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November 29, 2013

Via Email
Original via Mail

British Columbia Utilities Commission
6th Floor, 900 Howe Street
Vancouver, BC
V6Z 2N3

Attention: Ms. Erica M. Hamilton, Commission Secretary

Dear Ms. Hamilton:

Re: FortisBC Energy Inc. (FEI or the Company)

Application for a Certificate of Public Convenience and Necessity (CPCN) to Construct and Operate a Transmission Pressure Pipeline Crossing of the Muskwa River (the Application) for the Fort Nelson Service Area

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Pursuant to sections 45 and 46 of the *Utilities Commission Act* (the Act), FEI files the attached application (the Application) for approval from the British Columbia Utilities Commission (the Commission) for a CPCN construct and operate a Nominal Pipe Size (NPS) 6 (inch) transmission pressure (TP) pipeline crossing of the Muskwa River (the Project) that will replace the existing NPS 6 pipeline crossing in FEI's Fort Nelson service area (FEFN or Fort Nelson). The estimated cost for the replacement pipeline is $6.7 million (in as spent dollars)[1].

FEI also requests Commission approval under sections 59-61 of the Act to defer the Project application and Project development costs, using a new non-rate base deferral account

[1] This includes project costs, project development costs and application costs but does not include allowance for funds used during construction (AFUDC). The total including AFUDC is estimated at $7.0 million.

called the Muskwa River Crossing Project Costs Deferral Account on a net-of-tax basis attracting AFUDC until December 31, 2014, and to amortize these costs over a three-year period beginning in 2015.

FEI is proposing to replace the existing NPS 6 pipeline crossing of the Muskwa River in Fort Nelson with a NPS 6 pipeline crossing, which will be installed by trenchless construction. The pipeline crosses the Muskwa River approximately 3 kilometres southeast of Fort Nelson, and approximately 75 meters upstream of the Alaska Highway Muskwa River Bridge. This pipeline is the sole supply source of natural gas to Fort Nelson.

The regulatory history of FEI's efforts for a replacement pipeline is outlined in Section 1.3 of the Application. In 2010, FEI applied to the Commission to replace the pipeline by attaching a pipe to the existing Muskwa River Bridge that crosses the Muskwa River. The Commission found that the proposed pipeline crossing replacement was in the public interest. However, despite its efforts, FEI could not proceed with the pipeline attachment to the Bridge as it could not obtain the required permit from the federal Department of Public Works and Government Services Canada (PWGSC). Consistent with the Commission's prior direction (Order G-27-11), FEI conducted an updated review and analysis of the remaining crossing options with regard to feasibility, costs and risks and has now identified the HDD option as the preferred option from both financial and non-financial considerations.

In the Application, FEI has described in more detail the justification for the Project, alternatives considered, the nature and scope of the Project, the capital costs, and the rate and socioeconomic impact of the Project.

As further explained in Section 3 of the Application, the risks that were present when the Commission initially approved a pipeline replacement have since intensified. FEI believes it is necessary to replace the pipeline crossing by May 1, 2014 prior to the 2014 spring freshet.

Requests for Confidential Treatment of Certain Appendices

To support the Application, FEI has filed several appendices, with the following ones being filed confidentially in accordance with the Practice Directive of the British Columbia Utilities Commission "Confidential Filings":

Appendix C1 - Buckland and Taylor Aerial Crossing Estimate Report

Appendix C2 - Jacobs Muskwa River Crossing Estimate

Appendix C3 - Worley Parson Isolated Open Cut Estimate Report

Appendix G - Muskwa HDD Risk Analysis and Contingency November 25, 2013

Appendix H1, H2, H3, and H4 - Financial Schedules

Additionally, there is one table in the Application that is also filed confidentially:

Table 6-2 - Capital Costs

FEI respectfully requests that the Commission hold the above listed documents/tables confidentially, in accordance with the Commission's Practice Directive on Confidential filings, and believes that such information shall remain confidential even after the regulatory process for this Application is completed. Below, FEI will outline the reasons for keeping the information confidential.

