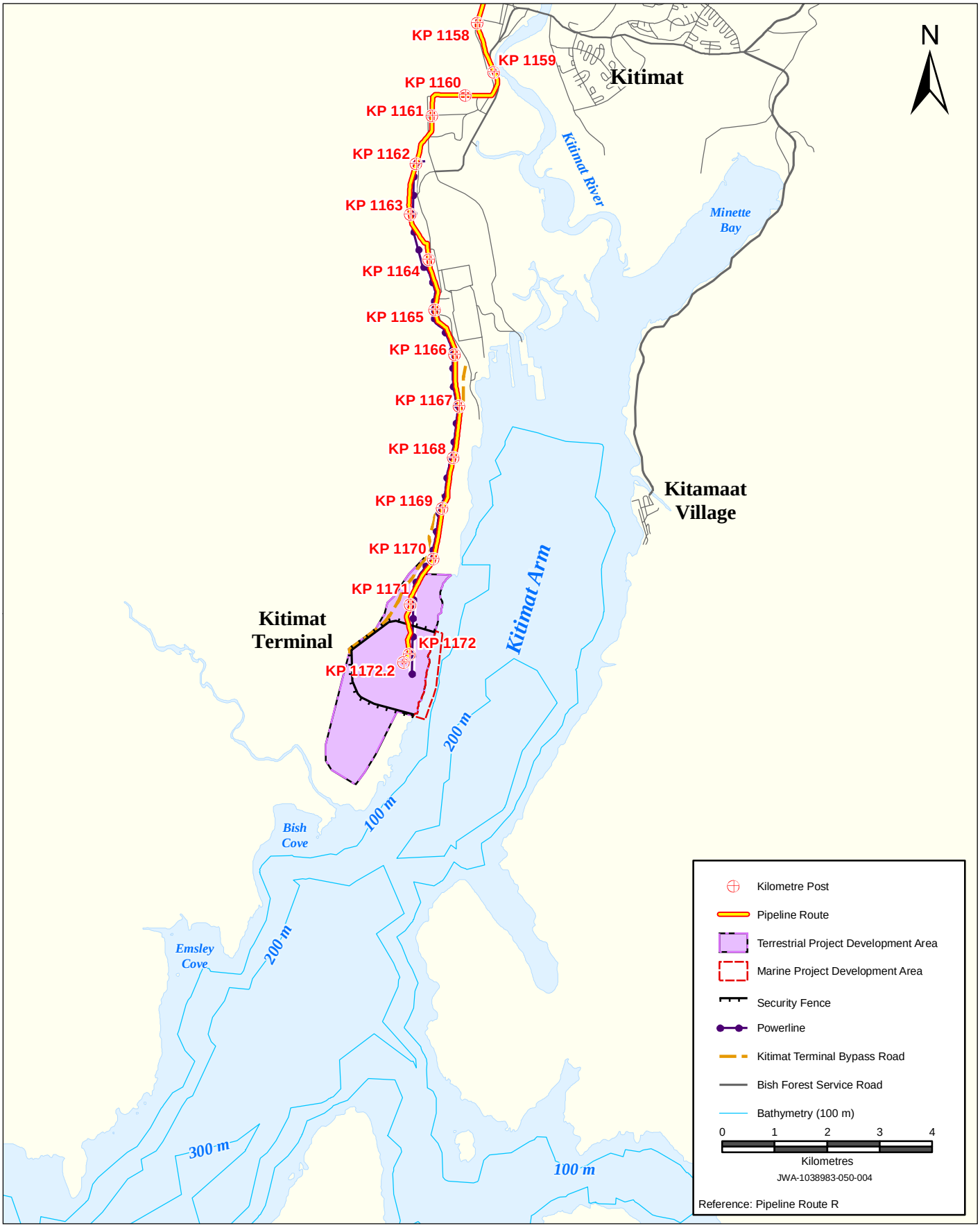

REFERENCES: SPOT

CONTRACTOR: Jacques Whitford AXYS Ltd.	ENBRIDGE NORTHERN GATEWAY PROJECT	FIGURE NUMBER: 2-2		DATE: 20091211
PREPARED BY: gem	Location of Kitimat Terminal	SCALE: 1:650,000	AUTHOR: JP2	APPROVED BY: DC
PREPARED FOR: ENBRIDGE NORTHERN		PROJECTION: UTM 9	DATUM: NAD 83	

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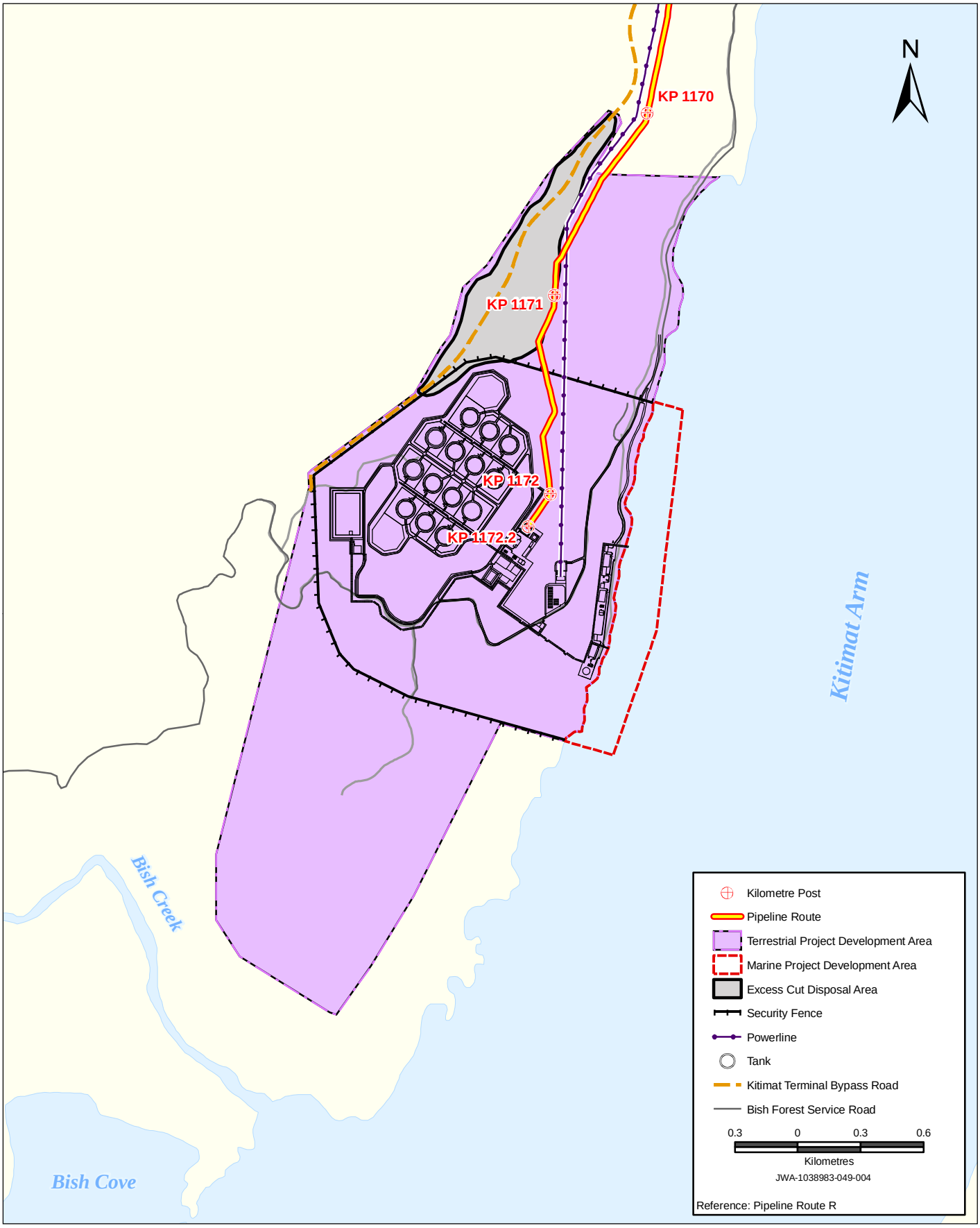

REFERENCES: SPOT

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 2-3		DATE: 20091211
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PREPARED FOR: ENBRIDGE NORTHERN		PROJECTION: UTM 9	DATUM: NAD 83	

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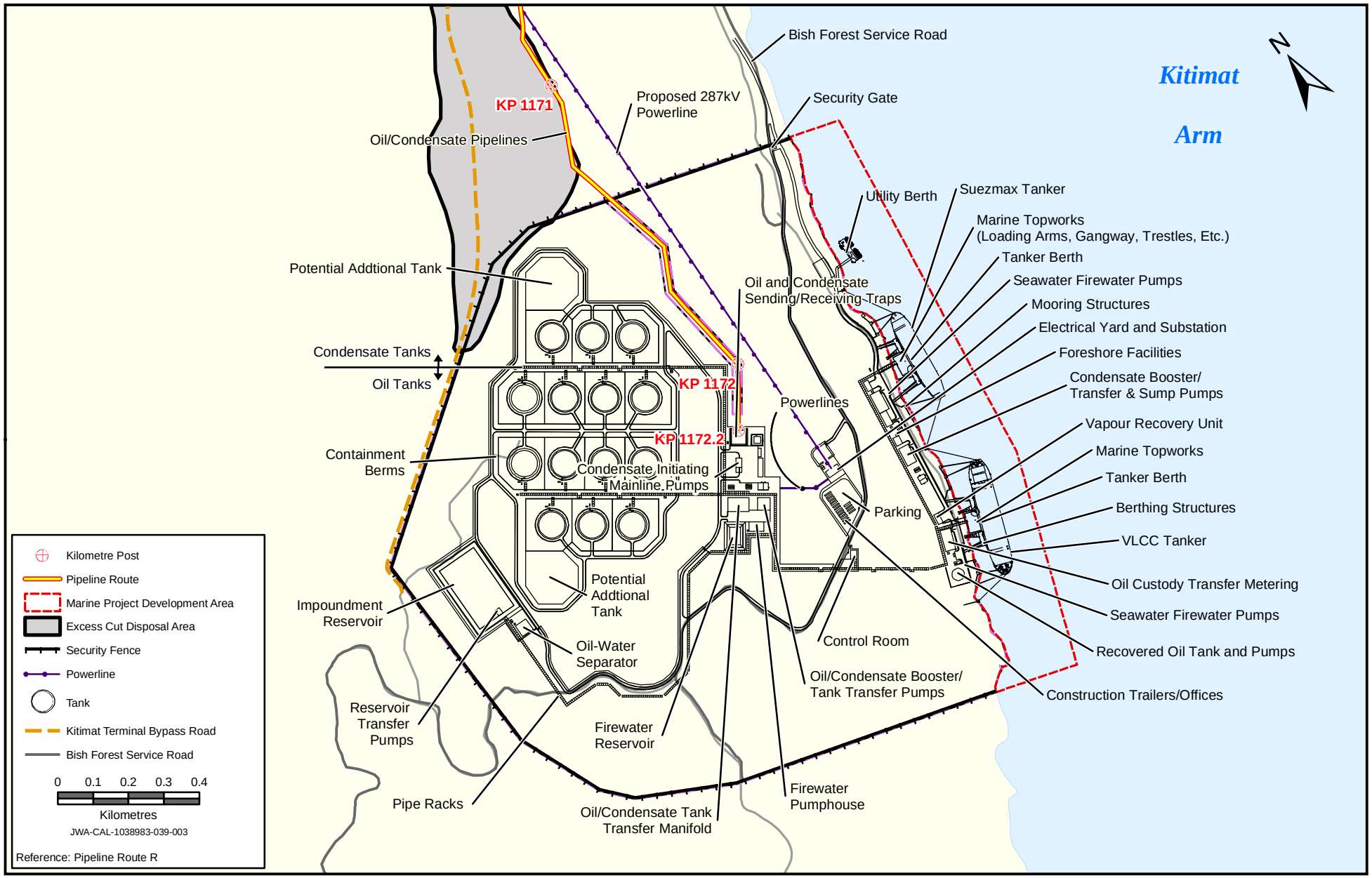

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: ENBRIDGE NORTHERN GATEWAY PIPELINES

ENBRIDGE NORTHERN GATEWAY PROJECT

Preliminary Layout of Kitimat Terminal

FIGURE NUMBER:	DATE:
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2.5.1 Tank Terminal

The tank terminal (see Figure 2-4) will occupy approximately 220 ha and will include 14 hydrocarbon tanks (11 oil and 3 condensate), each with a capacity of 78,800 m^3 (496,000 barrels). A security fence will be built around the tank terminal. A 60-m wide firebreak area 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 potential future tanks for product segregation purposes. The size and spacing of tanks will be optimized during detailed design. The main components of the tank terminal include:

- the oil transfer system, including an oil receiving station, tanks, an oil loading system, custody transfer metering and a recovered oil drain tank
- the condensate transfer system, including a condensate unloading system, custody transfer metering, booster pumps, tanks and a condensate initiating pump station
- ancillary systems, including electrical supply and distribution, fire protection, tank impoundment, water management, vapour recovery unit, corrosion control, potable water, utility air and emergency shutdown
- buildings
- control centre
- civil infrastructure including roads and fences

2.5.2 Marine Terminal

The marine terminal will include 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 in the safety zone). The marine terminal will comprise two tanker berths and one utility berth (see Figure 2-4). Both tanker berths will be equipped for loading oil tankers and unloading condensate tankers. Figure 2-4 illustrates a very large crude carrier (VLCC) and a Suezmax condensate tanker berthed at the marine terminal.

The main components of each tanker berth include:

- a loading platform with gangway tower
- access trestles and catwalks
- berthing and mooring structures
- a containment boom

The utility berth will have facilities that can accommodate the mooring of harbour tugs and two utility workboats. A davit system will be used to launch the utility boats from the utility berth deck and retrieve the boats for stowage and maintenance.

2.5.3 Marine Transportation

Marine transportation includes the routine operations of oil and condensate tankers, as well as construction vessels. Tankers transiting to and from the Kitimat Terminal will be chartered by other

interests. Compliance with Northern Gateway's tanker vetting and operational protocols will be enforced for any tankers nominated to call at the Kitimat Terminal and these vessels will comply with all international safety conventions. Before entering Canadian waters, all tankers will have complied with the *Canada Shipping Act* ballast water management regulations.

2.5.4 Construction-Related Vessels

The number of supply vessels, coastal tugs and barges that will be required during construction of the tank terminal will be determined during detailed engineering. Routing and scheduling of these vessels will also be determined as part of this process.

2.5.5 Oil and Condensate Tankers

Transit Areas

During operations, Northern Gateway expects that between 190 and 250 oil and condensate tankers will call on the Kitimat Terminal each year. On average, this will likely comprise 50 VLCCs, 120 Suezmax tankers and 50 Aframax tankers. The average cargo capacity of these tankers ranges from 80,000 DWT for an Aframax tanker to 320,000 DWT for a VLCC. All tankers will be double hulled.

Tankers arriving from or departing to Asian ports will navigate the northern approach. The northern approach passes Haida Gwaii[2] through Dixon Entrance and continues through Hecate Strait, Browning Entrance, Principe Channel, Nepean Sound, Otter Channel, Squally Channel, Lewis Passage, Wright Sound and Douglas Channel to the Kitimat Terminal.

Tankers arriving from or departing to ports south of Kitimat on the North American west coast will use one of the following routes (see Figure 1-2):

- Southern Approach (direct) – pass through Queen Charlotte Sound, and continue through Hecate Strait, Caamaño Sound, Campania Sound, Squally Channel, Lewis Passage, Wright Sound and Douglas Channel
- Southern Approach (through Principe Channel) – pass through Queen Charlotte Sound and north through Hecate Strait, before continuing through Browning Entrance and following the route to the Kitimat Terminal outlined previously

Project-related vessel traffic will be controlled and monitored within the Territorial Sea of Canada (see Figure 2-5)—an area that is generally referred to in Volume 8 of the Application as the open water area (OWA). It includes the Northern Approach and the Southern Approaches to and from the Kitimat Terminal and encompasses Hecate Strait, Dixon Entrance, Browning Entrance, Otter Passage, Queen Charlotte Sound and other coastal waters around Haida Gwaii to the 12 nautical mile (nm) limit on the western side of these islands.

[2] The name of Queen Charlotte Islands was changed to Haida Gwaii in December 2009. However, for consistency with source information used for mapping, Queen Charlotte Islands is used on all maps.

Vessel Operations Protocols

The Full Mission Bridge Simulator shows that tankers of the largest design size are capable of navigating the entire route unassisted. During vessel transits of the CCAA and OWA:

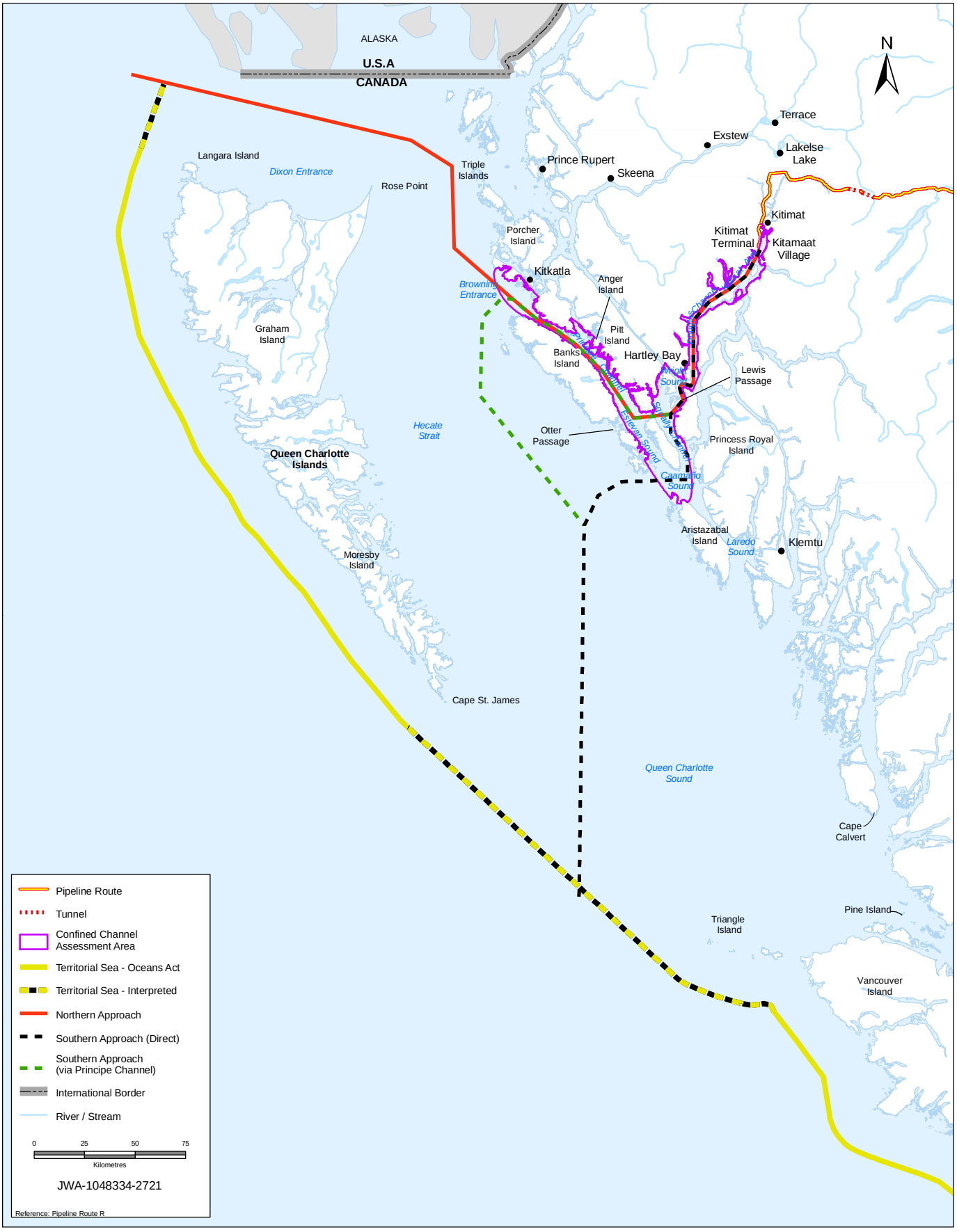
- a close escort tug will be used for all laden and ballasted tankers beginning at the pilot boarding stations (Triple Island and proposed sites in Browning Passage and Caamaño Sound) to and from the marine terminal
- a tethered tug, in addition to a close escort tug, will be used for all laden tankers in the CCAA. The tug will be tethered to the stern of the laden tanker at all times, ready to assist with steering or slowing down.
- the close escort tug will normally be positioned approximately 500 m astern of the tanker, or as directed by the shipmaster or pilot during the transit. Local pilots will board and assist all incoming and outgoing tankers. During transit of the CCAA, average tanker speeds will range between 8 to 12 knots.

Harbour tugs and line-handling boats will support berthing and unberthing operations at the marine terminal. All tankers using the Kitimat Terminal will follow requirements for ballast water management and discharge under the *Canada Shipping Act* and Canadian Ballast Water Control and Management Regulations (BWCMR), and implement an International Maritime Organization (IMO) approved Ballast Water Management Plan. Tankers will have segregated ballast on board that has been exchanged not less than 200 nautical miles from shore, as described by the Ballast Water Management Procedures under the BWCMR. Oily ballast water will not be discharged at the Kitimat Terminal. Solid waste and liquid waste will be managed according to the *Canada Shipping Act*.

2.5.6 Support Vessels for the Marine Terminal Operations

Line-handling boats will support the operations of the marine terminal and will be berthed and fuelled at the utility berth and used for pre-booming. When not active, escort tugs will berth at the utility berth or at a facility in Kitimat. Maintenance for escort and harbour tugs will be provided at existing facilities in Kitimat. Escort and harbour tugs will be fuelled at the utility berth or at existing facilities in Kitimat. Harbour tugs will be on standby at the utility berth but may be berthed at a facility in Kitimat if there is no tanker at the Kitimat Terminal.

Each tanker berth will be equipped with a containment boom. The containment boom will be deployed during all oil loading operations. It will extend from shore, out around the tanker and back to shore. Because condensate dissipates quickly, the containment boom will not be used during condensate off-loading.



CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 2-5		DATE: 20100315
PREPARED BY: gem	Territorial Sea of Canada	SCALE: 1:2,600,000	AUTHOR: NP	APPROVED BY: CM
PREPARED FOR: ENBRIDGE NORTHERN GATEWAY PIPELINES		PROJECTION: UTM 9	DATUM: NAD 83	

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2.6 Construction Spreads, Camps and Stockpile Sites

Preliminary plans provide for the pipelines to be constructed using 12 construction spreads. Three construction spreads will be constructed concurrently during four construction seasons: the summer and winter of the first pipeline construction year and the summer and winter of the second pipeline construction year. Pipeline construction will require 11 camps, each with an area of approximately 25 ha to support 500 to 700 workers. Some of the construction camps will require new temporary access roads, the details of which will be determined during detailed engineering in conjunction with local stakeholder and Aboriginal input.

Preliminary pipe stockpile locations and construction staging areas have been selected to provide the best logistical support for construction. Pipe will be transported primarily by rail to sidings that are located as close as possible to the RoW. Pipe will then be transported to stockpile sites and to the RoW by truck.

Staging areas are used primarily for mobilizing construction teams along the RoW. The sites are relatively small, located primarily at construction spread breaks and tunnel portals, and have been included in the environmental assessment. Stockpile sites are used for the temporary storage of pipe, materials and equipment and each will require from 8 to 27 ha.

The construction of the Clore and Hoult tunnels will also require the temporary use of land for construction camps, staging areas and stockpile sites. Three camps will be needed during tunnel construction, each with a capacity of 100 to 150 persons. One camp will be located near the east portal of the Clore Tunnel, a second camp located near the west portal of the Hoult Tunnel, and a third camp between the two tunnels near the west portal of the Clore Tunnel. Each camp will occupy approximately 3 to 5 ha. An excess cut disposal area of about 20 ha will be required near each tunnel portal. Staging areas of various sizes will be required at both ends of the tunnels as well as between the two tunnels.

A construction safety manual will be developed and implemented for the Project. A copy of this manual will be submitted to the NEB before project construction starts.

2.7 Project Schedule

Construction of the Project is scheduled for a 42-month period to achieve the planned in-service date, and to provide for a safe and efficient work progression while limiting adverse environmental and socio-economic effects. An additional six months might be required to complete construction of the Kitimat Terminal. Clearing activities for the first construction season will begin the year before pipeline construction. A comprehensive construction plan will be developed during detailed engineering and construction planning. The plan will take into account environmental and other issues to be managed, and available pipeline industry construction capacity. This might result in changes to the current plans, including changing the season of construction at some locations.

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

Table 2-2 Project Milestones

Project Milestone	Start Date	Completion Date
NEB Application submission	–	Q2, 2010
Detailed design	Q1, 2011	Q1, 2015
Joint Review Panel hearing	Q1, 2011	Q2, 2011
Governor in Council (GIC) decision	NA	Q2, 2012
Commercial sanction	Q2, 2012	Q3, 2012
Procurement of major material and equipment	Q3, 2012	Q3, 2016
Kitimat Terminal construction	Q2, 2013	Q3, 2017[a]
Tunnel construction	Q2, 2013	Q4, 2016
Oil and condensate pipeline construction	Q4, 2013	Q4, 2016
Pump station construction	Q3, 2014	Q4, 2016
Leave-to-open and commissioning	Q3, 2016	Q4, 2016
Project in-service	NA	Q4, 2016[b]

NOTES:
[a] A limited number of tanks will see construction extend beyond the in-service date to Q3, 2017.
[b] Q4, 2016 is the earliest in-service date. In-service date will depend on various factors, including timing of the regulatory decision, timing of commercial sanction for the Project, detailed engineering and construction progress.

2.8 Project Cost Estimate

The estimated capital cost for the Project is $5.54 billion (Q4, 2009 Canadian dollars) plus allowance for funds used during construction (AFUDC, see Table 2-3). This estimate is based upon Enbridge and consultant construction experience over the past several years. The estimate differs from that contained in the Preliminary Information Package (PIP) because there have been:

- changes to the project scope
- adjustments to material and labour costs
- new findings from:
  - consultation with stakeholders and participating Aboriginal groups
  - engineering and environmental field studies

Table 2-3 Estimated Capital Cost for the Project

	Pipelines ($ millions)	**Pump Stations** ($ millions)	**Kitimat Terminal (Includes Tankage and Metering)** ($ millions)	**Total**[4] ($ millions)
Land[1]	47	1	4	52
Materials[2]	926	245	172	1,343
Construction	2,740	310	481	3,531
Project Execution	470	66	79	615
TOTAL	**4,183**	**622**	**736**	**6,650**[3]

NOTES:
[1] Land includes property taxes.
[2] Materials include provincial sales tax (PST) in British Columbia.
[3] This total includes and AFUDC amount of $1,109 million.
[4] Goods and services tax (GST) is excluded.

3 Project Need and Purpose

Energy delivery is Enbridge's core business. Enbridge routinely reviews the capacity of existing infrastructure to meet the take-away requirements of producing areas and the delivery requirements of markets. Enbridge's analysis determined the need for, and feasibility of, a new pipeline to provide access for WCSB production and oil sands production to new international markets. The Project was conceived to meet these needs (see Section 7 and Volume 2, Section 1.6).

Providing new pipeline transportation service to tidewater on the west coast will allow Canada to diversify its market for oil, providing increased competition and additional transportation options for producers by connecting Canadian supply to large, long-term and strategic markets in northeast Asia and elsewhere. Increasing the number of transportation options and markets for Canadian oil supply will lead to higher netbacks for all Canadian producers and encourage innovation in Canada's energy sector.

The Project will also include an import condensate pipeline. Historically, shortages of condensate supply have created risks and additional costs for Canadian oil sands producers. The NEB forecasts for future condensate requirements suggest that there may be future shortages of condensate import capacity. The Project's condensate pipeline is capable of meeting this forecast need.

4 Alternatives and Justification

Northern Gateway has considered alternatives to the Project, including alternative locations for the inland terminus and the marine terminal (see Figure 4-1).

For the conceptual alternatives considered, the general criteria used by Northern Gateway to evaluate the viability and relative benefits of the Project included:

- overall project life-cycle costs, including design, construction and operations
- acceptability to potential shippers of product receipt and delivery locations and tolls
- suitability for tankage
- suitability and safety for tanker berthing and manoeuvring
- constructability of the pipelines, associated facilities, tank and marine terminals, and associated infrastructure
- safety during construction and operations
- likelihood of the Project to affect sensitive environmental and socio-economic components

4.1 Eastern (Alberta) Pipeline Terminus Alternatives

Siting the eastern (Alberta) pipeline terminus was based primarily on:

- economic feasibility based on providing receipt of oil and delivery of condensate locations acceptable to potential shippers
- technical feasibility based on distance to tie-in facilities and availability of suitably zoned land

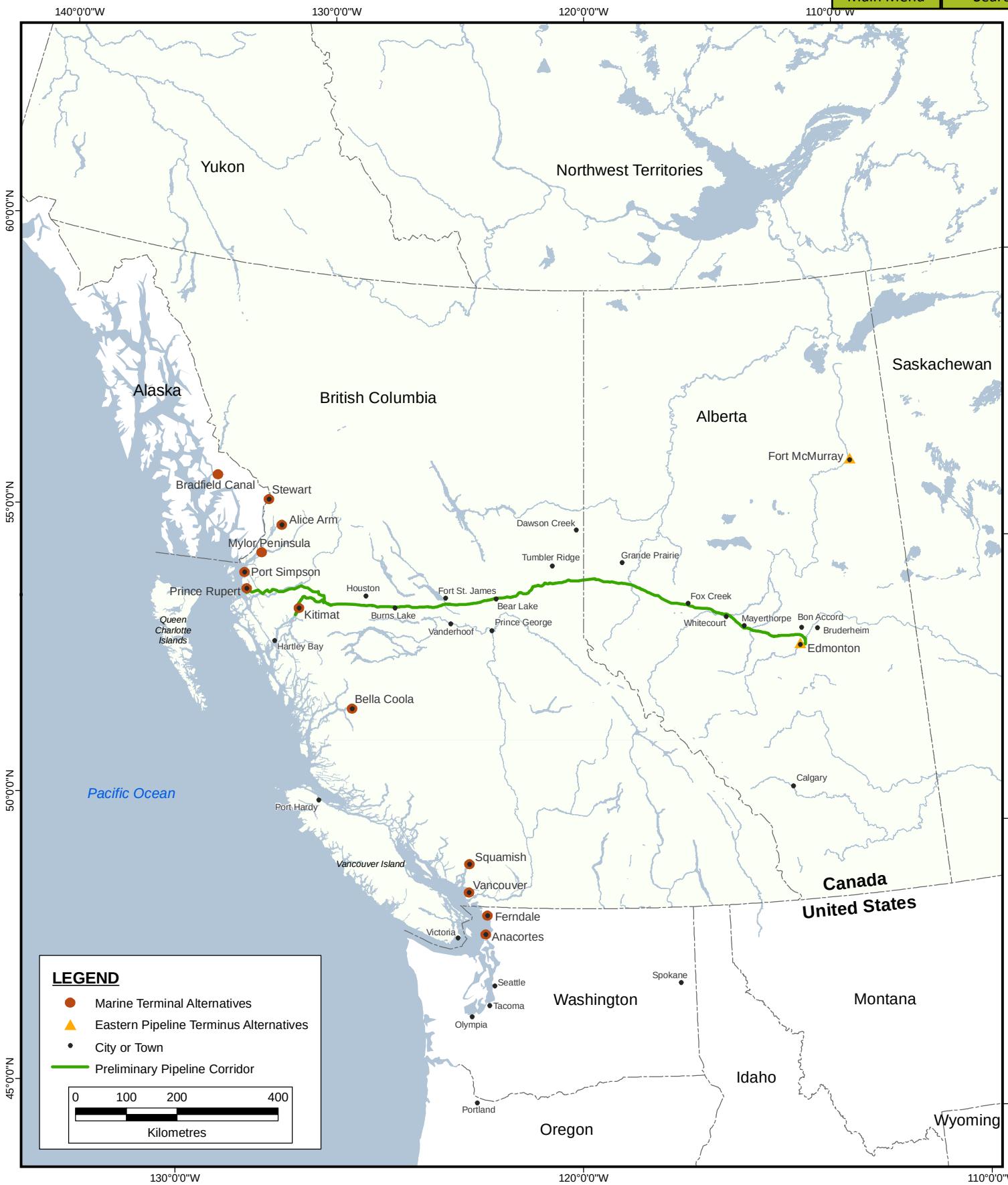
The technical, economic and environmental advantages of locating the oil and condensate pipelines in a single RoW also supported the selection of a single eastern pipeline terminus.

Enbridge initially considered the areas around Fort McMurray and Edmonton as possible termini for the oil pipeline, but market response clearly showed shipper preference for a terminus near the Edmonton hub. As well, the need for condensate delivery was centred on the blending terminals in the Edmonton and Hardisty areas.

Given this, Northern Gateway determined that an eastern pipeline terminus near Edmonton would be viable and the preferred alternative for meeting the needs of the Project.

4.2 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).



WorleyParsons resources & energy

REFERENCES
Projection: Lambert Conformal Conic (Central Meridian 120W, Standard Parallels 48N and 59N), Datum: NAD 83.
Pipeline Route: Preliminary Pipeline Corridor, digitized from scanned 500k scale maps, positional accuracy is +/-250m.
Cites, Towns, Other Settlements: IHS Inc., CGNDB (NRCAN); Hydrography: Geography Division, Statistics Canada, 2006 Boundary Files,92-160-XWE/F
Political Boundaries: © 2003. Government of Canada with permission from Natural Resources Canada

SCALE 1:10,000,000
DATE 01 Apr 2009

PREPARED FOR
ENBRIDGE NORTHERN GATEWAY PIPELINES

ENBRIDGE NORTHERN GATEWAY PROJECT

FIGURE ID 11-022-001
REVISION A

Alternatives Map

FIGURE NO. 4-1

Version: A
NGP_B-FIGMAP-L

4.2.1 Comparison of Marine Terminal Alternatives

During the 1970s, a working group was established by Fisheries and Oceans Canada (DFO) and Environment Canada to compare the relative vulnerability of 11 potential west coast ports to the effects of accidental oil releases.[3] Ports were compared based on navigational, biological, economic and social risk, and included 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 ranked as having the lowest relative risks, Northern Gateway eliminated Port Simpson and Port Angeles from further consideration based on the criteria noted in Section 4.2.3. Prince Rupert and Kitimat were further evaluated.

4.2.2 Evaluation of Prince Rupert and Kitimat Terminal Locations

Having determined that a marine terminal would be feasible at either Kitimat or Prince Rupert, Northern Gateway considered the feasibility of pipeline access to these potential termini. Pipeline route alternatives were considered from the Terrace, British Columbia area westward to Prince Rupert, and through various mountain passes south and east from Terrace southward to Kitimat. The evaluation focused on pipeline constructability, operability, safety, environmental sensitivity, mitigation measures and lifecycle costs.

The route to Prince Rupert is characterized by steep topography and narrow river valleys, which constrain large diameter pipeline construction and heighten operational issues. Pipelines constructed along these rivers would be exposed to challenging hydrotechnical issues, and to avalanches and rock slides in the narrow valleys. Access and watercourse crossing construction, particularly over the Kasiks, Khyex and Skeena Rivers, was anticipated to be difficult. The Skeena River, characterized by unstable channels and deep scour holes, is also too wide for directional drilling using current technology.

The Prince Rupert route was expected to result in a disproportionate number of moderate to serious environmental constraints and issues, compared with the Kitimat alternative. Challenging silt and erosion control requirements would result from varying water flows in high-value fish habitat, and potentially serious issues could result from exposure to avalanches and rockslides in the narrow valleys. Costs to mitigate the potential environmental effects were anticipated to be high.

The pipeline route southward to Kitimat through the Kitimat River valley would possibly encounter slide-prone marine clays and would likely require watercourse crossings in potentially boulder-prone material. However, this pipeline route alternative was determined to be viable and preferable.

Northern Gateway concluded that Kitimat was the preferred alternative for the marine terminal, based on environmental considerations and other matters resulting from the:

- high-level comparative analysis of marine terminal alternatives
- findings of the Port Working Group port comparison report
- findings of the pipeline route alternatives analysis

[3] The final report of the working group was "Potential Pacific Coast Oil Ports: A Comparative Environmental Risk Analysis" and was released in 1978.

4.2.3 Considerations in the Kitimat Terminal Siting

Important considerations in siting the Kitimat Terminal included:

- the need for year-round, ice-free access
- sufficient channel width and water depth and a suitable turning basin to permit safe transit by large tankers
- a tanker 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 limit environmental effects
- availability of suitable land to locate the tank and marine components of a terminal
- availability of nearby existing onshore and marine infrastructure

4.3 Alternative Means

Having determined that a pipeline route between an inland terminus located near Edmonton and a marine terminal located near Kitimat would be viable and the preferred alternative, Northern Gateway considered the alternative means of carrying out the Project. This analysis focused on siting and route alternatives for the terminals and pipeline route and other alternative design considerations (see Volume 3, Section 2).

5 Economic Feasibility and Justification

5.1 Economic Feasibility

Northern Gateway submits that the Project is economically feasible, based on the following:

- there is an existing and growing supply of oil and condensate to support the use of the pipelines
- potential shippers have made substantial financial commitments to support project development and activities leading to regulatory approval
- there are new and growing markets to absorb the volumes of oil and condensate to be transported
- the Project will generate important diversification, option and insurance values for the Canadian oil industry
- the Project will be financeable
- before construction, firm long-term shipping agreements with credit-worthy shippers will be in place

These considerations are discussed in detail in Volume 2.

5.1.1 Supply

Oil

Western Canadian oil supply growth is being driven by the production of Canada's massive oil sands reserves. The forecast supply rate is subject to continuous assessment and revision based on projected conditions, which include oil prices, financial markets and capital cost projections to develop oil sands projects. The projected growth in supply may vary between forecasts but there remains the underlying assumption that growth will continue in the Canadian oil sands.

Condensate

Regarding condensate supply, Northern Gateway relied on information concerning global condensate markets produced by Poten & Partners, who also have a supply outlook for various condensate streams. This allowed for an evaluation of whether the growth in these condensate supply sources could be available to markets in western Canada, with the conclusion that there was more than sufficient supply available to the Project when taking into consideration a combination of field condensates, ultra-light oil, plant condensates, return condensates and light virgin naphtha (LVN) supplies.

5.1.2 Contractual Arrangements

Northern Gateway has secured substantial commercial support for the Project, in the form of Funding Support Agreements (FSA), with a variety of producers and market interests. Northern Gateway's dealings with prospective shippers have been based on developing precedent agreements that will enable all parties to resolve uncertainties and issues before entering into long-term, firm shipping commitments.

Although the details of the Northern Gateway precedent agreements remain under discussion, the basic process to finalize firm transportation service agreements will include a number of steps, including:

- reviewing the terms and conditions of regulatory approval to confirm their commercial acceptability
- estimating more definitive costs to construct the Project, based on prevailing labour and materials costs at the time, and the conditions, if any, imposed by the NEB. This process will be a substantial undertaking, involving expenditures of $150 to $180 million, depending on the degree of cost certainty required at that stage.
- arranging construction financing

5.1.3 Markets

Oil

Exports from the oil pipeline will target the Asia-Pacific because of strong demand, proximity to Kitimat and the ability of those markets to process Canadian synthetic and diluted bitumen. There is the further potential for serving markets in the western United States, which would add to the benefits assessed for the Project.

Condensate

Supplies of domestic field condensates have remained relatively flat and are expected to decline throughout the forecast period. However, growth in bitumen production will require much more diluent for blending. In the past, condensate supply for blending has been supplemented with light oil, synthetic oil (cracked synthetic and synthetic naphtha) and imported volumes of natural gasoline. Although light oil and synthetic oil may continue to be used for blending, additional sources of condensate will be required to sustain the forecasted growth in bitumen production. The amount of import diluent required will be based on the economics between blending with import condensate or synthetic and the market need for these blends.

5.1.4 Financing

Northern Gateway will be the primary proponent of the Project. Opportunities for equity investment have been made available to shippers that have entered into an FSA. Northern Gateway is also offering economic opportunities, including equity investment, to Aboriginal groups.

Although financing arrangements have not been finalized, each proponent will be required to finance its ownership share of the development and construction costs of each pipeline using a combination of internally generated funds and project financing. As the proponents for each of the oil and condensate pipelines could be different, the decision to proceed to construct each pipeline will be made independently.

Northern Gateway is confident that the Project is financeable given:

- the existing and growing supply of, and markets for, oil and condensate
- the credit worthiness standards to be met by prospective shippers on the pipelines
- that, before construction, long-term firm shipping agreements will be in place

5.1.5 Justification

There is clearly supply for the Project, which is to be connected to large and growing markets. All Canadians will derive significant benefits from the economic development and market diversification achieved by the Project. These benefits are measurable in terms of Canadian economic and employment growth that results in large, long-term government revenue streams that are spread broadly across Canada. A summary of these benefits was provided in Section 1.3.

6 Regulatory Framework

6.1 Federal Regulatory Framework

The Project is subject to regulation by the NEB, which has jurisdiction over the construction and operations of international, interprovincial and offshore pipelines under the *NEB Act*. Northern Gateway will require various authorizations and approvals from the NEB, including a Certificate of Public Convenience and Necessity (CPCN) pursuant to Section 52 of the *NEB Act*.

The Project must also satisfy the requirements of the *Canadian Environmental Assessment Act (CEA Act)*. The *CEA Act* is administered by the CEA Agency and sets out uniform requirements for environmental assessments put forth by all federal government departments and agencies. Under the *CEA Act*, an environmental assessment must be carried out before a federal authority such as the NEB can issue a permit or license, or grant an approval to a project. Because more than 75 km of new RoW will be constructed, the Project is subject to a comprehensive study level of environmental assessment pursuant to the *Comprehensive Study List Regulations* under the *CEA Act.*

6.1.1 Regulatory History

On November 2, 2005, Northern Gateway submitted the Preliminary Information Package (PIP) to the NEB and CEA Agency. It was suggested that the Project be referred to a review panel and that the Minister of Environment enter into an agreement with the NEB to establish a JRP pursuant to subsection 40(2) of the *CEA Act*. With the JRP, the Project would be subject to a single set of environmental filing requirements and public hearing proceedings.

On September 29, 2006, the federal Minister of Environment announced that the Project had been referred to an independent JRP, as requested. The draft JRP agreement—establishing the mandate and authorities of the JRP, its composition and project review procedures—was issued and a 60-day comment period was established. The comment period was to expire on November 27, 2006.

By letter dated November 27, 2006, counsel to Northern Gateway advised the NEB and CEA Agency that, due to prioritization of projects, development activity for the Project would be slowing down. It was suggested that, in light of those developments, the environmental assessment process could be delayed.

On June 19, 2008, Northern Gateway advised the NEB and CEA Agency that it had resumed its environmental, regulatory, public consultation and Aboriginal engagement activities for the Project and requested finalization of the JRP agreement. A public comment period on the draft JRP agreement was held between February 9 and April 14, 2009 and a comment period of eight months for Aboriginal groups was established in November 2009. On December 4, 2009, the CEA Agency and the NEB issued the JRP agreement, including the Terms of Reference and Scope of Factors for the environmental and regulatory review of the proposed Project. The agreement also described the process to be followed for conducting the JRP. On January 20, 2010, CEAA and the NEB announced the establishment of a three-member JRP for the environmental and regulatory review of the proposed Project.

6.1.2 Other Federal Requirements

Table 6-1 identifies the permits and authorizations that may be required for the Project, in addition to the NEB approvals outlined in this Application.

Table 6-1 Potential Federal Permits, Approval and Notification Requirements

Federal Agency	Act/Regulation	Permit/ Authorization	Comments
National Energy Board	*National Energy Board Act*	Section 33: Detailed Route Approval	Involves approval of the detailed route for the pipelines following the filing of plans, profiles and books of reference
		Section 47: Leave to Open Pipeline	Must be obtained before opening the pipelines after showing the pipelines are safe for operation and that other pre-operation conditions of the CPCN are met
		Section 108: Leave for construction on, along, or under a utility	This is for the same purpose as a permit under s. 5(1) of the *Navigable Waters Protection Act*
Fisheries and Oceans Canada	*Fisheries Act*	Section 32: Authorizes destruction of fish by means other than fishing.	Necessary if fish will be destroyed during construction.
		Section 35(2): Issues authorizations for harmful alteration, disruption or destruction ("HADD") of fish habitat	Necessary if construction will create "HADD"
Department of Indian and Northern Affairs	*Indian Act*	Section 28: Approval to cross an Indian Reserve	Necessary if crossing reserve lands
Transport Canada	*Navigable Waters Protection Act*	Section 5(1): Issues permits for structures on, over, under, through or across water	Required for the marine terminal and certain river crossings

Table 6-1 Potential Federal Permits, Approval and Notification Requirements (cont'd)

Federal Agency	Act/Regulation	Permit/ Authorization	Comments
Environment Canada	*Canadian Environmental Assessment Act*	Section 5: Environmental Assessment required before a project is permitted.	Triggered by a number of federal authorizations referred to in this table
	Canadian Environmental Protection Act (CEPA), 1999; Disposal at Sea Regulations; Regulations Respecting Applications for Permits for Disposal at Sea	Section 127: Permit for Disposal at Sea	If dredging or marine disposal is required for construction or maintenance of the Kitimat Terminal, a permit for disposal at sea is required under *CEPA*, 1999, Part 7, Division 3
Natural Resources Canada	*Explosives Act*	Section 6-7: Explosives Transportation Permit and Magazine Licence (for storage during construction)	Necessary for any storage place of explosives in amounts that exceed the regulations. If a factory is required to make explosives near the site, additional permits may be required. Also, additional permits may be required, depending on the type of explosives (e.g., an Ammonium Nitrate Fuel Oil Permission) and whether they are blended.

6.1.3 TERMPOL Review Process

Shipping in Canadian waters is subject to regulation under a variety of statutes, such as the *Canada Shipping Act*, as well as various international conventions. Liquid terminals such as the Kitimat Terminal are also subject to review under Transport Canada Marine Safety's (TCMS's) TERMPOL Review Process (TRP). TERMPOL stands for "Technical Review Process of Marine Terminal Systems and Transhipment Sites". Its purpose is to "objectively appraise operational ship safety, route safety, management and environmental concerns associated with the location, construction and subsequent operation of a marine terminal system for the bulk handling of oil, chemicals, liquefied gases or other cargoes" (Transport Canada 2001, Internet site). The TRP is voluntary and not a regulatory requirement.

Northern Gateway informed Transport Canada in March 2009 of its intent to complete detailed TERMPOL studies in support of the Project. The official TERMPOL Review Committee (TRC) was established and Transport Canada held an introductory meeting in May 2009. The majority of the TERMPOL studies and reports were submitted to the TRC in January 2010.

Further details about this process and the various studies that Northern Gateway will be completing in support of the TRP are provided in Volume 8A.

6.2 Provincial Regulatory Framework

6.2.1 Provincial Environmental Assessment Requirements

Because the Project is federally regulated, it does not trigger the provincial environmental assessment processes in Alberta and British Columbia. The provinces may participate in the federal environmental assessment or regulatory processes in an advisory capacity or as an active participant.

6.2.2 Provincial Permitting Requirements

A number of authorizations for ancillary project activities will be sought under provincial legislation following approval from the NEB. See Volume 7A for more information on provincial permitting requirements.

6.3 Precautionary Principle

The Scope of Factors to be Considered by the JRP for the Project refers to the Precautionary Principle as follows:

"Another purpose of the Act is to ensure that projects are considered in a careful and precautionary manner before authorities take action in connection with them, and to ensure that such projects do not cause significant adverse environmental effects. While there is no universally agreed upon definition of the "precautionary approach" or the "precautionary principle," Principle 15 of the 1992 Rio Declaration on Environment and Development states that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." The proponent shall clearly demonstrate how it has applied such an approach and in what circumstances. In doing so, the proponent shall consider the guiding principles set out in the Government of Canada's Framework for the Application of Precaution in Science-based Decision Making About Risk (2003)." [4]

The following provides a discussion of how Northern Gateway has taken the precautionary principle into consideration in the ESA.

6.3.1 Overview

Canada's risk framework includes several key principles relevant to the environmental assessment process, including:

- sound science is the basis for implementing the precautionary principle
- follow-up and monitoring activities are a key element where there is uncertainty

[4] Available online at: http://www.pco-bcp.gc.ca/docs/information/publications/precaution/Precaution-eng.pdf

- high degree of transparency, clear accountability and meaningful public involvement are appropriate
- precautionary measures should be proportional to the potential severity of the risk
- precautionary measures should be cost-effective, with the goal of generating:
    - an overall net benefit for society at least cost
    - efficiency in the choice of measures

The environmental assessment approach used for the Project is based on this precautionary approach and incorporates all of these key principles. Key aspects of the ESA approach include:

- the environmental assessment methods
- scope of the Project and project details
- quantifying and assessing project and cumulative effects
- considering mitigation and environmental protection measures
- follow-up and monitoring
- assessing accidents and malfunctions
- precautionary measures proportional to the potential severity of the risk

6.3.2 Environmental Assessment Methods

The environmental assessment methods for all biophysical and human environment disciplines includes approaches that result in a conservative assessment of environmental effects (i.e., tends to overestimate the potential effect). The method is based on the following principles:

- The assessment is based on sound science. Scientists from a wide range of biophysical and social sciences contributed to the analysis of existing data, developing a comprehensive program of field studies between 2005 and 2009 to collect new information where it was absent, and analyzing the results using methods that met or exceeded industry standards.
- The assessment is transparent, with meaningful public involvement. A broad range of opportunities has been provided to Aboriginal organizations and the public to be informed about the Project and to provide input on their concerns.
- The assessment is based on a precautionary approach and overestimates (i.e., it is conservative) potential effects as follows:
    - the geographic scope for the assessment is larger than the area affected by the Project. Thus, the assessment includes not only the physical footprint of the project (referred to in Volumes 6 through 8 as the project development area [PDA]), but the much larger project effects assessment area (PEAA) where additional environmental effects are likely. For the pipelines, the PDA includes the maximum cleared area for the pipeline RoW during construction. The PEAA is 1-km wide and includes the RoW. For some disciplines, the PEAA is even larger. For the Kitimat Terminal, the PDA includes the fenced area (220 ha) for the terminal infrastructure and an areas of land north and south of the terminal infrastructure (258 ha).

- the geographic scope of the regional effects assessment area (REAA) that is used in assessing cumulative effects is based on the area in which the effects of the Project may interact with similar effects from other projects and human activities. These areas are often very large and reflect meaningful ecological units (e.g., watersheds).Where a range of possible values could describe a project activity or effect, the value with the greatest environmental effect is used in the assessment, unless there is a compelling rationale for not doing so.
- the duration of an effect is defined as the time required for the valued environmental component (VEC) to return to a condition similar to that which existed before the Project, not just the duration of the project activity or activities that contributed to the effect. As a result, the predicted duration of the effect is conservative in favour of the VEC and takes into consideration the capacity of the VEC to recover.

For each effect, the assessment includes a statement on the confidence in the conclusions about the predicted effect and the effectiveness of the mitigation. Follow-up and monitoring programs are described whenever confidence is low in the prediction of the effect or the effectiveness of mitigation. These programs will monitor the effect and mitigation success, a key element of the precautionary approach.

6.3.3 Scope of the Project and Project Details

The scope of the Project for the ESA includes all the components and infrastructure associated with construction and operations. In addition to the main components of the Project, the scope of the Project includes aspects such as:

- clearing and use of the powerline easements
- clearing of new road access and expansion of existing road access
- traffic and personnel associated with the project and movements to and from the project site
- construction vessel and barges
- marine transportation

The project description for the ESA also includes the confirmed project details, as well as a number of assumptions about the design, construction and operation of the Project. For these assumptions, the ESA consistently used the highest values for a project component or activity in terms of its effect on the surrounding environment and duration. In the case of discharges or emissions, estimated maximum values are used in modelling.

6.3.4 Quantifying and Assessing Project and Cumulative Effects

In quantifying and assessing environmental effects of the Project and cumulative effects, the assessment is generally based on conservative assumptions to take into account the most severe type of effect that is reasonably possible (i.e., the effect assessed would affect the largest area for the longest duration).

Examples of this approach include:

- the air quality assessment used conservative assumptions for modelling air emissions from the project activities around the Kitimat Terminal:
  - the sulphur content of fuel used by tankers will be 2.7%, even though sulphur levels are expected to be lower when the Kitimat Terminal becomes operational
  - large booster pumps that consume more fuel will be used, and the pumps would operate for 24 hours (compared with the 15 hours that would be expected based on tanker volumes)
  - two tankers will operate simultaneously at the terminal, even though this will rarely occur
- the wildlife assessment assumes that all construction will occur during the most sensitive periods for woodland caribou, even though this is highly unlikely
- the noise assessment assumes multiple pumps would be operating simultaneously to pump condensate (i.e., louder noise levels) even though this is unlikely
- the marine assessment assumes a 1,000-m long strip of marine riparian habitat that is 20-m to 30-m wide would be cleared along the foreshore, even though less than this is expected to be disturbed
- underwater acoustic analyses assume that a tanker will always operate with two propellor-driven escort tugs. Audible noise thresholds for marine mammals are also conservative (i.e., all animals will hear a wide range of noise frequencies). It is also assumed that a whale exposed to this noise is stationary and therefore exposed for a longer period, even though animals would likely move away.
- in the socio-economic assessment, the project benefits contained in the engineering information and the subsequent input-output (I/O) model for economic simulations (GDP, employment and income) tend to be conservative and lower than what is likely to be achieved by the Project. Past experience and socio-economic monitoring results have shown that, with effective mitigation and management, greater economic benefits can be achieved than the estimates provided in the socio-economic assessment. At the same time, the socio-economic analysis tends to overstate potential adverse social effects, even with identified mitigation measures that have proven to be effective in reducing the adverse effects from projects of a similar nature and magnitude.

In addition to these assumptions for project effects, it was typically assumed that effects would occur during periods when the species or species group is most sensitive to an effect (i.e., during peak reproductive periods, moulting period for birds and late-winter period for ungulates when energy stress is greatest). As a result, the assessment tends to overestimate project and cumulative effects.

6.3.5 Consideration of Mitigation and Environmental Protection Measures

One element of the precautionary principle is to use the best technology available when the potential for harm is uncertain. The design of the Project included a wide range of features that use the best available technology economically achievable (BATEA). Similarly, many mitigation measures are incorporated into the Construction Environmental Protection and Management Plan (EPMP) (see Volume 7A), based on BATEA.

A wide range of additional mitigation and environmental protection measures are also included in discipline-specific assessments. Although the application of mitigation measures is considered reasonable, caution is exercised in estimating how effective the measures would be in limiting the geographic scope and duration of an effect (i.e., a precautionary approach to evaluating mitigation effectiveness).

