ALASKA
PipelineProject

Preliminary Socio-Economic and Environmental Information Review and Issues Update 2010 Summary

CAAG-TR-SPENV-000004

TransCanada ExxonMobil

The Alaska Pipeline Project

Foothills Pipe Lines Ltd. ("Foothills"), through its wholly owned subsidiaries, holds certificates of public convenience and necessity (“CPCN”) issued pursuant to the *Northern Pipeline Act* 1977-78 c.20, R.S., 1985 c. N-26 (the “NPAct” or “the Act”) to construct, own and operate a buried pipeline along a prescribed route through Canada to connect Alaska gas to all major markets in North America.

Construction of the Alaska Highway Gas Pipeline began in the early 1980s when the Eastern and Western Legs, referred to as the Pre-Build, were built (Figure 1-1). Foothills is now continuing work under its existing CPCNs, with planning for construction in Yukon and Northern British Columbia (“B.C.”) ("the Project"). This work is part of a larger project referred to as the Alaska Pipeline Project (“APP”) being undertaken by Foothills’ parent, TransCanada PipeLines Limited (“TransCanada”), and ExxonMobil Corporation. The APP includes facilities to be constructed and operated in Alaska and Canada (Figure 1-2).

The Project will entail the construction and operation of the following facilities.

- A 1,555 km natural gas pipeline that extends from near Beaver Creek, Yukon to Boundary Lake near the B.C. – Alberta border, within the routing defined in Schedule 1 of the NPAct.
- The base case design is a pipeline of 48 inches (1,219 mm) diameter and operated at a pressure of 2,500 psig.
- The pipeline will generally be buried except at compressor stations and at select sites such as seismic fault crossings.
- The base case design includes 11 compressor stations in Canada (6 in Yukon and 5 in Northern B.C.), located within the existing easement or corridor.
- Other permanent facilities include one or more heater stations, one or more Operations and Maintenance Centres, and permanent access needs to compressor stations.
- Temporary facilities will likely include material staging yards, access roads and construction camps.

In Yukon, all permanent facilities are being planned and will be constructed within the existing easement held by way of an agreement between Foothills and the government of Canada (“the Easement”). All permanent facilities in Northern B.C. will be located within the corridor specified in map reserves unless otherwise authorized.

Purpose and Scope of this Document

The purpose of the Preliminary Socio-Economic and Environmental Information Review and Issues Update ("PRU") is to document and update existing information on key issues to create a shared foundation for plans and programs that satisfy terms and conditions to the NPAct Terms and Conditions (“Terms and Conditions”).

The PRU will:

- describe Foothills’ proposed work plans for developing these plans and programs;
- document available data reviewed to date;
- share information with stakeholders and Aboriginal groups, to grow understanding of the past reviews and to participate in future Project activities; and
- support the Foothills engagement program.

Figure 1-1 Alaska Pipeline Project Existing and Planned Facilities (Stages 1, 2 and 3)

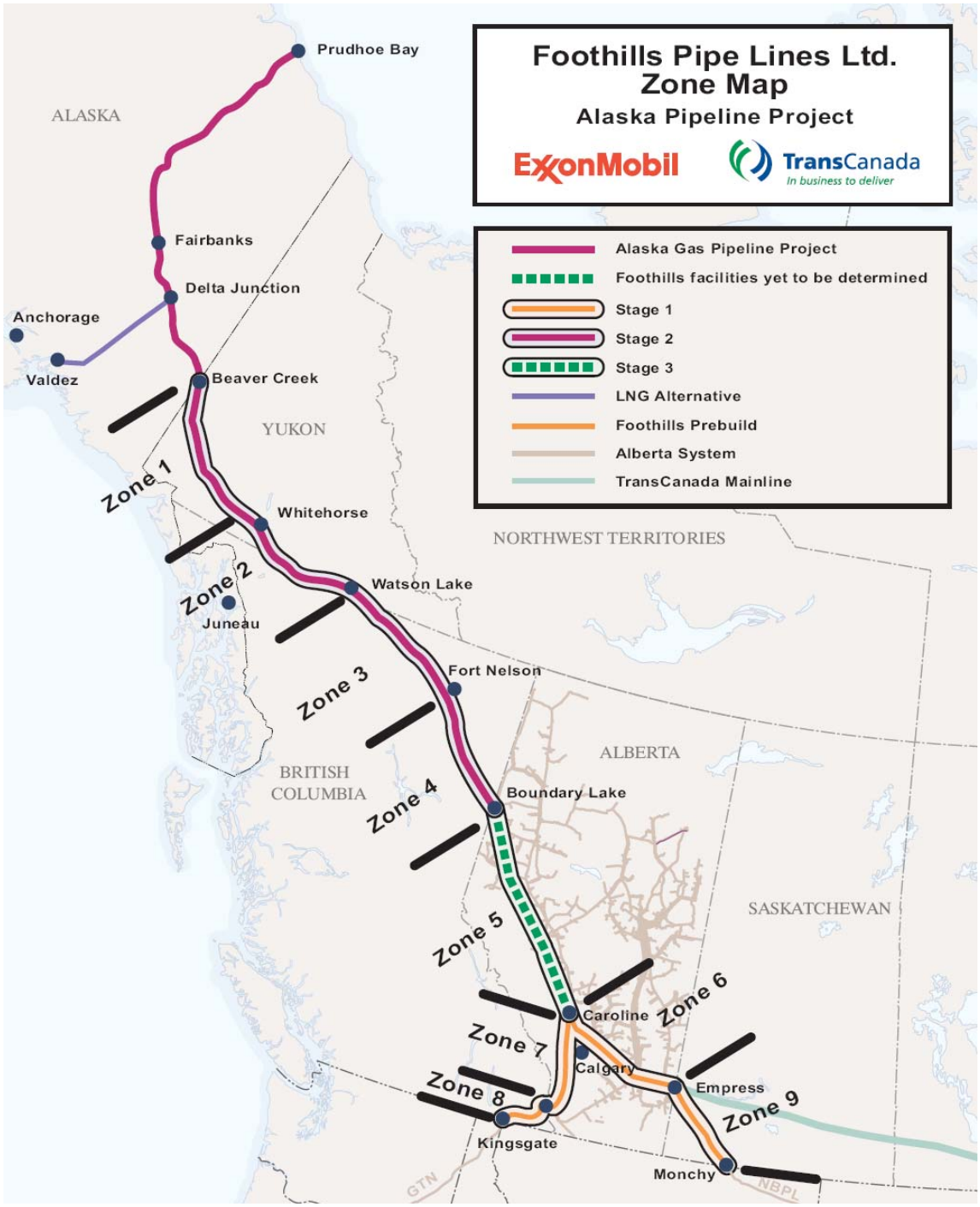
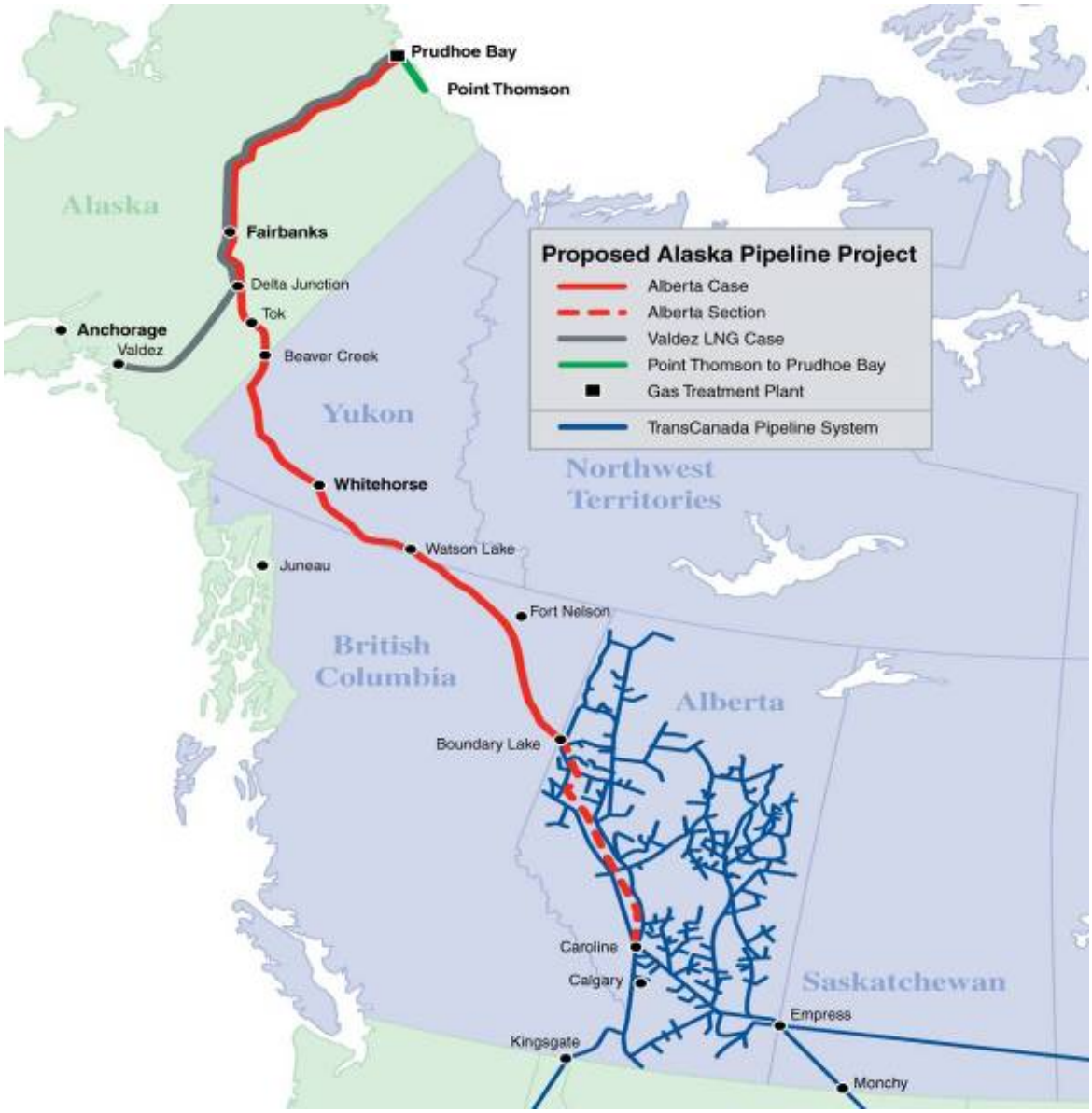


Figure 1-2 Alaska Pipeline Project Overview



Foothills proposes to use this issues-focused approach for several reasons:

- to be consistent with past work and existing project documents;
- to provide a comprehensive topic reference for the Project's engagement program; and
- to link the issues and work plans to the compliance filings under the Terms and Conditions.

Extensive socio-economic and environmental work supports the project planning. Much of this work was completed to support the competitive hearings held by the National Energy Board ("NEB") in the mid-1970s, while other existing information is the result of work undertaken after that process. Although the natural environment and the socio-economic settings of the Project are not dramatically different from the mid-1970s, both regulatory and public expectations have changed, and issues need to be updated. Also, many people, both external stakeholders and internal Project personnel, are new to the Project. Foothills intends to comply with the NPAct Socio-Economic and Environmental Terms and Conditions and to design and construct the pipeline Project to current standards. These standards include protection of the environment and the interests of Aboriginal groups, meeting current regulatory requirements, and providing local and national economic benefits.

The use of the word 'issues' in this document requires clarification. In looking at the reports of the initial regulatory reviews, the term 'previously identified issue' appears to refer to concerns raised during the 1977-1982 period and that were yet to be resolved. In the 2010 issue update, Foothills has broadened the term 'issue' to refer to a wide range of topics for discussion with those interested in the Project. This approach includes previously identified issues where appropriate and those that have arisen more recently. This inclusive definition of 'issues' better reflects the broader view that the Project has adopted in response to interests of today.

The following information is presented for each issue identified in the PRU:

- a synopsis of the previously identified issue as it was described in the Environmental Assessment and Review Process ("EARP") reports, socio-economic inquiries, and Terms and Conditions;
- a 2010 update to the previously described issue; and
- a general work plan describing activities to be undertaken in 2010-2012 to address the issue in a manner and format that can be submitted to satisfy specific Terms and Conditions.

Further, the PRU is structured around three key themes in keeping with the structure of the previous socio-economic and environmental reviews:

- socio-economic issues;
- traditional knowledge; and
- environmental issues.

Background to the Issues

The next three years (2011-2014) is an important period for continuation of the Project in Canada. During this time, Foothills will address the requirements of the Terms and Conditions through a process to be determined by the Government of Canada and the Northern Pipeline Agency ("NPA"). In late 2012, Foothills intends to file the socio-economic and environmental plans and programs required for compliance with the NPAct. Foothills anticipates that its compliance filings for socio-economic and environmental matters, when found to meet the requirements, will be approved by the NPA by mid-2014.

The issuance of CPCNs to Foothills for the construction and operation of a pipeline to transport Alaska gas through Canada was the outcome of lengthy hearings before the NEB in 1976-77. These hearings continued for more than 200 days and included consideration of environmental and

socio-economic potential effects and related mitigation measures. The NPAct was passed in Canada to give effect to the bilateral *Agreement between Canada and the United States of America on Principles Applicable to a Northern Natural Gas Pipeline ("Canada-US Agreement")*. The NPAct established a specific regulatory regime to facilitate expeditious decision-making with respect to the Project and to maximize benefits to Canada. Under the NPAct, CPCNs were deemed issued to various Foothills entities authorizing construction of the Pipeline upon certain Terms and Conditions set out in Schedule III to the NPAct. The Terms and Conditions set out in Schedule III have been augmented by more comprehensive environmental and socio-economic Terms and Conditions for all regions except Yukon. Draft environmental and socio-economic Terms and Conditions for Yukon were developed but have not as yet received approval by the Governor in Council, as required.

The NPA that was established through the NPAct is the keystone of the regime of one-window federal oversight set up for the Project. This is accomplished by consolidating ministerial decision-making in the minister responsible for the NPA ("the Minister") and by designating a single Board member ("the Designated Officer") of the NEB to exercise delegated decision-making authority under the *National Energy Board Act (*"NEB Act"*)* or as established under the NPA. In addition to the Minister and the Designated Officer, the NPAct provides for decision-making by the Governor-in-Council and the NEB. For example, tolling methodology and tariffs are to be approved by the NEB under the NEB Act.

Starting from the time of Foothills' application for an Easement in Yukon (1976) and following issuance of the CPCNs, the Government of Canada conducted a number of environmental and socio-economic assessments of the Foothills Project under the *Environmental Assessment and Review Process Guidelines Order*. This took place as a series of hearings from 1977-1982, with additional information being provided by Foothills as requested by the EARP Panel and as Foothills' plans developed. The EARP Panel final report was issued in September 1982. Other specific inquiries, such as Lysyk (1977) and Mair (1980), also took place in this timeframe. The reports of these reviews and inquiries informed the development of zone-specific Terms and Conditions under the NPAct, which now form the basis of Foothills' compliance filings as the Project moves forward to Stage 2.

