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RISK ANALYSIS OF BRITISH COLUMBIA NATURAL GAS PROJECTS: ENVIRONMENTAL AND INDIGENOUS PEOPLES ISSUES

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Risk Analysis of British Columbia Natural Gas Projects:
Environmental and Indigenous Peoples Issues

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Abbreviations and Definitions

AB	Alberta
AIR	Application Information Requirements (BC EAO)
BC	British Columbia
Bcf	Billion cubic feet
Bcfpd	Billion cubic feet per day
BCSC	Supreme Court of British Columbia
CAPP	Canadian Association of Petroleum Producers
CCEI	Canadian Centre for Energy Information
CEAA, or CEA Agency	Canadian Environmental Assessment Agency
CEAA, 2012	*Canadian Environmental Assessment Act, 2012*
CERI	Canadian Energy Research Institute
CHRP	Caribou Habitat Restoration Plan
CIRC	Cumulative Impacts Research Consortium (BC)
CO2	Carbon dioxide
CO2e	Carbon dioxide equivalent
COGOA	*Canada Oil and Gas Operations Act*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPCN	Certificate of Public Convenience and Necessity (NEB)
Designating Regulations	Regulations Designating Physical Activities (Canada)
DFO	Department of Fisheries and Oceans (Canada)
E	East
EA	Environmental Assessment
EAA	*Environmental Assessment Act* (BC)
EAC	Environmental Assessment Certificate (BC EAO)
EADS	Environmental Assessment Decision Statement (CEA Agency)
EAO	Environmental Assessment Office (BC)
EIA	Energy Information Administration (USA)
EMP	Environmental Management Plan
ERP	Emergency Response Plan
EC	Environment Canada
ECCC	Environment and Climate Change Canada
EPMG	Environmental Protection and Management Guideline
FID	Final Investment Decision
FNLP	First Nations Limited Partnership
GBI	Great Bear Initiative Society (BC)
GBPU	Grizzly Bear Population Unit
GHG	Greenhouse Gas
GIC	Governor in Council
IBA	Impact Benefits Agreement
INAC	Indigenous and Northern Affairs Canada
KI	Key Indicator

kt	kilotonnes
LNG	Liquefied Natural Gas
LNGBA	Liquefied Natural Gas Benefits Agreement
LNGESI	Liquefied Natural Gas Environmental Stewardship Initiative
m3	cubic metres
MARR	Ministry of Aboriginal Relations and Reconciliation (BC)
Mbpd	Thousand barrels per day
MEM	Ministry of Energy and Mines (BC)
MEMPR	Ministry of Energy, Mines and Petroleum Resources (BC)
MFLNRO	Ministry of Forests, Lands and Natural Resource Operations (BC)
Mm3/d	Thousand cubic meters per day
MMtpa	Million metric tons per year
MNBC	Métis Nation of British Columbia
MNGD	Ministry of Natural Gas Development (BC)
MOE	Ministry of Environment (BC)
MOELP	Ministry of Environment, Lands and Parks (BC)
MOU	Memorandum of Understanding
Mt	Million tonnes
N	North
NA	Not applicable or Not available
NGPBA	Natural Gas Pipeline Benefits Agreement
NE	Northeast
NEB	National Energy Board
NEBA	*National Energy Board Act* (Canada)
NGL	Natural Gas Liquids
NRCan	Natural Resources Canada
NW	Northwest
OGAA	*Oil and Gas Activities Act* (BC)
OGC	Oil and Gas Commission (BC)
PMT	Peace Moberly Tract
Projects Regulation	Reviewable Projects Regulation (BC)
PRPA	Prince Rupert Port Authority
RSEA	Regional Strategic Environmental Assessment
RCAP	Royal Commission on Aboriginal People
S	South
SARA	*Species at Risk Act* (Canada)
SE	Southeast
SCC	Supreme Court of Canada
SW	Southwest
t	tonnes
Tcf	Trillion cubic feet
TC	Transport Canada
TEK	Traditional Ecological Knowledge
TLU	Traditional Land Use

UBC	University of British Columbia
UNBC	University of Northern British Columbia
VC	Valued Component
W	West
WCSB	Western Canadian Sedimentary Basin
WWF	World Wildlife Fund

Executive Summary

This study identifies major environmental and Indigenous Peoples issues facing development of the natural gas and LNG industry in British Columbia (BC), and examines the key approaches to mitigate, manage and monitor the issues effectively.

Currently, British Columbia is the second largest producer of marketable natural gas amongst the Canadian provinces, with the most economically viable natural gas wells, both vertical and horizontal (BC OGC 2015a; CAPP 2016). Since 2013, approximately 65% of the wells drilled in BC have been in its unconventional Montney formation, with the remainder of the drilling split fairly evenly between the rest of the Province's formations (CERI 2016). As shale gas has increased North American supply of natural gas, investor focus is moving to exports, specifically of liquefied natural gas (LNG). In 2012, the Province issued a *Natural Gas Strategy* which recognizes natural gas, particularly LNG exports, as a provincial priority and lists a series of actions the Province will undertake to promote the industry (BC MEM 2012). Since 2012, 20 LNG projects have been proposed in BC, 18 export licenses have been issued by the National Energy Board (NEB), and 9 environmental assessments (EAs) have been completed by BC Environmental Assessment Office (BC EAO) and the Canadian Environmental Assessment Agency (CEA Agency), with a few more underway (Province of BC 2016b).

Environmental assessments at the provincial level, and often at the federal level as well, are typically required for all major natural gas pipeline and LNG projects developed in BC. A legal framework for provincial EAs includes three main sources: the *BC Environmental Assessment Act (EAA)* (SBC 2002, c 43) as the primary EA legislation; regulations under the *BC EAA*; and common law regarding Indigenous Peoples consultation (BC EAO 2015a). All natural gas pipeline and LNG projects that are considered as 'reviewable' under the *BC EAA* Reviewable Projects Regulation (Province of BC 2002) are subject to the provincial EA process, with BC EAO as the main regulator and provincial responsible authority. The majority of provincial permits are provided through the BC Oil and Gas Commission (BC OGC), the primary operational regulator of oil and gas activities in the Province (BC OGC 2015d).

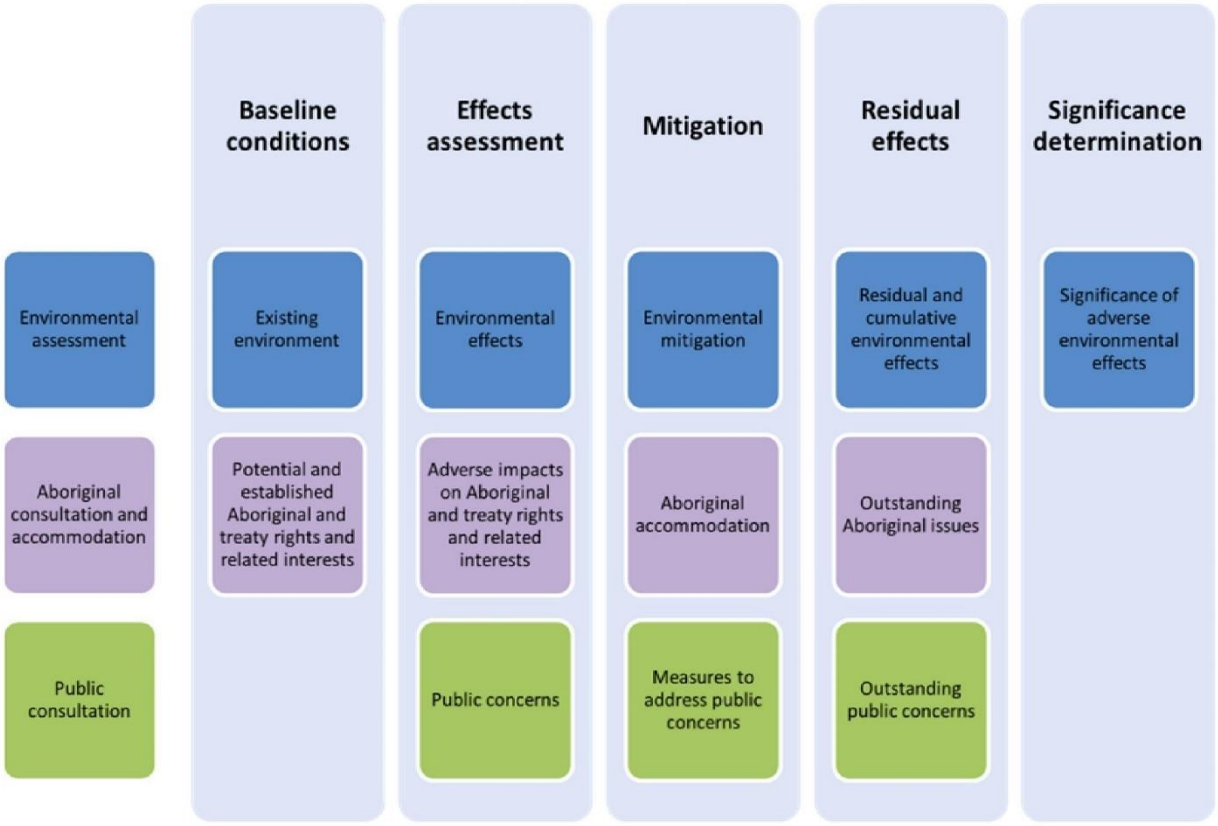
A federal EA may be required for a proposed natural gas pipeline or an LNG facility that meets the thresholds set out in the Regulations Designating Physical Activities (Canada 2012) under the *Canadian Environmental Assessment Act* (*CEAA*, 2012). The *CEAA,* 2012 provides the framework for the federal EA process, with the CEA Agency as the main regulator for intraprovincial pipelines and related facilities, and the NEB as the regulator for pipelines that cross provincial and international boundaries (CEAA 2016e). Authorization or approval from the NEB is also required for the export of natural gas liquids (NGLs), and export or import of natural gas (Government of Canada and NEB 2016).

An EA application is typically organized around the Valued Components (VCs) which the project has the potential to impact (BC EAO 2015a). The application must describe the technically and economically feasible mitigation measures to prevent or reduce to an acceptable level any

potential adverse effects of the project on selected VCs (BC EAO 2013e; BC EAO 2015a). A critical step in the EA process is to determine if the residual adverse effects (i.e. effects remaining after the implementation of all mitigation measures) are significant, based on the defined criteria (BC EAO 2013e). Another major objective of the EA application is to measure the impacts of the project and all other past, present, and reasonably foreseeable projects and activities in the region (i.e., a cumulative effect assessment).

Figure E.1 illustrates the steps generally followed in the EA process, from the baseline conditions assessment to the determination of significance of residual adverse effects (CEAA 2013a).

Figure E.1: Steps to Follow in an Environmental Assessment Process



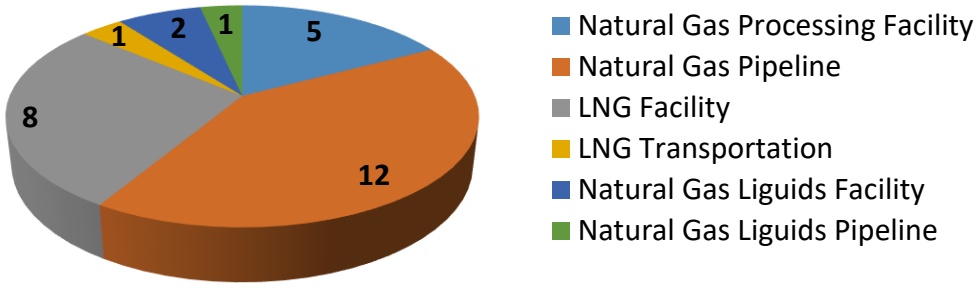
Source: (CEAA 2013a)

This study reviewed EA applications and assessment reports for 29 major natural gas, NGLs and LNG projects in BC (including upstream, midstream and downstream developments) that have undergone a typical EA process (active or complete) with the provincial and/or federal responsible authority since 2010. The reviewed projects are representative of the entire geographical region and involve a wide range of output capacities, with the projected average daily production from 0.15 billion cubic feet per day (Bcfpd) to 0.40 Bcfpd for natural gas processing facilities, from 0.23 Bcfpd to 2.2 Bcfpd for natural gas pipelines, and from 0.32 Bcfpd to 3.47 Bcfpd for LNG facilities. The anticipated daily productions of these projects at full build-

out range even higher, up to 0.6 Bcfpd for natural gas processing facilities, 8.4 Bcfpd for natural gas pipelines, and 4.0 Bcfpd for LNG facilities.

Figure E.2 shows distribution of the reviewed EA applications by the project category.

Figure E.2: Reviewed Environmental Assessment Applications by Project Category



Source: CERI (2016)

Residual adverse effects on environmental VCs identified by the proponents in the EA applications were reviewed by the provincial or federal responsible authorities to determine their significance. An analysis of the regulators' assessment reports for the 18 natural gas pipeline and LNG projects where the provincial or federal EA process has been completed identified the following key environmental issues associated with the natural gas development in BC:

- Significant residual adverse effects related to greenhouse gas (GHG) emissions;
- Significant residual adverse effects and cumulative effects to rare and threatened wildlife species (specifically, to caribou, grizzly bear and harbour porpoise);
- Cumulative adverse impacts of natural gas development.

Significant residual adverse effects related to GHG emissions have been one of the major environmental issues reported on 7 projects out of 18 with the EA process completed (BC EAO 2009; BC EAO 2013d; BC EAO 2014a; BC EAO 2014d; BC EAO 2014b; BC EAO 2015b; CEAA 2016f). As assessed by the regulators, some of the proposed projects would be amongst the largest sources of GHG emissions in the oil and gas sector in Canada, with estimated emissions up to 4.5 Mt CO2e per year (CEAA 2016f).

Significant residual adverse effects on caribou and caribou habitat were determined on three major natural gas pipeline projects out of 18 with the EA process completed, and were also determined as a key issue that should be fully compensated for on two other natural gas pipeline projects (BC EAO 2014b; BC EAO 2014d; BC EAO 2014a; Canada and NEB 2015; NEB 2012). These impacts were mostly attributed to enhanced predator access to caribou and loss of caribou habitat due to the habitat fragmentation. For two reviewed projects, impacts to threatened wildlife species (caribou and grizzly bear) were considered as significant in terms of cumulative effects, but not in terms of project specific effects (BC EAO 2016h; BC EAO 2013d).

The analysis of EA reports for six provincially and/or federally approved natural gas pipeline and LNG projects that include the Marine Resources VCs revealed impacts to marine mammals to be a concern for several projects. Residual adverse effects and cumulative adverse effects on marine mammals (particularly, on harbour porpoise) were considered to be significant for one LNG project (CEAA 2016f).

Potential cumulative effects from the natural gas and LNG development in BC discussed in this study are a growing concern for both stakeholders and the general public. Cumulative impacts are also of particular concerns for Indigenous Groups, with many of them unsatisfied with the adequacy of cumulative effects assessment of past, present and reasonably foreseeable industrial activity in their traditional territory, in relation to their respective Aboriginal interests.

The most common potential accidents or malfunctions associated with project activities, as considered by the proponents in the EA applications for 19 natural gas pipeline and LNG projects, were also reviewed. In addition, the study provides examples of actual sour natural gas and natural gas pipeline incidents reported in BC in 2010-2015. The analysis of publicly available data shows that in 2015, sour natural gas pipelines recorded the lowest incident rate with a frequency of 0.14 per 1,000 km, whereas crude oil pipelines had an incident frequency of 2.81 per 1,000 km (BC OGC 2016b). The leading cause of failure for both sour natural gas and natural gas pipelines in 2010-2013 was related to metal loss, e.g., wall thickness reduction due to corrosion (BC OGC, 2012, 2013, 2014, 2015).

While British Columbia has fewer than one-fifth of Canada's Indigenous and First Nations peoples, it is characterized by the greatest diversity of Indigenous population and culture in Canada representing 198 First Nations (about one third of all First Nations in Canada); more than 60% of the First Nations languages and 64% of unique language families in Canada (INAC 2010a). The Province also presents a unique landscape of Aboriginal rights and interests, with the history of treaty making substantially different from this process for the rest of Canada, and lands that are subject to modern-day treaties, treaty negotiations or unresolved land claims.

This study examines and summarizes the most common potential adverse impacts on Indigenous Peoples interests based on the review of 18 natural gas pipeline and LNG projects where the provincial or federal EA process has been completed since 2010. The identified potential adverse effects include but are not limited to effects to the environment on health and socio-economic conditions; physical and cultural heritage; the current use of lands and resources for traditional purposes; and structures or sites that is of historical or archeological significance.

For 17 out of the 18 reviewed projects, the regulatory authorities have been of the view that no significant adverse effects on the Aboriginal interests will occur as a result of the proposed projects, with the implementation of impacts and benefits, and other agreements established by the proponents with Indigenous Groups to address Aboriginal interests in relation to the proposed projects. The EA reports concluded that the majority of issues raised during the review processes by Indigenous Groups were satisfactorily addressed through existing, revised or new commitments, and project design changes made by the proponents.

The study also considered key approaches to address the identified environmental and Indigenous Peoples issues, and best practices for proponents of natural gas pipelines and LNG projects. The discussed mitigation measures were split by the type of mitigation, starting with the highest priority in the mitigation hierarchy, and included measures to avoid, minimize, restore on-site and offset potential adverse effects from the reviewed projects. The majority of proponents have also proposed a number of pipeline route changes implemented as project design restrictions, in order to avoid or reduce significant residual adverse effects to the environmental VCs and Aboriginal interests, based on input from Indigenous Groups and technical working groups during the EA process.

The Province of BC has proposed, designed and implemented a number of key strategies, progressive programs and policies to reduce potential adverse effects of industrial development on the environmental VCs. In particular, numerous regulatory and legislative measures to reduce GHG emissions across the Province have been implemented since 2008 (BC MOE 2016b). The BC Ministry of Environment (BC MOE) has announced management plans and recovery strategies to reduce the expected decline in caribou populations in BC (BC MOE n.d.; BC MOE 2011; BC MOE 2014a; Environment Canada 2014; Government of BC 2011). The Province is also moving forward with initiatives that aim to assess and manage cumulative effects to key values, and to consider the impact to Aboriginal rights (BC EAO 2016g). Examples of those initiatives include, but are not limited to, the Cumulative Effects Framework, Area-Based Analysis, Northeast Water Strategy and Water Tool, LNG Environmental Stewardship Initiative, and Regional Strategic Environmental Assessment (BC MARR 2016d; BC MFLNRO and BC MEM 2016; BC OGC 2015b; BC OGC 2015e; Province of BC 2015; Province of BC 2016d).

While the duty to consult Indigenous Peoples rests with the Crown, the procedural aspects of consultation may be delegated to proponents. They are encouraged to engage with Indigenous Peoples as early as possible in the planning stages in order to build relationships, and continue throughout the lifecycle of the project (BC EAO 2013f; BC MARR 2016a). The Province of BC, BC EAO and BC Ministry of Aboriginal Relations and Reconciliation (BC MARR) have developed a number of guidelines to assist proponents with meeting obligations to consult with Indigenous Peoples (BC EAO 2013f; BC MARR 2014a; Province of BC n.d.; Province of BC 2010). The proposed guidelines adopt a four-phased approach to the consultation procedures, including the preparation, engagement, accommodation, decision and follow-up phases each consisting of 3 to 5 steps (BC MARR 2014a; Province of BC n.d.; Province of BC 2010).

The courts have repeatedly encouraged the resolution of Indigenous issues by negotiation rather than litigation (INAC 2010d). There are various types of agreements with Indigenous Groups that have been negotiated within the Province to date; those specific to the natural gas and LNG industry include, but are not limited to, the LNG Environmental Stewardship Initiative, capacity building initiatives and economic benefit agreements (BC MARR 2015c; BC MARR 2016c; BC MARR 2016d; BC MARR 2016e). Examples of economic benefit agreements include natural gas pipeline benefits agreements (currently reached with 29 out of 32 eligible First Nations for four major natural gas pipelines); the First Nations Limited Partnership Agreement (signed by 16 First

Nations); the Coastal First Nations LNG Benefits Agreement (signed by 9 First Nations for 10 proposed LNG projects); revenue sharing agreements, etc. (BC MARR 2015c; BC MARR 2016e; BC MARR and GBI Society 2016; FNLP 2016; Province of BC 2014b). Economic benefits agreements are not legally required and must be kept separate and distinct from the duty to consult. By entering into impact benefits agreements, Indigenous Peoples are not waiving their right to review, comment and approve or not, any environmental studies, permit applications or environmental monitoring regimes related to the project (McCarthy Tétrault LLP 2016; McMillan LLP 2011).

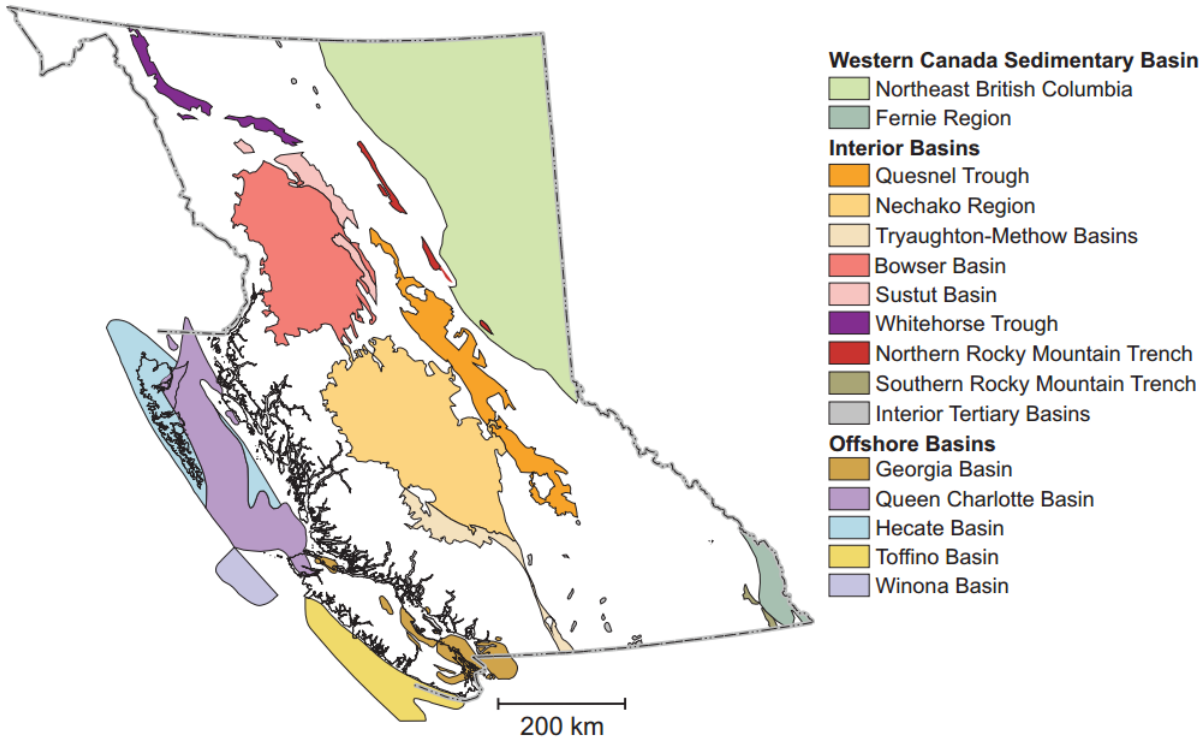
Chapter 1: Introduction and Background

History of Natural Gas Development in British Columbia

The history of natural gas discoveries and exploration in British Columbia (BC) stretches back over 120 years. While British Columbia currently produces the second largest amount of marketable natural gas amongst the Canadian provinces (Canadian Association of Petroleum Producers - CAPP 2016), this was not always the case.

British Columbia contains three groupings of sedimentary basins containing oil and gas resources: the Western Canadian Sedimentary Basin (WCSB), the Interior Basins and the Offshore Basins. These basins are shown in Figure 1.1.

Figure 1.1: Principal Sedimentary Basins of British Columbia



Source: BC Ministry of Energy and Mines (BC MEM 2016)

Modern discovery of BC's natural gas occurred in 1889 when gas was discovered by a railway company drilling for coal (Province of BC 2016a). This occurred on the Fraser River in the southwestern part of the province and the discovery spurred the drilling of BC's first natural gas well, Port Haney No. 1. Over the next 50 years, sporadic drilling of wells for oil and gas occurred in the province as the provincial government investigated the resource. The Second World War particularly sparked interest in developing Canada's oil and gas sector as the country realized the benefits of energy independence. While British Columbia had placed land under reserve in the 1930s in order to discourage foreign investment, the government drilled a well in 1941 due to

pressures from the War (Janicki 2008). The drilling of BC's first successful gas production well started in late 1947 (Province of BC 2016a).

Meanwhile, in February of the same year, the discovery of oil at Leduc, Alberta was the turning point for Alberta's, and western Canada's petroleum industry. Alberta's oil industry was not new, with the first production starting in 1902, however this and subsequent discoveries did not produce enough volumes to create a sustained industry (Calgary Herald 2012). However, the experiences in drilling and geological learnings gained from these discoveries positioned explorers to discover Leduc. The well, Leduc No. 1, pumped 317,000 barrels of oil and 9 million cubic metres (m3) of natural gas over 27 years, and oil output in the province over the next ten years grew from 3 million barrels to 143 million barrels (Le Riche 2006).

This discovery in Alberta stimulated exploration in British Columbia, and within a few years the northeastern part of the Province was recognized as a region with hydrocarbon potential. Large amounts of natural gas were discovered in this region in the early 1950s which led to the completion of several gas wells (Janicki 2008). Supporting infrastructure for the industry was developed and in 1957, the Westcoast Transmission Gas Line was constructed to bring gas from Taylor, BC to the United States border (Connors 2016). This natural gas pipeline, Canada's first, brought gas from a single plant built near Taylor with a capacity of 10 million m3/day.

From the 1950s through the 1980s, exploration, drilling and production continued in natural gas plays in the northeastern part of the Province. Political factors caused variance in the levels of activity throughout this time, such as tensions between Alberta and British Columbia, the effects of Canada's National Energy Program and tensions in the Middle East. Technological advances in the 1990s, however, led to a new era of gas development in the province.

Horizontal drilling techniques, while dating back over a century, became commercially viable in the 1980s. In 1993, the US Energy Information Administration (EIA) reported on the increasing popularity of horizontal drilling for crude oil but noted that 'less than 1% of the domestic horizontal wells drilled [in 1990] were completed for gas' (EIA 1993). More recently, advances in horizontal drilling, 3-D seismic technology and hydraulic fracturing (frac'ing or fracking) are opening up new shale gas resources in North America, previously determined as not feasible to produce. Natural gas production in British Columbia has steadily increased since the 1950s, with marked increases in the 1970s, 1990s and most recently since 2009. Canadian shale growth has been focused on the Montney and Horn River basins of British Columbia, with the recent uptick in production having almost entirely been due to increased volumes out of the Montney (Natural Resources Canada - NRCan 2016b).

The largest player in marketable gas production by province (in 2015) is Alberta, accounting for 72%, followed by British Columbia at 24% and Saskatchewan at 2% (NRCan 2016a). Of total 2015 average Canadian natural gas production of 14.4 billion cubic feet per day (Bcfpd), this shows Alberta to have produced 10.37 Bcfpd, British Columbia to have produced 3.46 Bcfpd and Saskatchewan to have produced 0.29 Bcfpd (NRCan 2016a). While the WCSB is traditionally the largest producer of natural gas, with Alberta leading the way, the dynamic in the WCSB is

changing. British Columbia's wealth of emerging sources of shale and tight gas are changing the dynamics of Canadian supply, accounting for 35% of Canada's natural gas resources, of which 90% is found in the Montney Shale and the Horn River Basin (Murillo 2015).

In June of 2016, the Canadian Energy Research Institute (CERI) released its Canadian Natural Gas Market Review which assessed current conditions and expectations for the next 20 years (CERI 2016). This report found that the most economically viable natural gas wells, both vertical and horizontal, are in the province of BC, particularly its Montney formation. Since 2013, approximately 65% of the wells drilled in British Columbia have been in its Montney formation. The remainder of the drilling has been split fairly evenly between the rest of British Columbia's formations, with the next highest numbers coming out of its Jean Marie formation at 5%. The Montney has the overwhelmingly highest concentration of activity, and it is expected that this will remain the case throughout the next 20 years due to its favorable well economics.

Currently, British Columbia has the second largest production levels in western Canada. The four major gas producing regions in the province are unconventional plays: the Montney, the Horn River Basin, the Liard Basin and the Cordova Embayment. The estimated reserves in the province at the end of 2014 were 51,000 billion cubic feet (Bcf) of raw natural gas, with half of that being found in the Montney. The Montney represents just over half of the production activity in the province (BC Oil and Gas Commission - BC OGC 2015a).

Specific areas of the province have very favourable supply costs, which will lead to increased production out of the province over the foreseeable future. Demand for natural gas as a feedstock to British Columbia's proposed Liquefied Natural Gas (LNG) facilities will drive increased growth in this area, particularly in the Montney, Horn River and Liard Basin. This study assumed that supply will increase to match demand from the LNG plants, and this alone will increase production out of the province by 4 Bcfpd.

British Columbia also has large inland and offshore sedimentary basins which have not been developed for a variety of reasons. The significant inland basins are as follows: the Nechako Basin with resources of 9,500 Bcf of gas, the Bowser Basin with resources of 16,000 Bcf of natural gas and 8,087 Bcf of coalbed methane, and the Whitehorse Trough with resources of 1,800 Bcf of natural gas. Smaller basins include the Georgia Basin, the Rocky Mountain Trench and the Fernie Basin, all located along the southern border of the province. Challenging geological conditions and lack of infrastructure due to the location of the basins have discouraged production (Energy BC 2012).

The offshore basins are the Queen Charlotte with 25,600 Bcf of natural gas, the Tofino with 9,400 Bcf of natural gas and the Winona with an unknown resource (Energy BC 2012). Offshore exploration started in 1967 by Shell Canada, and 14 wells were drilled at the end of the decade (Canadian Centre for Energy Information - CCEI 2004). Nevertheless, the federal government initiated an offshore moratorium on crude oil tanker traffic through Dixon Entrance, Hectata Strait and Queen Charlotte Sound in 1972. In 1983, the governments of Canada and British Columbia established a joint federal-provincial review process for the potential environmental

and socio-economic effects of oil and gas exploration in the offshore of British Columbia. A five-member environmental assessment panel was appointed and held public hearings throughout northern coastal British Columbia. The Public Review Panel's report contained 92 terms, conditions and recommendations to be applied to offshore oil and gas activities. However, following the Exxon Valdez oil spill in 1989, both the federal and provincial governments decided to continue the moratorium. In 1985, the Haida House of Assembly passed a resolution stating that no offshore drilling would be considered until the Haida Aboriginal title was resolved (Library of Parliament 2004).

