Prince Rupert
Gas Transmission Project

Project Description

PRGT4776-TC-EN-SD-0001

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ACRONYMS AND ABBREVIATIONS

AIA	Archaeological Impact Assessment
AIR	Application Information Requirements
ALR	Agricultural Land Reserve
AT	Alpine Tundra
BC	British Columbia
BC EAO	British Columbia Environmental Assessment Office
BC OGC	British Columbia Oil & Gas Commission
BGC	biogeoclimatic
BWBS	Boreal white and black spruce
CEAA	*Canadian Environmental Assessment Act, 2012*
CSA	Canadian Standards Association
WH	Coastal Western Hemlock
FO	Fisheries and Oceans Canada
ESCIA	Economic, Social and Cultural Impact Assessment
EAC	Environmental Assessment Certificate
ESSF	Engelmann spruce-subapline fir
HDD	horizontal directional drill
IBA	Important Bird Area
km	kilometre
KP	kilometre post
kW	kilowatt
LNG	liquefied natural gas
LRMP	Land and Resource Management Plan
LSA	Local Study Area
MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
MH	Mountain Hemlock
mm	millimetre
NGL	natural gas liquid
NGTL	NOVA Gas Transmission Ltd.
NPS	nominal pipe size
OCC	Operations Control Center
OGAA	*Oil & Gas Activities Act*
PRGT	Prince Rupert Gas Transmission Ltd
the Project	Prince Rupert Gas Transmission Project
RMZ	Resource Management Zone
ROW	right-of-way
RSA	Regional Study Area
SARA	*Species at Risk Act*
SBS	Sub-boreal Spruce
SCADA	Supervisory Control and Data Acquisition
SRMP	Sustainable Resource Management Plan

1.0 INTRODUCTION

Prince Rupert Gas Transmission Ltd. (PRGT) is proposing to construct and operate a sweet natural gas pipeline from a point near Hudson's Hope, BC, to the proposed Pacific NorthWest LNG export facility near Prince Rupert, at Lelu Island, within the District of Port Edward, BC. The Prince Rupert Gas Transmission Project (Project) involves the construction and operation of approximately 750 km of 48 inch (NPS 48) (1,219 mm) diameter pipeline, metering facilities at the receipt and delivery points, and two compressor stations with provisions for up to six additional compressor station sites to allow for future expansion. The Project would have an initial capacity of approximately 2.0 billion cubic feet per day (bcf/d) (56.6 million m^3/d) with the potential for expansion up to approximately 3.6 bcf/d (101.9 million m^3/d). The expansion scenarios do not require the construction of any additional pipeline but would involve a potential increase in compression capacity for the Project.

The Project would require the construction of temporary infrastructure, such as access roads, temporary bridges, stockpile sites, borrow sites, contractor yards and construction camps.

1.1 PROPONENT INFORMATION

The Project would be designed, owned and operated by PRGT, a wholly owned subsidiary of TransCanada PipeLines Limited (TransCanada). PRGT is the general partner and acts on behalf of Prince Rupert Gas Transmission Limited Partnership. The general partner would legally own and operate the Project assets for the benefit of the limited partnership.

PRGT will draw on TransCanada's expertise, experience and resources in the course of designing, constructing and operating the Project. TransCanada has owned and operated Canada's largest natural gas pipeline system for more than 60 years. Its technically advanced pipeline systems comprise a network of approximately 57,000 km (35,500 mi.) of wholly owned and 11,500 km (7,000 mi.) of partially owned natural gas pipelines. These pipelines connect virtually every major natural gas supply basin and market in North America, transporting 15 bcf/d of natural gas, or 20% of the natural gas consumed in North America. TransCanada continually explores new ways to help producers reach their markets, and has also developed and maintained relationships with landowners, Aboriginal communities and other stakeholders across its pipeline system.

PRGT is committed to designing, constructing and operating the Project in a safe and environmentally responsible manner that respects the communities within which it would operate. In this regard, PRGT will be adopting and implementing many of TransCanada's policies, such as the Stakeholder Engagement Commitment Statement, the Health, Safety and Environment Commitment Statement, and the Aboriginal Relations Policy. Copies of these documents are included in Appendix A.

1.1.1 Proponent Contact Information

The primary contact for the Project is:

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1.2 WEBSITE

The website for the Project is: www.princerupertgas.com

1.3 REGULATORY FRAMEWORK

The proposed Project is wholly located within the province of BC and involves the construction of more than 40 km of pipeline that is greater than 323.9 mm in diameter. The Project may also involve the direct physical disturbance of greater than or equal to 2 hectares of foreshore or submerged land, or a combination of foreshore and submerged land, below the natural boundary of a stream, marine coastline or estuary. Consequently, pursuant to Table 8, section 4, and Table 9, section 5 of the Reviewable Projects Regulation under the BC *Environmental Assessment Act* (BCEAA), an Environmental Assessment Certificate will be required. A project description is needed to initiate the provincial environmental assessment process.

Pursuant to section 14 of the schedule to the federal *Regulations Designating Physical Activities*, a project involving the construction, operation, decommissioning and abandonment of a gas pipeline with more than 75 km in length of new right-of-way (ROW) is a designated project. As the Project meets this criterion, it is a

designated project and is therefore subject to the provisions of the *Canadian Environmental Assessment Act, 2012* (CEAA). Under CEAA, a project description is required to initiate the screening process through which the Canadian Environmental Assessment Agency will determine whether a federal environmental assessment is required. A Project Summary is also required and is included in Appendix B (English version) and Appendix C (French version).

This complete document is intended to satisfy both the provincial and federal requirements for a project description, initiating the environmental assessment process under both the BCEAA and CEAA. A concordance table for the British Columbia Environmental Assessment Office (BC EAO) guidance is included in Appendix D, and a concordance table for CEAA requirements is included in Appendix E. PRGT expects that if an assessment is required under CEAA, the federal and provincial assessment processes would be harmonized pursuant to the *Canada-British Columbia Agreement on Environmental Assessment Cooperation (2004)*.

PRGT will also require a permit to construct and operate the Project pursuant to section 25 of the BC *Oil and Gas Activities Act* (OGAA). The pipeline would not be providing utility service. Accordingly, no toll or tariff approvals will be sought from the British Columbia Utilities Commission.

1.3.1 Permits, Licences, Approvals and Authorizations Required

In addition to the environmental assessment decisions by federal and provincial ministers, the permits, licences, approvals and authorizations listed in Tables 1-1, 1-2 and 1-3 may be required. The federal and provincial permits and authorizations have been grouped according to the project phase during which they will be required.

Table 1-1: Potential Permit Requirements during Project Planning

Permit / Consent	Legislation	Responsible Agency
Provincial		
Investigative use permits (e.g., drilling investigations, helipad construction): Temporary Occupation of Crown Land and Cutting Permits	*Land Act,* section 14	BC OGC
	Forest Act	BC OGC
Approval for Short Term Use of Water	*Water Act,* section 8	BC OGC
Heritage Investigation Permit	*Heritage Conservation Act,* section 14	BC OGC; Archaeology Branch
Fish Collection Permit	*Wildlife Act*	MFLNRO
Forest Service Road Use	*Forest Act*	BC OGC
Ancillary Sites (e.g., camps): Temporary Occupation of Crown Land and Licence of Occupation and Cutting Permit	*Land Act,* section 14/39	BC OGC
	Forest Act	BC OGC
Approval for Changes in and about a Stream	*Water Act,* section 9	BC OGC

Table 1-2: Potential Permit Requirements prior to Project Construction

Permit / Consent	Legislation	Responsible Agency
Provincial		
Master Licence to Cut	*Forest Act*, section 47	BC MFLNRO
Pipeline: Construction and Operation of a Pipeline, Temporary Occupation of Crown Land and Licence of Occupation, Cutting permit, *Heritage Conservation Act* Clearance, and Approval for Changes in and about a stream	*Oil & Gas Activities Act*, section 24/25	BC OGC
	Land Act, section 14/39	BC OGC
	Forest Act, sections 47 and 117	BC OGC
	Heritage Conservation Act	BC OGC; Archaeology Branch
	Water Act, section 9	BC OGC
Facilities: Construction and Operation, Temporary Occupation of Crown Land and Licence of Occupation, Cutting permit, *Heritage Conservation Act* Clearance, and Approval for Changes in and about a stream (cont'd)	*Oil & Gas Activities Act*	BC OGC
	Land Act, section 14/39	BC OGC
	Forest Act	BC OGC
	Heritage Conservation Act	BC OGC; Archaeology Branch
	Water Act, section 9	BC OGC
Roads: Temporary Occupation of Crown Land and Licence of Occupation, Cutting permit, *Heritage Conservation Act* Clearance, and Approval for Changes in and about a stream	*Land Act,* section 14/39	BC OGC
	Forest Act	BC OGC
	Heritage Conservation Act	BC OGC; Archaeology Branch
	Water Act, section 9	BC OGC
Prescribed Roads (private land)	*Oil and Gas Activities Act*	BC OGC
Site Alteration Permit	*Heritage Conservation Act,* section 12	BC OGC
Forest Service Road Use	*Forest Act*	BC OGC
Approval for Short Term Use of Water	*Water Act,* section 8	BC OGC
Non-farm use on ALR lands (for facilities)	*Agricultural Land Commission Act*	ALC/BC OGC
Federal		
Authorization to cause a harmful alteration or disruption, or the destruction, of fish habitat	*Fisheries Act* (section 35(2))	DFO

Table 1-2: Potential Permit Requirements prior to Project Construction (cont'd)

Permit / Consent	Legislation	Responsible Agency
Federal (cont'd)		
Approval to Interfere with Navigation	*Navigable Waters Protection Act*	Transport Canada
Explosives User Magazine License	*Explosives Act*	Natural Resources Canada
Disposal of Material at Sea	*Canadian Environmental Protection Act,* section 127(1)	Environment Canada

Table 1-3: Potential Permit Requirements during and following Project Construction

Permit / Consent	Legislation	Responsible Agency
Provincial		
Fish Collection Permit	*Wildlife Act*	BC MFLNRO
Wildlife Sundry Permits (Beaver dam removal, wildlife salvage, amphibian relocation)	*Wildlife Act*	BC MFLNRO
Burning Permits	*Forest Act*	BC MFLNRO
Water Discharge Permit (Hydrotesting)	*Environmental Management Act*	BC OGC
Waste Discharge Permit (Air Emissions at Facilities)	*Environmental Management Act*	BC OGC
Regional		
Food, Water, Accommodations and Sewerage for Industrial Camps	*Health Act*	Local Health Authority
Various Zoning Permits	Municipal Bylaws	Regional Districts

2.0 GENERAL DESCRIPTION OF THE PROJECT

2.1 FACILITIES, INFRASTRUCTURE AND ROUTE

Facilities and Infrastructure

PRGT is proposing to construct and operate an approximately 750-km-long sweet natural gas pipeline from a point near Hudson's Hope, BC, to the proposed Pacific NorthWest LNG export facility near Prince Rupert, at Lelu Island within the District of Port Edward, BC.

The Project also includes the construction and operation of metering facilities at the receipt and delivery points and two compressor stations, with provisions for up to six additional compressor station sites to allow for future expansion (Figure 2-1). In addition, temporary infrastructure would be required during construction, such as new access roads, bridges, stockpile sites, borrow sites, contractor yards and construction camps. Where commercial power is available, electrical power would be supplied by third-party providers. Where commercial power is not available, electrical power will be generated at the facilities using natural gas from the pipeline as a fuel source. Typical electrical power required at compressor facilities to meet the station loads for pumps, fans, instrumentation and lights would be less than 500 kW. At meter stations, load requirements for lights and instrumentation would be less than 2 kW. It is not anticipated that new major transmission lines would be required to service the project.

Conceptual Corridor

At this stage, a 2-km-wide conceptual corridor for the Project follows a path from northeastern BC to the District of Port Edward. This conceptual corridor may be adjusted as new information, gained through continued technical, environmental and constructability assessments, becomes available. PRGT is also seeking input from Aboriginal groups, landowners and stakeholders on their perspectives as to the best route for the Project within the conceptual corridor.

Refer to Section 4.0 for further details on the Project components. Appendix F contains detailed maps of the conceptual corridor.

Marine Alternatives to the Conceptual Corridor

In addition to the conceptual corridor, PRGT is considering two marine routing alternatives (Marine Alternatives) for a portion of the Project. Alternative 1 would be about 186 km long and would start at the eastern end of Alice Arm. It would be routed along the seabed from Alice Arm and continue offshore to Lelu Island. Alternative 2 would run along the Nasoga Gulf and continue offshore to Lelu Island. The Marine Alternatives may be required if ongoing technical assessment and Aboriginal and stakeholder engagement determine that a marine route option may be

more appropriate for portions of the Project. For more information on the Marine Alternatives, see Section 8.1.1.

It is possible that more than 2 hectares (4.94 acres) of foreshore will be disturbed by the pipeline shore crossings. At this stage of the work, before the survey or geotechnical investigations, or before front end engineering has commenced, it is not possible to say with any certainty what methods will be used for the pipe to cross the land/sea interface.