Regulatory Context

Before authorizing construction for the Yukon and Northern B.C. portions, the NPA will require Foothills to submit information for approval to satisfy applicable Terms and Conditions for each CPCN and for other regulatory purposes. Foothills is progressing the socio-economic and environmental work required for these post-certificate regulatory submissions using an issues-focused approach. Regulatory submissions are planned to commence in late 2012. The issues on which the current work is focused were identified in socio-economic, environmental and regulatory proceedings in the past and more recently through various updating processes**.** The Project's regulatory phase will be overseen by the NPA on behalf of the Government of Canada. Foothills also anticipates it will require permits and licences under other legislation. In preparation for these permit applications, Foothills is discussing information requirements with responsible agencies to ensure that their data needs are included in the development of work plans, particularly plans for field studies and information gathering. In the past under the NPAct, federal regulatory decision-making was consolidated in the Minister responsible for NPA through delegation to facilitate one-window federal oversight.

A Short Chronology of Events in the Foothills Project

An abbreviated chronology of the Foothills Project from the early 1970s to late 1980s is presented in Figure 1-3. Some key highlights of the chronology are:

- On August 30, 1976, Foothills applied to the NEB for the Alaska Highway Pipeline Project; also known as the Alcan Proposal. The NEB held over 200 days of hearings on competing applications and in its Reasons for Decision Northern Pipelines recommended approval of the Alcan (Foothills) route on July 4, 1977.

- On August 30, 1976 Foothills also applied to the Minister of Indian Affairs and Northern Development for interests in lands in Yukon. This application was referred on March 21, 1977 to an EARP Panel chaired by Mr. H. M. Hill. This Panel considered the various pipeline route options and issued its report on July 27, 1977. It concluded that the proposed Alaska Highway route was preferable and could be constructed and operated in an environmentally acceptable manner subject to numerous conditions. It also recommended that a detailed Environmental Impact Statement ("EIS") be prepared for the Foothills Project. In 1977 the EARP Panel issued guidelines for the preparation of an EIS.

- In 1974, Mr. Justice Thomas R. Berger was appointed to conduct an inquiry into the effects of pipeline construction in the Northern Yukon and Northwest Territories ("NWT") (Mackenzie Valley). He released his report, “Northern Frontier, Northern Homeland”, in May 1977 rejecting all routes though the Northern Yukon and recommending a 10-year delay in pipeline construction through the Mackenzie Valley. With respect to the Alaska Highway option, Mr. Berger said that

  > “…*some of the concerns that led me to reject the corridor across the Northern Yukon do not appear to apply in the case of the Alaska Highway route. It is a route with an established infrastructure. In my view, the construction of a pipeline along this route would not threaten any substantial population of any species in the Yukon or Alaska. But I am in no position to endorse such a route: an assessment of social and economic impact must still be made and native claims have not been settled.”*

- In December 1977, the Minister of Indian Affairs and Northern Development appointed a Board of Inquiry under the Chairmanship of Dean K. Lysyk to identify and report on potential socio-economic effects of the Foothills proposal.

- Foothills submitted its EIS to the EARP Panel in January 1979. In March 1979, the Panel, then under the chairmanship of Mr. F. Hurtubise, held hearings and concluded in its August 1979 report that Foothills had not provided sufficient information for the Panel to complete its review. In March 1981, Foothills submitted the first addendum to the EIS, including reports on route alternatives in the Whitehorse and Ibex Pass areas. Technical hearings on these route alternatives were held by the Panel then under the chairmanship of Mr. E. Cotterill, who recommended in July 1981 that the Ibex Pass route alternative be rejected.

- The EARP Panel did not initially approve the Ibex route, however, the Designated Officer approved the route when the Plans, Profiles, and Books of Reference (“PPBoR”) were approved and an easement was first granted in Yukon in 1983.

- In November 1979, Mr. W. Mair chaired hearings regarding socio-economic Terms and Conditions for the Northern B.C. portion of the proposed pipeline. The Mair Report, entitled ‘Forgotten Land, Forgotten People’, was issued in June 1980.

- In March 1982, Foothills submitted an additional series of addenda to the EIS. The EARP Panel resumed in April 1982, this time under the chairmanship of Mr. R.M. Robinson, and reported in September 1982. The Panel concluded that the "preliminary environmental planning of the Project is adequate and that the proposed pipeline can be constructed and operated in an environmentally acceptable manner". Numerous recommendations on specific topic areas and issues were made.

These EARP Panel reports as well as the reports of the Lysyk and Mair inquires are the sources for the consolidated list of issues and recommendations around which this PRU has been developed.

Aboriginal and Stakeholder Engagement

A key objective of the Project is to achieve positive, long-term relationships with the aboriginal groups, organizations and communities along the Project corridor. Foothills believes these relationships will be realized through active communications and engagement as the Project progresses and opportunities to participate are identified. Developing these relationships will include the following:

- implementing a long-term and systematic aboriginal and stakeholder engagement program;
- conducting community meetings along the Project corridor and in local communities and regional hubs to provide information and to hear about local ideas, issues and concerns; and
- discussing Project work plans and mitigation development as activities advance.

Foothills' approach to achieving positive long-term relationships involves conducting engagement activities in a meaningful way. Carrying out this engagement will include several communication methods such as face to face meetings, open houses, workshops, site visits, local advertisements, and the Project website, e-mail and a dedicated Project telephone line. Types of information to be shared through these relationships will include Project description and schedules, pipeline and facility locations, field program activities, available information collected through traditional knowledge programs, employment and business opportunities, as well as training and educational opportunities.

Foothills' approach to Aboriginal engagement also involves collaboration with Aboriginal communities through various ways, such as: hiring local community liaisons to act as Project liaison between the Foothills and communities; hiring and training local community members to participate in field programs; and, to contract local Aboriginal businesses in economic opportunities, when available.

Figure 1-3 Foothills Historical Overview

		FOOTHILLS	STAKEHOLDER CONSULTATION	REGULATORY
1970			1974: Mr. Justice Tom Berger appointed to head inquiry into effects of Mackenzie Valley pipeline.	1974: The NEB received competing applications for gas pipelines to carry Arctic gas up the Mackenzie Valley to southern markets.
1975		1976: Foothills files application for Alcan route through Yukon.	1977: Lysyk Inquiry into potential socio-economic effects of Alcan proposal.	
		1976: Foothills applies to the Minister of Indian Affairs and Northern Development for interests in lands in Yukon	1977: EARP Panel (Chairman H.M. Hill) considers environmental effects of various northern pipeline routes.	July 1977: The NEB releases 'Reasons for Decision Northern Pipelines' approving the Foothills Alaska Highway route.
		1977-78: Foothills supplements routing and environmental information.	1979: EARP (Chairman F.G. Hurtubise) examines Yukon route.	1978: NPAct passed.
			1979: Mr. W. Mair chaired hearing regarding socio-economic issues in B.C.	1978: NPA issued CPCNs to Foothills.
		1979-82: Foothills files its EIS and subsequent addenda.		
1980		1980-82: Foothills constructs "pre-build" sections in AB, SK and B.C.	1982: The 1982 EARP concluded that the Project could be built in an environmentally acceptable manner. The EARP issued recommendations to the government on how the Project should go forward. Recommendations were directed to the NPA for implementation.	1983: PPBoR were approved and an easement was granted in Yukon
1985				1980-98: NPA approves various Foothills applications for construction of the eastern and Western Legs of the Pre-build sections and expansions of the Pre-build.
1990		1983-98: Foothills completes various expansions to pre-build sections.		
1995		Pre-build expansions.		
2000		2008: State of Alaska awards *Alaska Gasline Inducement Act* licence to TransCanada Alaska LLC.		
2005		2009: Initiated work to advance Stage 2.		
		2009: ExxonMobil joins TransCanada to advance the APP.		
2010		APP Open Season.		

Socio-Economic Issues

A wide range of direct and indirect socio-economic issues will be examined and managed in the context of the Project. Socio-economic issues cover a range of factors that affect the way people work and live, such as demographics, economy, employment, housing, regional infrastructure, access to services, recreation and land use. Since 1982, social and economic conditions have changed substantially. Accordingly, the baseline information, as it exists in historical Project documents, requires updating. Historically, the Lysyk Report (Yukon) and the Mair Report (Northern B.C.) framed the socio-economic issues and recommended management strategies, many of which appeared in the Terms and Conditions.

Building on these historical documents and its updated information, Foothills will develop a Socio-economic Issues Management Plan that will address the requirements of the NPAct Terms and Conditions and provide comprehensive guidance for implementation of socio-economic management plans and programs during the Project execution.

Traditional Knowledge

Foothills appreciates there is substantial information held by Aboriginal people. It is widely accepted that traditional knowledge, both Traditional Ecological Knowledge ("TEK") and Traditional Land Use ("TLU") is complementary to western science and greatly adds to the body of information held by western science models. Collection and review of biophysical data are typically designed to align with western value systems. Since the Project is located in a region where people maintain close ties to the land, cultural values (i.e., traditional knowledge) are important in data collection and development of mitigation strategies. Accordingly, Foothills expects to have continuing engagement with holders of this information along the Project corridor.

Environmental Issues

The environmental issues were originally described by the EARP Panels in a number of categories, including Physical and Engineering Concerns. This latter category included technical and engineering aspects. The PRU content focuses on the environmental issues, while engineering issues will be addressed in engineering work plans and in the engineering design compliance filings under the Technical Orders for approval by the Designated Officer. The Project benefits from years of industry experience, and innovative mitigation and reclamation strategies that would not otherwise have been applied in the 1980s. Since 1982, industry-accepted best practices for pipeline construction have been developed and can be applied to address many previously identified issues. In parallel, Foothills plans to advance its development of pipeline design based on current engineering approaches, materials, and techniques for construction and environmental protection.

The Environmental Protection and Management Plan (“EPMP”) will describe protection measures, management plans, reclamation strategies and monitoring to be implemented on the Project. This plan will be filed with the NPA in late 2012.

Foothills also recognizes that since the previous issues were identified there have been some emerging issues including cumulative effects, sustainability and climate change. A suite of Project-wide discussion papers will be developed to contribute information to the discussion of these matters.

Comprehensive Issues Summary

Overall, the PRU is designed to provide go-forward plans to address previously identified and updated socio-economic and environmental issues. A comprehensive summary of each of these issues appears in Table 1-0. The table includes an outline of the previously identified issues, existing regulatory direction, a 2010 update to the issues, and Foothills' current workplan and proposed 2012 NPAct compliance filings. This framework of issues will guide Project activities over the 2010-2012 period leading up to commencement of socio-economic and environment compliance filings in late 2012.

TABLE 1-0

COMPREHENSIVE ISSUES SUMMARY TABLE

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Socio-Economics			
The following issues were distilled from the Lysyk and Mair Reports. Both of these inquiries were held prior to finalization of Terms and Conditions and their recommendations, to the extent that they were accepted by government, have been incorporated into the Terms and Conditions. Foothills is referencing the Terms and Conditions as the most current regulatory direction.			
Employment and Training In the 1970s, residents of Yukon and Northern B.C. saw the opportunity for pipeline-related employment as a key benefit of the Foothills project. The following issues were identified: • Employment opportunities would increase at the local, provincial/territorial, national levels • Skills training and capacity development were needed to take advantage of employment opportunities. • Pipeline-related demand for workers would significantly exceed available labour in Yukon and Northern B.C. • Concern was expressed about potential job-seekers arriving expecting to get project-related employment and competing with local residents. • There was potential for inequitable access to employment and training opportunities (i.e., women, aboriginals, traditional harvesters, etc.) due to systemic barriers (i.e., lack of child care, physical isolation of reserves, high standards for education and experience, perceptions). **Source**: Lysyk and Mair reports	NPAct draft Yukon Terms and Conditions s 27; 32; 33-38 NPAct Northern B.C. Terms and Conditions ss 31-35	The 2010 issue description is unchanged from the previously identified issue description. The opportunity for employment related to large projects continues to be a potential positive issue in 2010. • The local unemployed labour forces in Yukon and B.C. are not large enough to fill the anticipated pipeline construction labour demands and do not have the necessary skills for some of the construction work. • Yukon and B.C. are losing skilled workers to Alberta, and skilled workers are typically employed. • Educational attainment levels for employment have increased. • Local and Aboriginal workers do not always take full advantage of available employment opportunities (e.g., reluctance to leave home/family for distant employment, desire/obligation to participate in traditional activities that conflict with project work schedules, etc.). • The potential for in-migration by speculative job-seekers remains a concern. • A reliable means to identify a “Northerner” in order to give hiring preference remains undefined. • Entry level jobs are not being filled by residents; some local businesses have opted to bring in foreign workers to fill positions. The Aboriginal communities in Yukon have higher than the territorial average unemployment rates and proportions of the population without high school or higher training and somewhat lower participation rates. The Northern B.C. Aboriginal communities also typically have higher than the regional average unemployment and lower than average participation rates and, in some cases, significantly higher proportions with no high school or higher education.	**2010** In 2010, work began on updating economic and employment data for communities based on secondary sources. Key sources of information include Statistics Canada Community Profiles; Indian and Northern Affairs Canada First Nations (“FNs”) profiles; industry-related reports; and economic data provided on community/FNs websites. Data are being collected on a wide range of variables including labour force size and demographics; labour force participation rates; unemployment rates; educational attainment statistics; key industries; and key occupations. **2011-2012** Work on updating all data relevant to employment and training will continue in 2011-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., municipal officials, service providers/agencies, FNs) to identify additional local data sources, verify certain data, further discuss and explore trends and issues emerging from the data. organizing data, along with other socio-economic variables, into Community Profiles; and • developing the required issue management plans for submission to the NPA, including the Manpower Plan, Northern Residents Training and Employment Plan (Yukon), Orientation Plan (Northern B.C.), Orientation and Counselling Plan (Yukon), Opportunities Measures Plans (Yukon and Northern B.C.). **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.) Manpower Plan Northern Residents Training & Employment Plan (Yukon) Opportunities Measures Plan (Northern B.C. & Yukon), Orientation & Counselling Plan (Yukon/Swift River)