In 2001, the province of BC announced that it would reverse the moratorium on exploration, and in 2002 a provincially mandated review panel recommended lifting the moratorium, however it was not lifted (CCEI 2004; Library of Parliament 2004). In 2011, the provincial energy minister referenced increased attention on British Columbia's unconventional resources as reason for why offshore development is no longer a focus for producers (CBC News 2011). As shale gas has increased domestic (North American) supply of natural gas, investor focus is moving to exports, specifically of LNG. Both provincial and federal governments have put in place support for the industry. In 2012, the province issued a Natural Gas Strategy which recognizes natural gas, particularly LNG exports, as a provincial priority and lists a series of actions the province will undertake to promote the industry (BC MEM 2012).[1] In 2013, Christie Clark, the Premier of British Columbia, announced in her throne speech that a provincial Prosperity Fund would be developed through natural gas export revenues, specifically targeting Asian markets (Office of the Premier 2013). In 2015, the Canadian federal government issued a tax relief in support of LNG exports via capital cost allowances for liquefaction equipment and export infrastructure (Office of the Premier 2015). Since 2012, 20 LNG projects have been proposed in British Columbia; the National Energy Board (NEB) has issued 18 export licenses and 9 environmental assessments have been completed by the BC Environmental Assessment Office (BC EAO) and the Canadian Environmental Assessment Agency (CEA Agency) (Province of BC 2016b). Most recently, in September of 2016, the federal government approved the Pacific NorthWest LNG project, subject to 190 conditions (Government of Canada 2016d).

Regulatory Requirements to the Environmental Assessment Process for Natural Gas and LNG Projects in British Columbia

Environmental assessments (EA) are conducted by provinces, territories and the federal government throughout Canada in order to determine whether proposed major projects should proceed, and what are the terms and conditions for their approval (BC EAO 2015a). All major natural gas pipeline and LNG projects developed in British Columbia typically require an environmental assessment at the provincial level, and often at the federal level as well.

[1] Actions include investment in infrastructure to power LNG facilities, continuation of royalty credits, continuation of Oil and Gas Rural Road Improvement Program, continue to invest in road access to enable shale gas development, among many others (BC MEM 2012).

Provincial Environmental Assessment Process

British Columbia Environmental Assessment Office

A legal framework for environmental assessments in British Columbia includes three main sources: the *BC Environmental Assessment Act (EAA)* (SBC 2002, c 43) as the primary EA legislation; regulations under the *BC EAA*, and common law regarding Indigenous Peoples consultation. The main regulator in British Columbia is the Environmental Assessment Office (BC EAO) that was established to administer the provincial EA process under the *BC EAA* and to enforce compliance with the conditions of Environmental Assessment Certificates (EACs) issued (BC EAO 2015a).

All natural gas and LNG projects developed in British Columbia that meet the thresholds set out in the Reviewable Projects Regulation (2002) under the *BC EAA* are considered as 'reviewable' and trigger an EA at the provincial level. Reviewable projects, in terms of the Projects Regulation, include the following (Province of BC 2002):

- a new natural gas processing plant facility that
  a) has the design capacity to process natural gas at a rate of < 5.634 million m3/day and will result in sulphur emissions to the atmosphere of ≥ 2 tonnes/day (t/day); or
  b) has the design capacity to process natural gas at a rate of ≥ 5.634 million m3/day;
- a new transmission pipeline with
  a) a diameter of ≤ 114.3 mm and a length of ≥ 60 km;
  b) a diameter of between > 114.3 mm and ≤ 323.9 mm and a length of ≥ 50 km; or
  c) a diameter of ≥ 323.9 mm and a length of ≥ 40 km;
- a new off-shore gas facility.

The Reviewable Projects Regulation also specifies criteria for modifications of existing natural gas pipelines and facilities.

Projects can become reviewable in three ways: 1) through the Reviewable Projects Regulation if they meet its thresholds (applicable to most major projects); 2) through Ministerial Designation by the Minister of Environment who has the authority to direct the review of projects; 3) through proponent "opt-in" when a proponent may request designating its project (that does not trigger a provincial EA process) as a reviewable project by BC EAO (BC EAO 2016b).

It is important to note that projects that do not require an EA under the *BC EAA* may still require other permits or approvals. For example, provincial legislation does not require an environmental assessment for seismic exploration, well production, well drilling and well testing projects. However, environmental issues will be considered by the BC Oil and Gas Commission (BC OGC, see below) when issuing a well permit, especially if a drilling activity is located in an environmentally sensitive area (McCarthy Tétrault LLP 2016). In addition, the Minister of Environment can apply the *BC EAA* to an otherwise uncovered project, and order an assessment of any policy, plan or practice of the government (BC EAO 2016b).

The provincial EA process regulated by BC EAO represents a thorough review that offers significant opportunities for stakeholders, government agencies, Indigenous Peoples, and the public to provide input on potential environmental, economic, social, heritage and health effects from proposed projects. BC EAO collaborates with the BC Ministry of Aboriginal Relations and Reconciliation (MARR) and other government and permitting agencies to ensure regulatory oversight that continues through the EA process and subsequent permitting, and to coordinate compliance management (BC EAO 2015a; BC EAO 2016a).

Under the BC EAA, two ministers are responsible for making the decision for a project undergoing an environmental assessment: the Minister of Environment and the other responsible minister (for natural gas projects, either the Minister of Natural Gas Development, or the Minister of Forests, Lands and Natural Resource Operations). The responsible Minister can make a decision either to issue an EAC with any conditions they consider necessary, or to refuse to issue the certificate, or require further study or assessment. A key factor the ministers will consider is whether the Province has satisfied its legal duty to consult with and, to the extent appropriate, accommodate Aboriginal Groups (BC EAO 2015a; BC EAO 2016b).

British Columbia Oil and Gas Commission

The *BC Oil and Gas Activities Act (OGAA)* enacted in 2010 strengthens regulations around environmental protection, consultation, notification, compliance and enforcement. The provincial regulatory framework for oil and gas development was modernized through the *OGAA*, specifically in terms of the shift toward unconventional gas development in British Columbia (BC OGC 2014b). The majority of provincial permits are provided through the BC Oil and Gas Commission (BC OGC), the primary operational regulator of oil and gas activities in British Columbia. The BC OGC's regulatory oversight and compliance begins once an application is submitted and continues during its review. If a permit is issued, the Commission oversees that project throughout its lifecycle and until the land used is remediated (BC OGC 2015d). As an agent of the Crown, the BC OGC also consults and accommodates Indigenous Peoples on activities that could have potential adverse impacts on Aboriginal rights (BC OGC 2014b).

In 2013, BC EAO established a Memorandum of Understanding (MOU) with BC OGC to manage a single, predictable regulatory regime for LNG projects and to improve engagement with Aboriginal Groups, communities and the public (BC EAO and BC OGC 2013).

In 2016, BC OGC released the Environmental Protection and Management Guideline (EPMG), a reference document for oil and gas applicants and permit holders. Environmental guidance in the EPMG includes an interpretation of Government's Environmental Objectives for values such as water, riparian areas, fish, wildlife, habitat, and old-growth forest. The EPMG also provides guidance on environmental mitigation planning, restoration and reclamation (BC OGC 2016c).

Federal Environmental Assessment Process

Canadian Environmental Assessment Agency

If a proposed natural gas pipeline or an LNG facility meets the thresholds set out in the Regulations Designating Physical Activities (2012) under the *Canadian Environmental Assessment Act* (*CEAA*, 2012), a federal EA may be required. Designated projects (i.e., those that are deemed reviewable in terms of the Designating Regulations) include the following (Canada 2012):

- the construction, operation, decommissioning and abandonment of a new gas facility or gas pipeline in a wildlife area or migratory bird sanctuary;
- the construction, operation, decommissioning and abandonment of a new offshore gas pipeline, other than a flowline;
- the construction and operation of a new pipeline, other than an offshore pipeline, with a length of 40 km or more;
- the construction, operation, decommissioning and abandonment of a new
  a) sour gas processing facility with a sulphur inlet capacity of 2,000 t/day or more;
  b) facility for the liquefaction, storage or regasification of LNG, with an LNG processing capacity of 3,000 t/day or more or an LNG storage capacity of 55,000 t or more;
- the expansion of an existing
  a) sour gas processing facility that would result in an increase in sulphur inlet capacity of 50% or more and a total sulphur inlet capacity of 2,000 t/day or more;
  b) facility for the liquefaction, storage or regasification of LNG that would result in an increase in the LNG processing or storage capacity of 50% or more and a total LNG processing capacity of 3,000 t/day or more or a total LNG storage capacity of 55,000 t or more.

The *CEAA 2012* provides the framework for the federal EA process, with the Canadian Environmental Assessment Agency (CEA Agency) as the main regulator for intraprovincial pipelines and the National Energy Board (NEB, see below) as the regulator for pipelines that cross provincial and international boundaries (CEAA 2016e).

The *CEAA 2012* applies to both public and private sector proposed projects where specific federal decisions or approvals must be made or granted. A federal level of assessment is required if a project involves a federal authority making decisions as proponent, land administrator, or regulator under specified provisions of legislation identified on the Law List Regulations (1994, last amended 2014) (Canada 1994).

Specifically, a *CEAA 2012* paragraph 5(1)(a) requires an assessment of changes the project may cause to the following federal areas of responsibility:

- fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act* (1985, last amended 2016);
- aquatic species as defined in subsection 2(1) of the *Species at Risk Act (SARA)* (2002, last amended 2015); and

- migratory birds as defined in subsection 2(1) of the *Migratory Birds Convention Act* (1994, last amended 2010).

It is important to note that for projects located entirely on federal land and water, an environmental assessment under Section 67 of *CEAA 2012* is required, even if the project is not a designated project listed in the Designating Regulations under the *CEAA 2012* (CEAA 2014). For projects located entirely on federal land, a certificate under the *BC EAA* is not required. The Ridley Island Propane Export Terminal Project is an example of a Section 67 project (AltaGas Ltd. 2016).

Transport Canada (TC) is another federal regulatory agency that is responsible for overseeing marine infrastructure in Canada and ensuring safe and efficient marine transportation. Once LNG is loaded onto LNG carriers transporting it to the global market, TC becomes a regulatory authority.

There are two types of EA's conducted under the *CEAA 2012*: assessment by a responsible authority, and assessment by a review panel. Both types of assessments can be conducted by the federal authority alone or in cooperation with another jurisdiction (such as the Province) (CEAA 2016e).

Federal and provincial EA regulatory processes can overlap due to their nature. In 2004 the federal and provincial governments signed the Agreement on Environmental Assessment Cooperation, in order to avoid duplication of efforts and to clarify roles and responsibilities. In 2013, BC EAO and the CEA Agency signed an MOU on the Substitution of Environmental Assessments to help facilitate a single review process (BC EAO 2013b). Under substitution, where both federal and provincial environmental assessments are required, there can be a single provincial review process, and two decisions – federal and provincial. A single assessment that meets both provincial and federal standards is conducted by BC EAO instead of doing two separate assessments for the same project (BC EAO 2015d; McCarthy Tétrault LLP 2016).

Currently, British Columbia is the only province to receive substitution. The LNG Canada Export Terminal is the first project where an EA Certificate was granted under the substitution process. There are 6 other proposed LNG projects in British Columbia where the federal government has agreed to substituted environmental assessments (BC EAO 2015d).

A substitution process differs from equivalency. Under equivalency provisions of the *CEAA 2012*, only a single provincial environmental assessment is conducted, and a single provincial decision is made about whether the proposed project should be granted approval. Therefore, a designated project would be exempted from the application of the *CEAA 2012*, and no federal approval decision is made. Substitution and equivalency provisions do not apply if a project is being assessed by the NEB or if the project has been referred to a review panel (BC EAO 2015d).

National Energy Board

Companies regulated by the *National Energy Board Act (NEBA)* or the *Canada Oil and Gas Operations Act (COGOA)* are required to seek the NEB authorization or approval for various

activities. Applications under the *NEBA* include the construction and operation of international and interprovincial pipelines in Canada, along with related facilities and activities, or modifying or abandoning existing facilities; the export of natural gas liquids, and the export and import of natural gas (*NEBA*, 1985, last amended 2016). Under the *COGOA*, approval is required for exploration and drilling for oil and gas and production, processing and transport of oil and gas on the non-Accord federal lands (Government of Canada and NEB 2016).

For major pipeline facility projects, the issuance of a Certificate of Public Convenience and Necessity (CPCN) is required. The NEB has the responsibility to make recommendations to the Governor in Council (GIC) on whether the reviewed facilities meet a threshold for public convenience and necessity. The GIC is responsible for the decision on whether to issue a CPCN or not, and this decision takes the form of an order to be implemented by the NEB. In addition, EAs under *CEAA 2012* are consolidated with applications for CPCNs from the NEB, if an application relates to a designated project within the meaning of *CEAA 2012* (McCarthy Tétrault LLP 2016).

If a proponent plans to export LNG from Canada, a license from the NEB under the *NEBA* authorizing the export will be required. Since 2012, the NEB has already approved 18 export licenses for LNG export facilities in British Columbia (Province of BC 2016b).

Review of Federal Environmental Assessment Process

On January 27, 2016, the federal Government launched an interim approach (including principles and plans) to review major projects being assessed under federal environmental assessment processes. These principles are the first part of a broader strategy to restore confidence in Canada's environmental assessment processes and to demonstrate that 'a clean environment and a strong economy go hand in hand' (Government of Canada 2016a).

Five main principles to apply to major projects during the review of federal EA processes associated with *CEAA 2012* are stated by the Government of Canada as follows (Government of Canada 2016a):

- No project proponent will be asked to return to the starting line – project reviews will continue within the current legislative framework and in accordance with treaty provisions;
- Decisions will be based on science, traditional knowledge of Indigenous Peoples and other relevant evidence;
- The views of the public and affected communities will be sought and considered;
- Indigenous Peoples will be meaningfully consulted, and where appropriate, impacts on their rights and interests will be accommodated;
- Direct and upstream greenhouse gas emissions linked to the projects under review will be assessed.

On June 20, 2016, a comprehensive review of environmental and regulatory processes was launched by the federal Government and responsible Ministers that will focus on three main components, specifically, rebuilding trust in environmental assessment processes; modernizing

the NEB; restoring lost protection for fish and fish habitat and incorporating modern safeguards to the *Fisheries Act* and the *Navigation Protection Act* (Government of Canada 2016b).

On August 15, 2016, the Minister of Environment and Climate Change announced the creation of an Expert Panel to review federal environmental assessments, anticipated to begin immediately (Government of Canada 2016c).

The Pacific NorthWest LNG project approved in September 2016 is an example of the successful application of the interim approach to major project assessments announced in January 2016, and the first LNG project where the interim principles for federal environmental assessments were applied (Government of Canada 2016d).

Research Objectives and Methodology

The main objective of this report is to identify the key environmental and Indigenous Peoples issues facing development of the natural gas and LNG industry in British Columbia, and provide suggestions on policies to mitigate, manage and monitor the issues effectively.

This review focuses on the following areas:

- understanding the current legal framework and regulatory requirements associated with the environmental assessment process for natural gas and LNG activities in British Columbia;
- analyzing the most important environmental issues associated with the development and operation of natural gas pipelines and LNG facilities in British Columbia;
- defining Indigenous rights and legal issues as they affect natural gas development in British Columbia and understanding the context of how Indigenous Peoples are affected by natural gas and LNG development;
- providing suggestions on key approaches to address the identified environmental and Indigenous Peoples issues, and best practices for proponents of natural gas pipelines and LNG projects.

The overall approach applied in this review is to provide a background context, highlight key issues and provide a summary of guidance for each reviewed area. This report is developed based on a literature review, content analysis of primary regulatory documents and issues identified in relevant case law. A discussion of existing and proposed natural gas and LNG projects within the region is fundamental to the analysis of the current state of this industry in British Columbia.

Baseline Inventory of Environmental Assessment Applications for Major Natural Gas and LNG Projects in British Columbia

This study reviewed environmental assessment applications and assessment reports for 29 major natural gas, natural gas liquids (NGL) and LNG projects in British Columbia (including upstream, midstream and downstream developments) that have undergone a typical EA process (active and/or complete) with the provincial (BC EAO) or the federal (CEA Agency or NEB) responsible authority since 2010. The projects selected for this relevant and representative sample of the

past, present and anticipated future natural gas projects included those that have entered the EA process (pre-application stage); the projects currently under review with the regulatory authorities; and the projects with an EA Certificate (EAC), a Certificate of Public Convenience and Necessity (CPCN) or an EA Decision Statement (EADS) issued, amended or extended since January 1, 2010.

Detailed information regarding the 29 reviewed projects is presented in Table 1.1. Locations of the LNG projects and related natural gas pipeline projects that are currently in the BC EA process or have received an EAC (as of March 2015) are shown on Figure 1.2.

As shown in Table 1.1 and Figure 1.2, the reviewed projects are representative of the entire geographical region. They also involve a wide range of output capacities, with the projected average daily production from 0.15 Bcfpd to 0.40 Bcfpd for natural gas processing facilities, from 0.23 Bcfpd to 2.2 Bcfpd for natural gas pipelines, and from 0.32 Bcfpd to 3.47 Bcfpd for LNG facilities (see Table 1.1 for details). The anticipated daily productions of these projects at full build-out range are even higher, up to 0.6 Bcfpd for natural gas processing facilities (Fortune Creek Gas Project), up to 8.4 Bcfpd for natural gas pipelines (Westcoast Connector Gas Transmission Project), and up to 4.0 Bcfpd for LNG facilities (WCC LNG Project).

Figure 1.3 shows distribution of the reviewed EA applications by the project category, including the following categories: natural gas processing facilities, natural gas pipelines, LNG facilities, LNG transportation, NGL facilities and NGL pipelines.

Figure 1.4 shows distribution of the reviewed EA applications by the provincial EA status, including projects with the completed EA process (an EAC issued, amended or extended); projects where a provincial EAC is not required either due to an equivalency process with the federal regulatory agency, or because an exemption from obtaining the EAC was granted by BC EAO; and projects that are currently at the pre-application stage with BC EAO.

Figure 1.5 shows distribution of the reviewed EA applications by the federal EA status, including projects with the completed EA process (a CPCN or an EADS issued or denied); projects where the federal EA process is currently underway; projects where federal approval is not required either because the projects do not trigger a federal review under the *CEAA 2012*, or because an exemption from obtaining the CPCN was granted by the NEB; and projects where the federal EA will be conducted under a substitution process with the provincial regulatory agency.

The intent of the review was to identify the most important environmental and Indigenous Peoples issues that have been addressed to date in EAs for natural gas and LNG projects in British Columbia, including the cumulative effects arising from natural gas development in combination with other past, present and potential future activities and projects. The results of the review are discussed in Chapters 2 and 3 of this report.

Table 1.1: Inventory of Major British Columbia Natural Gas and LNG Projects That Have Undergone a Typical Environmental Assessment Process Since 2010

Project Title	Project Proponent	Project Description	Project Location (British Columbia)	Average Production/ Storage or Transmission Capacity	Provincial Environmental Assessment Status	Federal Environmental Assessment Status
Aurora LNG Digby Island Project	Aurora Liquefied Natural Gas Ltd. (a joint venture between Nexen Energy ULC, INPEX Corporation and JGC Corporation)	An LNG export facility including up to four LNG processing units, LNG storage tanks, and marine berth for loading of LNG vessels	Digby Island, Prince Rupert	24 MMtpa (3.2 Bcfpd)	Pre-application started June 2014	Federal EA will be conducted under a substitution process
Cabin Gas Plant Project	Enbridge G&P Canada Limited Partnership	A natural gas processing facility designed to process natural gas from the Horn River Basin	60 km NE of Fort Nelson	0.8 Bcfpd	EAC issued January 2010 (subject to 60 conditions), with amendments issued November 2011 and December 2012 (16 new conditions)	The Project does not trigger a federal review under the *CEAA 2012*, and is not subject to a federal EA
Coastal GasLink Pipeline Project	Coastal GasLink Pipeline Ltd. (owned by TransCanada PipeLines Ltd.)	A natural gas pipeline (~650 km long, with a diameter of 1219 mm (48'')) with up to 8 compressor stations	40 km W of Dawson Creek to near Kitimat	Initial phase: 2.1 Bcfpd; potential to expand to 5 Bcfpd	EAC issued October 2014 (subject to 32 conditions)	Federal assessment terminated, after removing non-NEB-regulated pipelines from designated projects under *CEAA 2012*
Dawson Liquids Extractions Project	Spectra Energy Midstream Corporation	A natural gas liquids (NGL) extraction facility with a short interconnecting sales gas pipeline of up to 1.5 km in length	16 km W of Dawson Creek	0.4 Bcfpd	Pre-application started April 2013. BC EAO concluded that the Project does not require an EAC	Reviewed by NEB under Section 58 of the *NEBA* (the NEB Environmental Screening Report of January 2011)

Project Title	Project Proponent	Project Description	Project Location (British Columbia)	Average Production/ Storage or Transmission Capacity	Provincial Environmental Assessment Status	Federal Environmental Assessment Status
Eagle Mountain - Woodfibre Gas Pipeline Project	Fortis BC Energy Vancouver Island Inc.	A natural gas pipeline (~52 km long, with a diameter of 508 mm (20'')); additional compression at two existing compressor stations; a new compressor station in Squamish; and metering facilities at the receipt and delivery points	N of Coquitlam Lake to Squamish	0.23 Bcfpd	EAC issued August 2016 (subject to 30 conditions)	The Project does not trigger a federal review under the *CEAA 2012*, and is not subject to a federal EA
Fort Nelson North Gas Processing Facility	Westcoast Energy Inc. (Spectra Energy Inc.)	A natural gas processing facility for inlet separation, gas sweetening, amine regeneration, acid gas incineration, gas dehydration and sales gas compression	~75 km NE of Fort Nelson	0.25 Bcfpd	Provincial EA not required	NEB assessment completed. The Project exempted from obtaining a CPCN (Order issued March 2010).
Fortune Creek Gas Project	Quicksilver Resources Canada Inc.	A natural gas-processing facility to remove hydrogen sulphide and carbon dioxide from raw natural gas to produce treated gas for transport to market	~110 km N of Fort Nelson	Initial phase: 0.15 Bcfpd; subsequent phases: up to 0.60 Bcfpd	EAC issued October 2013 (subject to 52 conditions)	The Project does not trigger a federal review under the *CEAA 2012*, and is not subject to a federal EA
Grassy Point LNG Project	Woodside Energy Holdings Pty Ltd.	An LNG export facility and associated marine terminal	Grassy Point, 30 km N of Prince Rupert	20 MMtpa (~2.7 Bcfpd)	Pre-application started August 2014	Federal EA will be conducted under a substitution process

Project Title	Project Proponent	Project Description	Project Location (British Columbia)	Average Production/ Storage or Transmission Capacity	Provincial Environmental Assessment Status	Federal Environmental Assessment Status
Groundbirch Pipeline Project	NOVA Gas Transmission Ltd. (owned by TransCanada Pipelines Ltd.)	A natural gas pipeline (~77 km long, with a diameter of 914 mm (36")), proposed as an extension of the existing TransCanada system, and related facilities, including meter stations and valve sites	~11 km E of Bay Tree, AB, to the Groundbirch area in NE BC (~37 km NW of Dawson Creek)	1.66 Bcfpd	Provincial EA not required	CPCN issued by NEB March 2010 (subject to 28 conditions). Screening level of EA under the *CEAA 2012*
Horn River Gas Project	NOVA Gas Transmission Ltd. (owned by TransCanada Pipelines Ltd.)	The Project consists of two primary components: NGTL's acquisition and operation of the existing Ekwan Section and the construction and operation of a new pipeline (the Cabin Section, ~72 km long, and the Komie East Section, ~2.2 km long) and 4 new meter stations to transport sweet natural gas	~70 km E of Fort Nelson, BC, to Ekwan, AB	Initial capacity 0.7 Bcfpd (the Cabin Section); projected capacity up to 1.04 Bcfpd	Provincial EA not required	CPCN issued by NEB January 2011 (subject to 31 conditions). Responsible authorities: NEB/TC
Kitimat LNG Terminal Project	Kitimat LNG Inc. (owned by Chevron Canada and Woodside Energy)	An LNG terminal that will include storage facilities, either regasification or liquefaction facilities and send-out pipelines, as well as a marine terminal and an access road	Bish Cove, 14 km S of Kitimat	NA	EAC issued June 2006 (subject to 243 commitments), amended April 2010, extended June 2011	Comprehensive study review (April 2006) by TC, Environment Canada (EC), and Indigenous and Northern Affairs Canada (INAC) as responsible authorities

Project Title	Project Proponent	Project Description	Project Location (British Columbia)	Average Production/ Storage or Transmission Capacity	Provincial Environmental Assessment Status	Federal Environmental Assessment Status
Komie North Extension Project	NOVA Gas Transmission Ltd. (owned by TransCanada Pipelines Ltd.)	An extension of NGTL's existing system in Alberta and BC that includes four new segments (totaling 166 km) of natural gas pipeline and related facilities. The proposed Project consists of the Chinchaga Section (AB) and the Komie North Section (BC)	Chinchaga Section: ~76 km NW of Manning, AB; Komie North Section: ~110 km N of Fort Nelson, BC	NA	Provincial EA not required	January 2013: NEB approved the Chinchaga section (AB), and denied the Komie North section (BC), as NEB was not persuaded that the Komie North section was "economically feasible"
LNG Canada Export Terminal Project	LNG Canada (a joint venture between Shell Canada, KOGAS, Mitsubishi and PetroChina)	An LNG plant, associated marine terminal facilities and LNG shipping by carriers for the export of LNG to Asian markets	Kitimat	3.47 Bcfpd (26 MMtpa)	EAC issued June 2015 (subject to 24 conditions), amended August 2016	EADS issued June 2015 following a substituted EA process
North Montney Mainline Pipeline Project	NOVA Gas Transmission Ltd. (owned by TransCanada Pipelines Ltd.)	New natural gas pipeline (~306 km long, with a diameter of 1,067 mm (42")) in the North Montney area and related permanent facilities and temporary infrastructure	~141 km S of Fort Nelson to ~35 km SW of Fort St. John	NA	Under review (started April 2016)	CPCN issued by NEB June 2015 (subject to 45 conditions). EADS issued September 2015

Project Title	Project Proponent	Project Description	Project Location (British Columbia)	Average Production/ Storage or Transmission Capacity	Provincial Environmental Assessment Status	Federal Environmental Assessment Status
Northeast British Columbia Expansion Project	Plateau Pipe Line Ltd. (owned by Pembina Pipeline Corporation)	A transmission pipeline facility (~147 km long, with a diameter of 323.9 mm) to transport natural gas liquids (including condensate, propane, and butane, or other combinations of natural gas liquids) to an existing terminal	N of Wonowon to near Taylor	Transmission capacity 75 Mbpd (12 Mm3/d)	EAC issued September 2016 (subject to 26 conditions)	Federal EA is not required for the proposed Project.
Northwest Mainline Expansion Project	NOVA Gas Transmission Ltd. (owned by TransCanada Pipelines Ltd.)	An expansion of NGTL's existing system in AB and BC that includes three natural gas pipeline loops totaling 111.2 km of new pipeline and associated facilities to provide additional capacity to transport sweet natural gas	~80 km SE of Fort Nelson, BC, to ~76 km NW of Manning, AB	The proposed project would increase the transportation capability of the existing pipeline system by 0.49 Bcfpd (to 1.26 Bcfpd)	Provincial EA not required	CPCN issued by NEB February 2012 (subject to 28 conditions). Responsible authorities: NEB/CEA Agency (screening level of EA)
Pacific Northern Gas Looping Project	Pacific Northern Gas Ltd. (owned by AltaGas Ltd.)	A natural gas pipeline (~525 km long, with a diameter of 610 mm (24'')) to loop the Proponent's existing natural gas pipeline, with the replacement of four existing compressor stations	Summit Lake to Kitimat	0.6 Bcfpd	Pre-application (started July 2013)	The Project may be subject to the *CEAA 2012*, which will determine if a federal EA is necessary

Project Title	Project Proponent	Project Description	Project Location (British Columbia)	Average Production/ Storage or Transmission Capacity	Provincial Environmental Assessment Status	Federal Environmental Assessment Status
Pacific NorthWest LNG Project	Pacific NorthWest LNG Limited Partnership (majority-owned by PETRONAS, with the Japan Petroleum Exploration Co., PetroleumBRUNEI, the Indian Oil Corp. and SINOPEC)	An LNG export facility that would be developed in two phases, and would include a marine terminal and liquefaction plant with up to three liquefaction trains (production units)	Lelu Island at the Port of Prince Rupert	18 MMtpa (~2.4 Bcfpd)/ storage capacity 540,000 m3	EAC Issued November 2014 (subject to 8 conditions)	EADS issued September 2016 (subject to over 190 conditions)
Pacific Trail Pipelines Project (previously known as Kitimat-Summit Lake Pipeline Looping Project)	Pacific Trail Pipeline Limited Partnership (owned by Chevron Canada Ltd. and Apache Canada Ltd., operated by Chevron)	A new natural gas pipeline (~470 km long, with a diameter of 36") that may also include one or more new compressor stations along the pipeline	Kitimat to Summit Lake	NA	EAC issued June 2008 (subject to numerous commitments), amended April 2012 to March 2016, extended June 2013	EADS issued March 2009
Prince Rupert Gas Transmission Project	Prince Rupert Gas Transmission Ltd. (a wholly-owned subsidiary of TransCanada Pipelines Ltd.)	A sweet natural gas pipeline system (up to 900 km long with a diameter of 914 to 1219 mm (36'' to 48'')) that would include up to nine compressor stations.	Hudson's Hope to Lelu Island near Prince Rupert	Initial capacity: ~2 Bcfpd; potential to expand to 3.6 Bcfpd	EAC issued November 2014 (subject to 45 conditions), amended December 2015 to May 2016	The Project does not trigger a federal review under the *CEAA 2012*, and is not subject to a federal EA