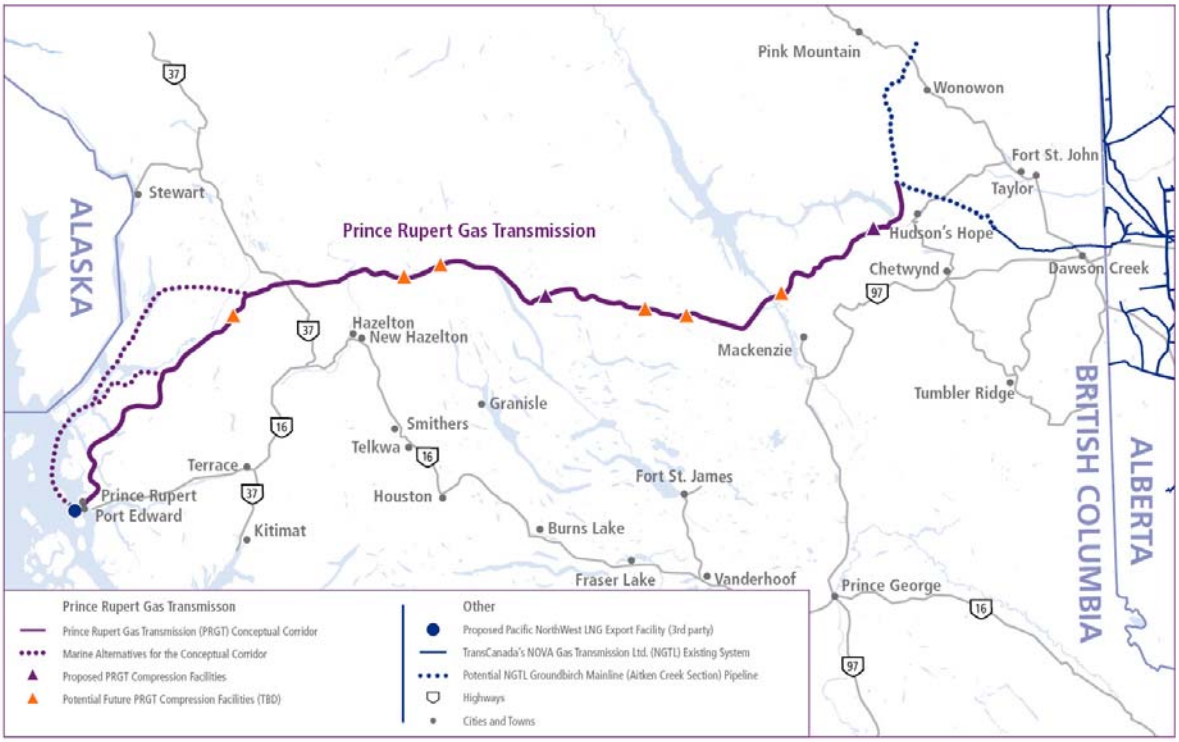

Figure 2-1: Prince Rupert Gas Transmission – Conceptual Corridor

2.2 PROJECT PURPOSE AND RATIONALE

TransCanada has entered into an agreement with Progress Energy Canada Ltd. (Progress) to design, build, own and operate the Project, which would provide natural gas transportation service to the proposed Pacific NorthWest LNG export facility. Progress will enter into a transportation services agreement with PRGT for transportation service to this facility. Consequently, the Project will be required to construct and operate a buried pipeline to transport natural gas from gas producing areas in northeastern British Columbia to the proposed Pacific NorthWest LNG export facility.

The Project would also provide western Canadian gas producers with access to new natural gas markets. The Project would interconnect with a proposed extension of the NOVA Gas Transmission Ltd. system (NGTL System) and would have a connection with Westcoast Energy Inc.'s Transportation North Pipeline System.

2.3 ESTIMATED CAPITAL COST AND EMPLOYMENT

Total expenditures on the PRGT Project are presently forecast to be approximately $5 billion (in 2012 dollars). At this time, PRGT estimates that in consideration of the cycle of resource requirements for pipeline construction, there are approximately 4,400 to 5,500 person years of work. Approximately 30 to 40 permanent field positions are expected to be created during the operations and maintenance phase of the Project. The complete Project labour requirements and economic effects will be further defined and assessed as project planning progresses.

2.4 PROJECT PLANNING UNDERTAKEN TO DATE

To date, PRGT has undertaken studies in the following areas to define the Project:

- current conceptual corridor
- preliminary location of meter stations
- preliminary location of compressor stations
- environmental overview (including a review of available information about fisheries, wildlife and vegetation values, and heritage resources)
- land use and socio-economic overview
- preliminary discussions with regulatory agencies
- preliminary contact with Aboriginal groups
- preliminary contact with stakeholders, including landowners and government
- engineering design studies of the pipeline crossing of the Khutzeymateen Inlet and the Work Channel

PRGT has also initiated studies exploring the potential for the Marine Alternatives, including pre-front end engineering design and environmental studies for seabed-installed marine pipelines.

3.0 AREAS OF FEDERAL INTEREST

The Project does not require federal financial support. The Project, as currently planned, does not require an interest in any federal land. However, PRGT is currently evaluating whether an interest in federal lands within the boundaries of the Prince Rupert Port Authority (PRPA) may be required for a portion of the Project. PRGT will obtain all necessary legal permission from the responsible federal authorities, should an interest in PRPA lands be required. It is not anticipated that the Project will cross any Indian Reserve lands. The Project is also not expected to have any transboundary effects and will not result in any changes to federal lands.

3.1 FEDERAL AUTHORIZATIONS

Federal authorizations are included in Table 1-2, and are required pursuant to the following legislation.

3.1.1 *Fisheries* Act

The Project may require authorization(s) pursuant to the *Fisheries Act* if Fisheries and Oceans Canada determines that the project may bring about a harmful alteration, disruption or destruction of fish or fish habitat. Project activities that may interact with fish and fish habitat and potentially require *Fisheries Act* authorization(s) include pipeline watercourse crossings (streams, rivers, lakes and fjords), laying of pipeline on the seabed, temporary bridge installation and clearing riparian vegetation.

3.1.2 *Species at Risk* Act

The Project may require authorization(s) pursuant to the *Species at Risk Act* if it is determined that the Project will affect a species listed on Schedule 1 of the Act, any part of its critical habitat, or the residences of its individuals.

3.1.3 *Migratory Birds Convention* Act

The Project will comply with the requirements of the *Migratory Birds Convention Act*.

3.1.4 *Navigable Waters Protection* Act

The Project may require authorization(s) pursuant to the *Navigable Waters Protection Act* if it is determined that the Project activities include works built in, on, over, under, through or across any navigable water that may interfere with navigation. Project activities that may interfere with navigation and potentially require a permit under the *Navigable Waters Protection Act* include pipeline watercourse crossings (streams, rivers, lakes and fjords), temporary bridge installation and, if one of the marine route alternatives is pursued, works associated with placement of pipeline on the sea floor.

3.1.5 *Canadian Environmental Protection* Act

The project may require authorization(s) pursuant to the *Canadian Environmental Protection Act* if it is determined that materials will be required to be disposed of at sea. Activities associated with pipeline construction in the marine environment, either through fjord crossings along the preferred route or through installation along the sea bed if one of the marine route alternatives is pursued, may require a disposal at sea permit.

3.1.6 *Explosives Act*

The Project may require the use of explosives and PRGT will obtain any licences or permits required under the *Explosives Act*. The use of explosives during project construction would be limited to activities associated with pipeline trenching, grading and potential tunnel construction.

4.0 PROJECT OVERVIEW

This section provides a description of the Project components, the Project schedule and activities in the various phases of the Project.

4.1 SCOPE OF THE PROJECT

The Project scope includes the facilities and activities associated with the construction, operation and maintenance of the Project, as well as foreseeable changes to the Project. Where relevant, the Project scope also includes consideration of the decommissioning, abandonment and reclamation of the pipeline and its associated facilities. The Project components are described in the following sections.

4.1.1 Pipeline

The approximately 750 km of NPS 48 (1,219 mm) diameter sweet natural gas transmission pipeline would extend from a point near Hudson's Hope, BC, to the proposed Pacific NorthWest LNG export facility at Lelu Island. The Project commencement point and end point are in the general vicinity of the coordinates provided in Table 4-1. Maps showing the conceptual corridor are provided in Appendix F.

Table 4-1: Approximate Project Location

Project Commencement Point	
Latitude/Longitude	56.206222 / -122.085948
Universal Transverse Mercator	556702.58 East, 6229407.84 North
BC Oil and Gas Grid	094B-01-I-097
Project End Point	
Latitude/Longitude	54.201798 / -130.285133
Universal Transverse Mercator	416170.27 East, 6006736.80 North
BC Oil and Gas Grid	103J-01-K-043

4.1.2 Watercourse and Inlet Crossings

The Project would involve the crossing of watercourses, including streams, rivers, lakes and fjords. Environmental and engineering studies for the Project watercourse crossings have not yet been undertaken and the specific techniques for each watercourse crossing have not yet been finalized. A variety of crossing techniques may be used during the construction of the pipeline.

The conceptual corridor would cross two fjords, the Khutzeymateen Inlet and the Work Channel. These are deep-water fjords that require pipeline installation on the seabed. Twin concrete-covered steel pipes would be used through the marine section.

4.1.3 Marine Alternatives

As PRGT indicated in Section 2.0, two marine alternatives are being considered in the event that ongoing technical assessment and Aboriginal and stakeholder engagement determine that marine route options may be more appropriate for western portions of the conceptual corridor. Further study, surveys and engineering work are required to determine route details and the preferred pipe installation methods.

4.1.4 Meter Stations

The meter stations involve the installation of metering runs, yard piping, isolation and control valves, separators, and electrical, control and telecommunication systems. Currently, the Project includes the installation of metering facilities at the:

- commencement or receipt points of the Project
- proposed Pacific NorthWest LNG export facility delivery point

4.1.5 Compressor Stations

The Project currently includes the installation of two compressor stations, one approximately 10 km west of the W.A.C. Bennett Dam and the second approximately 100 km west of Williston Lake. Construction of the compressor stations would require all-season access from the nearest existing all-season road.

The compressor station design would require installing two, approximately 30 MW International Organization for Standardization (ISO) rated natural gas fired turbo-compressor packages, complete with discharge gas coolers for each unit and other auxiliary equipment, including high-pressure yard piping, isolation valves, electrical, control and gas systems, storage facilities, offices and, if necessary, temporary living quarters. Potential for emissions is discussed in Section 8.3.

Additional compressor units at the initial compressor stations and/or additional compressor stations may be required for incremental design volumes.

4.1.6 Mainline Valves

Mainline valves would be installed at meter stations, compressor stations and at other locations along the conceptual corridor, as necessary, to comply with Canadian Standards Association (CSA) Z662-11, to enable isolation of pipeline sections and to facilitate system operations.

4.1.7 Supervisory Control and Data Acquisition (SCADA) System

The Project would include the installation and operation of a SCADA system, linking pipeline and compressor facilities to the existing TransCanada Operations Control Centre (OCC) in Calgary, Alberta, which would allow for the remote monitoring of operational and measurement data.

4.1.8 Communication Links and Power Supply

The Project would include necessary communication links to service compressor stations, meter stations and other pipeline facilities. Electrical power would be supplied by third-party power providers. Where commercial power would not be available, required electrical power sufficient to meet the station loads for pumps, fans, instrumentation and lights would be generated at the facilities.

4.1.9 In-Line Inspection Facilities

The Project would have facilities for launching and receiving in-line inspection tools. These tools allow for internal examination of the pipeline to monitor pipe integrity. The in-line inspection facilities are typically installed at compressor stations and at mainline valve sites. The facilities generally consist of valves, piping and launchers or receivers, depending on the location. The precise location of these facilities will be determined during detailed design.

4.1.10 Cathodic Protection

Cathodic protection is a common method used to protect the pipeline from electrochemical corrosion. A cathodic protection system, including anode beds, rectifiers and associated facilities, would be designed and installed for the pipeline and metering facilities.

4.1.11 Temporary Infrastructure

It is anticipated that construction of ancillary infrastructure, including new access roads, bridges, stockpile sites, borrow sites, contractor yards and construction camps, will be required.

4.1.12 Operations and Maintenance Activities

Throughout the operating life of the pipeline, various operations and maintenance activities are required to ensure safe operation of the pipeline and facilities. These activities include, but are not limited to:

- monitoring and surveillance using both ground-based and aerial methods
- managing brush and vegetation
- conducting regular site visits to the pipeline and facilities
- ensuring pipeline maintenance programs are carried out
- maintaining signage

4.2 PROJECT SCHEDULE

The schedule for the Project is outlined in Table 4-2.

Table 4-2: Project Schedule

Activity	Date
Project announced by TransCanada	January 9, 2013
Project Description filing to initiate federal and provincial environmental assessment processes	May 2013
Submission of Application for Environmental Assessment Certificate to BC Environmental Assessment Office	Early 2014
Submission of Environmental Impact Statement to Canadian Environmental Assessment Agency	Early 2014
BC OGC application	Initiate early 2014
Receipt of key regulatory approvals	Late 2014
Construction and Commissioning: • Commence Construction • Pre-Construction (including camps, storage yards, clearing, access and ROW preparation) • Mainline Construction (including pipeline, compressor stations and meter stations) • Commissioning	 Early 2015 Early 2015 to mid-2017 Late 2015 to 2018 Late 2018
In-Service	Late 2018
Decommissioning and Abandonment	End of pipeline activities

4.3 PIPELINE RIGHT-OF-WAY

Dimensions of the PRGT pipeline construction ROW would vary depending on the ownership, terrain, construction techniques, access, and the extent and nature of existing ROWs being paralleled. Where the project abuts existing linear disturbance easements, requests will be made to the easement holder for permission to use their easement for workspace where practical and safe, to reduce potential disturbance.

The conceptual corridor is adjacent to, or contiguous with, existing and proposed pipeline, power line and all-season public highway ROWs for approximately 85 km (11%) of the total proposed length. Approximately 665 km (89%) of the route is currently comprised of non-contiguous ROW. Approximately 5.5% of the conceptual corridor crosses parks or protected areas that include the Khutzeymateen Inlet West Conservancy, Khutzeymateen Inlet Conservancy, Ksi X'Anmaas Conservancy and the Woodsworth Lake Conservancy.

Where possible, the conceptual corridor would utilize existing disturbances. This may not always be practical or feasible in order to:

- achieve the shortest practical route and therefore, the smallest overall footprint
- accommodate pipeline watercourse crossings
- address input from Aboriginal groups
- address input from stakeholders, including landowners and governments
- avoid sensitive terrain and environmental areas
- address potential construction issues and requirements

It is anticipated that the construction ROW on level, flat terrain would generally be about 40 to 45 m wide. The actual width would vary along the route, taking into account the various terrain conditions encountered. Additional temporary construction workspace would be required at certain locations to facilitate construction. The width of this temporary workspace would vary depending on site characteristics and specific construction activities. In some locations, temporary workspace ranging up to 100 m in width may be required. This may include access roads, potential work camps, side bends, pipe and material storage areas, watercourse crossings, timber decking areas, borrow sites and equipment laydown areas. Following construction, these areas would be reclaimed and re-vegetated, where appropriate. The locations and associated dimensions of necessary temporary workspace have not yet been finalized.