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Economic Effects Construction of the Foothills project was expected to result in very large capital investments in Yukon and Northern B.C. and to provide income to a large portion of the local labour force over a several-year period resulting in both positive and adverse effects on the local economies. Local businesses, it was thought, could benefit from increased sales to the project, and local residents could benefit through increased income from pipeline-related employment. On the other hand, the demands for local supplies could decrease supplies and services to local residents and could cause local inflation. Some businesses could have expanded to meet construction demand, only to be non-viable in the long-term when construction-related demand decreased. Governments could have received increased revenues through various taxes and fees associated with the project. These factors were anticipated to have a range of effects on local economies, including: • increased opportunity for B.C., Yukon and Canadian businesses supplying project-related goods and services. • local businesses will need adequate time to prepare for project opportunities (e.g., expansion, training, getting inventory, etc). • influx of capital and labour to the region would likely leading to inflationary pressure and effects on prices of goods and services for local residents. May affect lower/fixed income residents not employed by pipeline. • concern about the effect of construction activity and influx of workers on hunting and fishing activities relied upon by many for subsistence and livelihoods. • increased demand for goods and services in the region. The project would generate opportunities for expansion of existing businesses or new businesses; but careful planning would be required to ensure their long-term viability. • concern about inability of services to meet project demands, thereby reducing level of goods and services available to local residents and associated price increases. • compensation for damages caused during pipeline construction; compensation expected for damage to property, reduced trap line yields, reduced hunting opportunities and damage to private business operations. The project would result in increased costs to government during the construction phase and increased revenues later during operations. **Source**: Lysyk and Mair Reports	NPAct draft Yukon Terms and Conditions ss 39-43 NPAct Northern B.C. Terms and Conditions ss 36-38	The 2010 issue description is unchanged from the previously identified issue description. It is anticipated that similar economic benefits and issues would emerge with the Project in the current day, including: • capital investment in local, regional, provincial/territorial, and the national economy, and likely have direct, indirect, and induced economic effects. • creation of employment and income opportunities, and opportunities for procurement of local and regional goods and services. • some inflationary pressures may emerge due to influx of capital and labour to the region. • opportunities for expansion of businesses will require careful -planning to ensure long-term viability • many Yukoners still participate in the traditional land-based economy; however, most of these people are also generally well-assimilated into the wage economy, at least part-time. There are now established FN businesses and joint ventures that could participate in the pipeline construction.. There is the potential for several other industrial projects to be underway during the Project construction which could contribute to high demands in the regions for labour, goods, and services and potential contribute to local inflation.	**2010** In 2010, work began on updating community economic data based on secondary sources. Key sources of information include: Statistics Canada Community Profiles; Indian and Northern Affairs Canada FNs profiles; industry-related reports; and economic data provided on community/FNs websites. Data are being collected on a wide range of variables including: labour force size and demographics; labour force participation rates; unemployment rates; educational attainment statistics; key industries; and key occupations. **2011-2012** Work on updating all data relevant to employment and training will continue in 2011-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., municipal officials, service providers/agencies, FNs) to identify additional local data sources, verify certain data, further discuss and explore trends and issues emerging from the data. organizing data, along with other socio-economic variables, into Community Profiles; and • developing the required issue management plans for submission to the NPA, including the Business Opportunities Plan (Northern B.C.) and the Northern Business Opportunities Plan (Yukon). **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.) Business Opportunities Plan (Northern B.C.) Northern Business Opportunities Plan (Yukon).
Demographic Changes It was anticipated that the project would attract many newcomers to both Yukon and Northern B.C. in search of jobs and project-related business opportunities during the construction period. There was concern that in-migration would cause a destabilization of local economies, cause an acute increase in demand for local services, increase unemployment rates, and put strong upward pressure on inflation. In-migration was seen as a fundamental issue that would drive potential effects for a range of other social and economic factors, including housing, transportation, and community services.	NPAct draft Yukon Terms and Conditions s 32 NPAct Northern B.C. Terms and Conditions s 29	The 2010 issue description is unchanged from the previously identified issue description. In-migration by Project-related workers, speculative in-migrants and their families into the Project region - particularly into small communities close to the route - will continue to be an issue as the Project moves forward. The improvements that have been made to the Alaska Highway in the last 30 years could facilitate movement of in-migrants through the region.	**2010** In 2010, work began on updating community population and demographics data based on secondary sources. Key sources of information include Statistics Canada community profiles, Indian and Northern Affairs Canada FNs profiles, and annual population information collected by the Territorial government in Yukon and Provincial government in B.C. Data on a wide range of population variables are being collected and analyzed, including: total counts gender; age; population growth/change since 1980; visible minorities; mobility; Aboriginal identity; language; marital status; and family characteristics. Preliminary and high level community overview information was developed for communities on or close to the proposed route in Yukon and Northern B.C. in 2010. Population data collected to-date include: overall population counts on a community basis; total on- and off-reserve population counts for FNs; age; gender;

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
In the previous hearings, it was noted that the project would likely bring many newcomers to Yukon. There was a concern that dramatic population changes could intensify existing social dislocations in Yukon. In-migration and associated population and demographic changes were also noted as issues in Northern B.C. Source: Lysyk and Mair reports			percentage of population over the age of 15 (considered to be the percentage of the population of working age); Aboriginal identity population; mother tongue; and knowledge of official languages (English or French). **2011- 2012** Work on updating population/demographic data will continue in 2011-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., municipal officials) to identify additional local data sources, verify certain data, further discuss and explore trends and issues emerging from the data; • organizing data, along with other socio-economic variables, into Community Profiles; and • developing mitigation measures to be included in the Plans required under the NPAct Terms and Conditions. **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.) Business Opportunities Plan (Northern B.C.) Northern Business Opportunities Plan (Yukon).
Housing The prospect of large-scale in-migration during the construction phase raised concerns about local housing supply and markets. Available accommodation in both regions was not sufficient to meet the likely growth in demand. There were also issues raised pertaining to campgrounds and parking lots being used for workers' mobile homes, which would have reduced their availability for regular use by community members or tourists. Local housing supply would require significant upgrading and additions in advance of the start of the construction period. Any new housing developments directly related to the project should be done in such a manner that housing will be available to the communities and become an asset for communities once the construction period is over. The inflationary pressure of the project would affect housing markets and prices in Yukon. The existing housing supply in Yukon would not be able to accommodate the anticipated number of newcomers to the region. There was concern about the particularly acute pressure that would be put on low–cost accommodations in Yukon. The not-for-profit sector could experience increased pressure to respond to emergency housing and shelter needs from the in-migrant population unable to find paid accommodation. There was also a concern about the potential for a proliferation of sub-standard accommodation and lack of spaces for mobile homes to park. In previous hearings it was noted that housing supply was already at capacity in Northern B.C. and that any influx of workers would worsen the situation. Concern was also raised about the possibility of over-building of new housing capacity in communities such as Fort St. John, as it may lead to bankruptcies and foreclosures and may encourage transients to linger. **Source**: Lysyk and Mair reports	NPAct draft Yukon Terms and Conditions ss 66-68 NPAct Northern B.C. Terms and Conditions ss 49-50	The 2010 issue description is unchanged from the previously identified issue description. It is expected that concerns about availability of accommodation and acute pressure on housing and land prices related to speculative in-migration and general economic growth will continue to be an issue as the Project moves forward.	**2010** In 2010, work began on updating community housing data based on secondary sources. Key sources of information include Statistics Canada community profiles, published information from provincial/territorial housing authorities, and research available from the Canada Mortgage and Housing Corporation. Data on a wide range of housing variables are being collected and analyzed, including: number private dwellings; owned versus rented dwellings; dwellings requiring major repair; age of dwellings; housing structures; dwelling values; rental vacancy rates; availability and capacity of temporary accommodation (hotels, campgrounds etc.). **2011 - 2012** Work on updating housing data will continue in 2011-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., municipal officials, local housing authorities, social services dealing with housing support/subsidization issues) to identify additional local data sources, verify certain data, further discuss and explore trends and issues emerging from the data.; • organizing data, along with other socio-economic variables, into Community Profiles; and • developing mitigation measures for presentation in the Housing Plans and Work Camp Plan required by the NPAct Terms and Conditions. **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.) Housing Plan (Northern B.C. & Yukon) Work Camp Plan (Yukon).

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Transportation There was concern that the project would affect the utilization and condition of key transportation infrastructure in both Yukon and Northern B.C. Road infrastructure would experience considerable increases in use, and thus increased traffic volumes during the construction phase. Concern was also raised about the possibility for vehicles during the construction phase to be stranded on local roads, especially during the winter. Rail infrastructure would also have been utilized for the delivery of key components during construction, and may not have the capacity or storage areas to deal with major equipment deliveries. Regional airports would also be used for transportation of labour and potentially cargo deliveries or would be generally underserviced. A significant program of road, rail, and airport infrastructure upgrading would be required to support project transportation requirements. Transportation-related businesses (i.e., trucking, rail) would also be significantly affected by the project and may need ample lead time to ensure they have the ability to meet the needs of the project. Related to road infrastructure, there were concerns that construction traffic on the Alaska Highway would conflict with existing daily traffic. Concerns were also raised about the use of rural roads for pipeline-related transport and potential effects on the conditions of these roads. Source: Lysyk and Mair reports	NPAct draft Yukon Terms and Conditions ss 44- 47 NPAct Northern B.C. Terms and Conditions ss 39-42 NPAct Swift River Terms and Conditions ss 24-26	The 2010 issue description is unchanged from the previously identified issue description. Potential effects on transportation infrastructure use and condition will continue to be an issue as the Project moves forward. The increase of traffic on the Alaska Highway that would be anticipated in relation to the Project will likely give rise to concern about traffic volume, traffic safety (i.e., accidents, wildlife strikes), noise, potential effects on tourism, increased road-bed damage, and costs associated with increased road maintenance. There may be fewer concerns about the condition of the Alaska Highway and related safety issues as the highway has been significantly upgraded since 1980. To the extent that airports are used for the movement of labour and certain cargo, there may be issues related to the capacity of certain smaller regional airports in Northern B.C. and Yukon, or with increased service/flight demands on the Whitehorse International Airport. The major regional airports have undergone significant upgrades since 1980 which may reduce Project-related effects. To the extent that rail is use for transporting large equipment and modules, there may be issues with unloading, storage, and transfer capacities at certain places.	**2010** In 2010, work began on updating community transportation information based on secondary sources. Key sources of information include municipal and community websites, published data from the Yukon Department of Highways and Public Works and the B.C. Ministry of Transportation and Infrastructure, local airport authorities, and published information from rail companies. Data on a range of transportation variables are being collected and analyzed, including: highway design capacities and constraints; daily traffic volume data at key locations on the Alaska Highway; a range of airport capacity data (runway lengths, plane size capacities, runway lighting, navigational equipment, terminal facilities). **2011-2012** Work on updating transportation data will continue in 2011-2012. Key work activities will include: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., provincial/territorial transportation officials, municipal officials as required) identify additional local data sources, verify certain data, further discuss and explore trends and issues emerging from the data; • organizing data, along with other socio-economic variables, into Community Profiles; and • developing mitigation measures to be presented in Transportation and Logistics Plans required under the NPAct Terms and Conditions. **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.) Transportation & Logistics Plan (Northern B.C. & Yukon/Swift River) May be asked to participate in government transportation study to assess quality and capacity of infrastructure.
Communications Infrastructure Construction activities would pose special problems for the communication system of the time. There would be increased demand for phone lines, long-distance connections and more sophisticated equipment. Upgrades to support project needs would require significant capital investment. Source: Lysyk and Mair reports	NPAct draft Yukon Terms and Conditions ss 48-50 NPAct Northern B.C. Terms and Conditions s 51 NPAct Swift River Terms and Conditions s 27	The 2010 issue description is unchanged from the previously identified issue description. Telecommunications technology has advanced considerably since the previous project reviews. However, based on anecdotal information, concerns about potential effects on telecommunications infrastructure, tied to general population pressures caused by in-migration or particular technical communications needs of the Project (particularly for small communities close to the route) will continue to be an issue as the Project moves forward. The issues related to telecommunications will continue, given the large unpopulated and potentially non-serviced areas between settlements along the route, and the increased need for automation and advanced communication by the Project.	**2010** In 2010, work began on updating information pertaining to telecommunications capacity based on secondary sources. Key sources of available information include municipal websites and service provider websites. Data sought include: land phone service providers active in Yukon and Northern B.C.; line/exchange capacities; cellular coverage; satellite capacity; and issues/constraints with current service provision. Preliminary and high level overview information was collected for communities on or close to the proposed route in Yukon and Northern B.C. in 2010. However, the information found to-date has been very sparse and, if anything, has been usually limited to naming the telephone or cell phone service provider(s) in a given community. **2011 - 2012** Work on updating data about telecommunications infrastructure/capacity will continue in 2011-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., municipal officials, telephone/mobile service providers) to verify certain data; further discuss and explore existing trends and issues with service provision; • organizing data, along with other socio-economic variables, into Community Profiles; and • developing mitigation measures for presentation in the Telecommunications Plans required under the NPAct Terms and Conditions.

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
			FILING Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.) Telecommunications Plan (Northern B.C. & Yukon/Swift River).
Gas/Utilities Infrastructure The opportunity for Yukon, and to a lesser extent Northern B.C., communities to access natural gas from the Alaska Pipeline was seen in the 1970s as a major, long-term benefit of the project. • Communities used a combination of electricity, fuel oil, and wood for energy/heat. • Foothills would install take-off valves along the pipeline route and provide assistance and technical advice to any community or commercial user wishing to conduct feasibility studies. • Benefits of conversion to natural gas for heat would accrue to a small portion of Yukon residents. • Conversion from wood heating to natural gas would be too expensive for Aboriginal communities using wood. Source: Lysyk and Mair reports	NPAct draft Yukon Terms and Conditions s 54 NPAct Northern B.C. Terms and Conditions s 53	The 2010 issue description is unchanged from the previously identified issue description. The opportunity to access natural gas remains a potential long-term benefit to northern communities. • Natural gas may be less expensive than other energy sources in some communities and in 2010, natural gas is seen as a more environmentally friendly fuel than some of the alternatives presently being used. • There is still high interest in the potential supply of natural gas to communities in Yukon. The perception is that gas will have a price advantage over other forms of heating, which are now fuel oil, electricity, propane and wood. The Yukon Government has identified access to energy from the natural gas pipeline as one of their seven key interest areas regarding the pipeline. • There is an emphasis on “greening” Yukon, and natural gas is seen as a preferable energy source, especially compared to using wood for heating. • Hydroelectricity is no longer viewed as having low environmental effect for many locations, and there are limited locations available for new hydro developments in Yukon.	**2010** In 2010, work began on identifying the extent to which natural gas is available and supplied in key communities in the Project area. Key information sources reviewed include: municipal websites, available community profiles, and available census data. **2011 - 2012** Work on updating information about natural gas supply will continue in 2010-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., municipal officials, gas service companies) to determine the extent of gas supply infrastructure in the study area and the interest of local communities in improving their gas supply infrastructure; • organizing data, along with other socio-economic variables, into Community Profiles; and • developing mitigation measures required under the NPAct Terms and Conditions.