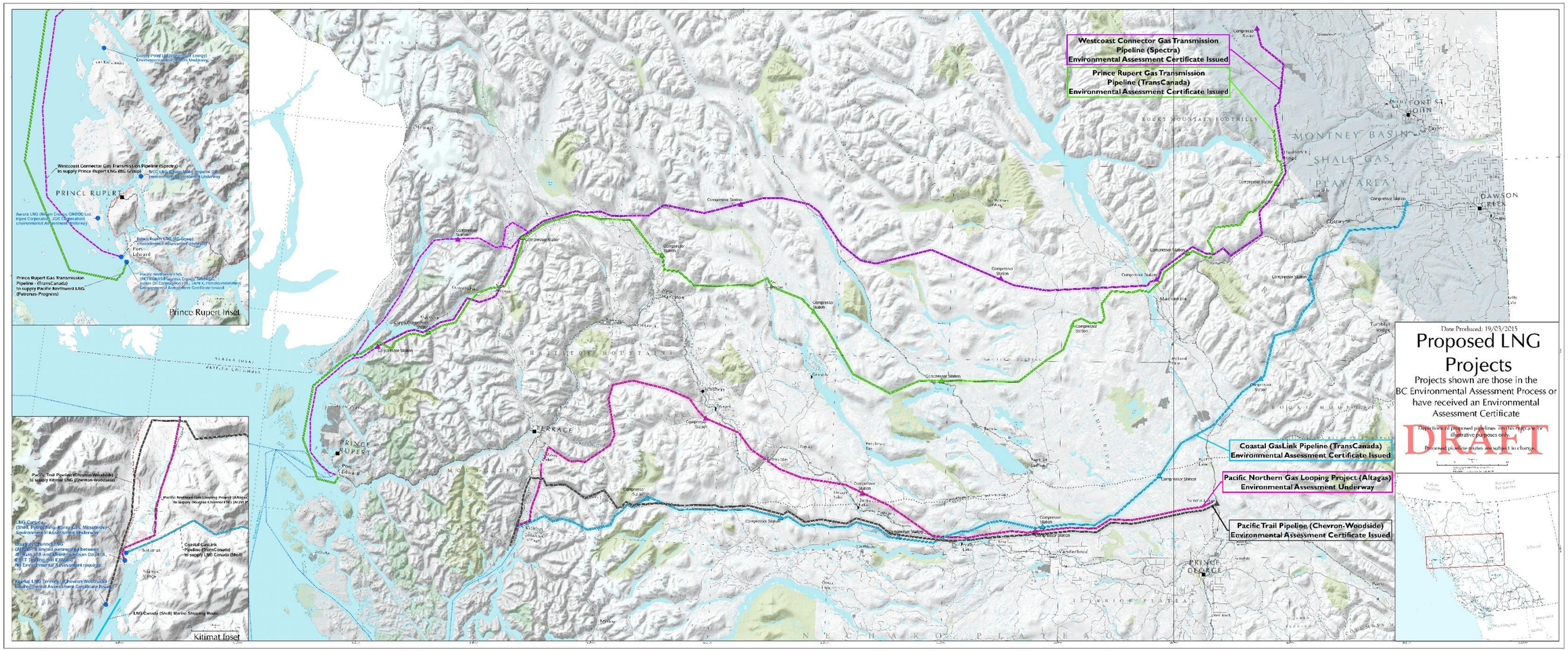
Project Title	Project Proponent	Project Description	Project Location (British Columbia)	Average Production/ Storage or Transmission Capacity	Provincial Environmental Assessment Status	Federal Environmental Assessment Status
Prince Rupert LNG Project	Prince Rupert LNG Limited (owned by Shell Canada)	A liquefied natural gas export facility that would be developed in two phases, and would include a marine terminal and liquefaction plant with three trains (production units)	Ridley Island at the Port of Prince Rupert	21 MMtpa (~2.8 Bcfpd)/ storage capacity 540,000 m3	Pre-application (started May 2013)	In progress with CEA Agency as a responsible authority
Progress Town North Gas Project	Progress Energy Canada Ltd.	A new natural gas processing facility that would be built in one phase and would process natural gas, supplied from three existing compressor stations within a 15 km radius	117 km NW of Fort St. John	0.35 Bcfpd	Pre-application started November 2014. BC EAO concluded that the Project does not require an EAC	The Project does not trigger a federal review under the *CEAA 2012*, and is not subject to a federal EA
Ridley Island Propane Export Terminal	AltaGas Ltd.	A propane export terminal that will be built on a site that has a history of industrial development and will use existing rail lines and existing world class marine jetty that has deep water access to the Pacific Ocean	Ridley Island, Prince Rupert	Shipping up to 1.2 MMtpa of propane/ storage capacity 98,000 m3	Provincial EA not required	EA in progress (started April 2016), with Ridley Terminals Inc., Transport Canada, and Prince Rupert Port Authority as federal authorities

Project Title	Project Proponent	Project Description	Project Location (British Columbia)	Average Production/ Storage or Transmission Capacity	Provincial Environmental Assessment Status	Federal Environmental Assessment Status
Saturn 15-27 Sweet Gas Plant Project	Encana Corporation	A new sweet gas processing facility (co-located with an existing compressor station) that would remove water and hydrocarbon liquids from sweet raw gas produced from the Proponent's gas field to meet transmission pipeline requirements	25 km NW of Dawson Creek	0.4 Bcfpd	Pre-application started April 2015. BC EAO concluded that the Project does not require an EAC	The Project does not trigger a federal review under the *CEAA 2012*, and is not subject to a federal EA
Towerbirch Expansion Project	NOVA Gas Transmission Ltd. (owned by TransCanada Pipelines Ltd.)	New gas pipelines and associated facilities including meter stations, valves sites and pipeline tie-ins in NW AB and NE BC. The Groundbirch Mainline Loop Section is located in BC and includes 55 km of 914 mm diameter pipe	Tower Lake Area along AB and BC	NA	Pre-application started April 2016	NEB recommended approval of the Project in October 2016 (subject to 24 conditions)
WCC LNG Project	WCC LNG Project Ltd. (ExxonMobil Canada Ltd. and Imperial Oil Resources Limited)	An LNG export facility to include production, storage, transfer, and loading of LNG onto LNG vessels for marine transportation to offshore markets	Tuck Inlet, Prince Rupert	Initial capacity: 15.0 MMtpa (2.0 Bcfpd); potential to expand to ~30.0 MMtpa (4.0 Bcfpd)	Pre-application started January 2015	Federal EA will be conducted under a substitution process

Project Title	Project Proponent	Project Description	Project Location (British Columbia)	Average Production/ Storage or Transmission Capacity	Provincial Environmental Assessment Status	Federal Environmental Assessment Status
WesPac Tilbury Marine Jetty Project	WesPac Midstream-Vancouver LLC	The Project includes the construction of a new marine jetty, LNG infrastructure to receive processed LNG for transfer to marine vessels for delivery to local fuel markets and offshore export markets, and safety and process control systems	Tilbury Island, Delta	NA	Pre-application started May 2015	Federal EA will be conducted under a substitution process
Westcoast Connector Gas Transmission Project	Westcoast Connector Gas Transmission Ltd. (Spectra Energy Transmission and BG International Ltd.)	Up to two sweet natural gas transmission pipelines (up to 860 km long, with a diameter of 1067 to 1219 mm (42" to 48")) to a new LNG terminal	Cypress Area (100 km NW of Fort St. John) to Ridley Island near Prince Rupert	Initial capacity: 2.2 Bcfpd; potential to expand to 8.4 Bcfpd	EAC issued November 2014 (subject to 43 conditions)	The Project does not trigger a federal review under the *CEAA 2012*, and is not subject to a federal EA
Woodfibre LNG Project	Woodfibre LNG Limited, a subsidiary of Pacific Oil&Gas Ltd. (part of the Royal Golden Eagle Group, Singapore)	An LNG export facility that includes a storage facility, a marine terminal and LNG shipping by carriers	7 km W-SW of Squamish	2.4 MMtpa (~0.32 Bcfpd)/ storage capacity 250,000 m3	EAC issued October 2015 (subject to 25 conditions)	EADS issued March 2016 (subject to 56 conditions) following a substituted EA process

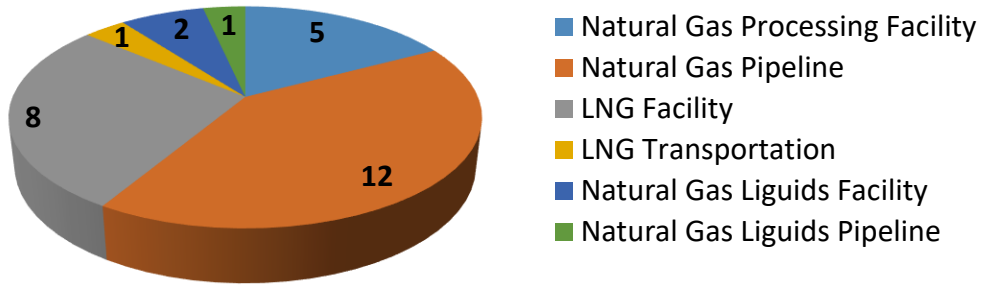
Data Sources: (AltaGas Ltd. 2016; BC EAO 2008; BC EAO 2009; BC EAO 2011; BC EAO 2013c; BC EAO 2014a; BC EAO 2014c; BC EAO 2014d; BC EAO 2014b; BC EAO 2015b; BC EAO 2015c; BC EAO 2015f; BC EAO 2015e; BC EAO 2016h; BC EAO 2016g; BC EAO 2016c; BC EAO et al. 2006; BC MOE and BC MEMPR 2006; BC MOE and BC MEMPR 2008; BC MOE and BC MEMPR 2010; BC MOE and BC MNGD 2013b; BC MOE and BC MNGD 2014a; BC MOE and BC MNGD 2014b; BC MOE and BC MNGD 2014c; BC MOE and BC MNGD 2014e; BC MOE and BC MNGD 2014f; BC MOE and BC MNGD 2014d; BC MOE and BC MNGD 2014h; BC MOE and BC MNGD 2015a; BC MOE and BC MNGD 2015c; BC MOE and BC MNGD 2015d; BC MOE and BC MNGD 2016a; BC MOE and BC MNGD 2016b; BC MOE and BC MNGD 2016c; BC MOE and BC MNGD 2016d; Canada and NEB 2010; Canada and NEB 2012; Canada and NEB 2013; Canada and NEB 2016; CEAA 2015b; Government of Canada 2016d; NEB 2010; NEB 2015a). Table created by CERI.

Figure 1.2: Proposed LNG Projects and Related Natural Gas Pipeline Projects in British Columbia



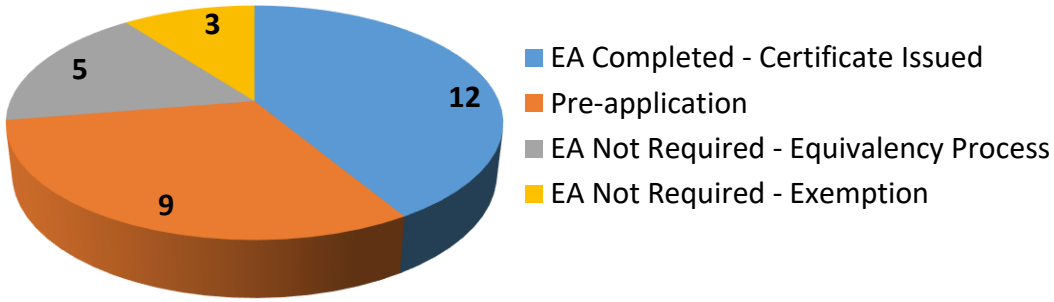
Source: BC Ministry of Forests, Lands and Natural Resource Operations (BC MFLNRO 2015a)

Figure 1.3: Reviewed Environmental Assessment Applications by Project Category



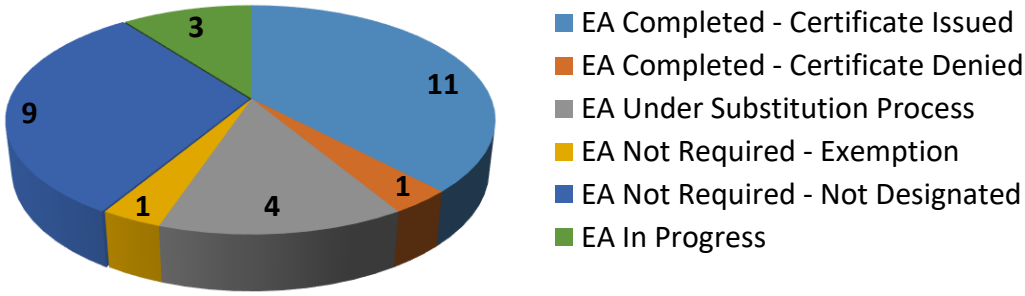
Source: CERI (2016)

Figure 1.4: Reviewed Environmental Assessment Applications by Provincial EA Status



Source: CERI (2016)

Figure 1.5: Reviewed Environmental Assessment Applications by Federal EA Status



Source: CERI (2016)

Chapter 2: Major Environmental Issues Associated with Natural Gas and LNG Development in British Columbia

The Practice of Environmental Assessment

All natural gas pipeline and LNG projects developed in British Columbia that are considered as 'reviewable' under the *BC EAA* Reviewable Projects Regulation (Province of BC 2002) require an environmental assessment at the provincial level. For projects considered as 'designated' under the *CEAA 2012* Regulations Designating Physical Activities (Canada 2012), a federal level assessment is also required.

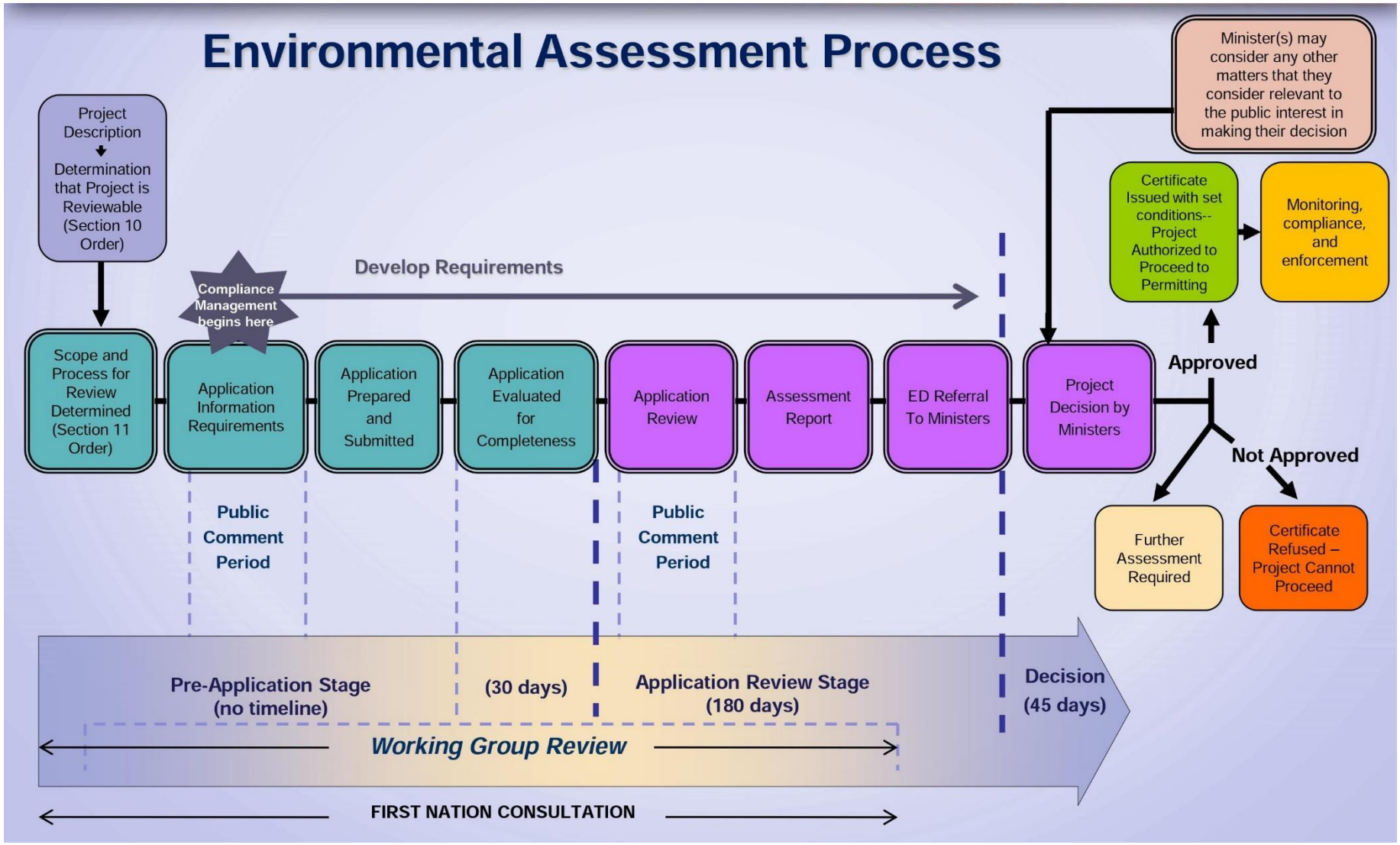
The provincial EA process consists of three stages (BC EAO 2016b):

1) pre-application stage, where a project description is reviewed; scope, procedures and methods for the EA process are specified; Application Information Requirements (AIR) are prepared and finalized; and an application for an EAC is submitted by the proponent and evaluated by BC EAO for completeness;
2) application review stage, where the application is reviewed by the working group composed of representatives of various government agencies and Indigenous Groups, with public input provided; an assessment report is prepared by BC EAO, and recommendations from the Executive Director are provided to Responsible Ministers as to whether to issue an EAC;
3) EAC decision stage, where the Ministers make a decision as to whether to certify the project.

Timeframes can vary by project, however, a typical EA process takes at least 16 to 20 months to complete, depending on the technical complexity of the project and consultation requirements (BC EAO 2015a). The application review stage and the EAC decision stage are governed by legislated timelines (BC EAO 2016b). Figure 2.1 provides more details on the EA process managed by BC EAO (BC EAO 2013a).

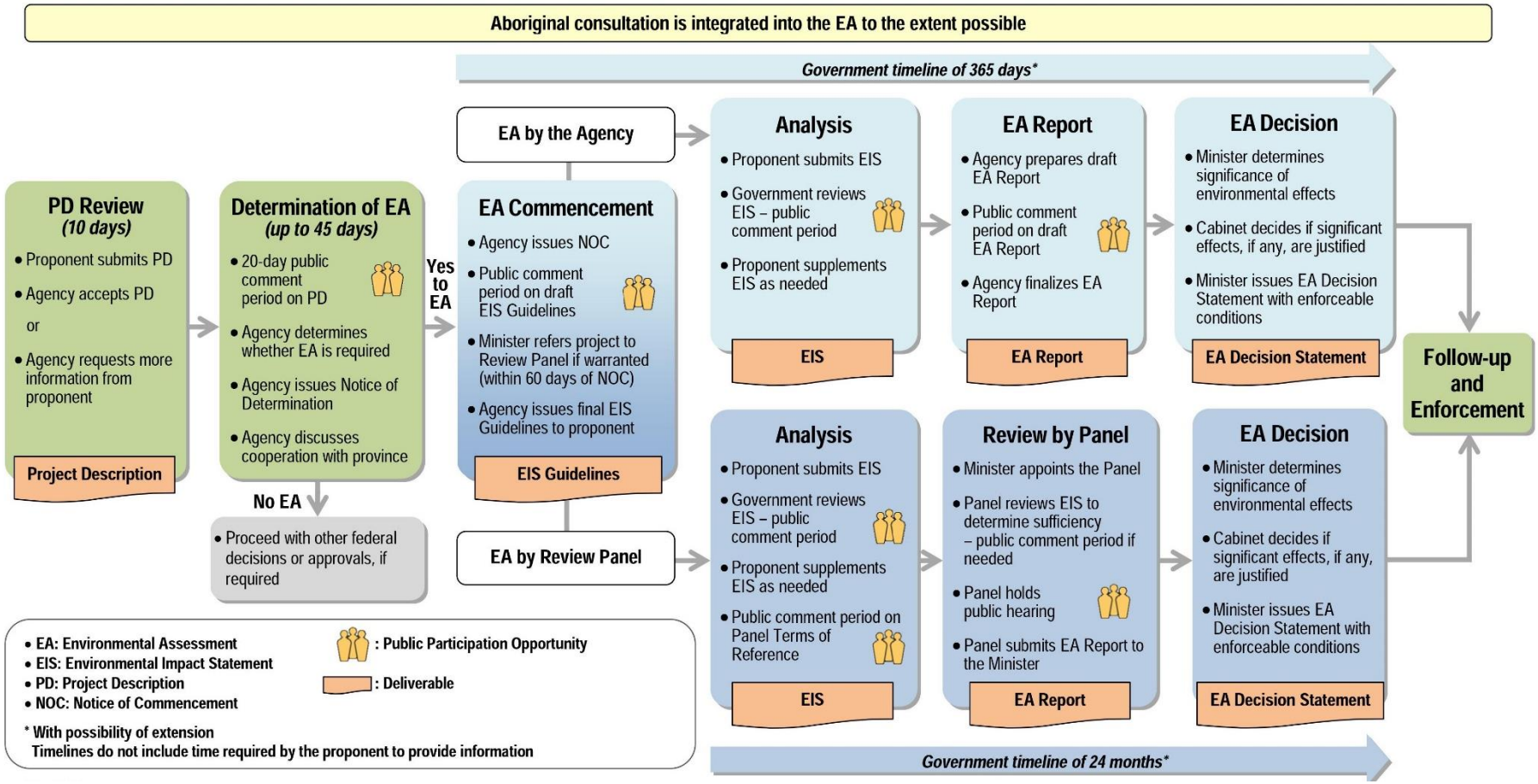
The federal EA process is conducted within the framework provided by the *CEAA 2012*, with the NEB (for interprovincial pipelines) or the CEA Agency (for intra-provincial pipelines and LNG facilities) as responsible authorities (CEAA 2016e). The federal EA process is focused on assessing potential adverse environmental effects that are within federal jurisdiction, including fish and fish habitat, other aquatic species, migratory birds, federal lands, effects that cross provincial or international boundaries and impacts on Indigenous Peoples (CEAA 2016e; McCarthy Tétrault LLP 2016). A typical federal EA process can be expected to take at least 24 to 36 months to complete from the time a project description is submitted. However, delays may occur if the project proponent is required to submit further information or legislated timelines are extended by the Minister to enable cooperation with another jurisdiction or to take into account other project-specific circumstances. Figure 2.2 provides more details on the EA process managed by the CEA Agency (CEAA 2013b).

Figure 2.1: Environmental Assessment Process Managed by the British Columbia Environmental Assessment Office



Source: (BC EAO 2013a)

Figure 2.2: Environmental Assessment Process Managed by the Canadian Environmental Assessment Agency



Source: (CEAA 2013b)

The content of an EA application for the provincial regulator is defined by the AIR that outline the issues to be addressed in the assessment and the information that the proponent must include in the application. This document is prepared by the proponent and approved by BC EAO.

An EA application is typically organized around the Valued Components (VCs) which the project has the potential to impact. For the purposes of the EA process in British Columbia, valued components are defined as *'aspects of the natural and human environment that are considered to have scientific, ecological, economic, social, cultural, archaeological, historical or other importance'* (BC EAO 2015a). VCs represent the foundation of environmental assessments in British Columbia and many other jurisdictions as well. VCs are usually identified by the proponent on the basis of comprehensive issues scoping, including review of available information and considering input from key stakeholders, Indigenous Groups, and the public. Selected VCs will vary for each project depending on the characteristics of the project and the region and context within which it is located (BC EAO 2013e). In addition to VCs, Key Indicators (KIs) have to be identified to measure the potential adverse effects of the proposed project on each selected VC. Selection of VCs and KIs should be done as early in the assessment process as possible (before the AIR document is finalized) (BC EAO 2013e).

The EA application typically includes the proponent's baseline data of the study areas (i.e., the state of the environment, economic or social conditions before a project is started), as well as the analysis of the potential environmental, social, health, heritage, and economic effects of the project on the selected VCs. The Application must describe the technically and economically feasible mitigation measures to prevent or reduce to an acceptable level any *potential* adverse effects of the project on selected VCs (BC EAO 2013e; BC EAO 2015a).

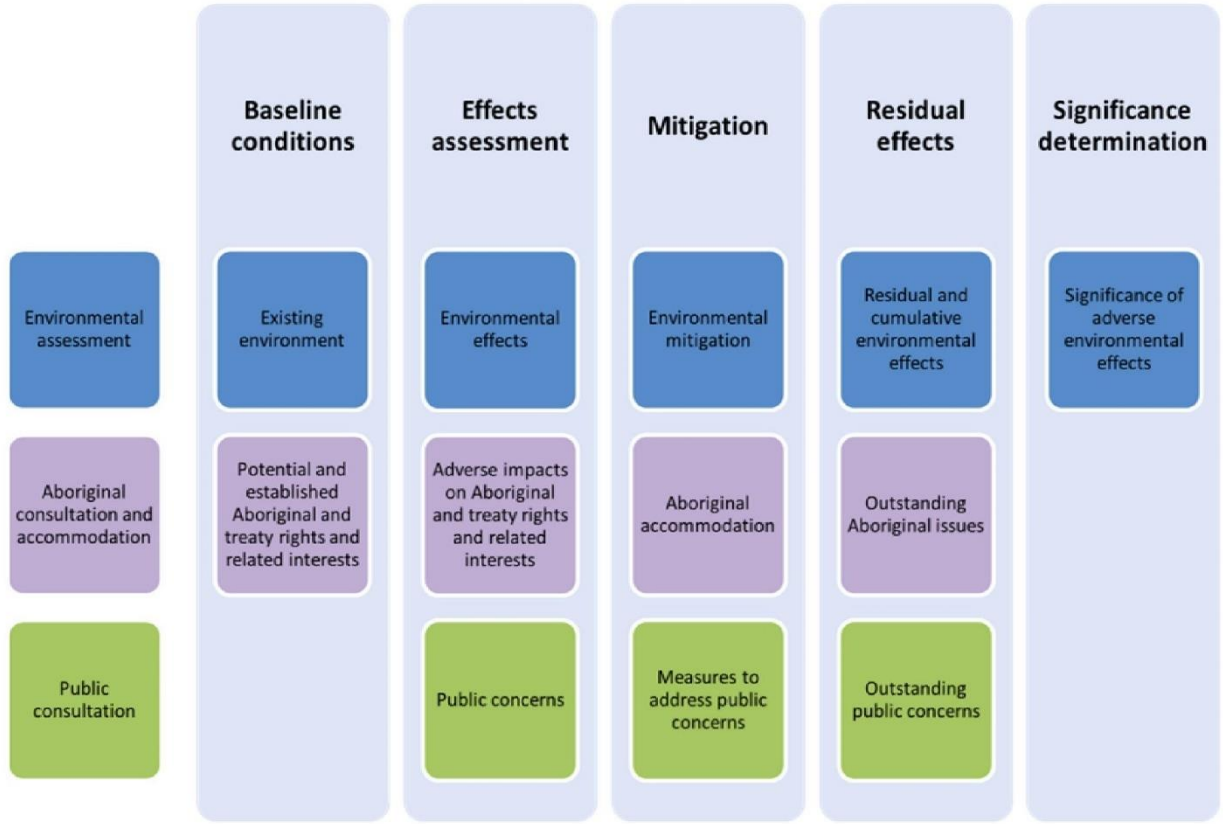
Residual adverse effects (i.e., effects remaining after the implementation of all mitigation measures) is characterized using defined criteria (context, magnitude, extent, duration, reversibility, and frequency). Determination of likelihood, definition and determination of significance, and statement of the level of confidence are the next steps in the evaluation of the significance of residual effects. The potential for *significant* residual adverse effects is *'a key consideration in determining whether or not an Environmental Assessment Certificate is issued for a proposed project'* (BC EAO 2013e). Where feasible, a quantitative threshold should be defined for the significance determination for VCs based on published data, as well as environmental standards and guidelines. Due to a lack of regulatory standards, guidelines or objectives, a significance determination based on qualitative thresholds can be also used for some VCs; definitions have to be provided when qualitative thresholds are used.

Another major objective of an EA application is to measure the impacts of the project and all other past, present, and reasonably foreseeable projects and activities in the region (i.e., a cumulative effect assessment). The cumulative effects assessment is required if a reviewable project is expected to result in *any* residual adverse effects on the selected VCs (not only those predicted to be significant).

Planning and execution of post-construction monitoring and follow-up studies is the last and one of the most important steps for the EA application. These studies are intended to monitor adverse project effects and mitigation measures throughout the construction and operations phase and beyond (often including decommissioning and abandonment). It is important to confirm that project impacts are not higher than predicted and that mitigation measures are working as proposed.

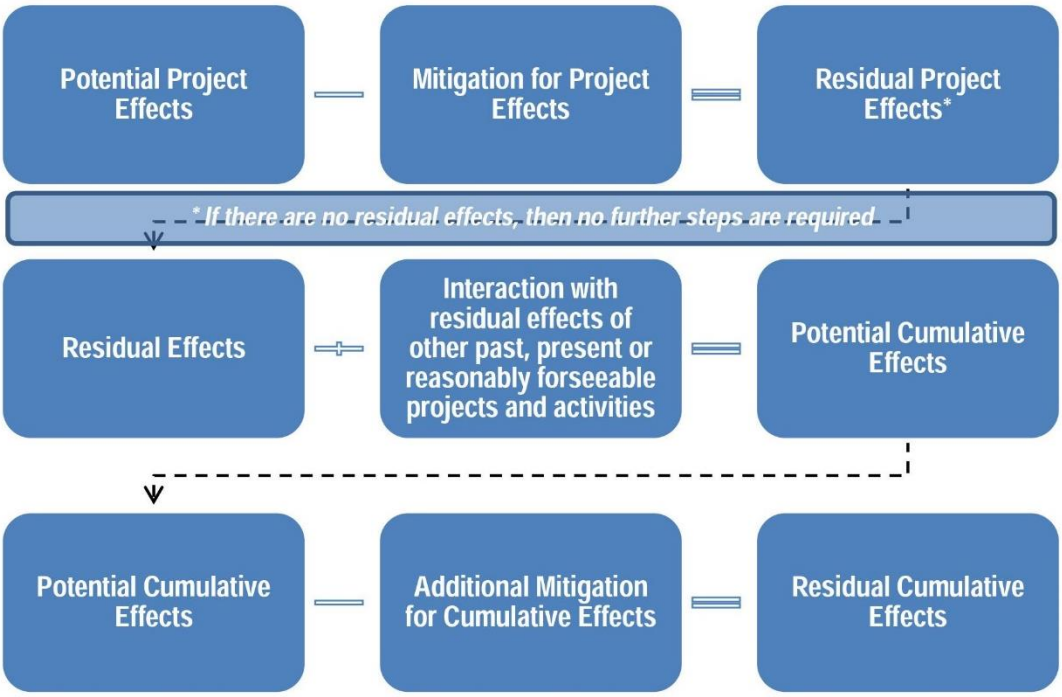
Figure 2.3 illustrates the steps generally followed in the EA process, from the baseline conditions assessment to the determination of significance of residual adverse effects (CEAA 2013a). Figure 2.4 illustrates the steps generally followed in determining whether there are residual effects, cumulative effects, and residual cumulative effects to selected VCs caused by the proposed project (BC EAO 2013e).

Figure 2.3: Steps to Follow in an Environmental Assessment Process



Source: (CEAA 2013a)

Figure 2.4: Steps to Determine Residual Project Effects and Cumulative Effects



Source: (BC EAO 2013e)

Potential Adverse Effects on the Environment Identified from Natural Gas and LNG Projects

The key potential environmental issues reported in Tables 2.1 and 2.2 were selected based on the typical content of EA documents for natural gas pipeline and LNG projects. For Table 2.1, this includes a list of Terrestrial VCs that may be impacted by the project, with potential effects on these VCs that may result from the construction, operation, and/or decommissioning of the proposed projects, as identified by the proponents. For Table 2.2, this includes a list of Marine VCs that may be impacted by the project activities, with potential adverse effects on these VCs. The Marine VCs were mostly identified on the proposed LNG projects, as well as on a few natural gas pipeline projects that include a marine portion of the pipeline route (for detailed information on the project's type, description and location, refer to Table 1.1 of this report).

Data in Table 2.1 are based on the review of EA applications for the 29 natural gas pipeline and LNG projects that have entered a typical EA process with the provincial (BC EAO) and/or federal responsible authority (CEA Agency/NEB) since 2010. Data in Table 2.2 are based on the review of EA applications for the 12 natural gas pipeline and LNG projects with the Marine VCs identified that have entered a typical EA process with the provincial and/or federal responsible authority since 2010. In both cases, this amount includes projects at pre-application stage; those where the EA process is underway, and projects where the provincial and/or federal EA process has been completed.