Appendices C1, C2 and C3

Appendices C1, C2, and C3 provide AACE International Recommended Practice No. 17R-97 Class 3 cost estimates for all four options. The information should be kept confidential as FEI will be going to the market for competitive bids for the materials and construction work. If the estimated costs for the material and construction work or contingency are disclosed, it can be reasonably expected that FEI's negotiating position may be prejudiced. For instance, the bidding parties with knowledge about the estimated costs may use the estimate costs as a reference for their bidding. Because there are limited contractors due to high demand in the market in recent years, FEI's negotiating position may be further prejudiced if the bidders know about the Company's estimated costs for materials and construction work and associated contingencies.

FEI can release the information contained in Appendix C3 relating to the Isolated Open Cut Option if that specific option is not selected after the Commission's decision.

Appendix G

The Muskwa HDD Risk Analysis and Contingency Report contain information about how FEI's contingency for the Project was calculated. FEI will be going to the market for competitive bids for the materials and construction work. Thus, for the reason listed above, FEI requests the above information to be kept confidential.

Appendices H1, H2, H3, and H4

These financial schedules contain the cost estimates for the Project and of other options. The information should be kept confidential for the same reasons listed above.

Table 6-2: Capital Costs

This table provides a detailed breakdown of construction and material costs and contingency. For the same reasons listed above, FEI believes this information should remain confidential.

FEI does not object to customer group interveners such as the British Columbia Public Interest Advocacy Centre on behalf of the British Columbia Pensioners' and Seniors' Organization *et al* (BCPSO), being provided with these appendices and figures upon executing an Undertaking of Confidentiality, as provided in Appendix L, in accordance with the Commission's Practice Directive on Confidential Filings.

FEI proposes that information requests relating to these confidential appendices be filed separately from other information requests, with a copy circulated only to FEI and other parties that have signed Undertakings of Confidentiality. This process will ensure that confidential information is not inadvertently disclosed.

If there are any questions regarding this Application, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): BCPSO (Registered Intervener in FEFN 2011 RRA)
Fort Nelson & District Chamber of Commerce

FORTISBC ENERGY INC. – FORT NELSON SERVICE AREA

Application for a Certificate of Public Convenience and Necessity to Construct and Operate a Transmission Pressure Pipeline Crossing of the Muskwa River

Volume 1 - Application

November 29, 2013

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1. APPLICATION

1.1 *SUMMARY OF APPROVALS SOUGHT*

FortisBC Energy Inc. (the Company or FEI), pursuant to sections 45 and 46 of the *Utilities Commission Act* (the Act), applies to the British Columbia Utilities Commission (the BCUC or the Commission) for a Certificate of Public Convenience and Necessity (CPCN) to construct and operate a Nominal Pipe Size (NPS) 6 (inch) transmission pressure (TP) pipeline crossing of the Muskwa River (the Project) that will replace the existing NPS6 pipeline crossing in FEI's Fort Nelson service area (FEFN or Fort Nelson). The estimated cost for the Project is $6.7 million represented in as spent dollars.[1]

FEI is also seeking Commission approval under Sections 59-61 of the Act for deferral treatment of Project application and Project development costs. Application costs include costs for legal review, Commission costs and Commission approved intervener costs. Project development costs include project management, engineering, and consultants' costs for assessing the potential design and alternatives and associated costs that were incurred between 2009 and 2013. FEI is seeking approval to add these deferred costs to a new non-rate base deferral account, the Muskwa River Crossing Project Costs Deferral Account, on a net-of-tax basis attracting allowance for funds used during construction (AFUDC). At the beginning of 2015 the deferral account would be included in rate base, and no further AFUDC would be charged to the deferral account FEI is requesting a three year amortization period to commence in 2015.

1.2 *EXECUTIVE SUMMARY*

FEI is applying to the Commission to replace the existing NPS 6 pipeline crossing of the Muskwa River in Fort Nelson, BC with a NPS 6 pipeline crossing installed by trenchless construction.

Fort Nelson receives natural gas by way of a 19 km long single FEI transmission pressure pipeline from the Spectra Transmission System to the Fort Nelson distribution system. The pipeline crosses the Muskwa River approximately 3 kilometres southeast of Fort Nelson at Km post 17 +300, and approximately 75 meters upstream of the Alaska Highway Muskwa River Bridge.