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Security/Policing Economic growth, employment and incomes associated with the construction phase of the project could have had an influence on the incidence of certain crimes, particularly those related to drug and alcohol use and violence. There were also concerns about resultant pressures on local policing services. In Yukon key issue was security of the pipeline route and maintaining security within nearby communities. This could place additional burden on current Royal Canadian Mounted Police ("RCMP") personnel and resources and could affect the level of regular policing and security provided to the communities normally served. Large issue with the behaviour of workers when they were away from camp on off-rotation leisure time. Source: Lysyk and Mair reports	NPAct draft Yukon Terms and Conditions ss 63-65 NPAct Northern B.C. Terms and Conditions ss 46-48 NPAct Swift River Terms and Conditions ss 30-32	The 2010 issue description is unchanged from the previously identified issue description. Concerns about potential effects on security and policing, tied to general population pressures caused by in-migration or to particular security needs associated with the pipeline construction and work camps, will continue to be an issue as the Project moves forward. Public safety, and increased crime and violence associated with increasing incomes, is a current issue in some larger communities in the Project region. There are existing concerns in certain areas about limited policing resources..	**2010** In 2010, work began on updating information pertaining to policing based on secondary sources. The sources of data are the RCMP and municipal/community websites. Data being sought include: detachment locations; size/capacity of police services (number of officers, cells, calls per month, etc.); and crime incidence data. Development of preliminary and high level community overviews commenced for communities on or close to the proposed route in Yukon and Northern B.C. Available information was limited mostly to detachment locations. **2011 - 2012** Work on updating policing/security information will continue in 2011-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources. • identifying data gaps or areas requiring verification. • discussions with individuals in the Project areas (i.e., RCMP sergeants) to verify certain data, access qualitative information about service capacity, and further discuss and explore existing trends and issues with service provision; • organizing data, along with other socio-economic variables, into Community Profiles; and • developing mitigation measures required under the NPAct Terms and Conditions. **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.)
Health Services The project may have a range of implications for the use and capacity of health and social services in Yukon and Northern B.C., particularly during the construction phase. These include: • health and medical care would need to be provided to workers during construction, and to employees and their families during operations. • anticipated population growth would cause generally increased pressure on health services. • potential for pressure on local/regional health services due increased traffic and industrial accidents. • potential for decline of services to local residents if health services prioritize project emergencies/needs over regular resident care. • potential for increase in stress-related mental illness, related to increased work demands and time away from family; also those agencies and institutions that deal with alcohol, crime and related social problems. • need to prepare services to meet such problems. • may require increased child care to support workers and subsidies to support parents. Source: Lysyk and Mair reports	NPAct draft Yukon Terms and Conditions ss 59-62 NPAct Northern B.C. Terms and Conditions ss 43-45 NPAct Swift River Terms and Conditions s 29	The 2010 issue description is unchanged from the previously identified issue description. It is expected that concerns about potential effects on health and social services, tied to general population pressures caused by in-migration or to particular medical services needs of the Project workforce or Project emergencies, likely will continue to be an issue as the Project moves forward.	**2010** In 2010, work began on updating information pertaining to health and social services based on secondary sources. Sources of existing data include B.C. Northern Health Authority websites and reports; municipal websites; the B.C. Ministry of Children and Family Development website; the B.C. Ministry of Housing and Social Development website; Yukon Department of Health and Social Services website; and FN community websites. Data sought included: type of health services provided in community (hospitals, clinics, visiting physicians/nurses/clinics, number of doctors/nurses, etc.); mental health and social services provided (child and family services, addiction services, mental health supports); and service capacity constraints issues. Development of preliminary and high level community overviews commenced for communities on or close to the proposed route in Yukon and Northern B.C. Information available pertaining to health and social services infrastructure that was readily available through municipal/community websites was reported in the community overviews. However, often limited information was available and often just noting whether health facilities or social services were present in certain communities. **2011-2012** Work on updating health and social services infrastructure/capacity data will continue in 2011-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., Northern Health Authority officials, representatives from the northern service region of the B.C. Ministry of Children and Family Development, B.C. Ministry of Housing and Social Development, and the Yukon Department of Health and Social Services, B.C. and Yukon ambulance service providers, and key FNs communities) to

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
			verify certain data, access qualitative data, and further discuss and explore existing trends and issues with service provision; • organizing data, along with other socio-economic variables, into Community Profiles; and • developing mitigation measures to be included in the Health Plan required under the NPAct. **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.) Health Plan (Northern B.C. & Yukon/Swift River).
Other Community Services Other community-level services were identified as potentially affected by project-related in-migration into Yukon and Northern B.C. As with housing, health, and social services, other government-provided services may face capacity pressures associated with an influx of workers, speculative in-migrants and their families. The other community services that were identified were education and municipally provided services such as water/sewer, and fire protection. In Yukon, there could be effects on quality education in the face of growing population pressures. In Northern B.C. services such as water and sewer, streets, and industrial parks may face constraints and require upgrading to meet the needs of the construction period. Source: Lysyk and Mair reports	NPAct Northern BC Terms and Conditions ss 54-55	The 2010 issue description is modified to be broader than the previously identified issue description. Concerns about potential effects on other community services (such as education, utility/municipal services and fire protection) tied to general population pressures caused by in-migration or to particular needs of the Project may also be an issue as the Project moves forward.	**2010** In 2010, work began on updating information pertaining to education, other municipal services (i.e., water/waste and fire protection services) based on secondary sources. Sources of existing data include B.C. School Division websites; post-secondary education institution websites; B.C. Industry Training Authority website; and municipal/community websites. Data being sought include: type and level of service provided in communities (i.e., level of schooling provided in local schools; class size, issues with education drop-out and staff retention); capacity/constraints associated with water/sewage service; and equipment/constraints associated with local fire protection services. Development of preliminary and high level community overviews commenced for communities on or close to the proposed route in Yukon and Northern B.C. in 2010. Although limited, information available pertaining to certain other community services/infrastructure (i.e., education, fire protection) that was readily available through municipal/community websites is being included in the community overviews. **2011-2012** Work on updating other community services infrastructure/capacity data will continue in 2011-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., appropriate school divisions, regional and territorial colleges, municipal officials in key communities) to verify certain data, further discuss and explore existing trends and issues with service provision; • organizing data, along with other socio-economic variables, into Community Profiles; and • developing mitigation measures required under the NPAct Terms and Conditions. **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.)

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Traditional Livelihoods and Culture The project crosses the traditional territories of many FNs and Métis groups including areas used for harvesting of plants, animals, fish and birds for food, medicines and crafts and including sites of cultural importance. It was identified that traditional harvesting and livelihoods could be negatively affected by disturbance of wildlife, fisheries and plant communities. A change in traditional harvesting could have a negative effect on traditional culture, and culture could also be affected by any damage or disturbance to cultural sites. There was the concern of damage to Aboriginal cultural and sacred sites. Source: Lysyk and Mair reports	NPAct draft Yukon Terms and Conditions ss 78-82 NPAct Northern B.C. Terms and Conditions ss 65-68 NPAct Swift River Terms and Conditions ss 41-44	The 2010 issue description is unchanged from the previously identified issue description. Preliminary information gathered in 2010 indicates that this issue is still a concern among the Aboriginal people along the pipeline route. The level of reliance on traditional harvesting may be less in 2010 than it was in the 1970s as more Aboriginal people are engaged in both the wage economy and the traditional economy. Aboriginal people are also more involved in co-management of natural resources which are essential to their traditional livelihoods.	**2010-2012** Work on updating data will continue in 2011-2012. This activity is closely integrated with the work described for TLU and TEK Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (i.e., Aboriginal leaders and elders) and participation in TLU and TEK studies; • organizing data, along with other socio-economic variables, into Community Profiles; and • development of the Traditional Resource Protection Plans as required under the NPAct Terms and Conditions). **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.) Traditional Resource Protection Plan (Northern B.C. & Yukon/Swift River).
Recreation There were concerns that pipeline construction would restrict access to recreational sites or dramatically increase the use of campgrounds with workers and their families occupying sites for long periods. The project could provide a benefit to the regions by opening access to more recreational sites. Potential effects on recreation were identified due to: • restriction of access; • alienation of recreational lands; • localized congestion; and • general disruption of scenic and other aesthetic values. The pipeline may increase access and opportunity for development of new recreational sites, particularly at river crossings. That increased access could result in increased fishing and negative pressures on the fisheries resource. Source: Lysyk and Mair reports	NPAct Northern B.C. Terms and Conditions s 64	The 2010 issue description is unchanged from the previously identified issue description. It is anticipated that there will still be concerns that the pipeline construction would restrict access to recreational sites or dramatically increase the use of campgrounds with workers and their families occupying sites for long periods. There may also continue to be a perceived benefit related to opening access to more recreational sites in the region.	**2010** In 2010 work focussed on review of historical literature identifying the concerns regarding recreation. **2011-2012** Work on updating all data relevant to the recreational activities along the pipeline route will continue in 2011-2012 in conjunction with other land use studies. Key work activities will include the following • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (e.g., municipal officials, recreation organizations, other recreation service providers); and • development of the Recreation Plan required under the NPAct Northern B.C. Terms and Conditions. **FILING** Socio-Economic Issues Management Plans (Yukon/Swift River; Northern B.C.) Recreation Plan (Northern B.C.).
Special Areas/Land Use The potential for pipeline construction to alter or damage areas of natural or cultural significance was identified as an issue. Concern was expressed that pipeline construction could interfere with land uses such as agriculture, forestry, oil and gas activities, and consumptive harvesting activities including hunting, trapping and fishing. In Yukon, the project traverses the Kluane Wildlife Sanctuary, Kluane National Park and Reserve ("KNP&R") and the proposed Agay Mene Territorial Park. In B.C., the project traverses or is in close proximity to Smith River Falls – Fort Halkett Provincial Park, Liard River Hot Springs Provincial Park, Liard River Corridor Park and Muskwa-Kechika Management Area ("M-KMA"). The Project also traverses the Lower Elevation Zone of the Sulphur/8 Mile Pre-Tenure Plan Area of M-KMA. Source: Lysyk and Mair reports	NPAct draft Yukon Terms and Conditions ss 121-127 NPAct Northern B.C. Terms and Conditions ss109-116 NPAct Swift River Terms and Conditions ss 85-92	The 2010 issue description is unchanged from the previously identified issue description. The potential concern around pipeline construction altering or damaging areas of natural or cultural significance will continue to be an issue with the Project going forward. It is also anticipated that issues pertaining to construction interference with other land uses such as agriculture, forestry, oil and gas activities, and consumptive harvesting (e.g., hunting, trapping and fishing) will continue to be relevant. It is expected there will be a concern over the competition for aggregate resources and concerns that if the pipeline is constructed through aggregate resources, those resources would no longer be accessible by other users.	**2010** In 2010, work began on updating information about private land holdings and Crown tenures in the Project area, and identifying the range of local and regional land-use planning policies and documents that are relevant to key areas. In 2010, Foothills initiated discussions with resource management agencies including Parks Canada, Yukon Environment, and B.C. Parks. **2011-2012** Work on updating all data relevant to the special areas and land uses along the pipeline route will continue in 2011-2012. Key work activities will include the following: • finalizing the collection, organization and analysis of secondary data available through published sources; • identifying data gaps or areas requiring verification; • discussions with individuals in the Project areas (e.g., municipal officials, land use planners, special area administrators); • organizing data, along with other socio-economic variables, into Community Profiles; and • developing mitigation measures required under the NPAct Terms and Conditions. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Geotechnical Aspects and Pipeline Integrity			
Permafrost - Frost Heave and Thaw Settlement Concern was expressed about the integrity of the pipeline under conditions where frost heave or thaw settlement might result in differential movement of the pipe. Geotechnical science and engineering design were thought to be inadequate to accurately predict the effects and, therefore, design the pipeline to mitigate the development of unacceptable stresses. These stresses could lead to deformation of the pipe and potential failure, with environmental consequences. As a result of the concerns expressed, the following recommendations were made: • The NPA should ensure that Foothills actively pursues engineering and environmental information on new and existing large diameter pipelines in permafrost areas, and incorporates the results into the pipeline design in critical areas; • Secondary frost heave should be further researched and assessed for its risk to the project in permafrost zones and where the pipe is chilled; • Research and development on pipe behaviour under differential frost heave, and resulting design modifications, should be given a high priority to ensure the integrity of the pipe in permafrost conditions and to avoid environmental impacts that might arise along the right-of-way; and • A rigorous error analysis should be made of the geothermal calculations needed to support the pipeline design. This should include better information on thermal and hydraulic properties of the soil and ground surface energy coefficients. Source: EARP Panel Reports 1979, 1982	Condition 3, Schedule III, NPAct Technical Orders NP-MO-1-79 and 2-79: s 4,6,7 NPAct draft Yukon Terms and Conditions ss 86-89 NPAct Northern B.C. Terms and Conditions ss 73-74 NPAct Swift River Terms and Conditions ss 49-50	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. Information obtained through long-term monitoring of the Enbridge Norman Wells Oil Pipeline and other pipelines in northern environments has greatly increased the knowledge base related to the issues associated with continuous and discontinuous permafrost as well as associated design, mitigation and monitoring techniques. Current practice in Canada to mitigate the integrity risk associated with these issues includes the use of: • a strain-based design approach, higher strength materials; • mechanized welding and Non-Destructive Testing procedures; • small scale and full scale material testing to establish pipe and weld strain capacities; • specialized soils testing to establish frost heave and thaw settlement potential, benchmarked finite element modelling of soil pipe interaction including geo-thermal effects; • optimized use of pipeline and route data using a GIS platform; and • quality management systems, and established integrity management practices that are specific to the Project. The knowledge and experience gained from pipeline projects in northern latitudes since 1982 provide a solid base for the development of effective mitigation. Pipeline engineering and construction mitigation measures have also advanced over the years and Foothills will incorporate these measures, where appropriate, into the design of the Project. Potential environmental issues associated with permafrost, including trench and right-of-way settlement, changes to drainage patterns, ponding, disruption of stream flow due to frost bulb growth, erosion and sedimentation, localized flooding, and slope instability will continue to be addressed using current industry-accepted best practices. The term “secondary heave” is not commonly used in current practice; however, the phenomenon is taken into account in all current frost heave modeling.	In 2010, Foothills advanced its development of pipeline design based on current engineering approaches, materials, and techniques for construction and environmental protection. Foothills is addressing geohazards in its engineering work plans in preparation for its engineering design compliance filings under the Technical Orders for the approval of the Designated Officer. **2010** In summer 2010, Foothills undertook an aerial and ground reconnaissance of the entire route, as well as an aerial and ground-based watercourse crossing review at select watercourse crossings in Yukon and Northern B.C. Foothills team included a pipeline engineer, construction engineer, geotechnical engineer, environmental planner, and fisheries biologist. The results of this field work will help refine the route to minimize potential effects to permafrost and/or the potential effects of slope stability, slumping and erosion that could occur. The watercourse crossing team also visited locations where frost bulb effects may be an issue to inform the pipeline design and construction mitigation plans. The engineering team compiled route characterization data to assess the potential for large displacement frost heave developing along the “cold flow” portions of the route and for thaw settlement along warm flow sections of pipe in discontinuous and sporadic permafrost areas. **2011 - 2012** Work planned in 2011 - 2012 is intended to address specific issues and data gaps as outlined in the 1982 EARP Panel Report. There are considerable data on permafrost areas along the proposed pipeline route from measurements taken in the late 1970s and early 1980s. Foothills plans to collect biophysical and engineering data that include the following: • a geotechnical field program to collect borehole data and soil samples for laboratory testing to assess the uplift resistance and the frost heave and thaw potential of targeted terrain unit soils. These data will augment the existing route data previously collected by Foothills in the 1970s. • information on groundwater conditions in and around temporary and permanent facility sites; • baseline information on shallow groundwater conditions along the pipeline to assist in site-specific pipeline design; • updating data on the distribution and thermal state of permafrost; • continuing specialized soil laboratory soil testing program including frost heave tests, uplift resistance tests and geo-mechanical tests; • numerical modeling of frost heave and heave rate in susceptible soils; • updating of conditions at potential high thaw settlement sites originally identified in the early 1980s; • measurement and numerical modeling of long-term thaw settlement areas; and • evaluation of the potential for frost bulb formation at a specific watercourse along the pipeline route in winter 2011 and development of a mitigation toolbox. Foothills engineering, environmental and reclamation personnel will work closely to develop a suite of designs, mitigative measures, monitoring programs and materials appropriate for the various permafrost conditions and issues along the route. Where it is appropriate, monitoring programs will also be developed. Reports will be prepared and filed to meet the NPAct Terms and Conditions and Technical Orders. **FILING** EPMPs (Yukon/Swift River; Northern B.C.) Responses to Technical Orders