Since the EA process for a number of the reviewed projects has not been completed yet, and therefore, corresponding environmental assessment reports from the regulators were not available, other documents submitted by the proponent (including AIRs or Valued Components Selection documents) have been considered for this analysis. It is important to remember that the adverse effects presented in Tables 2.1 and 2.2 are potential interactions between the project activities and the VCs before implementation of mitigation, and they do not necessarily result in residual adverse effects remaining after the implementation of all mitigation measures.

Residual adverse effects on environmental VCs identified by the proponents in the EA applications for the proposed projects were reviewed by the provincial or federal responsible authorities to determine their significance. For the majority of the projects with the EA process completed, the regulators' assessment reports concluded that practical means have been identified to prevent or reduce any potential negative environmental impacts of the proposed projects such that no direct or indirect significant adverse effect is predicted or expected. Significant residual adverse effects to the Greenhouse Gas (GHG) Emissions VC and the Wildlife VC (specifically, to caribou, grizzly bear and harbour porpoise) reported for a number of projects will be discussed in detail below.

Table 2.1: Examples of Potential Adverse Effects on the Terrestrial Valued Components As Identified by the Proponents

Valued Component	Potential Adverse Effect	Projects with Potential Adverse Effect Identified
Acoustics	• Increase in ambient noise levels	29/29
Air Quality	• Increase in elevated concentrations of criteria air contaminants	29/29
Greenhouse Gas Emissions	• Increase in GHG emissions during construction and operation	29/29
Soil/Terrain	• Reduced slope stability, increased erosion, soil chemistry changes	21/29
Surface Water/ Groundwater	• Change in surface water quality due to increased total suspended solids	26/29
Fish and Fish Habitat	• Potential alteration and loss of instream and riparian habitat	23/29
	• Potential fish mortality and injury	23/29
Wetland Function	• Loss or alteration of wetland hydrologic, biogeochemical and habitat functions	24/29
Vegetation	• Loss or alteration of native vegetation, plant species and/or vegetation communities of concern	27/29
	• Introduction and spread of invasive plant species	26/29
Wildlife and Wildlife Habitat	• Changes in habitat availability resulting from habitat loss/alteration	28/29
	• Changes in movement and increased mortality risk	28/29

Data Sources: (AltaGas Ltd. 2016; BC EAO 2008; BC EAO 2009; BC EAO 2013d; BC EAO 2013g; BC EAO 2014a; BC EAO 2014b; BC EAO 2014c; BC EAO 2014d; BC EAO 2015b; BC EAO 2015e; BC EAO 2015f; BC EAO 2016g; BC EAO 2016h; BC EAO et al. 2006; Canada and NEB 2010; Canada and NEB 2012; Canada and NEB 2013; Canada and NEB 2016; NEB 2010; NEB 2011; NEB 2015a; Nexen Energy ULC 2015; Pacific Northern Gas Ltd. 2014; Prince Rupert LNG Limited 2014; Stantec Consulting Ltd. 2014; WCC LNG Project Ltd. 2016; WesPac Midstream 2016; Woodside Energy Holdings Pty Ltd. 2016). Table created by CERI.

Table 2.2: Examples of Potential Adverse Effects on the Marine Valued Components As Identified by the Proponents

Valued Component	Potential Adverse Effect	Projects with Potential Adverse Effect Identified
Marine Surface Water Quality	• Changes in water quality from discharges from the LNG facility, dredging and pile driving	12/12
	• Contaminant concentrations in sediment and water	12/12
Intertidal and Subtidal Marine Habitat	• Changes in marine habitat type, quantity and quality, and marine biodiversity	12/12
	• Effects of introduction of invasive species	5/12
Marine Fish and Shellfish and their Habitats	• Removal and alteration of estuarine and marine fish habitat, including marine plants	12/12
	• Changes in habitat availability, productivity and the use of habitat; effects of introduction of invasive species	12/12
Marine Mammals	• Direct and indirect effects on areas occupied by marine mammals and their types of use	11/12
	• Risk of LNG carriers and support vessels colliding with marine mammals	11/12
	• Behavioral changes that may occur as a consequence of project interactions	10/12

Data Sources: (AltaGas Ltd. 2016; BC EAO 2014b; BC EAO 2014c; BC EAO 2014d; BC EAO 2015b; BC EAO 2015f; BC EAO et al. 2006; Nexen Energy ULC 2015; Prince Rupert LNG Limited 2014; WCC LNG Project Ltd. 2016; WesPac Midstream 2016; Woodside Energy Holdings Pty Ltd. 2016). Table created by CERI.

Potential Cumulative Effects from Natural Gas and LNG Development

Cumulative effects are changes to environmental, social and economic values caused by the combined effect of past, present and potential future activities and natural processes (BC MFLNRO & BC MEM, 2016).

Cumulative effects can be classified into a number of types (Salmo Consulting Inc. and Diversified Environmental Services 2003):

- Habitat alteration, loss, and fragmentation;
- Barriers to movement;
- Direct and indirect mortality;
- Disturbance.

Exceedance of thresholds (due to overlapping in time and space) and induced effects should also be taken into consideration.

The analysis of cumulative effects of natural gas pipeline and LNG projects is to be done at the project level and included in the application, as required by both the provincial (BC EAO) and the federal (CEA Agency) regulatory bodies (BC EAO 2015a; CEAA 2015a). The *CEAA 2012* requires that each EA of a designated project takes into account any cumulative environmental effects

that are likely to result from the designated project in combination with the environmental effects of other physical activities that have been or will be carried out (CEAA 2015a). If it is expected that a reviewable project will result in any residual adverse effects on the selected VCs, then a cumulative effects assessment for those VCs must be considered. This consideration must be made for all residual adverse effects, not only those predicted to be significant (BC EAO 2013e). The significance of any cumulative effects must also be evaluated (BC EAO 2015a).

Key challenges in the completion of an adequate cumulative effects assessment include (Salmo Consulting Inc. and Diversified Environmental Services 2003; WWF-Canada and UNBC-CIRC 2015):

- Extending the analysis of project level impacts to a regional level; cumulative effects as practiced in the EA process do not provide a broader understanding of the concept;
- Inadequate baseline that does not adequately consider pre-development conditions; as a result, lack of baseline data can restrict value and indicator selection;
- Lack of standardized methodological approach, clarity, consistency, and transparency in defining significance and communicating risk;
- Lack of incorporation of traditional ecological knowledge (TEK), traditional land use (TLU) and Indigenous Peoples considerations;
- Lack of acceptance and implementation of thresholds; interim measures should be established to regulate ongoing impacts while decisions on thresholds are being made, especially if negative impacts are already occurring and growing;
- Dealing with uncertainty, which include imperfect knowledge of baseline conditions and present activities, limited understanding of the indirect impacts of activities and their interactions, and uncertainties about future development scenarios;
- Different interpretation of cumulative effects data based on inherent human values and varying biases.

It is important to remember that small, non-reviewable projects are not currently assessed for cumulative effects, so unintended impacts can accumulate. Cumulative effects are assessed by BC EAO mostly on major reviewable projects. However, the demand for natural gas infrastructure is rapidly growing and the context for new development is becoming more complex, resulting in a need to efficiently and consistently assess the impact of both small and large projects (Province of BC 2014a).

There is growing concern about the cumulative impacts of natural gas development arising from both stakeholders and the general public. Cumulative impacts are also of particular concerns for Indigenous Groups, with many of them unsatisfied with the adequacy of cumulative effects assessment of past, present and reasonably foreseeable industrial activity in their traditional territory, in relation to their respective Aboriginal interests. Detailed discussion of potential cumulative impacts on Aboriginal interests is provided in Chapter 3.

The analysis of cumulative effects from the 18 natural gas pipeline and LNG projects where the provincial or federal EA process has been completed shows that the majority of the proposed

projects will not likely result in significant cumulative adverse effects to identified VCs taking into account practical means of preventing or reducing to an acceptable level, any potential adverse effects. However, for the Wildlife VC, the cumulative effects of past, present and known proposed future projects were rated as significant for three threatened and endangered species (specifically, caribou, grizzly bear and harbour porpoise) on a number of the assessed projects (BC EAO 2013d; BC EAO 2014a; BC EAO 2014d; BC EAO 2014b; BC EAO 2016h; CEAA 2016f). It is worthwhile noting that on two of those projects impacts to caribou or grizzly bear habitat were considered to be significant in terms of cumulative effects, but not in terms of project specific effects (BC EAO 2013d; BC EAO 2016h). These findings can be mostly attributed to the results of long-term habitat fragmentation and ongoing loss and alteration of the natural landscape in the region. Detailed discussion of significant cumulative adverse effects determined on the reviewed projects is provided below.

Significant Residual and Cumulative Adverse Effects on the Environmental Valued Components

Increase in Greenhouse Gas Emissions

Significant residual adverse effects related to GHG emissions have been one of the major environmental issues reported from the proposed natural gas pipeline and LNG projects. They have been identified by BC EAO or the CEA Agency on 7 projects out of 18 where the provincial or federal environmental assessment process has been completed (BC EAO 2009; BC EAO 2013d; BC EAO 2014a; BC EAO 2014d; BC EAO 2014b; BC EAO 2015b; CEAA 2016f).

There are four major gases or groups of gases influenced by human activities that are of interest with respect to GHG emissions: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and synthetic fluorinated gases (i.e., sulphur hexafluoride (SF6), hydro-fluorocarbons (HFCs) and perfluorocarbons (PFCs)). Total GHG emissions are aggregated into carbon dioxide equivalents (CO2e), representing an equivalent amount of carbon dioxide (CO2) that would cause the same amount of global warming as the aggregated gases. GHGs would be released during the construction, operation and decommissioning of the proposed projects.

Both the federal and provincial governments have created strategic-level plans to address GHG emissions. A target set by the Government of Canada under the Copenhagen Accord (2009), was reducing Canada's total GHG emissions by 17% from 2005 levels by 2020. In May 2015, the Government of Canada announced it will commit to reducing its GHG emissions by 30% below 2005 levels by 2030, which would require cutting current emissions by about 200 million tonnes (Mt) (Government of Canada 2015). At present, Environment Canada (EC) requires that any facility emitting more than 50 kilotonnes (kt) CO2e report their annual GHG emissions online (Environment and Climate Change Canada - ECCC 2016). The Greenhouse Gas Reduction Act passed by the BC Government in 2007, establishes provincial GHG reduction targets of 33% below 2007 emission levels by 2020 and 80% below by 2050. Interim reduction targets of 6% by 2012 and 18% by 2016 have been set in policy to guide and measure progress (Province of BC 2008). In 2012, the Province reached the first interim reduction target, and since that time, BC's

emissions levels have remained relatively unchanged. In the most recent BC Greenhouse Gas Inventory Report, the Province's 2014 CO2e emission levels were reported at 62,700 kt, which is 5.5% below 2007 levels (Province of BC 2016c).

In order to achieve the GHG reduction goals across the province, British Columbia has designed and implemented a number of policy, regulatory, and legislative measures. The Greenhouse Gas Industrial Reporting and Control Act passed by the BC Government in November 2014, establishes a GHG emissions intensity benchmark for LNG facilities of 0.16 tonnes of CO2e per tonne of LNG produced (t CO2e/t LNG). The BC Climate Leadership Plan released in August 2016 contains new actions to reduce GHG emissions across the six main action areas, including natural gas, where annual emissions are expected to be reduced by up to 5,000 kt by 2050, in particular, by reducing upstream methane emissions by 45%, developing regulations for carbon capture and storage, and investing in infrastructure to power natural gas projects with BC's clean electricity (Province of BC 2016c).

For the seven projects with the significant residual adverse effects related to GHG emissions, determination of significance was based on the existing context of global GHG emissions and the magnitude of the proposed projects' emissions, which was considered to be high in all instances in relation to BC's reduction targets (BC EAO 2009; BC EAO 2013d; BC EAO 2014a; BC EAO 2014d; BC EAO 2014b; BC EAO 2015b; CEAA 2016f). It should be noted that BC EAO did not require the proponents to include a cumulative effects assessment for GHG emissions, since they are a global issue.

Table 2.3 shows estimated GHG emissions (Mt of CO2e per year) of these seven natural gas pipeline or LNG projects at their full operational capacity (full build-out). The table also provides information on the estimated contribution (%) of each project to increase provincial, national and global GHG emissions. As stated by the proponents, the anticipated GHG emissions are conservative estimates that represent a worst case scenario, meaning that the estimates presented in Table 2.3 are most likely higher than actual emissions at the projects' full build-out.

Table 2.3: Estimated Greenhouse Gas Emissions at Full Operational Capacity for the Proposed Natural Gas and LNG Projects with the Significant Residual Adverse Effects Identified

Project Title	Estimated GHG Emissions, Mt CO2e/year	Contribution to Increase in GHG Emissions, %		
		Provincial Level	National Level	Global Level
Cabin Gas Plant Project	2.166	3.27[a]	0.29[b]	NA
Coastal GasLink Pipeline Project	3.517	6.0[c]	0.50[c]	0.012
Fortune Creek Gas Project	2.435	3.9[d]	0.35[d]	NA
LNG Canada Export Terminal Project	3.958	6.6[c]	0.57[c]	NA
Pacific NorthWest LNG project	4.5	7.2[e]	0.62[e]	0.015
Prince Rupert Gas Transmission Project	1.918	3.2[f]	0.30[f]	0.004[d]
Westcoast Connector Gas Transmission Project	4.4	7.0[c]	0.60[c]	0.010[d]

Data Sources: (BC EAO 2009; BC EAO 2013d; BC EAO 2014a; BC EAO 2014d; BC EAO 2014b; BC EAO 2015b; CEAA 2016f). Table created by CERI.

Notes: Contribution of the reviewed projects to increase in GHG emissions (%), as estimated by the regulator or the proponent, is based on the following data: a – 2006 Inventory; b – 2007 Inventory; c – 2011 Inventory; d – 2010 Inventory; e – 2014 Inventory; f – 2012 Inventory. For more information on the National Inventory Reports (1990-2015): Greenhouse Gas Sources and Sinks in Canada, refer to (Government of Canada 2013).

As shown in Table 2.3, the Pacific NorthWest LNG project approved by the CEA Agency in September 2016 would result in approximately 4.5 Mt CO2e per year (approximately 0.22 t CO2e/t LNG), which would represent a marked increase in GHG emissions both at the provincial and national level. It is important to note that, as part of the Government of Canada's interim approach for EAs announced in January 2016, an assessment of the upstream GHG emissions associated with the proposed project was required in addition to the assessment of the direct GHG emissions. Upstream emissions were estimated for the stages preceding the liquefaction process and included natural gas production, processing, and pipeline transmission. As estimated by the ECCC, the upstream GHG emissions associated with the Pacific NorthWest LNG project would represent 14.0% to 14.7% of provincial emissions and 1.2% to 1.3% of national emissions (based on 2014 levels), and would be high in magnitude, continuous, irreversible and global in extent. Therefore, they are considered to cause significant adverse environmental effects (CEAA 2016f).

According to the ECCC assessment, the proposed project would be amongst the largest single point sources of GHG emissions in the country, and would rank third among emitters in the oil and gas sector in Canada. The ECCC also noted that the use of third party electrical power could significantly reduce the direct GHG emissions from LNG facilities of the proposed project, and that electrical power supply is included to varying degrees in the design of the proposed

Woodfibre LNG and LNG Canada Export Terminal projects approved by BC EAO and the CEA Agency in 2015-2016 (CEAA 2016f). As a result of the federal environmental assessment, the Government of Canada approved the Pacific NorthWest LNG project with the imposing of, for the first time ever, a maximum cap on annual project direct GHG emissions (4.3 Mt of CO2e per year, 900,000 tonnes less than what had initially been proposed by the proponent) (Government of Canada 2016d).

In line with the recently announced principles to guide federal decision-making in relation to projects subject to federal EAs (Government of Canada 2016a), a number of other natural gas pipeline and LNG projects where the EA process is currently underway have been requested to ensure that appropriate considerations of GHG emissions are included as part of the environmental assessment of the proposed projects under the *CEAA 2012*. In February 2016, the CEA Agency submitted letters to BC EAO regarding consideration of GHG emissions for the projects in the substituted environmental assessment process. The CEA Agency requested the following information to be included in BC EAO's assessment reports: accounting of direct GHG emissions; an estimate of upstream GHG emissions associated with the projects; and an analysis of the relative contribution of the projects to provincial, national and sector GHG emissions and applicable standards or targets (CEAA 2016a; CEAA 2016b; CEAA 2016c; CEAA 2016d).

Significant Adverse Effects on Terrestrial Wildlife

An analysis of EA reports prepared by BC EAO, the NEB or CEA Agency for the 18 natural gas pipeline and LNG projects where the provincial or federal EA process has been completed revealed impacts to terrestrial wildlife to be a critical issue. Most adverse effects shown in Table 2.1 were related to habitat impacts or impacts to rare, threatened, or endangered species. In many cases impacts were attributed to loss of habitat for caribou and grizzly bear due to the habitat fragmentation; this was particularly true in regard to cumulative effects.

Impacts on Caribou and Caribou Habitat

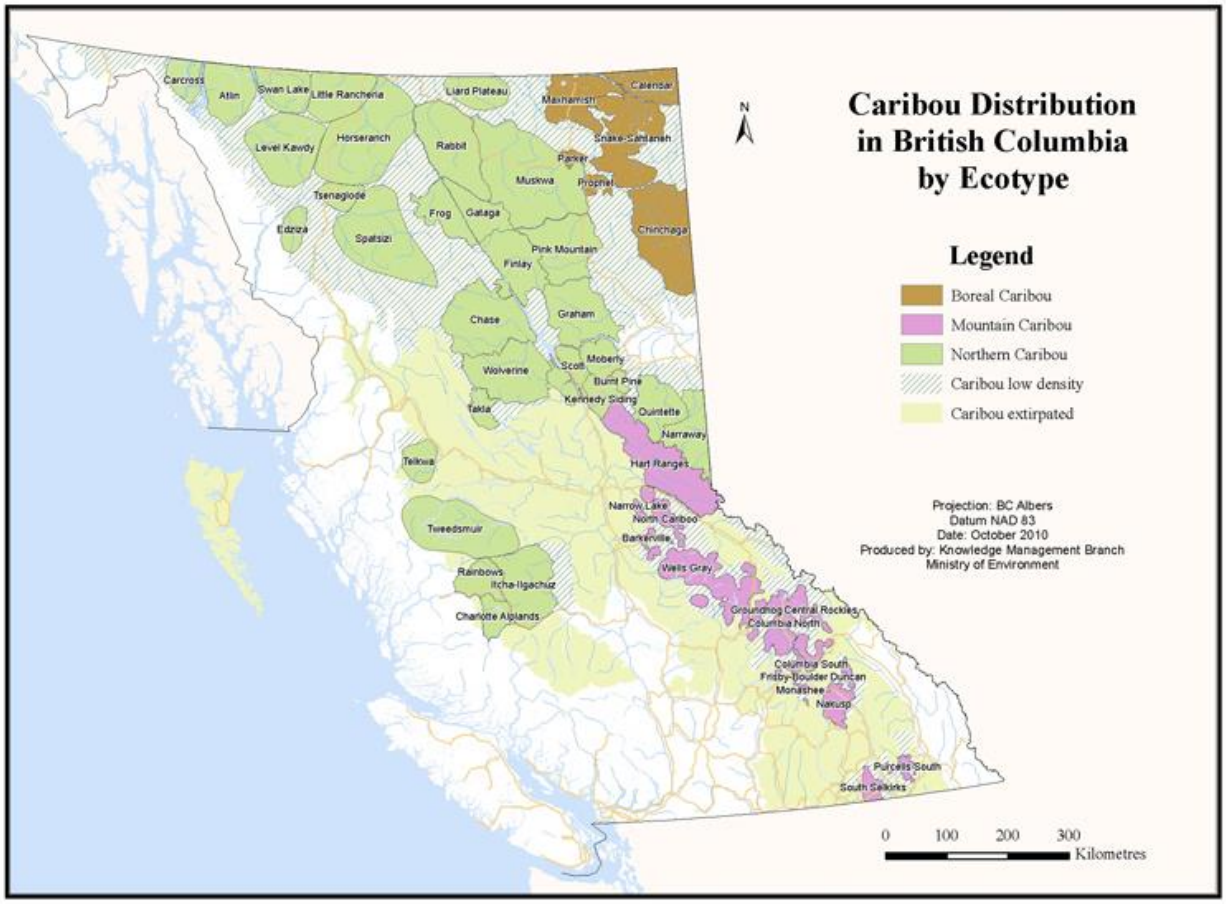
Impacts on caribou and caribou habitat were determined by BC EAO as a significant residual adverse effect on three major natural gas pipeline projects (out of 18 with the EA process completed), and were also determined by the NEB as a key issue that should be considered and fully compensated for on two other natural gas pipeline projects in northeast British Columbia (BC EAO 2014b; BC EAO 2014d; BC EAO 2014a; Canada and NEB 2015; NEB 2012). According to BC EAO's assessment reports, four natural gas pipeline projects will contribute to significant cumulative effects on caribou (BC EAO 2013d; BC EAO 2014a; BC EAO 2014d; BC EAO 2014b). For two other natural gas pipeline projects, the NEB concluded that the cumulative adverse effects of the proposed projects on caribou and caribou habitat are not likely to be significant, with the implementation of mitigation to offset unavoidable and residual impacts to caribou habitat (Canada and NEB 2015; NEB 2011).

All caribou in British Columbia are classified as Woodland Caribou (*Rangifer tarandus caribou*), and have been divided into three ecotypes – Mountain, Northern and Boreal – which are based primarily on behavior and the way caribou use their habitat (BC Ministry of Environment, Lands

and Parks - BC MOELP 2000). As shown on Figure 2.5, there are 52 caribou herds in British Columbia (BC MOE 2010a). Certain populations of Woodland Caribou in Canada are listed as Threatened under the *SARA*. In British Columbia, all Mountain and Boreal Caribou herds and 15 of 31 Northern Caribou herds are provincially listed as Threatened. Conserving caribou in British Columbia is a priority for the Government, with the BC Ministry of Environment (BC MOE) supporting the management of all three ecotypes (BC MOE 2016a).

Woodland Caribou in British Columbia are believed to be in decline. This decline may be attributed to habitat loss, fragmentation of the herd, alteration of their habitat, and increased predation, resulting from forestry and petroleum and natural gas activities (BC MEM 2012). Any additional residual loss of habitat, increase in mortality or increase in displacement/disturbance from critical habitat or important connections to critical habitat in the area of the proposed projects will have a serious impact on the potential for recovery of caribou subpopulations, since unavoidable and residual impacts may persist over a long period of time, beyond the construction phase and initial years of operation. Caribou are likely to alter their movement to avoid noise, activity and disturbance associated with construction activities, as well as noise from permanent facilities such as compressor stations, which could increase energetic demands. Potential habitat disturbance in high elevation areas can drive caribou into using lower-elevation, higher-risk habitat. The pipeline right-of-way and additional linear development could provide a travel route for predators, increasing the predations risk to caribou. Available mitigation to reduce impacts of increased predation are still unproven and cannot be relied upon to completely reduce those effects (BC EAO 2014b; BC EAO 2014d; BC EAO 2014a; Canada and NEB 2015; NEB 2015c).

Figure 2.5: Caribou Distribution in British Columbia by Ecotype



Source: (BC MOE 2010a)

For the three projects (Westcoast Connector Gas Transmission, Prince Rupert Gas Transmission and Coastal GasLink Pipeline) where the significant adverse effect on caribou was identified, the primary factors leading to the BC EAO's rating of significance were the long-term potential impacts from the proposed projects of enhanced predator access to caribou. In its assessment reports, BC EAO stated that mitigation measures may be effective, but until proven through detailed monitoring that confirms the proposed pipeline corridor does not result in predator access, increased caribou mortality or displacement or disruption of caribou movement, cannot be relied upon to reduce effects to a non-significant level (BC EAO 2014a; BC EAO 2014b; BC EAO 2014d).

For the four reviewed projects (Westcoast Connector Gas Transmission, Prince Rupert Gas Transmission, Coastal GasLink Pipeline, and Fortune Creek Gas Project), BC EAO concluded that the residual effects of habitat disturbance, sensory disturbance and creation of access from the proposed projects would likely interact with reasonably foreseeable future projects to create cumulative effects. Taking into account the significant project effects and the sensitivity of caribou to further disturbances, the cumulative effects to caribou were considered to be significant. Residual effects to caribou were predicted to exceed an acceptable biological

threshold or standard, and to contribute to effects on caribou such that stated management or conservation objectives might not be attainable. After considering all relevant proposed mitigation measures, conditions, and input from the Working Group, Aboriginal Groups, and the public, BC EAO concluded that these proposed projects are likely to contribute to significant cumulative adverse effects on caribou (BC EAO 2013d; BC EAO 2014a; BC EAO 2014b; BC EAO 2014d).

In the NEB's reports for the North Montney Mainline, Northwest Mainline Expansion and the Horn River Gas projects, the Board noted that impacts on caribou and caribou habitat may be used as an overall indicator of the adverse changes on the landscape. Given the conservation status of caribou, the presence of critical habitat in the projects' area, and the already substantial ongoing cumulative effects on the landscape and caribou in the region, the NEB concluded that all residual effects on caribou habitat should be considered and fully compensated for (Canada and NEB 2015; NEB 2011; NEB 2015c).

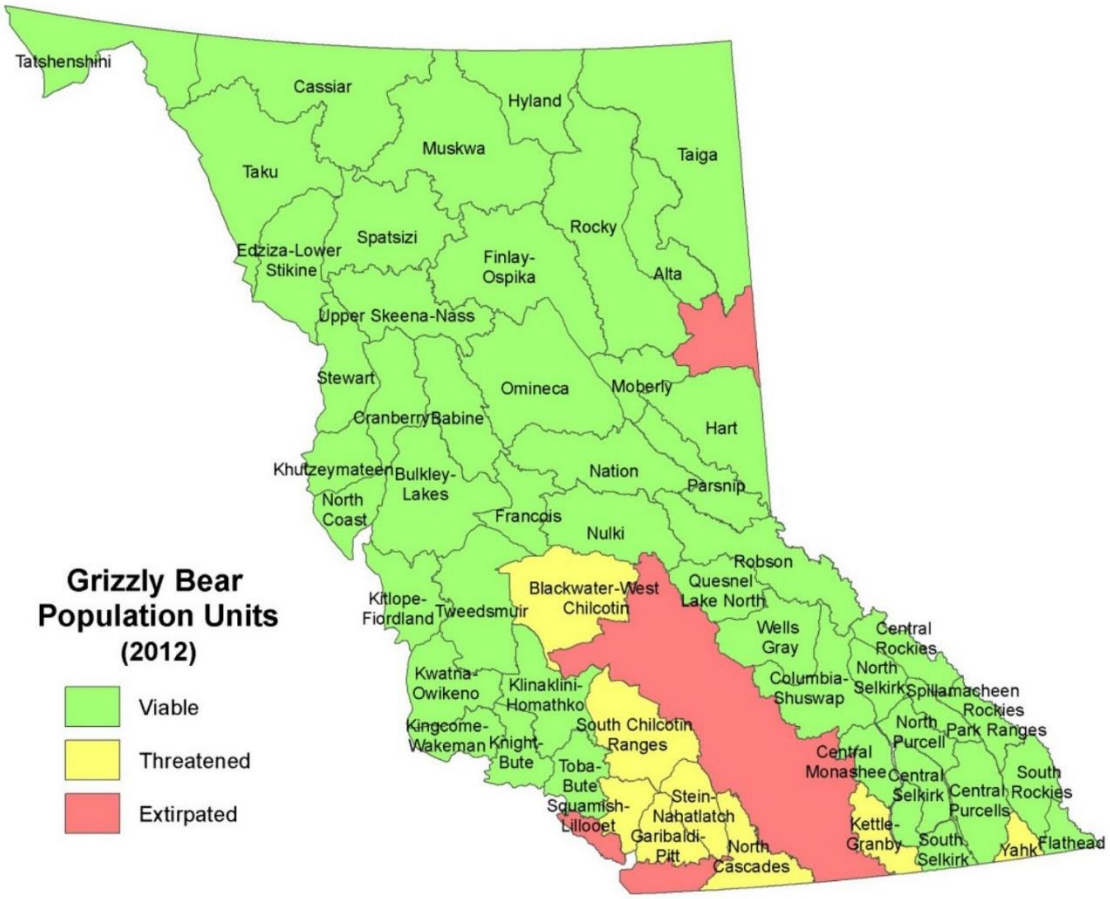
Cumulative Impacts on Grizzly Bear

Cumulative adverse effects on the grizzly bear population were considered by BC EAO to be significant on one natural gas project out of the 18 where an EAC, EADS or CPCN were issued (BC EAO 2016h).

Grizzly bear (*Ursus arctos*) is a Blue-listed species (Special Concern) by the BC Conservation Data Centre, and is designated as a Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As shown on Figure 2.6, there are 56 extant Grizzly Bear Population Units (GBPU) in BC, with 9 of them classified as Threatened (Environmental Reporting BC and BC MOE 2012). Grizzly bears are sensitive to human disturbance, and the cumulative effects of human disturbance is the greatest threat to bear populations. This impacts bears in three main ways (which can often be overlapping): 1) increase in frequency of conflicts between bears and humans, resulting in bears being killed or relocated; 2) isolation of bear populations because of human settlements, utility corridors or agriculture; 3) degradation or loss of habitat due to development; fragmentation due to high density developments (e.g., road network with high traffic volumes); or alienation of habitat due to bears' avoidance of humans and human activities (Environmental Reporting BC and BC MOE 2012).

Roads are known to have a negative effect on grizzly bear. At the regional scale, open road density higher than 0.6 km/km2 is known to adversely affect habitat use and these effects are magnified when road density increases over approximately 1 km/km2 (Environmental Reporting BC and BC MOE 2012).

Figure 2.6: Grizzly Bear Population Units in British Columbia



Source: (Environmental Reporting BC and BC MOE 2012)

The existing average motorized access density within the area that would be intersected by the proposed Eagle Mountain – Woodfibre Gas Pipeline project currently exceeds the minimum threshold for high risk of mortality and displacement for two GBPUs transected by the proposed project. Both GBPUs are provincially considered threatened, with core grizzly bear habitat currently remaining well below the recommended minimum target levels (although the habitat loss that would be attributed to the proposed project is negligible). Increased human access to the area, and the presence of construction workers and facilities has the potential to increase the risk of human-wildlife conflict that can result in increased mortality risk for bears. Disturbance from noise created by roads and linear corridors have also been found to adversely affect grizzly bear habitat effectiveness, to fragment habitat by creating barriers or filters to movement and alienating bears from suitable habitat, and to increase mortality risk (BC EAO 2016h). During the application review, it was identified by the BC Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) that any impacts to the reproductive potential of breeding females could significantly affect the ability for recovery of grizzly bears in the two GBPUs traversed by the proposed project.

Considering the analysis summarized above, BC EAO has concluded that while the proposed project alone does not have significant adverse effects to grizzly bears, cumulative effects to this species are considered to be significant, taking into account the effects from past and existing projects and activities on grizzly bears, and the threatened status of the GBPUs, as well as reasonably foreseeable projects and activities (BC EAO 2016h).