6.3.6 Follow-up and Monitoring

If there was a low level of confidence in the prediction of an effect or the effectiveness of mitigation to address the effect, a follow-up program is required to monitor the effect or the success of the mitigation. Such programs are described for effects on many VECs. Where follow-up is required, Northern Gateway has committed to using an adaptive management approach, where additional mitigation would be used if effects were greater than expected, or if mitigation results were not as planned.

So that monitoring is effective, Northern Gateway has partnered with other organizations, where appropriate. For example, to monitor effects of development on caribou, Northern Gateway has joined an alliance with government, industrial developers, a university and a First Nation. Such public–private partnerships can be effective ways of pooling resources, collaborating on issues of common concern and fostering environmental stewardship.

6.3.7 Assessment of Accidents and Malfunctions

The assessment of accidents and malfunctions for the pipelines, project-related marine transportation in the CCAA and project-related marine transportation in the open water area (OWA) use the following assumptions, for a conservative assessment:

- the assessment is based on sound science, including use of recent oceanographic and meteorological data in modelling how hydrocarbons behave in the marine environment, and laboratory analyses of hydrocarbon weathering and dispersion
- the quantities of hydrocarbons entering the environment as a result of a leak or break in one of the pipelines is assumed to be a maximum credible volume of oil (based on reasonable calculations from the pipeline design) into the environment for each hypothetical spill size example. Consideration for burial of the pipeline and associated containment are not included in the assessment of effects.
- at the marine terminal, the examples that are modelled for diluted bitumen and synthetic oil assume that no containment boom would be in place at the marine terminal during loading (even though a commitment has been made to always employ a boom during loading of oil). The models, therefore, overestimate the amount of oil that might be released.
- the quantitative risk analysis (QRA) and the examples for the CCAA and the OWA assume a maximum credible amount of spilled oil, based on probabilities, historical data and tanker design. Analyses for each example does not assume a containment boom or oil removal. As a result, the predicted quantities and distribution of hydrocarbons represent a conservative estimate.
- assessment of environmental effects assume that a spill would occur at the most sensitive time of year for a species (i.e., during a fish migration or spawning period and during moulting for birds)

6.3.8 Precautionary Measures Proportional to the Potential Severity of the Risk

The ESA approach focuses on the environmental effects that could potentially have the most severe effects on the biophysical and human environments. From 2005 to 2009, the study team has provided ongoing input to the engineering team, to identify priority environmental sensitivities and to modify the project design accordingly. Examples of modifications include:

- rerouting earlier versions of the pipeline RoW (the current pipeline route is Route R) to limit effects on fish habitat, woodland caribou habitat, avian habitat, specialized vegetation features and culturally important features, while taking into account hazards to pipeline integrity such as existing landslides, rockfalls and rock toppling failures, debris flows, avalanche paths, acid rock drainage and metal leaching, seismic issues and marine clays
- selecting the marine terminal site to avoid areas (e.g., Bish Cove) that were deemed to be more environmentally sensitive than the current site
- incorporating numerous measures to improve navigational safety
- modifying tanker operations in the CCAA to limit the risk of tankers striking marine mammals (especially humpback whales) and potential underwater noise effects on whales. Modifications to earlier tanker operations include:
    - tankers will travel at a maximum speed of 10 to 12 knots in straight channel areas such as Principe Channel and Douglas Channel
    - in more confined areas, such as Wright Sound and Squally Channel, where whales are most likely to be encountered, tankers will travel at a maximum speed of 8 to 10 knots
    - tankers will follow designated marine transportation routes during inbound and outbound transits of the CCAA. These will include alternate routes within the core humpback whale area
    - in the core humpback whale area, a whale spotting vessel is proposed to identify whales along the designated Northern and Southern Approaches

6.3.9 Conclusion

As described previously, the assessment of project effects and cumulative effects is based on sound science and is highly conservative (i.e., assuming the most conservative assumptions for the VECs when quantifying effects and determining their significance). Where doubt exists about the prediction of effects or the effectiveness of mitigation, follow-up programs are defined, which are intended to confirm the prediction of effects or the success of mitigation. The assessment (Volumes 6 through 8) represents a precautionary approach, as recommended in the JRP guidelines.

6.4 References

6.4.1 Internet Site

Transport Canada. 2001. *Part 1: Application and Intent TERMPOL Review Process – TP 743 E*. Accessed 2008. Available at: http://www.tc.gc.ca/marinesafety/tp/tp743/part1.htm#_toc502543566

7 Notification of Commercial Third Parties

7.1 Introduction

As early as 2002, Enbridge recognized the need for additional pipeline capacity to access new markets to meet the needs for the long-term growth of new oil sands production and provide Canadian producers with access to alternative markets. The Project was formally launched in early 2004 and was followed by open season processes for the oil and condensate pipelines.

7.2 Open Season and Funding Support Process

Following the formal launch of the Project, open season processes began for the oil and condensate pipelines, with advertisements in local, regional, national and international news publications and company press releases. The purpose of the open season process was to determine which companies were interested in obtaining service on the pipelines and to determine their capacity requirement.

Following the open season processes, it became clear that regulatory uncertainty was an issue to prospective shippers, and a barrier to securing shipping commitments. At the same time, the cost of resolving the regulatory uncertainty associated with a greenfield project to the West Coast was a significant obstacle for Enbridge, as the sole project sponsor. Northern Gateway ultimately concluded that obtaining regulatory approval for the Project was necessary, before prospective shippers would be able to enter into long-term shipping commitments and that additional financial support for project development was also required. Beginning in early 2007 and ending in early 2008, Northern Gateway approached prospective shippers that had been identified through the open-season processes, along with others subsequently identified, to determine if they would provide financial support to partially fund Northern Gateway's predevelopment activities.

Over twelve months, commitments were obtained from Canadian oil producers and Asian market interests with initial committed contributions totalling $100 million, which—when combined with the commitment by Enbridge—means that approximately one quarter of a billion dollars will have been invested in project development, before and during the regulatory process alone. This is a substantial demonstration of market support and commercial viability.

Northern Gateway intends to secure binding transportation service commitments following the conclusion of the regulatory process and subsequent completion of more definitive cost estimates and toll projections. This might include a follow-up open season for uncommitted firm capacity having regard for the need to reserve 5% of capacity for short-term uncommitted shippers. For further details of the commercial arrangements for the Project, see Volume 2.

7.3 Toll Principles

Northern Gateway has worked with prospective shippers to develop the toll principles that will apply to the Project. The design of the toll principles was guided by the following:

- Access to transportation service on each pipeline will be made available to those shippers who have executed a transportation service agreement (TSA), provided that the reserve volume and any excess capacity will be made available for non-term volumes.
- All committed shippers will be required to meet the financial assurances requirements.
- Just and reasonable tolls will be established for each pipeline on a cost of service basis. Tolls will comply with applicable regulatory requirements with those shippers holding the funding support units paying different tolls, for any volume up to and including the funding support option amount, than other term shippers as consideration for their early financial support for the Project.
- Tolls for each pipeline must recover the operating costs of the pipeline, the debt servicing costs, taxes (on a normalized basis) and the return of capital. Tolls must also provide for a reasonable return on equity.

Volume 2 provides further details on tolls, toll principles and tariffs.

8 Land Requirements and Land Rights and Acquisitions

8.1 Lands Required

To construct, operate and maintain the pipelines, facilities and associated infrastructure for the Project, surface rights must be acquired from the Crown and private landowners in British Columbia and Alberta. The estimated land areas required for the Project are listed in Table 8-1.

Table 8-1 Estimated Land Area Required for the Project

Project Component	Estimated Area (ha)
Permanent RoW for pipelines	2,921
RoW temporary workspace	2,886
Extra temporary workspace	581
Pump stations and the area within the security fence at the Kitimat Terminal	254
Infrastructure (access roads, construction camps and powerline easements)	1,634
TOTAL	8,276

8.1.1 Right-of-Way

Permanent Right-of-Way

The width of the permanent RoW required for the oil and condensate pipelines will be 25 m in most locations.

Temporary Workspace

In addition to the anticipated 25 m of permanent RoW, 25 m of temporary workspace will be required during construction. The total width of the RoW required during construction will generally be 50 m and is generally referred to as the construction RoW.

Extra Temporary Workspace

In addition, extra temporary workspace is frequently required at specific locations to provide workspace for:

- watercourse crossings
- highway, road and utility crossings
- grading along sloping terrain
- timber storage
- other special circumstances

The specific locations for extra temporary workspace will be determined during detailed engineering design and construction planning. The width of the extra temporary workspace at each location will depend on the site-specific needs, but might range from 5 to 20 m on either side of the construction work area. Experience has shown that, over the length of a pipeline construction project, the cumulative total of extra temporary workspace is 10% of the total RoW required during construction.

8.1.2 Pump Stations and Tank Terminal

The estimated area required for the pump stations and tank terminal is listed in Table 8-2.

Table 8-2 Area Required for Pump Stations and Tank Terminal

Location	Project Component	Estimated Area (ha)
Bruderheim, AB	Oil initiating station	2
Whitecourt, AB	Oil/condensate pump station	4
Smoky River, AB	Oil/condensate pump station	4
Tumbler Ridge, BC	Oil/condensate pump station	4
Bear Lake, BC	Oil/condensate pump station	4
Fort St. James, BC	Oil/condensate pump station	4
Burns Lake, BC	Oil/condensate pump station	4
Houston, BC	Condensate pump station	4
Clearwater, BC	Condensate pump station	4
Kitimat, BC	Condensate initiating station and tank terminal	220
	TOTAL	254

8.1.3 Construction Infrastructure

Land is required for permanent and temporary construction infrastructure, including construction camps, access roads, powerline easements and stockpile sites. The specific requirements for such lands will be finalized during detailed engineering design and construction planning. The estimated requirements for construction infrastructure are listed in Table 8-3.

Table 8-3 Land Requirements for Construction Infrastructure

Construction Infrastructure	Area (ha)
Construction camps	290
Access roads	51
Powerline easements	751
Stockpile sites	542
Total	1,634

8.1.4 Tank Terminal

The tank and marine terminal area will be approximately 220 ha, and will extend to the upper edge of the marine riparian zone. There will be a security fence around the land portion of the tank terminal but none along the foreshore area. A 60-m wide area within the 220 ha will be cleared around the outside perimeter of all major infrastructure, as a firebreak within the security fence.

8.2 Land Rights and Acquisitions

Approximately 516 km of the RoW will be in Alberta, with about half on Crown land and half on private land. Approximately 656 km of the RoW will be in British Columbia, of which more than 90% will be on Crown land.

The pump stations and infrastructure will likely be on Crown lands, but consideration will be given to locating some facilities on private lands and on reserve lands, if requested.

Northern Gateway will seek all necessary land rights and approvals by negotiating for:

- easement or statutory RoW agreements
- temporary workspace agreements
- access agreements
- fee simple purchase agreements

Based on the current pipeline routing, the number of private landowners is about 224 in Alberta and 41 in British Columbia, with 65 tenants in Alberta and two in British Columbia.

Where the pipelines cross Crown land in Alberta, Northern Gateway will seek a Crown Pipeline Agreement (PLA). Where the pipelines cross Crown land in British Columbia, Northern Gateway will seek an interim licence of occupation leading to a statutory RoW agreement. Land tenure in respect of Crown lands at the Kitimat Terminal will be acquired under a similar process, although the form of tenure agreement sought will likely be a long-term lease or purchase.

8.2.1 Landowner Consultation Process

Northern Gateway is committed to timely and meaningful dialogue with landowners. To date, landowners have been provided project information and updates, and the opportunity to participate in open houses and other initiatives, as part of the public consultation program (see Volume 4 for further details). Personal consultation with potentially directly affected landowners has been undertaken to obtain survey consent.

Moving forward, Northern Gateway will institute active consultation involving the direct and personal engagement of landowners and occupants within the 1-km corridor, where practicable. This continuing consultation activity will fulfill Northern Gateway's ongoing commitment to provide landowners with clear, relevant and timely information that is responsive to their needs, inputs and concerns.

It is anticipated that, to the extent practical, direct and personal engagement with potentially directly affected landowners and occupants within the 1-km corridor will be completed before the public hearing begins.

8.2.2 Section 87 Notice

Notices will be served according to Section 87(1) of the *NEB Act*, describing the lands required, compensation offered and other details pursuant to the *NEB Act*. Along with this notice, landowners will receive a copy of the NEB's Pipeline Regulation in Canada: A Guide for Landowners and the Public.

Samples of Section 87(1) notice for Alberta and British Columbia are included in Appendix A. A detailed project route map will accompany these notices.

8.2.3 Surface Rights Acquisition Process

Acquisition of surface rights will comply with the provisions and regulations of the NEB, including Section 87 of the *NEB Act*. Disagreements over compensation payments, if not settled through negotiation, will be resolved according to the negotiation or arbitration procedures set out in the *NEB Act.* In addition, the surface rights acquisition agreements with Northern Gateway will adhere to Section 86(2) of the *NEB Act*.

To date, no notices pursuant to Section 87(1) of the *NEB Act* have been served.

Surface rights acquisition process will begin with the negotiation of surface rights agreements following the Project's approval.

Once a CPCN has been issued by the NEB, Northern Gateway will prepare and submit to the NEB a Plan, Profile and Book of Reference for the Project. Also, notices will be served pursuant to Section 34(1) of the *NEB Act* in respect of rights of way to be acquired.

8.2.4 Surface Rights Acquisition Agreements

Samples of the following surface rights acquisition and use agreements are provided as appendices:

- Agreement for Easement, Alberta (Appendix B)
- *Land Title Act* Form C and Statutory Right of Way Agreement, British Columbia (Appendix C)
- Agreement for Temporary Working Space, Alberta (Appendix D)
- Agreement for Temporary Working Space, British Columbia (Appendix E)
- Option to Purchase Agreements for Alberta and British Columbia (Appendix F)

9 Enbridge Management Policies

Enbridge's existing policies and management framework will be adopted and applied, as appropriate, by Northern Gateway throughout the planning, permitting, construction and operations of the Project. Enbridge's corporate policies and management framework apply to all of its business units and serve to guide the development of more specific policies and supporting framework elements at each successive business unit level.

9.1 Corporate Social Responsibility

An important component of Enbridge's management framework and corporate culture is the company's Corporate Social Responsibility (CSR) Policy (Appendix G), adopted in 2004. Enbridge defines corporate responsibility as:

- conducting business in a socially responsible and ethical manner
- protecting the environment and the safety of people
- supporting human rights
- engaging, learning from, respecting and supporting the communities and cultures in which Enbridge works

The policy is built on:

- business ethics and transparency
- environment, health and safety
- stakeholder relations
- employee relations
- human rights
- community investment

Enbridge produces an annual publication, which reports on the company's economic, environmental and social performance (Enbridge 2010, Internet site).

9.2 Corporate Values

Enbridge's corporate values dictate how the company makes decisions regardless of the business climate, and marks the foundation for how it conducts business. The five components of Enbridge's value statement are:

- integrity
- accountability
- innovation and flexibility
- value creation
- social responsibility

The corporate values statement is included as Appendix H.

9.3 Business Conduct

Enbridge's *Statement on Business Conduct* (2008) (Appendix I) emphasizes the company's commitment to specific standards of conduct expected of each of its directors, officers, employees, consultants and contractors in all of the countries where Enbridge does business. These standards of conduct relate to:

- employee relations
- health, safety and environment
- human rights
- corporate property
- reporting of financial transactions
- conflicts of interest
- international operations
- competition and anti-trust legislation
- consultants and contractors
- compliance with, and enforcement of, company policies

Enbridge's *Statement on Business Conduct* will provide a normative framework for business decision-making for all aspects of the Project.

9.4 Enbridge and Aboriginal Groups

With operations throughout North America, Enbridge has an *Aboriginal and Native American Policy* to guide the nature and scope of its relationships with Aboriginal groups and Native American peoples. The goal of the policy is to help achieve mutually beneficial relations with Aboriginal and Native American communities in proximity to, or affected in some important way, by Enbridge's operations. The policy will help to provide a consistent and thorough approach during consultation and engagement with participating Aboriginal groups.

Enbridge's policy describes key principles for Aboriginal relations, such as respect for traditional ways and land, heritage sites, the environment, and traditional knowledge. As part of its engagement strategy, Enbridge strives to create opportunities that are aligned with the Aboriginal or Native American community's aspirations. This may lead to partnerships and sponsorship of educational and training programs, employment-opportunities initiatives, procurement and business development initiatives and other capacity-building efforts.

Northern Gateway has adopted Enbridge Inc.'s Aboriginal and Native American Policy (see Appendix J) with minor changes to reflect operation in an exclusively Canadian environment. Northern Gateway has been engaged with participating Aboriginal groups near the anticipated area of project activities for several years, and will continue to follow this policy throughout the Project's lifecycle. For further information about Aboriginal engagement, see Volume 5A.

9.5 Environmental Policy

Enbridge is committed to environmental protection as part of its long-term success:

- Enbridge will support environmental protection through continued careful planning, strict construction standards and ongoing careful monitoring of company activities.
- Rules and procedures for environmental protection will meet or exceed government regulations and standards.
- Enbridge will provide training so that employees understand their responsibility to protect the environment.
- Employees and contractors must follow environmental rules and procedures, and must carry out work in an environmentally responsible manner at all times.
- Enbridge will provide the public and government with relevant information regarding planned activities and will actively respond to their concerns.
- Environmental damage resulting from Enbridge's actions or actions of Enbridge contractors will be remediated as quickly as possible.
- Environmental research will be encouraged, supported and undertaken to continually improve environmental protection and restoration procedures.

A copy of Enbridge's Environmental, Health and Safety Policy is in Appendix K.

9.6 Health and Safety Policy

The objective of Enbridge's Health and Safety Policy is to provide a safe work environment, identify and control health and safety hazards and promote the safety of all company employees and contractor personnel. The policy influences all work plans and activities, including selection of resources, design and operation of work systems, and delivery of products and services. The policy is displayed prominently throughout the company and is periodically reviewed and updated to reflect changing conditions and information.

A copy of Enbridge's Health and Safety Policy is in Appendix K.

9.7 Operations and Maintenance Procedures

To facilitate safe and effective operation of the Project, Enbridge has developed operations and maintenance procedures (OMPs). The OMPs include all key standards and procedures that Enbridge personnel must adhere to during operations. Topics covered include training, emergency preparedness, security, environmental protection, incident reporting, public awareness, repair and modifications, RoW maintenance, tank maintenance and pipeline integrity.

The OMPs are on file with the NEB and will be amended, as applicable, to reflect project-specific considerations.

9.8 References

9.8.1 Internet Site

Enbridge Inc. 2010. *Corporate Social Responsibility*. Available at: http://www.enbridge.com/corporate/

10 Structure of the Application

10.1 Volume 1 – Overview and General Information

Volume 1 is a general overview of the Project. It contains the following general project information and common information needs as described in the NEB Filing Manual and the JRP Agreement, Terms of Reference and Scope of Factors (see Appendix M):

- an overview of the Project, including project need and benefits
- a basic project description, schedule and cost estimate
- a discussion of the alternatives and justification for the Project
- regulatory framework
- commercial information
- a discussion of lands and land rights
- a review of Enbridge and Northern Gateway management policies
- structure of the application
- executive summaries for all remaining volumes of the application

10.2 Volume 2 – Economics, Commercial and Financing

Volume 2 provides information on the oil supply available from the WCSB and the markets that could be served by the Project. It examines the potential condensate supply available for delivery to Kitimat to serve WCSB requirements.

Volume 2 outlines the net benefits to the Canadian energy industry and the benefits flowing to all Canadians.

Commercial considerations are also discussed, including the commercial support for the Project and toll principles. The proposed tolls for the two pipelines have been designed to recover the costs of developing, constructing and operating the pipelines and related facilities.

10.3 Volume 3 – Engineering, Construction and Operations

Volume 3 provides details on the conceptual design, construction and operations of the pipelines, the Kitimat Terminal and the Project's associated facilities. Alternatives for siting the endpoints of the pipelines, the pipeline route, the pump stations and the Kitimat Terminal, including criteria to establish them, are also described.

The Project will be designed, constructed and operated according to applicable industry regulations and the applicable codes and standards that these regulations reference. This includes the latest NEB regulatory requirements, such as the Onshore Pipeline Regulations 1999, which incorporate, by reference, the Canadian Standards Association (CSA) Z662-07, Oil and Gas Pipeline Systems, as well as Enbridge's design standards.

10.4 Volume 4 – Public Consultation

Northern Gateway has developed a comprehensive public consultation program. The goal of the public consultation program is to provide transparent information regarding the Project to all stakeholders and to address concerns. Volume 4 includes details of all public consultation efforts beginning in 2002. Some of the consultations undertaken to date are complete, whereas others are continuing, with ongoing refinement as the Project evolves. Feedback received so far has resulted in changes to the project design as well as the scope of the environmental assessment and the types and location of the biophysical and social science studies. Such refinements will continue as the Project progresses.

10.5 Volume 5A – Aboriginal Engagement

Volume 5A provides details on the Aboriginal engagement program for the Project and contains details on activities and communications between Northern Gateway and Aboriginal groups from early 2002. Engagement refers broadly to all of Northern Gateway's contacts, communications and other consultation efforts with Aboriginal groups and organizations.

The goal of the Aboriginal engagement program is to build and maintain effective working relationships with Aboriginal groups that might be affected by the Project, by providing transparent and timely information and addressing concerns. The intent is that information obtained through the program will be used to guide the planning and implementation of the Project, by taking Aboriginal interests into account. The program will remain ongoing throughout the Project's regulatory, construction and operations phases.

10.6 Volume 5B – Aboriginal Traditional Knowledge

Volume 5B describes the Aboriginal traditional knowledge (ATK) program for the Project, which has been undertaken to support the environmental and socio-economic assessment (ESA) and project planning and design. The volume introduces the ATK engagement program, including the objectives, how ATK is used in the ESA, the method for and status of ATK work and a summary of the key findings from work completed to date.

10.7 Volume 6A – Environmental and Socio-Economic Assessment (ESA) – Pipelines and Tank Terminal

Volume 6A comprises the detailed assessments of the effects of the routine activities of the pipelines, associated infrastructure and tank terminal on:

- atmospheric environment
- acoustic environment
- soils
- terrain
- vegetation
- wildlife
- surface water resources
- freshwater fish and fish habitat

- hydrogeology
- palaeontology
- effects of the environment on the pipelines and tank terminal

Project design and mitigation measures are considered, and cumulative effects are assessed, where necessary.

10.8 Volume 6B – Environmental and Socio-Economic Assessment (ESA) – Marine Terminal

Volume 6B provides a detailed assessment of the effects of routine activities at the marine terminal and activities within the marine safety zones around the berths on:

- marine sediment and water quality
- marine vegetation
- marine benthic invertebrates
- marine fish and fish habitat
- marine mammals
- marine birds
- marine fisheries, including commercial, commercial recreational, recreational and food, social and ceremonial fisheries
- ecological risk and human health
- effects of the environment on the marine terminal

Project design and mitigation measures are considered, and cumulative effects are assessed, where necessary.

10.9 Volume 6C – Environmental and Socio-Economic Assessment (ESA) – Human Environment

Volume 6C provides a detailed assessment of the effects of routine activities of the Project on the human environment, including effects on:

- national and provincial economics
- human health
- non-traditional land use
- heritage resources

Project design and mitigation measures are considered, and cumulative effects are assessed, where necessary.

Information on the potential effects on the following will be made available at a later date:

- regional economies, including employment and business opportunities
- regional population changes
- community services, regional transportation and infrastructure
- individual, family and community wellness

10.10 Volume 7A – Construction Environmental Protection and Management Plan

Volume 7A outlines the environmental protection and management measures that will be implemented during construction of the pipelines, Kitimat Terminal and associated facilities (i.e., construction camps, stockpile sites, access roads and powerline easements).

10.11 Volume 7B – Risk Assessment and Management of Spills – Pipelines

Volume 7B outlines Northern Gateway's approach to limiting the risks of accidents and malfunctions, including hydrocarbon spills from the pipeline. Outlined are:

- key prevention measures along the pipeline route
- the probability of incidents in each of the six physiographic regions along the pipeline route
- the characteristics of hydrocarbons that will be transported by the pipelines, including their fate in the environment (e.g., evaporation and dissolution)
- emergency response planning (i.e., key players' roles and responsibilities)
- response, recovery and containment methods and requirements (i.e., preliminary personnel and equipment lists)
- potential biophysical and socio-economic effects, including the need for, and approaches to, follow-up and monitoring along the pipeline route

To aid in emergency response planning, hypothetical examples in four of the biophysical settings along the pipeline route are identified and described.

10.12 Volume 7C – Risk Assessment and Management of Spills – Kitimat Terminal

Volume 7C outlines Northern Gateway's approach to limiting the risks of accidents and malfunctions during tank and marine terminal operations (i.e., loading and unloading operations) and describes:

- key prevention measures at the terminal
- probability of incidents occurring during loading and unloading
- characteristics of hydrocarbons in the marine environment, including their fate in the environment (e.g., evaporation and dissolution)

- emergency response planning (i.e., key players' roles and responsibilities)
- response, recovery and containment methods and requirements (i.e., preliminary personnel and equipment lists)
- need for, and approaches to, follow-up and monitoring initiatives
- potential biophysical and socio-economic effects, including the need for, and approaches to, follow-up and monitoring
- assessment of ecological risks and human health risks associated with exposure to condensate or oil at the marine terminal

To aid in emergency response planning, examples for several different types and quantities of hydrocarbons are described, including the potential for hydrocarbons to evaporate, disperse in the water column, be stranded onshore, and remain on the surface over a given timeframe.

10.13 Volume 8A – Overview and General Information – Marine Transportation

Volume 8A is an overview of all aspects of marine transportation and marine terminal operations, with a focus on the CCAA, which includes Kitimat Arm and Douglas Channel, Wright Sound, Lewis Passage and portions of Squally Channel, out through Caamaño Sound (Southern Approach) and Principe Channel (Northern Approach). The OWA is also discussed and it includes all water between the north end of Vancouver Island and Dixon Entrance out to the Territorial Sea of Canada, including Hecate Strait and Queen Charlotte Sound. Volume 8A provides a summary of the information provided to Transport Canada regarding shipping and navigation matters as they relate to the Project.

10.14 Volume 8B – Environmental and Socio-Economic Assessment (ESA) – Marine Transportation

Volume 8B provides an assessment of the environmental effects of routine activities associated with project-related marine transportation in the CCAA and OWA, including an assessment of the biophysical elements that might be affected by tanker operations.

10.15 Volume 8C – Risk Assessment and Management of Spills – Marine Transportation

Volume 8C identifies and describes Northern Gateway's approach to preventing accidental spills of hydrocarbons, as well as emergency response planning associated with project-related marine transportation, and describes:

- key prevention measures (e.g., tethered and close escort tugs)
- characteristics of hydrocarbons in the marine environment, including their fate in the environment (e.g., evaporation and dissolution) in the CCAA and OWA

- probability of an incident during marine transportation[5]
- emergency response planning (i.e., key players' roles and responsibilities)
- response, recovery and containment methods and requirements (i.e., preliminary personnel and equipment lists)
- potential biophysical and socio-economic effects from hydrocarbons entering the marine environment
- need for, and approaches to, follow-up and monitoring initiatives
- assessment of ecological risks and human health risks associated with a spill of condensate or bitumen in the CCAA and OWA

To aid in emergency response planning, examples are described, including the potential for hydrocarbons to evaporate, disperse in the water column, be stranded onshore, and remain on the surface over a given timeframe.

[5] Northern Gateway has initiated a process to complete a quantitative risk analysis (QRA) of spills in the CCAA and OWA. The process included direct participation of public stakeholders, including environmental non-government organizations in the scoping and direction of the assessment.

11 Executive Summaries

The section provides brief summaries for Volumes 2 to 8C of the Application.

11.1 Volume 2: Economics, Commercial and Financing

Volume 2 provides information on the oil supply available from the WCSB and the markets that could be served by the Project. It examines the potential condensate supply available for delivery to the Kitimat Terminal to serve WCSB requirements. Volume 2 also provides an assessment of the significant public interest benefits of the Project and discusses the commercial considerations.

Oil Supply

Demand for oil is driving the development of Canada's massive oil sands reserves. The forecast supply is subject to continuous assessment and revision based on oil prices, financial markets and capital cost projections to develop oil sands projects. Growth in supply may vary between forecasts, but the underlying confidence that growth will continue in the Canadian oil sands is a constant.

Condensate Supply

Northern Gateway used information available from Poten & Partners to conduct an analysis of condensate supply available for the import pipeline. There would be more than sufficient international supply available to the condensate pipeline when taking into consideration a combination of field condensates, ultra-light oil, plant condensates, return condensates and light virgin naphtha (LVN) supplies.

Oil Markets

Exports from the oil pipeline will access markets in northeast Asia and the United States West Coast because of strong demand, proximity and the ability of those markets to process Canadian synthetic oil and diluted bitumen.

Condensate Markets

Supplies of Canadian field condensates have remained relatively flat and are expected to decline. However, growth in bitumen production will require more diluent for blending. In the past, condensate supply for blending has been supplemented with light oil, synthetic oil (cracked synthetic and synthetic naphtha) and imported volumes of natural gasoline. Although light oil and synthetic oil may continue to be used for blending, additional sources of condensate will be required to sustain the forecasted growth in bitumen production. The amount of import diluent required will be based on the economics between blending with import condensate or synthetic and the market need for these blends.

Benefits

Increased prices for Canadian oil would result in annual producer revenues increasing by $2.39 billion in the first full year of operation and growing to over $4.47 billion by 2025. When adjusted for transportation tolls on Northern Gateway, and after taking into account increased unit transportation costs on the Enbridge Mainline System, as well as increased Canadian refinery feedstock costs resulting from the Project, the net benefit to the Canadian energy industry would be $28 billion over the first 10 years of the Project's operations alone.

Although the net benefits to the Canadian oil and gas industry resulting from the Project are very large, total benefits flowing to all Canadians are even greater. Over a 30-year operating period, it is projected that, as a result of this Project, Canadian gross domestic product (GDP) would increase by $270 billion. Additional labour income would be $48 billion, as a result of an additional 558,000 person years of employment. Finally, the federal and provincial governments would collect an additional $81 billion in revenue.

Contractual Arrangements

Northern Gateway has secured substantial commercial support for the Project, in the form of Funding Support Agreements with a variety of producers and market interests. Northern Gateway's dealings with prospective shippers have been based on developing precedent agreements that will enable all parties to resolve uncertainties and issues before entering into unconditional, firm transportation service agreements. At the same time, Northern Gateway has progressed discussions regarding the form of the transportation service agreements and the principles that will underlie the tolls to be charged for pipeline service so that negotiation and finalization of such agreements is completed well in advance of the regulatory decision.

Although the details of the Northern Gateway precedent agreements remain under discussion, the basic process to be followed to finalize firm transportation service agreements will include a number of steps, including:

- reviewing the terms and conditions of regulatory approval to confirm their commercial acceptability
- estimating more definitive costs to construct the Project based on prevailing labour and materials costs at the time, and the conditions, if any, imposed by the Board. This process will be a substantial undertaking, involving expenditures of $150 million to $180 million, depending on the degree of cost certainty required at that stage.
- arranging construction financing

Toll Structure and Principles

Northern Gateway has worked with prospective shippers to develop the toll principles that will apply to the Project. Toll design was guided by the following:

- access to transportation service on each pipeline will be made available to those shippers who have executed a transportation service agreement (TSA), provided that the reserve volume and any excess capacity will be made available for non-term volumes

- all committed shippers will be required to meet the financial assurances requirements
- just and reasonable tolls will be established for each pipeline on a cost of service basis. Tolls will comply with applicable regulatory requirements with those firm shippers holding funding support units paying different tolls, for any volume up to and including the funding support option amount, than other term shippers as consideration for their early financial support for the Project.
- tolls for each pipeline must recover the operating costs of the pipeline, the debt servicing costs, taxes (on a normalized basis) and the return of capital. Tolls must also provide for a reasonable return on equity.

Financing

Third-party lenders will be requested to provide credit commitment to fund 70% of estimated project costs and proportionate equity will be provided by each equity owner (30%). The opportunities for equity investment by participating Aboriginal groups will be structured to address the requirements of such groups to access credit. Pro forma financial statements (income, balance sheet and cash flow) are included for 2016 through 2020.

11.2 Volume 3: Engineering, Construction and Operations

Volume 3 provides details on the conceptual design, construction and operations of the pipelines, the Kitimat Terminal and the Project's associated facilities. As the Project is under the jurisdiction of the NEB, it will be designed, constructed and operated to comply with:

- the latest NEB regulatory requirements, including the Onshore Pipeline Regulations 1999, which incorporate, by reference, the Canadian Standards Association (CSA) Z662-07, Oil and Gas Pipeline Systems
- Enbridge's engineering standards and construction specifications
- Enbridge's operational policies, practices and activities that prioritize safety and stewardship of the environment

Volume 3 describes the alternative means to construct the Project, including selecting the pipeline endpoint locations (the Bruderheim Station and the Kitimat Terminal), the pipeline route and the pump station locations. Alternatives are identified and criteria for selecting the preferred alternatives are included. The preferred pipeline route, within a 1-km wide project pipeline corridor, is established through a series of route alternative assessments, revisions and refinements.

The hydraulic design has determined that a 914-mm OD (NPS 36) pipeline with seven pump stations is the optimum configuration for the oil system and that a 508-mm OD (NPS 20) pipeline with nine pump stations is the optimum configuration for the condensate system.

The line pipe for the oil and condensate pipelines will be manufactured to CSA Z245.1, Steel Pipe or to American Petroleum Institute (API) Standard API Spec 5L, Specification for Line Pipe. Design parameters and estimated quantities of line pipe are provided. Valves will be installed at strategic locations along the oil and condensate pipelines, including at pump stations, major watercourse crossings

and other locations. A combination of wide-area network, telephone lines, satellite and radio communication will provide main and backup (where required) communication systems for remote operation of the valves. The required infrastructure, including radio communication towers and pressure-indicating transmitters, associated with the selected communication systems will be determined during detailed engineering.

The pipelines will cross approximately 773 identified watercourses having defined bed and banks – 669 of which are fish bearing. There are 83 watercourse crossings subject to a detailed site review based on potential for issues and constraints. The proposed crossing methods for most of the watercourses are open cut and isolation. The proposed crossing method for 33 of the detailed review sites is trenchless, based on known sensitivity and site-specific information. The crossing methods and timing for all review sites will be finalized during detailed engineering.

Two tunnels will be constructed through the Coast Mountains, approximately 50 km northeast of Kitimat. The tunnels will be located between the Clore River valley on the east side of North Hope Peak and the Hoult Creek valley on the west side of Nimbus Mountain. The tunnels will be constructed using either tunnel boring machines, drilling and blasting methods or a combination of both. The tunnels will be approximately 5.5 m wide by 5.5 m high to provide space for the pipelines, ventilation ducts and utility lines, and construction and operations equipment. The tunnels will provide enhanced pipeline stability and safety, and reduced RoW reclamation and restoration activities relative to conventional pipeline design and construction in the upper reaches of the Clore River and Hoult Creek valleys.

The Kitimat Terminal will be located on the west side of Kitimat Arm in Douglas Channel and will comprise land-based facilities (the tank terminal) and marine facilities (the marine terminal). The tank terminal will include 11 oil tanks and 3 condensate tanks, each with a capacity of 78,800 m^3 (496,000 barrels). The size and spacing of the tanks will be determined during detailed engineering. Hydrocarbon transfer systems, including custody transfer metering, will transfer the oil and condensate between the tanks and the marine berths. The initiating condensate pump station will transfer condensate into the condensate pipeline for transportation to the Bruderheim Station. The marine terminal will include two tanker berths and one utility berth. Both tanker berths will be equipped for loading oil tankers and unloading condensate tankers.

Construction of the Project is scheduled for a 42-month period to achieve the planned in-service date. An additional six months might be needed to complete construction of a limited number of tanks at the Kitimat Terminal. Preliminary plans provide for the pipelines to be constructed using 12 spreads, ranging in length from approximately 74 to 192 km. Three spreads will be constructed concurrently during each of four construction seasons: the summer and winter of the first pipeline construction year and the summer and winter of the second pipeline construction year. Development of a comprehensive resource-loaded and schedule constrained construction plan during detailed engineering will likely result in changes to these preliminary plans, including the shifting of the construction season at some locations. Clearing activities for the first construction season will begin the year before pipeline construction.

A Supervisory Control and Data Acquisition (SCADA) system will be installed to enable the pipelines and facilities to be remotely controlled and monitored simultaneously from both control centres, which will be located in Edmonton and Kitimat. The Edmonton Control Centre will be used to control and remotely monitor the pipelines, pump stations, valve sites and the tank terminal. It will also be used to

remotely monitor the tanker loading and unloading operations performed by the Kitimat Terminal Control Centre. The Kitimat Control Centre will be used to control and monitor the tanker loading and unloading operations at the marine terminal, and to monitor the tank terminal operations performed by the Edmonton Control Centre. The Project will be designed with emergency shutdown systems that can be initiated remotely or locally if an unsafe condition is detected. Twenty-four hour, on-shift support for material balance system alarms and troubleshooting will be provided at the Edmonton Control Centre. Data will be made available to technical support locations, maintenance bases and third-party locations, as defined by the project operational plans.

Integrity management entails risk identification and assessment. Various tools will be used to generate, assess and evaluate operational risks applicable to project pipelines and facilities. The integrity assessment results will be used to prioritize maintenance activities or projects so that fitness-for-purpose tolerances are maintained. These activities will be formalized in various integrity management programs, based on the type of issue being considered.

If a pipeline or facility is to be decommissioned or abandoned, Northern Gateway will develop decommissioning and abandonment plans in consultation with relevant stakeholders, participating Aboriginal groups, the NEB and other authorities and agencies. Regulations, environmental issues and safety issues associated with decommissioning and abandonment options will be considered when developing these plans.

11.3 Volume 4: Public Consultation

In conjunction with extensive project engineering, environmental and field activities, Northern Gateway has undertaken a comprehensive public consultation and communications program. Northern Gateway is committed to meaningful and open discussion with stakeholders, including communities and private landowners, and participating Aboriginal groups in Alberta and British Columbia. Public consultation is an integral component of the Project because of Northern Gateway's belief that the Project can be improved by gaining local knowledge, insight and recommendations from people along the pipeline route as well as others potentially affected by the Project. Northern Gateway encourages stakeholders and participating Aboriginal groups to share their thoughts and help identify environmental, economic and social opportunities for communities throughout the life of the Project.

Identification of Stakeholders

Northern Gateway identified stakeholders to engage in the public consultation program. Stakeholders were identified as individuals, groups or organizations who:

- are landowners and tenants owning or residing on land potentially affected by, or next to, the RoW where the proposed construction and operations will occur
- are landowners and tenants residing in the project corridor
- reside or work near the Project and could be affected by construction or operations and their associated activities
- have established environmental, cultural, social or economic interests in the Project

- have particular knowledge that would be helpful for the Project
- have a statutory mandate to manage areas or activities that might be affected by the Project

An initial list of stakeholders was developed based on existing relationships, experience with other projects and knowledge of the area. Stakeholders were subsequently added as they self-disclosed or were identified by others.

Consultation Activities

The goal of the public consultation program is for Northern Gateway to provide transparent information and address concerns to the best of its ability. Consultation methods and tools are used to satisfy the information needs of the many stakeholders and to engage stakeholders in dialogue and face-to-face discussions as much as possible. Consultation methods and tools employed to date include:

- identifying stakeholders and interested parties
- developing a comprehensive mailing list
- developing project information packages
- distributing project information to stakeholders and interested parties
- distributing electronic newsletters
- establishing and monitoring a toll-free telephone line
- creating a Northern Gateway website, featuring:
  - project information
  - project newsletters
  - open house materials
  - discussion guides
  - videos
  - frequently asked questions
  - other related project information
- attending meetings with officials of urban municipalities, counties and regional districts
- attending meetings with federal and provincial government officials and elected representatives
- attending meetings and participating in discussions with various environmental non-governmental organizations (ENGOs) and non-governmental organizations (NGOs)
- providing project presentations to local chambers of commerce, service clubs, at resource and transportation industry conferences, and at regional economic development forums along the project corridor
- holding five ESA workshops and three ESA discussion forums
- establishing five regional advisory boards – one marine community advisory board with a focus on marine issues and four pipeline community advisory boards

- establishing a QRA working group
- mailing out project information and invitations to community open houses
- placing newspaper advertisements about community open houses in local and regional newspapers
- providing public service announcements to local radio stations
- scheduling media relations activities, including conducting numerous interviews and resulting media coverage
- hosting 36 community open houses from Edmonton, Alberta to Prince Rupert, British Columbia
- establishing skills development, education and employment readiness programs that support Northern Gateway's future workforce needs
- recording public inquiries and responses
- identifying stakeholder interests and concerns and incorporating input into the project planning, design, construction and operations, where practical

Summary of Key Issues and Concerns

Northern Gateway has received considerable input from stakeholders in Alberta and British Columbia. Private landowners whose property might be crossed by the pipeline corridor tend to be more concerned with the details of construction routing and surface rights compensation. ENGOs participating in project workshops tended to focus on environmental assessment and prediction methods, and more locally based organizations expressed concerns about effects of the Project near their area of operation. Stakeholders raised interests and concerns in the following key areas (see Volume 4, Appendix M for a summary):

- general project information
- regulatory process and policy
- public consultation
- pipeline route selection and RoW
- access management
- land use
- compensation
- environmental assessment methodology
- environmental effects—in general and specific to fish and fish habitat, wildlife and heritage resources
- socio-economic effects and community investment
- business and employment opportunities
- engineering and construction
- operations and safety
- the Project's risks and benefits
- shipping and navigation
- abandonment and decommissioning
- possibility of a hydrocarbon spill (terrestrial and marine)
- cumulative effects of resource development and oil sands expansion

Addressing Stakeholder Issues and Concerns

Stakeholder input is incorporated into the project design, planning and ESA studies, where practical. Information received from stakeholders is reviewed by discipline experts for consideration of refinements or modifications to the Project, while balancing factors related to community and landowners, Aboriginal groups, environmental, engineering, integrity, cost and constructability issues. Feedback received so far has resulted in refinements to the Project in the areas of pipeline route, pump station location, pipeline engineering and construction, Kitimat Terminal and marine operations and project execution and operations.

To date, the public consultation program has accomplished the primary objectives established by Northern Gateway to:

- provide information about the Project
- identify issues
- answer questions
- obtain input into environmental, economic and community benefits
- obtain input and incorporate it into project design, planning, construction and operations, where practical
- establish a community-based forum and community advisory boards for stakeholder participation and input through the entire project lifecycle

The continuation of consultation activities through all phases of the Project will fulfill Northern Gateway's ongoing commitment to provide stakeholders and participating Aboriginal groups with clear, relevant and timely information, which is responsive to their needs, input and concerns. Particular attention will be given to resolving outstanding concerns, where practical, and this might result in further refinements to the Project as the regulatory process continues.

11.4 Volume 5A: Aboriginal Engagement

Northern Gateway is committed to consulting with Aboriginal peoples—including First Nations and Métis belonging to a community, group or organization (i.e., Aboriginal groups)—that might be affected by the Project. Through implementation of the Aboriginal engagement program, Northern Gateway will provide participating Aboriginal groups with information about the Project, answer project-related questions, identify and address interests and concerns and obtain community input into project-planning activities and the ESA. Information gathered through the Aboriginal engagement program will enable Northern Gateway to improve the Project by avoiding, reducing or mitigating, wherever reasonable and feasible, potential adverse effects of the Project on Aboriginal interests. Northern Gateway is committed to enhancing potential positive effects by ensuring that Aboriginal groups derive sustainable benefits from project-related activities that arise throughout project development, construction and operations, including economic activity, equity participation, business development, and employment and training initiatives.

Engagement Approach

Northern Gateway's Aboriginal engagement program provides for a wide spectrum of participation alternatives for Aboriginal groups, with each group determining its level of participation. Key aspects to the approach include:

- the program enabling each Aboriginal group to determine its level of participation in terms of review, discussion and input into the Project
- the program being a community-based program. Northern Gateway's focus is to meet with each participating Aboriginal group, on a standalone basis, to understand their specific views, interests and concerns regarding the Project and to align opportunities for benefits stemming from the Project with the specific aspirations of each group.
- using a multidisciplinary team to participate in community meetings, Elders' meetings, technical workshops and open houses. The team provides project information, responds to questions and addresses interests and concerns identified by participating Aboriginal groups. Through this team approach, Northern Gateway provides a full range of project information, including updates about the Project. The wide array of inquiries about the Project can be responded to in a timely way.

Engagement Activities

Northern Gateway has communicated with participating Aboriginal groups in a variety of ways, including fulfilling specific requests as to their preferred methods of communication. The following communication tools are being used in the Aboriginal engagement program:

- letters of introduction and follow-up letters
- mail outs, brochures and newsletters, including:
    - route maps
    - e-newsletters
    - quarterly Aboriginal newsletters
    - employment and profile cards
    - NEB pamphlets
    - project newspaper flyers
    - open house display boards (approximately 30)
    - Aboriginal community PowerPoint presentations
    - Elders' PowerPoint presentations
    - press releases
    - distribution of the PIP and follow-up letter
- personal meetings and visits to communities
- telephone discussions
- attendance, presentations and informal discussions at community events and conferences
- technical workshops
- open houses and community information sessions

- project website
- pipeline and marine discussion guides
- toll-free information telephone number
- digital copies of the pipeline route—to aid specific Aboriginal groups in reviewing potential effects of the Project on their community
- provision of funding through Capacity Funding Agreements

Summary of Key Interests and Concerns

Aboriginal groups engaged to date have a range of opinions concerning the Project. Northern Gateway is committed to considering and responding to project-specific interests and concerns raised by participating Aboriginal groups. In broad terms, interests and concerns identified to date can be categorized as follows:

- general project information
- effects on the environment, including effects of routine activities and potential hydrocarbon spills (marine and terrestrial)
- cumulative effects of resource development
- interests in marine activity on the west coast
- logistics, safety and emergency response, both terrestrial and marine
- effects on traditional land use and cultural sites
- traditional knowledge, participation of Aboriginal groups in ATK programs and use of ATK in the ESA
- process issues, including capacity funding and participation in the regulatory and environmental review process
- community and economic development
- effects on Aboriginal and treaty rights

For a summary of these interests and concerns and Northern Gateway's responses, see Volume 5A, Appendix M.

Addressing Aboriginal Interests and Concerns

Northern Gateway strives to respond promptly to the interests and concerns brought forward by participating Aboriginal groups, using the same means that the Aboriginal group used to make contact with Northern Gateway. Communication with participating Aboriginal groups is aimed at addressing identified interests and concerns to the extent practicable.

Aboriginal input is incorporated into the project design and ESA studies. Information received is reviewed by discipline experts for consideration of refinements or modifications to the Project, while balancing factors related to community and landowners, environmental, engineering, integrity, cost and constructability issues.

Feedback received so far has resulted in refinements to the Project in the areas of:

- pipeline routing
- pump station locations
- pipeline engineering and construction
- operations of the Kitimat Terminal and tankers
- project execution and operations
- the scope of the environmental assessment (e.g., selection of VECs and types of issues considered)
- the geographic extent of field surveys

11.5 Volume 5B: Aboriginal Traditional Knowledge

Since the start of engagement and assessment activities for the Project, Northern Gateway has placed high importance on providing opportunities for Aboriginal groups interested in the Project to complete ATK community reports. The ATK program focuses on understanding potential effects of the Project on traditional lands, waters, resources and activities. Aboriginal groups that choose to participate in the ATK program have the option of working collaboratively with the Northern Gateway study team or preparing an independent community report.

Volume 5B summarizes the ATK program and approach, as well as knowledge shared by participating Aboriginal groups and their perspectives on how the Project will affect their communities and traditional use. Volume 5B includes:

- introduction to the ATK program undertaken for the Project
- brief overview of the regulatory context for ATK
- overall objectives of the ATK program
- description of how ATK information is shared and used in the ESA
- status of the ATK community reports at the time of filing
- description of ATK methods
- key findings from the community reports that have been released to Northern Gateway

At the time of filing the Application, ATK community reports for the Project are in various stages of development and implementation. Subject to confidentiality constraints, additional information on ATK community report updates and upcoming ATK community reports will be provided to project personnel and regulators as reports are completed.

11.6 Volume 6A, Part 1: Environmental and Socio-economic Assessment (ESA) – Pipelines and Tank Terminal

Volume 6A, Part 1 identifies and assesses the potential effects of routine project activities on the following terrestrial VECs:

- atmospheric environment
- acoustic environment
- soils
- terrain
- vegetation

The assessments focus on key issues that are of particular interest to regulators, participating Aboriginal groups or other stakeholders.

Technical data reports (TDRs), which are not being filed as part of the Application, but provide detailed background information on existing conditions, are summarized in Appendix M of this volume (i.e., Volume 1) and are available upon request.

Summary of Results

Atmospheric Environment

For the atmospheric environment assessment, key project issues are the emission of air contaminants, hazardous air pollutants and greenhouse gases. Incorporating proven mitigation measures such as using low-sulphur fuel and applying best technology will reduce emissions at their source, resulting in low emissions from operating the pipelines and the Kitimat Terminal. Modelling examples predict an increase in existing sulphur dioxide (SO_2) emissions from project-related tankers at berth because they will be using fuel containing 2.7% sulphur. Ground-level SO_2 concentrations combined with existing sources in Kitimat could exceed air quality objectives. However, by 2015, sulphur in fuel is expected to be 0.1%, which is a reduction of 96% from the fuel sulphur content assumed for this ESA, so SO_2 emissions will be reduced proportionally. Therefore, environmental effects of the Project on air quality, including SO_2 emissions, are considered not significant. Follow-up studies will be conducted to monitor SO_2 levels and corrective action will be taken, if warranted. Effects on climate also are expected to be not significant.

Acoustic Environment

Key issues are increased background noise associated with project construction and operations. Most noise will occur during construction of the pipeline, the pump stations and berths. During operations, terminal activities and pumps along the pipeline will be the principal sources of noise. Mitigation measures will include:

- purchasing electric motors, pumps and equipment that meet industrial acoustic standards
- inspecting and maintaining vehicles and equipment regularly
- turning off equipment when not in use
- enclosing and baffling noisy equipment
- designing blasting activities to use the optimum amount of explosives
- conducting a noise survey at the security fence for pump stations and the tank terminal and at the location of critical receptors, to confirm that noise levels meet the criteria adopted by Northern Gateway (which are the provincial levels identified in the Alberta Energy Resources Conservation Board's [ERCB] Directive 38: Noise Control)

Noise-control measures will be taken during construction and operations. No regular noise monitoring is proposed because unacceptable long-term high noise levels are not expected. With mitigation in place, effects of project noise are expected to be not significant.

Soils

Soil erosion and loss of soil productivity from site clearing, soil stripping, stockpiling and construction and acidification are key issues for the soils assessment. Soil deterioration and loss could occur from mixing topsoil with subsoil, compaction, rutting and puddling. Mitigation measures using established environmental protection measures and reclamation techniques will minimize any adverse effects to soil quality. As noted for air quality, sulphur levels in marine fuels will be substantially lower by the time project-related shipping starts, reducing predicted acid emissions and associated effects on soils. However, air emissions and soils will be monitored for up to three years to verify that the use of low sulphur fuels has been effective in addressing air quality and soil acidification issues. With the planned mitigation measures, the environmental effects of the Project on soils are all rated not significant.

Terrain

Pipeline construction has the greatest potential to disrupt the existing terrain and possibly compromise landscape integrity. Key issues for the terrain assessment are mass wasting, consolidation settlement and acid-rock drainage. Identified terrain geohazards have influenced the routing and engineering design. Ongoing geotechnical and hydrotechnical studies will continue to influence routing decisions, design and construction. Mitigation strategies will be based on site-specific conditions and developed during detailed engineering. With planned mitigation, project-specific residual effects on terrain integrity are rated as not significant. The Project could have a cumulative effect with other planned pipeline projects. However, based on the assumption of satisfactory joint planning and operation, the cumulative environmental effects of the Project on terrain are predicted to be not significant.

Vegetation

For the vegetation assessment, key issues are:

- clearing and disturbance of vegetation and soils
- loss of plant species diversity
- loss of old growth forest
- loss of rare species and rare ecological communities
- removal of forest resources and structure
- reclamation and revegetation of natural vegetation communities
- effects on wetland and riparian ecosystems related to changes in the water table
- introduction of non-native weed species to natural vegetation communities
- air emission effects on vegetation community health at the Kitimat Terminal

Vegetation has the potential to be affected by the Project through:

- surface disturbance (clearing)
- disruption of surface water or shallow groundwater flow patterns
- the introduction and spread of non-native weed species
- air emissions

Clearing for the Project is less than 1% of the vegetation PEAA. Therefore, the direct effects of project clearing are limited relative to regional conditions. Disruption of surface water or shallow groundwater flow patterns on wetlands and riparian ecosystems will be low to moderate in magnitude and can be successfully reduced. The weed management plan will limit the effect of non-native species on vegetation diversity to a low to moderate magnitude. As noted for air quality, sulphur levels in marine fuels will be substantially lower by the time project-related shipping starts, reducing predicted acid emissions and associated effects on vegetation. Project effects, both project-specific and cumulative, on vegetation can be adequately mitigated and are expected to be not significant.

11.7 Volume 6A, Part 2: Environmental and Socio-Economic Assessment (ESA) – Pipelines and Tank Terminal

Volume 6A, Part 2 identifies and assesses the potential effects of routine project activities on the following terrestrial VECs:

- wildlife
- surface water resources
- freshwater fish and fish habitat productive capacity
- hydrogeology
- palaeontology

In addition, Volume 6A, Part 2 contains a discussion of the effects of the environment on the pipelines and the tank terminal.

The assessments focus on key issues that are of particular interest to regulators, participating Aboriginal groups or other stakeholders.

TDRs, which are not being filed as part of the Application, but provide detailed background information on existing conditions, are summarized in Appendix M and are available upon request.

Summary of Results

Wildlife

Key issues of concern for the wildlife assessment are loss of biodiversity and abundance of key species. Potential effects of the Project on wildlife include direct and indirect habitat loss, disruption in movement and increased risk of mortality. Thirty species are assessed, including species at risk, species that migrate, species of interest to Aboriginal groups and species with high commercial, traditional or subsistence harvesting value. The greatest effects on habitat occur during construction, from clearing the pipeline RoW. During operations, if strict access is in place to limit human use of the 25-m wide RoW, the RoW is unlikely to impede large and medium-sized mammals from crossing.