As a general rule, all areas disturbed by construction would be reclaimed after construction, and a permanent easement maintained for pipeline operations.

4.4 PROJECT ACTIVITIES

Subject to receipt of regulatory and Project approvals, construction is scheduled to commence in 2015, with completion of construction and an in-service date in 2018.

PRGT proposes to commence pre-construction activities, including ROW clearing and preparation, in 2015.

Pipeline construction involves several activities that occur sequentially at any one location. These include development of new access where necessary, surveying, clearing, soil conservation and grading, drainage and sediment control, pipe stringing, bending and welding, trenching, lowering-in, backfilling, testing, cleanup and post-construction reclamation. The pipeline ROW would be divided into several construction spreads, meaning that there would be multiple construction crews carrying out construction activities in parallel at multiple locations along the construction ROW.

Construction of compressor and meter stations is expected to commence concurrent with pipeline construction. Site construction and equipment installation at the compressor and meter stations is expected to take several months.

In addition to the pipeline ROW and associated temporary workspace, lands would be required for staging and stockpile sites, equipment storage and possibly borrow pits (to supply fill material). Existing disturbed areas or areas already designated for such activities would be utilized wherever feasible.

Reclamation of disturbed areas would commence following construction and be completed after the Project is placed into service.

Currently, it is anticipated that the operations and maintenance phase of the Project would commence in late 2018 when the Project is placed in service. Further description of the Project activities is provided in the tables and sections below.

4.4.1 Construction

Pipeline Construction Activities

Standard pipeline construction activities and typical equipment requirements are outlined in Table 4-3.

Table 4-3: Pipeline Construction Activities and Equipment Requirements

Construction Phase	Associated Activities and Equipment Required
Engineering	The pipeline would be designed and constructed in accordance with all applicable CSA standards, TransCanada specifications and BC OGC regulations.
Construction Survey	Activities include line-of-sight clearing with chain saws, flagging and staking of the boundaries of the construction ROW, temporary workspace and facility sites as well as marking trench line and existing utilities. Areas to avoid, such as protected habitats, archaeological sites or rare plant communities, would be appropriately fenced or flagged.
Clearing	Snow, trees, brush and other vegetation would be generally cleared from the construction ROW and extra temporary workspace. Salvageable timber would be cut, decked and hauled to local mills (if merchantable). Non-salvageable vegetative debris would be burned unless required for mulch, corduroy, rollback, etc. Equipment used during clearing activities would include chainsaws, feller-bunchers or other tree clearing equipment, as well as bulldozers and backhoes.
Topsoil Salvage	In agricultural lands, topsoil would be salvaged to ensure that the soil capability is maintained. The width and depth of topsoil salvage depends on the land use, soil conditions, microtopography, regulatory agency requests and grading requirements. Equipment used during topsoil handling activities includes bulldozers, graders and backhoes.
Grading	Following topsoil salvage, grading would be conducted on irregular ground surfaces (including temporary workspace) to provide a safe work surface. Graders, backhoes and bulldozers would be used for this activity. Blasting may be required where hard bedrock is encountered.
Stringing and Welding	The pipe would be transported by truck from the stockpile sites to the ROW. The pipe would be bent, lined up, welded, joint coated and inspected before being lowered into the trench. Equipment used during stringing and welding activities includes pipe trucks, booms, pick-up trucks, welding stations and x-ray or ultrasonic inspection equipment mounted on trucks.

Table 4-3: Pipeline Construction Activities and Equipment Requirements (cont'd)

Construction Phase	Associated Activities and Equipment Required
Trenching	The trench would be excavated using tracked excavators to a depth sufficient to ensure the depth of cover is in accordance with, or in excess of, applicable codes. Typical depth of cover would be a minimum of 0.8 m and may vary based on land use and soil condition from 0.6 m to 1.2 m. Trenching would generally occur after stringing, bending and welding. Major road and railway crossings would be installed by boring under the road or railway.
Lowering-In	The pipe would be lowered into the trench using sideboom tractors. Trench dewatering may be necessary at certain locations during lowering-in (e.g., to ensure acceptable bedding for pipe, to prevent the pipe from floating, or for performing tie-in welds).
Backfilling	The trench would be backfilled using backhoes, graders, bulldozers or specialized backfilling equipment. Backfill material would generally consist of trench spoil material excavated during trenching. Displaced subsoils would be crowned over the trench to allow for settlement. After settlement, any excess trench spoil would be feathered out over adjacent portions of the ROW.
Testing	The completed pipeline would be pressure tested in sequential segments, using water as the test medium. The water would be drawn from suitable sources and returned to the appropriate watersheds in accordance with permit requirements.
Clean-Up and Post-Construction Reclamation	Initial clean-up and reclamation procedures would be initiated immediately following construction using bulldozers, backhoes and graders. Final reclamation would be completed once weather and soil conditions permit, likely in the year following construction. Garbage or debris remaining along the ROW would be removed regularly and disposed of in compliance with local regulations. The ROW contours would be returned to a stable and maintenance-free condition. In agricultural soils, compaction in subsoils would be relieved and the topsoil replaced. All disturbed upland areas would be seeded with an appropriate seed mix, and vegetation management and specific land reclamation measures would be applied, as required.
Watercourse Crossings	Watercourse crossing methods would be based on engineering and environmental considerations. Crossing methods typically used during watercourse construction include trenched methods, such as open cut and isolation (e.g., dam and pump, flumes), and trenchless methods, such as boring and horizontal directional drilling (HDD).
Tunnelling	Depending on terrain conditions, micro-tunnelling or conventional tunnelling may be required. Micro-tunnelling uses a drill to excavate a tunnel slightly larger than the diameter of the pipe to be installed. The pipe is then pulled into the tunnel and grouted in place. Conventional tunnelling uses conventional techniques to drill and blast a tunnel of sufficient diameter to allow construction personnel access to the tunnel. The pipe is then fabricated in the tunnel.
Fjord Crossings	The pipe would be installed across the fjords by welding the pipe onshore and pulling the pipe strings across the fjords. The pipe strings are welded on one side of the inlet and then connected to a winch on the opposite bank. The winch would be of sufficient capacity to pull the fabricated pipe across the inlet, allowing the pipe to take up its final position on the inlet seabed.

Table 4-3: Pipeline Construction Activities and Equipment Requirements (cont'd)

Construction Phase	Associated Activities and Equipment Required
Marine Alternatives	
Offshore Pipelay	The pipe would be laid on the seabed by a laybarge used to fabricate and install offshore pipelines. The laybarge moves forward as the pipe string is fabricated and lowered over the stern of the barge, taking up its position on the seabed. The pipe is lowered in a controlled manner with sufficient support to prevent buckling.

Compressor Station Construction Activities

Standard compressor station construction activities and typical equipment requirements are outlined in Table 4-4.

Table 4-4: Compressor Station Construction Activities and Equipment Requirements

Construction Phase	Associated Activities and Equipment Required
Engineering	The proposed compressor stations would be designed and constructed in accordance with all applicable CSA standards, industry standards, TransCanada specifications, and BC OGC and other relevant regulations.
Site Preparation	Initial site preparation would involve surveying, clearing, salvage and storage of topsoil, excavating and removal of unsuitable fill, grading, site drainage, placement and compaction of a gravel surface on work areas, laying of foundation and installation of building support pads. Equipment used during site preparation activities would include chainsaws, mowers, feller-bunchers and other timber clearing equipment, as well as bulldozers and backhoes.
Facility Construction	Construction of the new compressor stations would entail building new structures, installing compression, pipe, valves and electronics equipment, tying new pipe into pipelines, pressure testing all piping, testing safety systems and instruments, final commissioning of new equipment and control systems, and perimeter fencing construction. Equipment used during the construction of the compressor stations includes backhoes, cranes and manlifts.

Watercourse Crossing Method Selection

The conceptual corridor crosses approximately 1,340 watercourses, most of which are unnamed, minor and ephemeral drainages. The general route, however, does cross some large rivers and important watercourses. Environmental and engineering studies for the Project watercourse crossings have not yet been undertaken and techniques for each watercourse crossing have not yet been finalized. The following criteria are being considered in the analysis of watercourse crossing techniques:

- fisheries, habitat hydrology and water quality issues
- approvals, codes and regulations
- design and constructability issues
- operational requirements

A variety of crossing techniques may be used during the construction of the pipeline. These include conventional trenched crossings and trenchless crossings, e.g.,

horizontal directional drilling (HDD), tunnelling or boring. HDD crossings work best for large water bodies in areas with exceptionally vulnerable (water quality, fisheries and habitat) ecosystems and where geotechnical and hydrological conditions are favourable. Typical criteria for selecting candidate crossings for HDD include:

- presence of highly sensitive fish species, life stages or habitats
- presence of appropriate sub-surface conditions
- exceptionally steep approach slopes in a river valley
- presence of extensive existing pipeline infrastructure at the crossing

Trenched techniques, such as isolated crossing techniques, are best suited for streams and rivers with narrow channels and lower flow rates. With isolated crossing techniques, the main flow of the stream is isolated from the construction area while a trench is excavated and the pipe installed. The stream is stabilized and allowed to return to its bed. The three main methods of diverting stream flow in an isolation type crossing are:

- dam the stream and convey the water across the site by pumping
- dam the stream and install a culvert (flume)
- dam the stream and install a superflume for high-flow watercourses

Appendix G lists the major watercourse crossings anticipated for the Project.

Khutzeymateen Inlet and Work Channel Crossings

In addition to the traditional types of watercourse crossings and as previously described, the conceptual corridor crosses two fjords, at the Khutzeymateen Inlet and the Work Channel. The Khutzeymateen Inlet crossing would be 1.9 km mostly along the fjord seabed and the Work Channel crossing would be approximately 2.7 km along its seabed. The Khutzeymateen Inlet is approximately 140 m deep while the Work Channel is approximately 290 m deep. PRGT intends to lay twin concrete-covered steel pipes to cross these inlets.

Additional engineering study work and detailed geophysical and geotechnical surveys are required to determine the optimum method of installing the pipe on the seabed of these fjords.

4.4.2 Operations and Maintenance

System Protection and Controls

The Project would be monitored and controlled from the TransCanada OCC in Calgary. The OCC is staffed 24 hours per day and uses a computer-based SCADA system to continuously monitor and control pipeline operations. The OCC provides operational support to the pipelines TransCanada operates in Canada and in portions of the United States. The pipelines currently operated through the OCC are regulated

by the National Energy Board, the Alberta Utilities Commission and the United States Federal Energy Regulatory Commission (FERC).

The pipeline control system would monitor pipeline flows, pressures, temperatures and equipment status on a continuous basis. The SCADA system would alert the OCC operator of significant operational changes in the pipeline system. Status and control information would be received by the SCADA system.

Emergency Response

The Project would have emergency response plans that meet or exceed regulatory requirements during the construction of the Project. For the operations phase, PRGT would adopt TransCanada's corporate emergency preparedness and response system. Site-specific emergency response plans would be developed and routinely tested to ensure effective response in the event of an emergency.

PRGT would work with emergency response personnel in the areas in which it operates to ensure appropriate communications, understanding and co-operation. This would ensure that company emergency plans appropriately link into plans maintained by other affected agencies.

Public Awareness Program

Prince Rupert Gas Transmission would follow the existing TransCanada Public Awareness Program. This program is designed to inform the public of facility locations and operational activities to:

- protect the public from injury
- prevent or minimize effects on the environment
- protect the facilities from damage by the public
- provide an opportunity for ongoing public awareness

Maintenance Programs

Regular preventative maintenance programs would be incorporated into the design and operation of the pipeline. These programs include:

- regular aerial patrols to monitor conditions on the ROW. The frequency is established in accordance with CSA Z662 and is based on considerations of operating pressure, pipeline size, population density, terrain, weather, and agricultural and other land use.
- in-line inspections for internal examination of the pipeline to monitor the integrity of the pipeline
- cathodic protection monitoring to ensure that corrosion protection is effectively provided on the pipeline
- maintenance of pipeline markers along the ROW

Decommissioning and Abandonment

PRGT would apply TransCanada's policies and practices for the future decommissioning or abandonment of all, or portions of, the Project. TransCanada has extensive experience in pipeline abandonment and decommissioning. Additionally, TransCanada is currently participating with other pipeline companies in an initiative to advance research on pipeline abandonment. Pipeline activities are generally anticipated to continue for at least 40 years before decommissioning or abandonment may be considered. PRGT would comply with all applicable laws when abandoning or decommissioning its pipeline or related facilities.

4.5 RESOURCE AND MATERIAL REQUIREMENTS

4.5.1 Energy Requirements

Where commercial power is available, electrical power would be supplied by third-party providers. Where commercial power is not available, electrical power will be generated at the facilities using natural gas from the pipeline as a fuel source. Typical electrical power required at compressor facilities to meet the station loads for pumps, fans, instrumentation and lights would be less than 500 kW. At meter stations, load requirements for lights and instrumentation would be less than 2 kW.

4.5.2 Water Requirements

The environmental assessment (EA) will address water requirements during construction and proposed sources, as well as potential effects, cumulative effects and proposed mitigation.

Withdrawal and return of water for hydrostatic testing of the pipeline and construction camps would be undertaken with the approval of appropriate regulators, including Fisheries and Oceans Canada (DFO) and the BC OGC, and in compliance with all applicable regulations, guidelines and codes of practice relating to water withdrawal and discharge.

Water requirements at the compressor stations during operations are limited, and water is generally only required for general cleanup, landscaping and potable uses.

4.5.3 Excavation and Fill Requirements

In addition to the pipeline trench, excavation for pipeline construction would include grading of steep slopes and uneven terrain, and potentially tunnelling. Requirements for additional excavation would be addressed in the EA. Fill may be required along the right-of-way where trench rock cannot be replaced directly over the pipeline. Grading and contouring would also be required at the proposed compressor stations, in addition to importing gravel. The EA would address requirements for additional

excavation and fill, potential fill sources and any associated environmental effects and proposed mitigation, including any special measures that may be required in special areas, as outlined in the Land and Resource Management Plan (LRMP) process.