Significant Adverse Effects on Marine Mammals

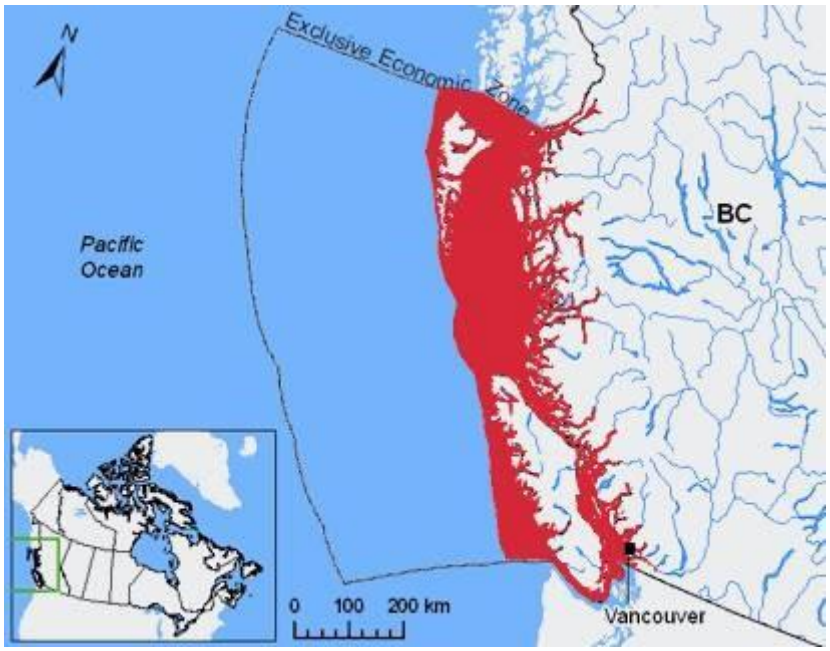
An analysis of EA reports for six provincially and/or federally approved natural gas pipeline and LNG projects that include the Marine Resources VCs was conducted. While the analysis revealed impacts to marine mammals to be a concern for several projects, only one project has considered residual adverse environmental effects (including cumulative adverse effects) on marine mammals (particularly, on harbour porpoise) to be significant.

Impacts on Harbour Porpoise

Impacts on harbour porpoise (including cumulative impacts) were determined by the CEA Agency as significant adverse effects in the EA report for the Pacific NorthWest LNG project (CEAA 2016f). Harbour Porpoise (*Phocoena phocoena*) is a small marine mammal reaching a length of about 2.2 m and weight of about 75 kg; it is the smallest whale in Canadian waters. This species has been listed as a Special Concern by the COSEWIC and *SARA* (Department of Fisheries and Oceans Canada - DFO 2009). As identified by the proponent of the Pacific NorthWest LNG project, high densities of harbour porpoise are found in the project's local assessment area in the shallow waters around Prince Rupert and in the southern portion of Chatham Sound, indicating these areas as preferred suitable habitat (CEAA 2016f). The distribution of this marine mammal species is shown on Figure 2.7.

Harbour porpoise is highly sensitive to acoustic disturbance (particularly underwater noise) and shows strong site fidelity and a higher degree of behavioral response to similar disturbances compared to other marine mammals (CEAA 2016f; DFO 2009). Notwithstanding that the proponent indicated alternative habitat for this species available in Chatham Sound, the DFO and the CEA Agency were of the view that there is still some uncertainty as to whether and how much adequate suitable alternate habitat is available for all marine mammal species affected by the project, in particular for harbour porpoise (CEAA 2016f; DFO 2009).

Figure 2.7: Harbour Porpoise Distribution in British Columbia



Source: (DFO 2009)

The CEA Agency concluded in the assessment report that the proposed Pacific NorthWest LNG project is likely to cause significant adverse environmental effects to harbour porpoise, given its susceptibility to behavioral effects from underwater noise, its current at risk status, its extensive use of the project area year-round, and the uncertainty of suitable alternative habitat. The Agency also concluded that the proposed project is likely to result in significant adverse cumulative environmental effects to harbour porpoise, given the number of large industrial projects proposed in the Prince Rupert area that could increase underwater noise along the east side of Chatham Sound, and considering that behavioral effects of overlapping projects are expected to occur over a larger area and for a longer period of time. It was also not clear whether alternative habitats for harbour porpoise would remain suitable. Given this conclusion, the CEA Agency determined that any further effects from other projects or activities likely to occur in combination with the already significant adverse effects of the project would likely result in significant adverse cumulative effects to harbour porpoise (CEAA 2016f; MOE 2016).

Accidents and Malfunctions

Potential Accidents and Malfunctions

During the construction or operation of proposed natural gas pipeline or LNG projects, unplanned events could arise from accidents or malfunctions associated with project activities, resulting in impacts to environmental, social, health, heritage or economic VCs. Pursuant to paragraph 19(1)(a) of *CEAA 2012*, the federal EA must take into account the environmental effects of accidents and malfunctions that may occur in connection with the proposed project. The Pipeline Safety Act assented in June 2015 amended damage prevention provisions in the *NEBA* and the

COGOA in order to strengthen the safety and security of pipelines regulated by those Acts. In British Columbia, the Liquefied Natural Gas Facility Regulation (2014, last amended 2016) enacted under the authority of the *BC OGAA* regulates the design, construction, operations and decommissioning of LNG facilities, including regulation of facility emissions; waste and water discharge permits; flaring and venting limits; and also hazard analysis, safety and loss management; risk assessment, and emergency response (Province of BC 2014c).

The reviewed applications considered the likelihood and consequences of the occurrence, and scenarios for each of the potential accidents or malfunctions, according to the likelihood and the potential consequence of the scenario arising. The applications have also assessed how potential accidents or malfunctions could affect selected VCs.

The most common potential accidents and malfunctions considered by the proponents in the EA applications for 19 natural gas pipeline and LNG projects (including those where the EA process is currently underway) as being of greatest concern or potential consequence included:

- Spills, leakage or accidental release:
  - toxic or hazardous substances or materials (e.g., hydrocarbon fuels, hydraulic fluid, motor oil, antifreeze, lubricants);
  - release of natural gas as a result of pipeline rupture;
  - loss of containment of LNG at the LNG processing and storage site;
  - sediment release, including drilling mud, into watercourses or marine environment;
  - acid rock drainage or metal leaching
- Fires or explosions
- Fly rock from blasting
- Natural gas pipeline malfunctions:
  - pipeline leaks or failure;
  - pipeline repair or replacement
- LNG plant malfunctions:
  - emergency LNG facility shutdown;
  - emergency flaring;
  - power generation malfunctions;
  - power outages
- Motor vehicle or marine vessel accidents:
  - motor vehicle accidents involving construction, maintenance, or transport crews;
  - marine vessel grounding;
  - marine vessel allision (vessel striking another fixed vessel or object);
  - marine vessel collision (vessel striking another moving vessel);
  - marine vessel collision with a marine mammal;
  - loss of containment of LNG from vessels into the marine environment.

Key issues or concerns raised during stakeholder's and Indigenous Peoples engagement and by the public were related to spill impacts to wildlife (including those resulting from marine vessel accidents), the impact of flaring to birds, and vessel collisions with marine mammals.

In assessment reports by BC EAO and/or the CEA Agency for the 10 reviewed projects where the EA process has been completed, the regulatory agencies were satisfied with the characterization of accidents and malfunctions provided by the proponents, as well as with the proponents' responses to government authorities, Indigenous Groups, and public comments. The responsible authorities concluded that the projects' design measures, mitigation and contingency measures would lower the likelihood and reduce the severity of any accident or malfunction on the proposed projects. Based on the combination of projects' design measures, implementation of the emergency response plans (ERPs), environmental management plans (EMPs) and/or associated plans, BC EAO and/or the CEA Agency were of the view that accidents and malfunctions of those proposed projects are not likely to result in significant risk to the public, or to the environmental, social, economic, health or heritage VCs associated with the reviewed projects (BC EAO 2013d; BC EAO 2014b; BC EAO 2014d; BC EAO 2014a; BC EAO 2015b; BC EAO 2015f; BC EAO 2016h; BC EAO 2016g; BC EAO et al. 2006; CEAA 2016f).

Natural Gas Pipeline Incidents in British Columbia

As of 2015, the BC OGC regulated 43,584 km of pipelines in British Columbia, including 21,117 km of natural gas pipelines and 13,997 km of sour natural gas pipelines.[1] Approximately 80% of these pipelines transport natural gas, while less than 6% carry oil. The remainder carries water or other gases or liquids (BC OGC 2016b).

In 2015, sour natural gas pipelines recorded the lowest incident rate (in terms of incidents that involved a release or spill) with a frequency of 0.14 per 1,000 km, whereas crude oil pipelines had an incident frequency of 2.81 per 1,000 km (BC OGC 2016b). Tables 2.4 and 2.5 show a total number of incidents per 1,000 km of sour natural gas and natural gas pipelines in British Columbia and incident frequency (incidents/1,000 km) in 2010-2015.

It should be noted that not all pipeline incidents result in spills. Prior to 2010, only incidents causing a release were reported; however, all incidents that have the potential to affect the integrity of a pipeline must be reported under the current regulations (BC OGC 2013). Under Section 37 of the *BC OGAA*, a permit holder or a person carrying out an oil and gas activity must prevent spillage and must promptly report to the BC OGC any damage or malfunction likely to cause spillage. In the event spillage occurs, the cause or source of the spillage must be promptly remedied by a permit holder or a person carrying out an oil and gas activity; the spillage must be contained and eliminated, any land or water body remediated, and the location and severity of the spillage reported to the BC OGC (BC OGC 2013).

[1] Sour natural gas includes natural gas with a hydrogen sulphide (H2S) partial pressure greater than 0.3%; natural gas includes natural gas, sweet gas and fuel gas (BC OGC 2013).

Table 2.4: Total Number of Incidents per 1,000 km of Sour Natural Gas Pipeline Inventory in British Columbia (2010-2015)

	2010	2011	2012	2013	2014	2015
Length of Pipelines (km)	11,952	11,910	12,708	12,951	13,739	13,997
Number of Incidents	16	6	7	2	6	2
Incident Frequency (Incidents/1,000 km)	1.34	0.50	0.55	0.15	0.44	0.14

Data Sources: (BC OGC 2012; BC OGC 2013; BC OGC 2014a; BC OGC 2015c; BC OGC 2016a; BC OGC 2016b). Table created by CERI.

Table 2.5: Total Number of Incidents per 1,000 km of Natural Gas Pipeline Inventory in British Columbia (2010-2015)

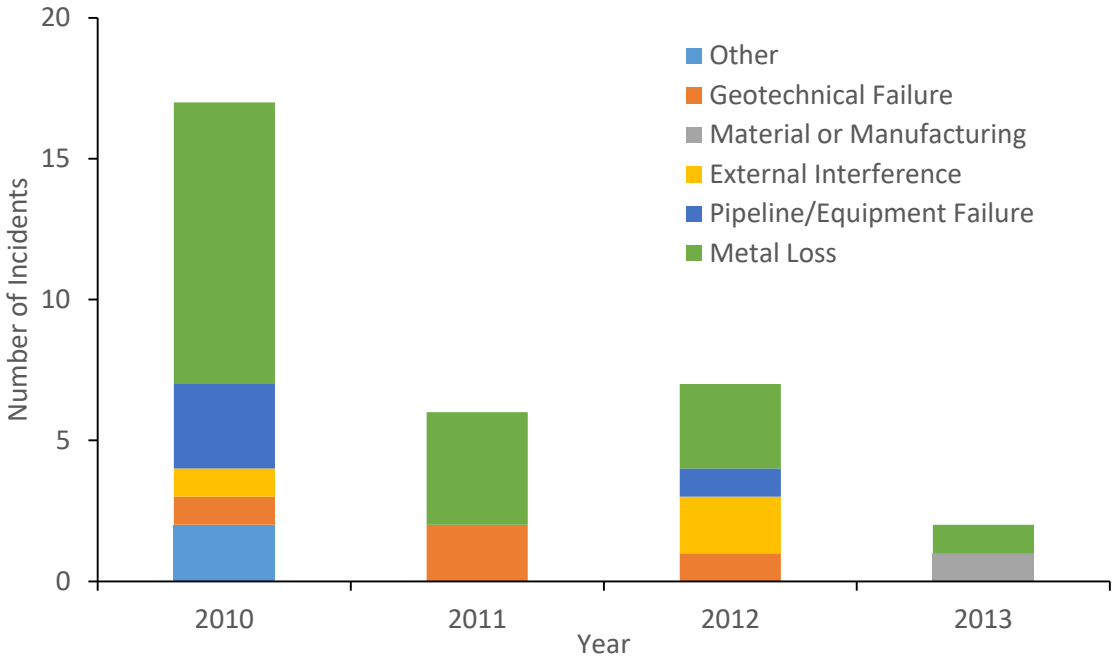
	2010	2011	2012	2013	2014	2015
Length of Pipelines (km)	18,717	19,159	18,125	20,176	20,865	21,117
Number of Incidents	20	10	4	15	9	10
Incident Frequency (Incidents/1,000 km)	1.07	0.52	0.22	0.74	0.43	0.47

Data Sources: (BC OGC 2012; BC OGC 2013; BC OGC 2014a; BC OGC 2015c; BC OGC 2016a; BC OGC 2016b). Table created by CERI.

Figure 2.8 shows incidents on sour natural gas pipelines and Figure 2.9 shows incidents on natural gas pipelines in British Columbia by the cause of failure in relation to each year, 2010 to 2013. Data related to pipeline incidents by cause for 2014-2015 were presented in the publicly available sources (BC OGC 2016a; BC OGC 2016b) as overall numbers of incidents on pipelines regulated by the BC OGC, and were not split by the pipeline type; therefore, they are not shown on Figures 2.8 and 2.9.

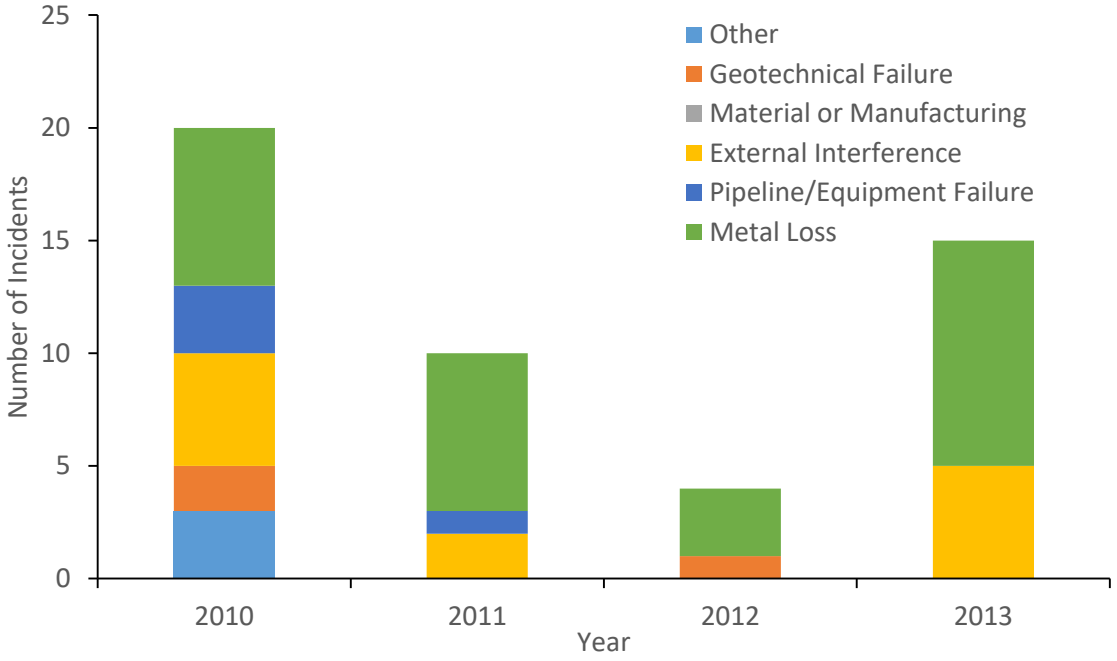
As illustrated on Figures 2.8 and 2.9, metal loss (i.e., wall thickness reduction, due to corrosion, for example) was the leading cause of failure for both types of pipelines in 2010-2013, contributing to 18 incidents overall on the sour natural gas pipelines and to 27 incidents overall on the natural gas pipelines. Geotechnical failure, and pipeline or equipment failure, accounting for 4 incidents each on the sour natural gas pipelines, were other major causes of failure for this type of pipelines. For the natural gas pipelines, external interference was the second leading cause of failures contributing to 12 incidents.

Figure 2.8: Sour Natural Gas Pipeline Incidents in British Columbia (2010-2013) by Cause



Data Sources: (BC OGC, 2012, 2013, 2014, 2015). Figure by CERI.

Figure 2.9: Natural Gas Pipeline Incidents in British Columbia (2010-2013) by Cause



Data Sources: (BC OGC, 2012, 2013, 2014, 2015). Figure by CERI.

Table 2.6 shows the total volume of gas released by type of product in 2010-2013. In 2010, three major incidents were responsible for over 98% of the natural gas released as a result of pipeline

failures (BC OGC 2012). The largest incident resulting in 129,238 m3 of natural gas release was caused by a third party construction company hitting a transmission line. Another major incident resulted in the release of 90,600 m3 of natural gas due to a geotechnical shift and a fallen tree on the pipeline. A third incident resulting in 13,970 m3 natural gas release was caused by a company hitting their own transmission line (BC OGC 2012).

Table 2.6: Gas Release Volume by Product in British Columbia in 2010-2013

Spill Gas	Release Volume, m3			
	2010	2011	2012	2013
Sour Natural Gas	625	81,306	7,006	2,001
Natural Gas	234,829	5,011	29,200	14,260

Data Sources: (BC OGC 2012; BC OGC 2013; BC OGC 2014a; BC OGC 2015c; BC OGC 2016a; BC OGC 2016b). Table created by CERI.

Table 2.7 summarizes all sour natural gas and natural gas pipeline incidents reported to the BC OGC in 2013. As shown in Table 2.7, two out of 17 incidents resulted in the zero gas release, and three other incidents resulted in negligible gas release (≤1 m3) (BC OGC 2015c).

Table 2.7: 2013 Natural Gas Pipeline Incidents in British Columbia

Date	Location[2]	Product Type	Volume (m^3)	Incident Type	Cause of Failure		Remediation
2/13/2013	Prophet River	Sweet Natural Gas	1,645	Hit	External Interference	Third Party	Yes
2/13/2013	Delta	Sour Natural Gas	2,000	Leak	Material Manufacturing or Construction	Defective pipe body	Yes
2/25/2013	Helmut Field	Sweet Natural Gas	0.2	Leak	External Interference	Employee or Contractor	Yes
3/5/2013	Langley	Sweet Natural Gas	4,500	Hit	External Interference	Third Party	Yes
4/22/2013	Fraser Lake	Sweet Natural Gas	50	Leak	Metal Loss	External Corrosion	Yes
4/30/2013	Burnaby	Sweet Natural Gas	1,286	Leak	Metal Loss	External Corrosion	Yes
6/11/2013	Cecil Lake	Sweet Natural Gas/ Produced Water	0.3	Leak	Metal Loss	Internal Corrosion	Yes
6/27/2013	Burnaby	Sweet Natural Gas	2,148	Leak	Metal Loss	External Corrosion	Yes

[2] Data regarding natural gas pipeline incidents by the type of development (upstream, midstream or downstream) were not available from the BC OGC.

Date	Location[2]	Product Type	Volume (m^3)	Incident Type	Cause of Failure		Remediation
7/12/2013	Cypress Field	Sour Natural Gas	1	Leak	Metal Loss	External Corrosion	Yes
7/17/2013	West Vancouver	Sweet Natural Gas	2,356	Leak	Metal Loss	External Corrosion	Yes
8/8/2013	Delta	Sweet Natural Gas	734	Leak	Metal Loss	External Corrosion	Yes
8/20/2013	Delta	Sweet Natural Gas	587	Leak	Metal Loss	External Corrosion	Yes
8/23/2013	Sunrise Field	Sweet Natural Gas	0	Hit	External Interference	Employee or Contractor	No Release
8/27/2013	Coquitlam	Sweet Natural Gas	293	Leak	Metal Loss	External Corrosion	Yes
9/5/2013	Blueberry Field	Sweet Natural Gas	n/a	Leak	Metal Loss	Suspected Corrosion	Yes
9/12/2013	Wonowon	Sweet Natural Gas	0	Other	External Interference	Employee or Contractor	No Release
10/9/2013	Burnaby	Sweet Natural Gas	661	Leak	Metal Loss	External Corrosion	Yes

Source: (BC OGC 2015c).

The largest gas release reported from a pipeline in 2014 was a 200,000 m3 release of sweet natural gas in the Laprise Creek area near Wonowon, caused by a combination of external corrosion and a geotechnical shift (BC OGC 2016a). The largest gas release from a pipeline in 2015 was a 199,000 m3 release of dry, sweet gas at a remote location within the Dilly Field outside of Fort Nelson, caused by underdeposit corrosion (BC OGC 2016b).

The BC OGC ensures that in the event of a pipeline gas release as the result of an incident, it is completely remediated by the company, and any problems are fixed before operations resume, with an investigation taking place for each incident (BC OGC 2016b).

Chapter 3: Major Indigenous Peoples Issues Influencing Natural Gas and LNG Development in British Columbia

Indigenous Peoples in British Columbia

The Indigenous,[1] or Aboriginal Peoples, are the descendants of the original inhabitants of North America. Section 35 of the Constitution Act (1982) recognizes three groups of Aboriginal Peoples: First Nations people (previously known as Indians),[2] Métis and Inuit. These are three distinct peoples with unique heritages, languages, cultural practices, and spiritual beliefs. Over the centuries, Indigenous Peoples have acquired knowledge and developed a way of life adapted to their specific environment. This has been expressed through traditional knowledge and beliefs that have been passed down from generation to generation (INAC 2010b).[3] BC's Indigenous population, based on Statistics Canada 2011 census data, consists of 232,280 people, which represented 5.3% of the total British Columbian population (Statistics Canada 2013).

There are 198 First Nations in British Columbia that represent about one third of all First Nations in Canada. First Nations population in BC, as per Statistics Canada 2011 census data, consists of 155,015 people, or 67% of the total Indigenous population in BC ((Statistics Canada 2013), see Figure 3.1 for details). With a total population in BC of 4,400,057 in 2011, First Nations represented 3.5% of the total population. Indigenous Peoples in BC represented 17% of Canada's Indigenous population, while First Nations people in BC represented 19% of Canada's First Nations people. While BC has fewer than one-fifth of Canada's Indigenous and First Nations people, it is characterized by the greatest diversity of Indigenous cultures in Canada, including 7 of Canada's 11 unique language families that are located exclusively in BC and represent more than 60% of the First Nations languages in Canada (INAC 2010a). Figure 3.2 provides detailed information on the First Nation community locations throughout the Province.

The Métis are recognized as Aboriginal Peoples, distinct from First Nations and Inuit, as noted in Section 35 of the Constitution Act, 1982. The Métis are originally the people of mixed First Nations-European ancestry, the descendants of eighteenth-century unions between European men (explorers, fur traders and pioneers) and First Nations women, mainly on the Canadian

[1] The term Indigenous Peoples is increasingly replacing Aboriginal Peoples, since the United Nations Declaration on Indigenous Peoples (2007), even though the term Aboriginal Peoples still prevails in Canadian legislation. The term Indigenous Peoples is generally considered to be more inclusive and respectful. For the purposes of this report, CERI will use the terms "Aboriginal Peoples" and "Indigenous Peoples" interchangeably, dependent on provincial versus federal legislation.

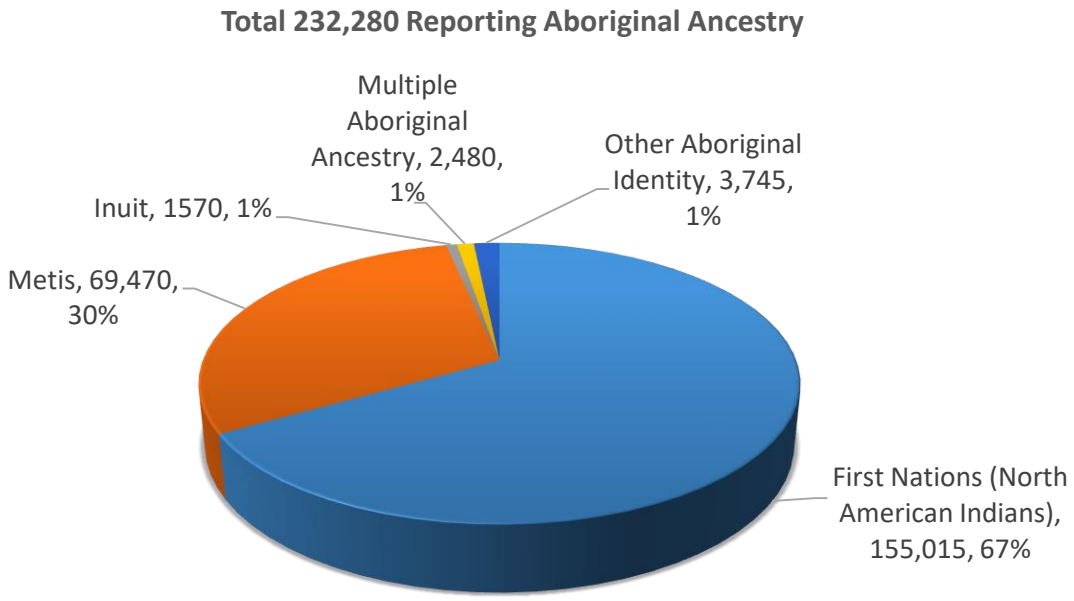
[2] For the purposes of this report, CERI will use the term "First Nation(s)", unless referring to a document or event where the term "Indian" was used.

[3] Federal Aboriginal Affairs and Northern Development has recently changed its name to Indigenous and Northern Affairs Canada (INAC); while in British Columbia, it is still the Ministry of Aboriginal Relations and Reconciliation (BC MARR).

Plains. Within a few generations the descendants of these unions developed a culture distinct from their European and First Nations forebears (Royal Commission on Aboriginal People - RCAP 1996). The test for evaluating whether an individual can be considered a Métis was set out by the Supreme Court of Canada in the 2003 case R. v. Powley ((SCC 2003), see below). Métis population in BC, as per Statistics Canada 2011 census data, consists of 69,470 people, or 30% of the total Indigenous population in BC ((Statistics Canada 2013), see Figure 3.1 for details). Figure 3.3 provides detailed information on the Métis population locations in British Columbia.

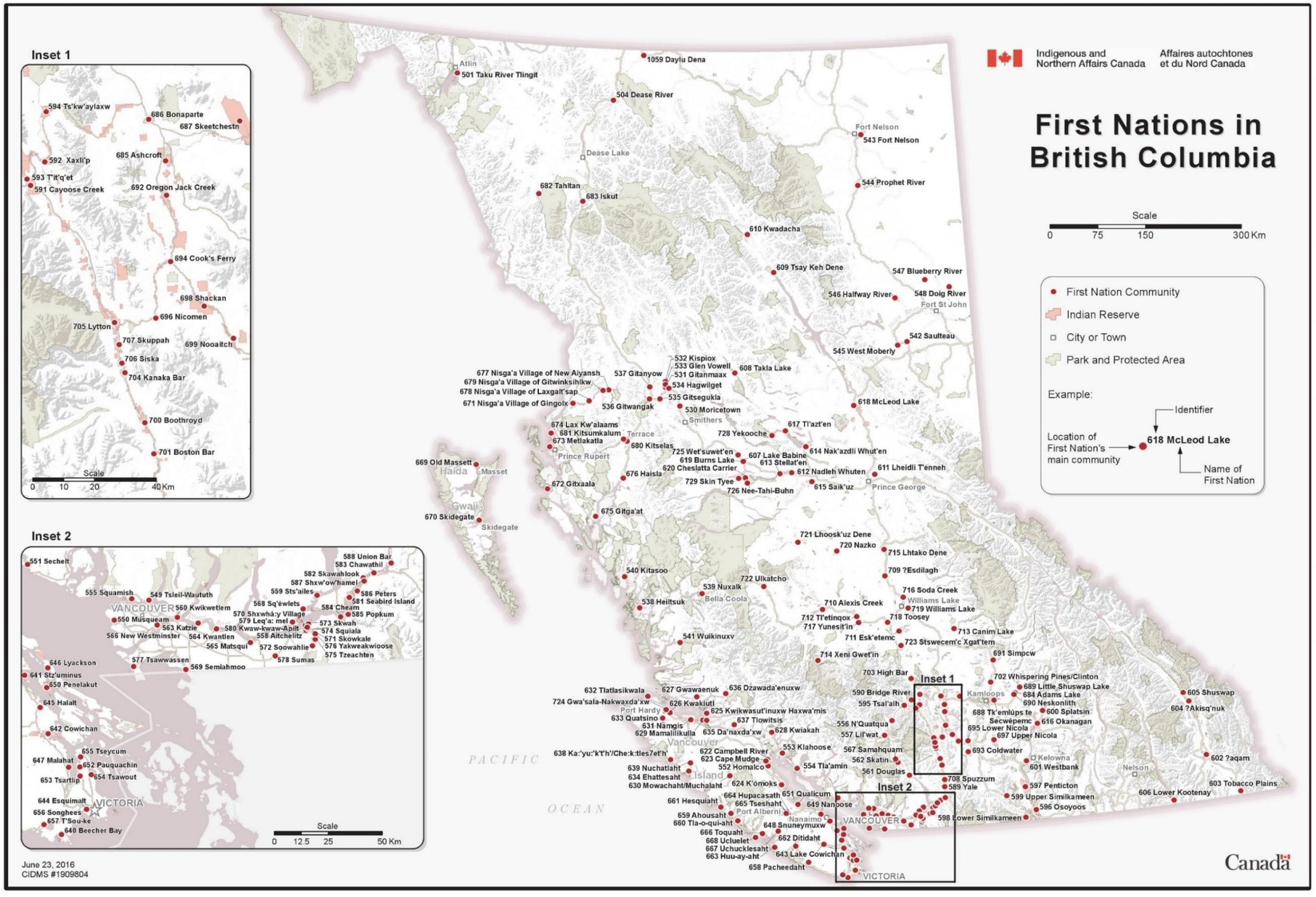
Inuit are the Aboriginal people of Arctic Canada. They live primarily in Nunavut, the Northwest Territories, Labrador, and Northern Quebec. Inuit means "the people" in Inuktitut, the Inuit language. Inuit population in BC, as per Statistics Canada 2011 census data, consists of 1,570 people, or 1% of the total Indigenous population in BC ((Statistics Canada 2013), see Figure 3.1 for details).