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Permafrost - Climate Change Both the 1979 and 1982 EARP Panel Reports required Foothills to address the issue of the effects of climate change on permafrost and consequently on the design of the pipeline to address frost heave and thaw settlement. The 1982 EARP Panel Report concluded that Foothills understood the implications of climate change. Source: EARP Panel Reports 1979, 1982	Condition 3, Schedule III, NP Act Technical Orders NP-MO-1-79 and 2-79: s 4,6,7 NPAct draft Yukon Terms and Conditions ss 86-89 NPAct Northern B.C. Terms and Conditions ss 73-74 NPAct Swift River Terms and Conditions ss 49-50	The 2010 issue description is modified to be broader that the previously identified issue description. Foothills addresses these issues through its workplan for Permafrost – Frost Heave and Thaw Settlement and in a Project-wide discussion paper on Climate Change.	See workplan for Permafrost – Frost Heave and Thaw Settlement. **FILING** Responses to Technical Orders. Project-wide discussion paper on Climate Change to be filed with the NPA in 2012.
Seismic - Pipeline Integrity in the Event of Earthquakes The pipeline corridor is an area of relatively high seismic activity. The 1982 EARP Panel was satisfied that Foothills understood the risks and could design the pipeline appropriately. Concern was expressed with the integrity of the Kluane Lake Crossing in a seismically active zone and the potential for liquefaction of silty lake bottom sediments following ground shaking, leading to lack of support for the pipeline. Foothills was instructed to undertake on-going review of the technical feasibility of the crossing and expect a public and technical review if the lake crossing route was changed to a land route within KNP&R. Source: EARP Panel Reports 1979, 1982	Condition 3, Schedule III, NP Act Technical Orders NP-MO-1-79 and 2-79: s 4,6,7	The 2010 issue description is unchanged from the previously identified issue description. The issues with respect to seismic effects are still relevant. A fault delineation and characterization study will define the locations of fault crossings and the nature of potential ground displacements. Other seismic issues such as liquefaction, triggered landslides, wave propagation, and ground shaking are being addressed by the design. The currently planned Kluane Lake crossing location, construction method and design have not fundamentally changed. Data obtained from field programs will be used to refine the design. For pipeline crossings of major active faults, an above-ground crossing method similar to the design of the Denali Fault crossing on TAPS in Alaska is being evaluated. Sections of the pipeline would be above-ground at fault-crossing locations supported by sliding shoes on grade beams (sleepers) to allow the pipe to move and flex in a controlled way should an event occur.	Foothills advanced its development of pipeline design based on current engineering approaches, materials, and techniques for construction and environmental protection. Foothills is addressing geohazards, including seismic hazards, in its engineering work plans and in its engineering design compliance filings under the Technical Orders for the approval of the Designated Officer. **2010** Foothills undertook a fault delineation and characterization study to define both locations of fault crossings and the nature of potential ground displacements. Reconnaissance and geophysical studies were conducted by the Project in the summer of 2010 to verify and delineate geologic faults in the vicinity of the pipeline route. A Kluane Lake geophysical survey was conducted in the summer of 2010 to update the bottom profile data and collect data on the nature of the sub-bottom sediments. The primary survey objective was to provide detailed bathymetry as well information on sub-surface soil layers. The field studies were conducted across the lake and at the two shore landing sites on the Easement. Analysis of the data will provide input to guide a potential future geotechnical program that will conduct *in situ* testing of lake bottom sediments. **2011 – 2012** **Seismic Fault Trenching Program** Additional geological field work is planned in Northern B.C. and Yukon to further delineate and characterize potentially active faults. A variety of non-intrusive and intrusive methods will be utilized including remote sensing (Light Detection And Ranging [“LiDAR”]), air (fixed-wing and helicopter) reconnaissance, ground reconnaissance, hand auguring and trenching, and geophysical surveys. Air reconnaissance methods provide an initial screening to identify indicators of potentially active faults. These indicators will then be evaluated for follow up ground investigation. Appropriate mitigative fault crossing designs will be developed for engineering filings in compliance with all Technical Orders. Reports will be prepared and filed to meet the NPAct Terms and Conditions. **Kluane Lake Geotechnical Investigation** The Kluane Lake investigation program will continue in the winter of 2011-12. This program is intended to further characterize lake bed soils and their susceptibility to liquefaction. The program will consist of drilling, and in situ testing of the lake bed sediments along the Easement across the lake. Access to the lake will be at existing points of entry.

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
			FILING Responses to Technical Orders
Subsidence along the Route after Abandonment Subsidence along the route after abandonment was discussed briefly by the EARP Panel, the NPA, and other government review agencies in recommendations put forward in the 1982 EARP Panel Report. The report also includes the recommendation for a viable project abandonment plan. Source: EARP Panel Reports 1979, 1982	NEB Act and Regulations	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. Relevant reference material presented in NEB Filing Manual (NEB 2008, Internet site) identifies information related to Project effects for decommissioning. After Leave to Open at the commencement of operation, the Project will be subject to regulation by the NEB and will comply with the NEB's requirements. Once the pipeline is scheduled to be decommissioned and abandoned, Foothills would be required to develop appropriate abandonment plans to meet regulatory requirements in consultation with the NEB and other authorities and agencies.	**2010-2012** Foothills is advancing its development of pipeline design based on industry-accepted best practices, including current engineering approaches, materials, and techniques for construction and environmental protection There is currently no work planned to evaluate post-abandonment subsidence along the pipeline route. It is expected that decommissioning and abandonment planning expectations of regulatory agencies will include consideration of many factors including: land use; ground subsidence; soil and groundwater protection; watercourse crossings; road, railway and utility crossings; landowner notifications; environmental protection; post-abandonment responsibilities. **FILING** in compliance with NEB Act and Regulations
Slope Stability The EARP Panel raised slope stability as an issue for a pipeline design in permafrost areas and in many areas of steep unfrozen terrain. Grading and cut and fill for the pipeline right-of-way create the potential for erosion, sedimentation, and ultimately slope movement and failure. The 1982 EARP Panel indicated that there was still much design work to be done to address this issue. Source: EARP Panel Reports 1979, 1982	Condition 3, Schedule III, NPAct Technical Orders NP-MO-1-79 and 2-79: ss 4,6,7	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. Potential slope instability is a geohazard being taken into account in pipeline design. These designs will leverage the experience gained from mitigation of unstable slopes on other pipelines including sections of TransCanada's Alberta System. The Enbridge Norman Wells pipeline also provides examples of successful mitigation of potentially unstable permafrost slopes. Site-specific mitigation will be utilized to address such geohazards and maintain pipeline and right-of-way integrity.	In 2010, Foothills advanced its development of pipeline design based on current engineering approaches, materials, and techniques for construction and environmental protection. Foothills is addressing slope stability in its engineering work plans and in its engineering design compliance filings under the Technical Orders for the approval of the Designated Officer. **2010** Foothills has used both legacy project data and newly acquired data to develop a GIS-based route data base for a preliminary assessment of geohazards, including slope instability, along the pipeline route. The data base includes terrain type, soil group and associated properties, permafrost condition, bedrock depth, a LiDAR-derived digital elevation model, watercourse crossing locations and attributes, and other information required to estimate and understand geotechnical conditions. Categories of potential geohazards included landslides/mass movement, tectonics/seismicity (including faults and liquefaction), hydrotechnics, erosion and upheaval displacement, geochemical, freezing, thawing, and unique soil structure. Aerial and ground-based field reconnaissance was also carried out during the summer of 2010 and several potentially unstable areas were identified for further data gathering and analyses. **2011 - 2012** The following provides a listing of planned activities related to terrain and slope stability: • develop information in a GIS format suitable for all disciplines, using the existing GIS platform developed for engineering; • review and assess methods used to identify areas of potential terrain and slope instability along the route; • update borehole and route databases, and associated GIS platform, to capture all available information for the pipeline route; • complete refinements to geohazard assessment algorithms and route data integration processes; • update geohazard assessment of the pipeline route based on new analyses using the route database, including LiDAR data. In particular, update the inventory of slopes and existing landslides; • conduct field investigations at specific sites to support engineering design and development of mitigation toolbox and criteria; and • complete route refinements to account for findings of geohazard assessment and field investigations. **FILING** EPMPs (Yukon/Swift River; Northern B.C.) Responses to Technical Orders

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Alternative Modes of Pipeline Installation The 1979 EARP Panel considered the issue of pipeline design in permafrost areas and requested information on the suitability of alternative pipeline designs (embankment mode, piles, etc.). Foothills provided this information and included information on a concrete restrained mode. The 1982 EARP Panel was satisfied that Foothills was aware of the environmental implications of the various designs. The EARP Panel recommended that the NPA undertake an evaluation of the performance of these different pipeline modes. Source: EARP Panel Reports 1979, 1982	included in Designated Officer's mandate to approve project design and detailed engineering	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. The issues related to pipeline design and construction in permafrost and discontinuous permafrost have remained essentially unchanged since 1982. However, the knowledge base of how to design and operate pipeline projects and mitigate issues related to permafrost has greatly increased. Above-ground pipeline construction modes are no longer planned to address pipeline integrity issues in permafrost areas. The pipeline will be buried for most of the route with the possible exception of areas where there is evidence of seismic activity (see Section 4.1.3 Seismic).	**FILING** Detailed design to be approved by Designated Officer.
Hydrology and Water Crossings			
Design Flow Criteria and Small Stream Hydrology The EARP Panels identified two issues of concern with respect to small stream hydrology. Firstly there was concern with the availability of data to support the safe design at small watercourse crossings. Secondly, the Panel was concerned with the lack of information about the design approach. The EARP Panel Report noted that "very little reference was made to the design approach and environmental planning for the numerous smaller crossings which may have greater environmental importance." The EARP Panel concluded that there was "inadequate hydrologic data required to design and schedule all water crossings and their approaches." The EARP Panel Report expressed concerns about "the adequacy of Foothills' methodology for determining design flows for crossings of small and intermediate-sized streams. The information base for guiding the estimates of factors used in the "rational method" for determining design flows has not been fully explained by Foothills. On the other hand, Foothills has obtained a wealth of information on stream channel characteristics, which will be used in checking the design flow estimates obtained by the "rational method". The EARP Panel recommended that Foothills consult with operators of other projects to determine their methods and the performance of their watercourse crossings. Source: EARP Panel Reports 1979, 1982	NP-MO-1-79 and NP-MO-2-79 s 4(c)(ii) and s 4(e)(iv)	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. The issue of information on the hydrology of small streams, particularly in Yukon, is still relevant, although data availability has improved. There are currently about 70 gauged streams in Yukon and 76 gauged streams in Northern B.C. and Northwestern Alberta that can be used for hydrologic analysis. Only about 40 gauged sites in Yukon were available for the 1978 Environment Canada ("EC") report. The methodology to estimate design flows on small and intermediate streams is no longer considered an issue given the regional hydrologic analyses that have been carried out in recent years by various government agencies for Yukon (United States Geological Survey 2003) and Northern B.C. (B.C. Ministry of Environment, Lands and Parks 2000). Standard methods, such as regional flood frequency analyses (Viessman et al. 1977), are now accepted to conservatively estimate design flows absent direct stream flow measurement. These methods have been used successfully to design and construct similar pipeline watercourse crossings in Canada for many years.	**2010** Field reconnaissance of many water crossings in Yukon and Northern B.C. was conducted in 2010. The reconnaissance team visited major to minor watercourse crossing locations. Additional activities undertaken in 2010 included: • commencing work to update the hydrometric database; • acquiring and analyzing flow data from the current gauging stations;. • reviewing regional hydrologic analysis to estimate flood flows at pipeline stream crossings; and, • commencing work to classify streams according to drainage area and other factors to assist in design and in the development of mitigation measures. **2011 - 2012** The classification of the streams will be refined using available data and data planned to be collected in 2011-2012 during the fisheries field program for habitat assessment. There are currently significantly more gauging stations than in the 1970s, and there are several that have drainage areas less than 5 km^2, but there is still an apparent data gap for drainage areas between 5 and 100 km^2. The planned summer and winter one-time discharge measurements and stream morphological data collection can partially address these current data gaps. The information will be used to benchmark the regional hydrologic analyses and to provide a geomorphic basis for the current stream classification or for any refinement that may be required. Hydrologic regions, drainage area, channel slope, observed flow conditions during the winter months and other times of the year, etc., will be used to further assess potential design issues, such as icings or frost bulb impacts, at small and intermediate streams. Stream flow and morphologic measurements will be taken on streams crossing the pipeline route during the fisheries field program for habitat assessment. The selection of these streams (drainage area as the key criterion) will be based on a stream classification system developed using data from gauged streams. The focus would be on intermediate-sized streams as some of these may freeze to the bottom and others may not, a distinction with implications for both fish habitat and, icings, frost bulb formation that may impede flows during the winter months on certain streams. The hydrology field program will involve: • Fall open-water field season sampling: discharge measurements at stream crossings (assumed to be about 10% to 20% of total crossings); measurements of bank-to-bank width and bankfull depth at crossing.

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
			• Fall open-water field season sampling: characterize the stream bed surface substrate in terms of dominant substrate (approximate percentage) and remaining substrate material. • Winter under-ice field season sampling: discharge measurements at stream crossings. Sites selected would be a subset and about half the number of the sites selected for open-water measurements. The fall and winter spot flow measurements would be distributed along the route through Yukon and Northern B.C. **FILING** Responses to Technical Orders
Streams on Alluvial Fans, Mudflows, Debris Torrents and Related Phenomena Alluvial fans, mudflows, debris torrents and related geomorphologic processes, common in Yukon, were perceived by both EARP Panels as presenting a significant risk to pipeline integrity. Foothills did not satisfy the 1982 EARP Panel that it could deal adequately with these processes, and the EARP Panel recommended that Foothills prepare a specific plan for dealing with geohazards that reflects consultation with other agencies responsible for projects along the pipeline route. The 1982 EARP Report required "information on the incidence of avulsions, mudflows, debris torrents and channel degradation on alluvial fans, on the design measures to be employed to prevent adverse effects on pipeline integrity and, on the environmental impact to be expected from such measures." The EARP Panel recommended that "Foothills should present a plan for dealing with shifting channels, debris torrents, mudflows and channel degradation that may occur on high-energy streams on alluvial fans." Source: EARP Panel Reports 1979, 1982	NP-MO-1-79 and NP-MO-2-79 s 4(c)(i), s 4(e)(v), 6(b)	The 2010 issue description is modified to be narrower, or more specific, than the previously identified issue description. The issue of avulsions, mudflows and debris torrent events is still relevant today. However, it is considered that the pipeline routing within Yukon avoids the majority of crossings where deep scour may occur. In Northern B.C. studies are continuing to refine the pipeline route that will minimize the potential impact of these geohazards. Crossings are usually in areas of deposition, which do not pose an overt integrity risk to the pipeline. The location of these geohazards and related vulnerability of the pipe to their potential occurrence have been assessed as part of a preliminary system-wide geohazard assessment of the pipeline route. Further updates to the route data base and analyses of those data are expected to improve the evaluation and mitigation of these geohazards.	**2010** Currently, streams crossed by the pipeline route are generally classified on the basis of drainage area, with additional consideration given to potential site-specific issues, which then determine the level of detail on the crossing design, and the construction and monitoring requirements. An initial review of the available literature on avulsions, mudflows and debris torrents in Yukon has been conducted. A preliminary geohazard assessment was commenced. **2011 - 2012** Methods to assess geohazards along the route will be updated as will the route data on which they are based. The design flow used to assess scour and lateral stream movement will take into account the potential for these specific geohazards The classification of the streams will be refined using available data and data collected in 2011-2012. The work plan will include the development of an approach to identify specific crossings locations that are within alluvial fans and/or subject to hazards such as stream avulsions, debris torrents and mudflows. During the 2011-2012 field programs, the locations of such hazards will be identified from maps, air photos, field reconnaissance and discussions with government experts. The information will then be incorporated in the stream crossing design and construction methods. **FILING** Responses to Technical Orders
Risk of Flood from Glacier-Dammed Lakes The 1977 EARP Panel raised the issue of the potential for rare exceptional 'outburst' floods and associated deep scour caused by sudden release of water from glacier-dammed lakes. The 1979 EARP Panel required that Foothills provide "up-dated river-crossing designs taking into account both out-burst peak-flow estimates and potential changes in Alaska Highway crossing designs." Based on information subsequently filed by Foothill and discussion at the technical hearings, the 1982 Panel Report noted that "The Foothills documentation on water crossing generally covered the information requirement. The EARP Panel is satisfied that the company is aware of the design requirements to accommodate outburst flood flow levels." Source: EARP Panel Reports 1979, 1982	NP-MO-1-79 and NP-MO-2-79	The 2010 issue description is unchanged from the previously identified issue description. Outburst floods from glacier-dammed lakes have the potential to affect the integrity of the pipeline for the few watercourses where this hazard may exist. The Project will include flood outburst as an explicit geohazard that, in an extreme event, could impact the integrity of the pipeline.	**2010-2012** The locations of past outburst floods and potential future outbursts floods will be compiled from existing mapping, air photographs, reports and discussions with government or other experts. The risks of future outbursts or re-occurrence of past outbursts and the consequences of such outbursts on pipeline integrity will be evaluated and considered in the design. If required, mitigation plans will be developed to address the risks and potential impacts of such events on pipeline integrity. **FILING** Risk integrated into design to be approved by the Designated Officer.