With mitigation, the effects of the Project on wildlife habitat, movement and mortality are considered not significant. Mitigation measures include:

- identifying and avoiding important wildlife habitat features
- limiting the size of work areas
- maintaining habitat connections in key areas
- developing a detailed RoW access management plan with stakeholders
- limiting speed on project roads and the RoW

The Project's contribution to cumulative effects on increased risk of mortality of grizzly bears can be mitigated if additional measures are taken. At baseline, the density threshold for linear features in high-quality grizzly bear habitat has already been exceeded in most grizzly bear population units. The Project will increase the density by approximately 1% to 20%, depending on the landscape unit. Northern Gateway will strive to achieve no net gain in linear access where increased access would have a significant effect by managing access along the RoW and any access associated with new or improved access roads. Northern Gateway will also explore approaches with government agencies, participating Aboriginal groups and affected stakeholders to achieve a no net gain in linear access in the Buckley Lakes grizzly bear population unit and, possibly, other grizzly bear population units in British Columbia and Alberta. Follow-up and monitoring will confirm that proposed mitigation measures are applied, effective and adjusted, if necessary.

Surface Water Resources

Key issues of concern are changes in surface water flow and quality. Potential effects of the Project on surface water resources include:

- changes in annual water yield
- peak and low flow
- surficial soil erosion
- sediment delivery to surface channels
- instream sediment concentrations
- channel geomorphology
- water quality

Mitigation for surface water resources will include:

- limiting the number of watercourse crossings
- using appropriate watercourse crossing techniques
- avoiding crossings with unstable channel bed and banks
- revegetating channel banks after construction to increase bank stability
- managing storm water runoff at pump stations and the Kitimat Terminal
- providing adequate wastewater treatment

The Project will have little to no measurable environmental effect on annual sediment loadings. The Project's contribution of total suspended solid loading for facility and road construction will not make levels substantially higher than they already are. With mitigation, the environmental effects of the Project on surface water resources are expected to be not significant.

Freshwater Fish and Fish Habitat

The key issues of concern for fresh water fish and fish habitat are loss of biodiversity and abundance of key species. The Project will result in the alteration of fish habitat at most trenched watercourse crossings, but the adverse effects at most crossings can be mitigated using established environmental protection measures and habitat restoration techniques. Along the pipeline route, 58 freshwater fish species occur and include sport fish, regionally important fish (e.g., fish harvested by Aboriginal groups) and species of conservation concern.

Pipeline corridor studies and fish habitat surveys have been completed to identify and evaluate initial and alternative pipeline routes from a fisheries perspective. Based on the assessments, the pipeline route has been realigned to accommodate sensitive habitats, important fish stocks and runs, known traditional and non-traditional harvest areas and fish species at risk.

Mitigation measures have been incorporated into the project design and include limiting disturbance areas within the pipeline RoW, selecting watercourse crossing techniques on the basis of the biological and physical conditions and adhering to construction least-risk periods for fish species present, where possible. The environmental effects of the Project on freshwater fish and fish habitat productive capacity will be not significant. Where adverse effects cannot be avoided or mitigated, a compensation plan will be developed in cooperation with DFO, according to DFO's policies and mandate, to offset the corresponding loss of habitat productive capacity.

Hydrogeology

Hydrogeology describes the interrelationships between geological materials and groundwater and the movement of groundwater. Project activities such as pipeline construction, groundwater withdrawal and waste disposal at camps or facilities, might affect groundwater quantity and quality. Therefore, key issues for the hydrogeology assessment are changes in ground water flow and quality. Mitigation includes grading during construction, maintaining or controlling groundwater flow across the RoW and managing wastewater during construction and operations. With mitigation, all residual effects on hydrogeology are assessed as not significant.

Palaeontological Resources

Palaeontological resources include fossil-bearing rocks, which occur at watercourse crossings in Alberta and in some of the mountainous areas in British Columbia. Project activities could affect palaeontological resources and their site contexts directly through disturbance of bedrock during construction or indirectly through increasing human access and resulting disturbance. Potential effects include the degradation, contamination and physical loss of palaeontological resources and their interpretive context. Rocks with high palaeontological potential along the route were identified through pre-field desktop analysis. Dozens of fossil sites were discovered during subsequent field studies. All sites of high heritage value will be avoided, so no excavation is required before construction. Buried palaeontological resources of potential high value could also be encountered. Construction activities will be monitored by a qualified palaeontologist to confirm that any palaeontological resources encountered are recovered and the site contexts are recorded. Additional mitigation measures to limit adverse and maximize positive project effects include educating project workers about the actions to take if palaeontological resources are

discovered by chance during construction, and implementing a ban on fossil collecting to reduce indirect effects through unrecorded fossil collecting and loss of site context. With proposed mitigation measures, the effects of the Project are expected to be not significant. The Project is expected to make a positive contribution to palaeontology, through fossil discovery, recovery, documentation and protection.

Effects of the Environment on the Pipelines and Tank Terminal

The rugged environment through which the pipelines pass and the tank terminal is located have the potential to affect the integrity of these structures if carefully planned mitigation measures are not in place. Effects of terrain changes (slides, avalanches and earthquakes) and water movement (erosion, floods and avulsion) are the environmental factors posing the greatest risks. Terrain and water hazards, without mitigation, have the potential to expose buried portions of the pipeline, increasing vulnerability to coating damage, falling rocks and other hazards. Hazards posed by terrain and water might also affect supporting infrastructure. For example, erosion or a slide could close a service road, restricting access to the pipeline.

Extensive studies by Northern Gateway have identified the locations of terrain and water hazards. Configuring the terminal and routing the pipelines to avoid exposure to these hazards are the main ways to reducing risk. Examples of mitigation includes:

- controlling ground and surface water
- grading to avoid triggering slides
- buttressing the toes of slopes
- following appropriate seismic codes
- installing fencing and berms to deflect rock fall

Given the project design and the mitigation measures that will be in place, remaining environmental effects on the pipelines and tank terminal are predicted to be not significant.

11.8 Volume 6B: Environmental and Socio-economic Assessment (ESA) – Marine Terminal

Volume 6B identifies and assesses the potential effects of routine project activities on the following marine VECs:

- marine sediment and water quality
- marine vegetation
- marine benthic invertebrates
- marine fish and fish habitat
- marine mammals
- marine birds
- marine fisheries, including commercial, commercial–recreational, recreational, and food, social and ceremonial fisheries

In addition, Volume 6B contains an analysis of ecological risk from emissions and effluent at the Kitimat Terminal as well as a discussion of the effects of the environment on the marine terminal.

The assessments focus on key issues that are of particular interest to regulators, participating Aboriginal groups or other stakeholders.

TDRs, which are not being filed as part of the Application, but provide detailed background information on existing conditions, are summarized in Appendix M and are available upon request.

Summary of Results

Marine Sediment and Water Quality

Marine sediment and water quality refers to the physical and chemical parameters of marine sediment and seawater, including salinity, temperature, dissolved oxygen, macro-nutrients, micro-nutrients and organic carbon, as well as inorganic and organic contaminants. Baseline data indicate some contamination of water, sediments and benthic organisms from previous industrial activity in the PEAA, which encompasses the area from the head of Kitimat Arm to just east of Emsley Cove. Potential environmental effects include altered suspended sediment levels and altered sediment and water chemistry primarily related to dredging. Only 400 m^2 of the assessed area is expected to receive more than 1 cm of sediment deposition from dredging; therefore, sediment disturbance during dredging is not expected to increase the amount of contaminants dissolved in seawater by any measurable amount. Project design and project-specific mitigation measures will include deploying silt curtains to limit dispersion of silt, managing surface water runoff and confirming wastewater discharges are compliant with the *Waste Management Act*, Petroleum Storage and Distribution Facilities Storm Water Regulation, and the British Columbia Special Waste Regulation. After mitigation, the Project is not expected to cause a long-term decline in sediments and water quality and residual effects are expected to be not significant.

Marine Vegetation

Marine vegetation has ecological importance as food, refuge and rearing habitat for invertebrates and juvenile fish. Eelgrass, rockweed and marine riparian vegetation are representative species or key indicators. Potential environmental effects assessed include changes in habitat quality from increased sedimentation or exposure to contaminants from resuspended sediments and habitat availability because of construction dredging, blasting and clearing of the foreshore. Mitigation will include reducing sedimentation by using sediment settlement ponds, silt fences and silt curtains and managing surface water drainage. After mitigation, the effects of the Project are not expected to cause a long-term decline in abundance, distribution or ecological function of marine vegetation, and residual effects are expected to be not significant. Where adverse effects cannot be avoided or mitigated, a compensation plan will be developed in cooperation with DFO, and according to DFO's policies and mandate, to offset the corresponding loss of habitat productive capacity.

Marine Invertebrates

Marine invertebrates have ecological importance as food, substrate, refuge and rearing habitat for other invertebrates and juvenile fish. Some also have commercial value. Bay mussel, Dungeness crab and hexactinellid sponges are the representative invertebrates assessed. Potential environmental effects include changes in habitat availability, direct mortality and changes in habitat quality. The amount of

marine invertebrate habitat affected by the Project is small compared with that available. For example, loss of approximately 1,000 m^2 of bay mussel habitat represents 3.7% of total habitat in the assessed area, and the area will be suitable for recolonization after construction. Loss of hexactinellid sponges would be limited to isolated individuals that are common throughout the north and central coasts and do not carry the same ecological vulnerability as the rare reef complexes. Mitigation will include reducing sedimentation, implementing a Blasting Management Plan and establishing work windows developed in consultation with DFO. Although not anticipated at this time, if high-quality crab habitat (eelgrass beds) will be disturbed by sedimentation from dredging and blasting, a preconstruction trap and release program will be implemented to relocate Dungeness crab away from areas affected. Effects of the Project are not expected to cause a long-term decline in abundance, distribution or ecological importance of marine benthic invertebrates. After mitigation, residual effects are expected to be not significant.

Marine Fish

Marine fish have ecological, social, cultural and commercial value. Eulachon, Pacific herring, rockfish and chum salmon are included in the assessment. Potential effects of the Project on marine fish include changes in habitat quality, changes in habitat availability and acoustic disturbance. Marine fish are not expected to be adversely affected by increased sedimentation, and resuspension of contaminants contained in sediments is expected to be limited. Potential effects of increased sedimentation and resuspension of contaminants from sediments are expected to be limited to within a few hundred metres of the dredging activity around the marine terminal. Acoustic disturbance from dredging, blasting and other project construction activities will be short-term and reversible. Some marine fish may temporarily alter swimming patterns or move from an area to avoid noise sources. For example, rockfish are expected to move out of the area during peak periods of construction noise, but return to home ranges after the disturbance is over. Mitigation will include:

- following work windows developed in consultation with DFO for dredging and blasting
- implementing a Blasting Management Plan, using bubble curtains, where practical, to reduce underwater noise propagation
- managing sedimentation

Effects of the Project are not expected to cause a long-term decline in abundance or change in distribution of marine fish. After mitigation, the residual effects of the Project on marine fish are expected to be not significant. Where adverse effects cannot be avoided or mitigated, a compensation plan will be developed in cooperation with DFO to offset the corresponding loss of habitat productive capacity.

Marine Mammals

Marine mammals have conservation status, as well as social, cultural, recreational and commercial value. Northern resident (NR) killer whale, North Pacific (NP) humpback whale and Steller sea lion are assessed. Whales are dependent on the acoustical environment for important life functions such as spatial orientation and migration, communication, predator and prey detection and locating conspecifics.

Potential effects assessed are behavioural change from underwater noise and physical injury due to underwater blasting. Mitigation will include:

- implementing a Blasting Management Plan
- developing seasonal work windows, using bubble curtains, where practical, to reduce underwater noise propagation
- implementing a marine mammal monitoring program
- conducting detection surveys at the marine terminal (to prevent underwater construction activities taking place when marine mammals are in a predetermined safety radius or danger zone)

With mitigation measures, blasting is unlikely to result in injury to, or mortality of, marine mammals. Underwater project noise mighty cause habitat avoidance and behavioural change, but is unlikely to adversely affect the viability or sustainability of marine mammal populations. After mitigation, the residual effects on marine mammals are expected to be not significant.

Marine Birds

Marine birds have conservation status and social, cultural, aesthetic and recreational value. Marbled Murrelet, Surf Scoter and Bald Eagle are the representative species assessed. Potential environmental effects include change in habitat, sensory disturbance and the risk of direct mortality. The amount of marine bird habitat affected by the Project is small compared with that available in the area assessed. Marine birds will likely avoid areas of increased noise levels and the duration of these effects will be limited to several weeks during construction. It is expected that direct mortality events will be rare. Mitigation will include:

- identifying and avoiding active nests, key feeding areas and other critical areas
- establishing work windows to reduce disturbance during sensitive life history stages such as nesting and rearing
- limiting night lighting
- implementing a Blasting Management Plan

Effects of the Project are not expected to cause a long-term decline in abundance or change in distribution of marine birds. With mitigation, residual effects are expected to be not significant.

Marine Fisheries

Marine fisheries have economic, recreational and cultural importance in the region. The four categories of fisheries assessed are:

- commercial fisheries
- food, social and ceremonial (FSC) fisheries
- commercial-recreational fishing
- recreational fishing

Commercial fisheries include Pacific salmon, Pacific halibut, prawn, shrimp, red sea urchin, octopus and some groundfish. The FSC fishery is important for spiritual and cultural purposes and as a key food source. Commercial-recreational fisheries include lodges, outfitters and vessel charters offering recreational fishing experiences. Recreational fishing has economic benefits to local industry and considers resident and out-of-town anglers who fish for sport, enjoyment and food. The potential environmental effect assessed was restriction of access to fishing grounds. Mitigation will include establishing a fisheries liaison committee to facilitate effective communication with commercial, FSC, commercial-recreational and recreational fishers along with regulators and other interested parties to address specific fisheries issues and develop mutually acceptable solutions. After mitigation, environmental effects are expected to be not significant.

Ecological Risk Assessment for Routine Activities Associated with the Kitimat Terminal

The marine ERA assesses the total current levels of chemicals of potential concern from past and ongoing projects in the Kitimat Arm region, plus the estimated input from the Kitimat Terminal. The stressors to marine ecology are chemicals that might be released because of routine operational activities at the Kitimat Terminal. These include volatile hydrocarbon and trace element emissions from tanks and valves, hydrocarbon and trace element emissions from marine engine operations while tankers are berthed, and liquid effluent emissions from normal operations and site-wide storm water runoff. Only operations of the Kitimat Terminal are considered because emissions to the marine environment from construction and decommissioning do not involve handling and storage of large quantities of liquid hydrocarbons.

Marine organisms representing a variety of life histories are assessed to collectively capture a broad spectrum of potential pathways of exposure in the marine environment. These organisms are marine plants, benthic invertebrates, fish, Bald Eagle, Marbled Murrelet, Spotted Sandpiper, Surf Scoter, harbour porpoise, Steller sea lion and coastal-dwelling American mink. For all marine organisms assessed, the ERA found the magnitude of effects for routine operations to be negligible to low, and in all cases below thresholds that would indicate reason for concern. Consequently, residual environmental effects are not significant.

Effects of the Environment on the Marine Terminal

Environmental factors that have the potential to affect the long-term integrity of the marine terminal include slope failure (slides), seismic events (earthquakes) and tsunamis. The marine terminal is configured, and will be designed, to limit exposure to these hazards.

The west side of Kitimat Arm, above the marine terminal, has been identified as a site that could be susceptible to slope failure resulting from slides, debris flows and rock fall. These hazards can be effectively mitigated by designing rock and soil cuts to produce stable slopes, and by using passive rockfall protection, including meshing, anchoring, ditch and berm design. Consideration will also be given to catch fences.

Seismic conditions at the marine terminal are characterized as moderate. The marine terminal will be designed for appropriate seismic forces with reference to applicable codes and engineering practice. Landslides, including slides in sensitive glaciomarine clays, might move in response to seismic motions, but the potential for movement has been and will be allowed for or mitigated during design. Glaciomarine

clay, which might be susceptible to seismically induced sliding, will be removed from selected areas such as below tank foundations. Cut slopes will be designed to allow for seismic motions, and infrastructure will be designed with appropriate consideration of seismic conditions.

Large seismically induced tsunami events have occurred at many locations around the Pacific Basin. However, the Queen Charlotte and other coast islands protect the Kitimat region from tsunamis originating west of these islands. There are no faults or identified sources of landslides near the Project that could generate a large tsunami.

The magnitude and frequency of locally generated tsunami events in Kitimat Arm will be determined during detailed design. The design and operation of the marine terminal will take into account appropriate wave heights and characteristics. Warning systems for tsunamis generated by offshore earthquakes will be coordinated with existing Pacific Basin tsunami warning systems.

Given the mitigation, and given that detailed engineering design will take these potential hazards into account, the residual effects of the environment on the marine terminal are predicted to be not significant.

11.9 Volume 6C: Environmental and Socio-economic Assessment (ESA) – Human Environment

Volume 6C identifies and assesses the effects of routine project activities on the human environment, including:

- national and provincial economics
- human health
- non-traditional land use
- heritage resources

The assessments focus on key issues that are of particular interest to regulators, participating Aboriginal groups or other stakeholders.

TDRs, which are not being filed as part of the Application, but provide detailed background information on existing conditions, are summarized in Appendix M and are available upon request.

Information on the potential effects on the following will be made available at a later date:

- regional employment opportunities and regional business opportunities
- regional population changes
- community services, regional transportation and infrastructure
- individual family and community wellness

Summary of Results

Socio-economic Conditions

Potential effects of construction and operations on socio-economic conditions include effects on:

- national and provincial economies
- regional employment

- population
- community services and infrastructure
- individual, family and community wellbeing
- human health
- traffic
- traditional culture

Project construction and operations will have a beneficial effect on the economies of Canada, Alberta and British Columbia. Construction spending of $5.54 billion over three years will increase the Canadian GDP by $6.3 billion, and project operations will increase the GDP by $203 million per year. Over the Project's life, British Columbia will experience 51% of the GDP effects, Alberta will experience 33% and the balance will be felt in other parts of Canada. Despite the magnitude and duration of project effects on GDP and employment, the overall effects on the provincial and national economies are considered not significant relative to the overall size of these economies. See Table 11-1 for key findings regarding the effects of the Project on the GDP.

Human health concerns during construction include:

- possible increased demands on community health facilities by project workers
- interactions between construction workers and local residents
- increased motor vehicle accidents resulting from increased road traffic
- exposure to chemicals of potential concern (COPCs) because of air emissions during construction

Mitigation measures will include:

- providing health and safety training for all construction personnel
- providing basic medical services in camps
- establishing appropriate transportation plans
- controlling dust
- using low sulphur fuel

With mitigation, project effects on human health are expected to be not significant. Modelling shows that emission levels during operations are well below ambient air quality objectives for acute and chronic exposures. Therefore, no direct incremental effect on human health risk is expected from project operations. As other industries already contribute substantially to emissions in the region, Northern Gateway will work with other industries and local and provincial governments to reduce regional air emissions and monitor effects on ecological and human health.

A detailed assessment of potential regional effects is being prepared to reflect recent changes in the project cost and will describe:

- potential employment benefits
- increases in regional populations
- management of potential social problems
- increased transportation activities
- possible effects on traditional culture

Table 11-1 Key Findings – Assessment of Project Effects on Socio-economic Conditions

Project Effects	Key Findings
Canadian GDP	• Project operations will cost about $192 million per year and will contribute $203 million per year to the GDP throughout the economy. • Project operations will increase government revenues throughout the economy by $86 million per year. • Effects of project construction and operations on the provincial and national economies are considered not significant relative to the overall size of these economies.
Employment	• Project construction will generate 62,694 person-years of employment throughout the Canadian economy. • Project operations will provide the equivalent of 1,146 full-time jobs annually throughout the Canadian economy, about 33% of which will be in Alberta and 49% in British Columbia.

Non-traditional Land Use (NTLU)

The Project may result in effects on:

- forestry
- trapping, hunting and recreational fishing
- use of designated recreation areas, protected areas, and non-consumptive recreational areas
- aggregate, mineral and oil and gas resources activities
- agriculture and private land use activities
- visual and aesthetic resources

It is expected that project environmental effects on forestry operations will be related to:

- loss of forestry land base
- loss of timber
- the potential to disturb high-priority forestry plots
- access road use and maintenance
- access to timber resources on the other side of the RoW from current access points
- the potential of project activities to spread the mountain pine beetle

The project RoW and area associated with project infrastructure are to remain clear of forest cover throughout the life of the Project. Project effects on forestry are low for loss of forestry land base (loss of merchantable timber) and of medium magnitude for forestry access and disturbance to high priority forestry plots.

Key concerns with respect to project effects on trapping, hunting and recreational fishing are that the Project might increase sensory and habitat disturbance for wildlife and interfere with harvesting activities, associated infrastructure (e.g., cabins and traplines) and travel. It is expected that mitigation measures will lessen the effects on trapping and consumptive recreational activities such that the effect of the Project on these activities is low, local, short-term and not significant.

Project construction and operations will take place near parks, protected areas and recreation areas, including parks near (both in water and on land) the marine transportation route. The proposed Burnie River protected area was planned by provincial authorities in consultation with and consideration of the Project, to allow for the pipeline RoW. After construction, only low-intensity, noise-producing activities such as aerial reconnaissance and pipeline and marine infrastructure operations will persist. Visual disturbance effects are expected to be not significant. Northern Gateway will work with the Monkman Pass Memorial Trail Project coordinators to help preserve the historic Monkman Pass Highway and create recreation opportunities along the pipeline route in the valley. The magnitude of the effect of tanker traffic on access to marine parks will be negligible, and the magnitude of noise and visual effects on marine and land-based parks and recreation areas will also be negligible.

Non-consumptive recreation activities (mountain biking and snowmobiling) in the Burns Lake area are also expected to be affected during construction activities. With mitigation, this effect will be not significant.

The Project may affect aggregate resource, mineral and oil and gas activities because of interference with planned exploration and extraction activities. Northern Gateway will notify and consult with all aggregate resource, mineral and oil and gas tenure holders regarding Project activities and compensate where disturbance is unavoidable. Effects are considered to be not significant.

The Project could affect agriculture and private land use activities along the RoW during construction and decommissioning. All temporary effects of construction on loss of agricultural land base will be addressed through a combination of mitigation (i.e., advance notification) and compensation (for temporary loss of land). Minor losses of Agricultural Land Reserve (ALR) lands will occur in British Columbia throughout the life of the Project. However, restoration of the sites following decommissioning will make it possible to return the sites to the ALR land base. In Alberta, the magnitude of effects is negligible through the life of the Project because of the limited spatial extent of lands that will be affected. The effects on land base loss are, therefore, considered to be not significant.

The assessment of the effects of the Project on visual and aesthetic resources considers visual, light and noise disturbances to evaluate the effects of the Kitimat Terminal on:

- the residents of the Kitamaat Village
- fishers (commercial, recreational and subsistence)
- recreation boaters
- land-based recreationists
- ecotourism-related businesses
- trappers
- guide outfitters
- the residents of District of Kitimat

For non-residents, visual effects are most prominent close to the Kitimat Terminal, but the magnitude of the effects becomes negligible as the viewer moves away from the Kitimat Terminal. Overall, residual effects from the Project on visual, light and noise disturbance are not significant.

Project effects on access to and the aesthetic, visual and noise effects on marine parks, protected areas and recreational areas will be not significant because of the low frequency of project-related tanker traffic and the short-term nature of any encounter with a project-related tanker.

With mitigation implemented by Northern Gateway, the effects of the Project on NTLU are predicted to be not significant.

Heritage Resources

Construction activities could affect heritage resource sites in Alberta and British Columbia. To assess project effects on heritage resources, historical resources impact assessments (HRIAs) were completed according to provincial legislative requirements. Several heritage resource sites, trails and culturally modified trees were documented in the area of direct physical disturbance and assigned a heritage value. Recommendations regarding their final dispensation were provided to the provincial regulatory agencies. The agencies will issue requirements for avoidance or further mitigation. Since Northern Gateway follows the provincial mitigation requirements and consults with the resident Aboriginal communities, adverse effects are expected to be not significant. Positive project effects include recording the sites scientifically, adding them to the provincial databases, and obtaining scientific data from mitigation studies.

11.10 Volume 7A: Construction Environmental Protection and Management Plan

The Construction EPMP describes the environmental management aspects that will be applied during construction of all project components. The Construction EPMP describes the approach and commitment by construction and project personnel to protect the environment during construction and outlines the general and specific methods that will be used. Once detailed design and route selection have been completed, additional details will be provided in a final Construction EPMP. The final Construction EPMP will document the requirements for project construction to be followed under applicable regulations, internal policies and procedures.

Key roles and associated responsibilities for the environmental inspection program will be coordinated with the construction team and incorporated into the final Construction EPMP. The existing policies and management tools will be used in the overall guiding philosophy for project construction and adapted as required for environmental conditions along the route.

11.11 Volume 7B: Risk Assessment and Management of Spills – Pipelines

Volume 7B describes:

- key measures that Northern Gateway will use to prevent and reduce the likelihood of hydrocarbon spills along the pipeline route
- emergency response planning

- spill response, recovery and containment
- the characteristics of hydrocarbons that will be transported by the pipelines, including their fate in the environment (e.g., evaporation and dispersion) in the unlikely event of a release

Potential environmental and socio-economic effects that could occur because of a hydrocarbon release during pipeline operations are also discussed. Hypothetical examples are included to describe emergency response and mitigation of different volumes in key environmental settings along the pipeline route.

Northern Gateway will implement mitigation measures during design, construction and operation of the pipelines to prevent releases and to quickly respond should an event occur. Pipeline design will comply with all applicable codes and standards, material specifications and engineering plans. The route selection process has been carefully conducted to avoid risks associated with geotechnical and other potential hazards. During construction, spill response measures outlined in the Construction EPMP (see Volume 7A) will be followed to reduce or contain spills that may occur because of construction-related activities. During operations, measures such as routine aerial and ground monitoring, integrity management (e.g., internal inspections), leak detection systems and remote control of valves will be implemented. Northern Gateway will also prepare response plans, including strategies for responding to emergencies in sensitive areas. These will include tactic response sheets for each of the major watercourse crossings.

Based on NEB historical data, and with planned mitigation measures, there is a low risk of a release occurring along the pipeline route during the life of the Project. Return periods of 118 to 2,525 years for medium (30 to 1,000 m^3) or large (1,000 m^3 or larger) spills in each of the six physiographic regions that the pipeline crosses are predicted, all of which are greater than the anticipated lifespan of the Project. Estimated failure frequencies for specific points along the pipeline are lower than those shown for physiographic regions.

Effects on Biophysical and Human Environments

Despite the low risk of a release occurring along the pipeline route, the effects on the biophysical and human environments are assessed. The biophysical assessment considers the effects on the atmospheric environment, soils, hydrogeology, surface water resources, vegetation, wildlife and freshwater fish and fish habitat. The assessment of the human environment considers the effects on heritage resources, ATK, NTLU and socio-economic conditions.

Biophysical Environment

Wildlife groups will be affected to some degree by habitat loss following a spill, particularly those species with low mobility and small home ranges. Direct contact and absorption, ingestion or inhalation of hydrocarbons can lead to mortality of vegetation and wildlife. Mechanisms of toxicity vary depending on the organism.

The effects depend largely on location (physical environment) and time of year. Although in some areas, only a few individuals from a population may be affected, other locations may have a high concentration of species that exist nowhere else, or there may be short-term or seasonal habitat for a significant percentage of an entire population (e.g., migratory birds in the Kitimat River estuary).

Physical and chemical analyses of the hydrocarbons that will be transported in the pipelines (i.e., diluted bitumen, synthetic oil and condensate) indicate that the effects of condensate would be more limited in space and time than those associated with synthetic oil or diluted bitumen, given the higher volatility and evaporation rate of condensate. Condensate may have immediate (acute) adverse effects on biota; however, where complete cleanup is not possible, diluted bitumen would be more persistent in the environment, resulting in acute and potential long-term adverse effects (i.e., months to years).

Emergency response plans and cleanup procedures would be implemented immediately to mitigate adverse effects to vegetation and wildlife. Monitoring would be necessary so that recovery continues post-cleanup.

Human Environment

Effects of a release on land to the human environment would generally be confined to a small area, and though not inconsequential, adverse effects would generally be short lived (e.g., one growing season for affected vegetation) and reversed by remediation of affected soils and, in some cases, groundwater. If heritage resources are nearby, cleanup activities would need to be carefully planned to reduce potential adverse effects. Effects may be greater in aquatic habitat, due mainly to the potential for fish mortality, closures for recreational fishing while populations recover and possible effects on drinking water (if potable water supplies are affected).

Hydrocarbons could adversely affect the human environment by interfering with land uses by:

- Aboriginal peoples
- other people or entities with a legal right to use resources or land (e.g., landowners, licences or rights to water, timber and trapping)
- commercial enterprises (e.g., guides and fishing lodges)
- the public (e.g., for recreation, fishing and camping)

Health and safety considerations for emergency responders and the general public would be dealt with through the Oil Spill Response Plan.

Northern Gateway is responsible as the operator of the pipeline for compensation to address property loss and personal injury as a result of an incident. Aboriginal groups, businesses and individuals in affected communities would also have opportunities to undertake or be employed to assist with cleanup and remediation activities.

Hypothetical Spill Examples

Hypothetical spill examples are used for four different types of environments, using specific locations along the pipeline route (representing different ecosystems and types of land use, i.e., agricultural land, wetland, inland fish-bearing river and coastal fish-bearing stream). Volumes used in the examples represent a range that could occur for the hydrocarbon products (diluted bitumen and condensate). The examples are intended to aid in the development of the emergency response plans and further risk reduction through design and engineering. The examples for condensate and diluted bitumen use

conservative volumes. Aquatic examples are selected to consider a range of factors such as stream order, remoteness, recreational use, flow, turbulence, access and remoteness for emergency response.

The results indicate that, for a medium-sized release onto agricultural land in Alberta, effects on soil capability would be reversible with cleanup and remediation. The release would affect a relatively small area of land around the pipeline RoW and be cleaned up within three to four days, with some soil remediation following for several weeks. A medium-sized release into a fen wetland in Alberta would affect a small area of land around the pipeline RoW and be cleaned up within a week. Effective response and cleanup would limit the potential for hydrocarbons to move into groundwater, which would also be slowed by the presence of peat, the underlying clay layer and the fact that wetlands are groundwater discharge areas. A large release entering a low-gradient inland river system in British Columbia (Crooked River) would be considered reversible, but long-term (i.e., several years or more) for many environmental components. A large release entering a high-gradient coastal stream system in British Columbia (Hunter Creek—a tributary of the Kitimat River) would enter highly valued fish habitat and could spread downstream 60 km into the Kitimat River estuary. Such an event would have adverse effects on water quality, fish and fish habitat, terrestrial vegetation, wildlife, NTLU and community wellbeing.

Summary

Spill prevention and emergency response planning is a key priority for Northern Gateway and has influenced pipeline design and routing, as well as in planning for construction and operations activities. While the likelihood of occurrence along the pipeline route is low, Northern Gateway will mitigate effects through measures outlined in emergency response plans. Contingency planning, including response equipment, locations and response requirements will be incorporated into the Project. Emergency response resources will be in place for containment (e.g., sumps and containment berms at pump stations) and effective cleanup. Detailed response plans will be developed, and priority response areas will be identified before project construction. Caches of response equipment will be positioned along the pipeline route and intercept points along watercourses, where responders can effectively deploy equipment to limit downstream movement of hydrocarbons.

11.12 Volume 7C: Risk Assessment and Management of Spills – Kitimat Terminal (Tank and Marine Terminals)

Volume 7C describes:

- key measures that Northern Gateway will use to prevent hydrocarbon spills at the terminal
- likelihood of a hydrocarbon spill
- emergency response planning
- recovery and containment of hydrocarbon releases
- characteristics of hydrocarbons that will be loaded and unloaded at the terminal, including their fate in the environment (e.g., evaporation and dispersion)

Potential environmental and socio-economic effects that could occur because of a liquid hydrocarbon release during operation of the marine terminal are also discussed. Hypothetical examples are included to describe emergency response and mitigation at the terminal. As a part of an ecological risk assessment, marine water and sediment quality models are used to predict the potential chronic effects at the terminal.

Northern Gateway will implement mitigation measures during design, construction and operation of the marine terminal to prevent spills and to effectively respond. Terminal design will comply with all applicable codes and standards, material specifications and engineering plans. During construction, emergency response measures outlined in the Construction EPMP (see Volume 7A) would be followed to reduce or contain incidents that might occur because of construction-related activities. The loading arms will be designed with leak detection and shutdown systems to limit the amount of hydrocarbon that can be released. Each tanker berth will be equipped with a containment boom. The containment boom will be deployed during all oil loading operations. It will extend from shore, out around the tanker and back to shore. Because condensate dissipates quickly, the containment boom will not be used during condensate off-loading.

The likelihood of a release at the marine terminal and the associated uncertainty of that estimate are addressed by the quantitative risk analysis (QRA). Based on the importance of understanding how the likelihood of an oil spill is determined quantitatively, Northern Gateway initiated a round-table process involving stakeholders and participating Aboriginal groups from the north coast area to identify issues of concern. Participants, called the QRA working group, contributed to the scoping, terms of reference and selection of a consultant to complete the QRA.

Calculating the likelihood of a spill at the marine terminal and the volumes associated with a release are preliminary and subject to change based on review by the QRA working group. This review will be finalized in Q2, 2010; therefore, quantitative information in this report on likelihood is based on a draft version of the QRA as of March 2010. Maximum credible volumes are calculated based on the size of the loading infrastructure and the leak detection and valve shutdown systems. The probability of releases at the marine terminal are calculated based on the global frequency of marine shipping incidents since 1990 (which represents the experience with modern tankers) and scaling factors appropriate to the site of the marine terminal (e.g., wind, current and traffic conditions). The overall risk of incidents at the marine terminal is considered low.

In the event of an incident, recovery and clean up of liquid hydrocarbon, follow-up and monitoring studies and habitat remediation would take place and are discussed for each topic, as applicable.

Similarly, the physical and chemical analyses of the hydrocarbons that will be loaded and unloaded at the terminal indicate that the effects of a condensate release would be much more limited in extent and time compared with synthetic oil or diluted bitumen, given the higher volatility and evaporation rate of condensate.

Effects on Biophysical and Human Environments

Despite the low risk of an incident occurring at the terminal, the effects on the biophysical and human environments are assessed. The biophysical assessment considers the effects on the atmospheric environment, water quality, plankton, marine vegetation, marine invertebrates, marine fish and marine

fisheries (i.e., the food, social ceremonial, commercial, recreational and commercial-recreational fisheries), marine birds, marine mammals and wildlife that use shoreline habitat. The assessment of the human environment considers the effects of a release on heritage resources, traditional use, NTLU and socio-economic conditions.

Biophysical Environment

Hydrocarbons could have immediate acute adverse effects, particularly for a release into the marine environment, where fish, marine biota and waterbirds would be most affected. Hydrocarbons dissolved in water have an immediate toxic effect on marine organisms (juvenile fish are more vulnerable than adults). There may also be some chronic toxicity associated with hydrocarbons remaining after cleanup. Results from the ecological risk assessment predicted that a spill at the terminal would mainly affect sessile intertidal organisms (e.g., rockweed and invertebrates), with no persistent or population-level effects on marine birds or furred mammals and no likely effects on marine mammals (due to the relatively small size and short duration of the incident). Most marine organisms would be affected to some degree by habitat loss following an incident, particularly those with low mobility and small home ranges. Direct contact and absorption, ingestion or inhalation of hydrocarbons can lead to mortality of vegetation and marine organisms. Mechanisms of toxicity vary depending on the organism.

Effects of a release depend largely on location (physical environment) and time of year. Although in some areas, only a few individuals from a population may be affected, other locations may have a high concentration of species that exist nowhere else, or there may be short-term or seasonal habitat for a significant percentage of an entire population (e.g., migratory birds in the Kitimat River estuary), leading to more pronounced effects to exposed species or habitats.

Physical and chemical analyses of the hydrocarbons that will be loaded and unloaded at the terminal indicate that the effects of a condensate would be much more limited in extent and time compared with synthetic oil or diluted bitumen, given the higher volatility and evaporation rate of condensate.

Emergency response plans and cleanup procedures would be implemented immediately to mitigate adverse effects on marine ecosystems and will be developed before project commissioning. Monitoring would be necessary so that recovery continues post-cleanup.

Human Environment

Hydrocarbons could adversely affect the human environment by interfering with marine resource (e.g., fish, shellfish and crustaceans) uses by:

- Aboriginal people
- other people or entities with a legal right to use marine resources (e.g., shoreline landowners, licences or rights to water resources, fisheries)
- commercial enterprises (e.g., guides, fishing lodges and tourism operators)
- the public (e.g., for recreation and fishing)

At the marine terminal, the effects on the human environment would be related to fish mortality, which could result in temporary closures to allow for recovery of fish populations and to mitigate effects potentially arising from contaminants in exposed seafood. The results of a human health risk assessment conducted at the marine terminal predict that risks to human health from eating molluscs, crabs and other shellfish in the potentially affected area would be well below thresholds that indicate a potential risk of chronic adverse effects. However, tainting of local seafood resources could occur and persist for one or more seasons, even if contaminant levels are low and there are no food safety concerns. Health and safety considerations for emergency responders and the general public will be addressed in the Spill Response Plan.

A release also has the potential to affect heritage resources (i.e., archaeological and palaeontological remains) through contamination or during the response and cleanup. More detailed study and mitigation plans would need to be developed at the time of an incident to identify and avoid damage to these resources.

In situations where individuals or commercial operations experience a clear economic loss, compensation would be paid. Northern Gateway would endeavour to compensate affected parties are remunerated as promptly as possible. The extent of socio-economic effects would likely only become clear after costs of cleanup have been documented. Health and safety considerations for emergency responders and the public would be handled through the Oil Spill Response Plan (OSRP).

Hypothetical Spill Examples

Two hypothetical examples are used: a medium-sized spill of diluted bitumen and similar sized spill of condensate, both at the marine terminal. The examples are intended to help develop an emergency response plan and further reduce risk through design and engineering. The examples use conservative estimates of release volumes estimated for the loading and unloading infrastructure at the terminal and the time required for shutdown following detection of a leak. Results do not take into account any standard mitigation measures or response measures (e.g., placing a containment boom around the tanker or removing oil).

A summertime release into the marine environment would result in hydrocarbons released into the water, spreading onto the shore and evaporating into the air. The results indicate the effects at the marine terminal would be reversible, with the greatest risk being contamination. Organisms likely to be exposed include marine birds, fish (primarily those spawning and rearing in nearshore areas), marine mammals and intertidal invertebrates and vegetation. Terrestrial biota along the shoreline may also be exposed. Human activities (e.g., traditional harvesting, subsistence, commercial and recreational activities) may also be adversely affected. As detailed information regarding traditional use in these areas has not yet been provided, conclusions regarding effects on harvesting and cultural resources have not been reached.

A medium-sized condensate spill at the marine terminal would result in short-term effects on water quality and potentially longer-term effects on sediment quality. Effects would be reversible. Recovery of the intertidal zone would be expected within two to five years. Species of conservation concern (e.g., Marbled Murrelet, Surf Scoters, killer whales and humpback whales) could be present near the marine terminal at the time of an incident. The estuary north of the marine terminal provides prime shorebird and fish habitat and leads to a salmon spawning river. Water quality, sediment and particularly

fish and fish habitat would be affected by a spill. There would likely be a closure on recreational fishing until the fish populations have recovered. For marine organisms, individuals in the immediate vicinity might suffer mortality, particularly fish, invertebrates and shorebirds, but this loss would not reduce viability of local populations. Exposed vegetation would die and be removed, but there are no rare plants or rare ecosystems identified for this area.

For either diluted bitumen or condensate, fisheries could be temporarily closed because of contaminant levels, conservation concerns or tainting. The area could experience temporary disruption of vessel traffic, loss of local fish and shellfish resources over one recruitment season (e.g., from salmon fry mortality or contamination of shellfish). Effects would be particularly noticeable on non-traditional marine uses at the marinas because summer is typically a peak recreational season. The possible effects would be aesthetic disturbances and restricted access to shorelines, the Kitamaat Village marina, and the marine terminal during the cleanup. The channel width is wide enough to maintain vessel traffic. However, exposed log snags, vessels and marine infrastructure would be fouled.

Summary

Spill prevention is a key priority for Northern Gateway and has influenced marine terminal design and planning for construction and operations. While the likelihood of an incident occurring at the marine terminal is low, Northern Gateway will implement emergency response measures as outlined in emergency response plans. Contingency planning, including response equipment, locations and response requirements will be incorporated into the Project. Emergency response resources will be in place to expedite containment (e.g., personal protective equipment, booms, skimmers, response vessels, pumps, shoreline cleaning equipment, temporary storage and equipment to mitigate and respond to affected wildlife) and effective cleanup. Detailed response plans will be developed, and priority response areas will be identified before marine terminal construction. Caches of response equipment will be positioned where responders can effectively deploy equipment to limit movement of oil and locations will be pre-determined.

11.13 Volume 8A: Overview and General Information – Marine Transportation

Oil will be exported in tankers ranging in size classification from Aframax to VLCCs, with capacities of approximately 80,000 to 320,000 DWT and lengths of 220 m to approximately 345 m. Condensate will be imported on tankers in the Aframax and Suezmax size (average of 160,000 dwt) tankers. All tankers will be double-hulled and will be equipped with modern navigation, safety and communications systems, which are standard for tankers of these types. On average, 50 VLCC, 120 Suezmax and 50 Aframax tankers are expected to call at the Kitimat Terminal annually. All tankers will comply with the *Canada Shipping Act* and international safety conventions and, before arrival in Canadian waters, will undergo a thorough tanker vetting process designed to comply with the most stringent safety requirements of Northern Gateway.

Tankers navigating to and from the Kitimat Terminal will use a network of well established coastal waterways that have been used by deep-sea tankers for many decades. The waterways leading to Kitimat are wide and deep. The routes have been reviewed by several experienced tanker captains and marine pilots and they are considered to be safe and viable for the full range of tankers being considered. Some improvements are recommended to the existing network of navigation aids to improve all-weather safety. Installing radar coverage of important sections of the marine transportation routes within the CCAA is planned.

While in coastal waters all project tankers will be under the guidance of licensed, experienced Canadian marine pilots who are familiar with the local waterways and weather conditions. During vessel transits of the CCAA and OWA:

- a close escort tug will be used for all laden and ballasted tankers beginning at the pilot boarding stations (Triple Island and proposed sites in Browning Passage and Caamaño Sound) to and from the marine terminal. The close escort tug will normally be positioned approximately 500 m astern of the tanker, or as directed by the shipmaster or pilot during the transit.
- a tethered tug, in addition to a close escort tug, will be used for all laden tankers in the CCAA. The tug will be tethered to the stern of the laden tanker at all times, ready to assist with steering or slowing down.

Local pilots will board and assist all incoming and outgoing tankers. During transit of the CCAA, average tanker speeds will be 8 to 12 knots.

Additional safety features that are proposed by Northern Gateway for the marine transportation and terminal components of the project are as follows:

- the Tanker Acceptance Program will ensure that the tankers scheduled to berth at the terminal will meet a model of world class standards
- all tankers must be equipped and will be required to conform with closed loading and vapour recovery operation systems
- all tankers will be equipped with an electronic chart display and information system (ECDIS), which integrates position information from the global positioning system (GPS) and other navigational sensors, such as radar and automatic identification systems (AIS)
- experienced marine pilots with independent pilot carried ECDIS navigation systems will be on board to provide guidance during transits of the coastal waterways
- improvements to navigational aids and the provision of radar station coverage for important areas of the CCAA
- dock monitoring, mooring load monitoring, firefighting, gas detection, security and other safety systems will be installed and monitored during all phases of cargo handling operations

The regional waterways are used by a wide variety of existing vessel traffic, including large bulk cargo and container ships, tankers, ferries, fishing vessels, tug boats and recreational craft. Overall, the existing vessel traffic is relatively sparse, with traffic in the most heavily used areas averaging less than one vessel per hour. Vessel traffic in the region is monitored by the CCG's Marine Traffic and Communications

Services (MCTS) centre in Prince Rupert. Tankers visiting the Kitimat Terminal will be in frequent radio contact with the MCTS to coordinate their movements with other shipping traffic in the region. The tankers associated with the Project will increase the overall regional traffic in the Wright Sound area by approximately 13% over existing levels.

The marine terminal will be designed, operated and maintained according to industry best practices. The equipment used to control and monitor tanker berthing, mooring and cargo transfer will feature state-of-the-art monitoring and control systems to reduce the potential for spills. A detailed pre-cargo transfer safety checklist will be followed before transfer of any cargo—to confirm that all equipment is in proper operating condition. In the unlikely event of a spill, the terminal personnel will be trained and equipped to respond quickly to contain and recover the spill. Detailed contingency plans and checklists will be put in place for safe operations and cover a full range of potential emergency situations.

The QRA of the marine transportation components of the project is being completed by Det Norske Veritas (DNV)—a Norwegian based independent foundation that specializes in risk management services. A draft QRA report has been submitted by DNV (DNV 2010, in prep.). In the case of information on risk and spill management being updated upon completion of the final QRA report, an update will be provided to the JRP and the NEB.

DNV (2010, in prep.) calculates a return period (recurrence interval) for events related to oil and condensate cargo handling operations (with a closed loading system) at Kitimat Terminal:

- 110 years for small oil spills of less than 10 m^3
- 230 years for small condensate spills
- 430 years for medium oil spills of between 10 and 1,000 m^3
- 910 years for medium condensate spills

For risk related to vessel transits within the Territorial Sea of Canada with inclusion of navigation safety mitigation (primarily the use of tethered and close escort tugs), the calculated return period of a spill of any size from a tanker carrying oil is 350 years. For condensate, the return period is 890 years. The return period for large scale releases increases (risk level decreases) substantially to a level of 550 years for a spill exceeding 5,000 m^3, 2,800 years for a spill exceeding 20,000 m^3 and more than 15,000 years for a spill exceeding 40,000 m^3.

The shipping and navigation aspects of the Project will be reviewed in detail as part of Transport Canada's TERMPOL Review Process—a voluntary process that focuses on tanker operations, terminal systems, terminal sites and their waterway access.

11.14 Volume 8B: Environmental and Socio-Economic Assessment (ESA) – Marine Transportation

Volume 8B identifies and assesses the effects of marine transportation between the coastal waters of British Columbia and the Kitimat Terminal on:

- marine vegetation
- marine invertebrates
- marine fish
- marine mammals
- marine birds
- marine fisheries

In addition, Volume 8B:

- contains an assessment of routine activities in the open water area
- discusses marine pollution and marine safety
- discusses the effects of the environment on marine transportation

Summary of Results for the CCAA

Marine Vegetation

Marine vegetation has ecological importance as food, refuge and rearing habitat for invertebrates and juvenile fish. Rockweed and sea lettuce are the dominant seaweeds. Relatively undisturbed marine riparian vegetation is present along most of the shoreline of the assessed area, and soft-bottom estuaries in the region are dominated by eelgrass. Change in habitat quality from tanker wake is the potential environmental effect on marine vegetation from marine transportation. The effects from tanker wake are considered not significant because waves generated by tankers are within the range of naturally occurring waves in the marine transportation area and are not expected to cause adverse effects.

Marine Invertebrates

Marine invertebrates have ecological importance as food, substrate, refuge and rearing habitat for other invertebrates and juvenile fish. Dominant species include barnacles, mussels, periwinkles and limpets. Some species, such as Dungeness crab, also have commercial value. Potential environmental effects are changes in habitat quality from tanker wake and acoustic disturbance. Waves generated by tankers are within the range of naturally occurring waves in the marine transportation area and are not expected to cause adverse effects. Elevated underwater noise from tankers berthing and in transit is not expected to affect the viability of marine invertebrates. Effects from marine transportation are not expected to cause adverse changes to marine invertebrate habitat or to the long-term viability of marine invertebrate populations and are, therefore, considered not significant.

Marine Fish

Marine fish have ecological, social, cultural and commercial value. Representative fish include eulachon, Pacific herring, rockfish and chum salmon. The area assessed is heavily used by marine fish for feeding, spawning, rearing and as a migratory route. Potential environmental effects are acoustic disturbances. Underwater noise from project-related marine transportation is not expected to substantially affect use of habitat by marine fish for feeding, migration or spawning. Any effects would be short-term in duration and reversible and, therefore, effects are considered not significant.

Marine Mammals

Three marine mammals are assessed: Northern Resident (NR) killer whale, North Pacific (NP) humpback whale and Steller sea lion. Potential effects assessed are behavioural change because of underwater noise from vessels and physical injury to humpback whales from vessel strikes. Marine mammals are highly dependent on their ability to perceive and discriminate underwater sounds. Sound production and audition are critical for important life functions such as spatial orientation, migration, communication, predator and prey detection, courtship displays and mating, and locating conspecifics (i.e., members of the same species). Mitigation measures include:

- using the Northern and Southern Approaches for vessel transits
- reducing vessel speed to 10 to 12 knots throughout the CCAA
- reducing vessel speed to 8 to 10 knots in the core humpback whale area during May to November, unless otherwise required for safe navigation
- implementing a whale-monitoring vessel during months of peak humpback whale abundance in the core humpback whale area
- investigating the use of remote detection techniques for humpback whales, such as passive acoustic monitoring or land-based radar
- using the best commercially available technology at the time of design and construction of the purpose-built tugs (primarily in engine vibration reduction and propeller design) so that escort and harbour tugs produce the least underwater noise possible

Residual environmental effects of project-related marine transportation may lead to changes in the distribution and abundance of some marine mammals within the CCAA, but are not expected to affect the long-term viability of marine mammals at a population level.

Although conservative assumptions are made in assessing potential effects, it is recognized that the NR killer whale population is small, threatened and potentially limited by prey. The CCAA includes potential critical habitat for NR killer whale but the amount of important foraging habitat for this species in the CCAA is not known. Given these uncertainties, and the potential that behavioural change may limit prey availability (a threat identified in the National Recovery Strategy), use of the precautionary approach in reaching a determination of significance for effects of vessel-based underwater noise on NR killer whales is merited. Using the precautionary approach, a confident determination of significance for residual effects is currently not possible.

Northern Gateway will:

- develop and implement a marine mammal protection plan specific to the Project that would outline measures to limit the effects of underwater noise on NR killer whales and other cetaceans in the CCAA, including all mitigation measures described. Monitoring of marine mammals would be used to assess the effectiveness of these measures and, if required, modify these measures or implement new measures to address this effect.
- take a lead role in researching potential behavioural changes, and associated effects such as increased energy expenditure or reduced foraging efficiency, with other interested parties
- Northern Gateway will use information from project-specific monitoring of marine mammals and the working group research initiatives as part of an adaptive management approach to mitigate project effects and support recovery of the species.

Marine Birds

Marine birds assessed are Marbled Murrelet and Surf Scoter. Potential environmental effects include sensory disturbances and habitat avoidance from in-air acoustic emissions, the physical presence of vessels and possibly underwater noise. The effects of sensory disturbance will be short term, localized, limited to a small number of birds, and are not expected to affect the viability or sustainability of regional marine bird populations. Therefore, these effects will be not significant.

Marine Fisheries

The four categories of fisheries considered are commercial fisheries, FSC fisheries, commercial-recreational fishing and recreational fishing. Available statistical data are primarily focused on commercial fisheries, which include Pacific salmon, Pacific halibut, herring, prawn, shrimp, Dungeness crab, red sea urchin, geoduck, horse clam, octopus and some groundfish. The FSC fishery is important to coastal Aboriginal groups for spiritual and cultural purposes and as a key food resource. Northern Gateway is conducting focused engagement with coastal and interior Aboriginal communities potentially affected by project-related marine transportation. Potential environmental effects on marine fisheries include:

- disruption of access to fishing grounds
- loss or damage to fishing gear
- aesthetic, visual and noise disturbances

Northern Gateway is proposing to establish a fisheries liaison committee (FLC) to facilitate effective communication with commercial, FSC, commercial-recreational and recreational fishers along with regulators and other interested parties to address specific fisheries issues and develop mutually acceptable solutions. Mitigation measures may include measures to limit conflicts with commercial fishery openings (e.g., hours to days). These measures are expected to be effective in addressing adverse effects. Therefore, effects on marine fisheries are expected to be not significant.

Open Water Area

In the OWA, the potential environmental effects considered are changes in air quality from the vessel exhaust, effects of project-related vessels on marine mammals, interactions with fishing vessels, and sensory disturbance on recreational and marine resource users.

Air Emissions

Emissions from vessels transiting the OWA are estimated for criteria air contaminants (CACs), hazardous air pollutants (HAPs) and greenhouse gases (GHG). Results of the analysis show that emission interactions with the sea surface, and environmental effects on the marine environment, are not significant. At any given location along the Northern and Southern Approaches, air emissions are low in magnitude, regional in extent, short term in duration, occur at sporadic intervals and are reversible.

Marine Mammals

While some small amount of behavioural change in marine mammals is expected as a result of underwater acoustic emissions, these effects are expected to be reversible, possibly within minutes to hours of the passing of the vessel. Since effects of underwater noise are not expected to affect the long-term viability of any population of marine mammal in the OWA, they are determined to be not significant.

Overall, the likelihood and frequency of a vessel–baleen whale strike is unknown but considered to be low. To minimize the risk of vessel-cetacean strikes and associated mortality of these species, Northern Gateway will require that vessels that are transiting to or from the Kitimat terminal do not exceeds speeds of 14 knots while they are within the 'approach lanes to the CCAA' during the period when high densities of marine mammals are likely to be present in the OWA (May 1 to November 1 each year). Vessels will also be transiting shipping routes that are already in common use. With the mitigation measures, the potential effect of physical injury to marine mammals (resulting from vessel strikes) is not likely to affect the long-term viability or recovery of populations of species whose range includes the OWA. Therefore, this potential environmental residual effect is considered not significant.

Marine Fisheries

Five of thirteen identified commercial fisheries operating in the OWA could potentially overlap with the Northern and Southern Approaches. Mitigation measures may include measures to reduce conflicts with commercial fishery openings. These measures, along with the existing CCG's fishing vessel advisory notices, are expected to address potential adverse effects. Therefore, effects on marine fisheries are considered not significant.

Sensory Disturbance

Sensory disturbance is expected to occur only when vessel transits are occurring in the marine transportation approaches, so the effects will be temporary (i.e., tens of minutes to less than one hour per transit), site-specific and reversible. Sensory disturbances to marine resource users by project-related marine transportation are predicted to be not significant.

Marine Pollution and Marine Safety for Marine Transportation

Measures to prevent marine pollution and to improve maritime safety are addressed by the International Maritime Organization (IMO)—a United Nations specialized agency dealing with maritime affairs. The IMO, through its member states and agencies, develops international conventions and standards that are implemented by governments through incorporation into their domestic legislation. With respect to marine pollution, the International Convention for the Prevention of Pollution from Ships (MARPOL; marine pollution is abbreviated as MARPOL) deals with pollution from oil, chemicals, packaged goods, garbage, sewage, air emissions, anti-fouling systems, aquatic organisms and pathogens. The international provisions in Annex I – Regulations for the Prevention of Pollution by Oil, of MARPOL, have been incorporated into Canadian legislation in Division 1 of the Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals under Part XV of the *Canada Shipping Act*. Tankers will comply with the regulations, and environmental effects of their operations on environmental quality will be not significant.

Effects of the Environment on Marine Transportation

The environmental factors that could affect project-related marine transportation are severe weather, slope stability, seismic activity and tsunamis.