4.5.4 Toxic and Hazardous Materials

Specific identification of hazardous substances, potential effects, spill prevention and emergency contingencies would be addressed in the EA. Hydrocarbons and hydraulic fluids are the primary toxic materials to be used during construction and operation of the Project. Activities associated with Project construction that may involve other substances of concern include welding and weld testing, hydrostatic testing and HDD or bored crossings. TransCanada has several systems in place (including its pipeline integrity management program, SCADA, aerial and ground patrol, and emergency response systems) to both prevent incidents and ensure rapid and effective response to spills of hazardous materials.

4.5.5 Waste Disposal

During the construction phase of the Project, typical waste includes construction materials (wood lathe, flagging tape, hydraulic fluids from equipment maintenance, and domestic products from camp operation). The pipeline construction contractor would collect waste daily, and would dispose of it at landfill sites appropriate for the nature of the waste. During the operation phase, the facilities are expected to produce waste typical to these facilities, including used compressor and generator oil and filters, air filters and domestic wastewater. Qualified contractors would collect waste and dispose of it at appropriate facilities.

To control Project waste, PRGT would apply TransCanada's waste management plan, which meets or exceeds requirements under the BC *Environmental Management Act*. Storage and transportation of waste material would be conducted in accordance with the *Transportation of Dangerous Goods Act*, Workplace Hazardous Materials Information System (WHMIS) and any other provincial regulations.

5.0 NISGA'A NATION ENGAGEMENT

The conceptual corridor and marine alternatives traverse Nisga'a Lands within the Nass Area as defined in the Nisga'a Final Agreement. The Nisga'a Nation owns and has control over development on Nisga'a Lands and has rights within the broader Nass Area. The Nisga'a Lisims Government is the regulatory authority on Nisga'a Lands, which include the following four individual villages:

- Village of Gitlaxt'aamiks
- Village of Laxgalts'ap
- Village of Gitwinkshihikw
- Village of Gingoix

Since the Project was announced in January 2013, the Nisga'a Lisims Government has been provided with initial Project information materials, including a letter introducing the Project and a Project map. PRGT expects that as dialogue progresses with the Nisga'a, further information will be available to contribute to identifying potential environmental and socio-economic effects, as well as to support a dialogue about effective avoidance, mitigation and management measures. In addition, PRGT expects to carry out Archaeological and Heritage studies as described in Section 8.8**.**

PRGT seeks meaningful and respectful engagement with the Nisga'a Lisims Government. The approach to engagement will depend on the wishes and needs of the Nisga'a. The goals of the Project engagement program are to:

- build and maintain a positive long-term relationship with the Nisga'a Nation
- comply with all applicable Nisga'a laws in respect of Nisga'a Lands
- ensure that input and concerns from the Nisga'a Nation are gathered, understood and integrated into Project design and execution as appropriate
- ensure that concerns and issues with respect to environmental or socio-economic effects related to the Nisga'a Nation are addressed, as appropriate
- ensure that the Nisga'a Nation are aware of how their input has shaped or affected project planning and the design process

To help achieve these goals, an assessment according to 8(e) and 8(f) of Chapter 10 the Nisga'a Final Agreement will be undertaken as part of the environmental assessment.

6.0 ABORIGINAL ENGAGEMENT

TransCanada seeks meaningful and respectful engagement with Aboriginal people. The approach to engagement will depend on the particular Aboriginal group being consulted and may change over time, depending on the wishes and needs of the communities involved. The goals of the Project engagement program are to:

- build and maintain positive long-term relationships with Aboriginal groups potentially affected by the Project
- ensure that input and concerns from Aboriginal groups are gathered, understood and integrated into Project design and execution as appropriate
- ensure that concerns and issues with respect to environmental or socio-economic effects related to Aboriginal groups are addressed, as appropriate
- ensure that Aboriginal groups are aware of how their input has shaped or affected Project planning and the design process

In compliance with BC Environmental Assessment Office (EAO) requirements, PRGT will develop and submit an Aboriginal Consultation Plan for approval by the EAO.

6.1 ABORIGINAL GROUPS

The conceptual corridor and marine alternatives cross areas of Treaty 8, as well as the claimed territories or areas of potential interest of more than 20 Aboriginal groups (see list in Table 6-1). As discussions with Aboriginal groups continue, some may determine that they do not have an interest in the Project. Conversely, there may be others that have not yet been identified that may assert an interest in the Project. In both cases, the Project will work with the Aboriginal groups and adjust engagement accordingly.

The potential environmental effects of the Project may affect various aspects of the livelihood and use of traditional resources of Aboriginal people along the conceptual corridor, including the marine alternatives. Potential effects may include impacts to fishing, including commercial fisheries, hunting, trapping and harvesting of plants. Potential effects on Aboriginal people will be considered and mitigation developed through the Project's ongoing program of Aboriginal engagement. Additional mitigation will be facilitated through the integration of traditional ecological knowledge and the results of traditional land use studies in the environmental assessment for the Project.

6.2 ABORIGINAL ENGAGEMENT ACTIVITIES COMPLETED TO DATE

Since the Project was announced in January 2013, all potentially affected Aboriginal groups have been provided with initial Project information materials, including a

letter introducing the Project and a Project map. PRGT is engaging with potentially affected Aboriginal groups along the conceptual corridor and marine alternatives.

Although engagement with Aboriginal communities is in its early stages, some communities have expressed concerns or interests relating to the cumulative effects from proposed projects, as well as the potential effects on watercourses, wildlife and wildlife habitat, and the marine environment. Other issues identified include employment and economic opportunities as well as concerns relating to routing. PRGT expects that as dialogue progresses, further information will be available to contribute to identifying potential environmental and socio-economic effects, as well as to support a dialogue about effective avoidance, mitigation and management measures. In addition, PRGT expects to carry out archaeological, heritage and traditional land use studies as described in Section 8.8**.**

Table 6-1: Aboriginal Groups

First Nations	
Gitanyow (includes Hereditary Chiefs and Band Council)	Gitxsan Nation (includes Hereditary Chiefs and Band Councils)
Blueberry River First Nations	Saulteau First Nations
Gitxaala Nation	Doig River First Nation
Fort Nelson First Nation	Kwadacha Nation
Kitselas Nation	Kitsumkalum First Nation
Lake Babine Nation	Lax Kw'alaams First Nation
Metlakatla Indian Band	McLeod Lake Indian Band
Takla Lake First Nation	West Moberly First Nations
Halfway River First Nation	Prophet River First Nation
Nak'azdli First Nation	Tsay Keh Dene First Nation
Tribal Councils and Associations	
Carrier Sekani Tribal Council	Treaty 8 Tribal Association
Métis Organizations	
Métis Nation British Columbia	Kelly Lake Métis Settlement Society

Engagement with Aboriginal groups is continuing with the following objectives:

- continue to build understanding and awareness of the Project
- understand how individual Aboriginal groups wish to be consulted
- gather preliminary information on Aboriginal interests and concerns

The Project Description will be shared with Aboriginal groups. The draft Application Information Requirements (AIR) and eventually aspects of the draft Environmental Assessment Certificate (EAC) Application will also be shared with Aboriginal groups and their feedback sought and considered. Input from Aboriginal groups will inform PRGT's approach to its regulatory applications.

7.0 PUBLIC ENGAGEMENT

PRGT strives to engage stakeholders early and often. This means listening, providing accurate information and responding to stakeholder interests in a prompt and consistent manner. The engagement objectives are to:

- identify potentially interested stakeholders and the nature of their interests
- provide timely and accurate information to allow for informed, effective and meaningful engagement with the public
- provide information about the need for the Project, process of approvals, construction practices and potential effects
- ensure that stakeholders have information on how to be involved in the regulatory process (e.g., BC EAO, CEAA and BC OGC approval processes)
- ensure that all communications materials are consistent, straightforward and easy to understand
- ensure there are a variety of means for stakeholders to get involved in the process
- ensure that stakeholder issues and concerns are gathered, understood and integrated into project design and execution, as appropriate
- ensure that stakeholders issues are reported to regulators on a regular basis
- ensure that stakeholders are aware of how their input has shaped or affected the design of the process

Throughout the Project, PRGT will engage with the public in several ways, which may include:

- Project website, printed materials and videos
- maintenance of a public contact telephone line and email address providing timely responses to questions and concerns
- discussions with landowners and Crown tenure holders
- open houses, information sessions, workshops and meetings with landowners, local governments and organizations to raise awareness and to identify and address issues and concerns
- Project updates via the Project website, newsletters, activity updates to local governments, and presentations to conferences and community groups
- public notification of events and regulatory milestones as appropriate through advertising, mailings and Project website

7.1 STAKEHOLDER GROUPS IDENTIFIED

The following stakeholder groups have been identified for engagement during the course of the Project:

- federal and provincial government authorities
- local authorities (e.g., elected officials and staff of regional districts and municipalities)
- federal and provincial regulatory agencies
- service providers (e.g., medical responders, protective services, educational institutes, health services, employment and training organizations, etc.)
- community residents (e.g., landowners, tenants and occupants within the conceptual corridor, area residents, landowner associations, etc.)
- land users (e.g., hunters, trappers, recreational users, etc.)
- local industry with operations in the Project area (e.g., oil and gas)
- civic organizations (e.g., business, economic development, employment, training, etc.)
- Environmental Non-Governmental Organizations (ENGOs) and Non-Governmental Organizations (NGOs)

7.2 REGIONAL AND MUNICIPAL GOVERNMENTS POTENTIALLY AFFECTED

A list of regional districts and municipal governments potentially affected by the Project is provided in Table 7-1. The conceptual corridor crosses the boundaries of two municipal districts, namely the District of Hudson Hope and District of Port Edward. It also crosses five regional districts, Bulkley-Nechako Regional District, Fraser-Fort George Regional District, Kitimat-Stikine Regional District, Skeena-Queen Charlotte Regional District and the Peace River Regional District.

Table 7-1: Regional and Municipal Governments Potentially Affected

City of Fort St. John	District of Taylor
City of Prince Rupert	Peace River Regional District
District of Chetwynd	Regional District of Bulkley-Nechako
District of Hudson's Hope	Regional District of Fraser-Fort George
District of MacKenzie	Regional District of Kitimat-Stikine
District of New Hazelton	Skeena-Queen Charlotte Regional District
District of Port Edward	Village of Hazelton

Written materials, including informational brochures, have been provided to the regional and municipal officials and staff. Project representatives will provide in-

person updates to municipal council and regional district boards. The Project team will work at the regional level to inform communities with regard to business and employment opportunities related to the Project.

7.3 PUBLIC ENGAGEMENT ACTIVITIES COMPLETED TO DATE

From January to April 2013 initial meetings were undertaken with representatives from all of the municipal and regional governments identified in Table 6-1. A presentation to the executive committee of the North Central Local Government Association, which included representatives from across the Project area, was held on March 8, 2013.

A Project information package was distributed in March 2013 to federal and provincial government elected officials, potentially affected regional districts and municipalities, provincial regulatory agencies and potentially affected landowners. The package included information about the Project, natural gas pipelines, PRGT and its approach to stakeholder engagement.

The PRGT landowner engagement program began in late February 2013. Approximately 55 landowners have been identified within the conceptual corridor. In early March 2013, notification calls were made to verify contact information, introduce the Project and in-person visits were scheduled. This was followed by in-person visits where information packages were provided, further explanations on the Project were shared and queries and concerns were discussed. An information session for potentially affected landowners was held on March 26, 2013 in the District of Hudson's Hope to provide an opportunity for further dialogue on the Project.

Public information sessions are planned for May 2013 in several communities along the conceptual corridor. At each information session, Project representatives will share information, gather input and respond to questions in order to facilitate continuing dialogue.

Municipal council and regional district board presentations for those along the conceptual corridor are planned for May and June 2013.

7.4 REGULATORY ENGAGEMENT CONDUCTED TO DATE

PRGT commenced its regulatory engagement following the Project announcement in January, 2013. PRGT has introduced the Project and discussed the regulatory process with the following agencies:

- Province of British Columbia:
    - BC Environmental Assessment Office
    - BC Oil & Gas Commission

  - Ministry of Aboriginal Relations and Reconciliation
  - Ministry of Energy & Mines
  - Ministry of Forests, Lands and Natural Resource Operations
- Port of Prince Rupert
- Government of Canada:
  - Canadian Environmental Assessment Agency
  - Natural Resources Canada's Major Projects Management Office
  - Fisheries and Oceans Canada
  - Transport Canada
  - Environment Canada

7.5 KEY DISCUSSION TOPICS AND COMMENTS

The municipal and regional district governments that were contacted from January to the April 2013 indicated their desire to be kept informed during various phases of the Project. Local governments generally reacted positively to news of the Project and to the associated potential benefits to their communities. These benefits could include increased tax revenues, employment and job training, as well as increased economic and business opportunities. Local governments have also expressed an interest in the Project potential effects on the environment, and more specifically, river crossings, wildlife, fisheries habitat and potential social impacts during construction.

Landowner comments during initial meetings included environmental, safety, permitting, agreements, number of pipelines, damage from survey crews, the pipeline route, the depth and size of pipe, increased traffic and the route location.

All concerns and issues raised have been registered and follow-up discussions will take place with the stakeholders and landowners who raised them.

8.0 PROJECT SETTING

This section provides an overview of the conceptual corridor along the general route and describes the physical, atmospheric, acoustic, aquatic, terrestrial, and human environments that will be crossed by the Project. This information is intended to assist government agencies, Aboriginal groups and the public understand the general environmental setting between the start point near Hudson's Hope and the end point at Lelu Island within the District of Port Edward, BC. It will be supplemented as necessary to support the environmental assessment process with data collected through Aboriginal and stakeholder engagement, additional literature review and field studies.

8.1 PIPELINE ROUTE OVERVIEW

As stated earlier, the conceptual corridor extends approximately 750 km from its start near Hudson's Hope to its terminus at Lelu Island, within the District of Port Edward, BC. The corridor is located north of Highway 97 and Highway 16 for its entire length.