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Watercrossing Designs The 1979 EARP Panel required that extensive information be filed on watercourse crossing designs for typical and non-typical crossings especially to address issues of scour, icings, etc. The 1982 EARP Panel was satisfied that Foothills was aware of the significance of these factors that influence design and had collected field data to inform their planning. The 1982 EARP Panel recommended that Foothills continue its surveys of natural icings. Source: EARP Panel Reports 1979, 1982	NP-MO-1-79 and NP-MO-2-79 ss 4(c)(iii), 4(e)(iv), 6(b)(iv) NPAct draft Yukon Terms and Conditions ss 161-163 NPAct Northern B.C. Terms and Conditions ss 157-162 NPAct Swift River Terms and Conditions ss 127-132	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. Since 1982, many thousands of pipeline watercourse crossings have been successfully installed in Canada and continue to operate safely under extensive regulatory direction and oversight. The experience and the 'toolbox' of mitigative techniques that industry has developed over the years provide a reliable guide for Foothills in the design of watercourse crossings for the Project.	**2010** Foothills undertook desktop studies of stream crossings in Yukon and Northern B.C., as well as Kluane Lake, to characterize the watercourse crossings. During the summer of 2010, a field reconnaissance was conducted to review and confirm, where possible, pipeline alignment at defined watercourse crossings to meet design, construction, environmental, and operational considerations. **2011 – 2012** In 2011, Foothills proposes to undertake geotechnical investigations and other studies to obtain additional data to advance the detailed design of select watercourse crossings. Additional field reconnaissance and pipeline refinement activities will continue in 2011 and 2012. **FILING** Responses to Technical Orders
Disruption of Groundwater Flow by a Chilled Pipeline The EARP Panel required data on groundwater flow and temperatures for the prediction of natural and project-induced icings and estimates of their magnitude, and the Project's mitigation plans to minimize or eliminate environmental effects to fisheries and hazards to pipeline integrity. The 1982 EARP Panel was not satisfied that Foothills could predict icings and recommended further investigations into the potential for project-induced icings, their magnitude and impact, and proposed mitigation measures. The EARP Panel requested very accurate soils information (Federal Environmental Assessment Panel 1982). Source: EARP Panel Reports 1979, 1982	NP-MO-1-79 and NP-MO-2-79 ss 4(c)(ii), 4(e)(v), 6(b)(iii)	The 2010 issue description is modified to be narrower, or more specific, than the previously identified issue description. The effects of groundwater disturbance will not be a pipe integrity issue, however icings remain a relevant issue from an environmental perspective. The ability to predict the conditions under which icings could occur will allow for the development of effective mitigation. Only the first approximately 200 km of pipeline in Yukon will be cooled to below 0 °C (32°F).	**2010** The 2010 work included a desktop literature review. During the desktop review, aerial photographs and existing literature were examined to identify locations of current and potential project-induced icings. This information will be confirmed and updated with field work in subsequent years. Preliminary geothermal modelling continued to evaluate the potential for impact of frost bulb development at watercourse crossings. This effort was directed to assess the impact of cold pipeline flow on winter water flow in watercourses and to guide future field program work. **2011 – 2012** Field work will be carried out in 2011 and 2012 to address identified data gaps as described above in Permafrost - Frost Heave and Thaw Settlement. Geothermal analyses using the GIS-based route data will be used to establish areas where cold flow impacts on groundwater and watercourses could be an issue. **FILING** Responses to Technical Orders
Revegetation and Erosion Control In 1982, the EARP Panel concluded that Foothills had demonstrated an improved understanding of the problem of re-establishing ground cover in areas disturbed by the project. However, the logistics and support facilities to achieve revegetation success over the entire route required further development. The EARP Panel recommended that Foothills should: • continue to monitor and evaluate the results of revegetation trials at seven test sites along the Alaska Highway; • before construction, provide a plan for a Yukon nursery to supply shrubs and trees for revegetation; • submit a plan to acquire hay or straw for revegetation, taking into account local demand; and • monitor the results of revegetation and review those results for the first three to five years after completion of the project. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions ss 90-97 NPAct Northern B.C. Terms and Conditions ss 75-83 NPAct Swift River Terms and Conditions ss 51-59	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. The issue of the most appropriate method of re-establishing ground cover in areas disturbed by the Project remains valid today. However, since 1982, the logistics and support facilities required to achieve revegetation success have changed substantially. • The availability of commercially available native seed varieties for grasses and some legumes has expanded since 1982. • The development and implementation of environmental protection and reclamation plans have improved with better knowledge and experience with effective erosion control measures.	**2010** A comprehensive background review of information sources commenced in 2010. **2011 - 2012** Foothills plans to continue to collect information to support the development of the EPMP. Soils and vegetation information will be gathered to fill data gaps and to inform erosion control and reclamation details in the EPMP for the approval of the Designated Officer. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
		• Appropriate soil handling and topsoil replacement promote successful revegetation. Information about soil properties contributes to development of plans for revegetation and erosion control in problematic situations such as steep slopes, very sandy soils, and ice-rich permafrost soils. • Maintaining plant communities and managing the spread of invasive species are still important aspects of current environmental protection considerations and the development of reclamation and revegetation plans. • Erosion control techniques and products have advanced since the early 1980s. Existing products have been improved and new products and methodologies have been developed. • Monitoring and measuring the success of reclamation of all disturbed areas is a requirement of NEB-regulated facilities; accordingly, Foothills will develop post-construction monitoring plans for inclusion in the EPMP for approval of the Designated Officer.	
Related Structures and Activities			
Access Roads The 1979 EARP Panel was concerned with potential environmental effects resulting from construction of access roads and culverts (particularly where the route diverts from the Alaska Highway), snow roads, and their abandonment. The 1977-1982 EARP report concluded that Foothills had the information required and had demonstrated their ability to plan, construct and operate access roads so as to reduce environmental damage. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions s 164, s 172, s 174 NPAct Northern B.C. Terms and Conditions s 143, ss 167-174 NPAct Swift River Terms and Conditions ss 143-149	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. Many of the previously identified issues related to access roads have been addressed by increased regulation and best management practices. For example, Fisheries and Oceans Canada ("DFO") has established several Operational Statements related to the installation, use and removal of temporary vehicle crossings at watercourses and, in some jurisdictions, controls have been placed on the development of new roads that would provide access into important caribou areas.	**2010** Desktop identification of existing access to the pipeline right-of-way and potential new access routes was initiated in 2010. During the aerial reconnaissance in 2010 potential access routes to the pipeline corridor and borrow sites were assessed for suitability and to identify issues. **2011 - 2012** Review of planned access routes will continue throughout 2011-2012. Review and reconnaissance will initially focus on the identification of potential access routes that minimize length, avoid steep grades, avoid adverse topographic features, and minimize the number of watercourse and wetland crossings while providing an adequate number of access points to the pipeline right-of-way and Project facility sites to support construction. Foothills stakeholder and Aboriginal engagement program expects to include dialogue about planned new access roads and upgrades to existing roads. Information gained through the engagement program will be used to inform development plans. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)
Granular Materials The 1979 EARP Panel was concerned with total volumes of granular materials required, and the operation and rehabilitation of granular material extraction sites, including the channels and floodplains of the White and Donjek Rivers. The 1977-1982 Panel recommended that before leave to construct, Foothills should provide a granular resources protection plan for the location, operation and rehabilitation of all granular extraction sites. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions s 142, ss 150-157 NPAct Northern B.C. Terms and Conditions s134,	The 2010 issue description is modified to be broader than the previously identified issue description. The initial borrow needs for the Project were updated, which resulted in changes in the quality and quantity of borrow material compared to the initial estimates by Foothills (South Yukon) Ltd. Granular material for the pad of the original above-ground mode design is no	**2010** A field reconnaissance of borrow sites was conducted in the summer of 2010 to assess the quantity and quality of borrow material remaining at 114 previously identified primary borrow sources proposed for use by Foothills in Yukon and Northern B.C. This reconnaissance was non-intrusive, since it did not entail boreholes or test pits. Where the results of the field reconnaissance indicated the primary source was not suitable, a nearby alternate borrow source was examined. Preliminary environmental and land use information was also gathered during the 2010 borrow site reconnaissance. Information collected included proximity to watercourses, site drainage, presence of existing access, and proximity to existing roads and the pipeline route. Desktop reviews of borrow sites were also initiated in the summer of 2010 to determine

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
	ss 142-147 NPAct Swift River Terms and Conditions s 110, ss 118-123	longer required. Foothills holds numerous reservations by notation on granular resource sites in Yukon, however, some extraction by other users has occurred since the time that the reservations were granted. In addition, some new borrow sites in the immediate vicinity of the route have been developed as part of the upgrades of the Alaska Highway. Several issues have arisen since the EARP report that need to be addressed by the current Project: • the potential for acid-generating bedrock exposed during quarrying operations; • the exploitation by others of Foothills granular sites that were reserved by notation; and • elimination of the above-ground mode of pipeline construction, which will reduce the overall volumes of granular materials, compared to the 1980s-era estimate	whether any known heritage resource sites, known important wildlife or fish habitat, or sites supporting vegetation species/communities of concern were located in proximity to the borrow sites. The results of the 2010 field reconnaissance will be used to assist in the determination of the scope of both subsequent borrow site field studies and identification of access to these sites. Upgrades and maintenance of the Alaska Highway over the past twenty years resulted in the use of borrow material from some of the sites held by Foothills under a reservation by notation. Consequently, field studies in the summer of 2010 focused on the assessment of many of these sites to evaluate the quantity and quality of the remaining borrow material and, where warranted, alternative sites as well as a reconnaissance at potential borrow sites that were not held under a reservation by notation. As a result of reconnaissance conducted in summer 2010, two potential granular resource deposits have been identified by Foothills in the Swift River portion of the route. Both of these sites are considered primary sites. **2011 - 2012** Work related to potential borrow sites in 2011 and 2012 will include the following: • field review of selected sites that were not visited in summer 2010, particularly Northern B.C. sites that are presently inaccessible from the ground. Some sites in Yukon may also be included in the study; • refinement of borrow material needs depending on final routing, presence of rock, effectiveness of pipe coatings, number, size and location of Project facilities; etc. • preparation of two example Pit Development Plans; one in Yukon and one in Northern B.C. In addition, to the planned studies that will focus on the determination of the volume and grade of borrow material, environmental studies for borrow sites will include a review of the results of the desktop study of primary sites conducted in the summer of 2010. Additional desktop studies at alternate sites, where warranted, will be conducted together with additional field studies at borrow sites to document vegetation present at each site and inform development and operation plans to address: • important wildlife habitat; • wildlife or vegetation species of concern; • important fish habitat; • archaeological or palaeontological resources, or traditional land use areas; or • nearby residents. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)
Compressor Stations, Construction Camps, Material Storage Areas, and Concrete Fabrication Plants The 1979 Panel required information on the criteria and methodology, predicted impacts and mitigation measures considered during the siting of compressor stations and other facilities. The 1982 Panel considered that the requirement was 'largely met'. Source: EARP Panel Reports 1979, 1982	NP-MO-1-79 and NP-MO-2-79 NPAct draft Yukon Terms and Conditions ss 102-104 NPAct Northern BC Terms and Conditions ss 88-90 NPAct Swift River Terms and Conditions ss 64-66	The 2010 issue description is unchanged from the previously identified issue description. Foothills will continue to demonstrate their ability to appropriately locate, plan, construct and operate compressor stations and other facilities required for the Project. Information contributing to siting facilities and developing mitigation measures is described in Section 4.3.3. Supplier and manufacturing capacity in the southern Yukon has developed or expanded in the past thirty years. Consequently, it is expected that local suppliers and manufacturing facilities will be able to provide some materials (concrete fabrication) for construction.	**2010** **Compressor Stations** Foothills conducted a commercial open season process during the late spring and summer of 2010. The results of this open season provided information about capacity needs for the pipeline system and, consequently, contribute to the number, size and optimum location of compressor stations. Pipeline industry considerations for compressor station siting were included in desktop studies which identified environmental, land use or cultural sensitivities. **Mainline Construction Camps and Stockpile Sites** Foothills continued construction planning activities in 2010 to delineate the appropriate construction schedule (i.e., winter or summer) and to assist in the identification of potential mainline construction camp locations and stockpile sites. **2011-2012** **Compressor Stations** The siting process for compressor stations will continue in 2011-12. Information resulting from the Project's commercial open season and from ground and/or aerial reconnaissance will be incorporated. Potential