The main weather hazards to shipping in the region are moderate to heavy sea states caused by strong winds associated with travelling storms, the periodic bitterly cold outflow winds in winter and the dense sea fog that occurs primarily in summer. To mitigate the effects of weather, special measures will be in place to assist the tankers, including improvements to navigational aids, provision of tug and pilot assistance and improved coastal communications. There will also be the options of riding out severe weather at sea, heaving to, anchoring in selected areas or remaining in port until bad weather has passed. Because tankers will travel in mid-channel, and the narrowest channel width is 1.5 km, tankers will be at least 0.5 to 0.7 km from shore and will not be at direct risk of a landslide or rockfall. The effects of any known slides or stability issues during tanker transit are not significant. Stability along the channels in the CCAA will be reviewed in the future.

The magnitude of effects from seismic activity on marine transportation is minor. There will be no direct effect from seismic shaking. Potential hazards of tankers close to the berths are minimal and adequately addressed by the design considerations and mitigation measures for the Kitimat Terminal.

Coastal islands protect the Kitimat Terminal from tsunamis originating west of these islands. However, some effects may be felt from refracted waves.

The magnitude and frequency of locally generated long-period waves will be determined during detailed engineering design. The design and operations of the Kitimat Terminal will take into account appropriate wave heights and characteristics. Warning systems for tsunamis generated by offshore earthquakes will be coordinated with existing Pacific Basin tsunami warning systems.

With the design and mitigation measures in place, the residual effects of the environment on project-related marine transportation are predicted to be not significant.

11.15 Volume 8C: Risk Assessment and Management of Spills – Marine Transportation

Volume 8C addresses the potential environmental and socio-economic effects that could occur because of a hydrocarbon spill associated with marine transportation in the CCAA or OWA. It describes:

- key measures to prevent incidents in the CCAA and OWA
- the likelihood of incidents
- emergency response planning
- emergency response, recovery and containment measures
- the characteristics of hydrocarbons that will be transported by tankers, including their fate in the environment (e.g., evaporation and dispersion)

Northern Gateway will only accept tankers incorporating modern technology and meeting stringent requirements for these tankers under the vetting program. All tankers will be required to have double hulls and segregated ballast tanks, and will observe speed restrictions and operational safety limits. Tanker manning certification for officers and crew will comply with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (and amendments). Local pilots will board inbound tankers before the tankers enter the CCAA or at the Kitimat Terminal (for outbound tankers). Radar and additional navigational aids will be installed along important sections of the Northern and Southern Approaches.

Calculations of the likelihood of a release during marine transportation in the CCAA or OWA and the associated volumes associated are preliminary and subject to change based on review by the QRA working group. This review will be finalized in Q2, 2010; therefore, the information in this report on likelihood is based on the draft version of the QRA as of March 2010.

The likelihood of an incident in the CCAA and OWA is calculated based on:

- the global frequency of marine shipping incidents since 1990, which represents the experience with modern tankers
- scaling factors appropriate to the area (e.g., wind, current, navigability and traffic conditions)
- the conditional probability of a spill if an incident occurs

The likelihood of incidents in the CCAA and OWA is considered low. The analyses indicate that the probability of an incident because of grounding is higher than collision and that the risk of both can be reduced with the use of tethered or close escort tugs. Northern Gateway will also prepare detailed response plans before beginning operations.

Hypothetical Spill Examples in the CCAA and OWA

Hypothetical examples are used to assess effects in the CCAA and OWA and to:

- refine tanker specification and operational plans to reduce risk
- develop and implement an emergency response plan
- develop and implement a habitat protection plan to protect sensitive environments and sites

Examples considered diluted bitumen and synthetic oil incidents for different geographic and environmental conditions, navigational hazards and winds and currents. Although the likelihood of these hypothetical examples is low, each example provides an opportunity to realistically determine:

- key design features to avoid an incident
- mitigation (or contingency) measures
- behaviour of liquid hydrocarbons in the environment
- probability of an incident resulting in a spill
- effective response plans and equipment and personnel needs
- potential social, economic and biophysical effects

Examples at specific locations, based on proximity to navigational hazards or to unique or sensitive environmental features, or both, are used: Emilia Island, Wright Sound, Principe Channel, Caamaño Sound and Browning Entrance. A hypothetical release of 10,000 m^3 from a tanker is discussed for:

- Emilia Island (synthetic oil under outflow conditions during winter)
- Principe Channel (diluted bitumen under inflow conditions during summer)
- Ness Rock in Caamaño Sound (diluted bitumen under typical winter conditions)
- Butterworth Rocks in Browning Entrance (synthetic oil under typical summer conditions)

This volume approximates the consequence of a laden tanker grounding, and complies with emergency response capability plans required by Transport Canada. The volume was derived through the QRA, which provides a theoretical calculation of the consequence from a breach of a double hull and two internal tanks of the largest tanker, a VLCC, due to grounding.

An additional example (Wright Sound during summer), although highly unlikely, is for a 36,000-m^3 release, which represents the volume of oil that might be released due to a collision between the largest tanker envisaged to be used and another vessel, resulting in a breach of the double hull and almost complete drainage of two internal tanks.

Important mitigation measures that will be employed by Northern Gateway to reduce the potential for releases in the CCAA or OWA include:

- using a close escort tug for all laden and ballasted tankers beginning at the pilot boarding stations (Triple Island and proposed sites in Browning Passage and Caamaño Sound) to and from the marine terminal. The close escort tug will normally be positioned approximately 500 m astern of the tanker, or as directed by the shipmaster or pilot during the transit.
- using a tethered tug, in addition to a close escort tug, for all laden tankers in the CCAA. The tug will be tethered to the stern of the laden tanker at all times, ready to assist with steering or slowing down.
- using additional and enhanced navigational aids as proposed by British Columbia Coastal Pilots
- boarding and assistance of all inbound and outbound tankers by local pilots
- requiring that all tankers have a double hull
- vetting of all tankers and assured compliance with Canadian regulations and IMO standards (e.g., requiring electronic chart display and information systems on tankers, watch-keeping and inspections)

- reducing speed within the CCAA to 10 to 12 knots and, in certain areas during periods of high marine mammal densities, to 8 to 10 knots
- observing weather restrictions for tankers entering or transiting the CCAA and berthing at the terminal

Effects on Biophysical and Human Environments

The biophysical assessment considers the effects of a release in the CCAA and OWA on:

- the atmospheric environment
- water quality
- plankton
- marine vegetation
- marine invertebrates
- fish and fisheries (traditional use, commercial, recreational and commercial-recreational)
- marine birds
- marine mammals
- wildlife that use shoreline habitat and open water areas

The assessment of the human environment considers the effects of a release on heritage resources, traditional use, NTLU and socio-economic conditions.

Biophysical Environment

A diluted bitumen or synthetic oil spill in the CCAA or OWA would likely have more extensive effects than a condensate incident—because condensate would evaporate quickly and be dispersed in the water column, degrade, and be less likely to reach shoreline habitat. Diluted bitumen would spread over the water surface, and could reach the shore within several hours, depending on the source location. Surface hydrocarbons would be detectable for days, depending on emergency response and meteorological and oceanographic conditions. Shoreline remediation of sensitive habitats in affected areas could result in temporary (one to two years) loss of habitat complexity.

Adverse effects could occur on:

- shoreline vegetation (rockweed and other species), which provides habitat for many species
- intertidal invertebrates
- fish that use nearshore habitat (e.g., herring spawning on kelp beds during spring, adult salmon passing into natal streams for spawning, or fry moving from streams to marine waters)
- waterbirds (e.g., Marbled Murrelets and Surf Scoters) during a sensitive phase such as moulting
- marine mammals, including whales, seals and sea lions
- semi-aquatic mammals such as the river otter

The effects could occur through short-term and long-term mechanisms. Lesser effects could occur for species that use shoreline habitat less frequently, such as scavenging bears, deer, crows or ravens that might feed on contaminated food sources.

Ecosystem effects from changes in habitat quality and mortality of prey organisms could result in further effects. For example, loss of herring eggs and fry following a spring incident would lead to a loss of prey and longer term effects on salmon populations. These changes could affect human use of the fisheries resources, as well as bird and mammal predators.

The effects on biota would be determined by their vulnerability (i.e., how likely they are to be present in the area of a spill, exposure pathway, sensitivity of the life stage at that time of year) and by the time needed for recovery of a population. For example, fish species that inhabit subsurface water would not be directly affected, whereas Marbled Murrelets, already of conservation concern, could suffer mortality if they were present in the source area. This could lead to long-term effects on an already small population.

In the unlikely event of a release in the CCAA or OWA, emergency response plans and cleanup procedures will be implemented immediately to limit adverse effects on marine organisms. Response plans would be developed before project commissioning. Monitoring would be necessary so that recovery continues after cleanup.

Human Environment

At Emilia Island, the affected shore would be predominately rock cliff and rock and coarse-grained beaches, the latter of which have the potential for penetration and remobilization of oil. In this hypothetical example, First Nations lands at Kitkiatla Creek and Quaal River (in the Kitkiatla Inlet) and at Malsey Bay near the Gabion River would be particularly vulnerable to the effects from a release. An unmitigated incident at Emilia Island, although unlikely, would have minor effects on non-traditional marine uses at Hartley Bay and Kitkatla Inlet because winter is not typically a peak recreational season.

In Principe Channel, the affected shore would be predominately:

- rock cliff
- rock and coarse-grained (gravel) beaches
- rock, sand and gravel-mixed beaches

The latter two have potential for penetration and remobilization of hydrocarbons, where they may persist or be released. In this example, the southern border of a First Nations fishery near the western shores of Anger Island would be vulnerable.

At Ness Rock (Caamaño Sound), hydrocarbons could reach the shoreline of the Dewdney and Glide Islands Ecological Reserve, which contains nesting habitat for several species of birds, including the Cassin's auklet, which nests on Glide Islands. In this example, hydrocarbons are projected to reach North Danger Rocks, one of three rookeries sites used by Stellar sea lions. Several rockfish conservation areas are in the example source area. The potentially affected area includes fisheries for Pacific halibut, several species of groundfish, shrimp, prawn, sea cucumber, octopus, geoduck, horse clam, red sea urchin, herring and octopus. This area is especially productive for the red sea urchin dive fishery. A release at Caamaño Sound would have effects on non-traditional marine uses such as the aquacultures sites off the

north side of Anger Island (next to Principe Channel). The likely effects could include temporary tainting of fish.

At Butterworth Rocks, extensive kelp beds could be affected by temporary exposure to hydrocarbons or changes in water quality. This area is also known to have abundant shrimp populations and is nearby the Tree Nob Group of the proposed Stephens Islands British Columbia Parks Conservancy. Several species of marine mammals and birds are known to inhabit areas that could be affected by a release. This includes scoters, northern resident killer whales and humpback whales. First Nations reserve lands are located near the hypothetical spill site. Ecotourism and sports fishing outfitters from Prince Rupert could also be affected.

In Wright Sound, hydrocarbons could reach many sensitive and commercially important locations and First Nations lands distributed over the shoreline where oil may strand. During this time of year, salmon would be migrating, which could increase the potential for presence of marine predators. Terrestrial mammals (e.g., river otters, black-tailed deer, bears and wolves, or birds such as ravens or crows), which feed and scavenge along the shoreline could come into contact with stranded oil. Fish and invertebrates in contact with hydrocarbons could lead to fisheries closures in the area because of contaminant levels, conservation concerns or tainting (e.g., salmon moving into the area to spawn). Salmon would typically be returning to spawn in July and this would also be the prime FSC, commercial and recreational fishing season for many species.

A hydrocarbon spill could adversely affect the human environment by interfering with marine resource uses by:

- Aboriginal people (e.g., harvesting of fish, shellfish and crustaceans)
- other people or entities with a legal right to use marine resources (e.g., shoreline landowners and commercial fisheries)
- commercial enterprises (e.g., guides, fishing lodges and tourism operators)
- the public (e.g., for recreation and fishing)

Health and safety considerations for responders and the general public would be dealt with through the Oil Spill Response Plan.

A release also has the potential to affect heritage resources (i.e., archaeological and palaeontological remains) through contamination or during spill response and cleanup. More detailed study and mitigation plans will need to be developed at the time of an incident to identify and avoid damage to these resources.

The analysis of risk to the marine environment from a hypothetical incident at Wright Sound examines potential effects on marine flora and fauna through ingestion of affected marine biota. Modelling results and data from EVOS predict the recovery times for affected wildlife, fish and shellfish. Subtidal sediment concentration of hydrocarbon compounds were found to be below thresholds that indicate a potential risk of chronic adverse effects.

The magnitude of effects on the human environment would be related to fish and shellfish mortality, which could result in closures to allow for recovery of fish populations and to protect people from contaminants in the seafood. The results of the ecological risk assessment were applied to the human

health exposure risk model used to generate a human health risk assessment. Results of this model predict risks to human health from eating molluscs, crabs and other shellfish in the potentially affected area would be well below thresholds that indicate a potential risk of chronic adverse effects. However, temporary tainting of local seafood resources could occur, even if contaminant levels are low and there are no food safety concerns. In the event of a hydrocarbon release, Northern Gateway would work with local and provincial governments to monitor effects on ecological and human health.

Summary

Spill prevention is a key priority for Northern Gateway and has influenced planning for marine transportation operations. Northern Gateway has committed to escort tug operations in the CCAA and OWA to reduce the likelihood of a tanker incident. Even though the likelihood in the CCAA and OWA is low, Northern Gateway will implement emergency response measures as outlined in spill response plans. Compensation for losses due to ship-sourced pollution is available on a strict liability basis from ship owners and their insurers and is backstopped by international and national pollution funds. Contingency planning such as response equipment, locations and response requirements will be incorporated into the Project. Emergency response resources will be in place to expedite containment (e.g., personal protective equipment, booms, skimmers, response vessels, pumps, shoreline cleaning equipment, temporary storage and equipment to mitigate and respond to affected wildlife) and effective cleanup. Detailed response plans will be developed, and priority response areas will be identified before handling bulk oil. First response stations, local personnel and equipment will be located at the Kitimat Terminal and throughout the CCAA and OWA to enable rapid response.

12 Abbreviations

AIS	automatic identification systems
AFUDC	allowance for funds used during construction
ALR	Agricultural Land Reserve
ATK	Aboriginal traditional knowledge
BWCMR	Ballast Water Control and Management Regulations
CCAA	confined channel assessment area
CCG	Canadian Coast Guard
CEA Act	*Canadian Environmental Assessment Act*
CEA Agency	Canadian Environmental Assessment Agency
CEPA	*Canadian Environmental Protection Act*
COPC	chemical of potential concern
CPCN	Certificate of Public Convenience and Necessity
CSR	corporate social responsibility
DFO	Fisheries and Oceans Canada
ECDIS	electronic chart display and information system
ENGO	environmental non-governmental organization
EPMP	Environmental Protection and Management Plan
ERCB	Energy Resources Conservation Board
ESA	environmental and socio-economic assessment
FEL	front-end loading
FLC	fisheries liaison committee
FSA	funding support agreement
FSC	food, social and ceremonial
GIC	Governor in Council
GPS	global positioning system
GST	goods and services tax
HADD	harmful alteration, disruption or destruction
HRIA	historical resources impact assessment
IMO	International Maritime Organization
JRP	Joint Review Panel
KP	kilometre post
kW	kilowatt
LVN	light virgin naphtha
Mb/d	thousand barrels per day
MARPOL	International Convention for the Prevention of Pollution from Ships
MCTS	Marine Communications and Traffic Services
NGO	non-governmental organization
Northern Gateway	Northern Gateway Pipelines Limited Partnership
NEB	National Energy Board
NPS	nominal pipe size

NTLU ..... non-traditional land use
PAR ..... primary area of response
OD ..... outside diameter
OMP ..... operations and maintenance procedure
OWA ..... open water area
PA ..... precedent agreement
PAH ..... polycyclic aromatic hydrocarbon
PDA ..... project development area
PEAA ..... project effects assessment area
PIP ..... Preliminary Information Package
PLA ..... Pipeline Agreement
Project ..... Enbridge Northern Gateway Project
PST ..... provincial sales tax
Q1 ..... first quarter
QRA ..... quantitative risk analysis
RoW ..... right-of-way
SCADA ..... supervisory control and data acquisition system
SO_2 ..... sulphur dioxide
TCMS ..... Transport Canada Marine Safety
TDR ..... technical data report
TRC ..... TERMPOL Review Committee
TRP ..... TERMPOL Review Process
TSA ..... transportation service agreement
VEC ..... valued environmental component
VLCC ..... very large crude carrier
WCSB ..... Western Canadian Sedimentary Basin

Appendix A Section 87(1) Notices for Alberta and British Columbia

TRACT:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC. ("Northern Gateway")

NOTICE PURSUANT TO SECTION 87(1) OF THE
NATIONAL ENERGY BOARD ACT
PROVINCE OF ALBERTA

TO: <>
being the registered owner(s) (the "Owner") of the lands described as follows (the "Land"):

(For details on land description, see Schedule "A" attached to and forming part of this Notice)

AND TO: <>
being other persons, as far as can be ascertained, interested in the said Land

Northern Gateway hereby gives notice of the following:

1. **Description of Lands Required for Pipelines** ***(See attached Property Sketch)***

   To accommodate the construction and installation of the pipelines through your above described property, Northern Gateway requires a Permanent Easement and Temporary Working Space adjacent to the Permanent Easement.

   The location of the Permanent Easement and Temporary Working Space is shown on the attached Property Sketch.

2. **Details of Compensation Offered**

   In consideration of granting the aforesaid **[*check if applicable*]**:

   - ☐ Permanent Easement to Northern Gateway, Northern Gateway shall offer to pay to the Owner a lump sum of _____ dollars (**$**_____), *plus applicable Goods and Services Taxes,* which sum is inclusive of the market value of the portion of the Land which comprises the Permanent Easement as set out in Paragraph 3 hereof. The proposed Permanent Easement Agreement will provide that, as an alternative to the lump sum payment, the Owner has the option of requiring the compensation to be paid by annual or periodic payments of equal or different amounts over a period of time.
   - ☐ Temporary Working Space to Northern Gateway, Northern Gateway shall offer to pay to the Owner a lump sum of _____ dollars (**$**_____), *plus applicable Goods and Services Tax*, which sum is inclusive of the market value of the portion of the Land which comprises the Temporary Working Space as set out in Paragraph 3 hereof.

3. **Detailed Statement of Value of Lands Required**

   After having considered the current use of the Land and neighbouring lands, any probable change in use of the Land and neighbouring lands in light of current zoning laws and economic considerations, recent sales of similar lands in the vicinity of the Land and other relevant factors, Northern Gateway has determined that present market value of the **[*check if applicable*]**:

   - ☐ Permanent Easement, ignoring any residual value to the Owner, is **$**_____ per hectare (**$**_____ per acre)*, plus applicable Goods and Services Tax.*
   - ☐ Temporary Working Space, accounting for an approximation of the reversionary value to the Owner, is **$**___ per hectare (**$**_____ per acre), *plus applicable Goods and Services Tax.*

   Northern Gateway will require only the limited rights as described in the Permanent Easement Agreement and Temporary Working Space Agreement, and the Owner will continue to be able to use the Permanent Easement area and Temporary Working Space subject to the conditions set out in the Agreements.

4. **Description of Procedure for Approval of Detailed Route of Pipelines**

   Sections 34 through 39, inclusive, of the *National Energy Board Act* (the "Act") establish a procedure for approval of the detailed route of a pipeline.

   Those sections provide that after a pipeline company has submitted to the National Energy Board (the "Board") a plan showing the proposed route of a pipeline, the company must serve on owners of lands proposed to be acquired and publish notices which describe the proposed detailed route of the pipeline and the location of the offices of the Board. Within thirty (30) days of service or last publication of such notice, an owner or person who anticipates that his land may be adversely affected by the proposed detailed route may oppose the detailed route by filing with the Board a written statement setting forth the nature of his interest in the land and the grounds for his opposition to that detailed route.

Where a written statement opposing the route is filed within the time limited therefore, the Board must, subject to certain exceptions, forthwith order that a public hearing be conducted within the area in which the lands to which the written statement relates are situated with respect to any grounds of opposition set out in such statement. At such hearing each person who properly filed a written statement will be allowed to make representations and the Board may allow any other interested person to make such representations as the Board deems proper. Following a hearing and after consideration of all representations made, the Board may either approve or refuse to approve the plan showing the proposed detailed route of the pipeline as filed by the pipeline company and in granting any approval the Board may impose such terms and conditions as it considers proper. The Board may not give its approval to a plan unless it has taken into account all written statements properly filed with it and all representations made to it at a public hearing in order to determine the best possible route of the pipeline and the most appropriate methods and timing of constructing the pipeline.

If the Owner and Northern Gateway enter into a Permanent Easment Agreement Northern Gateway will discuss with you the specific route of the proposed pipeline right-of-way, as well as the proposed methods and timing of the construction. The Permanent Easement Agreement that you will be asked to sign will contain your acknowledgment that you are in agreement with the location of the right-of-way, the methods and timing of construction and that you will not object if Northern Gateway does not provide you with notice of the detailed route of the pipeline pursuant to s. 34(1) of the Act and further waive your right to request a hearing to settle the detailed pipeline route.

Initial

For the complete text of the provisions relating to the procedure for determination and approval of a pipeline route and the provisions that result in exemption from such procedures, reference should be made to those sections of the Act referenced in this Notice. The description of sections of the Act referenced in this Notice is subject to the express provisions of the Act.

5. **Description of Procedure Available for Negotiation and Arbitration of Compensation Payable**

Sections 88 through 103, inclusive, of the Act establish a procedure for negotiation and arbitration in the event that an owner of land and a pipeline company are unable to agree on any matter respecting the amount of compensation payable under the Act for the acquisition of lands, or for damages suffered as a result of the operations of the pipeline company or on any issue related to such compensation.

These sections provide, in effect, that if the pipeline company and an owner of lands have not agreed on any such issue either of them may serve notice of negotiation on the other and on the appropriate Federal Minister requesting that the matter be negotiated. Following service of such notice, the Minister must appoint a negotiator who must meet with the parties and, without prejudice to any subsequent proceedings, proceed to attempt to negotiate a settlement of the matter. Within sixty days after commencing the negotiation proceedings, the negotiator must report to the Minister the success or failure of the negotiations and submit a copy of his report to both parties.

If either an owner of the land or the pipeline company wishes to dispense with the negotiation proceedings or if the negotiation proceedings have not resulted in settlement of any compensation matter, either the pipeline company or the owner may serve notice of arbitration on the other and on the Minister requesting that the matter be determined by arbitration. Forthwith thereafter the Minister must, subject to certain exceptions, refer the matter to an Arbitration Committee consisting of not less than three members appointed by the Minister, none of whom will be a member, officer or employee of the Board. The Arbitration Committee must then fix a suitable time and place for a hearing in order to determine all compensation matters referred to in the notice and serve notice of the hearing on the parties. Following such hearing, the Arbitration Committee will determine all compensation matters referred to it and in doing so must consider a number of factors set out in section 97 of the Act, where applicable.

For the complete text of the provisions relating to the procedure for negotiation and arbitration of compensation, reference should be made to those sections of the Act referenced in this Notice. The description of sections of the Act referenced in this Notice is subject to the express provisions of the Act.

6. **Fu rther Communications**

This Notice is not an offer and does not obligate either the Owner or Northern Gateway to enter into an Agreement.

If you have any questions, please contact Northern Gateway, Suite 3000, 425 1st Street SW, Calgary, Alberta, T2P 3L8. The address of the National Energy Board is 444 - Seventh Avenue S.W., Calgary, Alberta, T2P 0X8.

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner, NORTHERN GATEWAY PIPELINES INC.

Per: _____

_____
Print name and position

Per: _____

_____
Print name and position

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC. ("Northern Gateway")

NOTICE PURSUANT TO SECTION 87(1) OF THE
NATIONAL ENERGY BOARD ACT FOR EASEMENT
PROVINCE OF ALBERTA

TO: The Crown in the Right of Alberta

being the registered owner(s) (the "**Owner**") of the lands described as follows (the "**land**"):

(For details on land description, see Schedule A attached to and forming part of this Notice)

AND TO:

All crown land disposition holders within the described lands as per Schedule A

being other persons, as far as can be ascertained, having a potentially relevant interest in the said land.

Northern Gateway hereby gives notice of the following:

1. **Description of Lands Required for Pipeline**

To accommodate the construction and installation of the proposed facilities, namely a pipeline through your above described property, Northern Gateway requires a Permanent Easement and Temporary Working Space adjacent to the Permanent Easement. The location of the lands required and a description of the required Permanent Easement and Temporary Working Space are shown on the Survey Plans attached as "Schedule B", which forms part of this Notice.

2. **Details of Compensation Offered**

In consideration of granting the aforesaid Permanent Easement to Northern Gateway, Northern Gateway shall offer to pay to the Owner a lump sum of _____ dollars ($_____), *plus Goods and Services Tax,* which sum is calculated in accordance with the provisions of Paragraph 3 hereof.

In consideration of granting the aforesaid Temporary Working Space to Northern Gateway, Northern Gateway shall offer to pay to the Owner a lump sum of _____ dollars ($_____), *plus Goods and Services Tax,* which sum is calculated in accordance with the provisions of Paragraph 3 hereof.

The proposed Agreement for Easement will provide that, as an alternative to the lump sum payment, the Owner has the option of requiring the compensation to be paid by annual or periodic payment of equal or different amounts over a period of time.

3. **Detailed Statement of Value of Lands Required**

The value of the portion of the lands which comprises the Permanent Statutory Right of Way is $_____ per hectare, *plus Goods and Services Tax*.

The value of the portion of the lands which comprises the Temporary Working Space is $_ _____ per hectare, *plus Goods and Services Tax*.

4. **Description of Procedure for Approval of Detailed Route of Pipeline**

Sections 34 through 39, inclusive, of the *National Energy Board Act* (the "**Act**"), unless waived under section 58 of the act, establish a procedure for approval of the detailed route of a pipeline.

Those sections provide that after a pipeline company has submitted to the National Energy Board (the "**Board**") a plan showing the proposed route of a pipeline, the company must serve on landowners of lands proposed to be acquired and publish notices which describe the proposed detailed route of the pipeline and the location of the offices of the Board. Within thirty (30) days of service or publication, an owner or person who anticipates that his land may be adversely affected by the proposed detailed route may oppose the detailed route by filing with the Board a written statement setting forth the nature of his interest in the land and the grounds for his opposition.

Where a written statement opposing the route is filed, the Board must, subject to certain exceptions, forthwith order that a public hearing be conducted with respect to such written opposition.

Following a hearing and after consideration of all representations made, the Board may either approve or refuse to approve the plan showing the proposed detailed route of the pipeline as filed by the pipeline company.

5. **Description of Procedure Available for Negotiation and Arbitration of Compensation Payable**

Sections 88 through 103, inclusive, of the Act establish a procedure for negotiation and arbitration in the event that an owner of land and a pipeline company are unable to agree on any matter respecting the amount of compensation payable under the Act for the acquisition of land, or on damages suffered as a result of the operations of the pipeline company or on any issue related to such compensation.

These sections of the Act provide that either party may serve notice of negotiation on the other and on the appropriate Federal Minister requesting that the matter be negotiated. The Minister must then appoint a negotiator who must meet with the parties and proceed to attempt to negotiate a settlement of the matter.

If either the owner of the land or Northern Gateway wishes to dispense with the negotiation proceedings or if the negotiation proceedings have not resulted in settlement of any compensation matter, either the pipeline company or the owner may serve notice of arbitration on the other and on the Minister who must, subject to certain exceptions, refer the matter to an Arbitration Committee consisting of not less than three members appointed by the Minister. Following a hearing, the Arbitration Committee will determine all compensation matters referred to it.

6. **Further Communications**

This Notice is not an offer and does not obligate either the Owner or Northern Gateway to enter into an Agreement.

If you have any questions, please contact Northern Gateway, 3000, 425 – 1st Street SW, Calgary, Alberta T2P 3L8.

The address of the National Energy Board is 311 - 6 Ave SW, Calgary AB T2P 3H2.

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner NORTHERN GATEWAY PIPELINES INC.

Per: _____

_____
Print name and position

Per: _____

_____
Print name and position

NOTICE PURSUANT TO SECTION 87(1) OF THE NATIONAL ENERGY BOARD ACT FOR EASEMENT

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC.
3000, 425 - 1ST STREET SW
CALGARY, ALBERTA T2P 3L8

TRACT:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC. ("Northern Gateway")

NOTICE PURSUANT TO SECTION 87(1) OF THE
NATIONAL ENERGY BOARD ACT
PROVINCE OF BRITISH COLUMBIA

TO: <>
being the registered owner(s) (the "Owner") of the lands described as follows (the "Land"):

(For details on land description, see Schedule "A" attached to and forming part of this Notice)

AND TO: <>
being other persons, as far as can be ascertained, interested in the said Land

Northern Gateway hereby gives notice of the following:

1. **Description of Lands Required for Pipelines** ***(See attached Property Sketch)***

   To accommodate the construction and installation of the pipelines through your above described property, Northern Gateway requires a Statutory Right of Way and Temporary Working Space adjacent to the Statutory Right of Way.

   The location of the Statutory Right of Way and Temporary Working Space is shown on the attached Property Sketch.

2. **Details of Compensation Offered**

   In consideration of granting the aforesaid **[*check if applicable*]**:

   - ☐ Statutory Right of Way to Northern Gateway, Northern Gateway shall offer to pay to the Owner a lump sum of _____ dollars (**$**_____), *plus applicable taxes,* which sum is inclusive of the market value of the portion of the Land which comprises the Statutory Right of Way as set out in Paragraph 3 hereof. The proposed Statutory Right of Way Agreement will provide that, as an alternative to the lump sum payment, the Owner has the option of requiring the compensation to be paid by annual or periodic payments of equal or different amounts over a period of time.
   - ☐ Temporary Working Space to Northern Gateway, Northern Gateway shall offer to pay to the Owner a lump sum of _____ dollars(**$**_____), *plus applicable taxes*, which sum is inclusive of the market value of the portion of the Land which comprises the Temporary Working Space as set out in Paragraph 3 hereof.

3. **Detailed Statement of Value of Lands Required**

   After having considered the current use of the Land and neighbouring lands, any probable change in use of the Land and neighbouring lands in light of current zoning laws and economic considerations, recent sales of similar lands in the vicinity of the Land and other relevant factors, Northern Gateway has determined that present market value of the **[*check if applicable*]**:

   - ☐ Statutory Right of Way, ignoring any residual value to the Owner, is **$**_____ per hectare (**$**_____ per acre) *plus applicable taxes.*
   - ☐ Temporary Working Space, accounting for an approximation of the reversionary value to the Owner, is **$**_____ per hectare (**$**_____ per acre), *plus applicable taxes.*

   Northern Gateway will require only the limited rights as described in the Statutory Right of Way Agreement and Temporary Working Space Agreement, and the Owner will continue to be able to use the Statutory Right of Way area and Temporary Working Space subject to the conditions set out in the Agreements.

4. **Description of Procedure for Approval of Detailed Route of Pipelines**

   Sections 34 through 39, inclusive, of the *National Energy Board Act* (the "Act") establish a procedure for approval of the detailed route of a pipeline.

   Those sections provide that after a pipeline company has submitted to the National Energy Board (the "Board") a plan showing the proposed route of a pipeline, the company must serve on owners of lands proposed to be acquired and publish notices which describe the proposed detailed route of the pipeline and the location of the offices of the Board. Within thirty (30) days of service or last publication of such notice, an owner or person who anticipates that his land may be adversely affected by the proposed detailed route may oppose the detailed route by filing with the Board a written statement setting forth the nature of his interest in the land and the grounds for his opposition to that detailed route.

Where a written statement opposing the route is filed within the time limited therefore, the Board must, subject to certain exceptions, forthwith order that a public hearing be conducted within the area in which the lands to which the written statement relates are situated with respect to any grounds of opposition set out in such statement. At such hearing each person who properly filed a written statement will be allowed to make representations and the Board may allow any other interested person to make such representations as the Board deems proper. Following a hearing and after consideration of all representations made, the Board may either approve or refuse to approve the plan showing the proposed detailed route of the pipeline as filed by the pipeline company and in granting any approval the Board may impose such terms and conditions as it considers proper. The Board may not give its approval to a plan unless it has taken into account all written statements properly filed with it and all representations made to it at a public hearing in order to determine the best possible route of the pipeline and the most appropriate methods and timing of constructing the pipeline.

If the Owner and Northern Gateway enter into a Permanent Easment Agreement Northern Gateway will discuss with you the specific route of the proposed pipeline right-of-way, as well as the proposed methods and timing of the construction. The Permanent Easement Agreement that you will be asked to sign will contain your acknowledgment that you are in agreement with the location of the right-of-way, the methods and timing of construction and that you will not object if Northern Gateway does not provide you with notice of the detailed route of the pipeline pursuant to s. 34(1) of the Act and further waive your right to request a hearing to settle the detailed pipeline route.

Initial

For the complete text of the provisions relating to the procedure for determination and approval of a pipeline route and the provisions that result in exemption from such procedures, reference should be made to those sections of the Act referenced in this Notice. The description of sections of the Act referenced in this Notice is subject to the express provisions of the Act.

5. **Description of Procedure Available for Negotiation and Arbitration of Compensation Payable**

Sections 88 through 103, inclusive, of the Act establish a procedure for negotiation and arbitration in the event that an owner of land and a pipeline company are unable to agree on any matter respecting the amount of compensation payable under the Act for the acquisition of lands, or for damages suffered as a result of the operations of the pipeline company or on any issue related to such compensation.

These sections provide, in effect, that if the pipeline company and an owner of lands have not agreed on any such issue either of them may serve notice of negotiation on the other and on the appropriate Federal Minister requesting that the matter be negotiated. Following service of such notice, the Minister must appoint a negotiator who must meet with the parties and, without prejudice to any subsequent proceedings, proceed to attempt to negotiate a settlement of the matter. Within sixty days after commencing the negotiation proceedings, the negotiator must report to the Minister the success or failure of the negotiations and submit a copy of his report to both parties.

If either an owner of the land or the pipeline company wishes to dispense with the negotiation proceedings or if the negotiation proceedings have not resulted in settlement of any compensation matter, either the pipeline company or the owner may serve notice of arbitration on the other and on the Minister requesting that the matter be determined by arbitration. Forthwith thereafter the Minister must, subject to certain exceptions, refer the matter to an Arbitration Committee consisting of not less than three members appointed by the Minister, none of whom will be a member, officer or employee of the Board. The Arbitration Committee must then fix a suitable time and place for a hearing in order to determine all compensation matters referred to in the notice and serve notice of the hearing on the parties. Following such hearing, the Arbitration Committee will determine all compensation matters referred to it and in doing so must consider a number of factors set out in section 97 of the Act, where applicable.

For the complete text of the provisions relating to the procedure for negotiation and arbitration of compensation, reference should be made to those sections of the Act referenced in this Notice. The description of sections of the Act referenced in this Notice is subject to the express provisions of the Act.

6. **Fu rther Communications**

This Notice is not an offer and does not obligate either the Owner or Northern Gateway to enter into an Agreement.

If you have any questions, please contact Northern Gateway, Suite 3000, 425 1st Street SW, Calgary, Alberta, T2P 3L8.

The address of the National Energy Board is 444 - Seventh Avenue S.W., Calgary, Alberta, T2P 0X8.

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner, NORTHERN GATEWAY PIPELINES INC.

Per: _____

_____
Print name and position

Per: _____

_____
Print name and position

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC. ("Northern Gateway")

NOTICE PURSUANT TO SECTION 87(1) OF THE
NATIONAL ENERGY BOARD ACT FOR EASEMENT
PROVINCE OF BRITISH COLUMBIA

TO: The Crown in the Right of British Columbia

being the registered owner(s) (the "**Owner**") of the lands described as follows (the "**land**"):

(For details on land description, see Schedule A attached to and forming part of this Notice)

AND TO:

All crown land tenure holders within the described lands as per Schedule A

being other persons, as far as can be ascertained, having a potentially relevant interest in the said land.

Northern Gateway hereby gives notice of the following:

1. **Description of Lands Required for Pipeline**

To accommodate the construction and installation of the proposed facilities, namely a pipeline through your above described property, Northern Gateway requires a Permanent Easement and Temporary Working Space adjacent to the Permanent Easement. The location of the lands required and a description of the required Permanent Easement and Temporary Working Space are shown on the Property Sketch attached as "Schedule B", which forms part of this Notice.

2. **Details of Compensation Offered**

In consideration of granting the aforesaid Permanent Easement to Northern Gateway, Northern Gateway shall offer to pay to the Owner a lump sum of _____ dollars ($_____), *plus Goods and Services Tax,* which sum is calculated in accordance with the provisions of Paragraph 3 hereof.

In consideration of granting the aforesaid Temporary Working Space to Northern Gateway, Northern Gateway shall offer to pay to the Owner a lump sum of _____ dollars ($_____), *plus Goods and Services Tax,* which sum is calculated in accordance with the provisions of Paragraph 3 hereof.

The proposed Agreement for Easement will provide that, as an alternative to the lump sum payment, the Owner has the option of requiring the compensation to be paid by annual or periodic payment of equal or different amounts over a period of time.

3. **Detailed Statement of Value of Lands Required**

The value of the portion of the lands which comprises the Permanent Statutory Right of Way is $_____ per hectare, *plus Goods and Services Tax*, according to the rates and fees prescribed by: Land and Water BC Inc.

The value of the portion of the lands which comprises the Temporary Working Space is $_____ per hectare, *plus Goods and Services Tax*, according to the rates and fees prescribed by: Land and Water BC Inc.

4. **Description of Procedure for Approval of Detailed Route of Pipeline**

Sections 34 through 39, inclusive, of the *National Energy Board Act* (the "**Act**"), unless waived under section 58 of the act, establish a procedure for approval of the detailed route of a pipeline.

Those sections provide that after a pipeline company has submitted to the National Energy Board (the "**Board**") a plan showing the proposed route of a pipeline, the company must serve on landowners of lands proposed to be acquired and publish notices which describe the

proposed detailed route of the pipeline and the location of the offices of the Board. Within thirty (30) days of service or publication, an owner or person who anticipates that his land may be adversely affected by the proposed detailed route may oppose the detailed route by filing with the Board a written statement setting forth the nature of his interest in the land and the grounds for his opposition.

Where a written statement opposing the route is filed, the Board must, subject to certain exceptions, forthwith order that a public hearing be conducted with respect to such written opposition.

Following a hearing and after consideration of all representations made, the Board may either approve or refuse to approve the plan showing the proposed detailed route of the pipeline as filed by the pipeline company.

5. **Description of Procedure Available for Negotiation and Arbitration of Compensation Payable**

Sections 88 through 103, inclusive, of the Act establish a procedure for negotiation and arbitration in the event that an owner of land and a pipeline company are unable to agree on any matter respecting the amount of compensation payable under the Act for the acquisition of land, or on damages suffered as a result of the operations of the pipeline company or on any issue related to such compensation.

These sections of the Act provide that either party may serve notice of negotiation on the other and on the appropriate Federal Minister requesting that the matter be negotiated. The Minister must then appoint a negotiator who must meet with the parties and proceed to attempt to negotiate a settlement of the matter.

If either the owner of the land or Northern Gateway wishes to dispense with the negotiation proceedings or if the negotiation proceedings have not resulted in settlement of any compensation matter, either the pipeline company or the owner may serve notice of arbitration on the other and on the Minister who must, subject to certain exceptions, refer the matter to an Arbitration Committee consisting of not less than three members appointed by the Minister. Following a hearing, the Arbitration Committee will determine all compensation matters referred to it.

6. **Further Communications**

This Notice is not an offer and does not obligate either the Owner or Northern Gateway to enter into an Agreement.

If you have any questions, please contact Northern Gateway, 3000, 425 – 1st Street SW, Calgary, Alberta T2P 3L8.

The address of the National Energy Board is 311 - 6 Ave SW, Calgary AB T2P 3H2.

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner NORTHERN GATEWAY PIPELINES INC.

Per: _____

_____
Print name and position

Per: _____

_____
Print name and position

NOTICE PURSUANT TO SECTION 87(1) OF THE NATIONAL ENERGY BOARD ACT FOR EASEMENT

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC.
3000, 425 - 1ST STREET SW
CALGARY, ALBERTA T2P 3L8

Appendix B Agreement for Easement, Alberta

Appendix B

TRACT:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERGSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC. ("Northern Gateway")

AGREEMENT FOR EASEMENT
PROVINCE OF ALBERTA

I, (We) <>

(the "Owner"), being registered as owner or entitled to become registered as owner of an estate in fee simple, subject however to such encumbrances, liens and interests as appear on the Certificate of Title, in all that certain tract of land situated in the Province of Alberta being composed of:

as described in the Certificate of Title numbered _____ registered with the Land Titles Office for the North Alberta Land Registration District (the "Lands"),

and in consideration of the sum of _____ Dollars ($_____), the receipt of which is hereby acknowledged, now paid or payable to the Owner (or to others having an interest in the Lands by encumbrance or otherwise), by Northern Gateway, a corporation incorporated under the laws of Canada, and having its operating office in the City of Calgary, in the Province of Alberta, and in consideration of the covenants and conditions hereinafter mentioned,

DO HEREBY GRANT, CONVEY, SET OVER AND TRANSFER to Northern Gateway, for itself, its employees, agents, contractors, subcontractors, successors and assigns, an easement (also referred to as the "right-of-way"), across, over, under, in, through or on the Lands to survey, construct, operate, maintain, inspect, patrol (including aerial patrol), alter, remove, replace, reconstruct and repair two or more pipelines (subject to Clause 21 herein) and other facilities appurtenant, affixed or incidental thereto, including, but without limiting the generality of the foregoing, all such pipes, drips, valves, fittings, connections, meters, cathodic protection, equipment and other equipment and appurtenances, whether or not similar to the foregoing (hereinafter collectively referred to as the "Pipeline"), for the transportation, storage and handling of oil, other liquid and gaseous hydrocarbons and products thereof, together with the right of ingress and egress over the remainder of the Lands, to and from the right-of-way for Northern Gateway, its personnel, equipment, contractors and agents for all purposes necessary or incidental to the exercise and enjoyment of the rights herein granted.

The rights and easement are granted as and from the date hereof and for so long hereafter as Northern Gateway desires to exercise same on the following terms and conditions which are hereby mutually agreed to:

1. Northern Gateway shall, upon the completion of a legal survey plan, deposit for registration at the appropriate Land Titles Office a plan of survey limiting the right-of-way across, over, under, in, through or on the Lands to a strip of land being generally_____ in width within the Lands which right-of-way shall be substantially in the location as shown on the property sketch attached hereto. Northern Gateway shall file a plan of survey within a reasonable period of time having regard to all circumstances. Following registration of such plan of survey Northern Gateway shall, if it has not already done so, forward to the Owner at the address set forth in Clause 20 hereof an extract from the plan of survey showing the precise location of the right-of-way across, over, under, in, through or on the Lands (the "Surveyed Right-of- Way"). Reference to "right-of-way" in this Agreement shall mean the portion of the Lands as shown on the property sketch until the plan of survey is registered after which it shall mean the Surveyed Right-of-Way.

2. Northern Gateway, having delivered or mailed to the Owner the extract from the plan of survey, shall as soon as it is practicable to do so, cause to be registered in the appropriate Land Titles Office, a document restricting the right-of-way to the Surveyed Right of Way. Notwithstanding the registration of such document Northern Gateway shall continue to be entitled to enjoy the right of ingress and egress to and from the Surveyed Right-of-Way across the remainder of the Lands as set out in the granting provision of this Agreement.

3. Northern Gateway shall pay the compensation to the Owner for the grant of easement as follows:

   Delete (a) or (b):

   (a) one lump sum payment of _____ Dollars ($_____), *plus Good and Services Tax* *(initial)*

   - or -

   (b) by annual or periodic payments of equal or different amounts over a period of time as set forth in Schedule One attached hereto and forming part hereof; *(initial)*

   If the Lump Sum Payment option is chosen (option 3(a)), such payment shall be made on or before construction is commenced on the Lands. If option 3(b) is chosen the first of such payments shall commence on or before construction is commenced on the Lands. In the event that a lump sum payment or the first annual or periodic payment, as the case may be, has not been made before _____, 20_____, then this Agreement shall terminate and be at an end for all purposes and Northern Gateway shall forthwith execute and register such documents as may be necessary to discharge this Agreement from the Certificate of Title for the Lands and shall notify the Owner of the registration of the discharge.

4. The Owner shall have the right fully to use and enjoy the right-of-way except as may be necessary for the purposes herein granted to Northern Gateway provided however that the Owner shall not, without the prior written consent of Northern Gateway, which consent shall not be unreasonably withheld, excavate, drill, install, erect, place, plant or permit to be

excavated, drilled, installed, erected, placed, or planted on, over, under, across or through the right-of-way any pit, well, foundation, pavement, building, tree, or any other structure, installation or object.

5. Notwithstanding the provisions of Clause 4, Northern Gateway will not object to the Owner:

   (i) paving existing farm lanes, private roads, driveways, and sidewalks across the right-of-way;
   (ii) erecting fences across the right-of-way or any portion thereof; or
   (iii) constructing drains or repairing drains on the right-of-way or any portion thereof;

   provided, however, that the Owner agrees to exercise a high degree of care in carrying out any excavation or drilling necessary for such fencing, paving or drainage, and in no event shall the Owner or his contractors perform such work in such a manner as to endanger or damage the Pipeline. Before the commencement of any such work, the Owner shall give to Northern Gateway at least five (5) days prior notice in writing so as to enable a representative of Northern Gateway to inspect the site of the proposed work and to advise how the work may be performed without damage to the Pipeline.

6. Northern Gateway will compensate the Owner for all damages suffered as a result of its operations.

7. Northern Gateway will, as soon as weather and soil conditions permit and insofar as it is practicable so to do, bury and maintain the Pipeline in a manner that will not interfere with the drainage or ordinary cultivation of the Lands, and will restore all drains damaged or disturbed by the operation, according to good drainage practice.

8. Notwithstanding that in constructing, maintaining and operating its Pipeline, Northern Gateway may install pipe and other equipment and appurtenances in, on, over, under, across or through the right-of-way in such a manner that it or they become affixed to the Lands, the title to such pipe and other equipment and appurtenances shall until surrendered, remain in Northern Gateway. Northern Gateway may at any time remove the whole or any part of the Pipeline.

9. Upon the discontinuance of the use of the said right-of-way and of the exercise of the rights hereby granted, Northern Gateway shall and will restore the right-of-way to the same condition, so far as it is practicable so to do, as the same were in prior to the entry thereon and the use thereof by Northern Gateway. Northern Gateway agrees to withdraw and discharge any registrations at the Land Titles Office pertaining to this Agreement upon the abandonment of the right-of-way.

10. Northern Gateway in performing and observing the covenants and conditions contained in this Agreement, shall peaceably hold and enjoy the rights and easement hereby granted without hindrance, molestation or interruption on the part of the Owner or of any person, firm or corporation claiming by, through, under or in trust for the Owner.

11. Either party shall have the absolute right to assign this Agreement in whole or in part, and upon such assignment, shall give to the other party written notice thereof within ten (10) days, but Northern Gateway need not give such notice upon assignment in the course of its corporate financing by way of a deed of trust, mortgage, debenture or a floating charge or upon assignment arising out of an amalgamation or merger.

12. This Agreement shall not affect or prejudice Northern Gateway's statutory rights to acquire an easement or any portion of the Lands under the provisions of the *National Energy Board Act* (the "Act"), or any other laws, which rights may be exercised at Northern Gateway's discretion in the event of the Owner being unable or unwilling for any reason to perform this Agreement or to give to Northern Gateway a clear and unencumbered title to the right-of-way and easement herein granted.

13. The Owner will, if so requested by Northern Gateway, execute such further documents of title and assurances in respect of the Lands as may be required to perfect Northern Gateway's interest in the Lands.

14. Nothing contained herein shall vest in Northern Gateway any title to mines or minerals in or under the right-of-way, except only the parts thereof that are necessary to be excavated, carried away or used in the construction of the Pipeline belonging to Northern Gateway.

15. Where Northern Gateway requires an above ground installation of the Pipeline upon the right-of-way (other than pipeline markers installed at property or fence lines) or requires any part of the right-of-way to be fenced, the Owner shall be entitled to additional compensation to be agreed upon between the parties, or failing agreement, pursuant to the procedure available for negotiation and arbitration under Part V of the Act.

16. Northern Gateway will not object to any application made by the Owner under Section 112 of the Act so long as the proposed crossing is made in accordance with good engineering practice and does not interfere with the operation of the Pipeline.

17. This Agreement is a covenant running with the Lands and the provisions of this Agreement shall extend to, be binding upon, and enure to the benefit of the heirs, executors, administrators, successors and assigns of the Owner and Northern Gateway, respectively.

18. Wherever the singular or masculine is used in this Agreement, it shall be construed as if the plural or feminine or the neuter, as the case may be, had been used where the context so requires.

19. It is agreed that the Owner shall have the right to transfer or convey his interest in the Lands and the covenants and conditions herein contained in one or more parcels and by one or more conveyances and that all the covenants and

conditions herein contained shall extend to and be binding upon and enure to the benefit of each and all of the heirs, executors, administrators, successors, and assigns of the Owner in respect of each and every parcel transferred or conveyed.

20. All notices to be given hereunder may be given by registered letter addressed to Northern Gateway, Suite 3000, 425 1st Street SW, Calgary, Alberta T2P 3L8, and to the Owner at _____or such other address as Northern Gateway and the Owner may respectively appoint, from time to time, in writing, and any such notice shall be deemed to be given to and received seven (7) days after the mailing thereof, postage prepaid.

21. Northern Gateway proposes to install two (2) pipelines in the right-of-way. Northern Gateway will only install an additional pipeline or pipelines in the right-of-way with the consent and agreement of the Owner, or, in the absence of such consent and agreement, in accordance with all authorizations and determinations, including with respect to any additional compensation payable, made under the Act.

22. The Owner agrees that Northern Gateway may, at its option, at any time in the course of operating the Pipeline enter upon the right-of-way with men and equipment and remove all shrubs and trees from the right-of-way.

23. Northern Gateway shall indemnify the Owner from all liabilities, damages, claims, suits and actions arising out of the operations of Northern Gateway other than liabilities, damages, claims, suits and actions resulting from the gross negligence or willful misconduct of the Owner.

24. The Owner confirms having the option of requiring the compensation for the rights herein granted to be made by one lump sum payment or by annual or periodic payments of equal or different amounts over a period of time and that the Owner has selected the method of compensation hereinbefore set out. The Owner further confirms that if the Owner has selected annual or other periodic payments, the amount of such compensation payable by Northern Gateway shall be reviewed every five (5) years if the period of compensation extends beyond five (5) years.

25. The Owner consents to the collection and use of his/her personal information within this form. Northern Gateway collects this type of personal information for the purposes of general land rights acquisition and regulatory disclosure. The Owner consents to the collection, use and disclosure of its personal information for these legitimate business purposes in relation to land matters of Northern Gateway

26. The Owner acknowledges receipt of a notice given pursuant to Section 87(1) of the Act and given prior to the entering into of this Agreement, setting out or accompanied by:

    (a) a description of the Lands of the Owner required by Northern Gateway for a section or part of the Pipelines;
    (b) details of the compensation offered by Northern Gateway for such Lands required;
    (c) a detailed statement made by Northern Gateway of the value of such Lands required in respect of which compensation was offered;
    (d) a description of the procedure for approval of the detailed route of Northern Gateway's Pipelines; and
    (e) a description of the procedure available for negotiation and arbitration under Part V of the Act in the event that the Owner and Northern Gateway are unable to agree on any matter respecting the compensation payable.

27. The Owner acknowledges that Northern Gateway has explained the specific route of the proposed pipeline right of way, as well as the proposed methods and timing of the construction of the Pipeline that will be installed therein. This Agreement confirms that the Owner is in agreement with the location of the pipeline right of way, and the methods and timing of construction of the Pipeline that will be installed therein. The Owner hereby waives any right to ask for a hearing to settle the detailed Pipeline route or the methods and timing of construction, and understands that Northern Gateway may not serve the Owner with further Notice of the detailed route of the Pipeline pursuant to s. 34 (1)(a) of the Act.

IN W ITNESS W HEREOF the parties hereto have executed and delivered this Agreement as of the _____ day of _____, 20_____.

SIGNED in the presence of:

_____ _____

Witness: **Owner:**

_____ _____

Witness: O **wner:**

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner, NORTHERN GATEWAY PIPELINES INC.

Per: _____

_____

Print name and position

Per: _____

_____

Print name and position

CONSENT OF SPOUSE

I, _____, being married to the within named _____ do hereby give my consent to the disposition of our homestead, made in this instrument, and I have executed this document for the purpose of giving up my life estate and other dower rights in the said property given to me by the Dower Act, to the extent necessary to give effect to the said disposition.

_____

CERTIFICATE OF ACKNOWLEDGEMENT BY SPOUSE

1. This document was acknowledged before me by _____, apart from her husband (his wife).

2. _____, acknowledged to me that she (he):

   (a) is aware of the nature of the disposition or agreement;

   (b) is aware that the Dower Act, gives her (him) a life estate in the homestead and the right to prevent disposition of the homestead by withholding consent;

   (c) consents to the disposition or agreement for the purpose of giving up the life estate and other dower rights in the homestead given to her (him) by the Dower Act, to the extent necessary to give effect to the said disposition or agreement;

   (d) is executing the document freely and voluntarily without any compulsion on the part of her husband (his wife).

DATED at the _____ of _____, in the Province of Alberta, this _____ day of _____, 20___.

_____
A Commissioner for Oaths in and for the
Province of Alberta

DOWER AFFIDAVIT

CANADA	)	I, _____, of the
PROVINCE OF ALBERTA	)	_____ of _____, in the
TO WIT:	)	Province of Alberta, **MAKE OATH AND SAY**:

1. **THAT** I am the Grantor named in the within Instrument.

2. **THAT** I am not married.

- OR -

3. **TH AT** neither myself nor my spouse have resided on the within mentioned Land at any time since our marriage.

SWORN BEFORE ME at the _____ of _____, in the Province of Alberta, this _____ day of _____, 20___.

_____
A Commissioner for Oaths in and for the
the Province of Alberta

_____

AFFIDAVIT OF EXECUTION

CANADA
PROVINCE OF ALBERTA
WIT:

I, _____, of the _____ of _____, in the Province of Alberta, **MAKE OATH AND SAY**:

1. **THAT** I was personally present and did see _____ named in the within Instrument who is (are) personally known to me to be the person(s) named therein, duly sign and execute the same for the purpose named therein.

2. **THAT** the same was executed at the _____ of, in the Province of Alberta, and that I am the subscribing witness thereto.

3. **THAT** I know the said _____ named and he (she) (each) is in my belief, of the full age of eighteen years.

SWORN BEFORE ME at the _____ of _____, in the Province of Alberta, this _____ day of _____, 20___.