From the starting point, the conceptual corridor proceeds south, crossing the Peace River at the upstream end of the Dinosaur Reservoir (approximately at KP 36), and then continues southwest through the Rocky Mountain Foothills and the Hart Ranges of the Rocky Mountains to Williston Lake (Reservoir) at KP 149. The corridor crosses the Parsnip Reach of Williston Lake immediately north of Heather – Dina Lakes Park, approximately 30 km north of the District of Mackenzie.

The conceptual corridor proceeds west for roughly 375 km from Williston Reservoir, passing on the north side of Takla Lake (KP 365), Babine River Route Park, and Kisgega Indian Reserve (KP455) to Highway 37 (KP 525) where it turns southwest. Through this section of the province, the conceptual corridor passes through the southern Omineca Mountains, Kotsine Pass (west of Takla Lake), along upper Skeena River Valley, and crosses the Kispiox River.

West of Highway 37, the conceptual corridor parallels the Nisga'a Highway, Cranberry River and then the Nass River. The conceptual corridor is located within Nisga'a Lands from KP 564 through KP 649. Near Portland Channel (KP630) it turns southwest and enters the Coastal Mountains. Through this range, the conceptual corridor crosses Ksi X'anmaas Conservancy, Khutzeymateen Inlet Conservancy, Khutzeymateen Inlet (KP692), Work Channel (KP 712), and Woodworth Lake Conservancy before terminating at Lelu Island within the District of Port Edward.

8.1.1 Marine Alternatives

Alternative 1

The marine section of Alternative 1 is approximately 186 km long and commences at the eastern end of Alice Arm and is then routed along the seabed from Alice Arm and into Observatory Inlet. The route then runs through Observatory Inlet into Portland Inlet and then into Chatham Sound. The pipeline route then proceeds southward through the sound and terminates at Lelu Island. The submarine section of this route involves the installation of two concrete-covered steel pipes laid on the seabed. The maximum water depth on the route is about 626 m and the sea bed topography varies along the route.

Alternative 2

The marine section of Alternative 2 is approximately 100 km long and commences at the northern end of Nasoga Gulf and runs south westward along the gulf seabed and into Portland Inlet. From Portland Inlet the pipeline follows a similar route as Alternative 1 by running along Portland Inlet and into Chatham Sound. The pipeline runs southwards through the sound ending at Lelu Island. The marine section of this route involves the installation of two steel concrete covered pipes laid on the seabed. The maximum water depth on the route is about 626 m and the sea bed topography varies along the route.

8.2 PHYSICAL ENVIRONMENT

The pipeline route passes through six of the nine physiographic regions in BC as described from east to west below:

- The Alberta Plateau subdivision of the Interior Plains (Fort Nelson Lowlands sub region) is characterized by flat and gently flowing uplands that are drained and incised by the Peace River. The region is primarily underlain by folded sedimentary rock comprised of a thick layer of shales from the Fort Saint John Group.
- The Rocky Mountains and Rocky Mountain Foothills are characterized by rugged terrain reaching elevations up to 2,150 m. The region is primarily underlain by Paleozoic folded sedimentary rock.
- The Rocky Mountain Trench separates the Rocky Mountains on its east from the Columbia and Cassiar Mountains on its west. Williston Lake fills the basin of the upper Peace River backing into the Rocky Mountain Trench.
- The Cassiar-Columbia Mountains (Omineca Mountains sub region) are a broad band of rugged mountains consisting predominantly of granite. Glaciation has produced an intersecting pattern of east-west and north-south ridges and valleys.

- The Central Plateau and Mountains comprise the Interior Plateau, Skeena Mountains, and Nass Basin sub regions. The Skeena Mountains are a distinctive feature largely made up of complex folded sedimentary rock with peaks between 1,800 m and 2,300 m. They are drained by the Stikine, Nass and Skeena river systems.
- The Coast Mountains extend as an unbroken mountain chain from the Fraser River northward for approximately 1,600 km into the Yukon Territory. Their width ranges from a minimum 55 km to a maximum of 160 km. The mountains are comprised of sedimentary and volcanic rock of middle Jurassic and older age. Peaks in the Kitimat Range reach 2,750 m but most summits are below 2,400 m. Alpine areas are typically glaciated.

Mapping available from Natural Resources Canada (NRCan) was used to identify that the conceptual corridor crosses regions with isolated patches of permafrost (0-10%) (NRCan 1995). The mapping also indicates that the conceptual corridor crosses an area within the vicinity of historical major flooding (NRCan 2007a) and areas of low to moderate seismic hazard (NRCan 2010). The corridor also affects several areas within the vicinity of historical forest fire hotspots before 2009 and areas that have historically experienced low to high fire severity level ratings (NRCan 2009a, 2009b).

There are no historical indications of major landslides causing mortality, major tornadoes, major hailstorms or major avalanches in the vicinity of the conceptual corridor (NRCan 2009c, 2007).

Studies to be carried out during the Project design phase will collect information about potential acid rock draining, geohazards and other unique terrain features that require specific consideration in the design of the pipeline and the development of construction and reclamation techniques.

8.3 ATMOSPHERIC ENVIRONMENT

The pipeline route crosses several climatic regions of British Columbia, which are defined by their topography and distance from the Pacific Ocean. Characteristics of these climate zones, from east to west, are briefly described below.

The conceptual corridor begins in the Peace River region of Northeast BC, which consists of rolling prairie and Rock Mountain foothills. The Rocky Mountains act as a barrier for weather systems, making the climate of this region more like that of Alberta than the rest of British Columbia (NAV CANADA 2001). Winters are dominated by cold high pressure systems and frequent temperature inversions, with valley bottoms containing the coldest air. However, this pattern is occasionally disrupted when strong south-westerly flow over the Rockies produces Chinook winds to the lee of the mountains, which can rapidly warm surface temperature to above freezing. This changeable character of the region's weather is reflected in the

temperature record from the Chetwynd airport, where the extreme minimum and maximum temperatures recorded in January are −52.0ºC and 15.2ºC, respectively. The Chinook winds can be very strong and gusty near the Rockies and in the foothills.

A majority of the annual precipitation for northeast BC comes in the summer months when convective showers and thunderstorms are common, particularly in June and July. Pacific frontal systems can at times remain intact as they cross the Rockies, bringing episodes of more steady rainfall, typically lasting one day, during the summer and fall seasons. Annual precipitation at Chetwynd averages 448 mm. Precipitation is much higher in the Rockies, where winter snowpacks typically reach 1-2 metres in depth.

West of the Rockies the conceptual corridor passes through the Northern Interior, which is a broad region of plateaus, mountain ranges, and river valleys. The Northern Interior generally has a continental climate, but the Rockies often shield the region from the more severe cold air masses found over the prairies. Winter weather alternates between cold, clear conditions under high pressure and periods of snowfall from frontal systems. During summer, convective precipitation dominates with diurnal showers and thunderstorms forming over the higher terrain. Precipitation is enhanced on the windward side of mountain ranges, particularly the Skeena Mountains, where late winter snowpacks can exceed 2 metres depth. Owing to the remoteness of this section of the conceptual corridor, weather records are sparse. Climate data from Hazelton (south of the proposed conceptual corridor) show average annual precipitation totalling 614 mm with 185 cm of snowfall and monthly average temperatures ranging from −8.9ºC in January to 16.3ºC in July.

West of the Skeena Mountains, the conceptual corridor enters increasingly moist, marine-influenced terrain, culminating in the temperate rain forests that surround Prince Rupert. Here, the influence of the semi-permanent Aleutian Low is felt year-round, with the prevailing south-westerly flow ushering frontal systems across the area with high frequency. Some of the fall and winter weather systems include strong winds and heavy precipitation. The Coast Mountains feature deep snowpacks that persist into summer, while sea level locations receive most of the annual precipitation as rain. Dry periods of several days occur in winter when outflow winds of cold air from Interior high pressure systems reach the coast via mountain passes. Summertime dry spells occur when the Pacific High expands northward, thereby shunting frontal systems farther north into Alaska. The Port Edward area and specifically, Prince Rupert, ranks as the wettest city in Canada, with an average annual precipitation of 2,594 mm at the airport and greater amounts at higher elevations.

8.4 ACOUSTIC ENVIRONMENT

Background sound levels along the Project conceptual corridor include vehicle and truck traffic along major highways and active Forest Service roads, as well as

industrial activities including mining and forestry. Much of the proposed pipeline conceptual corridor crosses rural settings with few receptors.

The background sound levels near traffic corridors and Forest Service roads can vary, depending on the topography, traffic volume and type of vehicles. Background sound level close to industrial activities (mining and forestry) will depend on the acoustic energy (sound power level) associated with the industrial development.

8.5 AQUATIC SPECIES, FISH AND FISH HABITAT

The pipeline conceptual corridor crosses approximately 1,340 watercourses mapped using the 1:20,000 scale provincial water layer. These watercourses are located in five major drainage basins, including the Peace River (upper and lower), Fraser River, Skeena River, Nass River, and North Coast fjords and watershed drainage basins. A detailed list of the major watercourses crossed by the conceptual corridor and fish species presence can be found in Appendix G. An overview of the freshwater and marine aquatic resources found along the conceptual corridor is presented in the following sections.

8.5.1 Freshwater

Lower Peace River Basin

The conceptual corridor crossing location on the Peace River is located immediately downstream from the W.A.C. Bennett Dam at Dinosaur Reservoir. All tributaries crossed by the conceptual corridor in Lower Peace River basin are third and fourth order watercourses that flow directly into the Peace River mainstem or the Dinosaur Lake Reservoir. Tributaries of the Peace River mainstem include Mackie Creek, Brenot Creek, and Lynx Creek. The Dinosaur Lake Reservoir tributaries include Track Creek, Dowling Creek and Gething Creek.

Fish species known to occur within the Lower Peace River Basin include Arctic grayling, bull trout, cutthroat trout, rainbow trout, eastern brook trout, Kokanee, mountain whitefish, burbot, northern pike, northern redbelly dace, and other warm water fish species. Species assemblages are separated by the W.A.C. Bennett Dam on the Peace River.

Species of concern in the Lower Peace River Basin include provincially blue-listed (special concern – particularly sensitive or vulnerable to human activities or natural events) northern redbelly dace, bull trout, and cutthroat trout. Cutthroat trout are also designated a species of special concern under the *Species at Risk Act* (SARA).

Upper Peace River Basin

Created by the W.A.C. Bennett Dam, Williston Lake Reservoir fills the basin of the Upper Peace River. A number of major tributaries and the Parsnip Reach of Williston Lake are crossed by the proposed conceptual corridor. Carbon Creek, Mcallister Creek, Clearwater Creek, and Cut Thumb Creek flow directly into Williston Lake. Gaffney Creek is a tributary of the Manson River which flows into Parsnip Reach. Kwanika Creek is a tributary of the Nation River which flows into the Nation Arm of Williston Lake. Tom Creek is tributary of the Omineca River which flows into the Omineca Arm of Williston Lake.

Fish species known to occur in the Upper Peace River Basin include Arctic grayling, bull trout, lake trout, rainbow trout, kokanee, mountain whitefish, burbot, largescale sucker and other warm water fish species.

Species of concern occurring along this section of the conceptual corridor include bull trout, a blue-listed species in BC.

Fraser River Basin

The Fraser River flows approximately 1,400 km from the British Columbia-Alberta Border to the Pacific Ocean and includes thirteen secondary watersheds. The conceptual corridor crosses several watercourses within the Stuart-Takla watershed including the Driftwood and Kotsine Rivers, as well as Hudson Bay Creek, French Creek, Sitlika Creek, Bates Creek, and Elmore Creek.

Fish species known to occur within the Stuart-Takla watershed of the Fraser River drainage include chinook, coho, sockeye, pink, kokanee and steelhead salmon, cutthroat trout, rainbow trout, bull trout, Dolly Varden, bull trout, lake trout, brook trout, mountain whitefish, white sturgeon, burbot, and other warm water species.

Species of concern in the Fraser River Basin include provincially blue-listed bull trout, and cutthroat trout. Cutthroat trout are also designated a species of special concern under SARA. White sturgeon is provincially red-listed and listed as endangered by COSEWIC and SARA, and while they do not occur in any of the watercourses crossed by the conceptual corridor, they have been observed in watercourses downstream in the Fraser Basin.

Skeena River Basin

The Skeena River flows northwest from its headwaters to its confluence with the Bulkley River near Hazelton. The Williston River to New Aiyansh segment of the conceptual corridor crosses several rivers within the Skeena River Basin including the Nilkitkwa, Shalagyote, Skeena and Kispiox rivers. In addition, several third, fourth, and fifth order tributaries are crossed by the conceptual corridor. These include

Hanawald, Shenismike, Shedin, Sam Green, Blackstock, Carrigan, Cullon, Ironside, Steep Canyon, and Beaverlodge creeks.

Fish species known to occur within the Skeena River and its tributaries include chinook, chum, coho, pink and sockeye salmon, cutthroat trout, rainbow trout, summer and winter-run steelhead, Dolly Varden, bull trout, kokanee, mountain whitefish, eulachon, longfin smelt, green sturgeon, burbot, brook lamprey, pacific lamprey, and other warmwater fish species. The Skeena River system provides world class fisheries for Pacific salmon and steelhead.

Species of concern in the Skeena River Basin include green sturgeon which are provincially red-listed (threatened or endangered) and a species of special concern under SARA and COSEWIC, and blue-listed bull trout, eulachon, and cutthroat trout. Cutthroat trout are also designated a species of special concern under SARA. Eulachon are listed as threatened or endangered by COSEWIC.

Nass River Basin

The Nass River flows 380 km from the Coast Mountains southwest to Nass Bay within the Portland Inlet. The New Aiyansh to Lelu Island segment of the conceptual corridor crosses the Lower Nass River, and several of its larger tributaries including the Cranberry, Kiteen, Ksga'maal, Ksi Ts'oohl Ts'ap, and Ksi Hlginx Rivers. Smaller third and fourth order tributaries include Aluk Creek, Ginmiltkun Creek, North Seasinnish Creek, Chemainuk Creek, Kwinyarh Creek, Ksemamaith Creek, Ksi Mat'in, and Voshell Creek.