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
			compressor station sites will also be discussed with Aboriginal communities, stakeholders and government agencies. The desktop review will also continue to update the socio-economic and environmental issues, and inform the development of appropriate mitigation. These studies will gather information about: • important wildlife habitat; • wildlife or vegetation species or communities of concern; • important fish habitat; and • important archaeological and paleontological resources, or TLU areas. **Mainline Construction Camps and Stockpile Sites** Further work to identify suitable sites for mainline construction camps and stockpile sites will continue in concert with the optimization of the construction execution plan for the Project. Locations in Yukon will utilize previously identified reservations by notation. The exercise will include further desktop review of potential sites followed by a ground and/or aerial reconnaissance of the potential sites, and discussion with Aboriginal communities, stakeholders and government agencies. Potential mainline camp and stockpile sites will also be subject to surveys to update socio-economic and environmental issues and inform the development of appropriate mitigation. These studies will gather information about: • important wildlife habitat; • wildlife or vegetation species or communities of concern; • important fish habitat; • important archaeological and paleontological resources, or TLU areas; and • associated access concerns in currently remote areas. **FILING** Responses to Technical Orders EPMPs (Yukon/Swift River; Northern B.C.)
Biological Concerns			
Fisheries Foothills was required to provide a wide range of typical and site-specific information about potential impacts to fisheries and about mitigation, including construction scheduling, prevention of erosion and sedimentation; potential impacts to fish passage (culvert design); and potential for over-exploitation. The 1982 EARP Panel was largely satisfied with Foothills' plans, including consideration of impacts on route alternatives, but recommended that inspection include monitoring of erosion and pipeline integrity at water crossings and that construction techniques to minimize sedimentation be approved by the NPA. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions ss 114-120; s 183 (c) NPAct Northern B.C. Terms and Conditions ss 100-108, s 182(2)(b) NPAct draft Yukon Terms and Conditions ss 102-104 NPAct Northern BC Terms and Conditions ss 88-90 NPAct Swift River Terms and Conditions ss 64-66	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. Over the last 20 years, DFO and the pipeline industry have collaborated to develop risk-based approaches to protection of fish and fish habitat at water crossings. These approaches are based on industry-accepted best practice and mitigation measures approved by DFO. This collaboration has resulted in implementation of DFO Operational Statements that set out approved construction techniques and mitigation measures for low risk activities, and extensive use of DFO Letters of Comment/Advice to advise proponents on how best to avoid disturbance or harm to fish or fish habitat. The approach for the Project utilizes and builds upon the DFO Risk Management Framework.	**2010** **Water Crossing Review** A geomatics routing exercise was completed in 2010 to determine the general location of water crossings along the pipeline route. The water crossing review (304 crossings in Yukon and 307 in Northern B.C.) was based on 1:50,000 National Topographic System (NTS) maps for Yukon and the 1:20,000 Terrain Resource Information Management Program (TRIM) data for Northern B.C. The review included all the water crossings or drainages that were shown on the NTS and TRIM maps of the alignment. The drainage area at the crossing location and the channel width were the two main factors used to classify the watercourses as major, intermediate and minor crossings (as described above in the section on Design Flow). Fisheries background data were compiled for the water crossings. **Existing Fisheries Information** Once the water crossings were mapped, a background fish and aquatic resources review was completed utilizing the following sources: • electronic records from the Fisheries Inventory Data Queries and Fisheries Information Summary System; • a search of the Ecological Reports Catalogues; • review of Stream Information Summary Catalogues; • review of Yukon Biodiversity Database; • review of consultant reports and files contained at the B.C. Ministry of Environment (Fort St. John Regional Office) library; • communication with DFO representatives; and • review of reports and files within the Project library. As part of the literature review a master crossing spreadsheet was created to capture inputs such as fish

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
			presence, watercourse seasonal flow volumes, fisheries timing windows, and site-specific issues. **Kluane Lake Fisheries Study - Summer 2010 Overview** The Kluane Lake fisheries field studies were completed in August 2010. The fisheries program focused on collecting fish and fish habitat biophysical information along the 450-m wide pipeline Easement across Kluane Lake and several tributaries along the lake's south shore potentially crossed by the pipeline: Copper Joe, Lewis, Cluett, Bocks, and Couldron creeks. The program also included engagement of Kluane First Nation personnel to contribute TEK to the fish and fish habitat study. **Integrated Engineering and Environment Water Crossing Review 2010** Water crossings were investigated by an integrated engineering and environmental team during the 2010 field season. The integrated team consisted of a fisheries biologist, a pipeline construction specialist, an engineer from the Project engineering team, and a FN representative. The primary objective of this multi-disciplinary approach was to identify the level of sensitivity of the watercourse and aquatic resources, to gather information for Project design, and to inform development of the EPMP. The information collected will be compared to the historical data for each crossing and included as parameters in the Risk Management Framework. **2011 - 2012** **Fisheries Field Work** The data collection and related work anticipated in 2011 and 2012 to meet NPAct Terms and Conditions and other current regulatory expectations related to fish and fish habitat will include: • fish and fish habitat - Fisheries Inventory Update; • update fish and fish habitat information for all named stream crossings, all new Project roads, and all existing roads requiring crossing upgrades for the Project; • collection of information on sensitive habitats upstream, downstream, and in riparian areas to facilitate mitigation measures; • site characterizations of flow, channel and approach slope conditions to identify crossing risks and assist in crossing design; and • winter surveys for selected areas with high overwintering potential. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)
Wildlife The 1977-1982 EARP Panels identified the following key issues with respect to wildlife in general, waterfowl and raptors. <u>Wildlife in General:</u> • Critical wildlife habitat protection – The 1982 EARP Panel was largely satisfied with Foothills' plans and with route changes that had addressed some of the critical habitat issues. The EARP Panels recommended further baseline data collection on winter ranges. The Panels also recommended that Foothills prepare an atlas of critical fisheries and wildlife habitat in cooperation with NPA and appropriate management agencies. • Need to provide detailed information on mitigation measures related to construction – The 1982 EARP Panel recommended that Foothills take full advantage of opportunities to reduce impacts to wildlife and fisheries when establishing winter/summer construction schedules. • Disturbance of wildlife by aircraft, blasting and other construction noise. • Impact of new access. <u>Waterfowl:</u> • Sensory disturbance – The 1982 EARP Panel was satisfied with Foothills'	NPAct draft Yukon Terms and Conditions ss 108-113; s183 (c) NPAct Northern B.C. Terms and Conditions ss 94-99, s 182(2)(b) NPAct Swift River Terms and Conditions ss 70-75; s 158 (2) (b)	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. The previously identified key wildlife issues are still relevant today. New information is available related to these issues (e.g., least-risk timing windows for various species in the Peace Region of B.C., extensive literature on the effects of linear developments and other human activities on wildlife) and will be used to develop mitigation measures to reflect current standards and best management practices. In addition, three new issues have been identified: • Species of Conservation Concern – Since 1982, the local and regional focus on species of conservation concern has increased substantially, particularly with the introduction of *Species at Risk Act* ("SARA") in 2002. Conservation status designations include those recognized federally	**2010** The 2010 field program included completion of a large mammal habitat field reconnaissance along Yukon portion of the route as part of the Ecological Land Classification ("ELC") program. Regulatory agency engagement was undertaken to acquire current information on species of conservation concern, including population information, critical habitat areas, and distributions to determine potential interactions of the construction and operation of the Project with species of conservation concern. **2011 - 2012** A review, compilation and summary of wildlife information relevant to the Project that has become available since 1982 will continue in 2010. The updated information will include wildlife species and groups that have been identified as key issues since 1982 (e.g., caribou, species at risk). Information sources include the peer-reviewed literature, government and consultant reports, databases, inventory data, and spatial (map) data. This information will be used, in conjunction with the activities identified in 2010 and 2011-2012 work plans, to fill known information gaps, to describe the contemporary baseline conditions along the route and identify any general or site-specific concerns, and to contribute to the EPMP. It is expected that Foothills' TEK program as described in Section 3.2 will also contribute to developing environmental protection plans and programs. In addition to ongoing review and compilation of updated (post-1982) wildlife information, work to be completed in 2011-2012 includes the development of habitat ratings based on results of ELC and habitat analysis for selected species of management concern; raptor and Trumpeter Swan surveys, large mammal

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
approach to mitigation for sensory disturbance to spring migratory waterfowl, but was not confident of Foothills' mitigation plans for fall migrating species. The EARP Panel recommended that Foothills prepare a report on sensory disturbance zones for waterfowl and submit it to NPA for technical review with the Canadian Wildlife Service. Raptors: • Sensitive periods – Foothills and the agencies responsible for protection of raptors disagreed on sensitive periods. The 1982 EARP Panel recommended that Foothills recognize and adhere to the Yukon Department of Renewable Resources sensitive periods in planning construction. Source: EARP Panel Reports 1979, 1982		(SARA, Committee on the Status of Endangered Wildlife in Canada) and those recognized provincially (Conservation Data Centre ("CDC"), B.C. Conservation Framework) and territorially (Yukon CDC). • Designated Important Wildlife Areas – There are a variety of designations used to identify and delineate important wildlife areas in Yukon (e.g., Wildlife Key Areas), in B.C. (e.g., Ungulate Winter Ranges, Wildlife Habitat Areas) and in a federal context (e.g., Important Bird Areas). • Caribou – Boreal ecotype woodland caribou are Threatened and on Schedule 1 of SARA**.** The Northern Mountain population of caribou is of Special Concern and on Schedule 1 of SARA.	habitat reconnaissance level surveys (Northern B.C. portion of route); and breeding bird surveys (focused on species at risk). The scope of this proposed work may be refined based on discussions with Yukon and Northern B.C. regulators and other interested parties. Reports will be prepared and filed to meet the NPAct Terms and Conditions. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)
Alternative Modes and Wildlife The 1977-1982 EARP Panels concluded that Foothills' plans for mitigating wildlife passage during construction were adequate, but the Panels had concerns about potential impacts on moose and woodland caribou movement in areas where above-ground modes were utilized (including the concrete-restrained mode). Detailed construction and post-construction monitoring, based on pre-construction surveys of ungulate movements, was recommended. Source: EARP Panel Reports 1979, 1982		The 2010 issue description is modified to be narrower, or more specific, than the previously identified issue description. Above-ground pipeline construction modes are no longer planned to address pipeline integrity issues in permafrost areas. The pipeline will be buried for most of the route with the possible exception of areas where there is evidence of seismic activity (see Section 4.1.3 Seismic). Alternative Modes and Wildlife is no longer an issue.	**FILING** EPMPs (Yukon/Swift River; Northern B.C.)
Relationship to Other Projects The potential effects of the construction and operation of the pipeline on other projects and land uses were recognized in the 1977-1982 EARP Report and ultimately reflected in the NPAct Terms and Conditions. The 1982 EARP Report recommended that Foothills be required to update the status of associated projects prior to final design approval to ensure that appropriate environmental planning and mitigation were in place. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions s 85(a) NPAct Northern B.C. Terms and Conditions s 72 and s182 (3) NPAct Swift River Terms and Conditions s 48	The 2010 issue description is modified to be broader than the previously identified issue description. While the list of other projects or developments has changed, the previously identified issue of interactions with other projects is still current. Today the focus of cumulative effects is broader, encompassing both biophysical and socio-economic components in understanding the potential cumulative effects of past, current, and reasonably foreseeable projects and development of appropriate mitigation.	Foothills will be creating a Project-wide Discussion Paper to contribute information to discussions about cumulative effects in the context of the Project. **FILING** Project-wide discussion paper on Cumulative Effects to be filed with the NPA In 2012.

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
Other Issues			
Noise The 1982 EARP Report identified the primary noise issues associated with the project to be the potential noise effects on people and wildlife from compressor station operation, construction equipment operation, aircraft used during construction, and emergency compressor blowdown events. The issue was seen as particularly important in remote rural areas where ambient sound levels are low (i.e., quiet) which could result in potential noise disturbance to affected northern residents and wildlife. The 1982 EARP Report recommended that Foothills should be instructed to base its noise management and mitigation plans two regulatory standards - the National Environment Management Authority (NEMA) (d) curve for silencing the compressor stations and the Province of Ontario Startle Criterion for blowdown noise. Neither of these regulatory standards was referenced in the NPAct Terms and Conditions. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions ss 105-107 s 176 NPAct Northern B.C. Terms and Conditions ss 91-93, s 176 NPAct Swift River Terms and Conditions ss 67-69, s 152	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. The current noise issues are similar to the original issues and include potential noise effects on people and wildlife from compressor station operation, construction equipment operation and aircraft used during construction, and emergency compressor blow down events. These noise issues will be addressed using current regulatory guidelines for the applicable area. Additionally, consideration of potential low frequency noise effects of the facility would be evaluated using methods described in Energy Resources Conservation Board ("ERCB") Directive 038. This Directive is a current reference document for the pipeline industry. The NEB uses the ERCB Directive 038 as an example of a best management practice for noise evaluations. There was no discussion of low frequency noise in the 1982 EARP Report however; this will be included in the issue update using procedures recommended in Directive 038.	**2010** A comprehensive background review was completed of all available noise information sources previously compiled for Foothills. This included information related to the potential noise effects of compressor stations on people and wildlife, of construction equipment operation and aircraft to be used, and emergency compressor blowdown events. This information is listed in the Key Information Sources section. **2011 - 2012** The current work plan is focussed on completing baseline noise evaluations using methods that meet the requirements of ERCB Directive 038 and B.C. Oil and Gas Commission ("OGC") Noise Control guidelines in Yukon and B.C., respectively. As there is no equivalent noise control directive for Yukon, noise effects will be based on meeting the ERCB Directive 038 noise requirements. The B.C. OGC recently published a Noise Control Best Practices Guideline (B.C. OGC 2009) that is very similar to Alberta's ERCB Directive 038, and will be used for noise effects evaluation in Northern B.C. The noise modelling algorithm will be based on the International Organization for Standardization Standard 9613 sound propagation algorithm. Modelling information will be used to assist in the development of noise abatement design plans that are required to be submitted in accordance with the NPAct Terms and Conditions. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)
Recreational Land Use The 1982 Panel was satisfied that Foothills was sensitive to potential impacts of its construction on campgrounds and other recreational facilities. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions s 122, 164 (b) NPAct Northern B.C. Terms and Conditions ss 64-68, s110 NPAct Swift River Terms and Conditions s 86	This issue is addressed under Socio-Economic Issues, Section 2.2.12 Recreation.	Reference Filing in Section 2.2.12 Recreation
Water Use, Waste Water Treatment, and Disposal The 1977-1982 EARP Panels were satisfied that Foothills had addressed these issues commensurate with the early planning stage of the project in its submissions and undertakings. The Foothills submissions largely addressed issues related to sediment releases, camp water supply and releases of treated domestic wastewater from construction camps, releases of hydrostatic test waters, and spills and leaks. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions ss 98-101, 141-149, 164-171 NPAct Northern B.C. Terms and Conditions ss 84-87; ss 157-166	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. Additional pipeline-related water quality issues have been highlighted during recent large-scale pipeline project reviews in northern Canada. These include the following: • sediment inputs in runoff from disturbed areas or disturbance of previously contaminated streambed sediments; • drinking water protection near water crossings and	**2010** A comprehensive background review of all available data and information sources previously compiled for the project was completed in 2010, including water quality data and planned mitigation such as waste management, environmental protection, contingency plans and water quality management. **2011 – 2012** Water and sediment quality sampling is planned in 2011 and 2012, during the open-water season at a representative set of water bodies that will be crossed by the pipeline. Sampling locations will be selected to collect data at pipeline crossings on major rivers, crossings of importance to communities (e.g., from a drinking water supply perspective) and a representative set of crossings on smaller rivers and streams that flow year-round. Sampling is also planned at selected lakes near compressor station locations for acid sensitivity analysis, and at future camp locations, focusing on likely receiving waters for treated camp wastewaters. In areas where it is suspected that streambed sediments may be contaminated, sediment