_____
A Commissioner for Oaths in and for the the Province of Alberta

_____

CONSENT BY OCCUPANT(S)/PURCHASER(S) OR OTHER INTERESTED PARTIES

I (We), _____ of _____ in the Province of Alberta having an interest in the within Lands by virtue of an Agreement or Instrument dated the _____ day of _____; **DO HEREBY AGREE**, that all my (our) rights, interests and estate which are, or may be, affected by the Agreement for Easement shall be fully bound by the terms and conditions thereof both now and henceforth.

DATED at the _____ of _____, in the Province of Alberta, this _____ day of _____, 20___.

_____ _____
Witness: **Name:**

_____ _____
Witness: **Name:**

AFFIDAVIT OF EXECUTION

CANADA
PROVINCE OF ALBERTA
WIT:

I, _____, of the _____ of _____, in the Province of Alberta, **MAKE OATH AND SAY**:

1. **THAT** I was personally present and did see _____ named in the within Instrument who is (are) personally known to me to be the person(s) named therein, duly sign and execute the same for the purpose named therein.

2. **THAT** the same was executed at the _____ of _____, in the Province of Alberta, and that I am the subscribing witness thereto.

3. **THAT** I know the said _____ named and he (she) (each) is in my belief, of the full age of eighteen years.

SWORN BEFORE ME at the _____ of _____, in the Province of Alberta, this _____ day of _____, 20___.

_____
A Commissioner for Oaths in and for the the Province of Alberta

_____

ATTACHED TO AND FORMING
PART OF THE AGREEMENT
FOR EASEMENT

SCHEDULE ONE
Annual or Periodic Payment

The consideration for this Agreement is the sum of _____ Dollars ($_____) of lawful money of Canada to be paid on or before construction is commenced upon the Lands, the receipt of which is hereby acknowledged by the Owner, and thereafter the sum of _____ Dollars ($_____) of lawful money of Canada to be paid on or before the anniversary date thereafter for a period of _____ (_____) years. The amount of any annual or periodic payment will be reviewed every five (5) years.

The Owner hereby agrees to and accepts the annual or periodic payment set out above.

_____ _____
Witness: Owner:

_____ _____
Witness: Owner:

_____ _____
Witness: Owner:

FORM 31.1

LAND TITLES ACT
(Section 161)

AFFIDAVIT VERIFYING
CORPORATE SIGNING AUTHORITY

I, _____ of _____ in the province of Alberta, make oath and say:

1. I am an officer or a director of Northern Gateway named in the within or annexed instrument (or caveat).

2. I am authorized by the corporation to execute the instrument (or caveat) without affixing a corporate seal.

SWORN BEFORE ME at the _____ of _____, in the Province of Alberta, this _____ day of _____, 20___.

_____
A Commissioner for Oaths in and for the
the Province of Alberta

_____

Appendix C Land Title Act and Statutory Right of Way Agreement, British Columbia

LAND TITLE ACT
FORM C
(Section 233)

Province of British Columbia

GENERAL INSTRUMENT - PART 1 (This area for Land Title Office Use)

1. APPLICATION: (Name, address, phone number and signature of applicant, applicant's solicitor or agent)

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner NORTHERN GATEWAY PIPELINES INC.

Suite 3000, 425 1st Street S.W.
Calgary AB T2P 3L8

Per:

Tract:

2. PARCEL IDENTIFIER(S) AND LEGAL DESCRIPTION(S) OF LAND:*

(PID)	(LEGAL DESCRIPTION)

3. NATURE OF INTEREST:*

DESCRIPTION	DOCUMENT REFERENCE (page and paragraph)	PERSON ENTITLED TO INTEREST
Statutory Right of Way	**Entire Document**	**Transferee**

4. TERMS: Part 2 of this instrument consists of (select one only):

(a) Filed Standard Charge Terms		D.F. Number:
(b) Express Charge Terms	X	Annexed as Part 2
(c) Release		There is no Part 2 of this instrument

A selection of (a) includes any additional or modified terms referred to in Item 7 or in a schedule annexed to this instrument. If (c) is selected, the charge described in Item 3 is released or discharged as a charge on the land described in Item 2.

5. TRANSFEROR(S):*

6. TRANSFEREE(S): (including postal address(es) and postal code(s))*

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner NORTHERN GATEWAY PIPELINES INC.

425 1st Street S.W., Suite 3000
Calgary AB T2P 3L8

7. ADDITIONAL OR MODIFIED TERMS:* n/a

8. EXECUTION(S): This instrument creates, assigns, modifies, enlarges, discharges, or governs the priority of the interest(s) described in Item 3 and the Grantor(s) and every other signatory agree to be bound by this instrument, and acknowledge(s) receipt of a true copy of the filed standard charge terms, if any.

Officer Signature(s)	EXECUTION DATE Y	M	D	Party(ies) Signature(s)
				NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner NORTHERN GATEWAY PIPELINES INC. by its authorized signatory(ies):
Name:				
				by its authorized signatory(ies):
Name:				**[TRANSFEROR]**

OFFICER CERTIFICATION:

Your signature constitutes a representation that you are a solicitor, notary public or other person authorized by the *Evidence Act*, R.S.B.C. 1996, c. 124, to take affidavits for use in British Columbia and certifies the matters set out in Part 5 of the *Land Title Act* as they pertain to the execution of this instrument.

* If space insufficient, enter "SEE SCHEDULE" and attach schedule in Form E.

Terms of Instrument – Part 2 TRACT:_____

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC. ("Northern Gateway")

STATUTORY RIGHT OF WAY AGREEMENT
PROVINCE OF BRITISH COLUMBIA

WHEREAS _____ (the "Owner"), being registered as owner or entitled to become registered as owner of an estate in fee simple, subject however to such encumbrances, liens and interests as appear on the Certificate of Title, in all that certain tract of land more particularly described in item 2 of Part 1 of this Form C General Instrument (the "Lands");

WHEREAS the Owner has agreed to grant to Northern Gateway a statutory right of way (the "Statutory Right of Way") across, over, under, in, through or on the Lands on the terms and conditions set out herein;

AND WHEREAS the Statutory Right of Way herein granted is necessary for the construction, operation and maintenance of Northern Gateway's undertaking;

AND WHEREAS Northern Gateway is of the class of company suitable to hold a statutory right of way under Section 218(1)(d) of the *Land Title Act*.

NOW THEREFORE THIS INSTRUMENT WITNESSES that in consideration of the sum of _____ Dollars ($_____), the receipt of which is hereby acknowledged, now paid or payable to the Owner (or to others having an interest in the Lands by encumbrance or otherwise), by Northern Gateway, a corporation incorporated under the laws of Canada, and having its operating office in the City of Calgary, in the Province of Alberta, and in consideration of the covenants and conditions hereinafter mentioned:

DO HEREBY GRANT, CONVEY, SET OVER AND TRANSFER to Northern Gateway, for itself, its employees, agents, contractors, subcontractors, successors and assigns, a Statutory Right of Way across, over, under, in, through or on the Lands to survey, construct, operate, maintain, inspect, patrol (including aerial patrol), alter, remove, replace, reconstruct and repair two or more pipelines (subject to Clause 21 herein) and other facilities appurtenant, affixed or incidental thereto, including, but without limiting the generality of the foregoing, all such pipes, drips, valves, fittings, connections, meters, cathodic protection, equipment and other equipment and appurtenances, whether or not similar to the foregoing (hereinafter collectively referred to as the "Pipeline"), for the transportation, storage and handling of oil, other liquid and gaseous hydrocarbons and products thereof, together with the right of ingress and egress over the remainder of the Lands, to and from the statutory right of way for Northern Gateway, its personnel, equipment, contractors and agents for all purposes necessary or incidental to the exercise and enjoyment of the rights herein granted.

The rights and Statutory Right of Way are granted as and from the date hereof and for so long hereafter as Northern Gateway desires to exercise same on the following terms and conditions which are hereby mutually agreed to:

1. Northern Gateway shall, upon the completion of a legal survey plan, deposit for registration at the appropriate Land Title Office a plan of survey limiting the Statutory Right of Way across, over, under, in, through or on the Lands to a strip of land being generally _____ in width within the Lands which Statutory Right of Way be substantially in the location as shown on the property sketch attached hereto. Northern Gateway shall file a plan of survey within a reasonable period of time having regard to all circumstances. Following registration of such plan of survey Northern Gateway shall, if it has not already done so, forward to the Owner at the address set forth in Clause

20 hereof an extract from the plan of survey showing the precise location of the Statutory Right of Way across, over, under, in, through or on the Lands (the "Surveyed Right of Way"). Reference to "Statutory Right of Way" in this Agreement shall mean the portion of the Lands as shown on the property sketch until the plan of survey is registered after which it shall mean the Surveyed Right of Way.

2. Northern Gateway, having delivered or mailed to the Owner the extract from the plan of survey, shall as soon as it is practicable to do so, cause to be registered in the appropriate Land Titles Office, a document restricting the right-of-way to the Surveyed Right of Way. Notwithstanding the registration of such document Northern Gateway shall continue to be entitled to enjoy the right of ingress and egress to and from the Surveyed Right-of-Way across the remainder of the Lands as set out in the granting provision of this Agreement.

3. Northern Gateway shall pay the compensation to the Owner for the grant of Statutory Right of Way as follows:

Delete (a) or (b):

(a) one lump sum payment of _____ Dollars ($_____), *plus applicable taxes* *(initial)*

or

(b) by annual or periodic payments of equal or different amounts over a period of time as set forth in Schedule One attached hereto and forming part hereof; *(initial)*

If the Lump Sum Payment option is chosen (option 3(a)), such payment shall be made on or before construction is commenced on the Owner's Lands. If option 3(b) is chosen the first of such payments shall commence on or before construction is commenced on the Lands. In the event that a lump sum payment, or the first annual or periodic payment, as the case may be, has not been made before _____, 20_____, then this Agreement shall terminate and be at an end for all purposes and Northern Gateway shall forthwith execute and register such documents as may be necessary to discharge this Agreement from the Certificate of Title for the Lands and shall notify the Owner of the registration of the discharge.

4. The Owner shall have the right fully to use and enjoy the Statutory Right of Way except as may be necessary for the purposes herein granted to Northern Gateway provided however that the Owner shall not, without the prior written consent of Northern Gateway, which consent shall not be unreasonably withheld, excavate, drill, install, erect, place, plant or permit to be excavated, drilled, installed, erected, placed, or planted on, over, under, across or through the Statutory Right of Way any pit, well, foundation, pavement, building, tree, or any other structure, installation or object.

5. Notwithstanding the provisions of Clause 4, Northern Gateway will not object to the Owner:

(i) paving existing farm lanes, private roads, driveways, and sidewalks across the Statutory Right of Way;

(ii) erecting fences across the Statutory Right of Way or any portion thereof; or

(iii) constructing drains or repairing drains on the Statutory Right of Way or any portion thereof;

provided, however, that the Owner agrees to exercise a high degree of care in carrying out any excavation or drilling necessary for such fencing, paving or drainage, and in no event shall the Owner or his contractors perform such work in such a manner as to endanger or damage the Pipeline. Before the commencement of any such work, the Owner shall give to Northern Gateway at least five (5) days prior notice in writing so as to enable a representative of Northern Gateway to inspect the site of the proposed work and to advise how the work may be performed without damage to the Pipeline.

6. Northern Gateway will compensate the Owner for all damages suffered as a result of its operations.

7. Northern Gateway will, as soon as weather and soil conditions permit and insofar as it is practicable so to do, bury and maintain the Pipeline in a manner that will not interfere with the drainage or ordinary cultivation of the Lands, and will restore all drains damaged or disturbed by the operation, according to good drainage practice.

8. Notwithstanding that in constructing, maintaining and operating its Pipeline, Northern Gateway may install pipe and other equipment and appurtenances in, on, over, under, across or through the Statutory Right of Way in such a manner that it or they become affixed to the Lands, the title to such pipe and other equipment and appurtenances shall until surrendered, remain in Northern Gateway. Northern Gateway may at any time remove the whole or any part of the Pipeline.

9. Upon the discontinuance of the use of the said Statutory Right of Way and of the exercise of the rights hereby granted, Northern Gateway shall and will restore the Statutory Right of Way to the same condition, so far as it is practicable so to do, as the same were in prior to the entry thereon and the use thereof by Northern Gateway. Northern Gateway agrees to withdraw and discharge any registrations at the Land Title Office pertaining to this Agreement upon the abandonment of the Statutory Right of Way.

10. Northern Gateway in performing and observing the covenants and conditions contained in this Agreement, shall peaceably hold and enjoy the rights and Statutory Right of Way hereby granted without hindrance, molestation or interruption on the part of the Owner or of any person, firm or corporation claiming by, through, under or in trust for the Owner.

11. Either party shall have the absolute right to assign this Agreement in whole or in part, and upon such assignment, shall give to the other party written notice thereof within ten (10) days, but Northern Gateway need not give such notice upon assignment in the course of its corporate financing by way of a deed of trust, mortgage, debenture or a floating charge or upon assignment arising out of an amalgamation or merger.

12. This Agreement shall not affect or prejudice Northern Gateway's statutory rights to acquire a right of entry or any portion of the Lands under the provisions of the *National Energy Board Act* (the "Act"), or any other laws, which rights may be exercised at Northern Gateway's discretion in the event of the Owner being unable or unwilling for any reason to perform this Agreement or to give to Northern Gateway a clear and unencumbered title to the Statutory Right of Way herein granted.

13. The Owner will, if so requested by Northern Gateway, execute such further documents of title and assurances in respect of the Lands as may be required to perfect Northern Gateway's interest in the Lands.

14. Nothing contained herein shall vest in Northern Gateway any title to mines or minerals in or under the Statutory Right of Way, except only the parts thereof that are necessary to be excavated, carried away or used in the construction of the Pipeline belonging to Northern Gateway.

15. Where Northern Gateway requires an above ground installation of the Pipeline upon the Statutory Right of Way (other than pipeline markers installed at property or fence lines) or requires any part of the Statutory Right of Way to be fenced, the Owner shall be entitled to additional compensation to be agreed upon between the parties, or failing agreement, pursuant to the procedure available for negotiation and arbitration under Part V of the Act.

16. Northern Gateway will not object to any application made by the Owner under Section 112 of the Act so long as the proposed crossing is made in accordance with good engineering practice and does not interfere with the operation of the Pipeline.

17. This Agreement is a covenant running with the Lands and the provisions of this Agreement shall extend to, be binding upon, and ensure to the benefit of the heirs, executors, administrators, successors and assigns of the Owner and Northern Gateway, respectively.

18. Wherever the singular or masculine is used in this Agreement, it shall be construed as if the plural or feminine or the neuter, as the case may be, had been used where the context so requires.

19. It is agreed that the Owner shall have the right to transfer or convey his interest in the Lands and the covenants and conditions herein contained in one or more parcels and by one or more conveyances and that all the covenants and conditions herein contained shall extend to and be binding upon and ensure to the benefit of each and all of the heirs, executors, administrators, successors, and assigns of the Owner in respect of each and every parcel transferred or conveyed.

20. All notices to be given hereunder may be given by registered letter addressed to Northern Gateway Suite 3000, 425 – 1st Street SW, Calgary AB, T2P 3L8, and to the Owner at _____ or such other address as Northern Gateway and the Owner may respectively appoint, from time to time, in writing, and any such notice shall be deemed to be given to and received seven (7) days after the mailing thereof, postage prepaid.

21. Northern Gateway proposes to install two (2) pipelines in the Statutory Right of Way. Northern Gateway will only install an additional pipeline or pipelines in the Statutory Right of Way with the consent and agreement of the Owner, or, in the absence of such consent and agreement, in accordance with all authorizations and determinations, including with respect to any additional compensation payable, made under the Act.

22. The Owner agrees that Northern Gateway may, at its option, at any time in the course of operating the Pipeline enter upon the Statutory Right of Way with men and equipment and remove all shrubs and trees from the Statutory Right of Way.

23. Northern Gateway shall indemnify the Owner from all liabilities, damages, claims, suits and actions arising out of the operations of Northern Gateway other than liabilities, damages, claims, suits and actions resulting from the gross negligence or willful misconduct of the Owner.

24. The Owner confirms having the option of requiring the compensation for the rights herein granted to be made by one lump sum payment or by annual or periodic payments of equal or different amounts over a period of time and that the Owner has selected the method of compensation hereinbefore set out. The Owner further confirms that if the Owner has selected annual or other periodic payments, the amount of such compensation payable by Northern Gateway shall be reviewed every five (5) years if the period of compensation extends beyond five (5) years.

25. The Owner consents to the collection and use of his/her personal information within this form. Northern Gateway collects this type of personal information for the purposes of general land rights acquisition and regulatory disclosure. The Owner consents to the collection, use and disclosure of its personal information for these legitimate business purposes in relation to land matters of Northern Gateway.

26. The Owner acknowledges receipt of a notice given pursuant to Section 87(1) of the Act and given prior to the entering into of this Agreement, setting out or accompanied by:

    (a) a description of the lands of the Owner required by Northern Gateway for a section or part of the Pipelines;
    (b) details of the compensation offered by Northern Gateway for such lands required;
    (c) a detailed statement made by Northern Gateway of the value of such lands required in respect of which compensation was offered;
    (d) a description of the procedure for approval of the detailed route of Northern Gateway's Pipelines; and
    (e) a description of the procedure available for negotiation and arbitration under Part V of the Act in the event that the Owner and Northern Gateway are unable to agree on any matter respecting the compensation payable.

27. The Owner acknowledges that Northern Gateway has explained the specific route of the proposed pipeline right of way, as well as the proposed methods and timing of the construction of the Pipeline that will be installed therein. This Agreement confirms that the Owner is in agreement with the location of the pipeline right of way, and the methods and timing of construction of the Pipeline that will be installed therein. The Owner hereby waives any right

to ask for a hearing to settle the detailed Pipeline route or the methods and timing of construction, and understands that Northern Gateway may not serve the Owner with further Notice of the detailed route of the Pipeline pursuant to Section 34 (1)(a) of the Act.

IN WITNESS WHEREOF the Owner and Northern Gateway have executed and delivered these presents as of the day and year first above written, on Part 1 of the Form C General Instrument attached to and forming part of this Instrument.

_____
Witness:

_____
Owner:

_____
Witness:

_____
Owner:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner, NORTHERN GATEWAY PIPELINES INC.

Per: _____

_____
Print name and position

Per: _____

_____
Print name and position

AFFIDAVIT OF EXECUTION

CANADA	)	I, _____, of the
PROVINCE OF BRITISH COLUMBIA	)	_____ of_____, in the
WIT	)	Province of _____, **MAKE OATH AND**
	)	**SAY**:

1. **THAT** I was personally present and did see _____ named in the within Instrument who is (are) personally known to me to be the person(s) named therein, duly sign and execute the same for the purpose named therein.

2. **THAT** the same was executed at the _____ of _____, in the Province of British Columbia, and that I am the subscribing witness thereto.

3. **THAT** I know the said_____named and he (she) (each) is in my belief, of the full age of eighteen years.

SWORN BEFORE ME at the _____ of _____, in the Province of Alberta, this _____ day of _____, 20___.

_____
A Commissioner for Oaths in and for the
the Province of Alberta

_____

CONSENT BY OCCUPANT(S)/PURCHASER(S) OR OTHER INTERESTED PARTIES

I (We), _____of _____ in the Province of British Columbia having an interest in the within Lands by virtue of an Agreement or Instrument dated the _____day of _____, _____; **DO HEREBY AGREE** , that all my (our) rights, interests and estate which are, or may be, affected by the Agreement for Statutory Right of Way shall be fully bound by the terms and conditions thereof both now and henceforth.

DATED at the _____ of _____, in the Province of British Columbia, this _____ day of _____, 20___.

_____ _____
Witness: **Name:**

_____ _____
Witness: **Name:**

AFFIDAVIT OF EXECUTION

CANADA)
PROVINCE OF BRITISH COLUMBIA)
WIT:)

I, _____,
of the _____ of_____, in the Province of
_____, **MAKE OATH AND SAY**:

1. **THAT** I was personally present and did see _____ named in the within Instrument who is (are) personally known to me to be the person(s) named therein, duly sign and execute the same for the purpose named therein.

2. **THAT** the same was executed at the _____ of _____, in the Province of British Columbia, and that I am the subscribing witness thereto.

3. **THAT** I know the said_____named and he (she) (each) is in my belief, of the full age of eighteen years.

SWORN BEFORE ME at the _____ of ____,)
in the Province of Alberta, this _____ day of _,)
20___.)
)
)
)
_____
A Commissioner for Oaths in and for the
the Province of Alberta

_____

ATTACHED TO AND FORMING PART OF THE STATUTORY RIGHT OF WAY AGREEMENT

SCHEDULE ONE

Annual or Periodic Payment

The consideration for this Agreement is the sum of Dollars ($_____) of lawful money of Canada to be paid on or before construction is commenced on the Lands, the receipt of which is hereby acknowledged by the Owner, and thereafter the sum of Dollars ($_____) of lawful money of Canada to be paid on or before the anniversary date thereafter for a period of _____ (_____) years. The amount of any annual or periodic payment will be reviewed every five (5) years.

The Owner hereby agrees to and accepts the annual or periodic payment set out above.

_____	_____
Witness:	Owner:
_____	_____
Witness:	Owner:
_____	_____
Witness:	Owner:

Appendix D Agreement for Temporary Working Space, Alberta

Appendix D

TRACT:
GST Reg. No:

AGREEMENT FOR TEMPORARY WORKING SPACE

PROVINCE OF ALBERTA

This Agreement dated the _____ day of _____, 20____ (the "Effective Date").

BETWEEN:

_____ (the "**Owner**")

- and -

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC. ("Northern Gateway")

WHEREAS the Owner is registered as owner or entitled to become registered as owner of an estate in fee simple, subject however to such encumbrances, liens and interests as appear on the Certificate of Title, in all that certain tract of land situated in the Province of Alberta being composed of:
_____ (the "Lands");

AND WHEREAS Northern Gateway has acquired an easement from the Owner through the Lands for the purpose of constructing two (2) pipelines (the "Pipelines") all as more particularly described in an Agreement for Easement between the Owner and Northern Gateway;

AND WHEREAS Northern Gateway requires the right to use a portion of the Lands adjacent to its easement as shown on the attached property sketch (and identified as "Temporary Working Rights" and /or "Extra Temporary Working Rights") to facilitate the construction of the Pipelines ("Temporary Working Space");

AND WHEREAS the Owner is willing to grant to Northern Gateway the use of the Temporary Working Space for and in consideration of the covenants and payments hereinafter set out;

NOW THEREFORE, the parties hereto agree as follows:

1. The sum of _____Dollars ($_____), *plus Goods and Services Tax,* shall be paid to the Owner before construction of the Pipelines is commenced on the Lands.

2. The Owner hereby grants to Northern Gateway, its employees, agents, contractors, subcontractors, successors and assigns, the right, license, liberty and privilege to clear, enter and use the Temporary Working Space with people, vehicles, supplies, and equipment from the Effective Date until completion of final reclamation and clean-up, for all purposes useful or convenient in connection with or incidental to the exercise and enjoyment of the rights and privileges provided for in the Agreement for Easement.

3. Northern Gateway shall compensate the Owner for all damage resulting from the use of the Temporary Working Space by Northern Gateway, its employees, agents, contractors, and subcontractors.

4. When Northern Gateway no longer requires the use of the Temporary Working Space and the rights hereby granted, and as soon as it is reasonably practical to do so, Northern Gateway shall restore the surface of the Temporary Working Space in accordance with all applicable laws and regulations.

5. This Agreement, including all covenants and conditions herein contained, shall extend to, be binding upon and enure to the benefit of the heirs, executors, administrators, successors and assigns of the Owner and Northern Gateway. In the event the Owner transfers his/her ownership in the Lands, the Owner agrees to provide fifteen (15) days prior notice of said transfer to Northern Gateway. Such notice shall include the name of the Owner, the legal description of the Lands, the name of the transferee, and the effective date of the transfer. If made in writing, the notice shall be mailed to Northern Gateway, Suite 3000, 425 1st Street SW, Calgary, Alberta, T2P 3L8, and shall be deemed to have been given to and received by Northern Gateway seven (7) days after the mailing thereof. Alternatively, the Owner may affect such notice by leaving a detailed message at 1-888-434-0533.

6. Northern gateway may, at any time for whatsoever reason or cause, at its election on notice in writing to the Owner, terminate this Agreement, and upon giving such notice, this Agreement shall be of no further effect and the Company shall stand relieved of all of its obligations hereunder other than those which accrued prior to the date of termination.

7. Northern Gateway shall indemnify and save harmless the Owner from any and all liabilities, damages, claims, suits or actions arising out of the use of the Temporary Working Space by Northern Gateway, its employees, agents, contractors, and subcontractors, other than liabilities, damages, claims, suits and actions resulting from the gross negligence or willful misconduct of the Owner.

8. Northern Gateway and the Owner hereby agree and acknowledge that this Agreement does not create a lease and does not constitute a right or interest in land.

IN WITNESS WHEREOF the parties have executed and delivered this Agreement as of the date first above written.

_____	_____
Witness:	Owner:
_____	_____
Witness:	Owner:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner, NORTHERN GATEWAY PIPELINES INC.

Per: _____

_____
Print name and position

Per: _____

_____
Print name and position

Appendix E Agreement for Temporary Working Space, British Columbia

Appendix E

TRACT:
GST Reg. No:

AGREEMENT FOR TEMPORARY WORKING SPACE
PROVINCE OF BRITISH COLUMBIA

This Agreement dated the _____ day of _____, 20____ (the "Effective Date").

BETWEEN:

_____ (the "**Owner**")

- and –

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC. ("Northern Gateway")

WHEREAS the Owner is registered as owner or entitled to become registered as owner of an estate in fee simple, subject however to such encumbrances, liens and interests as appear on the Certificate of Title, in all that certain tract of land situated in the Province of British Columbia being composed of: _____ (the "Lands");

AND WHEREAS Northern Gateway has acquired a Statutory Right of Way from the Owner through the Lands for the purpose of constructing two (2) pipelines (the "Pipelines") all as more particularly described in a Statutory Right of Way Agreement between the Owner and Northern Gateway;

AND WHEREAS Northern Gateway requires the right to use a portion of the Lands adjacent to its Statutory Right of Way as shown on the attached property sketch (and identified as "Temporary Working Rights" and /or "Extra Temporary Working Rights") to facilitate the construction of the Pipelines ("Temporary Working Space");

AND WHEREAS the Owner is willing to grant to Northern Gateway the use of the Temporary Working Space for and in consideration of the covenants and payments hereinafter set out;

NOW THEREFORE, the parties hereto agree as follows:

1. The sum of _____Dollars ($_____), *plus applicable taxes,* shall be paid to the Owner before construction of the Pipelines is commenced on the Lands.

2. The Owner hereby grants to Northern Gateway, its employees, agents, contractors, subcontractors, successors and assigns, the right, license, liberty and privilege to clear, enter and use the Temporary Working Space with people, vehicles, supplies, and equipment from the Effective Date until completion of final reclamation and clean-up, for all purposes useful or convenient in connection with or incidental to the exercise and enjoyment of the rights and privileges provided for in the Statutory Right of Way Agreement.

3. Northern Gateway shall compensate the Owner for all damage resulting from the use of the Temporary Working Space by Northern Gateway, its employees, agents, contractors, and subcontractors.

4. When Northern Gateway no longer requires the use of the Temporary Working Space and the rights hereby granted, and as soon as it is reasonably practical to do so, Northern Gateway shall restore the surface of the Temporary Working Space in accordance with all applicable laws and regulations.

5. This Agreement, including all covenants and conditions herein contained, shall extend to, be binding upon and enure to the benefit of the heirs, executors, administrators, successors and assigns of the Owner and Northern Gateway. In the event the Owner transfers his/her ownership in the Lands, the Owner agrees to provide fifteen (15) days prior notice of said transfer to Northern Gateway. Such notice shall include the name of the Owner, the legal description of the Lands, the name of the transferee, and the effective date of the transfer. If made in writing, the notice shall be mailed to Northern Gateway, Suite 3000, 425 1st Street SW, Calgary, Alberta, T2P 3L8, and shall be deemed to have been given to and received by Northern Gateway seven (7) days after the mailing thereof. Alternatively, the Owner may affect such notice by leaving a detailed message at 1-888-434-0533.

6. Northern gateway may, at any time for whatsoever reason or cause, at its election on notice in writing to the Owner, terminate this Agreement, and upon giving such notice, this Agreement shall be of no further effect and the Company shall stand relieved of all of its obligations hereunder other than those which accrued prior to the date of termination.

7. Northern Gateway shall indemnify and save harmless the Owner from any and all liabilities, damages, claims, suits or actions arising out of the use of the Temporary Working Space by Northern Gateway, its employees, agents, contractors, and subcontractors, other than liabilities, damages, claims, suits and actions resulting from the gross negligence or willful misconduct of the Owner.

8. Northern Gateway and the Owner hereby agree and acknowledge that this Agreement does not create a lease and does not constitute a right or interest in land.

IN WITNESS WHEREOF the parties have executed and delivered this Agreement as of the date first above written.

Witness:	Owner:
Witness:	Owner:
Witness:	Owner:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP by the General Partner, NORTHERN GATEWAY PIPELINES INC.

Per: _____

Print name and position

Per: _____

Print name and position

Appendix F Option to Purchase Agreements

F.1 Option to Purchase Agreement – Alberta

Tract _____
GST Registration No. _____

OPTION TO PURCHASE

THIS AGREEMENT dated the _____ day of _____, 20__.

BETWEEN:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC.
("**Northern Gateway**")

– and –

_____
(the "**Owner**")

WHEREAS:

A. The **Owner** is the registered owner of certain lands in or near _____, in the Province of Alberta, more particularly described as follows:

[insert legal description]

subject to the reservations and exceptions appearing in Certificate of Title No. _____ attached as **Schedule "A"** (the "Property");

B. **Northern Gateway** wishes to acquire lands as substantially shown on the plan attached as **Schedule "B"** (the "Option Lands"); and

C. The **Owner** has agreed to grant to **Northern Gateway** an Option to Purchase the Option Lands pursuant to the terms, provisions and conditions set forth in this Agreement.

In consideration of the sum of _____ Dollars ($_____), exclusive of Goods and Services Tax (the "Consideration") now paid by **Northern Gatew ay** to the **Owner**, receipt of which the **Owner** hereby acknowledges, the **Owner** and **Northern Gateway** agree as follows:

Grant of Option to Purchase

1. The **Owner** hereby grants to **Northern Gatew ay** the sole and exclusive Option to Purchase the Option Lands irrevocable within the time for exercise provided in Section 2 herein.

Exercise of Option

2. The Option may be exercised by **Northern Ga teway** by notice in writing delivered or mailed on or before 5:00 p.m. Mountain Standard Time on _____, ____, 20___.

3. Notice in writing mailed to the **Owner** of the exercise of the Option by **Northern Gateway** shall be deemed effective at the time and date such notice is mailed by Registered Mail addressed to the **Owner** at _____ in the Province of _____.

4. In the event that **Northern Gateway** does not exercise the Option, this Agreement shall be null and void and no longer binding on the parties, except the **Owner** shall be entitled to retain the Consideration.

Purchase Price

5. If the Option is exercised, **Northern Gatew ay** shall pay to the **Owner** compensation constituting the purchase price ("Purchase Price") for the Option Lands. The Consideration paid to the **Owner** shall be credited towards the Purchase Price.

6. If the Option is exercised by **Northern Gate way**, **Northern Gatew ay** shall pay to the Owner the Purchase Price for the Option Lands calculated as follows:

   (a) one lump sum of _____ Dollars ($_____) per hectare ($ _____ per acre) multiplied by the area of the Option Lands in hectares (acres) determined, if required by either party, by a legal survey, (the "Lump Sum Payment") plus Goods and Services Tax ("GST"),

   (b) annual or periodic payments of equal or different amounts over a period of time as set forth in **Schedule "C"**.

7. The parties agree that on the Closing Date the Owner shall not collect GST from **Northern Gatew ay** in respect of the purchase and sale of the Option Lands, and **Northern Gatew ay** shall file returns and remit GST to the Canada Revenue Agency in respect of the purchase and sale of the Option Lands when and to the extent required by the Excise Tax Act. **Northern Gateway** shall provide the Owner a statutory declaration on closing confirming its GST registration number under the Excise Tax Act and any other matters reasonably required by the Owner.

8. Upon the exercise of the Option, this Agreement and the document by which the Option is exercised shall become a binding contract of sale and purchase and such sale and purchase shall be completed upon the terms provided herein.

Closing

9. The closing date shall be the last day of the 3rd month following the later of the month in which the Option is exercised, or the date upon which unconditional subdivision approval, if applicable, has been granted by the subdivision approval authority (the "Closing Date").

10. The Owner shall provide to **Northern Gateway**, in registerable form, a transfer of land and other conveyancing documents in a reasonable time prior to the Closing Date in order for **Northern Gateway** to confirm registration on or before the Closing Date.

11. On the Closing Date, **Northern Gateway** shall pay to the **Owner**, by cheque, the Lump Sum Payment or the first payment referred to in **Schedule "C"**, subject to a credit in **Northern Gateway's** favor for the Consideration toward such payment and also subject to all usual adjustments including for rents, taxes, and interest, if any. The payment shall be held in trust by the **Owner's** solicitor until:

    (a) title to the Option Lands has been issued in the name of **Northern Gateway**, subject only to non-financial instruments on the title to the Option Lands such as easements, utility rights-of-way and covenants that are normally found registered against property of this nature, and such non-financial encumbrances that have been specifically accepted by **Northern Gateway** in writing at the time of its exercise of the Option. Unless otherwise agreed to in writing, the title to the Option Lands shall be free and clear of all other liens, encumbrances, registrations and obligations except those implied by law, and

    (b) the **Owner** shall have delivered vacant possession of the Option Lands free and clear of any tenancy.

Access

12. Upon the granting of the Option, **Northern Gateway**, its employees, agents, contractors, and sub-contractors may enter upon the Property at the sole risk of **Northern Gateway** and make all surveys, soil tests, environmental and geotechnical investigations, and such other examinations as **Northern Gateway** deems appropriate. **Northern Gateway** shall compensate any tenant on the Property for any damage to the tenant's crops. **Northern Gateway** shall restore or pay for the restoration of any damage resulting from such activities if this Option is not exercised.

Representations and Warranties

13. Notwithstanding any investigations of **Northern Gateway**, the **Owner** makes, and **Northern Gateway** is entitled to rely upon, the following representations and warranties in respect of the Property and the Option Lands both as of the date hereof and as of the Closing Date:

    (a) the **Owner** is not a non-resident of Canada for purposes of Section 116 of the Income Tax Act of Canada;

    (b) the **Owner** is not aware of any contamination of or other adverse environmental concern related to the Option Lands or the Property;

    (c) to the best of the **Owner's** knowledge, information and belief the Option Lands has not been subject to any prior use which might reasonably be expected to have resulted in deleterious substances having been deposited or accumulated upon, within, or under the Option Lands; and

(d) the **Owner** has good and marketable title to the Option Lands, and is ready, willing and able to convey title to the Option Lands free and clear from any liens, encumbrances or adverse interests except as set out in Section 11 above, and also free and clear from any charges, claims or obligations of any party claiming by, through or under the **Owner**.

14. Without limiting the foregoing representations and warranties, **Northern Gate way** acknowledges that:

(a) it is relying on its own investigations, analysis, appraisals, and estimates as to the value of the Option Lands and the suitability of the Option Lands for the use it intends; and

(b) it is obtaining all required regulatory and other approvals, including planning, development, zoning and building approvals and permits.

Conditions Precedent

15. The following conditions shall be conditions precedent to **Northern Gatew ay's** obligation to complete the purchase of the Option Lands following exercise of the Option:

(a) **Northern Gatew ay** shall be satisfied, in its sole discretion, that all approvals or permits whatsoever, including without limitation, zoning, subdivision, regulatory, environmental, development and building permits, shall have been obtained or are obtainable on terms acceptable to it, in order for it to develop the Option Lands in accordance with its intended use;

(b) **Northern Gatew ay** shall be satisfied, in its sole discretion, that environmental and geo-technical investigations do not reveal any conditions that would make the Option Lands unsuitable for its intended use; and

(c) the **Owner's** representations and warranties shall be true and not misleading in any way and **Northern Gatew ay** shall not have become aware of any fact or thing which would reasonably lead it to believe otherwise.

(d) the **Owner** shall have complied with Section 13.

16. If the conditions precedent described in Section 15 are not satisfied fourteen (14) days prior to the Closing Date, and **Northern Gateway** does not waive them, this Agreement shall terminate and be of no further force and effect.

17. If applicable, **Northern Gateway** shall have received subdivision approval in respect of the subdivision of the Option Lands from the Property from the subdivision approval authority by no later than , and in the event approval is not obtained by this date, the Agreement shall terminate and be of no further force and effect.

Miscellaneous

18. The parties agree that the Consideration does not include GST of _____ and that the Owner shall not collect GST from **Northern Gatew ay** in respect of the Consideration, and **Northern Gateway** shall file returns and remit GST to the Canada Revenue Agency in respect of the Consideration when and to the extent required by the Excise Tax Act.

19. The **Owner** agrees not to remove or allow the removal of any materials from the Option Lands (including any soil) while this Agreement remains in effect, or otherwise alter the Option Lands, or the use of the Option Lands, which may result in a material adverse impact on the Option Lands, or the use of the Option Lands by **Northern Gateway**.

20. The **Owner** shall execute all further deeds, documents and assurances, and shall do all such further things as may be reasonably required for the purpose of carrying out this Agreement according to its true meaning and intent.

21. This Agreement shall be binding upon and enure to the benefit of the heirs, executors, administrators, successors and assigns of the **Owner** and **Northern Gate way**, respectively.

22. If any provision contained in this Option or its application to any party hereto or circumstance shall, to any extent, be invalid or unenforceable, the remainder of this Option or the application of such provision to such parties or circumstances other than those to which it is held invalid or unenforceable shall not be affected.

23. **Northern Gateway** shall be responsible for:

    (a) all costs related to the obtaining of subdivision approval of the Option Lands, if applicable;

    (b) the costs of a legal survey of the Option Lands; and

    (c) the costs for the preparation and registration of any legal property or subdivision plans.

24. The Option Lands including all fixtures and other items to be purchased related to the Option Lands shall remain at the risk of the Owner until the Closing Date. In the event of loss, destruction or damage or any such property between the granting of the Option and the Closing Date, either such loss will be repaired and corrected at the expense of the Owner, except to the extent that such loss is directly due to the actions of **Northern Gateway** or its representatives, or such loss will be dealt with in an equitable manner by way of an adjustment at closing.

25. **Northern Gateway** shall have the right at any time and from time to time to assign all of its rights and obligations under this Agreement. The Owner shall not, in whole or in part, assign his interest in this Agreement without the prior written consent of **Northern Gateway**.

26. Time shall be of the essence. The provisions hereof shall survive the registration of all conveyances and shall not merge therein or therewith.

27. The Agreement shall be governed by and interpreted in accordance with the laws of the Province of Alberta.

28. This Agreement shall enure to the benefit of, and be binding upon, the parties hereto and their respective successors and assigns.

29. The Owner acknowledges receiving a Notice pursuant to Section 87 (1) of the National Energy Board Act concerning the above property.

30. The Owner confirms having the option of requiring the Purchase Price to be made by one Lump Sum Payment or by annual or periodic payments of equal or different amounts over a period of time and that the Owner has selected the method of

compensation hereinbefore set out. The Owner and **Northern Gateway** further confirm that if the Owner has selected annual or other periodic payments, the amount of such compensation payable by the Owner shall be reviewed every five years if the period of compensation extends beyond five years.

31. Until the Closing Date, the Owner agrees as follows:

(a) to pay compensation for all damages suffered by the Owner as a result of the operations of **Northern Gateway** on the Property;

(b) to indemnify the Owner from all liabilities, damages, claims, suits and actions arising out of the operations of **Northern Gateway** on the Property other than liabilities, damages, claims, suits and actions resulting from the gross negligence or willful misconduct of the Vendor;

(c) that any use of the Option Lands shall be restricted to access, in accordance with Section 12, unless the Owner consents to any proposed additional use at the time of the proposed additional use.

IN WITNES S WHERE OF the parties hereto have duly executed this Agreement by their respective hands as of the day and year first above written.

_____ _____

Witness: Owner:

_____ _____

Witness: Owner:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP BY THE GENERAL PARTNER, NORTHERN GATEWAY PIPELINES INC.

Per: _____

_____

Print name and position

Per: _____

_____

Print name and position

SCHEDULE “A”

SCHEDULE “B”

SCHEDULE “C”

The consideration for this agreement is the sum of _____ Dollars ($_____) of lawful money of Canada to be paid before construction is commenced on the said Lands and thereafter the sum of _____ Dollars ($_____) of money of Canada to be paid in each and every year. This annual payment shall be made on or before the anniversary date of the first payment being made before construction is commenced, for a period of nine years (“term”), or until abandonment of the Option Lands if abandonment occurs prior to the expiration of the term.

ALBERTA – THE DOWER ACT
CONSENT OF SPOUSE

I, _____, being married to the within named _____ do hereby give my consent to the disposition of our homestead, made in the within instrument, and I have executed this document for the purpose of giving up my life estate and other dower rights in the said property given to me by THE DOWER ACT, to the extent necessary to give effect to the said disposition.

_____

CERTIFICATE OF ACKNOWLEDGEMENT BY SPOUSE

1. This document was acknowledged before me by _____ apart from her husband (his wife).

2. _____ acknowledged to me that she (he)

(a) is aware of the nature of the disposition or agreement;
(b) is aware that THE DOWER ACT, gives her (him) a life estate in the homestead and the right to prevent disposition of the homestead by withholding consent;
(c) consents to the disposition or agreement for the purpose of giving up the life estate and other dower rights in the homestead given to her (him) by THE DOWER ACT, to the extent necessary to give effect to the said disposition or agreement;
(d) is executing the document freely and voluntarily without any compulsion on the part of her husband (his wife).

SWORN before me at the _____)
of _____ in the)
Province of Alberta, this _____ day of)
_____, A.D.)
20____.) _____
)
_____)
A Commissioner for Oaths in)
and for the Province of Alberta)

AFFIDAVIT

CANADA
PROVINCE OF ALBERTA
TO WIT:

I, _____ of _____, in the Province of Alberta, _____, make oath and say:

1. That I am the Grantor named in the within instrument.
2. That I am not married.

   -OR-

   That neither myself nor my spouse have resided on the within mentioned land at any time since our marriage.

SWORN before me at the _____)
of _____ in the)
Province of Alberta, this _____ day of)
_____, A.D.)
20____.) _____
)
_____)
A Commissioner for Oaths in)
and for the Province of Alberta)

AFFIDAVIT OF EXECUTION

CANADA)
)
PROVINCE OF ALBERTA)
)
TO WIT:)

I, _____ of the _____ of _____ in the Province of Alberta,

MAKE OATH AND SAY:

1. THAT I was personally present and did see _____ named in the within instrument, who is (are) personally known to me to be the person(s) named therein, duly sign, seal and execute the same for the purpose named therein.

2. THAT the instrument, was executed at the _____ of _____ in the Province of Alberta, and that I am the subscribing witness thereto.

3. THAT I believe the person(s) whose signatures I witnessed is (are) at least eighteen (18) years of age.

SWORN before me at the _____)
of _____ in the)
Province of Alberta, this _____ day of)
_____, A.D.)
20____.)
)
_____)
A Commissioner for Oaths in)
and for the Province of Alberta)

_____

F.2 Option to Purchase Agreement – British Columbia

Tract _____
GST Registration No. _____

OPTION TO PURCHASE

THIS AGREEMENT dated the _____ day of _____, 20__.

BETWEEN:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP
by the General Partner NORTHERN GATEWAY PIPELINES INC.
("**Northern Gateway**")

– and –

_____
(the "**Owner**")

WHEREAS:

A. The Owner is the registered owner of certain lands in or near _____, in the Province of British Columbia, more particularly described as follows:

[insert legal description]

subject to the rights of way, easements and covenants in favour of utilities and public authorities as set out in **Schedule "A"** (the "Property");

B. Northern Gateway wishes to subdivide certain lands (the "Option Lands") from the Property as substantially shown on the plan attached as **Schedule "B"** (the "Subdivision Plan") and to purchase such lands from the Owner after the completion of the subdivision; and

C. The Owner has agreed to grant to Northern Gateway an Option to Purchase the Option Lands pursuant to the terms, provisions and conditions set forth in this Agreement.

In consideration of the sum of _____ Dollars ($_____), exclusive of Goods and Services Tax (the "Consideration") now paid by Northern Gateway to the Owner, receipt of which the Owner hereby acknowledges, the Owner and Northern Gateway agree as follows:

Grant of Option to Purchase

1. The Owner hereby grants to Northern Gateway the sole and exclusive option to Purchase the Option Lands ("Option") irrevocable within the time for exercise provided in Section 2 herein.

Exercise of Option

2. The Option may be exercised by Northern Gateway by notice in writing delivered or mailed on or before 5:00 p.m. Pacific Standard Time on _____, ____, 20___.

3. Notice in writing mailed to the Owner of the exercise of the Option by Northern Gateway shall be deemed effective at the time and date such notice is mailed by Registered Mail addressed to the Owner at _____ _____ in the Province of British Columbia.

4. In the event that Northern Gateway does not exercise the Option, this Agreement shall be null and void and no longer binding on the parties, except the Owner shall be entitled to retain the Consideration.

Purchase Price

5. If the Option is exercised, Northern Gateway shall pay to the Owner compensation constituting the purchase price ("Purchase Price") for the Option Lands. The Consideration paid to the Owner shall be credited towards the Purchase Price.

6. If the Option is exercised by Northern Gateway, Northern Gateway shall pay to the Owner the Purchase Price for the Option Lands which shall be the sum of $_____ per hectare ($_____ per acre) multiplied by the area of the Option Lands in hectares (acres) determined, if required by either party, by a legal survey, plus Goods and Services Tax ("GST").

7. The parties agree that on the Closing Date (as defined herein) the Owner shall not collect GST from Northern Gateway in respect of the purchase and sale of the Option Lands, and Northern Gateway shall file returns and remit GST to the Canada Revenue Agency in respect of the purchase and sale of the Option Lands when and to the extent required by the *Excise Tax Act*. Northern Gateway shall provide the Owner a statutory declaration on closing confirming its GST registration number under the *Excise Tax Act* and any other matters reasonably required by the Owner.

8. Upon the exercise of the Option, this Agreement and the document by which the Option is exercised shall become a binding contract of sale and purchase and such sale and purchase shall be completed upon the terms provided herein.

Permitted Encumbrances

9. The Option Lands will be free and clear of any encumbrances except:

   (a) the rights-of-way, easements and covenants in favour of utilities and public authorities set out in Schedule "A" to this Agreement; and

   (b) any rights-of-way, easements and covenants which may be required by municipal, regional district or other governmental authorities as a condition of approval of the Subdivision Plan;

   (together the "Permitted Encumbrances").

Closing

10. The closing date (the "Closing Date") shall be the last day of the third month following the later of, the month in which the Option is exercised, or the date upon which Northern Gateway receives notice that the requirements set out in the Preliminary Layout Approval in connection with the subdivision of the Property (the "Subdivision") have been satisfied and unconditional subdivision approval has been granted by the approving officer.

11. On or before the Closing Date, the Owner will deliver to Northern Gateway's solicitors, Fraser Milner Casgrain LLP ("Gateway's Solicitors"), in trust, the following documents duly executed as appropriate and applicable:

    (a) a Form A transfer document in registrable form, executed by the Owner (the "Form A");

    (b) a statement of adjustments;

    (c) a statutory declaration by an authorized officer of the Owner that the Owner is not a non-resident of Canada for the purposes of the *Income Tax Act* (Canada); and

    (d) such further deeds, acts, things, certificates and assurances as may be requisite in the reasonable opinion of Gateway's Solicitors for more perfectly and absolutely assigning, transferring and conveying to Northern Gateway, title to the Option Lands free and clear of any lien, charge, encumbrance or legal notation, other than the Permitted Encumbrances.

12. On or before the Closing Date, Northern Gateway will duly execute, as appropriate, and deliver to the Owner's solicitors the following:

    (a) a bank draft, certified cheque or solicitors trust cheque representing the Purchase Price subject to a credit in Northern Gateway's favour for the Consideration toward such payment and also subject to all usual adjustments including those referred to in Section 18; and

    (b) a statutory declaration by an authorized officer of Northern Gateway confirming Northern Gateway's status as a GST registrant.

13. All of the closing documents contemplated in Sections 11 and 12 will be prepared by Gateway's Solicitors and delivered to the Owner's solicitors at least five business days prior to the Closing Date. All documents referred to in Sections 11 and 12 shall be in the form and substance reasonably satisfactory to the solicitors for the party entitled to delivery thereof.

14. On or before the Closing Date, Northern Gateway shall pay the Purchase Price to Gateway's Solicitors. If Northern Gateway will be relying upon a new mortgage to finance a portion of the Purchase Price, Northern Gateway, while still required to pay the Purchase Price on the Closing Date, may wait to pay same until after the Form A and mortgage documents have been lodged for registration at the Land Title Office, but only if before lodging against title to the Option Lands, Northern Gateway has:

    (a) deposited in trust with Gateway's Solicitors the portion of the Purchase Price payable on the Closing Date less the portion of the Purchase Price being financed by the new mortgage (the "Balance of the Purchase Price");

(b) fulfilled all the new mortgagee's conditions for funding except lodging the mortgage documents for registration;

(c) advised the Owner's solicitors that Gateway's Solicitors have received the assurances of the new mortgagee that funds will be advanced in the normal course of business on the basis of pending registration; and

(d) made available to the Owner's solicitors an undertaking from Gateway's Solicitors to pay on the Closing Date the net Purchase Price payable of the Closing Date upon lodging of the Form A and the new mortgage documents, and upon receipt of a satisfactory post registration title search, and upon the advance by the new mortgagee of the mortgage proceeds.

15. Forthwith following the payment by Northern Gateway of the Balance of the Purchase Price into Gateway's Solicitors' trust account and upon receipt by Gateway's Solicitors of the executed closing documents from the Owner's solicitors, Northern Gateway shall cause Gateway's Solicitors to deliver the Form A to the British Columbia Land Title Office for registration.

16. Gateway's Solicitors will pay to the Owner's Solicitors by certified cheque or solicitor's trust cheque the net Purchase Price payable on the Closing Date forthwith following the application for registration of the Form A and receipt of a satisfactory post-filing title search disclosing only the following:

(a) the existing title number(s) to the Option Lands;

(b) the Permitted Encumbrances;

(c) the pending number assigned to the Form A;

(d) the pending numbers assigned to any security documents applicable to any mortgage financing arranged by Northern Gateway in connection with the purchase of the Option Lands; and

(e) any existing financial encumbrances granted by the Owner to be discharged in accordance with the procedure set out in Section 17 below.

17. Notwithstanding anything contained herein to the contrary, if the Owner has existing financial charges which are to be discharged from title to the Option Lands after completion of the sale of the Option Lands to Northern Gateway, the Owner, while still required to cause the discharge of such charges, may wait to cause the discharge of the same until immediately after the receipt of the Purchase Price, but in this event, Northern Gateway agrees to pay the Purchase Price to the Owner's solicitor in trust, on undertakings to pay and discharge such financial charges from the Option Lands.

Adjustments

18. All usual adjustments of taxes, utilities, local improvement assessments, rent, security deposits, interest and all other charges and costs relating to the Option Lands, both incoming and outgoing, will be made as at the Closing Date. The Owner shall be responsible for all taxes, obligations and payments to the adjustment time, and Northern Gateway shall be responsible for all taxes, obligations and payments thereafter.

Possession

19. The Owner shall deliver vacant possession of the Option Lands to Northern Gateway on the Closing Date free and clear of any tenancy.

Risk

20. The Option Lands shall be at the risk of the Owner until 11:59 a.m. Pacific Standard Time on the Closing Date and thereafter at the risk of Northern Gateway.

Access

21. Upon the granting of the Option, Northern Gateway, its employees, agents, contractors, and sub-contractors may enter upon the Property at the sole risk of Northern Gateway and make all surveys, soil tests, environmental and geotechnical investigations, and such other examinations as Northern Gateway deems appropriate. Northern Gateway shall compensate any tenant on the Property for any damage to the tenant's crops resulting from Northern Gateway's activities on the Property. Northern Gateway shall restore or pay for the restoration of any damage resulting from such activities if this Option is not exercised.

Subdivision

22. Upon the exercise of this Option, if applicable, Northern Gateway shall, at its cost, proceed to take all steps and do all the things necessary to subdivide the Option Lands from the Property substantially in accordance with the Subdivision Plan.

23. The Owner covenants with Northern Gateway that the Owner shall cooperate with Northern Gateway in obtaining all approvals or permits pertaining to the Property or the Option Lands, as the case may be, including without limitation, all zoning, subdivision, regulatory, environmental, developmental and servicing approvals and building permits (collectively, the "Approvals").

24. The Owner covenants with Northern Gateway that the Owner shall provide all consents required by Northern Gateway and the Subdivision approving officer to allow for the Approvals and, if required, shall execute on behalf of Northern Gateway, or authorize the execution by Northern Gateway, of any applications, documents and instruments of any nature whatsoever in connection with the Approvals.

Representations and Warranties

25. Notwithstanding any investigations of Northern Gateway, the Owner makes, and Northern Gateway is entitled to rely upon, the following representations and warranties in respect of the Property and the Option Lands both as of the date hereof and as of the Closing Date:

    (a) the Owner is not a non-resident of Canada for purposes of Section 116 of the *Income Tax Act* of Canada;

    (b) the Owner is not aware of any contamination of or other adverse environmental concern related to the Option Lands or the Property;

    (c) to the best of the Owner's knowledge, information and belief the Property and the Option Lands have not been subject to any prior use which might reasonably be expected to have resulted in Hazardous Substances (as hereinafter defined)

having been deposited or accumulated upon, within, or under the Option Lands or the Property or been released from the Option Lands or the Property; and

(d) the Owner has good and marketable title to the Option Lands, and is ready, willing and able to convey title to the Option Lands free and clear from any liens, encumbrances or adverse interests except as set out as permitted herein, and also free and clear from any charges, claims or obligations of any party claiming by, through or under the Owner.

26. Without limiting the foregoing representations and warranties, Northern Gateway acknowledges that:

(a) it is relying on its own investigations, analysis, appraisals, and estimates as to the value of the Option Lands and the suitability of the Option Lands for the use it intends; and

(b) it is obtaining all required regulatory and other approvals, including planning, development, zoning and building approvals and permits.