Fish species known to occur on the Nass River Basin include chinook, chum, sockeye, pink, and coho salmon, steelhead, rainbow trout, cutthroat trout, bull trout, Dolly Varden, eulachon, green sturgeon, mountain whitefish, lamprey, sculpin, and stickleback. Nass River salmon stocks are heavily managed through the Nisga'a Fisheries Program. The eulachon run in the Nass River is the largest found in British Columbia.

Species of concern in the Nass River Basin include green sturgeon which are provincially red-listed and a species of special concern under SARA and COSEWIC, and blue-listed bull trout, eulachon, and cutthroat trout. Cutthroat trout are also designated a species of special concern under SARA. Eulachon are listed as threatened or endangered by COSEWIC.

North Coast Fjords and Rivers

South of the Nass River Basin, the conceptual corridor traverses the Ksi X'anamas River and then turns south across the Khutzeymateen Inlet and the Work Channel. In addition to the fjord crossings, the conceptual corridor crosses the Ensheshese, Kloiya, and Shawatlan rivers and Mouse Creek.

Fish species known to occur in these watercourses include chinook, chum, sockeye, pink, and coho salmon, steelhead, rainbow trout, cutthroat trout, and Dolly Varden. The only species of concern occurring along this section of the proposed pipeline is cutthroat trout, which are a blue-listed species in BC and designated as a species of special concern under SARA.

8.5.2 Marine Alternatives

As previously described, the marine alternatives traverse through portions of coastal and marine environments.

The waters of Chatham Sound and Hecate Strait are part of the Pacific North Coast Integrated Management Area (PNCIMA) and a recognized transition zone between coastal tidal mixing and nutrient upwelling. This results in a seasonal increase in fish community structure and a broad distribution of marine life within the region.

Habitat-providing species, such as corals, eelgrass, kelps, rockweed and other algae, are found within Chatham Sound and Portland Inlet. Corals found in deeper waters of Chatham Sound include *Gorgonacea sp.* (DFO 2006) and *Primnoa sp.* (McKenna et al. 2009). *Gorgonacea sp.* and *Pennatulacea sp.* have also been found within deep waters of Work Channel and *Scleractinia sp.* have been found near Prince Rupert (DFO 2006). Coastal environments in Chatham Sound and Portland Inlet range from rocky shores to large tidal sand/mud flats, supporting algae and potentially eelgrass. Dominant algal species include bull kelp (*Nereocystis luetkeana*), rockweed (*Fucus spp.*) and sea lettuce (*Ulva spp.*). There is a large, well-known eelgrass bed on Flora Bank that provides important habitat for a variety of marine species. Eelgrass distribution throughout Chatham Sound and Portland Inlet is not well-known but eelgrass may be present in shallow coastal areas.

Chatham Sound and Hecate Strait are an important movement route and marine rearing and staging area for juvenile and adult salmonids. Chinook, chum, coho, pink, and sockeye salmon are commercially harvested within the region. Other species of commercial, recreational, and First Nations interest within Hecate Strait include rockfish, perch, Pacific cod, sole, lingcod, sablefish, Pollock, hake, skate, halibut, shrimp, Pacific herring, eulachon, crab and green urchin. Harvesting methods include offshore shrimp trawl, commercial crab harvesting, and commercial net-fishing and trolling.

A number of marine mammal species, including baleen whales, toothed whales, pinnipeds, and mustelids, use this marine region as an important area for migration, breeding, and foraging throughout much of the year. The pelagic waters and adjacent shorelines and bays are used seasonally by both resident and migrating marine bird species. These include a diversity of pelagic seabirds, waterfowl, shorebirds, waders, raptors, and scavenger birds such as gulls and petrels. A number of these marine mammal and bird species are listed under the SARA.

8.6 TERRESTRIAL ENVIRONMENT

8.6.1 Soils

The conceptual corridor crosses agricultural land including several areas that are designated as Agricultural Land Reserves (ALRs). A preliminary site review indicates that some compressor stations and metering facilities may be located on ALR land. Further site reviews and data collection will confirm the proposed locations to be included in the environmental assessment. Detailed soils investigations will be completed on agricultural land. Soil parent materials differ along the project corridor, but are expected to consist mainly of till, and glaciofluvial and glaciolacustrine deposits.

The conceptual corridor crosses previously developed land, some of which may have been used for industrial purposes. During the continued development of the Project, detailed information will be collected to identify the existence of contaminated soils in areas to be disturbed for construction, and to the extent that contaminated soil is encountered, appropriate management measures will be implemented, as required.

8.6.2 Vegetation

The conceptual corridor traverses seven biogeoclimatic (BGC) zones, large geographic areas each characterized by unique vegetation, soils, topography and macroclimate. An overview of common vegetation species found within each BGC zone as well as information on rare plant and ecological community occurrences and Old-Growth Management Areas (OGMAs) is provided below.

Boreal White and Black Spruce (BWBS)

The Acre Interconnect to Williston River conceptual corridor segment crosses the Boreal White and Black Spruce biogeoclimatic zone (BWBS), a mixture of upland forests, rich fens and swamps ranging from 400 m to 1200 m in elevation. Mixed stands of white spruce and aspen, or black spruce and lodge pole pine are found within upland regions of the BWBS with varying abundance of willow, alder and birch. Black spruce-moss forests dominate poorly-drained wetter sites, while lodge pole pine-lichen forests occupy well-drained drier sites. White spruce and balsam poplar stands form along riparian routes and river valleys. Tamarack occurs in solid stands within fens and swamps or in association with stunted black spruce. Grassland and scrub communities occur within drier portions of the BWBS.

Sub-Boreal Spruce (SBS)

Bordering the BWBS to the west, the Sub-Boreal Spruce zone (SBS) occurs between 600 m and 1300 m. Hybrid white spruce and subalpine fir dominate old-growth stands with lodge pole pine, trembling aspen and paper birch occupying younger forests. Black spruce and balsam poplar are prevalent on wetter alluvial sites. Sitka

alder grows under spruce-fir forests and mountain alder is common in riparian zones. Wetland communities are dominated by willow, scrub birch, sedges and Sphagnum moss within the SBS.

Engelmann Spruce-Subalpine Fir (ESSF)

The Engelmann Spruce-Subalpine Fir zone (ESSF) has a subalpine boreal climate and occurs at high elevations within the Rocky Mountains, Skeena, Babine, and Omineca ranges. Engelmann spruce and subalpine fir dominate the forested regions within the ESSF, with lesser amounts of lodge pole pine on drier sites. Western hemlock, Douglas-fir, and western red cedar occur at lower elevations within select subzones. Mountain hemlock, limber pine, and alpine larch occur with less frequency at higher elevations within the ESSF.

Alpine Tundra (AT)

The Alpine Tundra zone (AT) occurs at higher elevations in mountainous areas along the conceptual corridor. Precipitation in the AT ranges from 700-3000 mm, most falling as snow during the winter months. Vegetation is limited to low-growing shrubs, trees (in stunted or krummolz form), and mat-forming herbs, bryophytes, lichens, and sedge meadows. Soils are thin in the AT, and the growing season is short.

Interior Cedar-Hemlock (ICH)

The Interior Cedar-Hemlock zone (ICH) is found east of the Coast Mountains at low-mid elevations in the Nass River Basin, parts of the Skeena Basin, and on lower slopes within the Rocky Mountains. Western hemlock and western red cedar dominate old-growth stands. Subalpine fir and Engelmann spruce are important climax species within the ICH. Subalpine fir occurs to a lesser extent with Douglas-fir, lodge pole pine, ponderosa pine, western white pine, and western larch occurring as early seral species.

Mountain Hemlock (MH)

The Mountain Hemlock (MH) zone occurs at subalpine elevations along the Coastal Mountains at elevations from 400 m to 1000 m. Two subzones of the MH; the wet hyper-maritime subzone (MHwh) on the outer coast of the northern mainland, and moist maritime subzone (MHmm) within the Coastal Mountains both occupy the western portion of the conceptual corridor. Precipitation in the MHwh can exceed 4500 mm annually, while average precipitation in the MHmm varies between 2000 mm and 3500 mm within the Coastal Mountains.

Coastal Western Hemlock (CWH)

West of the Coastal Mountains, the Coastal Western Hemlock zone (CWH) occurs at low to mid-elevations along the coastal portion of the conceptual corridor. The CWH

borders the MH at higher elevations with 10 subzones of varying precipitation and continental influence. Western hemlock and western red cedar occur throughout the CWH with varying amounts of Douglas-fir, amabilis fir, yellow-cedar, shore pine, alder, cottonwood, and Sitka spruce depending on elevation and latitude.

Rare Plants and Ecological Communities

Two hundred and eighty six provincially listed plant species are listed as occurring within the Forest Regions and biogeoclimatic zones intersected by the conceptual corridor. Two hundred and two of these are blue-listed (of special concern) and eighty four are red-listed (endangered or threatened). Four of these species are listed on Schedule 1 of the Federal *Species at Risk Act* (SARA) as identified in Table 8-1.

One hundred and thirty-two provincially listed ecological communities are associated with the Forest Districts and BGC zones intersected by the conceptual corridor. Ninety - eight of these communities are blue-listed and 34 are red-listed. The federal *Species at Risk Act* does not track, rank, or regulate ecological communities.

Table 8-1: SARA (Schedule 1) Listed Plant Species Potentially Occurring along the Conceptual Corridor

Common Name	Scientific Name	SARA Status
Haller's Apple Moss	Bartramia halleriana	Threatened
Cryptic Paw	Nephroma occultum	Special Concern
Whitebark Pine	Pinus albicaulis	Endangered
Old growth specklebelly	Pseudocyphellaria rainierensis	Special Concern

Old Growth Management Areas

Although the conceptual corridor is expected to, where possible, avoid mature and old growth forest areas, portions of the conceptual corridor may overlap several old growth forests including several areas that are designated by MFLNRO as Old Growth Management Areas (OGMAs). However, the OGC has not adopted these areas under the OGOA and OGC has not yet established any OGMAs.

Wetlands

Various wetlands occur throughout the seven biogeoclimatic zones crossed by the conceptual corridor. From semi-terrestrial fens, bogs, and swamps to semi-aquatic marshes, estuaries and shallow open water, these wetlands and flood plain ecosystems contain several ecologically sensitive plant communities. Thirty six blue-listed and 12 red-listed ecologically sensitive plant communities associated with the Forest Districts and BGC zones intersected by the conceptual corridor occur within estuarine or freshwater wetlands communities.

8.6.3 Wildlife

The conceptual corridor traverses three BC Ministry of Environment regions: Peace, Omineca, and Skeena. Across these regions, more than 250 species of amphibians, reptiles, birds and mammals are likely to occur within all or a portion of the conceptual corridor. Of the species known or likely to occur, 76 are recognized as species of management concern. These include 34 species federally designated on Schedule 1 or 3 or the *Species at Risk Act* (SARA), 40 species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and 72 species listed as Red (endangered or threatened) or Blue (special concern) by the province of British Columbia. Some species are represented by more than one category. Table 8-2 summarizes designated species of management concern.

Table 8-2: Designated Species of Management Concern

Common Name	Scientific Name	SARA Status
Blue Whale	*Balaenoptera musculus*	Endangered – Schedule 1
Fin Whale	*Balaenoptera physalus*	Threatened – Schedule 1
Grey Whale	*Eschrichtius robustus*	Special Concern – Schedule 1
Grizzly Bear	*Ursus arctos*	Special Concern – Schedule 3
Harbour Porpoise	*Phocoena phocoena*	Special Concern – Schedule 1
Humpback Whale	*Megaptera novaeangliae*	Threatened – Schedule 1
Keen's Myotis	*Myotis Keenii*	Special Concern – Schedule 3
Killer Whale (Northeast Pacific northern resident population)	*Orcinus orca*	Threatened – Schedule 1
North Pacific Right Whale	*Eubalaena japonica*	Endangered – Schedule 1
Sea Otter	*Enhydra lutris*	Special Concern – Schedule 1
Sei Whale	*Balaenoptera borealis*	Endangered – Schedule 1
Steller Sea Lion	*Eumetopias jubatus*	Special Concern – Schedule 1
Woodland Caribou (Northern Mountain Population)	*Rangifer tarandus*	Special Concern – Schedule 1
Ancient Murrelet	*Synthliboramphus antiquus*	Special Concern – Schedule 1
Band-tailed Pigeon	*Patagioenas fasciata*	Special Concern – Schedule 1
Black-footed Albatross	*Phoebastria nigripes*	Special Concern – Schedule 1
Canada Warbler	*Cardellina Canadensis*	Threatened – Schedule 1
Common Nighthawk	*Chordeiles minor*	Threatened – Schedule 1
Great Blue Heron	*Ardea herodias fannini*	Special Concern – Schedule 1
Long-billed Curlew	*Numenius americanus*	Special Concern – Schedule 1
Marbled Murrelet	*Brachyramphus marmoratus*	Threatened – Schedule 1
Northern Goshawk	*Accipiter gentilis laingi*	Threatened – Schedule 1
Olive-sided Flycatcher	*Contopus cooperi*	Threatened – Schedule 1
Peregrine Falcon	*Falco peregrinus anatum*	Threatened – Schedule 1
Peregrine Falcon	*Falco peregrinus pealei*	Special Concern – Schedule 1

Common Name	Scientific Name	SARA Status
Pink-footed Shearwater	*Puffinus creatopus*	Threatened – Schedule 1
Red Knot	*Calidris canutus*	Endangered / Threatened – Schedule 1
Rusty Blackbird	*Euphagus carolinus*	Special Concern – Schedule 1
Short-eared Owl	*Asio flammeus*	Special Concern – Schedule 1
Short-tailed Albatross	*Phoebastria albatrus*	Threatened – Schedule 1
Western Screech-owl	*Megascops kennicottii kennicottii*	Special Concern – Schedule 1
Yellow Rail	*Coturnicops noveboracensis*	Special Concern – Schedule 1
Coastal Tailed Frog	*Ascaphus truei*	Special Concern – Schedule 1
Western Toad	*Anaxyrus boreas*	Special Concern – Schedule 1

In addition to species designated provincially and federally, several species are recognized as being important to First Nations, Aboriginal groups, and hunters and trappers. Examples of some of these species include:

- American beaver (*Castor canadensis*)
- American mink (*Neovison vison*)
- Marten (*Martes Americana*)
- Canada lynx (*Lynx canadensis*)
- Moose (*Alces alces*)
- Elk (*Cervus canadensis*)
- Mule deer (*Odocoileus hemionus*)
- White-tailed deer (*Odocoileus virginianus*)
- Wolverine (*Gulo gulo*)

The conceptual corridor overlaps four woodland caribou (northern ecotype) herd ranges: Graham, Moberly, Scott and Wolverine. Each of these herds is designated as threatened on Schedule 1 of SARA and Blue-listed in British Columbia. Within the Moberly herd range, the corridor overlaps one Ungulate Winter Range (UWR) designated for caribou; no other UWR for caribou overlaps the corridor. The latest population estimates for these herds are: Graham (208 in 2009), Moberly (25 in 2012), Scott (less than 35 in 2006), and Wolverine (378 in 2008).