Figure 3.1: Indigenous Population in British Columbia (2011)



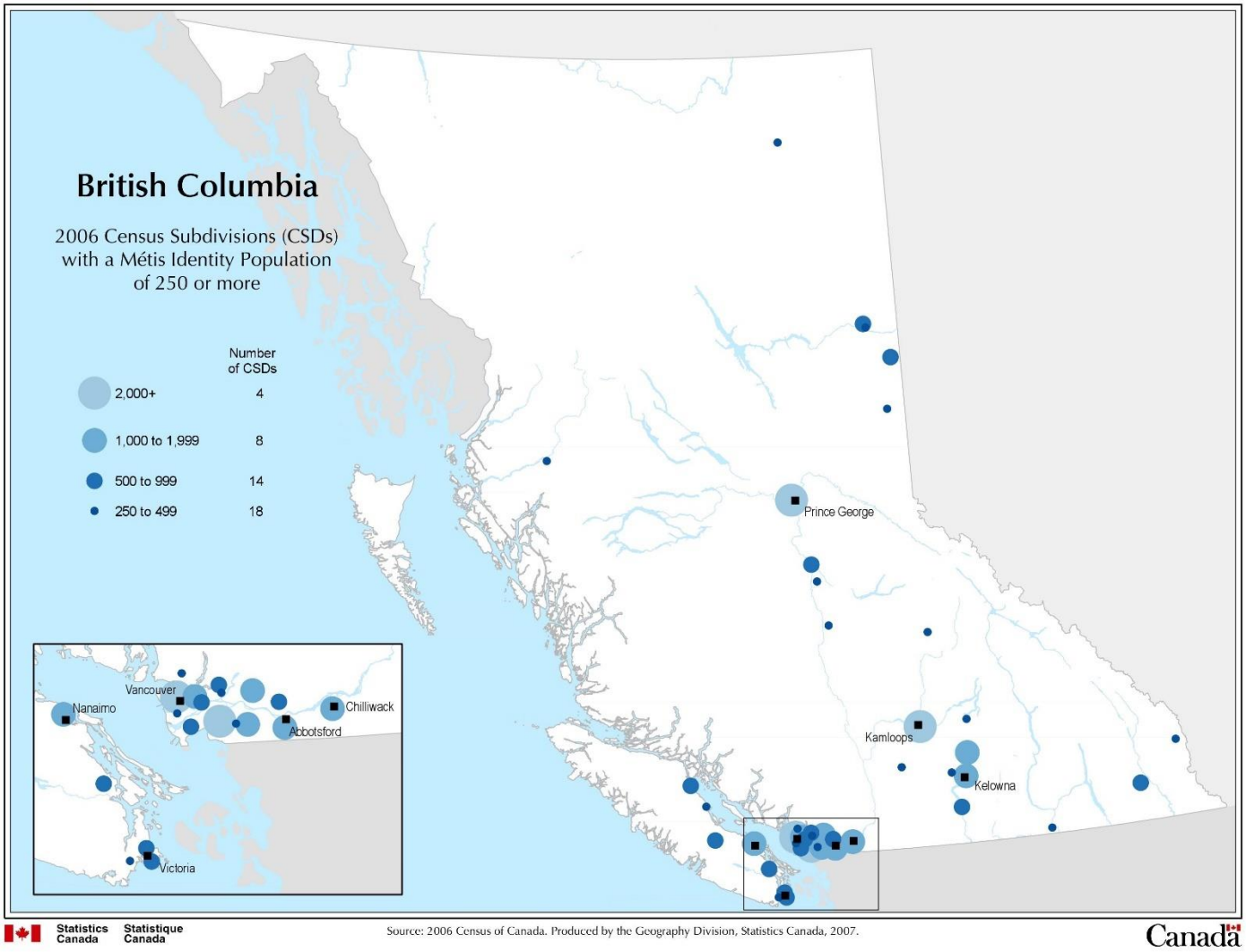
Data Source: (Statistics Canada 2013). Figure by CERI.

Figure 3.2: First Nations in British Columbia



Source: (INAC 2016c)

Figure 3.3: Métis Identity Population in British Columbia



Source: (Statistics Canada 2007)

Canadian Aboriginal Law

Canadian Aboriginal law is closely related to Canadian history and the settlement of Canada. Indigenous Peoples struggled for recognition of their rights and fair treatment in their relations with European settlers long before establishing Canadian Confederation in 1867. Canadian aboriginal law has developed as a response to the actions of government and/or as a tool used by Indigenous Peoples in their struggle.

Royal Proclamation (1763)

The first important step toward the recognition of existing Aboriginal rights and title, including the right to self-determination, has been done with the issuance of the Royal Proclamation in 1763. This document also set a foundation for the process of establishing treaties (University of British Columbia - UBC First Nations & Indigenous Studies 2009). The Royal Proclamation is still valid in Canada, it has the force of law and is referenced in the *Canadian Charter of Rights and Freedoms* that forms the first part of the *Constitution Act*, 1982.

Section 35 of the Constitution Act (1982)

In 1982, existing Aboriginal and treaty rights were recognized and affirmed in Section 35 of the *Constitution Act*, 1982; however, the nature, scope or extent of those rights were not defined in the *Act*. The Supreme Court of Canada (SCC) has stated that "existing" means that any Aboriginal rights that had been extinguished by treaty or other legal processes prior to 1982 no longer existed and therefore are not protected under the Constitution (Hanson 2009).

Section 35 has further been interpreted in the Supreme Court cases such as *Sparrow* and *Delgamuukw* ((SCC 1990; SCC 1997), see below). However, a clear definition of all Aboriginal rights was not included in the Court's decisions in those cases. Rather, it has been indicated that Aboriginal rights are fact, site and group-specific. Therefore, whenever a court considers issues of Aboriginal rights, it will do so only in the context of the particular facts and the particular group before it. (INAC 2010d).

Courts continue to clarify the nature of existing Aboriginal and treaty rights and, as a consequence, define the legal relationship between the Province and Indigenous Peoples.

History of Treaties in British Columbia

The history of treaty making in British Columbia has been substantially different than it has been for the rest of Canada. In the past, the majority of BC's Indigenous Groups did not sign treaties, except for 8 First Nations in the northeast quarter of BC, the signatories to Treaty 8 in 1899 (BC MARR 2016f). Under Treaty 8, the Treaty First Nations signatories negotiated for an 840,000 km2 area of what is now northern Alberta, northeastern BC, northwestern Saskatchewan and the southern portion of the Northwest Territories.

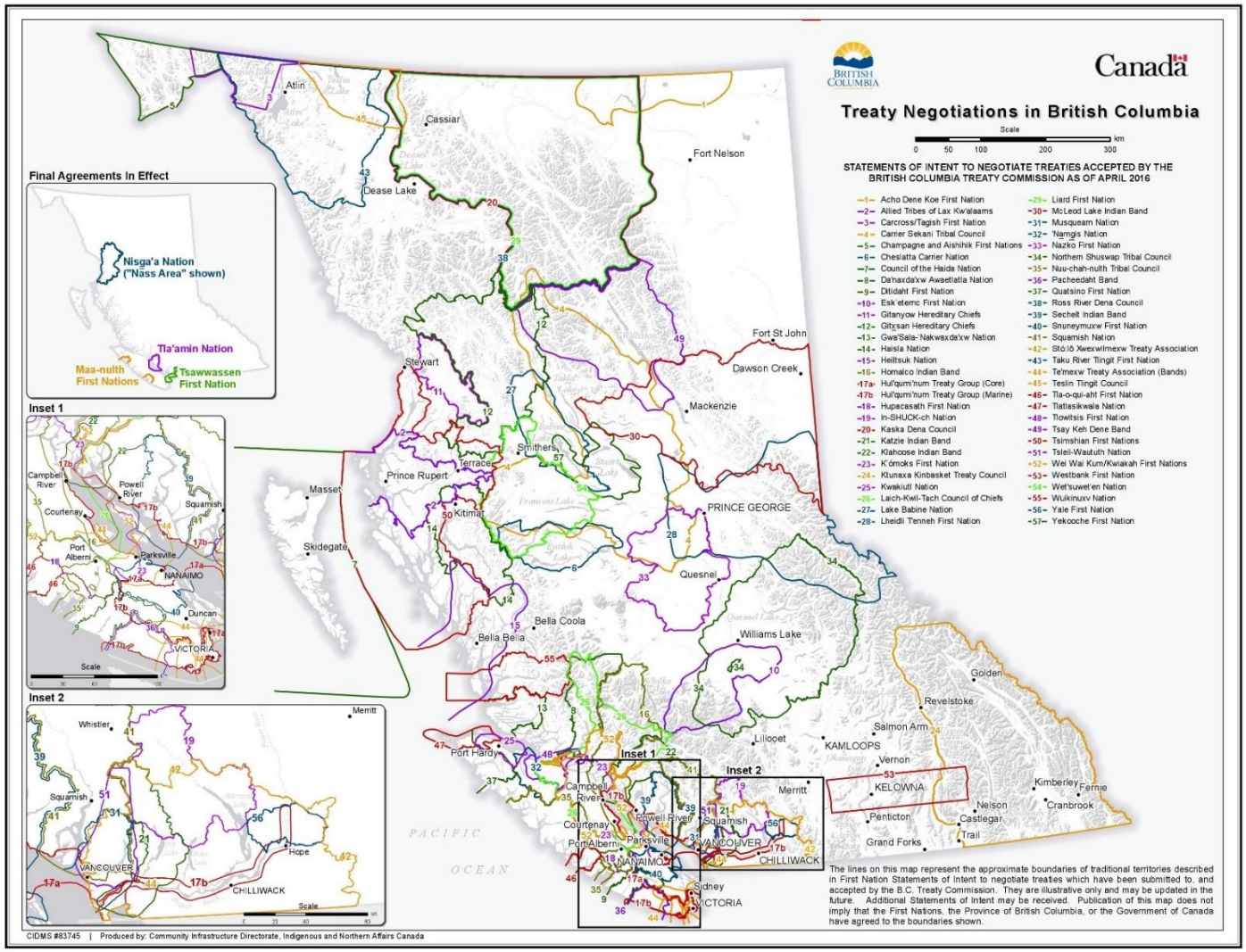
Until the negotiation of the Nisga'a Final Agreement (1998), almost all of the Province remained subject to outstanding Aboriginal land claims (INAC 2010d). The courts have confirmed that Aboriginal title still exists in British Columbia, but they have not indicated where it exists. To

resolve this situation, the Provincial government and Indigenous Groups have had two options: either negotiate land, resource and jurisdiction issues through the treaty process or do it through litigation and have Aboriginal rights and title decided on a case-by-case, right-by-right basis. In 1993, Canada, British Columbia and First Nations established the British Columbia Treaty Commission to facilitate the negotiation of treaties (BC Treaty Commission 2008).

Currently, the Government of Canada, along with the Province, is negotiating with approximately 70% of BC's First Nations through the BC Treaty Process (INAC 2010a). There are 65 First Nations that are participating in or have completed treaties through the BC treaty negotiations process. The 65 First Nations represent 104 of the 203 Indian Act Bands in British Columbia (BC Treaty Commission 2009). There are 4 First Nations that have already completed the six stage BC Treaty Process, and have their treaty final agreements ratified and implemented (BC MARR 2016b; INAC 2016a). Figure 3.4 provides more information on the treaty negotiations in British Columbia, including those with the final agreements in effect.

It is important to understand that treaty rights differ from Aboriginal rights. Aboriginal rights are not clearly defined, and must be established on a case-by-case basis, whereas treaty rights are negotiated, and can be exhaustively set out and described in detail.

Figure 3.4: Treaty Negotiations in British Columbia



Source: (INAC 2016a)

Indigenous Peoples Rights and Legal Issues

A number of important principles have been established by the Supreme Court of Canada in the following major legal cases with landmark judgements clarifying the nature of Aboriginal rights and title.

Calder v. Attorney-General of British Columbia, 1973 S.C.R. 313 (Calder)

The Supreme Court of Canada's *Calder* decision in 1973 was the first of a series of landmark judgements to deal with Aboriginal rights. It was the first time that the Canadian legal system acknowledged the existence of Aboriginal title to land and that such title existed at the time of the Royal Proclamation of 1763, and was not simply derived from statutory law (SCC 1973).
In that case, the Nisga'a First Nation of northwestern British Columbia argued that the Crown's underlying title was subject to Nisga'a title to occupy and manage their lands. While the Nisga'a did not win their case and the ruling did not settle their land question, the Supreme Court's decision was a legal turning point that set up a process for Aboriginal Groups to claim title to their territory (BC Treaty Commission 2008; Salomons 2009; SCC 1973). This decision would later lead to the BC Treaty Process and the settling of the first modern-day land claim in BC's history, the *Nisga'a Final Agreement* in 1998 (Salomons 2009).

R. v. Sparrow, 1990 1 S.C.R. 1075 (Sparrow)

In *R. v. Sparrow* (1990), the Supreme Court of Canada made a precedent-setting decision that set out a list of criteria (known today as the "Sparrow test") that determines whether an Aboriginal right is existing, and if so, how a government may be justified to infringe upon it.

Applying this test to fisheries legislation, the Court concluded that nearly a century of detailed governmental regulations and restrictions had not extinguished the Musqueam peoples' Aboriginal right to fish for food and ceremonial purposes (since the *Sparrow* case dealt with fishing rights, not rights in land). (BC Treaty Commission 2008; Salomons and Hanson 2009b; SCC 1990).

Delgamuukw v. British Columbia, 1997 3 S.C.R. 1010 (Delgamuukw)

The Supreme Court of Canada's decision in the *Delgamuukw* case (1997) confirmed that Aboriginal title does exist in British Columbia, and that it's a right to the land itself, not just the right to hunt, fish or gather. The Court also concluded that when dealing with Crown land, the government must consult with, and may have to compensate, First Nations whose rights may be affected.

Even though the actual land claim from the Gitxsan Nation and the Wet'suwet'en Nation was not decided (the Supreme Court concluded that this issue could not be decided without a new trial), the *Delgamuukw* case has enormous significance for British Columbia. The *Delgamuukw* case was widely seen as a turning point for treaty negotiations, since the judges make a number of statements about Aboriginal rights and title that indicate how the courts will approach these cases in the future (BC Treaty Commission 1999; BC Treaty Commission 2008; SCC 1997).

Nisga'a Treaty, 1998 (Nisga'a)

The Nisga'a Treaty (1998) is a negotiated agreement between the Nisga'a Nation, the Government of BC and the Government of Canada – the first modern-day treaty in British Columbia and the fourteenth modern treaty in Canada since 1973. This tri-partite agreement is separate from the BC Treaty Commission process (INAC 2010d).

As Nisga'a Lisims Government states, the Nisga'a quest for a treaty began over 100 years ago, with the formation of their first Land Committee in 1890, re-established as the Nisga'a Tribal Council in 1955 (Nisga'a Lisims Government 2016). In 1968, the Tribal Council began a legal action in the BC Supreme Court (BCSC), and the situation with Aboriginal land claims negotiation policy began to change after the Supreme Court of Canada's 1973 decision in the Calder case. The Government of Canada began treaty negotiations with the Nisga'a in 1976, and the Government of BC joined the negotiations in 1990 (INAC 2010d; Nisga'a Lisims Government 2016).

The Nisga'a Final Agreement that came into effect in 2000 represents a treaty and a land claims agreement within the meaning of the Constitution Act, 1982 and is a full and final settlement of Nisga'a's Aboriginal rights (INAC 2010c; Nisga'a Tribal Council, IAND, and Province of BC 1999). The Treaty establishes decision-making authority for Nisga'a Lisims Government that operates within the Constitution of Canada and the Canadian Charter of Rights and Freedoms; all Nisga'a laws operate alongside federal and provincial laws. The Agreement gives the Nisga'a control over their land, including the forestry and fishing resources contained in it (INAC 2010c; Nisga'a Tribal Council 1998).

For two major natural gas pipeline projects that traverse Nisga'a Lands, the Westcoast Connector Gas Transmission and Prince Rupert Gas Transmission, BC EAO conducted separate assessments of the potential effects of the proposed projects, mitigation measures and conclusions provided by the proponents, with respect to Chapter 10 of the Nisga'a Final Agreement (BC EAO 2014b; BC EAO 2014d).

R. v. Powley, 2003 SCC 43 (Powley)

R. v. Powley was the first major Aboriginal rights case concerning Métis peoples. The *Powley* decision resulted in the "Powley test," which laid out a set of criteria to not only define what might constitute a Métis right, but also establishes who can legally qualify for Métis rights (INAC 2016b; SCC 2003). Although the *Powley* decision defined Métis rights as they relate to hunting, many legal experts and Métis leaders view the *Powley* case as potentially instrumental in the future of recognizing Métis rights (Salomons and Hanson 2009a; SCC 2003).

Haida Nation v. British Columbia (Minister of Forests), 2004 SCC 73 (Haida)

In the *Haida* case, the Supreme Court of Canada established that the Crown is required to consult with Aboriginal Groups with respect to Crown-authorized activities that might affect Aboriginal interests, and that the extent (or level) of the consultation is proportionate to preliminary assessments of the following factors: strength of the case for the claimed Aboriginal rights (including title) that may be adversely affected; and seriousness of the potential impact of

contemplated Crown action or activity on Aboriginal interests (BC EAO 2015b; BC Treaty Commission 2008; SCC 2004a).

The consultative process must be fair and honorable, however, government is entitled to make decisions even in the absence of consensus. Therefore, the First Nations do not have a veto (BC Treaty Commission 2008). The court strongly urges the parties to **negotiate rather than litigate**, noting that '*while Aboriginal claims can be and are pursued through litigation, negotiation is a preferable way of reconciling state and Aboriginal interests*' (SCC 2004a).

Taku River Tlingit First Nation v. British Columbia (Project Assessment Director), 2004 SCC 74 (Taku)

In this case, the Taku River Tlingit challenged the Province of BC's decision in 1994 to grant a project approval certificate under the *BC Environmental Assessment Act* (1994) for an access road to an old mine site. The First Nation asserted that they had Aboriginal rights and title to the lands and resources affected by the government's decision, however, those rights had not been proved either by litigation or by treaties with government (Olynyk 2005; SCC 2004b). Similar to the *Haida* case, the Supreme Court of Canada agreed with the First Nation's arguments, and ruled that the Province should have consulted with the First Nations about the decisions, and possibly accommodated Aboriginal interests, even though the First Nations had not legally proved the existence of their Aboriginal rights and title. (BC Treaty Commission 2008; Olynyk 2005; SCC 2004b).

Mikisew Cree First Nation v. Canada (Minister of Canadian Heritage), 2005 SCC 69 (Mikisew)

In the *Mikisew* case decision (2005), the Supreme Court of Canada extended the Crown's obligation to consult and accommodate Aboriginal interests (established earlier in the *Haida* and *Taku* cases) in order to include existing treaty rights. The Court stated that the Crown's right to 'take up' lands under Treaty 8 is subject to the duty to consult and, if appropriate, accommodate the Treaty 8 First Nations' rights before reducing the area over which their members may continue to pursue hunting, trapping and fishing rights (BC Treaty Commission 2008; SCC 2005). These general principles were also recently reaffirmed in the *Grassy Narrows First Nations v. Ontario (Natural Resources)* case (SCC 2014b).

Tsilhqot'in Nation v. British Columbia, 2014 SCC 44 (Tsilhqot'in)

The Supreme Court of Canada's *Tsilhqot'in* decision (2014) clarified the test for Aboriginal title relating to the elements of sufficient and exclusive occupation at the time of assertion of European sovereignty in 1846 (SCC 2014a). This is the first time that any court has formally declared that Aboriginal title exists to a particular tract of land outside of a reserve (Tsilhqot'in National Government 2014). In addition, this case set out considerations for government when consulting Aboriginal Groups regarding potential impacts on asserted Aboriginal title claim. **It also stated that governments must have consent from First Nations which hold Aboriginal title in order to approve developments on that land.** Without consent, the government cannot interfere with Aboriginal title lands unless this infringement can be justified (SCC 2014a; Tsilhqot'in National Government 2014).

Coastal First Nations v. British Columbia (Environment), 2016 BCSC 34 (Coastal First Nations)

The decision of the BC Supreme Court in the *Coastal First Nations* case issued for the Enbridge Northern Gateway Pipelines project (2016) held that a portion of the Equivalency Agreement between BC EAO and the NEB was invalid (BCSC 2016). Under the Equivalency Agreement, BC EAO may accept an Environmental Assessment (EA) undertaken by the NEB under the *NEBA* as "equivalent" to BC's assessment, thereby avoiding the need to conduct duplicate environmental assessments (NEB and BC EAO 2010). In the *Coastal First Nations* case, the Court ruled that the *BC EAA* applies to NEB projects to the extent that they require a Provincial EA certificate. The decision makes it clear that the Province cannot rely on Canada to discharge its constitutional duties of consultation and accommodation due to jurisdictional overlap (BCSC 2016; Robe and Dean 2016)

The Supreme Court's decision applies to projects that were previously assessed and approved by the NEB, are currently being assessed or will be assessed in the future under the terms of the Equivalency Agreement. As the implications of this decision, two major natural gas pipeline projects in British Columbia, the North Montney Mainline Pipeline and Towerbirch Expansion that have been previously approved by the NEB under the Equivalency Agreement, now have to undergo the provincial EA process (BC EAO 2016e; BC EAO 2016f).

Principles Articulated by the Supreme Court of Canada

In these landmark judgments, the Supreme Court of Canada has established a number of important principles that clarify the nature of Aboriginal rights and title. Some of the most important principles, as summarized by the BC Treaty Commission (BC Treaty Commission 2008), include the following:

- Aboriginal rights exist in law;
- Aboriginal rights are distinct and different from the rights of other Canadians;
- They include Aboriginal title, which is a unique communally held property right;
- Aboriginal rights take priority over rights of others, subject only to the needs of conservation, environmental issues, and public safety;
- The scope of Aboriginal title and rights depends on specific facts relating to the Aboriginal Group and its historical relationship to the land in question;
- The legal and constitutional status of Aboriginal Peoples derives not from their race but from the fact they are the descendants of the peoples and governing societies that were resident in North America long before settlers arrived;
- Aboriginal rights and title cannot be extinguished by simple legislation because they are protected by the *Constitution Act*, 1982;
- Government has a duty to consult and possibly accommodate Aboriginal interests even where title has not been proven; and
- Government has continuing duty to consult, and perhaps accommodate, where treaty rights might be adversely affected.

The Crown's Duty to Consult with Indigenous Peoples within the Environmental Assessment Process

In accordance with Section 35 of the Constitution Act, 1982, the Crown is legally obligated to consult on and, if necessary, accommodate asserted or established Aboriginal rights including Aboriginal title or treaty rights that may be impacted by government decisions.

This duty also stems from Canadian common law as expressed in court decisions. In the case of asserted Aboriginal rights and title, the scope of consultation is based on an assessment of the strength of claim and the seriousness of potential impacts upon the asserted rights. In the case of proven Aboriginal rights or treaty rights, the scope of consultation is based on the seriousness of the potential impact on the right (BC EAO 2013f; Province of BC 2010).

BC EAO as the provincial responsible authority is obliged to consult and accommodate Aboriginal Groups, in keeping with the Supreme Court of Canada's direction in the Haida (SCC 2004a) and Tsilhqot'in (SCC 2014a) decisions. The extent of the Crown's obligation to consult with Aboriginal Groups is described in the Haida case as lying on a spectrum from notification to deep consultation.

For each particular project under the provincial review, BC EAO issues an Order under Section 11 of the *BC EAA* which specified consultation activities that both BC EAO and the proponent would undertake with all Aboriginal Groups potentially affected by the proposed project. At the initial stages of an environmental assessment for the proposed project, BC EAO primarily relies on the proximity of the proposed project to an Aboriginal Group's asserted traditional territory to determine whether an Aboriginal Group will be included on Schedule B (Aboriginal interests within 2 km of the proposed project) or Schedule C (Aboriginal interests within 30 km of the proposed project) of the Section 11 Order.

Aboriginal Groups on Schedule B are consulted at the higher end of the consultation spectrum, including notification of key milestones, opportunities to review and comment on key documents, participation in the Working Group and procedural consultations. Aboriginal Groups on Schedule C of the Order are consulted at the lower end of the consultation spectrum, including notification of key milestones, invitation to meet with BC EAO to discuss any Aboriginal interests in the proposed project area, and invitation to review and comment on the EAO's draft assessment report.

During the EA process, the procedural Order can be amended, so that Aboriginal Groups can be moved from Schedule C to Schedule B or vice versa, and can also be added to or removed from the Schedules, as a result of discussions with Aboriginal Groups, or new information related to an Aboriginal Group, including route amendments. BC EAO can also vary the procedural Order to undertake additional measures throughout the EA process in collaboration with Aboriginal Groups, as has recently been done for the proposed Aurora LNG Digby Island, Grassy Point LNG and WCC LNG projects (BC EAO 2016i; BC EAO 2016j; BC EAO 2016k).

BC EAO also considers Tsilhqot'in decision in the EA process, and the BC EAO's assessment of whether Aboriginal Groups may have a prima facie claim to Aboriginal rights or title is intended to inform the level of consultation required for each Aboriginal Group for the proposed project. However, it should be noted that an environmental assessment is not a process to determine Aboriginal rights or title, and BC EAO is not a body for determining Aboriginal rights, nor does BC EAO have all of the necessary information to make such a determination.

The Province entered into the Métis Nation Relationship Accord with the Métis Nation of British Columbia (MNBC) to work towards improving the quality of life of Métis people in BC. It is important to note that the Province does not recognize a legal obligation to consult with Métis people as the Province is of the view that no Métis community is capable of successfully asserting site-specific Section 35 rights in BC (Province of BC 2010). Consultation with the MNBC held by BC EAO is not an acknowledgement on the part of BC that it owes a duty of consultation or accommodation to Métis in BC under Section 35 of the Constitution Act, 1982. Nevertheless, BC EAO consulted the MNBC on behalf of the Government of Canada pursuant to the MOU on Substitution of Environmental Assessments for the proposed LNG Canada Export Terminal Project (BC EAO 2015b; BC EAO 2013b).

Announced by the Federal Government in January 2016, interim approach and principles for projects currently undergoing an environmental assessment stipulating that Indigenous Peoples will be meaningfully consulted, and where appropriate, impacts on their rights and interests will be accommodated, have been recently applied to two projects: Pacific NorthWest LNG and Towerbirch Expansion (Government of Canada 2016a; Government of Canada 2016d; NEB 2016). The former is an example of the successful application of the interim principles for project assessments, including extensive consultations with Indigenous communities with funding of over $480,000 provided to support their participation in the environmental assessment and establishing environmental monitoring committees comprised of Indigenous Peoples, and federal and provincial representatives, for the first time ever (Government of Canada 2016d).

Potential Impacts on Indigenous Peoples Interests Identified in the Environmental Assessment Process

Potential Adverse Effects on Aboriginal Interests

As set out in Section 5(1)(c) of *CEAA 2012*, the environmental effects that are to be taken into account in relation to a designated project include, with respect to Indigenous Peoples, an effect to the environment on:

a) health and socio-economic conditions;
b) physical and cultural heritage;
c) the current use of lands and resources for traditional purposes;
d) any structure, site or thing that is of historical, archeological, paleontological or architectural significance.

A summary of the most common potential adverse impacts from the reviewed natural gas pipeline and LNG projects on Indigenous Peoples interests is provided in Table 3.1. Data in the table are based on the review of EA reports prepared by BC EAO, the NEB or CEA Agency for the 18 projects where the provincial or federal EA process has been completed since 2010.

Table 3.1: Examples of Potential Adverse Impacts on Indigenous Peoples Interests Identified in the Environmental Assessment Process

Valued Component/ Key Indicator	Potential Adverse Impact	Projects with Potential Adverse Impact Identified
Health and Socio-Economic Conditions	• Change in human health - harvested foods, water quality, air emissions, noise	18/18
	• Reduction in visual quality and change to the acoustic environment in areas of identified concern to Aboriginal owned or operated businesses	9/18
	• Change in the availability of harvested foods for use by Aboriginal owned or operated businesses	17/18
Physical and Cultural Heritage	• Alteration or loss of site-specific traditional land use	18/18
	• Change in cultural practices	17/18
	• Changes to intangible heritage resources/expression of cultural values or ways of knowing	17/18
Current Use of Lands and Resources for Traditional Purposes	• Alteration of traditional subsistence activities, such as hunting, fishing, gathering and trapping	18/18
	• Depletion of resources within Aboriginal traditional territories due to an increase in access	18/18
	• Changes in preferred harvested species and traditional use sites	15/18
Structure/Site of Historical or Archeological Significance	• Alteration/removal of archaeological/cultural heritage sites, sacred sites, trails and culturally/spiritually important sites and culturally modified trees	18/18

Sources: (BC EAO 2008; BC EAO 2009; BC EAO 2013d; BC EAO 2014a; BC EAO 2014c; BC EAO 2014d; BC EAO 2014b; BC EAO 2015b; BC EAO 2015f; BC EAO 2016h; BC EAO et al. 2006; Canada and NEB 2015; Canada and NEB 2016; CEAA 2013a; CEAA 2016f; NEB 2015b; NEB 2015d). Table by CERI.

Some other common concerns raised by Indigenous Groups throughout the provincial or federal EA process for the natural gas pipeline and LNG projects included:

- Impacts on Aboriginal rights;
- Economic development, business and employment opportunities, and training;
- Economic effects including labor availability and wage inflation;
- Social effects, including housing availability and affordability;
- Impacts to community infrastructure, healthcare, and emergency response;
- Accidents or malfunctions (hull breach/grounding; vessel spills leading to contamination of shellfish; spill response plan; accidents at the facility);

- EMPs, follow up, monitoring and reporting;
- EA methodology regarding baseline information and VCs selection (gaps and the level of detail in baseline information; residual effects not applied consistently; EA scoping; spatial extent);
- Inadequate consideration of TLU/TEK studies;
- Consultation (adequacy; determining who to consult; what constitutes consultation).

For several LNG projects where the provincial and/or federal EA processes are currently underway (including projects at pre-application stage with BC EAO), proponents anticipate that the following concerns may be raised by Aboriginal Groups specifically with regard to potential impacts of the projects on the Marine VCs and KIs (AltaGas Ltd. 2016; Nexen Energy ULC 2015; Prince Rupert LNG Limited 2014; Woodside Energy Holdings Pty Ltd. 2016):

- Availability and access to land and resources for traditional purposes:
  - change in area available and/or accessible for marine fisheries and shoreline harvesting;
  - interference with Aboriginal fishing vessels and activities by vessel traffic during construction phase and LNG shipping during operation phase;
  - inhibiting Aboriginal Groups' access to preferred fishing locations due to LNG shipping and exclusion/safety zones around the marine terminal;
- Marine surface water quality (potential water quality issues from vessel propeller turbidity; disposal at sea, dredging, including toxicity of disturbed sediments);
- Marine fish and shellfish and their habitat (impacts of vessel wake on fish and fish habitat; potential affect to fish habitat due to ambient lighting issues and/or as a result of shadowing from vessel moorage at the berth facility);
- Marine mammals (changes to behavior of marine mammals from LNG carriers and tugs, due to pressure waves and underwater noise; and direct mortality to marine mammals from ship strikes);
- Cumulative effects to marine use and resources.