Indemnity

27. The Owner covenants to indemnify and save harmless Northern Gateway and its agents, successors and assigns or any of them from and against any and all claims, actions, judgments, orders, suits, losses, damages, liabilities, fines, penalties, costs and expenses (including costs relating to environmental studies, investigations, excavations, inspections and remediation activities), and reasonable consultants, experts and legal fees and expenses as a result of or arising from:

(a) any act, omission, negligence or misconduct of the Owner or any person for whom the Owner is in law responsible that is in non-compliance with any federal, provincial, municipal or other governmental or regulatory statutes, bylaws, regulations and rules relating to the environment, occupational safety, health or transportation ("Environmental Laws") in force on the Closing Date pertaining to the Option Lands or the Property or any activities conducted on the Option Lands or Property; or

(b) the release or presence upon, within, under or from the Option Lands or Property of any hazardous substance or pollutant or contaminant, toxic or dangerous waste, substance, chemical or material including, without limitation, gasoline and other petroleum substance or material which falls into the definition of waste, hazardous, toxic, dangerous goods or any variation of those terms or terms of similar import ("Hazardous Substances") under any Environmental Laws at or prior to the Closing Date; or

(c) as a result of any breach of the Owner of any of the representations and warranties and covenants of the Owner contained herein.

Conditions Precedent

28. The following conditions shall be conditions precedent to Northern Gateway's obligation to complete the purchase of the Option Lands following exercise of the Option:

(a) Northern Gateway shall be satisfied, in its sole discretion, that all approvals or permits whatsoever, including without limitation, zoning, subdivision, regulatory, environmental, development and building permits, shall have been obtained or

are obtainable on terms acceptable to it, in order for it to develop the Option Lands in accordance with its intended use;

(b) Northern Gateway shall be satisfied, in its sole discretion, that environmental and geo-technical investigations do not reveal any conditions that would make the Option Lands unsuitable for its intended use; and

(c) the Owner's representations and warranties shall be true and not misleading in any way and Northern Gateway shall not have become aware of any fact or thing which would reasonably lead it to believe otherwise.

(d) the Owner shall have complied with Section 25.

29. If the conditions precedent described in Section 28 are not satisfied fourteen (14) days prior to the Closing Date, and Northern Gateway does not waive them, this Agreement shall terminate and be of no further force and effect.

30. In addition to the conditions precedent described in Section 28, if applicable, Northern Gateway shall have received notice that the requirements set out in the Preliminary Layout Approval in connection with the Subdivision have been satisfied and unconditional subdivision approval has been granted by the approving officer by no later than _____, and in the event approval is not obtained by this date, the Agreement shall terminate and be of no further force and effect.

Miscellaneous

31. The parties agree that the Consideration does not include GST of _____ and that the Owner shall not collect GST from Northern Gateway in respect of the Consideration, and Northern Gateway shall file returns and remit GST to the Canada Revenue Agency in respect of the Consideration when and to the extent required by the *Excise Tax Act*.

32. The Owner agrees not to remove or allow the removal of any materials from the Option Lands (including any soil) while this Agreement remains in effect, or otherwise alter the Option Lands, or the use of the Option Lands, which may result in a material adverse impact on the Option Lands, or the use of the Option Lands by Northern Gateway.

33. The Owner shall execute all further deeds, documents and assurances, and shall do all such further things as may be reasonably required for the purpose of carrying out this Agreement according to its true meaning and intent.

34. This Agreement shall be binding upon and enure to the benefit of the heirs, executors, administrators, successors and assigns of the Owner and Northern Gateway, respectively.

35. If any provision contained in this Option or its application to any party hereto or circumstance shall, to any extent, be invalid or unenforceable, the remainder of this Option or the application of such provision to such parties or circumstances other than those to which it is held invalid or unenforceable shall not be affected.

36. Northern Gateway shall be responsible for:

(a) all costs related to the obtaining of subdivision approval of the Option Lands, if applicable;

(b) the costs of a legal survey of the Option Lands; and

(c) the costs for the preparation and registration of any legal property or subdivision plans.

37. The Option Lands including all fixtures and other items to be purchased related to the Option Lands shall remain at the risk of the Owner until the Closing Date. In the event of loss, destruction or damage or any such property between the granting of the Option and the Closing Date, either such loss will be repaired and corrected at the expense of the Owner, except to the extent that such loss is directly due to the actions of Northern Gateway or its representatives, or such loss will be dealt with in an equitable manner by way of an adjustment at closing.

38. Northern Gateway shall have the right at any time and from time to time to assign all of its rights and obligations under this Agreement. The Owner shall not, in whole or in part, assign his interest in this Agreement without the prior written consent of Northern Gateway.

39. Time shall be of the essence. The provisions hereof shall survive the registration of all conveyances and shall not merge therein or therewith.

40. The Agreement shall be governed by and interpreted in accordance with the laws of the Province of British Columbia.

41. The Owner acknowledges receiving a Notice pursuant to Section 87 (1) of the *National Energy Board Act* concerning the above property.

IN WITNES S WHERE OF the parties hereto have duly executed this Agreement by their respective hands as of the day and year first above written.

_____ _____

Witness: Owner:

_____ _____

Witness: Owner:

NORTHERN GATEWAY PIPELINES LIMITED PARTNERSHIP BY THE GENERAL PARTNER, NORTHERN GATEWAY PIPELINES INC.

Per: _____

_____

Print name and position

Per: _____

_____

Print name and position

SCHEDULE “A”

SCHEDULE “B”

Appendix G Corporate Social Responsibility Policy

Corporate Social Responsibility Policy

At Enbridge, we define Corporate Social Responsibility as follows:

- Conducting business in a socially responsible and ethical manner;
- Protecting the environment and the safety of people;
- Supporting human rights; and
- Engaging, learning from, respecting and supporting the communities and cultures with which we work.

In alignment with our Statement on Business Conduct*, Enbridge will ensure that all matters of Corporate Social Responsibility are considered and supported in our operations and administrative matters and are consistent with Enbridge stakeholders' best interests. Enbridge is committed to being recognized as a leader in the field of Corporate Social Responsibility and recognizes that in doing so, we will add significant value for our shareholders.

This Policy applies to activities undertaken by or on behalf of Enbridge Inc. and its controlled subsidiaries anywhere in the world.

All Enbridge employees and contractors will adopt the Corporate Social Responsibility considerations described in this policy into their day-to-day work activities. Enbridge leaders will act as role models by incorporating those considerations into decision-making in all business activities. Enbridge's leaders will ensure that appropriate organizational structures are in place to effectively identify, monitor, and manage Corporate Social Responsibility issues and performance relevant to our businesses.

This Policy is built on the following areas that reflect existing and emerging standards of Corporate Social Responsibility:

Business Ethics and Transparency

Enbridge is committed to maintaining the highest standards of integrity and corporate governance practices in order to maintain excellence in its daily operations, and to promote confidence in our governance systems.

Enbridge will conduct its business in an open, honest, and ethical manner.

Enbridge recognizes the importance of protecting all of our human, financial, physical, informational, social, environmental, and reputational assets.

Enbridge will advise our partners, contractors, and suppliers of our Corporate Social Responsibility Policy, and will work with them to achieve consistency with this policy.

Enbridge is committed to measuring, auditing and publicly reporting performance on its Corporate Social Responsibility programs.

Environment Health & Safety

Enbridge is committed to protecting the health and safety of all individuals affected by our activities, including our employees, contractors and the public. Enbridge will provide a safe and healthy working environment, and will not compromise the health and safety of any individual. Our goal is to have no accidents and mitigate impacts on the environment by working with our stakeholders, peers and others to promote responsible environmental practices and continuous improvement.

Enbridge is committed to environmental protection and stewardship.

Enbridge recognizes that pollution prevention, biodiversity and resource conservation are key to a sustainable environment, and will effectively integrate these concepts into our business decision-making.

All employees are responsible and accountable for contributing to a safe working environment, for fostering safe working attitudes, and for operating in an environmentally responsible manner.

Stakeholder Relations

Enbridge will engage stakeholders clearly, honestly, and respectfully.

Enbridge is committed to timely and meaningful dialogue with all stakeholders, including shareholders, customers, and employees, indigenous peoples, governments, regulators, and landowners, among others.

Employee Relations

Enbridge will ensure that employees are treated fairly and with dignity and consideration for their goals and aspirations and that diversity in the workplace is embraced.

Enbridge will apply fair labour practices, while respecting the national and local laws of the countries and communities where we operate.

Enbridge is committed to providing equal opportunity in all aspects of employment and will not engage in or tolerate unlawful workplace conduct, including discrimination, intimidation, or harassment.

Human Rights

Enbridge recognizes that governments have the primary responsibility to promote and protect human rights. Enbridge will work with governments and agencies to support and respect human rights within our sphere of influence.

Enbridge will not tolerate human rights abuses, and will not engage or be complicit in any activity that solicits or encourages human rights abuse.

Enbridge will always strive to build trust, deliver mutual advantage and demonstrate respect for human dignity and rights in all relationships it enters into, including respect for cultures, customs and values of individuals and groups.

Community Investment

Enbridge stresses collaborative, consultative, and partnership approaches in our community investment programs.

Enbridge will integrate Community Investment considerations into decision-making and business practices, and will assist in local capacity building to develop mutually beneficial relationships with communities.

Enbridge will contribute to our host communities' quality of life by supporting innovative programs in health, education, social services and the environment, as well as cultural and civic projects.

Enbridge will strive to provide employment and economic opportunities in the communities where we operate.

Annual sign-off of the Statement on Business Conduct is a condition of employment at Enbridge. Policies supporting the CSR Policy referenced therein are:

- *EH&S policies*
- *Indigenous peoples policy*
- *The Voluntary Principles on Security and Human Rights*
- *Community investment policy*
- *Privacy policy*
- *Climate Change Commitment*

Appendix H Corporate Values Statement

Corporate Values

AT ENBRIDGE WE VALUE . . .

Integrity:

At Enbridge, we operate with integrity, honesty and transparency in all of our dealings with stakeholders. We operate to the highest ethical standards with our custom ers, shareholders, em ployees, partners, landowners and others with whom we in teract. We communicate openly and honestly.

Accountability:

At Enbridge, we are accountable for our actions – as individuals and as an organization. It is everyone's responsibility to be the best he or she can be at all times, whether dealing with cu stomers, sharehol ders, partners or other members of the Enbridge team.

Innovation and Flexibility:

At Enbridge, we embr ace innovation and learning, both for the organization and for our people. We are open to change, adaptable to evolving circumstances, and flexible – we value agility and the ability to move quickly to anticipate and respond to a changing business environment, creating new solutions for new challenges.

Value Creation:

At Enbridge, we create value for our shareholders and business partners. We strive to deliver a prosperous fu ture for our shareholders, partners, customers and employees, through growth in the enterprise that adds value, and through excellence in customer service.

Social Responsibility:

At Enbridge we value the safety of our employees and the public; a clean and healthy environment; and strong, vi brant communities. We are committed to sustaining these ess ential values through socially responsible operations and involvement in our communities.

Appendix I Statement on Business Conduct

May 2008

Enbridge Inc. and its Subsidiaries

Revised Statement on Business Conduct

This Statement on Business Conduct is applicable to the Enbridge Group of Companies, their Directors, Officers, Employees, Consultants and Contractors in all countries in which Enbridge conducts business.

Statement on Business Conduct

Enbridge's vision is to be North America's leading energy delivery company. In achieving our vision and objectives we are guided by the strong set of corporate values embodied in our Statement on Business Conduct.

Each Enbridge employee is empowered to make decisions and conduct our business in a responsible, honest and ethical manner. Enbridge is committed to the highest standards of business conduct and makes this commitment to our shareholders, customers, partners and to each other. Enbridge's success is dependent upon our reputation for integrity and quality in everything we do.

Each of us is responsible for helping to ensure we continue to meet the standards that have made Enbridge a leader.

Patrick D. Daniel
President & Chief Executive Officer

Application and Purpose

This Statement on Business Conduct applies to Enbridge Inc. and each of its subsidiaries or controlled entities ("Enbridge"). This Statement emphasizes the commitment of Enbridge to specific standards of conduct expected of each of its directors, officers, employees, consultants and contractors in all of the countries where Enbridge does business.

This Statement and all other Enbridge policies referred to herein are available for viewing at www.enbridge.com. Any questions respecting this Statement may be directed to the Law Department.

Standards of Business Conduct

Enbridge is committed to conducting its business in accordance with the letter and spirit of all applicable laws of the countries in which it operates.

All relationships with landowners, suppliers, governments, regulators, First Nations representatives, shippers, customers, partners, the general public and other stakeholders shall be honest, fair, courteous, respectful, conducted with integrity and with due regard for the protection of the interests involved. Enbridge will ensure meaningful and transparent consultation with all stakeholders and strive to integrate its corporate activities with local communities so they may benefit from our presence.

Employee Relations, Health, Safety, Environment and Human Rights

Enbridge is committed to ensuring its employees are treated fairly, compensated appropriately, and hired and promoted without discrimination by reason of race, nationality, ethnic origin, color, religion, age, gender, marital status, family status, sexual orientation, political belief or disability.

Enbridge shall establish and maintain safe working conditions and conduct its operations in an environmentally responsible manner in accordance with applicable environmental laws, regulations and standards. All employees and contractors shall be aware of and comply with Enbridge's applicable health, safety and environmental policies.

Enbridge shall support the protection and observance of human rights and freedoms within its sphere of influence and has adopted the *Voluntary Principles on Security and Human Rights* as set forth by the US Bureau of Democracy, Human Rights and Labor.

Corporate Property and Reporting of Financial Transactions

Corporate Property

Employees are responsible for protecting Enbridge assets and for establishing and maintaining appropriate controls to protect against loss or unauthorized disposition of such assets. Absent the express approval of senior management, no employee shall obtain, use or divert Enbridge property for personal use or benefit or use Enbridge's name or purchasing power to obtain personal benefits. All assets of Enbridge must be used lawfully in furtherance of corporate objectives.

Contracts to which Enbridge is a party shall be in writing. Any "side" or "comfort" letters which are not attachments to the main contract should not be accepted except on the advice of the Law Department.

Proprietary and Confidential Information

Employees shall not, either during or following their employment, disclose proprietary and confidential information obtained in the conduct of Enbridge's business to anyone other than those who need to know it in furtherance of the business of Enbridge. Employees shall return all proprietary and confidential information in their possession forthwith upon the termination of their employment with Enbridge.

Employees must disclose any invention, improvement, concept, trademark or design prepared or developed in connection with their employment with Enbridge and Enbridge is the exclusive owner of such property.

Employees shall comply with the Enbridge *Privacy Policy* that is applicable to their respective business unit's operations.

Insider Trading

"Insider Information" is any information relating to Enbridge that has not been released to the general public and that, if generally known, might reasonably be expected to have a significant effect on the market price or value of any securities of Enbridge. Examples of Insider Information include: unpublished financial results, pending stock splits, dividend policy changes, expansions or curtailment of operations, operational incidents, anticipated acquisitions or pending major litigation.

It is a breach of securities laws and this Statement for an employee in possession of Insider Information to trade or tip others to trade in the securities of Enbridge Inc., Enbridge Energy Partners, L.P., Enbridge Energy Management, LLC or the Enbridge Income Fund or those of any party to any undisclosed transaction to which an Enbridge entity is a party.

Inquiries received by employees from financial analysts and others associated with the financial and investment communities shall be directed to the Investor Relations Department.

Communications Devices

Enbridge's communication resources (phone systems, faxes, computers and Blackberry devices):

- are to be used for business purposes, with incidental personal use permitted provided such use does not negatively impact productivity, compromise system capacity or contravene applicable law or any Enbridge policy; and

- are not to be used for improper or illegal activities such as the communication of defamatory, pornographic, obscene or demeaning material, hate literature, inappropriate blogging, gambling, copyright infringement, harassment or obtaining illegal software or files.

Communications resources are owned by Enbridge and are monitored and audited for improper usage, security purposes and network management.

When using these resources to transmit or receive confidential, sensitive or proprietary information, appropriate security precautions should be taken.

Reporting of Financial Transactions

Compliance with generally accepted accounting principles and internal controls is expected at all times and all Enbridge books of account, records and other documents must accurately account for and report all assets, liabilities and transactions. For example, no employee shall:

- cause Enbridge books or records to be incorrect or misleading in any way;
- participate in creating a record intended to conceal any improper transaction;
- delay the prompt or correct recording of disbursements of funds;
- hinder or fail to cooperate to ensure full disclosure with internal or external auditors, the Controller or other officers of Enbridge to ensure that all issues relating to internal and external audit reports are resolved;
- conceal knowledge of any untruthful, misleading or inaccurate statement or record, whether intentionally or unintentionally made; or
- conceal or fail to bring to the attention of appropriate supervisors transactions that do not seem to serve a legitimate commercial purpose.

Compliance with the US *Sarbanes Oxley Act* and the corresponding Canadian securities laws is mandatory. Employees are encouraged to seek advice and direction from the Law Department as necessary.

Each employee shall comply with the Enbridge *Whistleblower Policy* that is applicable to their respective business unit's operations. In accordance with such policies, Enbridge has implemented a Financial Compliance Hotline, accessible at 1-866–571-4989 or through the internet at https://www.compliance-helpline.com/welcomPageEnbridge.jsp. This service is provided by a third party external service provider and is continuously available.

Conflicts of Interest

Employees must not engage in any activity which could give rise, or could be perceived to give rise to, a conflict between an employee's personal interests and the interests of Enbridge. Employees are required to arrange their private affairs in a manner which prevents conflicts or the appearance of conflicts. If an employee believes they may have a conflict such interest should be disclosed and direction sought from their supervisor or the Law Department.

The following is a non-exhaustive list of examples where a conflict of interest could arise:

Employee Interests and Activities

In the absence of express approval from senior management, employees must not, either directly or indirectly (through families, friends or otherwise):

- place themselves in a position where any benefit or interest other than employment could be derived from a transaction with Enbridge;
- contract with or render services to Enbridge outside of their employment;
- participate in activities that compete with Enbridge or that interfere or appear to interfere with their duties and responsibilities to Enbridge;
- appropriate to themselves any business opportunity that Enbridge may be interested in;
- convey Insider Information to others or take Insider Information for their own use or benefit;
- have a financial or other interest in any entity doing business with Enbridge (other than an interest of 5% or less in a publicly traded entity).

Without the express prior approval of the President, or the Board of Directors in the case of the President, no employee shall act in the capacity of a director, officer, partner, consultant, employee or agent for a supplier, contractor, sub-contractor, customer, competitor or any other entity with which Enbridge does business or competes.

Outside Employment, Volunteering and Directorships

Outside interests must not adversely affect employee performance or objectivity at work. While Enbridge encourages community contribution and charitable service, the

contribution of corporate time or resources for such activities should only be provided with the approval of senior management.

The approval of senior management, or the Board of Directors in the case of the President, must be obtained before an employee accepts a directorship in any public company or any social, charitable, political or non-profit organization.

Political Contributions

No funds or assets of Enbridge shall be contributed to any political party or organization, or any candidate for public office, except where such contribution is permitted by applicable law and authorized by senior management or the Board of Directors.

No employee shall, directly or indirectly, exert influence on another employee to support any political cause, party or candidate. Any attempt at such exertion of influence shall be reported to the affected employee's supervisor.

Payments to Agents, Consultants and Government Officials

All commissions, fees or other payments to agents or consultants acting on behalf of Enbridge shall be made in accordance with sound business practices and be reflective of the reasonable value of the services performed.

No payments, gifts or favours may be made to any person in a position of trust or responsibility with the intent to induce them to violate their duties or to obtain favourable treatment for Enbridge or any of its employees.

Except as specifically permitted by law, payments, gifts of substantial value or lavish entertainment provided to government officials or personnel are prohibited.

Neither Enbridge nor its employees shall knowingly aid or abet any person or entity to circumvent laws, evade income taxes or defraud the interests of Enbridge shareholders, unitholders or creditors.

Gifts, Payments and Entertainment

No gift or benefit of any kind shall be given or received by any employee conducting business on behalf of Enbridge where it might be perceived that an obligation is created or a favour expected of the recipient. The giving of gifts or promotional items of modest value in the context of appropriate business conduct is permissible.

Receipt of excessive entertainment is prohibited, however it is permitted to accept hospitality or entertainment, provided it is reasonably within the limits of responsible and generally accepted business practice.

In circumstances where doubt arises as to the propriety of accepting a gift, direction from senior management should be sought as to the gift's acceptance and disposition.

International Operations

International operations at all of the locations where Enbridge does business must be conducted in accordance with the Canadian *Corruption of Foreign Public Officials Act and the US Foreign Corrupt Practices Act.*

This legislation establishes prohibitions on the bribing of foreign officials for the purposes of obtaining or retaining business in a foreign jurisdiction. There are extensive provisions dealing with the accounting requirements designed to reveal any payments for such purposes. Breaches may result in severe penalties including fines and imprisonment. The full text and comprehensive explanations of the legislation is available from the Law Department.

In foreign jurisdictions particular care must be taken in the retention of agents, partners and associates to ensure no transgression of the Canadian, US or other foreign legislation occurs.

Competition and Anti-Trust Legislation

Enbridge and its employees must comply with all applicable Canadian, US or other foreign competition and antitrust legislation.

Behavior which is prohibited under such legislation includes activities such as agreements with competitors to allocate markets or customers, price fixing or agreements to control prices, the boycotting of certain suppliers or customers, bid-rigging, misleading advertising, price discrimination, predatory pricing, price maintenance, refusal to deal, exclusive dealing, tied selling, delivered pricing and the abuse of dominant position.

Situations constituting potential breach of such legislation or circumstances requiring direction should be immediately reported to the employee's supervisor or the Law Department.

Consultants and Contractors

Consultants and contractors retained by Enbridge shall conduct themselves in accordance with this Statement in their activities relating to Enbridge.

Compliance and Enforcement

Compliance

Strict adherence to this Statement and all other Enbridge policies is mandatory. Failure to comply may result in disciplinary action up to and including termination. In interpreting this Statement, the spirit as well as the literal meaning, of the language shall be observed. Interpretation or direction on this Statement may be sought from your supervisor, senior management or the Law Department.

Non-Retaliation

Any violations of this Statement or other Enbridge policies shall be reported promptly to senior management, the President or the Law Department. Reports, discussions or inquiries will be kept in strict confidence to the extent appropriate or permitted by policy or law. Requests to remain anonymous will be respected in accordance with applicable laws. No retaliatory action will be taken against an employee or contractor for providing good faith information, either internally or to a government authority, or for participating in any proceeding concerning alleged violations of any laws or policies. Disciplinary measures may be taken against an employee or employee if they participated in prohibited activity, even if they reported it.

Enforcement

Each new employee shall, on the commencement of their employment and annually thereafter, certify compliance with this Statement and the other policies of Enbridge by signing a certificate in the form attached hereto. The President shall, on an annual basis, furnish to the Chairman of the Governance Committee a letter of compliance. Nothing in this Statement is intended to modify or contradict the position of Enbridge as an at-will employer, in those jurisdictions where that is the law, nor should this document be construed to create any express or implied guarantee as to the duration or terms of employment.

Enbridge may, in its sole discretion and without prior notice, amend or modify any provisions of this Statement.

Initial Certificate of Compliance

Name of Employer : _____

Address: _____

_____

Attention: Human Resources Department

I, _____, acknowledge that I have received a copy of and have read and understand the Statement on Business Conduct.

I agree to comply with the provisions of the Statement on Business Conduct as a term and condition of my employment.

_____ _____
Employee Signature Employee Number

_____ _____
Date Location

Annual Certification

To: _____ Date:_____

From:_____

Subject: Statement on Business Conduct

I confirm that I have personally complied with the Statement on Business Conduct and such other applicable policies of the entity which employs the undersigned and to the best of my knowledge and upon confirmation from each employee under my supervision, such employees have complied with the Statement.

_____
Signature

Appendix J Aboriginal and Native American Policy

Aboriginal and Native American Policy

Enbridge recognizes the history, uniqueness and diversity of Aboriginal and Native American Peoples. Positive relationships with Aboriginal and Native American Peoples, based on mutual respect and trust, will help them and us to realize our aspirations, and will help Enbridge to reach our strategic business objectives.

Enbridge commits to forging mutually beneficial relationships with Aboriginal and Native American Peoples in proximity to its projects and operations. To achieve this, Enbridge will be governed by the following principles:

- We recognize the legal and constitutional rights possessed by Aboriginal and Native American Peoples in the respective jurisdictions in which they reside.
- We respect the traditional ways, Aboriginal and Native American heritage sites, and the relationship that Aboriginal and Native American Peoples have with the land and the environment.
- We engage in forthright and sincere consultation with Aboriginal and Native American peoples about Enbridge's projects and operations which have an impact upon their legally and constitutionally protected rights.
- We commit to working with Aboriginal and Native American peoples to achieve sustainable benefits for them resulting from Enbridge's projects and operations, including opportunities in training and education, employment, procurement, business development, and community investment.
- We foster understanding and respect for local Aboriginal and Native American Peoples among Enbridge's employees and contractors.

In order to put the above principles into action, Enbridge commits to the following:

- Enbridge will offer the opportunity to First Nations and Native Americans to purchase equity in certain new green field projects, where appropriate.
- Enbridge will offer sole-sourced contracting opportunities to qualified Aboriginal and Native American suppliers and contractors where appropriate, and will encourage joint venture opportunities between Aboriginal/Native American

businesses and non-Aboriginal/Native American businesses when it builds capacity and supports mutual business interests.

- Enbridge will implement measures to enable Aboriginals and Native Americans to become part of our permanent workforce at a level that is representative of regional demographics, and encompasses a wide spectrum of career levels.
- Enbridge will enter into Agreements with Aboriginal and Native American peoples, where appropriate, to support training, environmental stewardship, community investment and other initiatives that will help build and sustain Aboriginal and Native American communities.
- Enbridge will continue to invest in Aboriginal and Native American communities in keeping with our broader commitment to Corporate Social Responsibility.

This commitment is a shared responsibility involving Enbridge and its subsidiaries, employees and contractors, and we will conduct business in a manner that reflects the above principles. Enbridge will provide ongoing leadership and resources to ensure the effective implementation of the above principles, including the development of implementation strategies and specific action plans.

Appendix K Environmental, Health and Safety Policy

Environment, Health and Safety Policy

Enbridge Inc. is committed to the protection of the health and safety of our employees and the general public, and to sound environmental stewardship. We believe that prevention of accidents and injuries and protection of the environment benefits everyone, and delivers increased value to our shareholders, customers and employees.

Our goal is to have no accidents and to cause no harm to the environment.
To achieve this, we will:

- consult openly with our customers, neighbours, employees and partners, work with our regulators, industry peers, and other partners to promote responsible environmental, health and safety performance,
- strive for continuous improvement, with all Enbridge operations establishing business-specific policies compatible with this policy, setting measurable targets, and reporting on performance.

This commitment is a shared responsibility involving the corporation, our subsidiaries, employees and contractors. To this end:

- Enbridge will conduct business in a manner that recognizes health and safety management as an integral part of our activities, and that promotes pollution prevention and resource conservation to achieve environmental sustainability
- Employees are responsible for conducting their activities in a manner that makes health, safety and environmental management a primary part of their daily activities.

Patrick D. Daniel
President & Chief Executive Officer

Appendix L JRP and NEB Concordance Tables

L.1 JRP Concordance Table

Filing #	Filing Requirement	Application References
Joint Review Panel Agreement		
1	The Panel will require the proponent to provide evidence regarding the concerns of Aboriginal groups	**Volume 5A**, Section 4, 5, Appendix M, O
Terms of Reference		
Terms of Reference (Part 1 - Scope of the Project)		
1	All-weather road access and electrical power requirements for the pump stations	**Volume 1**, Section 2.2 **Volume 3**, Section 2.5, 8.2, 8.3, 8.4, 8.6, 10.4.1 **Volume 6A**, Section 1.2, 2.1.2, 2.6 **Volume 6B**, Section 2.1 **Volume 6C**, Section 1.2, 2.1.2, 2.5 **Volume 7A**, Section 2
2	All-weather road access and electrical power requirements for the tank terminal	**Volume 3**, Section 9.4, 9.5.1, 10.5.1 **Volume 6A**, Section 1.2, 2.1.2.2, 2.6 **Volume 6B**, Section 2.1, 2.3 **Volume 6C**, Section 1.2, 2.1.2.2, 2.5, 2.7 **Volume 7A**, Section 2
3	All-weather road access and electrical power requirements for the new marine terminal	**Volume 3**, Section 9.4, 9.5.1, 10.5.1 **Volume 6A**, Section 1.2, 2.1.2.2, 2.6, 2.6.2, 2.8, 2.8.1 **Volume 6B**, Section 2.1, 2.1.2, 2.3 **Volume 6C**, Section 1.2, 2.1.2.2, 2.5, 2.5.2, 2.7 **Volume 7A**, Section 2
4	Block valves located at pumps stations, selected watercourse crossings and other locations	**Volume 1**, Section 2.4 **Volume 3**, Section 5.3, 5.5, 9.1.5, 11.3 **Volume 6A**, Section 1.2, 2.1.4, 2.5.1 **Volume 6C**, Section 1.2, 2.1.4, 2.4.1 **Volume 7A**, Section 2
5	Pigging facilities (scraper trap)	**Volume 1**, Section 2.4 **Volume 3**, Section 5.6, 8.5, 9.2.4, 9.2.5, 11.7, Appendix B, H **Volume 6A**, Section 1.2, 2.1.4, 2.5.2 **Volume 6C**, Section 1.2, 2.1.4, 2.4.2 **Volume 7A**, Section 2, 10

Filing #	Filing Requirement	Application References
6	Cathodic protection system include anode beds	**Volume 3**, Section 5.4, 8.5, 9.5.8, 10.2.10, 11.6, 12.1.2, 12.2 **Volume 6A**, Section 1.2 **Volume 6C**, Section 1.2 **Volume 7A**, Section 2 **Volume 7B**, Section 2.1, 2.3
7	Two marine loading and unloading berths (one each for oil and condensate)	**Volume 1**, Section 2.5.2 **Volume 3**, Section 2.2.2, 9.1.4, 9.5.2, 9.6, 10.5.4, 11.10.1 **Volume 6A**, Section 1.2, 2.6, 2.6.1, 2.7.2, 2.8, 4.4.3, 8.4.6 **Volume 6B**, Section 1.2, 2.1, 2.1.1, 2.2.2, 2.3, 2.3.2, 7.5.2, 15.1 **Volume 6C**, Section 1.2, 2.5, 2.5.1, 2.6.2, 2.7 **Volume 7A**, Section 2 **Volume 8A**, Section 4.7.2, 4.7.3, 4.8.1
8	Marine transportation of oil and condensate within the confined channel assessment area (CCAA) which includes the marine and shoreline area of Kitimat Arm, Douglas Channel to Camano Sound, and Principe Channel to Browning Entrance	**Volume 8A**, Section 1.2, 4.1.1, 4.2, 4.2.4, 4.2.6, 4.2.7, 4.3, 4.3.1, 4.3.2, 4.3.3, 4.6, 4.7.12, 4.8.1, 4.8.2 **Volume 8B**, Section 1.2, 1.3, 2.1, 4.1.3, 4.2.2, 4.2.3, 4.3, 7.3.1, 7.4, 8.3.1, 8.3.2, 8.4, 9.2.1, 9.2.3, 9.3, 9.6.2, 9.6.3, 10, 10.1, 10.2.1, 10.2.3, 10.2.7, 10.3, 10.4.2, 10.5, 10.5.1, 10.5.2, 10.6.2, 10.7.1, 10.7.2,10.7.3, 10.8.2, 10.8.3, 10.8.4, 10.9, 10.10, 10.10.1, 10.10.2, 10.10.3, 11.2.2, 11.2.3, 11.3, 11.5.3, 11.6.2, 11.6.3, 11.8, 12.2.3, 12.3, 12.6.2, 12.6.3, 12.7.2, 12.7.3, 12.7.4, 12.10, 15, 15.1, 15.3 **Volume 8C**, Section 1.2, 5, 9.4.2, 12
9	Marine transportation of oil and condensate within Hecate Strait	**Volume 8A**, Section 1.2, 3.1.2, 4, 4.1.1, 4.2.1, 4.2.2, 4.2.3, 4.2.5, 4.2.14, 4.3, 4.6, 4.8.1 **Volume 8B**, Section 2.4.1, 13.1, 13.2.2, 13.3, 13.7.2, 13.7.3, 13.7.5, 13.9.1 **Volume 8C**, Section 9.3.1, 9.3.4, 9.4.2, 12
10	Marine transportation of oil and condensate within the proposed shipping routes to be used for the project that are within the 12 nautical mile limit of the Territorial Sea of Canada	**Volume 8A**, Section 1.2, 3.1.2, 4, 4.1.1, 4.2.1, 4.2.2, 4.2.5, 4.2.10, 4.2.14, 4.3.2, 4.4.2, 4.6, 4.8.1, 4.8.2 **Volume 8B**, Section 1.0, 2.4.1, 13.1, 13.6.1, 13.7.2, 15 **Volume 8C**, Section 1.2, 2.2, 9.3.1, 9.3.4, 9.4.2, 12

Filing #	Filing Requirement	Application References
11	All related works and activities including temporary electrical power supply lines such as those supplying energy for camps and worksites	**Volume 3**, Section 10.1.4 **Volume 6A**, Section 2.1.5 **Volume 6C**, Section 1.2, 2.1.5, 2.2.8 **Volume 7A**, Section 10, Appendix A
12	temporary work camps	**Volume 3**, Section 7.4, 10.1.4 **Volume 6A**, Section 1.2, 2.1, 2.4 **Volume 6B**, Section 2.2 **Volume 6C**, Section 2.1, 2.6.3 **Volume 7A**, Section 10.2, Appendix A
13	temporary access roads	**Volume 3**, Section 6.1, 6.4, 10.2.9 **Volume 6A**, Section 1.2, 2.1 **Volume 6C**, Section 2.1, 2.2, 2.9 **Volume 7A**, Section 8.5, 10.2, Appendix A
14	bridges and watercourse crossings (new or modified)	**Volume 3**, Section 3.1, 6, 7.4, 10.1, 10.2, Appendix G.1 **Volume 6A**, Section 2.1, 2.2.7, 10, 11 **Volume 6C**, Section 2.1, 2.2 **Volume 7A**, Section 8.5, 10.5 Appendix A
15	management and treatment of waste waters and waste management	**Volume 3**, Section 9.5.6, 10.1.4, 10.2.9, 10.5.2, 13, Appendix I **Volume 6A**, Section 2.1, 2.8.1 **Volume 6B**, Section 2.1, 7.3, 7.5, 7.6, Appendix 4A **Volume 6C**, Section 2.1, 2.5, 2.7 **Volume 7A**, Section 9.2, 9.3, 10.2, Appendix A **Volume 7B**, Appendix B.5 **Volume 7C**, Appendix A.5, B.8
16	water withdrawals	**Volume 3**, Section 9.5, 10.1.4, 10.2.8 **Volume 6A**, Section 2.4, 10, 11.5, 11.6, 12.2.4, 12.4.3 **Volume 6C**, Section 2.3, 2.5 **Volume 7A**, Section 9.1, Appendix A
17	borrow pits and quarries No comments on pits and quarries in Volume 3. 6A, 6C – Support infrastructure. 7A – Borrow pit protection plan; potential acid-generating material source.	**Volume 6A**, Section 1.2, 3.3, Appendix 6A **Volume 6C**, Section 3.3 **Volume 7A**, Section 10.6, Appendix A

Filing #	Filing Requirement	Application References
18	management of excavation material including stockpiles	**Volume 3**, Section 10.1, 10.2, 10.5 **Volume 5A**, Section 5.6.1 **Volume 6A**, Section 2.1.5, 6.4, Appendix 6A **Volume 6C**, Section 2.1, 2.3 **Volume 7A**, Section 8.5, Appendix A
19	log handling and storage facilities	**Volume 3**, Section 10.2.3, 10.5 **Volume 6B**, Section 2.1, 10.5 **Volume 7A**, Section 8.5, Appendix A
20	construction worksites, storage areas and staging areas	**Volume 1**, Section 2.6 **Volume 3**, Section 10.1, 10.2, 10.5 **Volume 6A**, Section 2.1, 2.4 **Volume 6B**, Section 2.1, 2.2 **Volume 6C**, Section 2.1, 2.3, 2.5 **Volume 7A**, Section 2, 8.5, 10.1, Appendix A, Section A.3.13, A.3.33
21	handling and storage of petroleum products and hazardous materials	**Volume 3**, Section 9.1, 9.2 **Volume 6A**, Section 2.6 **Volume 6B**, Section 1.3, 2.1, 2.3 **Volume 6C**, Section 2.5 **Volume 7A**, Section 7.5, 11.11, Appendix A, Section A.3.33
22	handling, storage and use of explosives	**Volume 3**, Section 6.1 **Volume 6C**, Section 2.6 **Volume 7A**, Section 4.1, 9.1, 11.7, Appendix A, Section A.2.2, A.3.9
23	Any other components described by the proponent in its Preliminary Information Package, filed with the NEB on 1 Nov 2005	No other components were identified in the Preliminary Information Package (PIP). The PIP was determined by the NEB to be adequate, with no need to resubmit.
24	Any additional modifications or decommissioning and abandonment activities would be subject to future examination under the NEB Act and, consequently, under the Act, as appropriate. Therefore, at this time, the Proponent will be required to examine these activities in a broad context only.	**Volume 3**, Section 13 **Volume 6A**, Section 2.9, 3.2.2, 4.4, 5.4, 5.6, 6.4, 6.5, 7.4, 8.2, 8.3, 8.4, 9.2, 9.6.1, 9.6.3, 9.7.1, 9.7.3, 9.8.1, 9.8.3, 10.4.1, 10.4.3, 10.4.4, 10.4.5, 10.5.1, 10.5.2, 10.5.3, 10.7, 11.2, 11.5, 11.6, 12.4, 12.5, 12.7, 13.2, 13.4, 15.2, Appendix 6A, Appendix 11A **Volume 6B**, Section 2.4, 4.2, 7.2, 7.5, 7.8, Appendix 4A **Volume 6C**, Section 2.2, 2.8, 3.2, 4.1, 4.2, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.12, 6.4, 7.2 **Volume 7A**, Section 10.4, Appendix A.3.2.8

Filing #	Filing Requirement	Application References
Terms of Reference (Part II – Factors to be considered during the Joint Review)		
1	Environmental effects of the project and the significance of the effects	**Volume 6A**, Section 3.2.3, 3.2.4, 4.7, 5.6, 6.7, 7.6, 8.6, 9.10, 10.7, 11.8, 12.7, 13.6 **Volume 6B**, Section 4.2.3, 4.2.4, 7.8, 8.9, 9.10, 10.10. 11.10, 12.9, 13.8, 14.6 **Volume 6C**, Section 3.2.3, 3.2.4, 4.1.12, 4.2.11, 5.12, 6.4.4, 7 **Volume 8B**, Section 4.2, 4.3, 7.4, 8.4, 9.8, 10.10, 11.8, 12.10, 13.11, 15.3
2	Environmental effects of malfunctions or accidents that may occur in connection with the project and the significance of the effects	**Volume 7B**, Section 7, 8, 9 **Volume 7C**, Section 3.1, 7.11, 8.6 **Volume 8C**, Section 9.3.3, 9.4.2, 9.5.2, 9.6
3	Any cumulative effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out and the significance of the effects	**Volume 6A**, Section 3.2, 4.4, 4.5.3, 5.4.3, 5.6, 6.4.3, 6.5.3, 6.5.4, 6.7, 7.4, 7.6, 8.4, 9.6, 9.7, 9.8, 9.10, 10.4, 10.5.3 to 10.5.5, 10.7.2, 11.2.5, 11.5.3, 11.6.3, 12.4.3, 12.5.3, 12.7, 13.4.3, 15.2, Appendix 3A, 6B, 11B **Volume 6B**, Section 7.5.2, 7.6.3, 7.8, 8.6.3, 8.6.4, 8.7.2, 8.7.3, 8.9, 9.6.2, 9.6.3, 9.7.2, 9.7.3, 9.8.2, 9.8.3, 9.10, 10.6.2, 10.6.3, 10.7.3, 10.8.3,10.10 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 11.10, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.6.2, 13.6.3, 13.8, 16.2, Appendix 3A **Volume 6C**, Section 4.1.8, 4.1.9, 4.2.7, 4.2.8, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.5.3, 5.6.4, 5.7.3, Appendix 3A **Volume 8B**, Section 9.6.2, 9.6.3, 9.8, 10.6.2, 10.7.2, 10.7.3, 10.8.4, 10.10.3, 11.5.3, 11.6.3, 11.8, 12.6.2, 12.6.3, 12.7.2, 12.7.3, 13.11.5, 15.3
4	Comments from the public and Aboriginal peoples received during the review	This item specifically addresses information that the panel receives during the course of its review process including the hearing. It does not appear to reflect information the proponent gathers during consultation efforts prior to the hearing process.

Filing #	Filing Requirement	Application References
5	Mitigation measures that are technically and economically feasible	**Volume 6A**, Section 4.3, 4.4.3, 4.5.3, 5.3, 5.4.3, 6.3, 6.4.3, 6.5.3, 6.5.4, 7.3, 7.4.4, 7.4.5, 7.4.6, 8.3, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.4.3, 10.4.4, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.3, 11.5.3, 11.6.3, 12.3, 12.4.3, 12.5.3, 13.3, 13.4.3, Appendix 6A, 11B **Volume 6B**, Section 7.3, 7.5.2, 7.6.2, 8.3, 8.6.2, 8.7.2, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.6.2, 10.7.2, 10.8.2, 11.3, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 12.3, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.3, 13.6.2 **Volume 6C**, Section 4.1.3, 4.1.7, 4.2.3, 4.2.6, 5.3, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.6.4, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.9.5, 6.3, 6.4.4 **Volume 7B**, Section 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.2.3, 9.3.3, 9.4.3, 9.5.3 **Volume 7C**, Section 7.5.4, 7.6.4, 7.7.4, 7.8.4, 7.9.4, 7.10.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.3, 9.5.2, 9.6.2 **Volume 8B**, Section 5, 9.3, 9.6.2, 10.3, 10.6.2, 10.7.2, 10.7.3, 11.3, 11.5.3, 11.6.3, 12.3, 12.6.2, 12.7.2, 13.5, 13.7.3, 13.7.5, 13.8.2 **Volume 8C**, Section 8.4.2, 8.5.4, 8.6.4, 8.7.4, 8.8.4, 8.9.4, 8.10.3, 9.2.3, 9.3.4, 9.4.3, 9.5.3, 10.3, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2
6	Purpose of the project	**Volume 1**, Section 1.2, 3 **Volume 2**, Section 1.6
7	Alternative means of carrying out the project that are technically and economically feasible	**Volume 1**, Section 4 **Volume 3**, Section 2
8	Environmental effects of any such alternative means	**Volume 1**, Section 4.2 **Volume 3**, Section 2

Filing #	Filing Requirement	Application References
9	Need for and requirements of any follow-up program	**Volume 1**, Section 6.3.6 **Volume 3**, Section 1.6.4 **Volume 5B**, Section 4.3.6, Appendix C **Volume 6A**, Section 3.2.5, 4.6, 5.5, 6.6, 7.5, 8.5, 9.9, 10.6, 11.7, 12.6, 13.5 **Volume 6B**, Section 4.2.5, 7.7, 8.8, 9.9,10.9, 11.9, 12.8 **Volume 6C**, Section 3.2.5, 4.1.11, 4.2.10, 5.11, 6.5 (for construction only) **Volume 7A**, Section 8.5.9, 11.3, Appendix A.2.7, A.3.2, A.3.5, A.3.10, A.3.17, A.3.19, A.3.20, A.3.26, A.3.31, A.3.34 **Volume 7B**, Section 7.3.4, 7.4.4, 7.5.4, 7.6.4, 7.7.4, 7.7.4, 7.8.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4 **Volume 7C**, Section 7.5.5, 7.6.5, 7.7.5, 7.8.5, 7.9.5, 7.10.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4, 10.4 **Volume 8B**, Section 10.9, 12.9, 13.10 **Volume 8C**, Section 8.5.5, 8.6.5, 8.7.5, 8.8.5, 8.9.5, 8.10.4, 9.2.4, 9.3.5, 9.4.4, 9.5.4, 11.4
10	Capacity of renewable resources that is likely to be significantly affected by the project to meet the needs of the present and those of the future	The definition of significance for the assessment sections (Volumes 6A, 6B, 6C, 7B, 7C, 8B, 8C) includes a consideration of sustainability (e.g. for wildlife, significance definition includes the ability of the regional population to sustain itself).
11	Need for the project	**Volume 1**, Section 1.2, 3 **Volume 2**, Section 1.6
12	Alternatives to the project	**Volume 1**, Section 4 **Volume 3**, Section 2
13	Community knowledge and Aboriginal traditional knowledge received during the review.	This item specifically addresses information that the panel receives during the course of its review process including the hearing. It does not appear to reflect information the proponent gathers during consultation efforts or prior to the hearing process.
14	Measures to enhance any beneficial environmental effects	**Volume 6A**, Section 13.3, 13.4.3

Filing #	Filing Requirement	Application References
15	Environmental protection plans	**Volume 6A**, Section 2.10, 4.3, 5.3, 6.3, 7.3, 8.3, 9.3, 10.3, 11.3, 12.3, 13.3 **Volume 6B**, Section 5, 7.3, 8.3, 9.3, 10.3, 11.3, 12.3, 13.3, 15.2 **Volume 6C**, Section 4.1.3, 4.2.3, 5.3, 6.3 **Volume 7A**, Section 8.5, 8.6, 8.7, 8.9, Appendix A.3 **Volume 7B**, Section 2, 5, 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9 **Volume 7C**, Section 2, 5, 7.5.4, 7.6.4, 7.7.4, 7.8.4, 7.9.4, 7.10.4, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9 **Volume 8B**, Section 5, 9.3, 10.3, 11.3, 12.3, 13.5, 13.7.3, 13.8.2, 15.1 **Volume 8C**, Section 2, 5, 8.5.4, 8.6.4, 8.7.4, 8.8.4, 8.9.4, 8.10.4, 9.2.3, 9.3.3, 9.4.3, 9.5.3, 10.3
16	Environmental monitoring plans	**Volume 6A**, Section 3.2.5, 4.6, 5.5, 6.6, 7.5, 8.5, 9.9, 10.2.1, 10.6, 11.7, 12.6, 13.5, Appendix 11B.5.9 **Volume 6B**, Section 4.2.5, 5, 7.7, 8.8, 9.9, 10.9, 11.9, 12.8 **Volume 6C**, Section 3.2.5, 4.1.11, 4.2.10, 5.11, 6.5 (for construction only) **Volume 7A**, Section 8.5.9, 11.3, Appendix A.2.7, A.3.2, A.3.5, A.3.10, A.3.17, A.3.19, A.3.20, A.3.26, A.3.31, A.3.34 **Volume 7B**, Section 7.3.4, 7.4.4, 7.5.4, 7.6.4, 7.7.4, 7.7.4, 7.8.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4 **Volume 7C**, Section 7.5.5, 7.6.5, 7.7.5, 7.8.5, 7.9.5, 7.10.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4, 10.4 **Volume 8B**, Section 4.2.5, 9.7, 10.9, 11.7, 12.9, 13.10 **Volume 8C**, Section 8.5.5, 8.6.5, 8.7.5, 8.8.5, 8.9.5, 8.10.4, 9.2.4, 9.3.5, 9.4.4, 9.5.4, 11.4
17	Contingency plans	**Volume 7A**, Section 8.8, Appendix A.2 **Volume 7B**, Section 2, 5, 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9 **Volume 7C**, Section 2, 5, 7.5.4, 7.6.4, 7.7.4, 7.8.4, 7.9.4, 7.10.4, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9 **Volume 8C**, Section 2, 5, 8.5.4, 8.6.4, 8.7.4, 8.8.4, 8.9.4, 8.10.4, 9.2.3, 9.3.3, 9.4.3, 9.5.3, 10, 11

Filing #	Filing Requirement	Application References
18	Emergency response plans	**Volume 7A**, Section 6.7, Appendix A.2 **Volume 7B**, Section 9.2.2, 9.3.2, 9.4.2, 9.5.2, Appendix B, C **Volume 7C**, Section 5.2, 5.5, 9, Appendix A, B, C, D **Volume 8A**, Section 4.8.2 **Volume 8C**, Section 5.2, 5.4, 5.8.1, 10, Appendix A, B, C, D
Scope of Factors		
2. Principles to Consider		
1	Community knowledge and Aboriginal traditional knowledge	**Volume 4**, Section 4 **Volume 5A**, Section 4, 5 **Volume 5B**, Section 5, Appendix C
2	Sustainable Development	**Volume 1**, Section 1.4 **Volume 4**, Section 3.1.3
3	Precautionary Approach	**Volume 1**, Section 6.3
3. Consideration of Alternatives		
1	Alternative means	**Volume 1**, Section 4 **Volume 3**, Section 2
4. Project Description		
1	Description of Marine Components	**Volume 1**, Section 2.5.2, 2.5.3 **Volume 3**, Section 9.6, 10.5.4 **Volume 6B**, Section 2 **Volume 8B**, Section 2
2	Project Benefits	**Volume 1**, Section 1.3 **Volume 2**, Section 1.6 **Volume 4**, Section 3.6 **Volume 6A**, Section 13.3, 13.4.3 **Volume 6C**, Section 4.1.3, 4.1.7
5.Study Area Boundaries and Key Issues		
1	Identification of Key Issues	**Volume 6A**, Section 3.3.1, 4.2.1, 5.2.1, 6.2.1, 7.2.1, 8.2.1, 9.2.1, 10.2.1, 11.2.1, 12.2.1, 13.2.1 **Volume 6B**, Section 4.3.1, 7.2.1, 8.2.1, 9.2.1, 10.2.1, 11.2.1, 12.2.1, 13.2.1 **Volume 6C**, Section 3.3.1, 4.1.2, 4.2.2, 5.2.1, 6.2.1 **Volume 8B**, Section 4.3.1, 7.2, 8.2, 9.2.1, 10.2.1, 11.2.1, 12.2.1, 13.4.2, 13.6.1, 13.7.2

Filing #	Filing Requirement	Application References
2	Study Area Boundaries	**Volume 6A**, Section 4.2.3, 5.2.3, 6.2.3, 7.2.3, 8.2.3, 9.2.3, 10.2.3, 11.2.3, 12.2.2, 13.2.3 **Volume 6B**, Section 7.2.3, 8.2.3, 9.2.3, 10.2.3, 11.2.3, 12.2.3, 13.2.3, 14.2.1 **Volume 6C**, Section 4.1.2, 5.2.3, 6.2.3
3	Marine Spatial Boundaries	**Volume 6B**, Section 7.2.3, 8.2.3, 9.2.3, 10.2.3, 11.2.3, 12.2.3, 13.2.3, 14.2.1 **Volume 8B**, Section 9.2.3, 10.2.3, 11.2.3, 12.2.3
4	Marine Temporal Boundaries	**Volume 6B**, Section 7.2.4, 8.2.4, 9.2.4, 10.2.4, 11.2.4, 12.2.4, 13.2.4, 14.2 **Volume 8B**, Section 9.2.4, 10.2.4, 11.2.4, 12.2.4
6. Baseline Information		
1	Physical Environment	**Volume 6A**, Section 4.1, 4.4.3, 4.4.4, 5.4.3, 6.4.3, 6.5.3, 6.5.4, 7.4.3, 8.1, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.1, 9.4.1, 9.5, 10.4.3, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.1, 11.4, 11.5.3, 11.6.3, 12.4.3, 13.4.3, Appendix 10A, 10C
2	Marine Environment	**Volume 6B**, Section 7.5.1, 7.6.1, 8.5, 8.6.1, 8.7.1, 9.5, 9.6.1, 9.7.1, 9.8.1, 10.5, 10.6.1, 10.7.1, 10.8.1, 11.1, 11.5.1, 11.6.1, 11.7.1, 11.8.1, 12.1, 12.5.1, 12.6.1, 12.7.1, 13.1, 13.5, 13.6.1, 14.3 **Volume 8B**, Section 3, 7.1, 8.1, 9.5, 9.6.1, 10.1, 10.5.1, 10.6.1, 10.7.1, 10.8.1, 11.1, 11.5.1, 11.6.1, 12.1, 12.5, 12.6.1, 12.7.1, 13.3, 13.7.1, 13.8.4 **Volume 7C**, Section 7.5.1, 7.6.1, 7.7.1, 7.8.1, 7.9.1, 7.10.1 **Volume 8C**, Section 8.5.1, 8.6.1, 8.7.1, 8.8.1, 8.9.1, 8.10.1
3	Human Environment	**Volume 6B**, Section 13.1, 13.5, 13.6.1 **Volume 6C**, Section 4.1.5, 4.2.4, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.10.1, 5.10.2, 6.4.3 **Volume 7C**, Section 8.2.1, 8.3.1, 8.4.1, 8.5.1 **Volume 8B**, Section 12.1, 12.5, 12.6.1, 12.7.1 **Volume 8C**, Section 9.2.1, 9.3.1, 9.4.1, 9.5.1
4	Aboriginal Rights and Interests	**Volume 5A**, Section 2.8.1, Appendix M, O **Volume 5B**, Section 5.2, Appendix C

Filing #	Filing Requirement	Application References
7. Impact Assessment		
1	Effects on the Physical Environment	**Volume 6A**, Section 4, 5, 6, 7, 8, 9,10, 11, 12, 13 **Volume 7B**, Section 7, 8, 9
2	Effects on the Marine Environment	**Volume 6B**, Section 7, 8, 9, 10, 11, 12, 13, 14 **Volume 7C**, Section 7, 9, 10.2 **Volume 8B**, Section 7, 8, 9, 10, 11, 13.6, 13.7 **Volume 8C**, Section 8, 10, 11.2
3	Effects on the Human Environment	**Volume 6B**, Section 13 **Volume 6C**, Section 4, 5, 6 **Volume 7B**, Section 8.2, 8.3, 8.4, 8.5 **Volume 7C**, Section 8, 10.3 **Volume 8B**, Section 12, 13.8, 13.9 **Volume 8C**, Section 9, 11.3
4	Effects on Aboriginal Rights and Interests	**Volume 5A**, Section 2.8.1 **Volume 5B**, Section 5.2
5	Potential Accidents and Malfunctions	**Volume 7B**, Section 5, 7, 8, 9 **Volume 7C**, Section 5, 7, 8, 9, 10 **Volume 8C**, Section 5, 8, 9, 10,11
6	Effects of the Environment on the Project	**Volume 6A**, Section 14 **Volume 6B**, Section 15 **Volume 8B**, Section.14
7	Mitigation Measures	**Volume 6A**, Section 4.3, 4.4.3, 4.5.3, 5.3, 5.4.3, 6.3, 6.4.3, 6.5.3, 6.5.4, 7.3, 7.4.4, 7.4.5, 7.4.6, 8.3, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.4.3, 10.4.4, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.3, 11.5.3, 11.6.3, 12.3, 12.4.3, 12.5.3, 13.3, 13.4.3, Appendix 6A, 11B **Volume 6B**, Section 7.3, 7.5.2, 7.6.2, 8.3, 8.6.2, 8.7.2, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.6.2, 10.7.2, 10.8.2, 11.3, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 12.3, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.3, 13.6.2 **Volume 6C**, Section 4.1.3, 4.1.7, 4.2.3, 4.2.6, 5.3, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.6.4, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.9.5, 6.3, 6.4.4