Seven areas designated as UWR for mountain goat (*Oreamnos americanus*) overlap the conceptual corridor, primarily in the Coast Range. There are seven grizzly bear population units intersected by the conceptual corridor, which include the Rocky, Moberly, Omineca, Babine, Cranberry, Stewart and Khutzeymateen units. The conceptual corridor is also proximate to one Important Bird Area (IBA BC124) located off the coast of Lelu Island, which ranges from Big Bay to Delusion Bay in Hecate Strait. The IBA is recognized globally and nationally for its tidal rivers and estuaries, saline mud and sand flats, and inlets, coastal cliffs and rocky shores that support concentrations of waterbirds, waterfowl and seabirds.

8.7 HUMAN ENVIRONMENT

8.7.1 Regional and Municipal Populations

Table 8-3 presents communities within 10 km of the proposed pipeline route, while Table 8-4 presents the populations of regional districts and municipalities that may have an interest in the Project.

Table 8-3: Communities within 10 km of the Proposed Pipeline Route

Community	Area Type	Distance to Pipeline (km)
Cranberry Junction	Community	0.56
Gitwinksihlkw	Community	1.5
Hudson's Hope	District Municipality	5.2
Laxgalts'ap	Community	1.2
Nass Camp	Community	1.7
New Aiyansh	Community	6.6
Port Edward	District Municipality	0.60
Prince Rupert	City	8.3

Table 8-4: Regional District and Municipal Population Estimates

Name	Area Type	2012 Population Estimate
Peace River	Regional District	66,167
Chetwynd	District Municipality	2,764
Dawson Creek	City	12,475
Fort St. John	City	20,992
Hudson's Hope	District Municipality	1,074
Pouce Coupe	Village	800
Taylor	District Municipality	1,553
Tumbler Ridge	District Municipality	2,835
Unincorporated Areas	Regional District Unincorporated Area	23,674
Kitimat-Stikine	Regional District	39,722
Hazelton	Village	333
Kitimat	District Municipality	9,009
New Hazelton	District Municipality	611
Stewart	District Municipality	488
Terrace	City	12,182
Unincorporated Areas	Regional District Unincorporated Area	17,099
Fraser-Fort George	Regional District	97,449
Mackenzie	DM	3,772
McBride	Village	690
Prince George	City	76,286
Valemount	Village	1,089
Unincorporated Areas	Regional District Unincorporated Area	15,612
Skeena-Queen Charlotte	Regional District	19,375
Masset	Village	914
Port Clements	Village	447
Port Edward	District Municipality	563
Prince Rupert	City	12,913
Village of Queen Charlotte	Village	940
Unincorporated Areas	Regional District Unincorporated Area	3,598

8.7.2 Regional Development Areas

The conceptual corridor crosses the Peace River, Fraser-Fort George, Kitimat-Stikine, and Skeena-Queen Charlotte regional districts of BC within three BC development regions; the Northeast, the Cariboo, and the Nechako and North Coast. A brief overview of the economic activity and employment resources for each region are provided below.

Northeast Development Region

Peace River Regional District includes Fort St. John and Dawson Creek and is located within the Northeast development region of BC. The Northeast development region

shares a border with Alberta and Yukon, with approximately 37% of the population living in rural areas. The region's industries include forestry, fisheries and mining, with 20% of the region's workforce related to the oil and gas sector. Due to the robust job growth in the oil and gas sector, the oil and gas industry in the region enjoys the highest rate of full-time employment of any region in the province. Other industries in the region include construction, manufacturing, and agriculture. The largest service sectors include wholesale and retail trade, health and social services, and education.

North Coast and Nechako Development Region

The North Coast and Nechako development region includes the northern coastal areas of BC within the Kitimat-Stikine and Skeena-Queen Charlotte with the majority of the population residing in Terrace, Kitimat, or Prince Rupert. Primary industry includes forestry, fisheries, and mining, and the goods and services sectors. The largest goods sector employers for the region include manufacturing, forestry, fishing and mining, and construction, accounting for a total of 30% of the region's workforce. Of the manufacturing jobs, the highest employing industries include wood and lumber production, mineral product manufacturing, food processing, and industrial paper production.

Cariboo Development Region

The Cariboo Development Region covers much of BC's northern interior and includes the regional district of Fraser-Fort George. Forestry, fishing and mining account for 11% of the region's workforce. The goods-producing industry (i.e., agriculture, utilities, construction and manufacturing) employs 28% of workers within the region.

8.7.3 Land Ownership

The conceptual corridor traverses provincial Crown Lands and to a lesser extent private (freehold) lands including several mineral tenures, infrastructure right of ways, and Timber Sales Business Areas.

8.7.4 Land Use

At present, the conceptual corridor supports a variety of activities on private and Crown land. These include:

- traditional uses by Aboriginal peoples
- forestry
- agriculture and grazing
- mining and mineral exploration and development
- oil and gas

- public recreation and tourism (i.e., fishing, hunting and guide outfitting, and trapping)
- protected and recreational areas

The conceptual corridor does not cross any lands previously subject to environmental studies carried out under the *Canadian Environmental Assessment Act;* however, the conceptual corridor crosses areas subject to Land and Resource Management Plans (LRMPs), including Dawson Creek, Mackenzie, Fort St. James, Bulkley, Kispiox, Kalum and North Coast. The conceptual corridor also crosses lands covered by Sustainable Resource Management Plans (SRMPs), including the Mugaha Marsh, Xsu gwin lik'l''inswx: West Babine, Nass South, Kalum South, and the Khutzeymateen Protected Areas Management Plan. The conceptual corridor would also cross lands administered by the Prince Rupert Port Authority. It is anticipated that the proposed conceptual corridor may be proximate to primary or seasonal residences. As detailed routing progresses, all residences within close proximity will be identified and appropriate consultation undertaken.

Forestry

The conceptual corridor crosses forested lands in the three development region areas North Coast, Nechako, and Northeast. Although forestry is in decline in several regions of the province, it is still one of the primary sectors of employment in the North Coast and Nechako Region. Forest products manufacturing is still a major industry in the Bulkley-Nechako Regional District including pulp and pellet-plant operations, bio-energy facilities and value-added wood production.

Agriculture and Grazing

The conceptual corridor crosses agricultural lands in the Northeast, the North Coast the Nechako, and the Cariboo Development Regions. The conceptual corridor crosses private and public agricultural lands including an approximately 12 km segment recognized as Agricultural Land Reserve (ALR). Use of range land in this area is largely limited to use by wildlife.

Mining and Mineral Exploration Development

A wide range of mineral development activities are ongoing within the three development regions crossed by the conceptual corridor. In the Northeast Region, the Peace River coalfield contains an estimated resource of 160 billion tons and extends for 400 km in northeastern BC around Chetwynd. In total, one hundred and forty nine mineral tenures occur within 1.5 km of the proposed conceptual corridor.

Oil and Gas

In recent years, the oil and gas sector has contributed substantially to the economic development of the Northeast, North Coast and Nechako Development Regions. Oil

and gas-related exploration and development activities within these regions include seismic exploration and the construction of pipelines, access roads, well sites, gas processing plants and related facilities. In total, fifty-eight oil and gas tenures occur within 1.5 km of the proposed conceptual corridor.

Public Recreation and Tourism

Fishing

A number of lakes and rivers along the conceptual corridor provide opportunities for recreational fishing.

Hunting and Guide Outfitting

Hunting and guide outfitting provides outdoor recreational opportunities and contributes to the local economy. Hunting by First Nations is also valued culturally, socially and economically.

Non-residents of British Columbia wishing to hunt big game in British Columbia must be accompanied by a licensed Guide Outfitter. Guide outfitting in British Columbia is estimated to contribute $116 M to the British Columbia economy.

Trapping

Approximately 1,500 trapping licences are issued each year in British Columbia, with trapping contributing approximately $1 M to the provincial economy. Trapping by First Nations is also valued culturally, socially and economically.

Protected Areas and Recreation Areas

Parks and protected areas and recreation values add to the tourism industry in northern BC. The conceptual corridor crosses the northwestern tip of Nisga'a Memorial Lava Bed Provincial Park, the southern edge of Gingietl Creek Ecological Reserve, and three conservancies including the Ksi X'Anmass Conservancy, the Khutzeymateen Inlet Conservancy and the Woodworth Lake Conservancy.

Known recreation areas are located in the general vicinity of the conceptual corridor. Outdoor recreational activities, such as hunting, hiking and snowmobiling, are expected to occur throughout the area. Recreational fishing occurs on many watercourses and lakes.

8.7.5 Reserves Defined Under the *Indian Act*

Table 8-5 shows a list of Indian Reserves within 10 km of the conceptual corridor. The conceptual corridor does not cross any Indian Reserves (IRs), as defined under the *Indian Act,* however, it does pass close to the boundary of the Kisgegas IR, a

Gitxsan reserve associated with the Gitanmaax Band. It is not anticipated that the pipeline right-of-way will cross IR lands.

The corridor is also in the vicinity of an additional 28 IRs and a number of First Nations' traditional territories. Section 6.1 includes a preliminary list of First Nations, who have been identified as having potential interest in the Project. This list may change as consultation with the communities and EAO progresses.

Table 8-5: Indian Reserves within 10 km of the Conceptual Corridor

Indian Reserve	Distance from Conceptual Corridor (km)
Kisgegas (Gitanmaax)	0.01
Ensheshese 53 (Lax Kw'alaams)	1.1
Ensheshe 13 (Lax Kw'alaams)	1.2
Cheztainya Lake 11 (Takla Lake)	1.75
Knamadeek 52 (Lax Kw'alaams)	2.3
North Tacla Lake 10	3.1
Ndakdolk 54 (Lax Kw'alaams)	3.4
Lax Kw'alaams 1 (Lax Kw'alaams)	3.8
North Tacla Lake 11A (Takla Lake)	4
Shoowahtlans 4 (Metlakatla)	4.4
Nishanocknawnak 35 (Lax Kw'alaams)	4.6
Tuck Inlet 89 (Metlakatla)	5.4
Kotsine (Skutsil) 2 (Takla Lake)	5.6
Wilnaskancaud 3 (Metlakatla)	5.6
North Tacla Lake 7 (Takla Lake)	6.3
North Tacla Lake 7A (Takla Lake)	6.5
Khutzemateen 49 (Lax Kw'alaams)	6.5
Red Bluff 88 (Lax Kw'alaams)	7.2

Table 8-5: Indian Reserves within 10 km of the Conceptual Corridor (cont'd)

Indian Reserve	Distance from Conceptual Corridor (km)
Spayaks 60 (Lax Kw'alaams)	7.7
Kasika 36 (Lax Kw'alaams)	7.8
Wudzimagon 61 (Lax Kw'alaams)	7.9
Kateen River 39 (Lax Kw'alaams)	8.9
Lachmach 16 (Lax Kw'alaams)	8.9
Wilskaskammel 14 (Lax Kw'alaams)	8.9
Bill Lake 37 (Lax Kw'alaams)	9.1
Dashken 22 (Lax Kw'alaams and Metlakatla)	9.1
North Tacla Lake (West Landing) 8	9.3
Maganktoon 56 (Lax Kw'alaams)	9.4
Spanaknok 57 (Lax Kw'alaams)	9.8

8.8 ARCHAEOLOGICAL AND HERITAGE RESOURCES

Heritage Resources are non-renewable resources managed under the BC *Heritage Conservation Act*, and the BC Archaeological Impact Assessment Guidelines. Heritage sites are locations that have significance and cultural value for BC.

Aboriginal interests are also taken into consideration in the management of heritage resources. These resources are important and of value to the scientific, cultural and public communities. In BC, archaeological sites predating 1846 AD are administered by the Archaeology Branch as specified in the BC Archaeological Resource Management Handbook. The BC MFLNRO is responsible for structures and sites of historical age (post-1846). However, post-1846 Aboriginal heritage sites are considered in assessments under BCEAA and CEAA and may be protected under the *Heritage Conservation Act* under agreement with Aboriginal groups. The conceptual corridor crosses several archaeologically recognized cultural areas that are characterized by regional adaptations to local environments spanning the last 12,000 years. Although many portions along the conceptual corridor have not been investigated for cultural remains, regional information is available for estimating the nature and time of past land occupation. An Archaeological Impact Assessment (AIA) will be conducted for all areas that might be disturbed during construction of the Project. Areas of moderate and high archaeological potential will be identified, surveyed and assessed.

8.8.1 Traditional Ecological Knowledge and Traditional Land Use

Prince Rupert Gas Transmission has initiated an engagement process with potentially affected Aboriginal groups in BC (see Section 6.0). PRGT will provide opportunities

to participate in Traditional Knowledge (TK) and Traditional Land Use (TLU) studies to First Nations whose territories are impacted by the Project.

Such studies will focus on the current use of land and marine resources for traditional purposes in the study areas identified by the Aboriginal community, and will be used to collect knowledge regarding the significance of the sites identified during fieldwork. These studies will be used to identify the potential for:

- effects on traditional activities that could be caused by pipeline construction and operations
- effects on heritage and culturally important structures or sites
- effects on species (e.g., caribou) important to traditional hunting activities
- increased access to land

9.0 POTENTIAL PROJECT EFFECTS

The following descriptions provide a brief overview of key potential environmental, social, economic, heritage and health effects, as they are currently understood, that may arise from construction and operation of the Project. These issues, and others that are identified through further study and engagement, will be addressed in the environmental assessment.