Potential Cumulative Impacts on Aboriginal Interests

Cumulative effects remain a matter of critical importance for various Aboriginal Groups potentially impacted by proposed natural gas pipeline and LNG projects. Many of them expressed concerns about the inadequacy of the cumulative effects assessment of past, present and reasonably foreseeable industrial activity in their traditional territory. Specifically, cumulative effects in northeast British Columbia at a regional scale have been a concern of the Treaty 8 First Nations, including Blueberry, Saulteau, West Moberly and Fort Nelson First Nations, who are of the view that industrial development in the WCSB and northeast British Columbia has already and will continue to result in a reduced ability to exercise their treaty rights. Many Aboriginal Groups sought a cumulative effects assessment of their territory, relative to their respective Aboriginal interests. For example, Blueberry First Nation stated in their evidence for the NEB hearings in the matter of the Towerbirch Expansion Project that '*Unless cumulative impacts are meaningfully dealt with in our territory, the time will soon come when our culture and way of life*

have been destroyed and we no longer exist as a unique people and nation' (Canada and NEB 2016).

Throughout its review of the proposed projects, BC EAO set out to address Aboriginal Groups' concerns regarding cumulative effects. BC EAO considered the potential cumulative impacts of multiple proposed natural gas pipeline and LNG projects, along with past, current and reasonably foreseeable future projects, on Aboriginal interests when assessing the seriousness of impacts on Aboriginal interests. BC EAO drew on relevant information provided by the proponents regarding cumulative effects assessment of VCs, as well as the potential impacts of proposed projects on Aboriginal Interests.

BC EAO also informs Aboriginal Groups on Schedule B of the Section 11 Order that, if they are not satisfied with the final version of the Aboriginal Consultation Report, they may provide independent submissions to Responsible Ministers regarding the proposed projects. Numerous Aboriginal Groups have provided BC EAO with independent submissions for 11 out of the 12 reviewed projects where a provincial EAC was granted, and these materials have been included in the referral materials provided to the Ministers (BC EAO 2008; BC EAO 2009; BC EAO 2013d; BC EAO 2014a; BC EAO 2014c; BC EAO 2014d; BC EAO 2014b; BC EAO 2015b; BC EAO 2015f; BC EAO 2016h; BC EAO 2016g). BC EAO is of the view that these submissions do not raise any Aboriginal Groups issues or concerns that have not already been addressed in BC EAO's assessment reports or Aboriginal consultation reports.

Significance of Potential Impacts to Aboriginal Interests

The general BC EAO conclusion for the vast majority of the reviewed projects was that although there could be potential impacts to resources or values of importance to Aboriginal Groups, the majority of this disturbance and impact would be expected to be short to medium term, during and following construction, and would be reversible shortly after construction. Assessment reports provided by BC EAO for each project with the completed provincial EA process concluded that the potential for adverse effects on the Aboriginal rights and Treaty 8 rights of Aboriginal Groups has been avoided, minimized or otherwise accommodated to an acceptable level, and the provincial Crown has fulfilled its obligations for consultation and accommodation to Aboriginal Groups relating to the issuance of an EAC for the proposed projects.

For 17 of the 18 projects discussed in this section, with the provincial or federal EA processes completed, both BC EAO or NEB have been of the view that no significant adverse effects on the Aboriginal interests will occur as a result of the proposed projects, with the implementation of impacts and benefits, and other agreements (including follow-up environmental management and monitoring program agreements) established by the proponents with Aboriginal Groups to address Aboriginal interests in relation to the proposed projects. The majority of issues raised during the review processes by Aboriginal Groups were satisfactorily addressed through existing, revised or new commitments, and project design changes made by the proponents, who have made efforts to avoid high value areas for Aboriginal Groups (e.g., by building on existing

industrial lands, minimizing clearing wherever possible, and providing appropriate mitigation measures to reduce the potential effects of project shipping).

The North Montney Mainline Pipeline project is the only instance of BC's recently approved natural gas pipeline projects where the adverse effects on Aboriginal interests were considered to be significant. The majority of the Panel at the NEB hearings for the project was of the view that, with the measures proposed by the proponent and the NEB's conditions, the North Montney Project is not likely to cause significant adverse environmental effects on the current use of lands and resources for traditional purposes by Aboriginal Peoples. However, a dissenting member of the Panel was of the view that for the portion of the project that crosses the Peace Moberly Tract (PMT), the project is likely to cause significant adverse environmental effects on the current use of lands and resources for traditional purposes by Aboriginal Peoples that are not justified in the circumstances. His decision relied on extensive evidence that the Saulteau First Nation and the West Moberly First Nation were seeking to have the PMT identified as a protected area due to its special significance to these Treaty 8 First Nations. For the remainder of the Project that does not cross the PMT, the dissenting member was of the view that, with the measures proposed by the proponent and the NEB's conditions, the project is not likely to cause significant adverse environmental effects on Aboriginal interests (Canada and NEB 2015).

Aboriginal Consultation and Engagement Issues

In 2015, Squamish Nation entered into separate agreements with the proponents of the Eagle Mountain – Woodfibre Gas Pipeline project and the Woodfibre LNG project that set out a process between the parties to discuss Squamish Nation's environmental assessment of the two projects. This included an assessment of the potential effects of the Eagle Mountain project and the Woodfibre LNG project on Squamish Nation's asserted Aboriginal rights and title (the "Squamish Process"). Squamish Nation chose not to share detailed or site-specific information with BC EAO regarding Squamish Nation's Aboriginal interests. As a result of the Squamish Process, Squamish Nation identified a number of environmental issues of concern that may potentially affect their Aboriginal interests (BC EAO 2015f; BC EAO 2016h). In October 2015, Squamish Nation approved the Woodfibre LNG EA Agreement and issued an Environmental Certificate to the proponent (subject to the 13 conditions), and in June 2016, Squamish Nation announced Council's decision to approve their EA Agreement in support of the Eagle Mountain Project (subject to the nine conditions). The negotiating team made it clear that the proponents and the Province must meet all of the Squamish Nation's legally binding conditions, otherwise, Squamish Nation can either revoke the EA Agreements or pursue legal remedies in court to force the proponents to comply with the conditions (Squamish Nation Chiefs and Council 2016; Woodfibre LNG 2016).

The Nak'azdli Whut'en First Nation announced in June 2016 it would not proceed with any of agreements at this time involving the Coastal GasLink and Prince Rupert Gas Transmission Projects (Pynn 2016). The Luutkudziiwus, a Gitxsan Nation House Group, is strongly opposed to the Prince Rupert Gas Transmission Project, which crosses 34 km of their traditional territory. As of April 2016, this Gitxsan Group was raising money to launch a court challenge to overturn

provincial approval and permits for the project on the basis they were not consulted (Hoekstra 2016).

In the case with the Lax Kw'alaams First Nation, there was a difference of opinion in the community, within hereditary leaders and the council, with regard to the Pacific NorthWest LNG project. In 2015, the community voted to unanimously reject a $1.14 billion benefit agreement from the proponent and the Government of BC; however, in March 2016, the Lax Kw'alaams offered conditional support for the proposed project in a letter from its mayor to the CEA Agency (Hoekstra 2016).

The Tsawwassen First Nation's rejection to an LNG export facility on their territory near Delta, BC, represents another example of the difference of opinions within an Aboriginal community. While the leadership of the Tsawwassen First Nation had initially been supportive of the project, in December 2015, 53% of the band members voted to reject plans to build the proposed LNG facility on their traditional lands. As a result of the vote, the Tsawwassen First Nation said it would 'not be moving forward with any additional discussion regarding this proposed LNG concept' (Canadian Press 2015).

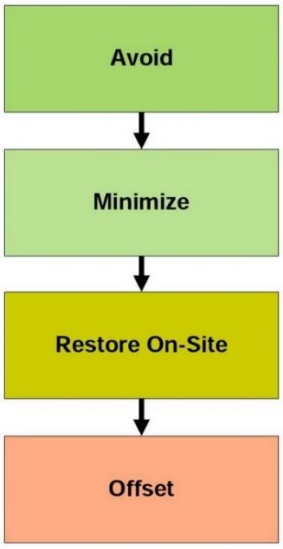
Chapter 4: Key Approaches to Address Environmental and Indigenous Peoples Issues Identified on Natural Gas and LNG Projects

Mitigation Measures to Avoid or Reduce Potential Adverse Effects

The *CEAA 2012* defines mitigation measures as *'measures for the elimination, reduction or control of the adverse environmental effects of a designated project, and includes restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means.*' The BC MOE defines a mitigation measure as action taken *'to avoid, minimize, restore on-site, or offset impacts on environmental values and associated components, resulting from a project or activity'* (BC MOE 2014b). The BC EAO's definition for mitigation is very close to the latter, however, it also includes compensation that is considered as measures taken to further reduce the potential adverse effects. Compensation may include not only direct physical measures (e.g., habitat enhancement, restoration or creation on, near or away from the project site), but also financial mechanisms (e.g., contributions to research and recovery plans, population enhancement programs, etc.) for reducing the residual effect (BC EAO 2013e).

Various types of mitigation can be prioritized in a hierarchy starting with the highest priority (avoidance). Figure 4.1 shows the components of the mitigation hierarchy.

Figure 4.1: The Hierarchy of Mitigation Measures to Avoid or Reduce Potential Adverse Effects



Source: (BC MOE 2014b)

It is expected that all feasible measures at one level of higher priority are considered before moving to the next one of lower priority, with a rationale provided for the approach taken. However, it is not necessarily the case in practice, since moving through the hierarchy may not be completely linear (BC EAO 2013e; BC MOE 2014b).

Avoidance as the first priority for application of mitigation measures should be considered at the initial project planning and route selection process. It can include assessing multiple pipeline route options within the proposed corridor and limiting the potential for adverse environmental effects through route selection (e.g., avoiding sensitive wildlife or wetlands habitat; avoiding key areas known to be important for Indigenous Peoples; collaborating with another operator in the same area and utilizing existing access roads where possible to reduce the project footprint). Impacts on some VCs within a project study area can be avoided through application of alternative timing for the project activities (e.g., scheduling the clearing and construction activities to avoid the nesting period for migratory birds and restricted periods set out to protect watercourses and *SARA*-listed species) (BC EAO 2013e; BC MOE 2014b).

Minimization as the second highest priority for application of mitigation measures should be considered when avoidance measures have been exhausted or they are not feasible. The same procedures as those considered for avoidance can generally apply to minimization measures as well, since "minimize" means to *partially* avoid the level of impacts on VCs. It can also be considered at the initial route selection process (e.g., locating the pipeline route along previously disturbed areas, including existing forestry cutblocks and access roads to reduce the overall proposed project footprint and minimize habitat fragmentation) (BC MOE 2014b).

Restoration on-site involves returning the impacted ecosystem to a sustainable ecological pathway. Unlike the minimization measures, restoration measures may be implemented or completed at a future date. In the order of preference, the "restore on-site" measures include restoration, remediation and reclamation. To restore environmental VCs is usually much more expensive than it would be to conserve them by avoidance or by minimization of impacts (BC MOE 2014b). Monitoring and evaluation of the restoration for effectiveness is critical for determining whether the restoration project is achieving its targets.

Offset is the last step in the mitigation hierarchy, and it should be implemented only after all previous steps to fully avoid, minimize and restore on-site have been properly considered. The responsibility for offsetting rests with the proponent, who must address the costs associated with offsetting by an in-lieu payment (either directly or indirectly).

Examples of Mitigation in Legally Binding Conditions of Environmental Assessment Certificates

When the provincial or federal EA process for a major natural gas pipeline or an LNG project is completed and approval is granted, an EAC (by BC EAO), a CPCN (by the NEB) or an EADS (by the CEA Agency) is issued, subject to the terms and conditions, including project design restrictions. The specified conditions form a part of the certificate or the decision statement and represent legally-binding requirements that the proponent must meet to be in compliance with the

certificate for the proposed project. It is not uncommon for an EA certificate to have over 100 commitments. For the 12 reviewed projects that have been approved by the provincial regulator (BC EAO), the amount of legally binding conditions for each project ranges from 8 (Pacific NorthWest LNG) to 243 (Kitimat LNG Terminal). For the 11 reviewed projects that have been approved by the federal regulators (the NEB or the CEAA Agency) the amount of commitments for each project varies from 28 (Northwest Mainline Expansion) to over 190 (Pacific NorthWest LNG). Mitigation conditions proposed by the provincial and federal regulatory authorities do not necessarily overlap, and the federal agency may propose additional mitigation for consideration by the federal Minister of Environment as legally binding conditions in an EADS under the *CEAA 2012* (as it can be seen in the Pacific NorthWest LNG project's case).

Certificate conditions are generally based on the results of consultation and input from Indigenous Peoples, government agencies, communities and the public. To avoid or decrease potential adverse effects, proponents can also propose a number of pipeline route changes, based on feedback and input from Indigenous Groups and the technical working groups during the EA process.

Table 4.1 provides examples of some common mitigation measures split by the type of mitigation (a priority level in the mitigation hierarchy) based on the analysis of the legally binding conditions in the EACs, CPCNs or EADSs for the 18 reviewed natural gas pipeline and LNG projects where the provincial and/or the federal EA process has been completed.

Table 4.1: Examples of Mitigation in Legally Binding Conditions of Environmental Assessment Certificates (EAC, CPCN and EADS)

Type of Mitigation	Mitigation Measures Incorporated as Certificate's Legally Binding Conditions	Examples of Projects with the Legal Binding Condition - References
Avoidance	Pipeline route changes to avoid: • Incursions into Old Growth Areas, parks and protected areas	(BC EAO 2016d; BC MOE and BC MNGD 2014a; BC MOE and BC MNGD 2014g; BC MOE and BC MNGD 2014h; BC MOE and BC MNGD 2016b; BC MOE and BC MNGD 2016a)
	• Critical habitat for species at risk (e.g., caribou, grizzly bear)	(BC MOE and BC MNGD 2014a; BC MOE and BC MNGD 2014g; BC MOE and BC MNGD 2014h; NEB 2011)
	• Culturally sensitive and traditionally important area for Indigenous Peoples	(BC MOE and BC MNGD 2014a; BC MOE and BC MNGD 2014g; BC MOE and BC MNGD 2014h; BC MOE and BC MNGD 2015d; BC MOE and BC MNGD 2016a)
	• Alternative timing to avoid conducting activities within the migratory bird nesting period	(BC MOE 2010b; BC MOE and BC MNGD 2015b; Canada and NEB 2010; Canada and NEB 2016; MOE 2016; NEB 2011)
Minimization	• Developing a number of environmental protection plans/monitoring programs to minimize project impacts	(BC MOE 2010b; BC MOE and BC MNGD 2014c; BC MOE and BC MNGD 2014h; Canada and NEB 2010; Canada and NEB 2012; MOE 2016; NEB 2010; NEB 2011; NEB 2015a)
	• Locating a portion of the route parallel to previously disturbed areas	(BC MOE and BC MNGD 2015d; BC MOE and BC MNGD 2016b)
	• Reducing GHG emissions by using energy-efficient equipment and power from the BC Hydro instead of natural gas	(BC MOE 2010b; BC MOE and BC MNGD 2014h; BC MOE and BC MNGD 2015b)
Restoration On-Site	• Developing a site restoration and reclamation program	(BC EAO 2016d; BC MOE 2010b; Canada and NEB 2010; Canada and NEB 2012; NEB 2015a)
	• Preparing a caribou habitat restoration plan	(BC MOE and BC MNGD 2013a; Canada and NEB 2012; NEB 2011; NEB 2015a)
	• Developing a post-construction monitoring plan and reports	(Canada and NEB 2010; Canada and NEB 2012; NEB 2011; NEB 2015a)
Offset	• Providing funds to support conservation of grizzly bear populations	(BC MOE and BC MNGD 2014a; BC MOE and BC MNGD 2014h; BC MOE and BC MNGD 2016a)
	• Developing a caribou offset measures plan	(Canada and NEB 2012; NEB 2011; NEB 2015a)
	• Developing a fish compensation/ offsetting plan with DFO and TC	(BC MOE and BC MNGD 2015b; Canada and NEB 2010; MOE 2016)
	• Compensation for permanent loss of wetlands or wetland function	(BC MOE and BC MNGD 2015b; BC MOE and BC MNGD 2016b; Canada and NEB 2010; MOE 2016; NEB 2011)
	• Replacement or recruitment of Old Growth Management Areas	(BC MOE and BC MNGD 2014a; BC MOE and BC MNGD 2014g; BC MOE and BC MNGD 2014h)

In addition, some of the key mitigation measures included in the conditions that are required for the reviewed projects where the residual adverse effects and/or cumulative adverse effects are considered to be significant, are listed below.

Measures to Mitigate the Increase of GHG Emissions from the Projects

Key mitigation measures identified by the provincial and/or federal regulators for a number of projects (BC MOE 2010b; BC MOE and BC MNGD 2013a; BC MOE and BC MNGD 2014a; BC MOE and BC MNGD 2014g; BC MOE and BC MNGD 2014h; BC MOE and BC MNGD 2015b; BC MOE and BC MNGD 2015d; MOE 2016) include:

- Developing a GHG Management Plan that includes adherence to the Ministry of Natural Gas Development's (MNGD) guidance on the Best Available Techniques Economically Achievable, regulatory requirements to report on GHG emissions and site-specific mitigations;
- Quantifying and reporting GHG emissions to the ECCC in a manner that is consistent with BC's *Greenhouse Gas Industrial Reporting and Control Act* (2014) and its regulations;
- Implementing mitigation measures during all phases of the proposed projects to reduce and control air emissions and GHG emissions;
- Developing, prior to construction and in consultation with Indigenous Groups and relevant federal and provincial authorities, and implementing during all phases of the proposed projects, a follow-up program to determine the effectiveness of the mitigation measures as it pertains to air quality and GHG emissions.

Measures to Mitigate the Adverse Impacts of the Projects on Caribou and Caribou Habitat

Key mitigation measures identified by the provincial and/or federal regulators for a number of projects (BC MOE and BC MNGD 2013a; BC MOE and BC MNGD 2014a; BC MOE and BC MNGD 2014g; BC MOE and BC MNGD 2014h; NEB 2011; NEB 2012; NEB 2015a) include:

- Avoiding sensitive caribou habitat wherever possible, avoiding increased impacts from predators and providing up to $2 million[1] to fund caribou and predator monitoring work;
- Reducing the project corridor length within caribou ranges;
- Developing and implementing a Caribou Habitat Restoration Plan (CHRP) and a Caribou Mitigation and Monitoring Plan;
- Offsetting all unavoidable and residual effects from directly and indirectly disturbed critical habitat for caribou after taking into account the implementation of the CHRP measures;
- Developing and implementing an Offset Measures Monitoring Plan that shall be for a minimum of 10 years.

[1] For the Prince Rupert Gas Transmission Project and Westcoast Connector Gas Transmission Project

Measures to Mitigate the Cumulative Adverse Impacts of the Projects on Grizzly Bear

Key mitigation measures identified by the provincial and/or federal regulators for a number of projects (BC MOE and BC MNGD 2014a; BC MOE and BC MNGD 2014g; BC MOE and BC MNGD 2014h; BC MOE and BC MNGD 2016a) include:

- Preventing mortality risks to grizzly bears from displacement and disturbance and contributing up to $875,000[2] to support the conservation and management of regional grizzly bear populations;
- Developing a Grizzly Bear Mitigation and Monitoring Plan to avoid or reduce impacts to grizzly bears from the project;
- Conducting a pre-construction grizzly bear den sweep.

Measures to Mitigate the Adverse Impacts of the Projects on Marine Mammals (Including Harbour Porpoise)

Key mitigation measures identified by the provincial and/or federal regulators for a number of projects (BC MOE and BC MNGD 2015b; BC MOE and BC MNGD 2015d; MOE 2016) include:

- Developing, in consultation with DFO, and providing to the regulatory agencies and Indigenous groups a Marine Mammal Management Plan;
- Developing and implementing a Marine Mammal Detection Program for all in-water construction activities to reduce adverse behavioral change in, or injury to, marine mammals;
- Monitoring of presence, density and spatial and temporal habitat use of marine mammals potentially affected by the proposed project and of levels of underwater noise in the areas where that monitoring occurs;
- Monitoring during years one, two, three, five, eight, and ten of operation that shall be included in the follow-up program.

Environmental Management Plans and Follow-up Programs

Environmental management plans (EMPs) would be required for all phases of proposed projects in order to minimize environmental adverse effects of the projects. As defined by BC EAO, the plans *'provide a framework to communicate and implement mitigation measures and best management practices, and to support compliance with applicable legislation, terms and conditions of permits, and approvals and authorizations issued in relation to proposed projects, including an EAC, if issued*' (BC EAO 2015b).

Management plans are usually developed in consultation with appropriate regulatory agencies, Indigenous Groups, and key stakeholders, as required.

[2] For the Westcoast Connector Gas Transmission Project.

Some of the EMPs and follow-up programs would be required by the provincial and/or federal agencies or authorities, while others would be incorporated into the EAC conditions as commitments made by the proponent. Examples of the most common EMPs and follow-up programs identified through the analysis of the EA applications in relation to the environmental effects from the reviewed projects are summarized below (BC EAO 2015f; BC EAO 2015b; CEAA 2016f).

Environmental Management Plans

- Emergency Response Plan (provides guidance on a hazardous material spill or emergency during construction and operations);
- Erosion and Sediment Control Plan (provides guidance on avoiding or reducing the potential for adverse effects on water quality and aquatic habitat from erosion and sediment runoff);
- Fish Habitat Offsetting Plan (describes measures to offset serious harm to fish);
- Greenhouse Gas Management Plan (describes mitigation measures to reduce effects to GHGs during operations of the proposed project);
- Invasive Plant Management Plan (outlines procedures to identify, prevent, control and monitor the introduction or spread of invasive plant species during construction and operations);
- Marine Activities Plan (describe measures to mitigate potential adverse effects on marine biota and habitats during construction and operations of an LNG facility);
- Noise Management Plan (describes measures to avoid or mitigate noise from project activities during construction and operations);
- Traffic Management Plan (describes mitigation and control measures to protect wildlife, personnel and the public from vehicle interactions due to increased traffic during construction and operations);
- Waste Management Plan (describes measures to manage hazardous and non-hazardous wastes generated by project activities during construction and operation);
- Wastewater Management Plan (describes measures to mitigate potential adverse effects of project activities associated with wastewater on water quality and aquatic habitat during construction and operations);
- Wetland Compensation Plan (describes mitigation measures to offset project-related loss of wetland function).

Follow-up Monitoring Programs

- Air Quality Monitoring Program (identifies sources of air emissions and mitigation measures for adverse effects to air quality);
- Marine Water Quality Monitoring Program (monitoring of project emissions, effluents and discharges, and assessment of the environmental performance and effects monitoring);

- Surface Water Quality Monitoring Program (outlines directions for protection of water quality and ensures that project-related activities are within applicable federal and provincial water quality guidelines);
- Fisheries and Aquatic Life Monitoring Program (extends the marine water quality monitoring and surface water quality monitoring programs during construction and operations);
- Wildlife Monitoring Program (describes measures to protect wildlife and personnel to manage the potential for human-wildlife conflicts during construction and operations);
- Vegetation Monitoring Program (describes measures to minimize potential effects to vegetation resources as a result of project construction activities).

Accidents and Malfunctions Prevention

Mitigation measures related to accidents and malfunctions include a requirement for proponents to develop and implement an ERP in relation to the project in consultation with Indigenous Groups and relevant federal and provincial authorities. Preparation and implementation of an environmental ERP is required under the federal Environmental Emergencies Regulations (2003, last amended 2011) (Canada 2003). The BC OGC also requires oil and gas operators to have a current ERP in accordance with the Emergency Management Regulation (2013) to ensure '*a quick, effective and appropriate response to emergencies in order to protect the public, company, and contract personnel from fatalities and irreversible health effects and the environment from damage'* (Province of BC 2013).

A number of proponents provided information regarding proposed projects design measures to reduce the risk associated with possible accidents and malfunctions. Some examples of these measures may include (BC EAO 2009; BC EAO 2015b; BC EAO 2015f):

- Installing engineering controls and protection barriers (e.g., valves, alarms, detectors, emergency shutdown systems) on facility infrastructure;
- Implementation of control and emergency shutdown systems which contain protection barriers to safely shut down equipment if required;
- Adopting spill prevention and containment measures (e.g., valves, cryogenically stable materials, primary and secondary containment, berms, impoundments areas, drainage systems);
- Adopting fire prevention and protection measures (e.g., fire-resistant materials, fire-rated control mechanisms, a fire water monitor, firefighting equipment and personnel);
- Using vessel pilots and tugs to accompany LNG tankers;
- Installing cargo containment systems on LNG carriers;
- Implementing and enforcing safe work procedures;
- Developing and implementing an Environmental Protection Plan, documenting employee safety training, and generating and retaining incident and malfunction reports in the event of an incident or malfunction;
- Maintaining spill kits on the project site, and in company vehicles; ensuring spill response training is provided for appropriate construction and operational personnel.

The proponents also committed to implementing health, safety, security and environment policies to prevent accidents or malfunctions. These policies would include a systematic strategy to identify hazards, threats, unwanted events and their potential effects, risk reduction measures and recovery planning in the event of an accident or malfunction.

Examples of Key Strategies and Progressive Programs Proposed by the Province

Greenhouse Gas Emissions Policies

British Columbia has designed and implemented a number of policy, regulatory, and legislative measures to reduce GHG emissions across the Province, in order to achieve the legislated GHG reduction targets. These measures include (BC MOE 2016b):

- Provincial carbon tax, introduced through the *Carbon Tax Act* (2008);
- Carbon-neutrality mandate for all public sector operations (the Carbon Neutral Government Regulation [2008, amended 2014]), mostly achieved through the sourcing of province based offsets via the Pacific Carbon Trust (the Emissions Offset Regulation [2008, amended 2010]);
- Mandatory GHG emissions reporting program for industrial facilities (the Greenhouse Gas Emissions Reporting Regulation [2009]);
- Potential cap-and-trade program and compliance offset scheme for large final emitters as set out in the *Greenhouse Gas Reduction (Cap and Trade) Act* (2008, amended 2015).

BC's *Greenhouse Gas Industrial Reporting and Control Act* (2014), implemented in January 2016, requires proponents to achieve an emissions intensity benchmark of 0.16 CO2e/t LNG. It also defines alternative compliance mechanisms for facilities that cannot achieve the benchmark by allowing offsets, contributions to a technology development fund, or emission credits. Money received into the technology fund would go to technology investment to reduce GHG emissions. Facilities below the benchmark can receive a credit that they can sell.

Caribou Stewardship Strategies

To reduce the expected decline in Boreal Caribou population in the province, the BC MOE with support from other provincial government agencies developed the Implementation Plan for the Ongoing Management of Boreal Caribou in British Columbia (2011). This plan balances habitat protection and management of Boreal Caribou with oil and gas development. It establishes resource review areas where oil and gas tenures will not be offered for a minimum of five years, and establishes management practices for activities within certain caribou habitat areas (BC MEM 2012; BC MOE n.d.; BC MOE 2011).

Another document developed by the BC MOE, the Interim Operating Practices for Oil and Gas Activities in Identified Boreal Caribou Habitat in British Columbia (2011), provides guidance on mitigation to reduce impacts to Boreal Caribou populations and associated habitat. This operational policy must be followed by all oil and gas activities within identified Boreal Caribou

habitat, and the BC OGC should consider this document when regulating petroleum and natural gas activities within Wildlife Habitat Areas and Ungulate Winter Ranges established for Boreal Caribou under the *BC OGAA* (BC MOE n.d.; BC OGC 2016c; Government of BC 2011).

The Province announced the Mountain Caribou Recovery Implementation Plan in 2007, with the goal to stop the decline of Mountain Caribou populations by 2014 and recover the population to pre-1995 levels (2,500 animals) within 20 years (BC MOE 2014a). The federal government released the Recovery Strategy for the Woodland Caribou, Southern Mountain population in June 2014 (Environment Canada 2014).

Prince Rupert Port Authority Marine Mammal Management Plan

The Prince Rupert Port Authority (PRPA), a federal responsible authority, started to develop a Prince Rupert Port Authority Marine Mammal Management Plan in 2015. This plan will identify best management practices and other mitigation measures to minimize risks to marine mammal populations from port operations (including projects construction and operations), and will improve management of cumulative effects to marine mammals. A component of the plan will be the monitoring and evaluation of underwater marine noise. The PRPA identified that resulting management actions regarding the reduction or mitigation of marine noise may also be beneficial to marine fish. The PRPA will engage with Indigenous Groups and key stakeholders to develop and implement the plan which is expected to improve knowledge of marine mammal use and dependency on the harbour area (CEAA 2016f).

Cumulative Effects Management Programs

While a high degree of uncertainty regarding the cumulative effects still remains in the region, the Province is moving forward with a number of initiatives that aim to assess and manage cumulative effects to key values, including vegetation and wildlife values, and to consider the impact to Indigenous Peoples rights (BC EAO 2016g). Examples of those initiatives include the Cumulative Effects Framework, Area-Based Analysis, Northeast Water Strategy and Northeast Water Tool, Liquefied Natural Gas Environmental Stewardship Initiative, and Regional Strategic Environmental Assessment.

British Columbia has become one of the first provinces to develop a *Cumulative Effects Framework*, built on the Province's existing environmental management framework. Over 90% of the Province's territory is covered by various land use plans that designate parks and protected areas, and also provide management objectives for resource development activities. Approximately 37% of BC's land base has some sort of conservation status. In addition, numerous acts and regulations ensure that environment in the Province is sustainably managed. Currently, the cumulative effects framework is being applied in the Northeast, Thompson-Okanagan and Cariboo regions, and expanding throughout the North and into specific areas (e.g., the Elk Valley and Howe Sound) (BC MFLNRO 2015b; BC MFLNRO and BC MEM 2016).

Area-Based Analysis has been developed by the BC OGC as a framework for managing the impacts of oil and gas development. This approach considers the cumulative effects of all industrial

development across the landscape when making decisions on oil and gas applications, and aims to identify and minimize the cumulative effects of oil and gas activity on select environmental and cultural values. It was first introduced in the application review process in January 2015. Effective September 2015, all oil and gas activity applications submitted to the BC OGC requiring new land must indicate if there is an impact to Enhanced Management Zones (BC OGC 2015e; BC OGC 2015f).

The Northeast Water Strategy was developed by the Province with involvement of the provincial and local governments, Indigenous Groups, and the industry, and was released in March 2015. It is a proactive long-term approach for the sustainable use and management of water resources in northeast British Columbia (BC MFLNRO 2016; Province of BC 2015). The *Northeast Water Tool* is a GIS-based hydrology decision support tool that was developed in partnership by the BC OGC and the BC MFLNRO. The tool provides information for decision makers, stakeholders, and the public on current stream flow data and permit approvals (BC OGC 2014b; BC OGC 2015b).

The Liquefied Natural Gas Environmental Stewardship Initiative (LNGESI) and the Regional Strategic Environmental Assessment (RSEA) will be discussed in detail below.

Indigenous Peoples: Consultations and Engagement

While the main responsibility for ensuring adequate and appropriate consultation and accommodation with Indigenous Peoples rests with the Province, the procedural aspects of consultation may be delegated to proponents. They are encouraged to engage with Indigenous Peoples as early as possible in the planning stages in order to build relationships and for information sharing purposes (BC EAO 2013f; BC MARR 2016a).

Proponents should seek to engage with Indigenous Peoples regarding the topics of potential impacts to Aboriginal interests; the type of information required to assess those impacts; methods of gathering information; and other topics as appropriate. At the planning stages of the provincial and/or federal EA process, the proponents are encouraged to involve Indigenous Groups early in the establishment of baseline studies and study boundaries, and to select VCs for the EA that are related to Aboriginal interests (BC EAO 2013f).