Filing #	Filing Requirement	Application References
7 (cont'd)	Mitigation Measures (cont'd)	**Volume 7B**, Section 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.2.3, 9.3.3, 9.4.3, 9.5.3 **Volume 7C**, Section 7.5.4, 7.6.4, 7.7.4, 7.8.4, 7.9.4, 7.10.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.3, 9.5.2, 9.6.2 **Volume 8B**, Section 5, 9.3, 9.6.2, 10.3, 10.6.2, 10.7.2, 10.7.3, 11.3, 11.5.3, 11.6.3, 12.3, 12.6.2, 12.7.2, 13.5, 13.7.3, 13.7.5, 13.8.2 **Volume 8C**, Section 8.4.2, 8.5.4, 8.6.4, 8.7.4, 8.8.4, 8.9.4, 8.10.3, 9.2.3, 9.3.4, 9.4.3, 9.5.3, 10.3, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2
8	Determination of the Significance of Residual Effects	**Volume 6A**, Section 4.4.3, 4.5.3, 5.4.3, 6.4.3, 6.5.3, 6.5.4, 7.4.4, 7.4.5, 7.4.6, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.6.3, 9.7.3, 9.8.3, 10.4.3, 10.4.4, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.5.3, 11.6.3, 12.4.3, 12.5.3, 13.4.3,14.2, Appendix 10B, 11A **Volume 6B**, Section 5, 7.5.2, 7.6.2, 8.3, 8.6.2, 8.7.2, 9.6.2, 9.7.2, 9.8.2, 10.6.2, 10.7.2, 10.8.2, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.6.2, 14.3, 15.2, Appendix 4A **Volume 6C**, Section 4.1.8, 4.2.7, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.6.4, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.9.5, 5.10.3, 6.4.4 **Volume 7B**, Section 7.3.2, 7.4.2, 7.5.2, 7.6.2, 7.7.2, 7.8.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2, 9.2.4, 9.3.4, 9.4.4, 9.5.4 **Volume 7C**, Section 7.5.2, 7.6.2, 7.7.2, 7.7.3, 7.8.2, 7.9.2, 7.9.3, 7.10.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2, 9.5.3, 9.6.3, 10.2.4, 10.3.1, 11.5.3, 11.6.3 **Volume 8B**, Section 7.3, 8.3, 9.6.2,10.6.2, 10.7.2, 10.7.3, 10.8.2, 10.8.3, 10.8.4, 12.6.2, 12.7.2, 13.6.4, 13.7.5, 13.8.4, 13.9, Appendix 3A, 3B **Volume 8C**, Section 8.2, 8.3, 8.4.1, 8.5.2, 8.5.3, 8.6.2, 8.6.3, 8.7.2, 8.7.3, 8.8.2, 8.8.3, 8.9.2, 8.9.3, 8.10.2, 9.2.2, 9.3.3, 9.4.2, 9.5.2, 10.5.3, 10.6.3, 10.7.3, 10.8.3, 10.9.3, 11.2.4, 11.3.2

Filing #	Filing Requirement	Application References
9	Cumulative Environmental Effects	**Volume 6A**, Section 4.4.3, 4.4.4, 6.5.4, 7.4.4, 7.4.5, 7.4.6, 8.4.3, 8.4.5, 8.4.6, 9.6.4, 9.7.4, 9.8.4, 10.4.3, 10.5.3, 11.5.3, 11.6.3, Appendix 8A **Volume 6B**, Section 8.6.3, 10.7.3, 13.6.3 **Volume 6C**, Section 4.1.9, 4.2.8, 5.4.3, 5.4.7, 5.5.3, 5.6.3, 5.7.3, 5.9.3 **Volume 8B**, Section 9.6.3, 10.6.2, 10.7.2, 11.5.3, 11.6.3, 12.6.3, 12.7.3
10	Capacity of Renewable Resources	**Volume 1**, Section 1.4
8. Follow-up and Monitoring		
1	Follow-up and Monitoring	**Volume 6A**, Section 4.6, 5.5, 6.6, 7.5, 8.5, 9.9, 10.6, 11.7, 2.6, 13.5 **Volume 6B**, Section 7.7, 10.9, 11.9, 13.7, 14.5 **Volume 6C**, Section 4.1.11, 4.2.10, 5.11, 6.5 (for construction only) **Volume 7A**, Section 8.5.9, 11.3, Appendix A.2.7, A.3.2, A.3.5, A.3.10, A.3.17, A.3.19, A.3.20, A.3.26, A.3.31, A.3.34 **Volume 7B**, Section 7.3.4, 7.4.4, 7.5.4, 7.6.4, 7.7.4, 7.8.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4 **Volume 7C**, Section 7.5.5, 7.6.5, 7.7.5, 7.8.5, 7.9.5, 7.10.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4, 10.4 **Volume 8B**, Section 10.9, 12.9, 13.10 **Volume 8C**, Section 8.5.5, 8.6.5, 8.7.5, 8.8.5, 8.9.5, 8.10.4, 9.2.4, 9.3.5, 9.4.4, 9.5.4, 11.4

L.2 NEB Concordance Table

Chapter 3 Common Information Requirements: NEB Filing Requirements

Filing #	Filing Requirement	Application References
3.1 Action Sought by Applicant		
1	Requirements of s. 15 of the Rules.	**Volume 1**, Section 1.6
3.2 Application or Project Purpose		
1	Purpose of the proposed project.	**Volume 1**, Section 1.2
3.3 Consultation		
3.3.1 Principles and Goals of Consultation		
1	The corporate policy or vision.	**Volume 1**, Appendix G **Volume 4**, Section 2.1
2	The principles and goals of consultation for the project.	**Volume 4**, Section 2.3 **Volume 5A**, Section 2.3
3	A copy of the Aboriginal protocol and copies of policies and principles for collecting traditional use information, if available.	**Volume 1**, Appendix J **Volume 5A**, Section 2.1, Appendix A **Volume 5B**, Section 1.1, Appendix A, B
3.3.2 Design of Consultation Program		
1	The design of the consultation program and the factors that influenced the design.	**Volume 4**, Section 2 **Volume 5A**, Section 2
3.3.3 Implementing a Consultation Program		
1	The outcomes of the consultation program for the project.	**Volume 4**, Section 4 **Volume 5A**, Section 4, 5
3.3.4 Justification for Not Undertaking a Consultation Program		
1	The application provides justification for why the applicant has determined that a consultation program is not required for the project.	N/A
3.4 Notification of Commercial Third Parties		
1	Confirm that third parties were notified.	**Volume 1**, Section 7.2 **Volume 2**, Section 2
2	Details regarding the concerns of third parties.	**Volume 1**, Section 7.2 **Volume 2**, Section 2
3	List the self-identified interested third parties and confirm they have been notified.	**Volume 1**, Section 7.2 **Volume 2**, Section 2
4	If notification of third parties is considered unnecessary, an explanation to this effect.	N/A

Chapter 4 Sections 4.1 and 4.2: Common Requirements for Physical Projects

Filing #	Filing Requirement	Application References
4.1 Project Description		
1	The project components, activities and related undertakings.	**Volume 1**, Section 2
2	The project location and criteria used to determine the route or site.	**Volume 1**, Section 4, 8 **Volume 3**, Section 2
3	How and when the project will be carried out.	**Volume 1**, Section 2.7 **Volume 3**, Section 1.3, 10
4	Description of any facilities, to be constructed by others, required to accommodate the proposed facilities.	N/A
5	An estimate of the total capital costs and incremental operating costs.	**Volume 1**, Section 2.8
6	The expected in-service date.	**Volume 1**, Section 2.7
4.2 Economic Feasibility, Alternatives and Justification		
4.2.1 Economic Feasibility		
1	Description of the economic feasibility of the project.	**Volume 1**, Section 5.1
4.2.2 Alternatives		
1	Description of other alternatives that were examined in the context of economic feasibility and rationale for selecting the applied-for project.	**Volume 1**, Section 4
2	Describe and justify the selection of the proposed route and site including a comparison of the alternatives using the selection criteria.	**Volume 1**, Section 4 **Volume 3**, Section 2
3	For projects for which 'alternative to' has been identified as a relevant factor to consider under the CEA Act, a description of the alternatives to the project.	**Volume 1**, Section 4 **Volume 3**, Section 2
4	For a comprehensive study, panel review or projects for which alternative means has been identified as a relevant factor under the CEA Act, a description of the alternative means for carrying out the project.	**Volume 1**, Section 4 **Volume 3**, Section 2
4.2.3 Justification		
1	Justification for the proposed project.	**Volume 1**, Section 4, 5.1.1

Guide L L.1 Engineering

Filing #	Filing Requirement	Application References
L.1.1 Engineering Design Details		
1	Fluid type and composition.	**Volume 3**, Section 4.2.2, 4.3.2, Table 4-2, 4-5
2	Line pipe specifications.	**Volume 3**, Section 5.1, Table 5-1, 5-2
3	Pigging facilities specifications.	**Volume 3**, Section 5.6, Table 5-3, 5-4
4	Compressor or pump facilities specifications.	**Volume 3**, Section 8.3, Table 8-1
5	Pressure regulating or metering facilities specifications.	**Volume 3**, Section 8.6, 9.1.5, 9.1.7, 9.2.3, 9.2.6
6	Liquid tank specifications.	**Volume 3**, Section 9.1.3, 9.1.6, 9.2.4, Table 9-1, 9-2, 9-5
7	New control system facilities specifications.	**Volume 3**, Section 11.2, 11.2, 11.3, 11.4
8	Gas processing, sulphur or LNG plant facilities specifications.	No such facilities
9	Technical description of other facilities not mentioned above.	No such facilities
10	Building dimensions and uses.	**Volume 3,** Section 8.7, 9.3, Table 8-3, 9-8
11	If project is a new system that is a critical source of energy supply, a description of the impact to the new system capabilities following loss of critical component.	Not a critical energy supply because the Project is designed to serve the export market
L.1.2 Engineering Design Philosophy		
1	Confirmation project activities will follow the requirements of the latest version of CSA Z662.	**Volume 3**, Section 1.4, 1.6.1
2	Statement confirming compliance with OPR or PPR.	**Volume 3**, Section 1.4, 1.6.1
3	Listing of all primary codes and standards, including version and date of issue.	**Volume 3**, Section 1.4, Appendix B, Table B-1
4	Confirmation that the project will comply with company manuals and confirm manuals comply with OPR/PPR and codes and standards.	**Volume 3**, Section 1.4, 1.6.1, 1.6.3. Appendix B, Table B-1, B-2
5	Any portion of the project a non-hydrocarbon commodity pipeline system? Provide a QA program to ensure the materials are appropriate for their intended service.	All products are hydrocarbon liquids

Guide L L.1 Engineering (cont'd)

Filing #	Filing Requirement	Application References
6	If facility subject to conditions not addressed in CSA Z662: • Written statement by qualified professional engineer • Description of the designs and measures required to safeguard the pipeline	**Volume 3**, Section 5.14, Table 5-7
7	If directional drilling involved: • Preliminary feasibility report • Description of the contingency plan	**Volume 3**, Section 6.3.2
L.1.3 Onshore Pipeline Regulations		
1	Designs, specifications programs, manuals, procedures, measures or plans for which no standard is set out in the OPR.	Existing standards will be followed
2	A quality assurance program if project non-routine or incorporates unique challenges due to geographical location.	No unique challenges
3	If welding performed on a liquid-filled pipeline that has a carbon equivalent of 0.50% or greater and is a permanent installation: • Welding specifications and procedures • Results of procedure qualification tests	Welding on liquid filled pipe will not be conducted

Guide L L.2 Environmental and Socio-economic Assessment

Filing #	Filing Requirement	Application References
L.2.4 Description of the Environmental and Socio-Economic Setting		
1	Identify and describe the current biophysical and socio-economic setting.	**Volume 6A**, Section 4.1, 5.1, 6.1, 7.1, 8.1, 9.1, 10.1, 11.1, 12.1, 13.1 **Volume 6B**, Section 3, 7.1, 8.1, 9.1, 10.1, 11.1, 12.1, 13.1 **Volume 6C**, Section 4.1, 5.1, 6.1 **Volume 8B**, Section 3, 7.1, 8.1, 9.1, 10.1, 11.1, 12.1, 13.3
2	Describe and quantify the biophysical and socio-economic elements in the study area which are of ecological, economic, or human importance	**Volume 6A**, Section 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 **Volume 6B**, Section 4, 6, 7, 8, 9, 10, 11, 12, 13 **Volume 6C**, Section 3, 4, 5, 6 **Volume 8B**, Section 3.2, 3.3, 4.3, 6, 7, 8, 9, 10, 11, 12, 13
	Determine which biophysical or socio-economic elements require more detailed analysis	**Volume 6A**, Section 4.6, 5.5, 6.6, 7.5, 8.5, 9.9, 10.6, 11.7, 12.6, 13.5 **Volume 6B**, Section 7.7, 8.8, 9.9, 10.9, 11.9, 12.8, 13.7, 14.5 **Volume 6C**, Section 4.1.11, 4.2.10, 5.11, 6.5 **Volume 8B**, Section 9.7, 10.9, 11.7, 12.9, 13.10
	Detailed information related to biophysical or socio-economic elements from Tables-A-4 and A-5 where applicable	**Volume 6A**, Section 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 **Volume 6B**, Section 7, 8, 9, 10, 11, 12, 13, 14 **Volume 6C**, Section 4, 5, 6 **Volume 7B**, Section 7, 8, 9 **Volume 7C**, Section 7, 8, 9, 10.2, 10.3 **Volume 8B**, Section 7, 8, 9, 10, 11, 12, 13.6, 13.7, 13.8, 13.9 **Volume 8C**, Section 8, 9, 10, 11.2, 11.3

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
3	Provide supporting evidence for information and data collected, analysis completed, conclusions reached and for any professional judgment or experience provided in meeting these information requirements.	**Volume 6A**, Section 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 **Volume 6B**, Section 7, 8, 9, 10, 11, 12, 13, 14 **Volume 6C**, Section 4, 5, 6 **Volume 7B**, Section 7, 8, 9 **Volume 7C**, Section 7, 8, 9, 10.2, 10.3 **Volume 8B**, Section 7, 8, 9, 10, 11, 12, 13.6, 13.7, 13.8, 13.9 **Volume 8C**, Section 8, 9, 10, 11.2, 11.3
4	Identify, describe and justify the methodology used for any surveys. Justification or plan for further surveys if season for a survey conducted was not optimal.	**Volume 6A**, Section 4.4.2, 4.5.2, 5.4.2, 6.4.2, 6.5.2, 7.4.2, 8.4.2, 9.4, 10.4.2, 10.5.2, 11.5.2, 11.6.2, 12.4.2, 12.5.2, 13.4.2, Appendix 6B **Volume 6B**, Section 7.4, 8.4, 9.4, 10.4, 11.4, 12.4, 13.4 **Volume 6C**, Section 5.4.2, 5.5.2, 5.6.2, 5.7.2, 5.8.2, 5.9.2, 5.10.2, 6.4.2 **Volume 8B**, 7.2, 8.2, 9.4, 10.4, 11.4, 12.4, 13.6, 13.7, 13.8
L.2.5 Effects Assessment		
Identification and Analysis of Effects		
1	Identify potential effects associated with the proposed project.	**Volume 6A**, Section 4.4.1, 4.5.1, 5.4.1, 6.4.1, 6.5.1, 7.4.1, 8.2.1, 8.4.1, 9.2.1, 10.4.1, 10.5.1, 11.5.1, 11.6.1, 12.4.1, 12.5.1, 13.4.1 **Volume 6B**, Section 4.1.2, 4.2.3, 7.2.1, 8.2.1, 9.2.1, 10.2.1, 11.7.1, 11.8.1, 12.5.2, 12.6.2, 12.7.3, 13.2.1 **Volume 6C**, Section 4.1.2, 5.4.1, 5.4.3, 5.5.3, 5.6.1, 5.6.3, 5.7.1, 5.8.1, 5.9.1, 5.10, 6.4.1 **Volume 7B**, Section 7.3.2, 7.4.2, 7.5.2, 7.6.2, 7.7.2, 7.8.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2 **Volume 7C**, Section 7.5.2, 7.5.3, 7.6.2, 7.6.3, 7.7.2, 7.7.3, 7.8.2, 7.8.3, 7.9.2, 7.9.3, 7.10.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2 **Volume 8B**, Section 7.3, 8.3, 9.2.2, 10.5, 11.5.2, 11.6.2, 12.2.1 **Volume 8C**, Section 8.4.1, 8.5.2, 8.5.3, 8.6.2, 8.6.3, 8.7.2, 8.7.3, 8.8.2, 8.8.3, 8.9.2, 8.9.3, 8.10.2, 9.2.2, 9.3.3, 9.4.2, 9.5.2

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
2	For those biophysical and socio-economic elements that require further analysis, describe, quantify and justify: • spatial and temporal boundaries for the effects analysis of the biophysical or socio-economic element, or valued component, including how this element could change from baseline over the life of the project • local and regional conditions of the biophysical or socio-economic element, or valued component • key receptors that could potentially be affected by the project and a change in the element of concern	**Volume 6A**, Section 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 **Volume 6B**, Section 7, 8, 9, 10, 11, 12, 13, 14 **Volume 6C**, Section 4, 5, 6 **Volume 7B**, Section 7, 8, 9 **Volume 7C**, Section 7, 8, 9, 10.2, 10.3 **Volume 8B**, Section 7, 8, 9, 10, 11, 12, 13.6, 13.7, 13.8, 13.9 **Volume 8C**, Section 8, 9, 10, 11.2, 11.3
3	An effects analysis of the project for each biophysical or socio-economic element, or valued component.	**Volume 6A**, Section 4.4.3, 4.5.3, 5.4.3, 6.4.3, 6.5.3, 6.5.4, 7.4.4, 7.4.5, 7.4.6, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.6.3, 9.7.3, 9.8.3, 10.4.3, 10.4.4, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.5.3, 11.6.3, 12.4.3, 12.5.3, 13.4.3, 14.2, Appendix 10B, 11A **Volume 6B**, Section 5, 7.5.2, 7.6.2, 8.3, 8.6.2, 8.7.2, 9.6.2, 9.7.2, 9.8.2, 10.6.2, 10.7.2, 10.8.2, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.6.2, 14.3, 15.2, Appendix 4A **Volume 6C**, Section 4.1.8, 4.2.7, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.6.4, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.9.5, 5.10.3, 6.4.4 **Volume 7B**, Section 7.3.2, 7.4.2, 7.5.2, 7.6.2, 7.7.2, 7.8.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2, 9.2.4, 9.3.4, 9.4.4, 9.5.4 **Volume 7C**, Section 7.5.2, 7.6.2, 7.7.2, 7.7.3, 7.8.2, 7.9.2, 7.9.3, 7.10.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2, 9.5.3, 9.6.3, 10.2.4, 10.3.1, 11.5.3, 11.6.3 **Volume 8B**, Section 7.3, 8.3, 9.6.2, 10.6.2, 10.7.2, 10.7.3, 10.8.2, 10.8.3, 10.8.4, 12.6.2, 12.7.2, 13.6.4, 13.7.5, 13.8.4, 13.9, Appendix 3A, 3B

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
3 (cont'd)		**Volume 8C**, Section 8.2, 8.3, 8.4.1, 8.5.2, 8.5.3, 8.6.2, 8.6.3, 8.7.2, 8.7.3, 8.8.2, 8.8.3, 8.9.2, 8.9.3, 8.10.2, 9.2.2, 9.3.3, 9.4.2, 9.5.2, 10.5.3, 10.6.3, 10.7.3, 10.8.3, 10.9.3, 11.2.4, 11.3.2
4	Detailed information outlined in Tables A-4 and A-5 for elements identified in Table A-3.	**Volume 6A**, Section 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 **Volume 6B**, Section 7, 8, 9, 10, 11, 12, 13, 14 **Volume 6C**, Section 4, 5, 6 **Volume 7B**, Section 7, 8, 9 **Volume 7C**, Section 7, 8, 9, 10.2, 10.3 **Volume 8B**, Section 7, 8, 9, 10, 11, 12, 13.6, 13.7, 13.8, 13.9 **Volume 8C**, Section 8, 9, 10, 11.2, 11.3
Mitigation Measures		
1	Describe the general and specific mitigation measures and their effectiveness to address the project-specific effects, or clearly reference sections of company manuals that provide mitigation measures	**Volume 6A**, Section 4.3, 4.4.3, 4.5.3, 5.3, 5.4.3, 6.3, 6.4.3, 6.5.3, 6.5.4, 7.3, 7.4.4, 7.4.5, 7.4.6, 8.3, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.4.3, 10.4.4, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.3, 11.5.3, 11.6.3, 12.3, 12.4.3, 12.5.3, 13.3, 13.4.3, Appendix 6A, 11B **Volume 6B**, Section 7.3, 7.5.2, 7.6.2, 8.3, 8.6.2, 8.7.2, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.6.2, 10.7.2, 10.8.2, 11.3, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 12.3, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.3, 13.6.2 **Volume 6C**, Section 4.1.3, 4.1.7, 4.2.3, 4.2.6, 5.3, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.6.4, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.9.5, 6.3, 6.4.4 **Volume 7A** **Volume 7B**, Section 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.2.3, 9.3.3, 9.4.3, 9.5.3 **Volume 7C**, Section 7.5.4, 7.6.4, 7.7.4, 7.8.4, 7.9.4, 7.10.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.3, 9.5.2, 9.6.2

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
1 (cont'd)		**Volume 8B**, Section 5, 9.3, 9.6.2, 10.3, 10.6.2, 10.7.2, 10.7.3, 11.3, 11.5.3, 11.6.3, 12.3, 12.6.2, 12.7.2, 13.5, 13.7.3, 13.7.5, 13.8.2 **Volume 8C**, Section 8.4.2, 8.5.4, 8.6.4, 8.7.4, 8.8.4, 8.9.4, 8.10.3, 9.2.3, 9.3.4, 9.4.3, 9.5.3, 10.3, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2
2	Describe how commitments regarding mitigative measures will be communicated to field staff for implementation.	**Volume 7A**, Section 6
3	Describe any plans or program that may be used to mitigate potential effects	**Volume 6A**, Section 4.3, 4.4.3, 4.5.3, 5.3, 5.4.3, 6.3, 6.4.3, 6.5.3, 6.5.4, 7.3, 7.4.4, 7.4.5, 7.4.6, 8.3, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.4.3, 10.4.4, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.3, 11.5.3, 11.6.3, 12.3, 12.4.3, 12.5.3, 13.3, 13.4.3, Appendix 6A, 11B **Volume 6B**, Section 7.3, 7.5.2, 7.6.2, 8.3, 8.6.2, 8.7.2, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.6.2, 10.7.2, 10.8.2, 11.3, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 12.3, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.3, 13.6.2 **Volume 6C**, Section 4.1.3, 4.1.7, 4.2.3, 4.2.6, 5.3, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.6.4, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.9.5, 6.3, 6.4.4 **Volume 7A** **Volume 7B**, Section 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.2.3, 9.3.3, 9.4.3, 9.5.3 **Volume 7C**, Section 7.5.4, 7.6.4, 7.7.4, 7.8.4, 7.9.4, 7.10.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.3, 9.5.2, 9.6.2 **Volume 8B**, Section 5, 9.3, 9.6.2, 10.3, 10.6.2, 10.7.2, 10.7.3, 11.3, 11.5.3, 11.6.3, 12.3, 12.6.2, 12.7.2, 13.5, 13.7.3, 13.7.5, 13.8.2 **Volume 8C**, Section 8.4.2, 8.5.4, 8.6.4, 8.7.4, 8.8.4, 8.9.4, 8.10.3, 9.2.3, 9.3.4, 9.4.3, 9.5.3, 10.3, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
1	Evaluate the likelihood and significance of residual adverse effects.	**Volume 6A**, Section 4.4.3, 4.5.3, 5.4.3, 6.4.3, 6.5.3, 6.5.4, 7.4.4, 7.4.5, 7.4.6, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.6.3, 9.7.3, 9.8.3, 10.4.3, 10.4.4, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.5.3, 11.6.3, 12.4.3, 12.5.3, 13.4.3, 14.2, Appendix 10B, 11A **Volume 6B**, Section 5, 7.5.2, 7.6.2, 8.3, 8.6.2, 8.7.2, 9.6.2, 9.7.2, 9.8.2, 10.6.2, 10.7.2, 10.8.2, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.6.2, 14.3, 15.2, Appendix 4A **Volume 6C**, Section 4.1.8, 4.2.7, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.6.4, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.9.5, 5.10.3, 6.4.4 **Volume 7B**, Section 7.3.2, 7.4.2, 7.5.2, 7.6.2, 7.7.2, 7.8.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2, 9.2.4, 9.3.4, 9.4.4, 9.5.4 **Volume 7C**, Section 7.5.2, 7.6.2, 7.7.2, 7.7.3, 7.8.2, 7.9.2, 7.9.3, 7.10.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2, 9.5.3, 9.6.3, 10.2.4, 10.3.1, 11.5.3, 11.6.3 **Volume 8B**, Section 7.3, 8.3, 9.6.2, 10.6.2, 10.7.2, 10.7.3, 10.8.2, 10.8.3, 10.8.4, 12.6.2, 12.7.2, 13.6.4, 13.7.5, 13.8.4, 13.9, Appendix 3A, 3B **Volume 8C**, Section 8.2, 8.3, 8.4.1, 8.5.2, 8.5.3, 8.6.2, 8.6.3, 8.7.2, 8.7.3, 8.8.2, 8.8.3, 8.9.2, 8.9.3, 8.10.2, 9.2.2, 9.3.3, 9.4.2, 9.5.2, 10.5.3, 10.6.3, 10.7.3, 10.8.3, 10.9.3, 11.2.4, 11.3.2
2	Define the "significant effect" for each biophysical or socio-economic element, or valued component	**Volume 6A**, Section 4.2.7, 5.2.7, 6.2.8, 7.2.7, 8.2.7, 9.2.7, 10.2.7, 11.2.7, 12.2.6, 13.2.7 **Volume 6B**, Section 7.2.7, 8.2.7, 9.2.7, 10.2.7, 11.2.7, 12.2.7, 13.2.7 **Volume 6C**, Section 4.1.2, 4.2.2, 5.2.6, 6.2.7, 11.2.7, 12.2.7, 13.2.7 **Volume 8B**, Section 4.3.6, 9.2.7, 10.2.7, 11.2.6, 12.2.7

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
3	Describe the methodology for determining whether the project is likely to cause significant adverse effects and justify conclusions	**Volume 6A**, Section 4.4.3, 4.5.3, 5.4.3, 6.4.3, 6.5.3, 6.5.4, 7.4.4, 7.4.5, 7.4.6, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.6.3, 9.7.3, 9.8.3, 10.4.3, 10.4.4, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.5.3, 11.6.3, 12.4.3, 12.5.3, 13.4.3, 14.2, Appendix 10B, 11A **Volume 6B**, Section 5, 7.5.2, 7.6.2, 8.3, 8.6.2, 8.7.2, 9.6.2, 9.7.2, 9.8.2, 10.6.2, 10.7.2, 10.8.2, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.6.2, 14.3, 15.2, Appendix 4A **Volume 6C**, Section 4.1.8, 4.2.7, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.6.4, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.9.5, 5.10.3, 6.4.4 **Volume 7B**, Section 7.3.2, 7.4.2, 7.5.2, 7.6.2, 7.7.2, 7.8.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2, 9.2.4, 9.3.4, 9.4.4, 9.5.4 **Volume 7C**, Section 7.5.2, 7.6.2, 7.7.2, 7.7.3, 7.8.2, 7.9.2, 7.9.3, 7.10.2, 8.2.2, 8.3.2, 8.4.2, 8.5.2, 9.5.3, 9.6.3, 10.2.4, 10.3.1, 11.5.3, 11.6.3 **Volume 8B**, Section 7.3, 8.3, 9.6.2, 10.6.2, 10.7.2, 10.7.3, 10.8.2, 10.8.3, 10.8.4, 12.6.2, 12.7.2, 13.6.4, 13.7.5, 13.8.4, 13.9, Appendix 3A, 3B **Volume 8C**, Section 8.2, 8.3, 8.4.1, 8.5.2, 8.5.3, 8.6.2, 8.6.3, 8.7.2, 8.7.3, 8.8.2, 8.8.3, 8.9.2, 8.9.3, 8.10.2, 9.2.2, 9.3.3, 9.4.2, 9.5.2, 10.5.3, 10.6.3, 10.7.3, 10.8.3, 10.9.3, 11.2.4, 11.3.2
L.2.6 Cumulative Effects Assessment		
Scoping and Analysis of Cumulative Effects		
1	Identify potential effects for which residual effects are also predicted in the ESA.	**Volume 6A**, Section 4.4.3, 4.4.4, 6.5.4, 7.4.4, 7.4.5, 7.4.6, 8.4.3, 8.4.5, 8.4.6, 9.6.4, 9.7.4, 9.8.4, 10.4.3, 10.5.3, 11.5.3, 11.6.3, Appendix 8A **Volume 6B**, Section 8.6.3, 10.7.3, 13.6.3 **Volume 6C**, Section 4.1.9, 4.2.8, 5.4.3, 5.4.7, 5.5.3, 5.6.3, 5.7.3, 5.9.3 **Volume 8B**, Section 9.6.3, 10.6.2, 10.7.2, 11.5.3, 11.6.3, 12.6.3, 12.7.3

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
2	For each biophysical or socio-economic element, or valued component where residual effects have been identified, provide a description of the spatial and temporal boundaries used to assess the potential cumulative effects • Identify other projects and activities that have occurred or are likely to occur within the boundaries • Identify whether those projects and activities will produce effects on the biophysical or socio-economic element, valued components within the identified boundaries	**Volume 6A**, Sections 3.2, 4.4, 4.5.3, 5.4.3, 5.6, 6.4.3, 6.5.3, 6.5.4, 6.7, 7.4, 7.6, 8.4, 9.6, 9.7, 9.8, 9.10, 10.4, 10.5.3 to 10.5.5, 10.7.2, 11.2.5, 11.5.3, 11.6.3, 12.4.3, 12.5.3, 12.7, 13.4.3, 15.2, Appendices 3A, 6B, 11B **Volume 6B**, Sections 7.5.2, 7.6.3, 7.8, 8.6.3, 8.6.4, 8.7.2, 8.7.3, 8.9, 9.6.2, 9.6.3, 9.7.2, 9.7.3, 9.8.2, 9.8.3, 9.10, 10.6.2, 10.6.3, 10.7.3, 10.8.3, 10.10, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 11.10, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.6.2, 13.6.3, 13.8, 16.2, Appendix 3A **Volume 6C**, Section 4.1.8, 4.1.9, 4.2.7, 4.2.8, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.5.3, 5.6.4, 5.7.3, Appendix 3A **Volume 8B**, Sections 4.2, 9.6, 10.6, 10.7, 10.8, 10.10, 11.5, 11.6, 11.8, 12.6, 12.7
3	Provide a cumulative effects analysis of the proposed project in combination with other projects and activities for each biophysical or socio-economic element, or valued component.	**Volume 6A**, Sections 3.2, 4.4, 4.5.3, 5.4.3, 5.6, 6.4.3, 6.5.3, 6.5.4, 6.7, 7.4, 7.6, 8.4, 9.6, 9.7, 9.8, 9.10, 10.4, 10.5.3 to 10.5.5, 10.7.2, 11.2.5, 11.5.3, 11.6.3, 12.4.3, 12.5.3, 12.7, 13.4.3, 15.2, Appendices 3A, 6B, 11B **Volume 6B**, Sections 7.5.2, 7.6.3, 7.8, 8.6.3, 8.6.4, 8.7.2, 8.7.3, 8.9, 9.6.2, 9.6.3, 9.7.2, 9.7.3, 9.8.2, 9.8.3, 9.10, 10.6.2, 10.6.3, 10.7.3, 10.8.3, 10.10, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 11.10, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.6.2, 13.6.3, 13.8, 16.2, Appendix 3A **Volume 6C**, Section 4.1.8, 4.1.9, 4.2.7, 4.2.8, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.5.3, 5.6.4, 5.7.3, Appendix 3A **Volume 8B**, Sections 4.2, 9.6, 10.6, 10.7, 10.8, 10.10, 11.5, 11.6, 11.8, 12.6, 12.7

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
1	Describe the general and specific mitigation measures that are technically and economically feasible to address the cumulative effects.	**Volume 6A**, Section 4.3, 4.4.3, 4.5.3, 5.3, 5.4.3, 6.3, 6.4.3, 6.5.3, 6.5.4, 7.3, 7.4.4, 7.4.5, 7.4.6, 8.3, 8.4.3, 8.4.4, 8.4.5, 8.4.6, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.4.3, 10.4.4, 10.4.5, 10.5.3, 10.5.4, 10.5.5, 11.3, 11.5.3, 11.6.3, 12.3, 12.4.3, 12.5.3, 13.3, 13.4.3, Appendix 6A, 11B **Volume 6B**, Section 7.3, 7.5.2, 7.6.2, 8.3, 8.6.2, 8.7.2, 9.3, 9.6.2, 9.7.2, 9.8.2, 10.3, 10.6.2, 10.7.2, 10.8.2, 11.3, 11.6.2, 11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 12.3, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.3, 13.6.2 **Volume 6C**, Section 4.1.3, 4.1.7, 4.2.3, 4.2.6, 5.3, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.5.3, 5.6.3, 5.6.4, 5.7.3, 5.8.3, 5.8.4, 5.8.5, 5.9.3, 5.9.4, 5.9.5, 6.3, 6.4.4 **Volume 7A** **Volume 7B**, Section 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.2.3, 9.3.3, 9.4.3, 9.5.3 **Volume 7C**, Section 7.5.4, 7.6.4, 7.7.4, 7.8.4, 7.9.4, 7.10.3, 8.2.3, 8.3.3, 8.4.3, 8.5.3, 9.3, 9.5.2, 9.6.2 **Volume 8B**, Section 5, 9.3, 9.6.2, 10.3, 10.6.2, 10.7.2, 10.7.3, 11.3, 11.5.3, 11.6.3, 12.3, 12.6.2, 12.7.2, 13.5, 13.7.3, 13.7.5, 13.8.2 **Volume 8C**, Section 8.4.2, 8.5.4, 8.6.4, 8.7.4, 8.8.4, 8.9.4, 8.10.3, 9.2.3, 9.3.4, 9.4.3, 9.5.3, 10.3, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
1	Evaluate the likelihood and significance of adverse residual cumulative effects.	**Volume 6A**, Sections 3.2, 4.4, 4.5.3, 5.4.3, 5.6, 6.4.3, 6.5.3, 6.5.4, 6.7, 7.4, 7.6, 8.4, 9.6, 9.7, 9.8, 9.10, 10.4, 10.5.3 to 10.5.5, 10.7.2, 11.2.5, 11.5.3, 11.6.3, 12.4.3, 12.5.3, 12.7, 13.4.3, 15.2, Appendices 3A, 6B, 11B **Volume 6B**, Sections 7.5.2, 7.6.3, 7.8, 8.6.3, 8.6.4, 8.7.2, 8.7.3, 8.9, 9.6.2, 9.6.3, 9.7.2, 9.7.3, 9.8.2, 9.8.3, 9.10, 10.6.2, 10.6.3, 10.7.3, 10.8.3, 10.10, 11.6.2,11.6.3, 11.7.2, 11.7.3, 11.8.2, 11.8.3, 11.8.4, 11.10, 12.5.3, 12.5.4, 12.5.5, 12.6.3, 12.6.4, 12.6.5, 12.7.3, 12.7.4, 12.7.5, 13.6.2, 13.6.3, 13.8, 16.2, Appendix 3A **Volume 6C**, Section 4.1.8, 4.1.9, 4.2.7, 4.2.8, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.5.3, 5.6.4, 5.7.3, Appendix 3A **Volume 8B**, Section 4.2, 9.6, 10.6, 10.7, 10.8, 10.10, 11.5, 11.6, 11.8, 12.6, 12.7
2	Define "significant cumulative effect" for each biophysical or socio-economic element, or valued component.	**Volume 6A**, Section 4.2.7, 5.2.7, 6.2.8, 7.2.7, 8.2.7, 9.2.7, 10.2.7, 11.2.7, 12.2.6, 13.2.7 **Volume 6B**, Section 7.2.7, 8.2.7, 9.2.7, 10.2.7, 11.2.7, 12.2.7, 13.2.7 **Volume 6C**, Section 4.1.2, 4.2.2, 5.2.6, 6.2.7, 11.2.7, 12.2.7, 13.2.7 **Volume 8B**, Section 4.3.6, 9.2.7, 10.2.7, 11.2.6, 12.2.7
3	Describe the methodology for determining whether the project is likely to cause significant cumulative effects and justify any conclusions	**Volume 6A**, Section 4.4.3, 4.4.4, 6.5.4, 7.4.4, 7.4.5, 7.4.6, 8.4.3, 8.4.5, 8.4.6, 9.6.4, 9.7.4, 9.8.4, 10.4.3, 10.5.3, 11.5.3, 11.6.3, Appendix 8A **Volume 6B**, Section 8.6.3, 10.7.3, 13.6.3 **Volume 6C**, Section 4.1.9, 4.2.8, 5.4.3, 5.4.7, 5.5.3, 5.6.3, 5.7.3, 5.9.3 **Volume 8B**, Section 9.6.3, 10.6.2, 10.7.2, 11.5.3, 11.6.3, 12.6.3, 12.7.3

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
1	Describe plans to ensure compliance with biophysical and socio-economic commitments.	**Volume 1**, Section 6.3.6 **Volume 3**, Section 1.6.4 **Volume 5B**, Section 4.3.6., Appendix C **Volume 6A**, Section 3.2.5, 4.6, 5.5, 6.6, 7.5, 8.5, 9.9, 10.6, 11.7, 12.6, 13.5 **Volume 6B**, Section 4.2.5, 7.7, 8.8, 9.9, 10.9, 11.9, 12.8 **Volume 6C**, Section 3.2.5, 4.1.11, 4.2.10, 5.11, 6.5 **Volume 7A**, Section 8.5.9, 11.3, Appendix A.2.7, A.3.2, A.3.5, A.3.10, A.3.17, A.3.19, A.3.20, A.3.26, A.3.31, A.3.34 (for construction only) **Volume 7B**, Section 7.3.4, 7.4.4, 7.5.4, 7.6.4, 7.7.4, 7.7.4, 7.8.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4 **Volume 7C**, Section 7.5.5, 7.6.5, 7.7.5, 7.8.5, 7.9.5, 7.10.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4, 10.4 **Volume 8B**, Section 10.9, 12.9, 13.10 **Volume 8C**, Section 8.5.5, 8.6.5, 8.7.5, 8.8.5, 8.9.5, 8.10.4, 9.2.4, 9.3.5, 9.4.4, 9.5.4, 11.4
2	Evaluate the need to monitor the elements potentially affected by the project and if needed, describe the environmental monitoring plan to be implemented during construction, reclamation, and operation of the project.	**Volume 1**, Section 6.3.6 **Volume 3**, Section 1.6.4 **Volume 5B**, Section 4.3.6., Appendix C **Volume 6A**, Section 3.2.5, 4.6, 5.5, 6.6, 7.5, 8.5, 9.9, 10.2.1, 10.6, 11.7, 12.6, 13.5, Appendix 11B.5.9 **Volume 6B**, Section 4.2.5, 5, 7.7, 8.8, 9.9, 10.9, 11.9, 12.8 **Volume 6C**, Section 3.2.5, 4.1.11, 4.2.10, 5.11, 6.5 **Volume 7A**, Section 8.5.9, 11.3, Appendix A.2.7, A.3.2, A.3.5, A.3.10, A.3.17, A.3.19, A.3.20, A.3.26, A.3.31, A.3.34 (for construction only) **Volume 7B**, Section 7.3.4, 7.4.4, 7.5.4, 7.6.4, 7.7.4, 7.7.4, 7.8.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4 **Volume 7C**, Section 7.5.5, 7.6.5, 7.7.5, 7.8.5, 7.9.5, 7.10.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4, 10.4

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Filing #	Filing Requirement	Application References
2 (cont'd)		**Volume 8B**, Section 4.2.5, 9.7, 10.9, 11.7, 12.9, 13.10 **Volume 8C**, Section 8.5.5, 8.6.5, 8.7.5, 8.8.5, 8.9.5, 8.10.4, 9.2.4, 9.3.5, 9.4.4, 9.5.4, 11.4
3	Where a project triggers the CEA Act, evaluate the need for element-specific follow-up programs to verify the accuracy of the ESA and to determine the effectiveness of any mitigation measures that were implemented, particularly those mitigation measures that are new or unproven.	**Volume 1**, Section 6.3.6 **Volume 3**, Section 1.6.4 **Volume 5B**, Section 4.3.6., Appendix C **Volume 6A**, Section 3.2.5, 4.6, 5.5, 6.6, 7.5, 8.5, 9.9, 10.6, 11.7, 12.6, 13.5 **Volume 6B**, Section 4.2.5, 7.7, 8.8, 9.9, 10.9, 11.9, 12.8 **Volume 6C**, Section 3.2.5, 4.1.11, 4.2.10, 5.11, 6.5 **Volume 7A**, Section 8.5.9, 11.3, Appendix A.2.7, A.3.2, A.3.5, A.3.10, A.3.17, A.3.19, A.3.20, A.3.26, A.3.31, A.3.34 (for construction only) **Volume 7B**, Section 7.3.4, 7.4.4, 7.5.4, 7.6.4, 7.7.4, 7.7.4, 7.8.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4 **Volume 7C**, Section 7.5.5, 7.6.5, 7.7.5, 7.8.5, 7.9.5, 7.10.4, 8.2.4, 8.3.4, 8.4.4, 8.5.4, 10.4 **Volume 8B**, Section 10.9, 12.9, 13.10 **Volume 8C**, Section 8.5.5, 8.6.5, 8.7.5, 8.8.5, 8.9.5, 8.10.4, 9.2.4, 9.3.5, 9.4.4, 9.5.4, 11.4
Table L-3 Circumstances Triggering the Need for Detailed Biophysical and Socio-Economic Information		
Physical environment		**Volume 6A**, Section 7.2
Soil and soil productivity		**Volume 6A**, Section 6.2, 6.4.1, 6.5.1
Vegetation		**Volume 6A**, Section 8.2, 8.4.1 **Volume 6B**, Section 8.2 **Volume 8B**, Section 7
Water quality and quantity		**Volume 6A**, 10.2, 10.4.1, 10.5.1 **Volume 6B**, Section 7.2
Fish and fish habitat		**Volume 6A**, Section 11.2, 11.5.1, 11.6.1 **Volume 6B**, Section 10.2, 13.2 **Volume 8B**, Section 9.2, 12.2, 13.8.2
Wetlands		**Volume 6A**, Section 8.2

Guide L L.2 Environmental and Socio-economic Assessment (cont'd)

Table L-3 Circumstances Triggering the Need for Detailed Biophysical and Socio-Economic Information (cont'd)	
Wildlife and wildlife habitat	**Volume 6A**, Section 9.2 **Volume 6B**, Section 11.2, 12.2 **Volume 8B**, Section 10.2, 11.2, 13.7.2
Species at Risk or Species of Special Status and related habitat	**Volume 6A**, Section 9.2.2 **Volume 6B**, Section 6 **Volume 8B**, Section 6
Air quality	**Volume 6A**, Section 4.2, 4.4.1
Acoustic environment	**Volume 6A**, Section 5.2, 5.4.1
Human occupancy and resource use	**Volume 6C**, Section 5.2, 5.4.1, 5.5.1, 5.6.1, 5.7.1, 5.8.1, 5.9.1, 5.10.1
Heritage resources	**Volume 6C**, Section 6.2, 6.4.1
Traditional land and resource use	**Volume 5B**
Social and cultural well-being	**Volume 6C**, Section 4.2
Human health and aesthetics	**Volume 6C**, Section 4.2.2, 5.9.2
Infrastructure and services	**Volume 6C**, Section 4.1
Employment and economy	**Volume 6C**, Section 4.1.2

Guide L L.3 Economics

Filing #	Filing Requirement	Application References
L.3.1 Supply		
1	A description of each commodity.	**Volume 2**, Section 1.1, 1.4
2	A discussion of all potential supply sources.	**Volume 2**, Section 1.1, 1.4
3	Forecast of productive capacity over the economic life of the facility.	**Volume 2**, Section 1.1, 1.4
4	For pipelines with contracted capacity, a discussion of the contractual arrangements underpinning supply.	**Volume 2**, Section 2
L.3.2 Transportation Matters		
Pipeline Capacity		
1	In the case of expansion provide: • Pipeline capacity before and after and size of increment • Justification that size of expansion is appropriate	N/A
2	In case of new pipeline, justification that size of expansion is appropriate given available supply.	**Volume 2**, Section 1.1, 1.4
Throughput		
1	For pipelines with contracted capacity, information on contractual arrangements.	**Volume 2**, Section 2
2	For non-contract carrier pipelines, forecast of annual throughput volumes by commodity type, receipt location and delivery destination over facility life.	N/A
3	If project results in an increase in throughput: • theoretical and sustainable capabilities of the existing and proposed facilities versus the forecasted requirements • flow formulae and flow calculations used to determine the capabilities of the proposed facilities and the underlying assumptions and parameters	N/A
4.	If more than one type of commodity transported, a discussion pertaining to segregation of commodities including potential contamination issues or cost impacts.	**Volume 3**, Section 11.7

Guide L L.3 Economics (cont'd)

Filing #	Filing Requirement	Application References
L.3.3 Markets		
1	Provide an analysis of the market in which each commodity is expected to be used or consumed.	**Volume 2**, Section 1.3, 1.5
2	Provide a discussion of the physical capability of downstream facilities to accept the incremental volumes that would be delivered.	**Volume 2**, Section 1.3, 1.5
L.3.4 Financing		
1	Evidence that the applicant has the ability to finance the proposed facilities.	**Volume 2**, Section 4
2	Estimated toll impact for the first full year that facilities are expected to be in service.	**Volume 2**, Section 3
3	Confirmation that shippers have been apprised of the project and toll impact, their concerns and plans to address them.	**Volume 1**, Section 7 **Volume 2**, Section 2
4	Additional toll details for applications with significant toll impacts.	N/A
L.3.5 Non-NEB Regulatory Approvals		
1	Confirm that all non-NEB regulatory approvals, required to allow the applicant to meet the construction schedule and planned in-service date and to allow the facilities to be used and useful, are or will be in place.	**Volume 1**, Section 6
2	If any of the approvals referred to in 1. may be delayed, describe the status of those approval(s) and provide an estimation of when the approval is anticipated.	N/A

Guide L L.4 Lands Information

Filing #	Filing Requirement	In Application? References
L.4.1 Land Areas		
1	• Width of right-of-way and locations of any changes to width • Locations and dimensions of known temporary work space and drawings of typical dimensions • Locations and dimensions of any new lands for facilities	**Volume 1**, Section 8.1
L.4.2 Land Rights		
1	The type of lands rights proposed to be acquired for the project.	**Volume 1**, Section 8.2
2	The relative proportions of land ownership along the route of the project.	**Volume 1**, Section 8.2
3	Any existing land rights that will be required for the project.	**Volume 1**, Section 8.2
L.4.3 Lands Acquisition Process		
1	The process for acquiring lands.	**Volume 1**, Section 8.2
2	The timing of acquisition and current status.	**Volume 1**, Section 8.2
3	The status of service of section 87(1) notices.	**Volume 1**, Section 8.2
L.4.4 Land Acquisition Agreements		
1	A sample copy of each form of agreement proposed to be used pursuant to section 86(2) of the NEB Act.	**Volume 1**, Appendix A, B, C, D, E
2	A sample copy of any proposed fee simple, work space, access or other land agreement.	**Volume 1,** Appendix B, C, D, E
L.4.5 Section 87 Notices		
1	A sample copy of the notice proposed to be served on all landowners pursuant to section 87(1) of the NEB Act.	**Volume 1**, Appendix A
2	Confirmation that all notices include a copy of *Pipeline Regulation in Canada: A Guide for Landowners and the Public.*	**Volume 1**, Section 8.2
L.4.6 Section 58 Application to Address a Complaint		
1	The details of the complaint and describe how the proposed work will address the complaint.	N/A

Appendix M Technical Data Report Summaries

M.1 Terrestrial TDRs (in support of Volumes 6A and 6C)

M.1.1 Atmospheric Environment

M.1.1.1 Purpose

The Atmospheric Environment TDR lays out the technical details and assumptions of the air quality assessment in the Project's environmental and socio-economic assessment (ESA). The report provides an overview of the initialization and parameterization of selected plume dispersion models, a technical description of these models, model results (effects on local air quality), and an assessment of model performance. The report also includes a detailed description of existing air quality and climatic conditions in areas along the pipeline route.

M.1.1.2 Methods

The regional climate was characterized through an analysis of meteorological measurements including ambient air temperature, precipitation, visibility, wind speed, wind direction, severe weather, and thermal inversions, using data from thirty stations along the pipeline route. Ambient air quality data were statistically and graphically summarized for eight stations in British Columbia and fourteen stations in Alberta along the pipeline route. Particular attention has been paid to conditions in the Kitimat area.

A dispersion modelling analysis was conducted for the Kitimat Terminal using the United States Environmental Protection Agency (US EPA) AERMOD and CALPUFF models to predict concentrations (AERMOD) and potential acid input (CALPUFF). The models were used to assess the Base Case, Project Case, Application Case and Future Case emission examples. Model predictions were compared to various ambient air quality objectives (AAQOs).

Emissions estimates were made for the construction and operations phases of the pipeline and the Kitimat Terminal. The terminal emission sources considered include marine vessels (stacks) during loading and unloading activities and fugitive emissions from the product storage tanks. Emissions from existing and proposed facilities in the Kitimat area were also considered.

M.1.1.3 Findings and Conclusions

Historical ambient air quality along the pipeline route and in Kitimat in particular is generally good, with little year to year variability. Occasional exceedances of short-term AAQOs (1-h, 24-h) are reported in the historical data. Predicted concentrations of criteria air contaminants indicate that only sulphur dioxide (SO_2) concentrations in the Kitimat Terminal could potentially exceed the applicable AAQOs.

Although operations at the Kitimat Terminal may be associated with localized exceedances of the AAQOs for SO_2, exceedances are predicted to be rare. In addition, the area in exceedance is predicted to be small, and immediately adjacent to the marine vessel stacks on elevated terrain. The close proximity to elevated terrain and the conservative nature of the dispersion modelling have resulted in anomalously high predicted SO_2 concentrations. Ambient air quality monitoring proposed for before and during terminal operations is expected to find actual concentrations well below predicted maximum values.

M.1.2 Acoustic Environment

M.1.2.1 Purpose

The Acoustic Environment TDR provides an overview of environmental acoustics, characterization of baseline sound levels, and acoustical predictions of project-generated operational noise at sites of particular interest.

M.1.2.2 Methods

The project team carried out baseline monitoring according to the following guidelines for environmental sound surveys:

- American National Standard Institute (ANSI) S12.18-1994 reaffirmed by ANSI 6/23/04, Procedures for Outdoor Measurement of Sound Pressure Level
- Alberta Energy Resources Conservation Board (ERCB) Directive 038: Noise Control

Three locations of particular interest were selected for 24-hour background sound surveys and potential project-generated sound modelling:

- along the pipeline route in rural Alberta
- at the initiating pump station near Bruderheim, Alberta
- near the Kitimat Terminal

The survey data were processed to determine average daytime and nighttime baseline ambient sound pressure levels (SPLs), and daytime and nighttime hourly equivalent SPLs.

Predictions and evaluations were also made for project-generated sound at two critical receptors, Kitamaat Village, approximately 6 km from the Kitimat Terminal, and the community of Bear Lake, located near a proposed project pump station in British Columbia. In both cases, SPLs were modelled with the SPM9613 noise mapping model based on acoustical data for relevant project noise sources, geometrical parameters, and local topography.

M.1.2.3 Findings and Conclusions

The lowest baseline SPLs were recorded near the Kitimat Terminal (approximately 20 dBA) and the highest levels were measured near the Bruderheim site (approximately 40 dBA) where several distant industrial facilities contribute to the combined ambient noise.

According to the SPL prediction for Kitamaat Village, project-generated noise will not change the village background sound level because sound will be attenuated in the 6 km between the Kitimat Terminal and Kitamaat Village.

The nighttime permissible sound level (L_{eq}) is 40 dBA under ERCB Directive 038. Sound levels attributable to the Bear Lake pump station will be below that level at distances greater than 100 m. The modelling results for the Bear Lake area showed SPLs in the range of 25 to 30 dBA 400 m north and east of the station. The modelling results show that the pump station noise will be a broadband harmonic at a steady level.

M.1.3 Soils

M.1.3.1 Purpose

The Soils TDR describes baseline characteristics of soil potentially affected by the Project for use in the Section 6 of the ESA.

M.1.3.2 Methods

Baseline conditions were evaluated using soil series mapping for agricultural lands in Alberta, and soil modelling techniques for both non-agricultural soil and for the Agricultural Land Reserve in British Columbia. In addition, information was collected and synthesized from existing literature sources and from field surveys for both agricultural and non-agricultural soil. Established methods are applied to derive agricultural capability ratings for soils and for risk of soil deterioration from wind and water erosion, compaction and paddling, and soil acidification.

M.1.3.3 Findings and Conclusions

The baseline information is provided separately for the six physiographic regions crossed by the pipeline route:

- Eastern Alberta Plains
- Southern Alberta Uplands
- Alberta Plateau
- Rocky Mountains
- Interior Plateau
- Coast Mountains

Each of these regions has relatively similar landforms, regional climatic conditions, general elevations, local relief, and soil profile morphology, although there is a great variety of soil types, soil materials, and topography along the route.

Most of the agricultural soils occur in the Eastern Alberta Plains, although small proportions of each of the other regions except of the Rocky Mountains are also used for agriculture. The major soils are chernozems, luvisols and solonetzic, of which chernozems have the highest agricultural capability. Many of these soils consist of clay or clay-till materials, and as such are somewhat susceptible to compaction. The solonetzic soils have subsoil hardpans and salinities that require special management practices in farming and other applications. Soils of the forested regions consist mainly of luvisols, brunisols and podzols, with organic soils (peatlands) in places. Many of these soils have sandy surfaces and may, therefore, be subject to erosion, especially where slopes are steep. The baseline information provides a basis for developing a variety of management techniques to conserve soils and maintain their ecosystem function and capability for agriculture and forestry.

M.1.4 Geology and Terrain

M.1.4.1 Purpose

The Geology and Terrain TDR provides baseline surficial geology information for the entire pipeline route and associated facilities, and (identifies geohazards, in particular mass wasting (e.g., deep seated landslides, shallow to moderately deep slides, rock fall, etc.), consolidation settlement, tsunami potential, and acid rock drainage.