Valued Components (VCs) are specific attributes within the broader categories of environmental, heritage, economic, health and social matters that may be affected by the proposed Project. They are generally selected with regard to their importance to people and ecosystems, and the potential for the proposed project to interact with them. The selected VCs and associated indicators provide useful categories on which to evaluate potential impacts of the proposed project and inform baseline data collection and analysis.

VCs that are to be considered in the preparation of an application for an Environmental Assessment Certificate under BCEAA and for an environmental impact statement under CEAA would be approved by the BC EAO and the CEA Agency according to the requirements of both acts, to assess for potentially significant adverse environmental, health, heritage, economic and social effects.

In developing the proposed VCs for consideration in the assessment, PRGT will use information and input obtained from engagement and consultation with Aboriginal groups, government agencies, local governments, stakeholders, and the public as well as land use plans, species recovery plans, VCs used for similar projects, information gathered through route reconnaissance and preliminary assessment and other relevant information. PRGT will ensure that the process and rationale for selecting VCs is included in the application for an Environmental Assessment Certificate.

9.1 ENVIRONMENTAL EFFECTS

9.1.1 Atmospheric Environment

The Project has the potential to interact with the atmospheric environment. Specifically, the construction and operation of the pipeline and compressor stations would result in emissions to the atmosphere.

Generally, construction would be far-removed from communities and public roads established in the region. Special measures would be taken to ensure identified sensitive receptors adjacent to the conceptual corridor are included in the assessment of effects on the atmospheric environment.

Construction of the pipeline and associated facilities will require the use of a variety of equipment that burns relatively small amounts of hydrocarbon fuels (e.g., gasoline,

diesel and natural gas), resulting in emissions of combustion by-products, including criteria air contaminants (CACs), such as nitrogen oxides (NO_X), carbon monoxide (CO) and greenhouse gases (GHGs). However, construction activities are expected to be short-term and transient in nature, and environmental effects will be minimized through the use of environmental protection practices that are known to effectively mitigate potential effects on the receiving environment. Therefore, CAC emissions for construction will not be evaluated quantitatively. Federal regulatory guidance requires that construction-related GHG emissions be estimated for the Project. Therefore, calculated GHG emissions will be compared to relevant provincial and national totals.

Air emissions from the compressor stations during the operation of the Project are associated with combustion of natural gas in the turbines and may also include combustion by-products for other intermittent sources, such as generators. It is expected that the primary substances of concern for the Operations Phase of the Project will be NO_X, particulate matter ($PM_{2.5}$) and CO. Emissions of these substances will be estimated and dispersion modelling will be conducted for each compressor station in accordance with regulatory guidance. Dispersion modelling results will be compared to relevant Ambient Air Quality Objectives. Greenhouse gas emissions for each compressor station will also be estimated and compared to relevant provincial and national totals.

9.1.2 Acoustic Environment

Noise emissions during Project construction may have potential effects on the acoustic environment. Primary noise emission sources during construction include: construction equipment, machinery, trucks and other site traffic and blasting. During operations, compressor stations, access by operators, occasional helicopter access, light truck traffic, and periodic maintenance works would also result in periodic noise.

Key receptors that may be affected by Project-related noise, including wildlife migration areas will be identified during the environmental assessment. Where appropriate mitigation measures will be proposed to reduce or avoid effects to the acoustic environment.

9.1.3 Aquatic Species, Fish and Fish Habitat

Freshwater

The potential effects of the pipeline construction on aquatic species and habitat are well known and understood. These potential effects may arise during construction of watercourse crossings or through erosion, and include the deposition of sediment into watercourses, temporary disturbance of species present at crossings and potential disturbance to fish habitat. Mitigation of these effects will be addressed through a variety of techniques, including erosion and sedimentation control methods and pipeline watercourse crossing techniques that are well known and well documented to

address these environmental concerns. These mitigation measures will be tailored to specific locations, approved by regulatory authorities where required, and described in the environmental assessment and environmental protection plans.

Marine

For marine segments of the route, there are potential effects on marine ecosystems during both construction and operation. During pipe laying, seabed sediments will likely be disturbed, and any directional drilling that might be required may introduce suspended sediments into the water column, potentially affecting marine plants and invertebrates as it resettles to the seabed. With the exception of the landing areas, the pipeline will sit on the seabed and will physically cover marine fish habitat, potentially affecting sessile marine invertebrates, algae and eelgrass. However, it will also provide hard substrates to which marine organisms can attach. Eelgrass has been identified as an Ecologically Significant Species by Fisheries and Oceans Canada due to its high ecological value and, therefore, may require enhanced management measures (DFO 2009). The pipeline may pose a barrier to motile benthic species. Site-specific marine surveys will be conducted as part of the baseline environmental surveys to provide a basis from which to determine specific Project-related impacts. The information collected will assist in the development of management strategies and monitoring programs to mitigate potential impacts on marine ecosystems.

9.1.4 Terrestrial Environment

Soils

The surface disturbance caused by pipeline construction has the potential to result in soil erosion. Soils are a primary concern where the conceptual corridor crosses agricultural land, including several areas that are designated as Agricultural Land Reserve (ALR). A preliminary site review indicates that some compressor stations and metering facilities may be located on ALR land. Further site reviews and data collection will confirm the proposed locations to be included in the environmental assessment. Detailed soils investigations will be completed on agricultural land. Soil parent materials differ along the project corridor, but are expected to consist mainly of till, and glaciofluvial and glaciolacustrine deposits.

The information collected will assist in the selection of soil handling measures to avoid soil loss or transport and maintain soil capability.

Vegetation and Wetlands

The Project has the potential to affect terrestrial vegetation and wetlands along the conceptual corridor (see Section 8.6).

Potential effects include loss of plants of management concern, plant communities of management concern, old growth forests, and wetlands. In addition, land disturbances

may create conditions favourable for invasive species. Vegetation species and community distribution along the conceptual corridor will be described in terms of diversity, relative abundance, the presence of species at risk or of special concern and the presence of merchantable timber. Mitigation measures and plans will be formulated to minimize disturbance to vegetation species and communities and merchantable timber resources. A site-specific reclamation plan will be developed to revegetate the right-of-way and will include seed mixes and weed control measures. The goal of the mitigation measures is to minimize the residual effects of the Project on vegetation along the conceptual corridor.

Wildlife

The Project has the potential to affect wildlife that is protected or designated under the *Migratory Birds Convention Act* (MBCA), the *Species at Risk Act* (SARA), and the *Wildlife Act*. There are also provisions in the *BC Wildlife Act* and the *Oil and Gas Activities Act* for the protection of wildlife habitat and wildlife habitat features.

The project has the potential to adversely affect wildlife and wildlife habitat through change in habitat, change in movement, and change in mortality risk. These potential effects arise as a result of construction (e.g., clearing of vegetation, creation of access roads) and operation (e.g., increase in linear density, maintenance activities) of the project. Information on wildlife and wildlife habitat along the conceptual corridor will be collected to identify and assess the effects of the Project on wildlife. Field programs and data collection will focus on wildlife and wildlife habitat features of management concern. To eliminate or reduce potential adverse effects on wildlife and wildlife habitat, mitigation measures will be proposed in consideration of best management practices, management guidelines, and regulatory, community and Aboriginal consultation.

Construction and operation of the Project also has the potential to affect migratory birds, as defined in the *Migratory Birds Convention Act*, 1994. The key potential effects include loss of terrestrial habitat and direct mortality due to vegetation clearing and alteration of movement due to noise and other disturbance.

Site-specific breeding bird surveys will be conducted as part of the baseline environmental surveys to provide a basis from which to determine specific Project-related impacts. Construction and operation activities will incorporate mitigation measures to reduce impacts to wildlife (i.e., wildlife disturbance, loss of habitat, critical periods, and species at risk locations). Mitigation measures for potential effects to wildlife will be determined based on the findings of the full baseline study program and environmental assessment. This will include specific measures to avoid or mitigate the potential Project-related effects on migratory birds and their nests.

9.2 SOCIAL EFFECTS

9.2.1 Land Use

The conceptual corridor crosses both private and Crown lands. Primary land uses in the vicinity of the conceptual corridor include traditional land uses by Aboriginal peoples, agriculture, forestry, grazing, hunting, oil and gas development, mineral exploration and development, recreation, rural residential lands, and tourism.

The environmental assessment will include identification of current and planned land use activities in the vicinity of the conceptual corridor and address issues raised during the public consultation process. The consultation process will include meetings with local stakeholders including community members, municipal, regional and provincial government representatives, Aboriginal communities, local municipalities, port tenants, Crown tenure holders and others. Additional information will be collected from regional and local planning documents.

9.2.2 Community Infrastructure and Services

The Project may have a range of implications for community infrastructure and services. The conceptual corridor predominantly crosses remote areas of central BC and potentially, increased traffic and the Project construction workforce may place unplanned demands on community infrastructure and emergency services and their effectiveness. The anticipated increase in workers and activities may also place increased pressure on police and health care services, municipal services, and require higher levels of maintenance for public infrastructure including roadways.

9.2.3 Visual Aesthetics

The pipeline would cross a variety of landscapes that have visual aesthetic values. Key areas of concern identified through the consultation process will be considered in the visual impact assessment process. Available information databases, including the Province of British Columbia visual inventory, will be reviewed.

9.3 ECONOMIC EFFECTS

A wide range of economic benefits will emerge in relation to the Project, including employment, gross domestic product, labour income, and government revenues, as well as the enhancement of workforce and business capacity. The Project will create significant short-term employment and contracting opportunities during planning and construction, and a limited number of long-term jobs during Project operations. The Project will also provide fair bidding opportunities for local contracting work.

Development of the pipeline will contribute to continued development of the province's natural gas resources; this in turn creates significant jobs and royalty

revenue for the provincial government, which helps pay for social services. Important additional benefits include community investments that will be made through the life of the Project and significant ongoing property taxes paid to regional districts.

The effects assessment will identify municipal, provincial, and federal employment and economic benefits, including the tax revenues generated by the Project. Project related industrial activity will be discussed along with the resultant economic opportunities for skilled and non-skilled labour populations and local businesses.

9.4 HERITAGE AND ARCHAEOLOGICAL RESOURCES

As part of the environmental assessment, an Archaeological Overview Assessment (AOA) will be undertaken with the involvement of affected Aboriginal communities and under permit to the Heritage Conservation Branch. An Archaeological Impact Assessment (AIA) will be undertaken at sites identified in the AOA.

The results of the archaeological assessment will be used to develop effective protection measures for heritage resource values through mitigation and avoidance techniques.

The anticipated key issues associated with the Project regarding heritage resources include direct and indirect impacts on archaeological sites, paleontological sites and historical sites. Areas of particular interest at this time include areas of high or moderate archaeological potential identified by resource proximity and access, traditional, ethnographic, and historical land use characteristics, and known archaeological site proximity.

All identified sites will be mapped, photographed, recorded, and the sites' relationship to the proposed development's impact zone determined. Based on the results of the initial testing stage, recommendations regarding the mitigation options will be reviewed with affected Aboriginal communities and provided to the appropriate regulatory authority.

9.4.1 Aboriginal Communities' Traditional Land Use, Knowledge and Wisdom

Section 6 describes the Aboriginal groups whose Treaty lands and traditional territories are overlapped by the conceptual corridor.

The Project expects to work with directly affected Aboriginal communities to prepare TLU studies for their respective traditional territories. In some cases, these Aboriginal communities will have already prepared some of this documentation. PRGT will engage with the Nisga'a Lisims Government's Lands on an ESCIA. It is expected that such studies will identify potential project effects on plant harvesting, hunting, fishing and trapping.

While these data and information may be considered confidential by the Aboriginal communities and, therefore, not included in the environmental assessment, the information will be used in the development of mitigation plans and environmental protection plans as governed by agreements between PRGT and the Aboriginal parties.

9.5 HEALTH EFFECTS

The construction of the Project will result in short-term increases in noise levels, air emissions from construction equipment operation, and dust from vehicle use of access roads and the pipeline ROW. Operation of the compressor stations will result in noise and air emissions but will be within applicable regulatory requirements.

The environmental assessment will undertake noise and air quality assessments and modelling to understand the potential effects of the Project on air quality and the acoustic environment, and to ensure that appropriate mitigation is undertaken to avoid or reduce those potential effects.

9.6 ACCIDENTS AND MALFUNCTIONS

The potential effects of accidents and malfunctions that may occur during the construction and operation of the Project will be considered in the environmental assessment. This assessment will include the potential effects on the biophysical and the human environment leading to the development of effective management and mitigation measures and programs. These measures and programs will be appropriately linked into plans maintained by other affected local agencies (e.g., emergency response plans).

9.7 EFFECTS ASSESSMENT METHODOLOGY

The environmental effects assessment methods will be based on an approach that meets both federal and provincial industry standards. In general, the methods will include:

- a project effects assessment
- identification of mitigation measures to avoid or reduce potential adverse project effects
- identification of any residual project effects after mitigation
- characterization of the residual effects and their significance
- a cumulative effects assessment of any residual project effects. This would incorporate the potential for these residual effects to interact with past, present, and reasonably foreseeable future projects.

- identification of mitigation measures that avoid or minimize potential cumulative effects
- characterization of the residual cumulative effects and their significance

The project-specific environmental effects assessment and the cumulative effects assessment will be informed by:

- approved land use plans that designate the most appropriate activities on the land base
- baseline studies and historical data that factor in the effects of past development and set out the current conditions
- potential overlapping effects due to present developments
- predicted effects from future developments that have been publically announced or are in a regulatory approval process

10.0 CONCLUSION

Prince Rupert Gas Transmission is pleased to submit this Project Description to initiate the approval process for this project, which is significant for both British Columbia and Canada. This Project would provide economic benefits to British Columbia and Canada, and in particular to the communities near which it will be located. Prince Rupert Gas Transmission is committed to meaningful relationships with the Aboriginal communities, landowners, municipalities and stakeholders along the conceptual corridor to ensure that their interests are taken into account in Project planning. Throughout the Project lifecycle, PRGT will carry out its activities in a manner that is respectful of the environment.

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