The following guidelines and procedure manuals have been developed by the Province of BC, BC MARR and BC EAO to assist proponents with meeting consultation obligations with Indigenous Peoples (BC MARR 2016a):

- *Building Relationships with First Nations: Respecting Rights and Doing Good Business*: This document provides an overview of the role of proponents and industries in government's consultation processes, along with practical advice and strategies to help businesses with building effective working relationships with Indigenous Peoples (Province of BC n.d.).
- *Guide to Involving Proponents When Consulting First Nations*: The guide assists the industry sector with a better understanding of the range of proponent's roles in Indigenous Peoples consultation (BC MARR 2014a). It has to be used in conjunction with

the next manual on this list, the Updated Procedures for Meeting Legal Obligations When Consulting First Nations.

- *Updated Procedures for Meeting Legal Obligations When Consulting First Nations*: The document is intended to reflect the legal requirements established by the courts regarding claimed or proven Aboriginal rights (including Aboriginal title) or treaty rights. It describes the Province's approach to consulting and accommodating Indigenous Peoples where a proposed activity by the Province may affect those rights (Province of BC 2010).
- *Proponents Guide to First Nation Consultation in the Environmental Assessment Process*: The guide clarifies the roles and responsibilities of the Province and proponents in Indigenous Peoples consultation throughout an EA process, establishing the ground for successful relationships between government, proponents and Indigenous Peoples (BC EAO 2013f).

Analysis of the above documents (BC MARR 2014a; Province of BC n.d.; Province of BC 2010) shows that the consultation procedures proposed by the BC Government adopt a four-phased approach:

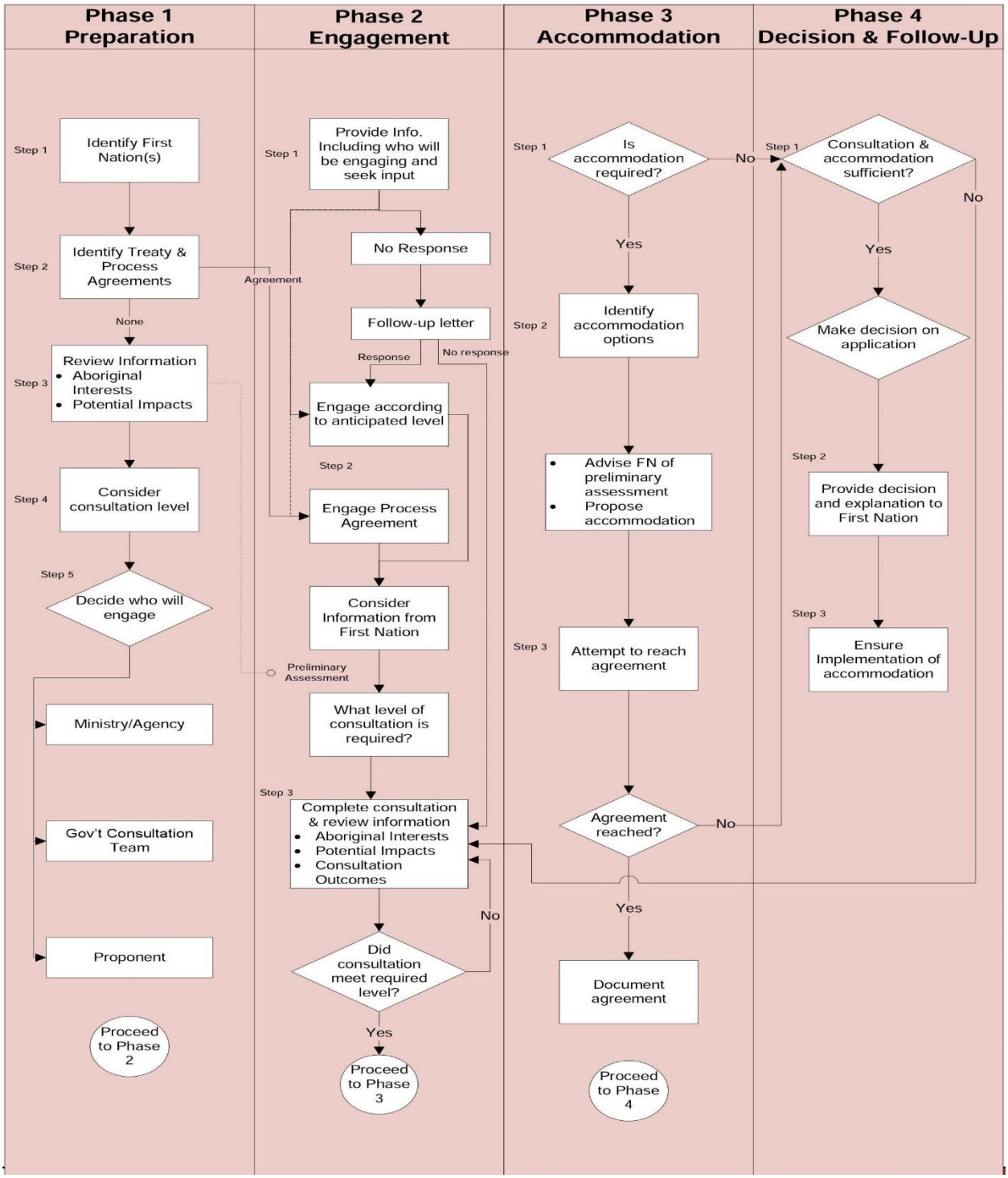
1) **Preparation**. The objective of this phase is to undertake basic research and analysis to be prepared for appropriate consultation. Phase One includes the following 5 steps:
   - identify Indigenous Group;
   - identify treaties or process agreements;
   - review readily available information;
   - consider a consultation level;
   - decide who will engage Indigenous Group.
2) **Engagement**. The objective of the second phase is to engage with Indigenous Groups to inform them of the proposed decision and try to understand their Aboriginal interests and concerns. Phase Two includes the following 3 steps:
   - provide information and seek input;
   - engage Indigenous Groups;
   - complete consultation at appropriate level
3) **Accommodation**. The objective of the third phase is to reconcile the Province's objectives with Aboriginal interests specified by Indigenous Groups. Phase Three includes the following 3 steps:
   - assess consultation and need to accommodate;
   - identify accommodation options;
   - propose accommodation measure and attempt to reach agreement.
4) **Decision and Follow-Up**. The objective of the last phase is to make a decision (after a full consideration of Aboriginal interests and any accommodations offered) and inform the Indigenous Group. To ensure that any accommodations have been implemented, a follow-up will be required. Phase Four includes the following 3 steps:
   - assess consultation and accommodation record;
   - provide decision to the Indigenous Group;
   - ensure implementation of accommodations.

Examples of best practices that have to be implemented through all phases of the consultation process include the following (Province of BC 2010):

- The Province and proponents must act honorably when dealing with Indigenous Peoples;
- Consultation must be held with the intention to substantially address the concerns of Indigenous Peoples regarding their Aboriginal interests that may be affected by regulatory decisions;
- If required, the Province has to seek ways to accommodate Aboriginal interests appropriately, after gaining a proper understanding of them through the consultation process;
- Ensuring a fair process is critical in the law; Indigenous Groups have the right to respond and be informed about pending decisions.

Figure 4.2. shows a diagram for a general consultation process with Indigenous Groups, as presented in the Province's *Updated Procedures for Meeting Legal Obligations When Consulting Indigenous Peoples* (Province of BC 2010).

Figure 4.2: General Consultation Process with Indigenous Groups



Source: (Province of BC 2010)

Agreements with Indigenous Peoples

The courts have repeatedly encouraged the resolution of Aboriginal issues **by negotiation rather than litigation**, which is a costlier, adversarial and time-consuming way to address outstanding Aboriginal issues (INAC 2010d).

Treaties and other agreements can be considered as important tools for Indigenous Peoples to build sustainable, healthy and resilient communities. The agreements can help establish effective relationships with Indigenous Peoples, address concerns associated with developments on their traditional territories, or resolve conflicts. Types of agreements with Indigenous Groups negotiated within the Province to date are as follows (BC MARR 2016c):

- Treaties (including Final Agreements, Agreements-in-Principle and Incremental Treaty Agreements);
- Reconciliation Agreements (including Accords and MOUs);
- Strategic Engagement Agreements;
- Off-Reserve Action Plans;
- Cut-off Claims;
- Economic and Community Development Agreements;
- Atmospheric Benefit Sharing Agreements;
- Revenue Sharing Agreements (including First Nations Clean Energy Business Fund Revenue Sharing Agreements, Forest Consultation and Revenue Sharing Agreements, etc.);
- Natural Gas Pipeline Benefits Agreements.

Agreements with Indigenous Peoples specific to the natural gas and LNG industry are discussed in detail below.

LNG Environmental Stewardship Initiative

The Liquefied Natural Gas Environmental Stewardship Initiative (LNGESI) is a new form of collaboration between the Province, Indigenous Peoples and the LNG sector that was established in May 2014. As of July 2015, 32 First Nations, the Province and the industry have been working together on the LNGESI. The Initiative is not designed to change or alter the current regulatory process, but rather to complement the regulatory process. The goal of the LNGESI is to ensure the balance between the environment and economic growth, establish strong environmental legacies related to LNG development and produce high quality, trusted and accessible environmental information. Four key areas included in the scope of the LNGESI are: 1) ecosystem assessment and monitoring; 2) ecosystem restoration and enhancement; 3) ecosystem research and knowledge exchange; and 4) stewardship education and training (BC MARR 2014b; BC MARR 2015b; BC MARR 2016d).

Regional Strategic Environmental Assessment

The Regional Strategic Environmental Assessment (RSEA) developed under and funded by the LNGESI aims to assess the cumulative effects of natural resource development activities on

environmental VCs related to the Treaty 8 rights of the participating First Nations in northeast British Columbia. As of June 2016, the RSEA agreement was ratified by the Province with 6 out of 8 BC-based Treaty 8 First Nations (Austin and Pokorny 2016).

To date, preliminary discussions have been held by the RSEA team (comprised of the Treaty 8 First Nations, the Province, select upstream natural gas and LNG related proponents) on a study area, selection of VCs and available tools and scenario modelling. The proposed study area is within the vicinity and overlaying the Montney Shale Gas Play in British Columbia. The results of the RSEA will be used to inform and recommend management responses that optimize the exercise of the Treaty rights and the development interests in the study area (Austin and Pokorny 2016; Province of BC 2016d).

Capacity Building Initiatives

In addition to the LNGESI, the Province is working with Indigenous Peoples on all aspects of LNG opportunities in British Columbia that include skills training, employment, consultation and accommodation work in regulatory decision making, and economic benefits sharing. In 2015, the Province has launched a new Aboriginal Skills Training Development Fund that is an investment of up to $30 million over the next three years for new Aboriginal skills-training projects and partnerships. Up to $10 million annually in this new funding are intended to support community-based training programs focused mainly on Indigenous Groups that will benefit from the growth of the LNG industry. The overall goal of this program is adding 15,000 more Indigenous workers to the Province's workforce within 10 years (BC MARR 2015a; BC MARR 2015c). As of June 2016, more than 1,000 Indigenous Peoples have already benefited from the training programs, with 85% graduating and finding a job (Pynn 2016).

Proponents of natural gas pipeline and LNG projects also have the potential to provide important economic opportunities for Indigenous Peoples, including capacity-building initiatives to support employment, contracting and business development. Examples of these initiatives have been specified by the proponents on a number of the reviewed projects and may include the following (BC EAO 2014c; BC MARR 2015a; BC MARR 2015c):

- Building Aboriginal business capacity during pre-construction and construction of proposed projects through designating services to qualified Aboriginal businesses and individuals;
- Providing capacity funding to optimize employment and contracting opportunities;
- Supporting workforce readiness programs focused on transferable skills with various post-secondary institutions including Aboriginal Skills and Employment Training organizations and local colleges;
- Supporting education legacy programs focused on long-term capacity building for Aboriginal and non-Aboriginal communities;
- Partnering with local non-profit organizations to enhance the quality of life in local communities, including training to address barriers to Aboriginal training and employment;

- Providing capacity funding to support meaningful participation in consultation activities with the proponents and in the regulatory process.

It is worthwhile noting that there is no legal obligation for proponents to provide capacity funding to Indigenous Groups as part of the consultation process. Nevertheless, proponents often chose to provide funding to help inform the consultation process and to avoid potential impacts to Aboriginal interests from the proposed project. The provincial regulator (BC EAO) encourages proponents to have early discussions with Indigenous Groups and to establish capacity funding agreements. BC EAO usually provides capacity funding to Indigenous Groups on Schedule B of the Section 11 Order to assist with their participation in consultation discussions and Working Group meetings during the EA process. Capacity funding agreements assist Indigenous Groups in participating in the EA process in an effective and timely way. These types of agreements should not be confused with any economic benefit agreements (BC EAO 2013f).

Economic Benefit Agreements

Natural Gas Pipeline Benefits Agreements (NGPBAs) are agreements between the Government of BC and Indigenous Peoples, and are part of the Province's comprehensive approach to partnering with Indigenous Peoples on LNG opportunities (which also includes development skills training and environmental stewardship projects discussed earlier). The purpose of the NGPBAs is to provide financial benefits to the participating Indigenous Groups and to secure their support regarding the proposed natural gas pipeline projects (BC MARR 2016e).

Economic benefit agreements are not legally required and must be kept separate and distinct from the duty to consult. The fact that Indigenous Peoples may have signed an Impact Benefit Agreement (IBA) for a project does not relieve the Crown of its duty to consult and accommodate Aboriginal interests. By entering into IBAs, Indigenous Peoples are not waiving their right to review, comment and approve or not, any environmental studies, permit applications or environmental monitoring regimes related to the project (McCarthy Tétrault LLP 2016; McMillan LLP 2011).

According to the BC MARR, as of June 2016, approximately 90% of the Indigenous Groups with proposed natural gas pipelines through their traditional territories have indicated their support through one or more pipeline benefit agreements. Throughout British Columbia, 62 NGPBAs have been reached with 29 of 32 eligible First Nations for four proposed natural gas pipelines – the Prince Rupert Gas Transmission, Coastal GasLink, Westcoast Connector Gas Transmission, and Pacific Trail Pipeline. According to the Province, 16 out of 19 Indigenous Groups that must be consulted along the Prince Rupert Gas Transmission Project route have signed benefit agreements; the Province has been in discussions with the three remaining Indigenous Groups (Hoekstra 2016). For the Pacific Trail Pipeline Project, all 16 Indigenous Groups located along the proposed pipeline route have indicated their support for the project (BC MARR 2015c; Pynn 2016).

Natural Gas Pipeline Benefit Agreements

Analysis of 24 NGPBAs for the Coastal GasLink Pipeline, Prince Rupert Gas Transmission and Westcoast Connector Gas Transmission Projects publicly available on the BC MARR's website shows that the Province will share financial benefits associated with the development of the proposed natural gas pipeline projects with the potentially impacted Indigenous Groups, including the following types of payment for each individual agreement:

1) Project payments specific for each individual NGPBA that will be provided by the Province to the participating First Nations in two installments, including:
   a) an initial payment within 90 days of the material commencement of the natural gas pipeline project construction, and
   b) a final payment within 90 days after the in-service date of the natural gas pipeline project.
2) Additional payments specific for each individual NGPBA that usually represent 10%, 15% or 20% of the project payment. They will be provided to the participating First Nations within 90 days after the effective date of the agreement.
3) Ongoing benefits that are not project- or agreement-specific. The Province will provide the ongoing benefits of $10,000,000 per year for each of the three major natural gas pipeline projects, commencing on the first anniversary of the in-service date for the natural gas pipeline project and continuing annually for as long as the project is making natural gas deliveries to an LNG facility. The ongoing benefits will be shared between eligible First Nations that should attempt to reach unanimous agreement on the allocation of the ongoing benefits.

Details of the reviewed NGPBAs are presented in Table 4.2.

First Nations Limited Partnership Agreement

The First Nations Limited Partnership (FNLP) Agreement announced February 26, 2013, is a benefit agreement between Chevron, Woodside (as the Apache successor) and all 16 First Nation bands whose territories are located along the proposed route of the Pacific Trail Pipeline Project from Summit Lake to Kitimat. This agreement is unique among any pipelines in Western Canada, since the Pacific Trail Pipeline Project is the first proposed natural gas pipeline related to LNG in British Columbia with the support of all directly affected First Nations (BC MARR 2015c; Chevron Canada 2016).

The FNLP Agreement includes up to $550 million in commercial benefits (up to $200 million in direct financial benefits) over the life of the Pacific Trail Pipeline Project, including a recent enhanced benefit of $10 million a year operating life of the project from the Province of BC. In addition, the agreement will also provide substantial business and training opportunities for the involved First Nations.

To date, over 1,600 FNLP members receive skills training through the Pacific Trail Pipeline's Aboriginal Skills to Employment Partnership; over 900 of these trainees have found jobs. First Nations employment currently accounts for 64% of all early works construction workforce hours

on this project. To date, FNLP members have also been awarded over $245 million in the Pacific Trail Pipeline's construction contracts, and over 65% of construction contract expenditures have been made to member First Nation businesses (Chevron Canada 2016; Rowland 2015).

Coastal First Nations Liquefied Natural Gas Benefits Agreement

The purpose of the Coastal First Nations Liquefied Natural Gas Benefits Agreement (LNGBA) signed in January 2016 is to enable the Province, the Great Bear Initiative (GBI) Society and GBI Member Nations to share in the benefits associated with the development of an LNG industry on the north coast of British Columbia. As stated in the Agreement, it applies to all LNG projects within the Coastal First Nations territory, and currently includes 10 proposed LNG projects. The Province will make payments to the GBI on behalf of GBI Member Nations (there are currently 9 GBI Member Nations – signatories of the LNGBA) as follows (BC MARR and GBI Society 2016):

1) Base funding, including:
   - Initial base payment in the amount of $4,500,000;
   - Ongoing base funding consisting of a one-time payment of $750,000 and ongoing annual payments of $1,500,000 that will be provided by the Province if the proponent of an LNG project makes a final investment decision (FID) before March 31, 2018;
   - The obligation to provide base funding is only triggered on a one-time basis and it is not provided for each LNG Project.
2) Incremental project funding, including:
   - FID payments for each LNG project where a FID has been announced that will be provided by the Province to the GBI annually until the in-service date is reached, in an amount that depends on *estimated* LNG production;
   - In-service payments for each LNG project that is commissioned and begins producing LNG that will be provided by the Province to the GBI annually in an amount that depends on *actual* LNG production;
   - LNG expansion payments (if an LNG project expands its LNG production capacity) that will be added by the Province to each annual in-service payment, until the LNG project expansion date is reached, in an amount that depends on estimated *additional* LNG production. The Province will not continue to provide LNG expansion payments for an LNG project once the LNG project expansion for that project is reached.

Table 4.2: Summary of Financial Benefits from Natural Gas Pipeline Benefit Agreements Between the Government of British Columbia and Indigenous Groups Potentially Impacted by the Proposed Natural Gas Pipeline Projects

Indigenous Group - Participant of Natural Gas Pipeline Benefits Agreement	Indigenous Group Population	Coastal GasLink Pipeline Project		Prince Rupert Gas Transmission Project		Westcoast Connector Gas Transmission Project	
		Project Payment, $	Additional Payment, $	Project Payment, $	Additional Payment, $	Project Payment, $	Additional Payment, $
Doig River First Nation	303	$1,170,000	175,500	1,120,000[a]	168,000	–	–
Gitanyow Nation	846	–	–	1,150,000[a]	230,000	1,130,000[b]	226,000
Gitxaala Nation	1,916	–	–	1,540,000	308,000	1,640,000[b]	328,000
Halfway River First Nation	277	2,030,000	406,000	1,680,000[a]	336,000	–	–
Kitselas First Nation	655	1,150,000	230,000	1,760,000[a]	352,000	1,590,000[b]	318,000
Lake Babine Nation	2,488	–	–	3,240,000	324,000	–	–
Lheidli T'enneh	419	1,240,000	248,000	–	–	–	–
McLeod Lake Indian Band	551	3,380,000	338,000	2,950,000[a]	295,000	–	–
Metlakatla First Nation	905	–	–	2,150,000[a]	430,000	1,950,000[b]	390,000
Moricetown Band	2,039	4,990,000	998,000	–	–	–	–
Nee-Tahi-Buhn Indian Band	149	2,100,000[c]	420,000	–	–	–	–
Nisga'a Nation	6,034	–	–	5,070,000	1,014,000	–	–
Skin Tyee First Nation	182	2,330,000[c]	466,000	–	–	–	–
Tl'azt'en Nation	1,777	–	–	2,160,000	324,000	–	–
West Moberly First Nations	290	2,010,000	201,000	–	–	–	–
Wet'suwet'en First Nation	246	2,320,000[c]	464,000	–	–	–	–
Yekooche First Nation	235	390,000	78,000	390,000	78,000	–	–
Total Payment (Per Project), $:		**23,110,000**	**4,024,500**	**23,210,000**	**3,859,000**	**6,310,000**	**1,262,000**

Data Sources: (BC MARR 2016e; BC MARR and Doig River First Nation 2015a; BC MARR and Doig River First Nation 2015b; BC MARR and Gitanyow Nation 2015a; BC MARR and Gitanyow Nation 2015b; BC MARR and Gitxaala Nation 2015a; BC MARR and Gitxaala Nation 2015b; BC MARR and Halfway River First Nation 2014a; BC MARR and Halfway River First Nation 2014b; BC MARR and Kitselas First Nation 2014; BC MARR and Lake Babine Nation 2015; BC MARR and Lheidli T'enneh 2014; BC MARR and McLeod Lake Indian Band 2015a; BC MARR and McLeod Lake Indian Band 2015b; BC MARR and Metlakatla First Nation 2014a; BC MARR and Metlakatla First Nation 2014b; BC MARR and Moricetown Band 2015; BC MARR and Nee-Tahi-Buhn Indian Band 2014; BC MARR and Nisga'a Nation 2014; BC MARR and Skin Tyee First Nation 2014; BC MARR and Tl'azt'en Nation 2015; BC MARR and West Moberly First Nations 2015; BC MARR and Wet'suwet'en First Nation 2014; BC MARR and Yekooche First Nation 2014a; BC MARR and Yekooche First Nation 2014b; BC MARR 2016). Table created by CERI.

Notes:

[a] Where a portion of the Prince Rupert Gas Transmission Project is constructed within 70 m of the centreline of the Westcoast Connector Gas Transmission Project, the Province at its sole discretion may reduce the project payment. For details, please refer to (BC MARR and Doig River First Nation 2015b; BC MARR and Gitanyow Nation 2015a; BC MARR and Halfway River First Nation 2014b; BC MARR and Kitselas First Nation 2014; BC MARR and McLeod Lake Indian Band 2015b; BC MARR and Metlakatla First Nation 2014a).

[b] Where a portion of the Westcoast Connector Gas Transmission Project is constructed within 70 m of the centreline of the Prince Rupert Gas Transmission Project, the Province at its sole discretion may reduce the project payment. For details, please refer to (BC MARR and Gitanyow Nation 2015b; BC MARR and Gitxaala Nation 2015b; BC MARR and Kitselas First Nation 2014; BC MARR and Metlakatla First Nation 2014b).

[c] Where a portion of the Coastal GasLink Pipeline is constructed within 70 m of the centreline of the Pacific Trails Pipeline Project, the Province at its sole discretion may reduce the project payment. For details, please refer to (BC MARR and Nee-Tahi-Buhn Indian Band 2014; BC MARR and Skin Tyee First Nation 2014; BC MARR and Wet'suwet'en First Nation 2014).

Other Examples of Economic Benefit Agreements

As of April 2016, IBAs or term sheets have been signed with four of five Indigenous Groups (Metlakatla, Kitselas, Kitsumkalum and Gitxaala) potentially affected by the Pacific NorthWest LNG project. The fifth, the Lax Kw'alaams First Nation, recently offered its conditional support for the project (Hoekstra 2016).

The LNG Canada Export Terminal and Kitimat LNG Terminal projects have also obtained the support of the Haisla Nation, whose traditional territory LNG terminals would be built on (Hoekstra 2016).

After more than a year of negotiations, Acho Dene Koe First Nation has signed its first project benefits agreement for the Fortune Creek Gas Plant Project located in the Horn River Basin area in northern British Columbia (Thompson 2014).

There is also ongoing engagement and negotiation on natural gas exploration, development and production between the Province and the Treaty 8 First Nations. As of April 2014, four economic benefit agreements were completed, and others were being worked on (Province of BC 2014b).

Revenue Sharing Agreements

The Government of BC is working with Indigenous Groups to provide benefit-sharing opportunities in regard to land and resource management. The revenue sharing agreements with Lax Kw'alaams and Metlakatla First Nations signed in 2014 share a portion of Provincial Government revenues from sole proponent agreements related to the Grassy Point lands and the proponents Aurora LNG (Aurora LNG Digby Island Project) and Woodside Energy (Grassy Point LNG Project). The sole proponent agreements give the proponents the exclusive right to proceed with activities to inform planning for LNG development (Province of BC 2014b).

By signing these revenue sharing agreements, Lax Kw'alaams and Metlakatla First Nations demonstrate their support for prospective LNG development at Grassy Point. These two reconciliation agreements are the fifth and sixth of the ten new non-treaty agreements that the Province has committed to reach within two years. They are also the 23rd and 24th economic benefit agreements reached with Indigenous Peoples since 2011, when the BC Jobs Plan was launched (Province of BC 2014b).

Chapter 5: Conclusions

This chapter attempts to summarize a substantial amount of information on the key environmental and Indigenous Peoples issues arising from natural gas and LNG development in British Columbia as identified in the foregoing sections of the report, and to provide suggestions on the key approaches to address these issues:

- A regulatory framework for the natural gas and LNG industry in British Columbia is robust, with many layers of government policies and regulations to guide responsible development of this sector. While the provincial and federal regulatory authorities work toward harmonization of the environmental assessment processes in order to avoid duplication of efforts and to clarify roles and responsibilities, these two regimes remain distinct and somewhat complex.
- It is very important for the proponents of the natural gas pipeline and LNG projects in British Columbia to fully understand the provincial and federal EA processes in order to manage timeframes and costs for the proposed projects where possible and to build effective relationships with stakeholders, Indigenous Groups and the general public.
- The review of the EA applications for 29 major natural gas, natural gas liquids (NGL) and LNG projects in British Columbia that have undergone a typical EA process (active or complete) with the provincial and/or federal responsible authority since 2010 identified the following key environmental issues:
  - Significant residual adverse effects related to GHG emissions;
  - Significant residual adverse effects and cumulative effects to rare and threatened wildlife species (specifically, to caribou, grizzly bear and harbour porpoise);
  - Cumulative adverse impacts of natural gas development.
- Significant residual adverse effects related to GHG emissions have been one of the major environmental issues reported on 7 projects out of 18 where the provincial or federal EA has been completed. They are of concern for stakeholders, Indigenous Groups and the general public. As part of the Government of Canada's interim approach for environmental assessments, a new regulatory requirement is to provide an assessment not only for the direct, but also for the upstream GHG emissions associated with the proposed project.
- Significant residual adverse effects on caribou and caribou habitat were determined on three major natural gas pipeline projects out of 18 with the EA process completed, and were also determined as a key issue that should be considered and fully compensated for on two other natural gas pipeline projects. These impacts were mostly attributed to enhanced predator access to caribou and loss of caribou habitat due to the habitat fragmentation.
- For two reviewed projects, impacts to threatened wildlife species (caribou and grizzly bear) were considered as significant in terms of cumulative effects, but not in terms of project specific effects. These cumulative impacts will only become more significant with the increased intensity of natural gas and LNG development.

- The analysis of EA reports for six provincially and/or federally approved natural gas pipeline and LNG projects that include the Marine Resources VCs revealed impacts to marine mammals to be a concern for several projects. The residual adverse effects and cumulative adverse effects on marine mammals (particularly, on harbour porpoise) were considered to be significant for one LNG project.
- There is a growing concern about the cumulative impacts of natural gas development arising from both stakeholders and the general public. Cumulative impacts are also of particular concern for Indigenous Groups, with many of them unsatisfied with the adequacy of cumulative effects assessment of past, present and reasonably foreseeable industrial activity in their traditional territory, in relation to their respective Aboriginal interests. Cumulative effects assessment must be conducted for all residual adverse effects identified by the proponents, not only for those predicted to be significant.
- Key approaches to mitigate the identified environmental issues include:
  - Avoiding key areas of concern at the initial project planning;
  - Assessing multiple pipeline route options within the proposed corridor and limiting the potential for adverse environmental effects through route selection;
  - Collaborating with other operators in the same area and utilizing existing access roads where possible to reduce the project footprint;
  - Coordinating the planning of surface disturbance and habitat removal with other land users;
  - Locating the pipeline route along previously disturbed areas to minimize habitat fragmentation;
  - Applying alternative timing for the project activities;
  - Compensating habitat loss through establishment of offset areas of equivalent or better habitat quality.
- Environmental management plans would be required for all phases of proposed projects in order to minimize environmental adverse effects of the projects. Management plans are usually developed in consultation with appropriate regulatory agencies, Indigenous Groups, and key stakeholders, as required.
- While British Columbia has less than one-fifth of Canada's Indigenous and First Nations peoples, it is characterized by the greatest diversity of Indigenous population and culture in Canada representing 198 First Nations (about one third of all First Nations in Canada); more than 60% of the First Nations languages and 64% of unique language families in Canada. The Province also presents a unique landscape of Aboriginal rights and interests, with the history of treaty making substantially different from the rest of Canada; lands that are subject to modern-day treaties, treaty negotiations or unresolved land claims.
- Understanding of Aboriginal and treaty legal rights issues is fundamental to the potential success of proposed natural gas pipeline and LNG projects in British Columbia. A failure to understand these issues can affect the progress or even the regulatory approval of a natural gas pipeline or LNG project.
- Consultation with Indigenous Peoples is not intended to prove or reject claimed Aboriginal rights or title, since they can only be declared by the courts or agreed to in a government-to-government document like a treaty. The courts have repeatedly

encouraged the resolution of Indigenous issues by negotiation rather than litigation, which is a costlier, adversarial and time-consuming way to address outstanding Indigenous issues.

- While the duty to consult Indigenous Groups rests with the Crown, the Crown, as represented by the regulatory authorities, can assign certain procedural aspects of consultation to proponents. Industry must contact, involve and reach agreements with Indigenous Peoples prior to commencing any operations in their traditional lands.
- The engagement of Indigenous Peoples by proponents needs to start as early as possible, prior to the exploration phase and continue throughout the lifecycle of the project, including construction, operations, decommissioning and abandonment.
- The Crown's duty to consult and accommodate relates to avoiding or mitigating impacts on Aboriginal rights or title, and does not imply an obligation to enter into any form of economic benefits agreement with Indigenous Groups. Nevertheless, signing such agreements can build effective relations with Indigenous Groups potentially affected by a proposed project.
- By entering into impact benefit agreements, Indigenous Groups are not waiving their right to review, comment and approve or not, any environmental studies, permit applications or environmental monitoring regimes related to the project.
- The importance of achieving and maintaining positive relationships with Indigenous Groups potentially affected by a proposed project cannot be stressed enough. Effective consultation and engagement with Indigenous Groups is one of the most critical factors for the success of the project.

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