M.1.4.2 Methods

The mapping of surficial geology and geohazards was completed using aerial photographs supplemented with detailed field investigations and a review of all available background data. Mapping occurred in HD-MAPP, a state-of-the-art digital mapping system that allows geologists to review aerial photographs at scales as large as 1:2,000. Aerial photographs are viewed using hand held stereoscopes at scales of 1:20,000 or smaller. HD-MAPP allows the identification of site-specific critical landscape features (e.g., deep seated landslides, etc.) that may not be visible on traditional aerial-photographs. Mapping was generally carried out at a scale of 1:7,500.

M.1.4.3 Findings

The pipeline route crosses six physiographic regions:

- Eastern Alberta Plains
- Southern Alberta Upland
- Alberta Plateau
- Rocky Mountains
- Interior Plateau
- Coast Mountains

Each of these physiographic regions has geological characteristics that separate them from one another; as such, each region presents special challenges to pipeline construction, operations, and maintenance.

Glacial till is the most common surficial sediment identified along the route. There are lesser amounts of glaciolacustrine, glaciomarine, and colluvial deposits, rock, and organic accumulations.

The Southern Alberta Uplands and the Coast Mountains are the most susceptible to geohazards. Both areas have a number of deep-seated and shallow- to moderately-deep slides, and the Coast Mountains also has areas where rock falls occur. Both regions also have numerous areas where increased sedimentation may be expected if proper mitigation techniques are not applied.

M.1.4.4 Conclusions

The detailed analysis of the surficial geology, and existing and potential geohazards has resulted in a better understanding of the geology and terrain conditions found along the pipeline route.

M.1.5 Vegetation

M.1.5.1 Purpose

The Vegetation TDR describes baseline vegetation conditions along a 1-km-wide corridor that includes the pipeline route.

M.1.5.2 Methods

Baseline vegetation conditions in the study areas are described using Alberta Ecological Land Classification (ELC) mapping, British Columbia Terrestrial Ecosystem Mapping (TEM), field surveys from 2006 to 2009, and existing literature sources. Baseline information is provided separately for the six physiographic regions crossed by the pipeline route. Each of these has a variety of landforms, climatic conditions, elevations, local relief, and soil profile morphology.

M.1.5.3 Findings and Conclusions

The Eastern Alberta Plains Physiographic Region occupies 14% of the study area, and is dominated by anthropogenic (agriculture, rural residential) ecosystem units. Field surveys established 76 survey plots. There are no old growth forests present and wetlands cover 3%. Seven provincially rare plants were identified. There is no merchantable timber present and no regulated weeds were observed.

The Southern Alberta Uplands Physiographic Region occupies 29% of the study area, and is dominated by deciduous and mixed-wood forests. Field surveys established 623 survey plots. Old growth forests occupy 9% and wetlands occupy 7%. Twenty-four provincially rare plants were identified. Merchantable timber is estimated at 338,000 m^3. Sixteen regulated weeds were observed.

The Alberta Plateau Physiographic Region occupies 4% of the study area, and is dominated by coniferous forests. Field surveys established 95 survey plots. Old growth forests occupy 6%. Five provincially rare plants were identified. Provincially rare ecological communities occupy 12% and wetlands cover 18%. Merchantable timber is estimated at 56,989 m^3. No regulated weed species were observed.

The Rocky Mountains Physiographic Region occupies 9% of the study area, and is dominated by coniferous forests. Field surveys established 95 survey plots. Old growth forests occupy 7%. Fifteen provincially rare plant species were identified. Provincially rare ecological communities occupy 4% and wetlands cover 12%. Merchantable timber is estimated at 133,038 m^3. One regulated weed species was observed.

The Interior Plateau Physiographic Region occupies 33% of the PEAA, and is dominated by coniferous forests. Field surveys established 432 survey plots. Old growth forests occupy 6%. Thirteen provincially rare plants were identified. Provincially rare ecological communities occupy 4% and wetlands cover 9%. Merchantable timber is estimated at 664,900 m^3. Three regulated weed species were observed.

The Coast Mountains Physiographic Region occupies 10% of the study area, and is dominated by coniferous forests. Field surveys established 163 survey plots. Old growth forests occupy 13%. One provincially rare plant species was identified. Provincially rare ecological communities occupy 30% and wetlands cover 5%. Merchantable timber is estimated at 304,982 m^3. One regulated weed species was observed.

M.1.6 Wildlife Data and Field Surveys

M.1.6.1 Purpose

The Wildlife Data and Field Surveys TDR describes the survey methods and baseline conditions for the following species or species groups:

- Trumpeter Swans
- waterbirds (focusing on Trumpeter Swan, White-winged Scoter, Great Blue Heron (coastal) and Sandhill Crane)
- Northern Goshawk
- Sharp-tailed Grouse
- songbirds (focusing on Olive-sided Flycatcher, Sprague's Pipit, Cape May Warbler, Black-throated Green Warbler, Bay-breasted Warbler, Connecticut Warbler, Canada Warbler, Le Conte's Sparrow, Nelson's Sparrow and Rusty Blackbird)
- animals detected during winter tracking surveys (American marten, fisher, wolverine, grizzly bear, moose, woodland caribou, and mountain goat)
- animals detected during spring pellet surveys (woodland caribou, white-tailed deer, mule deer, elk, mountain goat, snowshoe hare, Spruce Grouse, Dusky Grouse, White-tailed Ptarmigan, Willow Ptarmigan, Rock Ptarmigan, Ruffed Grouse, and Sharp-tailed Grouse)
- pond-dwelling amphibians (northwestern salamander, long-toed salamander, tiger salamander, rough-skinned newt, Canadian toad, western toad, Pacific tree frog, boreal chorus frog, coastal tailed frog, red-legged frog, Columbia spotted frog, and wood frog)
- coastal tailed frog

M.1.6.2 Methods

For each species or species group, the TDR describes baseline investigations, field methods, and data sources for a 1-km-wide corridor including the pipeline route.

M.1.6.3 Findings

The study area contains important wildlife habitat for a wide range of species. The area from the Alberta Foothills to the continental divide is particularly important for a number of species, including woodland caribou, grizzly bears, and Trumpeter Swans. The coastal mountain range in western British Columbia, including the area in and around the Tazdli Wyiez Bin/Burnie-Shea Provincial Park, the proposed Burnie River Protected Area, and the Herd Dome Special Resource Management Area, provide important habitat for woodland caribou, grizzly bear, mountain goat, and other species.

M.1.6.4 Conclusions

Wildlife habitat can be found along much of the proposed pipeline route. Some of the most important areas are near the Alberta–British Columbia border and in western British Columbia.

M.1.7 Wildlife Habitat Modelling

M.1.7.1 Purpose

The Wildlife Habitat Modelling TDR describes the models used to support the wildlife assessment in the Project's environmental and socio-economic assessment (ESA).

M.1.7.2 Methods

Models are an important analytical tool used in the ESA to identify potential project effects on wildlife habitat availability. They were also used to identify areas along the pipeline route that may be particularly sensitive to project disturbance. The habitat modelling conducted for this TDR was based primarily on the British Columbia Wildlife Habitat Ratings Standards for expert-based wildlife habitat suitability models. Habitat suitability models have been used to quantify habitat availability for key indicator (KI) species within the project effects assessment area (PEAA). This is done for the Base Case (i.e., prior to construction), and construction and operations phases of the Project.

M.1.7.3 Findings and Conclusions

This TDR does not present model results, as these are presented and discussed in the ESA. Instead, it summarizes the habitat suitability models and ratings developed for the following wildlife KIs:

- Trumpeter Swan
- White-winged Scoter
- Sharp-tailed Grouse
- American Bittern
- Pacific Great Blue Heron
- Northern Goshawk
- Yellow Rail
- Sandhill Crane
- Western Screech-Owl
- Barred Owl
- Short-eared Owl
- Common Nighthawk
- Olive-sided Flycatcher
- Sprague's Pipit
- Cape May Warbler
- Black-throated Green Warbler
- Bay-breasted Warbler
- Connecticut Warbler
- Canada Warbler
- Le Conte's Sparrow
- Nelson's Sparrow
- Rusty Blackbird
- moose
- woodland caribou
- mountain goat
- grizzly bear
- wolverine
- American marten
- fisher
- coastal tailed frog
- pond-dwelling amphibians

M.1.8 Surface Water and Sediment Quality

M.1.8.1 Purpose

The TDR describes the baseline characteristics of surface water and sediment quality used in the environmental and socio-economic assessment (ESA). The TDR includes:

- sources for water and sediment quality information
- field programs and data collection methods
- an overview of the water quality within major basins and hydrological zones
- surface water and sediment quality along the route at watercourse crossings
- a comparison and analysis of compliance with applicable Alberta, British Columbia and federal water and sediment quality guidelines

M.1.8.2 Methods

The data were collected and presented according to the six hydrological zones crossed by the pipeline route. The zones are distinguished by a suite of characteristics including stream characteristics and flows, climate, geomorphology, ecological conditions, and land uses. The six zones are:

- Prairies (initiating station near Bruderheim)
- Foothills
- Rocky Mountains
- Central Interior
- Central Mountains
- Coastal Mountains to the Kitimat Terminal

Surface water quality and sediment data were based on a 2005 field survey and historical, mostly governmental, sources. Historical data for both British Columbia and Alberta were obtained from appropriate governmental sources and data gaps were identified. Water samples were taken at locations along the pipeline route that were identified as having experienced possible environmental effects from upstream industry or where downstream water intakes for domestic consumption exist.

M.1.8.3 Findings and Conclusions

There were no temporal or distinct spatial patterns observed with the data. Generally, higher total suspended solids (TSS) were observed in the Prairies Hydrological Zone where most of the land is cultivated, while sub-alpine areas in the other zones tended to have the lowest concentrations. Most watercourses were well oxygenated and pH was within compliance at sampled locations. The concentration of nitrogenous compounds was near or below detection in most areas, while total phosphorus often exceeded guidelines throughout all hydrological zones. Colour exceeded guidelines in many watercourses throughout the route; however, organic compounds were usually observed at concentrations below guidelines. Aluminum and iron exceedances were common in all areas. Copper and lead exceedances were common in the Coastal Mountains Hydrological Zone, while copper and zinc exceeded guidelines sporadically at some other locations.

Sediments collected as part of field programs as well as historical data displayed variable substrates throughout the route. Most common guideline exceedances were observed for aluminum, chromium, copper, iron and nickel.

M.1.9 Freshwater Fish and Fish Habitat

M.1.9.1 Purpose

The Freshwater Fish and Fish Habitat TDR provides baseline information for the ESA and also addresses information requirements under the *National Energy Board Act*.

M.1.9.2 Methods

Information necessary to meet the NEB guidelines was obtained through:

- review, analysis and interpretation of existing information on freshwater fish and fish habitat in watercourses crossed by the pipeline route
- field surveys to identify and map fish-bearing and non-fish-bearing watercourses crossed by the pipeline route, and to determine fish species, life history, and distribution, as well as habitat availability and utilization in fish-bearing watercourses
- identification of fish species of concern (e.g., federally and provincially listed at-risk species) within watercourses crossed by the pipeline route including their distribution, relative abundance, and habitat use relative to watercourse crossings.

M.1.9.3 Findings and Conclusions

The pipeline route crosses six major river drainages. In Alberta, it crosses the North Saskatchewan, Athabasca, and Peace River drainages. In British Columbia, it also crosses the Peace River drainage, along with the Fraser, Skeena and Kitimat River drainages. The route includes 1,299 mapped watercourses, of which 669 are fish-bearing.

The literature review and field programs indicate the occurrence of 58 fish species near the pipeline route, including 27 sportfish, 8 coarse-fish and 23 forage-fish. Of these, 17 are common to both the Pacific (Fraser, Skeena and Kitimat) and Arctic (North Saskatchewan, Athabasca and Peace) drainages. Sportfish such as salmonids, walleye, sturgeon, sauger and northern pike are commonly targeted by anglers. Of the 27 sportfish species known to occur along the RoW, rainbow trout, Bull trout, mountain whitefish, and burbot are common, but only rainbow trout are present in every major watershed. All five Pacific salmon species (chinook, coho, sockeye, pink and chum) and steelhead are found in the Skeena and Kitimat drainages. Chinook, sockeye and coho salmon are also present in the Fraser drainage. There are 16 fish species of conservation concern with distributions that overlap the pipeline route in Alberta. Only the lake sturgeon of the Saskatchewan River system is under consideration for *SARA* listing. Six fish species with provincial red- or blue-list status have distributions that overlap with the RoW in British Columbia. These include the red-listed Arctic grayling population in the Williston Lake watershed, the white sturgeon population in the Nechako River, as well as the blue-listed bull trout, coastal cutthroat trout, Dolly Varden and pearl dace.

TDR data regarding effect of construction timing on all life stage of fish, potential for release of a deleterious substance into the watercourse, and presence or absence of steep embankments or other erosion prone are used in the Project; ESA to assess potential effects and design mitigation measures.

M.1.10 Hydrogeology

M.1.10.1 Purpose

The Hydrogeology TDR describes the baseline hydrogeological characteristics used in the ESA to identify construction and operational measures required to limit effects on hydrogeology.

M.1.10.2 Methods

Hydrogeology information was collected and synthesized from existing literature sources and field surveys for the following key data categories:

- springs and groundwater discharge areas
- groundwater chemistry
- shallow aquifers
- groundwater users

Available literature pertaining to the area within 15 km of the pipeline right-of-way (RoW) was reviewed, along with provincial databases for groundwater wells and licensed withdrawals within 500 m of the RoW. Only shallow wells (defined as 30 m or less total depth) were reviewed in detail. Field and aerial surveys were conducted along the pipeline route where existing information was considered insufficient.

The study area was divided into five physiographic regions:

- Eastern Alberta Plains
- Southern Alberta Uplands/Alberta Plateau
- Rocky Mountains
- Interior Plateau
- Coastal Mountains

M.1.10.3 Findings and Conclusions

The most important aquifers in the Eastern Alberta Plains Physiographic Region are the Paskapoo Formation sandstones. Within 500 m of the RoW there are potentially 60 shallow water wells and one spring. Of these, 19% were in surficial deposits and 24% in bedrock; however, for most wells, the host lithology is unknown. The most common water-well uses are for domestic and stock purposes. There are 73 groundwater licences in the region, and a total licensed annual withdrawal of 80,609 m^3.

The main shallow aquifers in the Southern Alberta Uplands/Alberta Plateau Physiographic Region include recent alluvial deposits, buried valley sands, and the Paskapoo sandstone. A large potential shallow aquifer corresponds to the alluvial deposits of the Athabasca River near Whitecourt. There are approximately 16 wells and 3 springs within 500 m of the RoW. About 75% of the shallow wells in this

region are used for industrial purposes. The type of geological materials that the wells are completed in is unknown for most of the wells.

The likelihood of exploited aquifers in the Rocky Mountain Physiographic Region is negligible and no groundwater wells are reported in proximity to the RoW.

Surficial aquifers provide the majority of groundwater resources in the Interior Plateau Physiographic Region and bedrock aquifers are not generally considered as important. In the area of Fort St. James there are six classified aquifers, four of which are surficial, composed of sands and gravels, and two of which are in bedrock. The RoW passes over a classified bedrock aquifer near Burns Lake, where the only reported shallow water wells within 500 m of the RoW were identified. All wells were being used for domestic purposes. Three of the five reported springs were identified in this region.

The Coastal Mountains Physiographic Region contains a number of warm and hot springs. Seven shallow wells were identified near Kitimat within the RoW. All wells are completed in sand and gravel, and one well record shows silt as well. The average reported well yield is 218 m^3/day.

M.1.11 Hydrology

M.1.11.1 Purpose

The Hydrology TDR presents information on existing surface water resources near the pipeline right-of-way (RoW). These resources, which include watercourses, lakes and other natural surface water bodies, are directly linked with other aquatic resources, such as fisheries, water quality, and groundwater systems.

M.1.11.2 Methods

The hydrology baseline study for the Project was prepared using information generated from existing literature sources and field surveys for the following key data categories:

- mean seasonal and mean annual total flow volumes
- 1:10 and 1:100 year return period peak flows
- drought (low) flows
- freeze-up and breakup timing and average duration of ice cover
- climate data (specifically rainfall)
- channel dimensions (width, depth and gradient)
- channel bed and bank materials

M.1.11.3 Findings and Conclusions

The pipeline route will cross six distinct hydrological zones, differentiated based on topography (i.e., elevation, relief, basin gradient and drainage density) and climate (principally precipitation and temperature), and confirmed by differences in surface runoff and hydrological characteristics. The hydrological zones are (from east to west):

- Prairies

- Foothills
- Rocky Mountains
- Central Interior
- Central Mountains
- Coastal Mountains

There are approximately 800 defined watercourse crossings. The majority of these crossing sites (about 80% of all defined watercourse crossings) are streams with drainage areas of less than 10 km^2.

To assess the potential environmental effects of the Project, information regarding relevant flow-related parameters was collected during baseline investigations. The measurable hydrological parameters for this investigation included annual total flow volumes (or runoff), peak discharges, and drought (low) discharges. For selected watercourses crossed by the RoW, information was gathered on channel characteristics, including channel geometry, water levels, velocities, and total suspended sediment concentrations.

M.1.12 Non-traditional Land Use

M.1.12.1 Purpose

The non-traditional land and marine resource use (NTLU) TDR collected and analysed baseline data for use in the assessment of potential project effects on NTLU.

M.1.12.2 Methods

Baseline data for NTLU were primarily collected from government ministries and departments in Alberta and British Columbia either through online databases or directly from departmental experts. Other baseline data sources included online and published reports, legislation and agreements, land-use stakeholders (individuals and organizations), the District of Kitimat, a LiDAR survey of the Project, orthophotographs, digital elevation models, and the Kitimat Terminal engineering plot plans. The study area boundaries for the NTLU baseline study encompass the areas potentially affected by the pipelines, terminal, and by project-related shipping through confined waters between the Kitimat Terminal and Hecate Strait.

M.1.12.3 Findings and Conclusions

The pipeline right-of-way (RoW) will cross crown and private lands in Alberta and British Columbia. These lands are governed by multiple land-use plans and policies, and are used for a range of activities, including agricultural, oil and gas, commercial, government-held, and mineral interests, and a variety of other uses. In Alberta, privately-owned land along the RoW is predominantly used for agriculture, along with oil and gas activities, industry, transportation, and utilities infrastructure. In British Columbia, private lands are largely forested and used as woodlots or for other rural residential purposes. The exception is the Fort St. James area, where there is some beef farming. The RoW will pass through mountain pine beetle-infested areas in the Prince George, Fort St. James, Vanderhoof, and Nadina Forest Districts. Forestry harvesting and related activities are carried out in the RoW in 5 forest management agreement areas in Alberta, as well as in 3 tree-farm licences, 12 woodlots licences, 5 timber supply

areas, and 3 community forests in British Columbia. For both the marine and terrestrial components of the study area, there is a wide variety of uses, both consumptive (hunting, game bird hunting, trapping, recreational fishing and recreational commercial fishing etc.) and non-consumptive (wildlife viewing, sailing, snowmobiling, skiing, eco-touring, mountaineering, hiking, camping, canoeing, kayaking, rafting, leisure boating, mountain biking, diving etc.). The parks, protected areas, and recreation areas in the study area are destinations for British Columbia residents and non-residents from Canada and abroad.

M.2 Marine TDRS (in support of Volumes 6B and 8B)

M.2.1 Marine Fish and Fish Habitat

M.2.1.1 Purpose

The Marine Fish and Fish Habitat TDR describes the baseline characteristics of the biophysical elements of marine fish and fish habitat within a 150-m zone seaward of the berth structures, in the local marine area in Kitimat Arm and the the confined waters along the proposed shipping route between the Kitimat Terminal and Hecate Strait. For consistency with the Marine Fish and Fish Habitat section of the ESA, these study areas are referred to as the project development area (PDA), the project effects assessment area (PEAA) and the confined channel assessment area (CCAA), respectively.

M.2.1.2 Methods

Data and information were accessed from peer reviewed literature, electronic resources, agency literature, and through personal communication with government and academic professionals. Field surveys were completed between 2005 and 2009. Surveys involved a boat-based reconnaissance, transect and quadrate surveys, qualitative and quantitative sub-tidal surveys, marine sediment and water quality analysis, benthic invertebrate sampling, nearshore fish and crab surveys, and a circulation and sediment model to compute the total suspended sediment (TSS) concentrations and deposition potentially resulting from dredging activity at the Kitimat terminal.

M.2.1.3 Findings and Conclusions

Rocky shores dominate the intertidal habitat, accounting for 39% of the total shoreline of the PEAA and 76% of the CCAA shoreline. Estuarine shorelines with mud flats and marsh habitats compose 15% of total shoreline in the PEAA and 4% of the CCAA shoreline. The subtidal areas are dominated by sand and mud habitats, but predominantly mud (silt and clay). Subtidal substrate in the PDA consists largely of silt veneer over bedrock. The depth of veneer varies from less than 1 cm in steeper areas to depths great enough to support a number of burrowing infauna.

Rockweed and sea lettuce are the dominant macrophytes in the intertidal zone. Barnacles, mussels, periwinkles and limpets are the dominant fauna. Sea urchins, moon snails, sea stars and the California sea cucumber make up the benthic community. Estuaries may contain eelgrass, which provides important habitat for juvenile fish, forage fish and a variety of invertebrates such as Dungeness crab. These soft bottom areas also contain commercially harvested bivalves such as butter clams and heart cockles.

Information synthesized from existing literature sources, and field surveys indicate that marine habitat and species assemblages in the study area are typical of the North Coast Fjord ecosection. There is relatively low species diversity and no unique or sensitive species, populations, or habitat were observed.

M.2.2 Marine Mammals

M.2.2.1 Purpose

The Marine Mammals TDR presents the baseline study on marine mammal species likely to be found in the confined waters along the proposed shipping route between the Kitimat Terminal and Hecate Strait (referred to as the confined channel assessment area [CCAA] for consistency with the ESA) and their general areas of concentration.

M.2.2.2 Methods

Review of existing data included a search of available peer-reviewed literature, grey literature, and government reports. In addition, marine mammal experts from Fisheries and Oceans Canada, environmental non-governmental organizations, and the University of British Columbia were contacted for information on recent marine mammal data for the study area.

Aerial surveys for marine mammals were completed in August 2005 and May 2006. Surveys were performed from a float plane travelling in a semi-random zigzag. Biologists documented all factors that influenced survey effort including sun glare, sea state, weather and reduced field of view (due to restricted channels). Information on species, behaviour, and group composition was recorded.

Vessel-based surveys were completed in February, April, June and September 2009. Surveys covered the CCAA as systematically as possible to reduce repeat detection of individuals. Biologists conducted continuous observations with both naked eye and binoculars. Environmental conditions were recorded hourly. Information on species, behaviour, and number of individuals was recorded.

Public consultation interviews were conducted in Kitamaat Village, on the east side of Kitimat Arm, home to the Haisla Nation and an active fishing area with two marinas.

M.2.2.3 Findings and Conclusions

Integration of available information on species presence and data collected during field surveys indicates that harbour seals, Steller sea lions, Dall's porpoises, harbour porpoises, Pacific white-sided dolphins, killer whales, and humpback whales frequent the CCAA. Fin whales, and possibly grey and minke whales, may occasionally occur, but are less common. The number of sightings and diversity of species is typically higher in the outer (western) regions than in the more confined (eastern) regions. Squally Channel had consistently high numbers of sightings for all surveys, while Estevan Sound, Browning Entrance, and Douglas Channel had consistently low numbers of sightings.

Information from public consultation suggests that the humpback whale is the most commonly-observed marine mammal in the study area; they have increased in abundance over recent years and they seem to travel further up the channels. Killer whales are also encountered, but less commonly than humpback whales. Seals, porpoises and sea lions are generally seen year-round.

Available information and expert opinion on marine mammals in the area was largely consistent with findings from Project field studies, increasing the confidence relating to species presence in the CCAA.

M.2.3 Marine Birds

M.2.3.1 Purpose

The Marine Birds TDR presents data on baseline conditions to assist in identifying measures required to avoid potential effects on marine birds and their habitats during Project construction and operations. Marine birds (or seabirds) are bird species that depend on nearshore and offshore aquatic habitats during a portion of their life cycle.

M.2.3.2 Methods

The TDR study area includes the area from the head of Kitimat Arm, south to Emsley Point and Coste Point (defined as the project effects assessment area [PEAA] in the ESA) and the confined waters along the proposed shipping route between the Kitimat Terminal and Hecate Strait (defined as the confined channel assessment area [CCAA] in the ESA.

Data collection methods, following established protocols included:

- vessel reconnaissance surveys
- fixed-wing aircraft reconnaissance surveys
- terrestrial-based surveys
- radar surveys

Vessel and aerial reconnaissance surveys were used to identify the distribution and relative abundance of seasonally occurring and resident marine birds along shorelines and in open waters of the PEAA and CCAA. Terrestrial-based stationary count surveys were used to determine marine bird occurrence along shorelines and over open ocean. Radar surveys were used to estimate the number and local habitat usage of Marbled Murrelets (a threatened species) in the PEAA and CCAA.

Data were collected for:

- loons and grebes
- albatrosses, fulmars, shearwaters and storm-petrels
- cormorants
- waders
- geese and swans
- diving ducks
- dabbling ducks
- coastal raptors
- shorebirds
- gulls, jaegers, skuas and terns
- alcids
- kingfishers

M.2.3.3 Findings and Conclusions

All species were observed throughout the PEAA and CCAA, although larger concentrations were found in shallow waters and in highly productive estuaries (e.g., inlets and sheltered bays), and their relative abundance varies by season. Higher numbers of birds are present during the spring migratory period. During this time most birds can be found in shallow protected waters and estuaries. These areas are also important for wintering birds and for colonial nesting seabirds conducting foraging trips. The number of marine birds that occur in the PEAA and CCAA represents a small proportion of regional marine bird populations.

M.2.4 Marine Fisheries

M.2.4.1 Purpose

The Marine Fisheries TDR presents baseline conditions for commercial fisheries, food, social, and ceremonial (FSC) fisheries, recreational fisheries, and commercial-recreational fisheries to assist in identifying measures required to mitigate effects during project construction and operations.

The TDR also provides management and regulatory specifications for aspects of each component fishery such as fishery opening times, area closures, total allowable catches, and permitted gear methods.

M.2.4.2 Methods

For technical data analysis and presentation purposes, the study area encompassed the entirety of Fisheries Management Areas (FMAs) 5 and 6.

Data were collected from existing literature and electronic resources. Interviews with local commercial and FSC fishers, and charter and lodge operators provided an overview of various fishing aspects (e.g., species caught, seasonality, methods used, areas fished and historical trends). Commercial, recreational and a limited amount of FSC data were obtained from the DFO Statistical Service Unit to provide information on species harvested, landings weights, values, location within fisheries management areas/subareas, gear types used, number of fishing vessels, and species targeted for the years between 1998 and 2008. Data availability varied depending on the specific fishery.

M.2.4.3 Findings and Conclusions

Species groups harvested in the study area include Pacific salmon, Pacific halibut, groundfish, Pacific herring (food and bait, spawn on kelp, and roe fisheries), geoduck clam, horse clam, shrimp, prawn, Dungeness crab, octopus, sea cucumber, and red sea urchin. All of these species are harvested by commercial fishers throughout the study area. Commercial-recreational and recreational fishers more commonly target prize species such as chinook and to a lesser extent chum and pink salmon, as well as Pacific halibut, rockfish species, crab, and prawn. FSC fishers harvest marine species for subsistence and cultural reasons and often use traditional fishing methods. Additional species harvested by FSC fishers include eulachon and seaweeds. Data for FSC fisheries were limited.

Marine fisheries activities are dependent on the seasonality of the species that are harvested. Target fisheries may be open for only a few months (e.g., salmon) or year-round (e.g., groundfish). Fishing

activity was reported to occur throughout the study area, with some areas more heavily harvested than others depending on habitat quality and species considered. Commercial and commercial-recreational fisheries are present in FMA 5 and 6 for economic and employment gain, while FSC fisheries are present for subsistence and ceremonial reasons. Recreational fisheries attract fishers from all over Canada and internationally. All fisheries are managed by Fisheries and Oceans Canada (DFO) regulations.

M.2.5 Marine Acoustics (2006)

M.2.5.1 Purpose

The Marine Acoustics (2006) Technical Data Report presents data and model results to predict noise levels and the extent of underwater ensonification that will be produced during berthing operations at the Kitimat Terminal and during project-related marine traffic in the confined waters along the proposed shipping route between the Kitimat Terminal and Hecate Strait (the confined channel assessment area [CCAA] in the ESA).

M.2.5.2 Methods

Field studies were conducted at four sites along existing tanker shipping routes in the CCAA. The sites at Principe Channel, Caamaño Sound, Wright Sound, and Douglas Channel at Emsley Creek Estuary were chosen based on their physical properties (bathymetry, channel width, and proximity to areas of particular sensitivity), to provide a representative sample of the different acoustic environments along the proposed shipping routes. Ambient noise and transmission loss measurements were taken to provide ground-truthing of acoustic models. Biological sounds, including marine mammal vocalizations, were also recorded to determine if they overlap with the sound frequencies produced by tanker and tug traffic.

A brief literature review of the Geological Survey of Canada study papers describing the Douglas Channel geomorphology was conducted. The sediment descriptions from those studies were used to characterize the geoacoustic properties of sediments in the channels of the Kitimat fjord system, and to ascribe geoacoustic parameters to the acoustic models.

Acoustic modelling was done to show the underwater sound pressure level (SPL) distributions for seven examples, three representing operations associated with the marine terminal (dredging, berthing, and a tanker on standby) and four with project-related tanker and tug traffic in the CCAA (at the four sites surveyed above). Audiogram weighting were used to predict project-related sound levels that might exceed the hearing thresholds of various fish and marine mammal species to determine whether project-introduced underwater sounds would be detectable by various marine species in the CCAA.

M.2.5.3 Findings and Conclusions

Across the seven different examples modelled, SPLs attenuated to 120 dB re 1 µPa at a distance of 1 to 20 km from a tanker. SPLs of 120 dB are considered the threshold value for behavioural change in cetaceans (whales and dolphins) according to the National Marine Fisheries Service. The smallest area of ensonification resulted from the model of a tanker on standby at the Kitimat Terminal; sound levels attenuated to 120 dB about 1 km from the tanker. Sound levels from a tanker and one escort tug transiting Caamaño Sound travelled the furthest, only attenuating to 120dB 20 km from the VLCC.

M.2.6 Marine Acoustics (2010)

M.2.6.1 Purpose

The Marine Acoustics (2010) Technical Data Report presents model predictions of noise levels and the extent of underwater ensonification that will be produced by a tanker and tug traffic in the open water area (OWA). The OWA comprises the open waters of Hecate Strait and the proposed shipping routes within the 12 nautical mile limit of the Territorial Sea of Canada.

M.2.6.2 Methods

The Marine Acoustics TDR (2010) employed the same acoustic modelling and vessel source levels that were used in the Marine Acoustics (2006) TDR, modelled four new locations and did not perform on-site measurements or audiogram weighting. The four locations selected for modelling in the OWA were Langara Island, Triple Island, Browning Entrance, and Cape St. James.

M.2.6.3 Findings and Conclusions

Across the four examples modelled, sound pressure levels (SPLs) attenuated to 120 dB re 1 µPa at a distance of 6.7 to 11.6 km from the tanker. The smallest area of ensonification was for a transiting VLCC at Langara Island. At this location, SPLs attenuated to 120 dB at 6.7 km from the VLCC. SPLs of 120 dB are considered the threshold value for behavioural change in cetaceans (whales and dolphins), according to the National Marine Fisheries Service. The largest area of ensonification was for a transiting tanker with escort tug at Browning Entrance, with sound levels only attenuating to 120 dB 11.6 km from the tanker.

M.2.7 Marine Physical Environment

M.2.7.1 Purpose

The Marine Physical Environment TDR characterizes the meteorology and oceanography of the confined waters along the proposed shipping route between the Kitimat Terminal and Hecate Strait (the confined channel assessment area [CCAA] in the ESA). This information has been used to:

- assess the potential effects of the proposed Project on the marine biophysical and human environments
- to better understand the potential behaviour of hydrocarbons in the marine environment
- inform emergency response planning in the unlikely event of a spill

M.2.7.2 Methods

Data were gathered for key subject areas through literature review and field surveys. Meteorological data were obtained mainly from Environment Canada and climatology summaries and reports from the International Panel on Climate Change (IPCC). In 2005, 2006, and 2007, ocean currents, water levels, and wave heights were measured at several locations in the CCAA. Temperature and salinity profiles, and underwater acoustic measurements were also collected.

M.2.7.3 Findings and Conclusions

At its seaward limit, the CCAA is dominated by the Pacific marine climate. At its landward limit, the temperatures exhibit a greater range, reflecting the increased influence of a continental climate. The wind speeds on the open coast of eastern Hecate Strait are considerably greater than those over the inland waters and exhibit a distinct seasonal pattern, with the highest wind speeds occurring in fall and winter. From October to April, the prevailing wind direction is from the north whereas the dominant wind directions from May to September are from the south to southwest. The air temperatures in the CCAA reflect a transition from the Pacific Ocean air masses of the Hecate Strait marine climate region through the inland waters that traverse the Coast Mountains zone. In winter, the warm, moist marine conditions to the west are paralleled by very wet and mild conditions in the inland waters, accompanied by increased snowfall amounts at higher elevations and with distance to the east. Large amounts of precipitation occur in the CCAA because of the mild, moist marine climate. Precipitation occurs mostly in the form of rainfall, with snowfall amounts being very low at the seaward edge of the CCAA. However, at inland locations, where the air temperatures are consistently cooler in fall and winter, the amount of snowfall increases considerably. Most of the interannual variability in temperatures occurs over periods of one to seven years, possibly related to El Niño or La Niña, or similar effects.

The ocean currents in the CCAA have typical flow speeds of about 15 to 30 cm/s at the surface. The subsurface currents below the main halocline at water depths exceeding 75 to 100 m typically average between 3 and 20 cm/s. The tidal currents exhibit a considerable degree of variability with location and with measurement depth. Apart from a few photographs, there is no direct evidence of river plumes in the CCAA.

In the Principe Channel, the outer southern waterways and southern Douglas Channel, the freshwater contribution from direct precipitation is comparable to or even greater than the river discharge values. For the more inland waterways, the river discharge contribution is much greater than direct precipitation. Year-to-year variations in total freshwater discharge are considerable.

The temperature and salinity profiles in the CCAA consistently reveal distinct upper layers ranging from a few metres to 10 to 15 m depth, characterized by much-reduced salinities compared to the underlying deeper waters. From late spring through the fall months, the salinities are much lower than those at depth, resulting in a large density gradient between the upper layers and the remainder of the water columns.

Surge levels are usually greater along the eastern side of Hecate Strait than on the western side. Tides along the British Columbia central coast are classified as mixed, mainly semi-diurnal (two highs and two lows for each 24.75 hour day, with successive highs or lows of unequal height). The spring tidal range at Kitimat is 6.5 m, reducing to about 3 m during neap tides. The tide in the CCAA is driven by the tide in Hecate Strait, but is modified by the network of channels and inlets. The tidal range increases with northward distance along the coast of the region and also from the mouth to the head of the inlet system. The British Columbia coast is susceptible to submarine earthquakes, and submarine landslides and related tsunamis have been recorded along this coast. Funnelling effects can increase wave height as a tsunami penetrates up the inlet.

Generally, near-surface oxygen concentrations are at or above saturation, and deep-water concentrations are below saturation. Anoxic conditions are rare, but have been observed in the deeper water of Minette

Bay, at the head of Kitimat Arm. Oxygen concentration maxima, with supersaturated values, have been observed beneath the halocline in Douglas Channel and are attributed to production by phytoplankton. The deep water in the basins is renewed regularly. Within the inlets and fjords, surface pH is usually high, except in the presence of low pH (acidic) runoff. There can be considerable variance in surface turbidity.

M.2.8 Marine Ecological Risk Assessment for Kitimat Terminal Operations

M.2.8.1 Purpose

This TDR evaluates the likelihood of adverse ecological effects occurring as a result of exposure to one or more ecological stressors, identified as chemicals of potential concern (COPC). The results are used as inputs into the Human Health Risk TDR. The analysis is based on known project details during operations and during routine activities.

M.2.8.2 Methods

Samples of diluted bitumen and synthetic oil supplied by Northern Gateway so that their chemcial constituents could be identified. As a result of those analyses, COPCs were identifed for inclusion in the risk assessment. Also included were chemicals likely to be released as air emissions. The receiving environment of air, water and sediment were modelled for the deposition and movement of the COPCs throughout the Kitimat Arm area. The following biological receptors were identified and for which risks were estimated:

- marine algae exposed in water
- invertebrates and fish exposed in sediment
- fish and invertebrates exposed in water
- Bald Eagle feeding on exposed prey at the water surface
- Marbled Murrelet feeding on exposed small fish and invertebrates at the water surface
- Spotted Sandpiper feeding on esxposed invertebrates on mud flats and salt marsh sediments
- Surf Scoter feeding on exposed invertebrates in the intertidal zone
- coastal-dwelling exposed mink feeding on fish
- harbour porpoise feeding on exposed fish and invertebrates in water
- Steller sea lion feeding on exposed fish and invertebrates in the intertidal areas

Exposures are modelled for a 50 year period.

M.2.8.3 Findings and Conclusions

The magnitude of effects for water and sediment are generally rated as negligible or low for the current situation, during project operations and for project operations considered along with other industrial atmospheric emissions and liquid effluents. The only exceptions occurred for the current situation, where benzo(b)fluoranthene (a polycyclic aromatic hydrocarbon) and the trace elements barium, manganese and

zinc were found to be present in water at concentrations that could cause moderate effects on aquatic community receptors such as fish and plankton.

The contribution of project-related emissions and liquid effluent discharge to the total emissions and discharges from all industries is below the level of detection

For avian and mammalian species, all risks are calculated to be below thresholds for adverse effects.

M.2.9 Human Health Risk Assessment

M.2.9.1 Purpose

Issues addressed in the Human Health Risk Assessment TDR include risk from exposure to chemicals in soil, air, and surface water; and from consuming local vegetation, wild game, fish, and aquatic wildlife.

M.2.9.2 Methods

Risk assessment methodology was used to develop a comprehensive understanding of the flow of hazards from potential project sources of risk via environmental pathways to sensitive end-point receptors. The risk assessment presented in this TDR is based on the prescriptive protocols outlined by the Canadian Council of Ministers of the Environment, Health Canada, and the US EPA. Additional guidance for the risk assessment was provided by discussions with Alberta Health and Wellness.

M.2.9.3 Findings and Conclusions

Acute health effects from marine terminal operations are evaluated by comparing the predicted 1-hour and 24-hour air concentrations to the ambient air quality objectives. Since all predicted air concentrations were below the air quality criteria, the derived Hazard Quotient (HQ) values were also less than 1.0 for all assessed chemicals at all receptor locations.

Chronic exposures from terminal operations are evaluated based on predicted annual average-maximum ambient air concentrations for the receptor locations. Exposure to particulate matter has been associated with respiratory and cardiovascular health problems. Using the “SUM25” and “SUM15” methods, all receptor locations were found to have negligible risks under the Application (Project-effect) scenarios for mortality, respiratory and cardiac hospital admissions due to particulate matter exposures.

Chronic health effects associated with traditional food consumption exposure pathways were evaluated by a total HQ or Incremental Lifetime Cancer Risk (ILCR) value. Bioaccumulation modelling determined point of exposure concentrations of the chemicals in sediments, fish, shellfish and seaweed.

For marine terminal operations, the acute and chronic health risks are not expected to increase as a result of project operations. Although development of the Project is expected to increase the release of chemicals in the environment, the risk estimate values indicate that such emissions or releases are expected to be negligible and will not increase the health risks for people in the area.

Exposure of human receptors to chemicals of potential concern (CoPC) emissions from pipeline operations and terminal decommissioning are expected to be minor, and largely mitigated by management techniques and plans, particularly considering the use of electric-powered pump stations.

M.3 Risk TDRs (in support of Volumes 7B, 8B and 8C)

M.3.1 River Control Points for Oil Spill Response

M.3.1.1 Purpose

The River Control Points for Oil Spill Response TDR describes the steps taken to develop oil spill response (OSR) tactics for identified control points on selected watercourse crossings. The TDR will form the basis for subsequent field studies and OSR planning for all sensitive watercourses along the pipeline right-of-way (RoW). Control points are used to identify pre-planned locations where spill responders can safely and effectively deploy OSR equipment to intercept and limit downstream movement of oil. One or more control points may be implemented, depending on the specific conditions at the time of a spill.

M.3.1.2 Methods

The study area for control points on rivers spans the length of the pipeline route from Bruderheim to Kitimat. Key watercourses crossed by the pipeline RoW were determined for Alberta and British Columbia. Ten target rivers and four possible alternatives were identified for the field program.

Information used to characterize the rivers and streams was obtained primarily during project fieldwork. River control point mapping surveys were carried out in 2005 (aerial video survey) and 2009 (ground survey for Crooked River and Hunter Creek-Kitimat River). Aerial video surveys included the collection of low-altitude aerial videotape coverage and accompanying voice commentary from approximately 5 km upstream to between 10 and 20 km downstream of watercourse crossings. Ground-truth surveys involved visual site inspections, photography, site assessment, and flow-velocity measurements.

Control points were identified by the aerial-survey team based on access points, distances downstream from watercourse crossings, and river characteristics. Tactics sheets were prepared for at least two preferred control point options for each river; and contained a site database report, location maps, aerial and ground photos, and oil spill response objectives and strategies. Control point selection followed general guiding principles used for spill response planning on other Enbridge pipeline routes.

M.3.1.3 Findings and Conclusions

The aerial video and voice commentary provided the basis for a watercourse crossing database and for OSR tactics sheets. Results of the ground-truth surveys have been added to the rivers OSR database and incorporated into control-point tactics sheets. Survey team comments, potential control-points identified during aerial surveys, and control-point information are tabulated in the TDR.

Recommended additional surveys and tasks considered necessary for oil spill response planning and readiness prior to start-up of pipeline operations include ground-truth surveys at all potential control-points for site characterization and verification of suitability; identification of locations that can be used to assess water levels; comparison of potential CPs with updated pipeline routing to identify data gaps in existing aerial surveys; prioritization of watercourse crossings for aerial video surveys and preliminary selection of CPs; and workshops to obtain feedback from participating Aboriginal groups and local

stakeholders with respect to site suitability, access limitations, land ownership, and information on environmental sensitivities.

M.3.2 Wind Observations in Douglas Channel, Squally Channel, and Caamaño Sound

M.3.2.1 Purpose

The Wind Observations in Douglas Channel, Squally Channel, and Caamaño Sound TDR presents the meteorological data used to validate and increase the accuracy of a kinematic wind model for the confined waters along the proposed shipping route between the Kitimat Terminal and Hecate Strait, referred to as the confined channel assessment area (CCAA). The kinematic wind model is used to better understand the behaviour of hydrocarbons, and in the unlikely event of a spill, will help direct spill response planning.

M.3.2.2 Methods

The data collected are from weather stations operated by government agencies (Environment Canada, Fisheries and Oceans Canada and the Ministry of Environment), as well as from those installed in September 2005 and January 2006 as part of data collection for the Project. Data collection by the project meteorological stations is ongoing.

M.3.2.3 Findings and Conclusions

A transition zone exists between Douglas Channel and Hecate Strait where the wind flows from these two areas meet. The wind regimes in these areas (an inflow/outflow system in Douglas Channel and a large-scale flow field in Hecate Strait) differ in the timing of their respective seasonal transitions, making wind flow predictions in this zone challenging. The inclusion of the data collected specifically for the Project improved wind-flow predictions.

M.3.3 Weather and Oceanographic Conditions at Sites in the CCAA and in Queen Charlotte Sound, Hecate Strait, and Dixon Entrance

M.3.3.1 Purpose

This TDR provides weather and ocean conditions (i.e., winds, waves, visibility and surface currents) for the five following locations near the confined waters along the proposed shipping route between the Kitimat Terminal and Hecate Strait (confined channel assessment area [CCAA]):

- Queen Charlotte Sound, outside the CCAA at Shoal Patch (near Triangle Island)
- Dixon Entrance, outside the CCAA at Celestial Shoal
- Hecate Strait, outside the CCAA at North Danger Rocks
- South Hecate Strait, outside the CCAA at the entrance to Hecate Strait from Queen Charlotte Sound
- Nanakwa Shoal, in the CCAA at the southwest extent of Kitimat Arm

Data presented in the TDR are intended for use in developing oil spill counter-measures in the unlikely event of an oil spill. Data were also collected and analyzed for use in assessing conditions for meeting and boarding large tankers near the entrances to the CCAA.

M.3.3.2 Methods

Meteorological and wave source data were obtained from publicly available Environment Canada data sets. Ocean current data were obtained from the Fisheries and Oceans Canada. For each measurement site, statistics showing magnitude, frequency, direction and exceedance, where appropriate, were determined for winds (mean and gust wind speeds), wind wave, swell wave, combined wind wave/swell, visibility, fog, and sea surface currents. Statistics for weather and ocean conditions in the CCAA and surrounding area are presented in tabular and graph form.

M.3.3.3 Findings and Conclusions

Ocean wave heights are small at Nanakwa Shoal and considerably larger at the other four sites. Wave heights exceeding 4 m occur nearly 18% of the time in Queen Charlotte Sound and much less frequently in South Hecate Strait (7%), North Hecate Strait (3%) and Dixon Entrance (2%). At Nanakwa Shoal, the largest measured significant wave height is only 2.3 m.

The largest wind speeds occur in Hecate Strait and Queen Charlotte Sound, with somewhat smaller values in Dixon Entrance. The largest near-surface ocean currents are found in Dixon Entrance. In Hecate Strait they are smaller, and in Queen Charlotte Sound they are smaller still.

Reduced visibility conditions exhibit a seasonal pattern, with the poorest visibility in August and September, and improved visibility in the spring. Eastern Dixon Entrance and western Hecate Strait have the most favourable visibility conditions. Visibility is more often reduced in eastern Hecate Strait and shows the greatest reduction in Queen Charlotte Sound at the Cape Scott and Cape St. James weather stations.

M.3.4 Coastal Operations and Sensitivity Mapping for the CCAA

M.3.4.1 Purpose

The Coastal Operations and Sensitivity Mapping for the CCAA TDR describes the baseline biophysical (sensitivity) and operational characteristics of the confined waters along the proposed shipping route between the Kitimat Terminal and Hecate Strait (the confined channel assessment area [CCAA]) that are important for spill response consideration.

M.3.4.2 Methods

The Government of British Columbia has developed oil spill sensitivity atlases for Southern Georgia Strait and West Vancouver Island. The atlas Northern Gateway developed for the Project generally follows the British Columbia Government's approach in terms of content and format. The atlas the following information was collected and presented in a series of maps for the CCAA:

- shoreline sensitivity (e.g., areas of ecological importance or importance to Aboriginal groups)

- coastal operations (e.g., locations of airports, boat launches and anchorages)
- shoreline types (e.g., mud, sand and rock)

Key categories on the coastal operations maps included boat ramps, marinas and anchorages, airports and heliports, wharves, dolphins and piers, shoreline substrate, oil residency, fish processors, nearshore bathymetry, and log rafting and dump areas.

Key categories on the sensitivity maps included anadromous fish streams, coastal biophysical characteristics, herring spawning areas, hatcheries, shellfish aquaculture sites, shorebird concentration areas, coastal areas used by Aboriginal groups, parks, ecological reserves, marine protected areas, rock fish conservation areas, finfish concentration areas, marine mammal haul-out and concentration areas (harbour seals), and long-term oil residency.

The atlas's shoreline and coastal information was compiled from public databases, reports, and other studies (e.g., for fisheries and marine mammals). The shoreline data maintained by the British Columbia Integrated Land Management Bureau (ILMB) formed the foundation for most of the atlas's database.

A preliminary field survey was conducted from small vessels September 7 through 18, 2005. The surveyed area encompassed Kitimat Arm, Douglas Channel, and Principe Channel. The survey resulted in additional information on area sensitivities and operations considerations for oil spill response planning, as well as time requirements for shoreline ground-truthing of the data. Verification of all data by shoreline ground-truthing is proposed in collaboration with participating local Aboriginal groups.

M.3.4.3 Findings and Conclusions

The CCAA encompasses approximately 3,500 km of shoreline. The predominant shoreline type in the CCAA is rock with gravel beach (29%), followed by rock, sand and gravel beaches (25%), and rock cliff (21%).

M.3.5 Coastal Operations and Sensitivity Mapping for the Open Water Area

M.3.5.1 Purpose

The Open Water Area's (OWA) TDR describes broad-scale baseline biophysical (sensitivity) and operational characteristics that are are important to consider for spill response. The OWA is defined as Hecate Strait and the Project's proposed shipping routes within the 12 nautical mile limit of the Territorial Sea of Canada.

M.3.5.2 Methods

The Government of British Columbia has developed oil spill sensitivity atlases for Southern Georgia Strait and West Vancouver Island. The atlas developed for the Project generally follows the Government's approach in terms of content and format. The following information was collected and presented in a series of maps for the OWA:

- shoreline sensitivity (e.g., areas of ecological importance or importance to Aboriginal groups)

- coastal operations (e.g., locations of airports, boat launches and anchorages)
- shoreline types (e.g., mud, sand and rock)

Key categories on operations maps included boat ramps, marinas and anchorages, airports and heliports, wharves, dolphins and piers, shoreline substrate, oil residency, fish processors, nearshore bathymetry, and log rafting and dump areas.

Key categories included on sensitivity maps are anadromous fish streams, coastal biophysical characteristics, herring spawning areas, hatcheries, shellfish aquaculture sites, shorebird concentration areas, coastal areas used by Aboriginal groups, parks, ecological reserves, marine protected areas, rock fish conservation areas, finfish concentration areas, marine mammal haul-out and concentration areas (harbour seals), and long-term oil residency.

The atlas's shoreline and coastal information was compiled from public databases, reports, and other studies (e.g., for fisheries and marine mammals). The shoreline data maintained by the British Columbia Integrated Land Management Bureau (ILMB) formed the foundation for most of the atlas's database. Verification of data (shoreline ground-truthing) may be proposed for portions of the OWA in collaboration with participating local Aboriginal groups.

M.3.5.3 Findings

The OWA encompasses approximately 15,000 km of shoreline. The predominant shoreline type in the OWA is rock cliff (31%), followed by rock with gravel beach (22%), and rock, sand and gravel beach (14%). Together, these types form more than two thirds (68%) of the shoreline in the area.

M.3.6 Properties and Fate of Hydrocarbons from Hypothetical Spills at Three Sites in the Open Water Area

M.3.6.1 Purpose

This TDR investigates the possible behaviour of hydrocarbons (oil and condensate) spilled in the open water area (OWA), Hecate Strait and the proposed project shipping routes that are within the 12 nautical mile limit of the Territorial Sea of Canada, from project-related inbound and outbound vessels. The objective was to complete fate modelling for a representative range of hydrocarbon types at two illustrative OWA sites, the results of which will be used for spill response planning purposes.

M.3.6.2 Methods

Butterworth Rocks and Ness Rock were selected as representative open-water sites for investigation of potential hydrocarbon spills. Condensate (CRW), synthetic oil (SYN) and diluted bitumen (MKH) were the three hydrocarbons modelled. CRW is a condensate that will evaporate and disperse quickly once spilled. SYN is light oil, but will evaporate and disperse at a slower rate than the CRW condensate. MKH is a persistent oil that will form a water-in-oil emulsion that is slow to evaporate and disperse.

Time series were developed for representative wind speeds, and air and water temperatures for each example spill location and season modelled. The winds used in the initial detailed oil-fate modelling are

representative of a moderate breeze (force 4). Additional modeling for a calmer wind set (force 3) was also conducted for Butterworth Rocks.

M.3.6.3 Findings and Conclusions

There are differences in spill behaviour between sites and seasons. Of the three hydrocarbons analyzed, only MKH (a diluted bitumen) is likely to emulsify and, if so, would attain high viscosities and densities. It is unlikely to sink in a marine environment, but would be easily over-washed by water. About 80% of the oil from a MKH spill would be on the surface after 120 hours under October conditions at the Butterworth Rocks site. The CRW (a condensate) would completely evaporate and disperse after about a five-hour exposure. The SYN (a synthetic oil) would survive on the surface for about 44 hours with 24% of the oil evaporating and 76% dispersing over this time. None of the oils will reach pour points where the oil will be semi-solid at ambient temperatures.

Additional modelling for Butterwork Rocks (force 3 breeze) in the case of a SYN spill indicates that oil released on day one would persist on the surface for a maximum of five days while the oil released in subsequent days would survive for a maximum of four days. Instantaneous releases of 50 m^3, 200 m^3 and 10,000 m^3 are modelled, and simulation results show only minor differences in the fate of the 50 and 200 m^3 spills; whereas, the 10,000 m^3 spill would disperse more slowly and would remain on the surface for a longer time.

M.3.7 Properties and Fate of Hydrocarbons from Hypothetical Spills in the Confined Channel Assessment Area and at the Marine Terminal

M.3.7.1 Purpose

This TDR investigated the possible behaviour of oil and condensate spills within the confined channel assessment area the confined waters along the proposed shipping route between the Kitimat Terminal and Hecate Strait (confined channel assessment area [CCAA]) for oil spill response planning purposes. The objectives of this study were to:

- conduct simulated oil-spill-weathering laboratory experiments for a range of hydrocarbons considered representative of those that will be part of the Project
- complete oil-fate modelling for these oils in the four spill examples developed for the CCAA (Kitimat Terminal, Emilia Island, Principe Channel, Wright Sound)

M.3.7.2 Methods

The following hydrocarbons were selected for this study:

- Syncrude synthetic light oil (SYN)
- CRW condensate (CRW)
- Cold Lake bitumen diluted with condensate (CLB)
- MacKay River heavy bitumen diluted with Suncor synthetic light oil (MKH)

A wind tunnel was used to determine the evaporative characteristics of the selected hydrocarbons, and to prepare weathered samples for physical property analysis. The fresh and weathered samples were then analyzed for physical properties, including density, viscosity, interfacial tension, pour point, flash point, emulsion formation tendency and stability, and oil adhesion.

Fate modelling was conducted for hydrocarbons under prevailing environmental conditions for the four spill examples in the CCAA. A representative average wind speed, and air and water temperatures for each spill location and season is modelled.

M.3.7.3 Findings and Conclusions

After wind tunnel simulation of three to four hours at sea, about 24% of the SYN, 57% of the CRW, 14% of the CLB, and 9% of the MKH evaporated. After a simulation of one day at sea about 30% SYN, 75% CRW, 17% CLB, and 13% MKH evaporated. SYN, CRW and CLB likely would not form stable emulsions even in cold water conditions. MKH would likely form stable emulsions when fresh and slightly weathered.

In general terms, CRW will evaporate and disperse quickly once spilled. SYN is light, but would evaporate and disperse at a slower rate than the CRW. MKH and CLB are persistent oils that would likely form water-in-oil emulsions that are slow to evaporate and disperse. Fate model results for the specific hypothetical spill examples in the CCAA are provided in tabular and graphical form in the TDR.