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
	NPAct Swift River Terms and Conditions ss 133-142	camps; • potential effects on surface water quality related to air emissions; • potential effects related to hydrostatic testing and test-water release; • potential effects related to changes in flows and water levels; and • releases of wastewaters generated by horizontal directional drilling. There have been a variety of acceptable practices developed in recent years that have become industry-accepted best practices. These standards will be evaluated and applied to the Project as applicable. Details of the standards will be provided within the EPMP.	sampling will be undertaken coincident with the fisheries data collection program. Baseline water and sediment quality data will be compared to regulatory guidelines and previously collected baseline data, where available, and used to describe current water and sediment quality along the pipeline route. Where appropriate, baseline data will be used to address site-specific issues, such as drinking water-related issues (e.g., by allowing before-after comparisons) and concerns over potential contaminant releases from bottom sediments during in-stream work. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)
Solid Waste Management, Toxic and Hazardous Materials, Fuels and Contingency Planning The EARP Panel required information on types of quantities of solid wastes for the project and a typical plan for the management of such wastes, including the gathering, transportation and methods of disposal, and, a plan for the management of toxic and hazardous materials and fuels. The plan was to include details on dykes, berms, records and logs, metering systems, distribution systems and disposal techniques, and a contingency plan for spills of hazardous or contaminating materials, fires, explosions and other environmental emergencies. At the conclusion of the 1982 technical hearings, the EARP Panel noted that Foothills provided a substantive response to these issues and undertakings were made to meet the requirements for solid waste management, toxic and hazardous materials, fuels and contingency planning. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions ss 135-140; 141-149 NPAct Northern B.C. Terms and Conditions ss 127-132; 133-141 NPAct Swift River Terms and Conditions ss 103-117	The 2010 issue description is modified to be broader than the previously identified issue description. The previously identified issue is still applicable. In addition, legislative changes applicable to the Project addressing the handling, storage and transport of hazardous materials will require updating of the various plans for submission to the NPA. The issue of potential contamination along the pipeline corridor in Yukon where the Easement parallels, and or overlaps with the abandoned Haines-Fairbanks and Canol pipelines will require a better understanding of the areal extent and levels of contamination at these locations.	**2010** In 2010, work began on draft preliminary environmental protection and management plans including several environmental management and contingency plans as required by the NPAct Terms and Conditions. These plans will consider all phases of construction and will be based on industry-accepted best practices and all applicable provincial, territorial and federal legislation regarding spill reporting requirements and handling of toxic and hazardous waste materials. **2011 - 2012** At completion of the socio-economic and environmental field data collection in 2011 and 2012, the environmental protection and management plans will be updated to reflect further site specific information. In addition, Foothills plans to conduct a Phase I site assessment along portions of the Easement in Yukon that parallel or overlap abandoned pipelines to determine the potential for soil contamination. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)
Archaeology and Heritage and Cultural Resources Foothills was not required to submit information reports on archaeological and palaeontological issues, but the EARP Panel commented that work in these areas was required under the NPAct Terms and Conditions. As described in Section 3.1 on TLU, the EARP Panels expressed a concern for damage to Aboriginal cultural and sacred sites. The NPAct Terms and Conditions list requirements applicable to archaeology and cultural resources. Source: EARP Panel Reports 1979, 1982	NPAct draft Yukon Terms and Conditions ss 124-126 NPAct Northern B.C. Terms and Conditions ss 109-115 NPAct Swift River Terms and Conditions ss 86-91	The 2010 issue description is modified to be broader than the previously identified issue description. Since 1982, there have been changes and updates to B.C. and Yukon legislation governing the protection, preservation and reporting of heritage, archaeological, cultural and palaeontological resources. As a result, information previously collected by Foothills for these resources will need to be updated to meet current regulatory review and reporting requirements.	**2010** Foothills conducted a review of all existing background information compiled by Foothills as well as available data from both Yukon and B.C. governments. Discussions were initiated with the Yukon Department of Tourism and Culture and B.C. Archaeology and Registry Services Branch. Permits and files provide informal information on and fill specific knowledge gaps related to archaeological resources to initiate the preparation of a Historical Resources Overview (“HRO”)**.** **2011 - 2012** The proposed Historical Resources Impact Assessment (“HRIA”) and management studies will be discussed with regulatory agencies, particularly with reference to appropriate field sampling designs and strategies. The Heritage Branch of the Yukon Department of Tourism and Culture has recently been established to coordinate permitting. The archaeological and palaeontological studies relating to the Project will be subject to permitting under the *Historical Resources Act* administered by the Department of Tourism and Culture.

TABLE 1-0 Cont'd

Previously Identified Issues (1977-1982)	Existing Regulatory Direction	Issues Update (2010)	Current Workplan and Filing
			An HRO for the Project will include a review of existing information, modelling, and other data designed to locate and evaluate through ground reconnaissance, historical resource site revisits and re-evaluations, and subsurface archaeological prospecting historic resources within the Project area. This HRO and HRIA plan will be submitted as part of the Archaeological Permit Application to the Yukon Tourism and Culture Branch and B.C. Archaeology and Registry Services Branch. The Yukon Department of Tourism and Culture and B.C. Archaeology and Registry Services Branch seek review of permits for archaeological studies by Aboriginal communities. Foothills will continue to engage key government personnel from Yukon and Northern B.C. as well as initiate dialogue with Aboriginal communities and researchers at institutions such as the Yukon College and University of Northern B.C. regarding archaeological, heritage and cultural investigative programs. Foothills will commence the development of a detailed predictive model of archaeological potential for the Project area which will include the use of remote sensing tools such as satellite imagery, aerial photographs, and LiDAR. Following identification of the high potential areas and where deemed appropriate, an HRIA will be undertaken followed by an Archaeological Impact Assessment. Participation of Aboriginal communities in the HRIA is planned. Final reports for archaeological, heritage, cultural, and palaeontological resources will be prepared and submitted to the Yukon Tourism and Culture Branch and B.C. Archaeology and Registry Service Branch as well as to the NPA in 2012. **FILING** EPMPs (Yukon/Swift River; Northern B.C.)
Air Emissions In the 1979 EARP Panel Report, the panel identified a number of issues associated with compressor stations including: location of the stations, noise, noxious emissions, and ice-fog formations. The Panel required information on the criteria and methodology, predicted impacts and mitigation measures considered during the siting of compressor stations and other facilities. The 1982 Panel considered that the requirement was 'largely met'. Source: Interim Report of the EARP Panel (1977)	NPAct draft Yukon Terms and Conditions ss 102-104 NPAct Northern BC Terms and Conditions ss 88-90 NPAct Swift River Terms and Conditions ss 64-66 current regulatory direction	The 2010 issue description is modified to reflect that current industry-accepted best practices sufficiently address the issue. Since the initial panel report, the state of knowledge with respect to potential effects on air quality has advanced substantially. In updating this earlier work to contemporary standards, Foothills will review the potential effects of (a) increasing emissions of criteria air contaminants (“CAC”) and other air contaminants, and (b) increasing emissions of water vapour. The CAC and other air emissions will change the local air quality which can affect human health and the environment. Effects on visibility (fogging) and other effects (icing) are attributable to emissions of water vapour.	**2010** Activities in 2010 included review of available data, literature, maps and identification of information gaps. Foothills plans to work with regulatory agencies from Yukon, Northern B.C. and the federal government (e.g., EC) to gather updated meteorological and air quality data. **2011 - 2012** Activities for 2011-2012 include the following: • gather meteorological and air quality monitoring data from established stations; • if preliminary investigations and regulatory engagement indicate a requirement, then air quality data will be collected at selected locations from mid-2011 to mid-2012; • conduct mesoscale meteorological modelling; • inventory emissions of CACs and other contaminants and conduct dispersion assessments for each of the compressor stations; • calculate emissions of water vapour and conduct assessments of visible emissions for each of the compressor stations; • inventory emissions of methane, carbon dioxide and nitrous oxide, and estimate the marginal contribution of the Project emissions to the provincial and national emissions; and • prepare technical data reports to meet the NPAct Terms and Conditions. **FILING** in response to Terms and Conditions and further current regulatory direction

APPENDIX 1: ACRONYMS AND ABBREVIATIONS

APP	Alaska Pipeline Project
B.C.	British Columbia
CAC	criteria air contaminants
Canada – US Agreement	*Agreement between Canada and the United States of America on Principles Applicable to a Northern Natural Gas Pipeline*
CDC	Conservation Data Centre
CPCN	Certificate of Public Convenience and Necessity
the Designated Officer	A single NEB board member designated to exercise delegated decision-making authority
DFO	Fisheries and Oceans Canada
EARP	Environmental Assessment and Review Process
Easement	existing easement held by way of an agreement between Foothills and the Government of Canada
ELC	Ecological Land Classification
EC	Environment Canada
EIS	Environmental Impact Statement
EPMP	Environmental Protection and Management Plan
ERCB	Alberta Energy Resources Conservation Board
FN	First Nation
Foothills	Foothills Pipe Lines (South Yukon) Ltd. and/or Foothills Pipe Lines (North B.C.) Ltd.
HRIA	Historical Resources Impact Assessment
HRO	Historical Resources Overview
KNP&R	Kluane National Park and Reserve
LiDAR	Light Detection And Ranging
the Minister	The minister responsible for the NPA
M-KMA	Muskwa-Kechika Management Area
NEB	National Energy Board
NEB Act	*National Energy Board Act*
NPAct	*Northern Pipeline Act*
NPA	Northern Pipeline Agency
NWT	Northwest Territories
OGC	British Columbia Oil and Gas Commission
PPBoR	Plans, Profiles, and Books of Reference
Project	Foothills continued work under its existing CPCNs, with planning for construction in Yukon and Northern British Columbia.
PRU	Preliminary Socio-Economic and Environmental Information Review and Issues Update
RCMP	Royal Canadian Mounted Police
SARA	*Species at Risk Act*
TEK	Traditional Ecological Knowledge

APPENDIX 1: ACRONYMS AND ABBREVIATIONS Cont'd

Terms and Conditions	NPAct Terms and Conditions
TLU	Traditional Land Use
TransCanada	TransCanada PipeLines Limited

APPENDIX 2: GLOSSARY

Term	Definition
Aboriginal	Being of the first or earliest known people present in a particular region. Aboriginal people in Canada comprise the First Nations, Inuit and Métis.
alluvial fan	Fan-shaped deposits of water-transported material that typically form at the base of topographic features where there is a marked break in slope.
aufeis (or icings)	A sheet-like mass of ice layers that develops from successive flows of ground water during freezing temperatures. Pipeline construction can restrict subsurface ground water flow, forcing flow towards the surface where it is subject to freezing temperatures. Flow continues to build up towards the surface forming stratified layers of ice. A large buildup of aufeis can have a negative impact on nearby facilities, roads, bridges or other structures.
bankfull depth	The depth of a bankfull channel measured at a section perpendicular to streamflow.
bathymetry	The measurement of the depth of bodies of water.
blowdown event	A process in which the pipeline is depressurized and any substance within the pipe is removed.
borehole	Narrow shaft bored in the ground, either vertically or horizontally.
borrow site	Site of a pit created to provide granular materials that can be used as fill at another site.
concrete-restrained mode	The pipeline is laid on a pad on the ground surface and formed concrete weights are placed over it to restrain the vertical or horizontal movement of the pipeline in permafrost areas.
cumulative effects	Changes to the biophysical, social, economic, and cultural environments caused by the combination of past, present and “reasonably foreseeable” future actions.
debris torrent	The rapid movement of water-charged debris confined to steep headwater channels.
design flows	Design specifications of the pipeline that contribute to the output volume.
Ecological Land Classification	Mapping of distinct ecological areas, identified by their geology, topography, soils, vegetation, climate conditions, living species, habitats, water resources, as well as anthropic factors. These factors control and influence biotic composition and ecological processes.
Easement	The existing easement held by way of an agreement between Foothills and the government of Canada.
First Nations	Those of Canadian Aboriginal ethnicity who are neither Inuit nor Métis. Individual groups of First Nations are sometimes referred to as bands.
frost bulb	A more or less symmetrical zone of frozen ground formed around a buried pipeline or beneath or around a structure maintained at an average annual temperature below 0°C.
frost heave	The process of ice lens formation in soil that results in lifting of the ground surface, often resulting in soil cracking.

APPENDIX 2: GLOSSARY Cont'd

Term	Definition
gauged streams	Streams in which measurements such as water surface elevation and/or flow are made and kept on record.
geohazards	A geological or environmental condition that has the potential to develop into a situation leading to changed physical effect or uncontrolled risk. This includes phenomenon related to: landslides/mass movements, tectonics/seismicity, hydrotechnics, erosion and uplift displacement, geochemical, freezing of unfrozen ground, thawing of permafrost, ands soils with unique structure.
geomorphologic processes	The processes involved with the shaping (topography) of landforms.
Geographic Information System (GIS)	Integrated hardware, software and data for capturing, mapping, managing, analyzing and displaying forms of geographically referenced information.
horizontal directional drill	A steerable trenchless method of installing underground pipes in a shallow arc along a prescribed bore path by using a surface-launched drilling rig.
hydraulic properties	Properties involving the behaviour of fluid under pressure.
hydrocarbon	An organic compound consisting entirely of hydrogen and carbon; predominately used as a combustible fuel source.
hydrologic (hydrology)	The study of water movement, distribution and quality throughout the Earth.
ice lens	An ice layer formed when moisture, flowing through rock or soil, accumulates in a localized zone and has the potential to continue to grow and wedge soil or rock apart.
industry-accepted best practice	Current approaches, techniques and mitigation that have been proven effective by the pipeline industry and accepted by regulators.
Kinematic Wave Model (Rational Method)	A mathematical model developed for describing the evolution and movement of bed profiles in alluvial channels; based on kinematic wave theory.
LiDAR	An optical remote sensing technology that measures properties of scattered light and/or other information of a distant target which can be used to develop detailed maps that show elevation changes.
liquefaction	The process by which unconsolidated saturated soil loses strength and stiffness (and behaves as a liquid) in response to an applied or repeated stress (often earthquakes)
Métis	A group of Aboriginal people in Canada who are of mixed First Nation and European descent.
mudflow	The downslope movement of a large mass of mud formed from loose soil and water.
Open Season	The principal purpose of an open season is to determine market interest in a pipeline project. Potential shippers have the opportunity to assess the project's detailed technical and commercial terms. Once bids are received, the pipeline company assesses the details of the bids and commences evaluations and negotiations with the shippers.
organic	Pertaining to compounds that contain carbon (some carbon-compounds excluded).
palaeontological resources	The geological evidence of prehistoric life, including fossils.

APPENDIX 2: GLOSSARY Cont'd

Term	Definition
permafrost	Soil that is at or below 0°C for two or more years. In saline soils, the salt could depress the freezing point to approximately -1°C, but the ground is still considered permafrost.
pipeline integrity	A program designed to identify and analyze current and potential events that could result in a pipeline incident (e.g., increased strain).
riparian	Area located on the bank of a river or other body of water.
secondary frost heave	Characterized by the existence of a partially frozen zone that underlies the frozen soil. Secondary frost heaves tend to exhibit much higher heaving pressures than primary heaves.
sedimentation	The tendency for particles to settle when suspended in a body of water.
seismic activity	The frequency, type and size of earthquakes experienced over a period of time.
strain-based design	A pipeline design that places a limit on the strains, rather than the stresses, at the design condition.
stratigraphy	A branch of geology concerned with the study of rock layers (i.e., stratification). Also, the layering of soil in a vertical profile.
strike slip faulting	A fault characterized by a nearly vertical fault surface with very little vertical motion. Often associated with seismic activity.
subduction	A process by which one tectonic plate is pushed below another converging plate, thereby sinking into the Earth's mantle. Often associated with seismic activity.
subsidence	To sink to a lower level in land elevation.
Technical Order	Region-specific requirements for engineering compliance filings under the NPAct.
thaw settlement	Subsidence of the ground due to the time-dependent thawing of frozen ground and subsequent draining of excess water.
Traditional Ecological Knowledge	Aboriginal forms of traditional knowledge regarding local environmental resources.
traditional economy	Economic system of societies with extensive subsistence activities associated with hunting, fishing and trapping (e.g., Some First Nation communities).
Traditional Land Use	The current use of lands and resources for traditional purposes by aboriginal persons.
ungulate winter ranges	An area where hooved mammals can be found during the winter.
uplift resistance	Resistance to the process of tectonic elevation increase. Uplift is the opposite of subsidence. Also, the resistance imparted by frozen soils to an upward movement of an object, such as a pipeline, as a result of frost heave.
wildlife habitat areas	Locations used by wildlife for important seasonal functions. These areas need to be protected to maintain the health and sustainability of these wildlife populations.

APPENDIX 3: REFERENCES

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