The original crossing of the Muskwa River was completed in the early 1960's. In 1973, the bridge was due to be replaced and the pipeline operators installed a replacement NPS 6 pipeline in an in-stream installation immediately upstream of the new bridge location. The installation was completed in 1974.

[1] This includes project costs, project development costs and application costs but does not include allowance for funds used during construction (AFUDC). The total including AFUDC is estimated at $7.0 million.

In 2011, FEI applied for the Commission to replace the pipeline by attaching the pipe to the Muskwa River bridge that crosses the Muskwa River because an underwater survey of the crossing in 2008 detected approximately 12m of exposed pipe in the channel and because a pipe failure would result in loss of natural gas supply to Fort Nelson as the pipeline is the sole supply source to Fort Nelson. The Commission found that the proposed pipeline was in the public interest. However, due to reasons external to FEI as discussed in Section 4.2.3 in this Application, the pipeline proposed to attach to the bridge could not be built.

The risks present in 2011 are now intensified for the following reasons:

- The pipeline crossing was re-inspected in 2010 and late 2012. The 2012 inspection revealed that the extent of pipeline exposure within the river thalweg[2] had increased to approximately 20 metres.
- The north bank has now eroded to the point where the pipeline exits the river channel is minimally protected with as little as 0.8 m of cover (measured in summer 2013).

The replacement of the pipeline crossing has greater urgency now due to the heightened risk to the pipeline from further loss of cover on the north bank and increased exposure within the river. The remaining cover may not be sufficient to withstand another freshet and the pipeline could be seriously damaged which may result in loss of gas supply to Fort Nelson. As the pipeline crossing is integral to the delivery of natural gas supply to Fort Nelson customers, a pipeline loss would completely disable FEI's ability to supply natural gas to its customers in FEFN. Thus, FEI believes it necessary to replace the pipeline crossing by May 1, 2014, prior to the 2014 Muskwa River freshet.

FEI is applying to the Commission to replace the existing NPS 6 pipeline crossing of the Muskwa River in Fort Nelson, BC. The proposed replacement will consist of an NPS 6 pipeline crossing installed by trenchless construction. Trenchless construction can be accomplished by horizontal directional drilling ("HDD") or microtunneling ("MT"). In this application, an HDD method is expected to be the most economical pipeline crossing replacement option.

Since 2010, FEI has examined other crossing methods and pursued the most economical replacement option, the installation of a pipeline on the adjacent Alaska Highway bridge and a pressure reducing station to reduce the operating pressure of the bridge mounted pipeline from transmission pressure ("TP") to intermediate pressure ("IP") to comply with provincial requirements of bridge mounted natural gas pipelines.

From 2011 to 2013 FEI sought permission from the owner of the bridge, the federal Department of Public Works and Government Services Canada ("PWGSC") to utilize the bridge for pipeline attachment. Despite substantial effort by FEI, in May 2013 the assistant deputy minister of the PWGSC communicated that a permit will not be issued.

[2] Thalweg is defined as the course of the deepest part of a valley or river.

An updated review of the remaining crossing options was conducted and this included examination of trenchless construction options (HDD and MT), an aerial pipeline crossing, and an isolated open cut of the Muskwa River.

The cost estimates were updated and prepared to AACE Class 3 levels to permit a timely and confident selection of the preferred option.

The cost estimates of the updated crossing options were:

Table 1-1: Summary of Alternatives Analysis ($ millions)[3]

Line		HDD	Isolated Open Cut[4]	Aerial Crossing	Micro tunnel
1	Capital Costs	5.9	10.7	7.0	7.9
2	Project Development Costs	0.8	0.8	0.8	0.8
3	Application Costs	0.1	0.1	0.1	0.1
4		**6.7**	**11.5**	**7.9**	**8.8**
5	AFUDC	0.3	0.5	0.8	0.4
6	O&M (NPV)	0.0	0.0	0.5	0.0
7	**Total Project Costs**	**7.0**	**12.0**	**9.1**	**9.2**
8					
9	Financial Preference	1	4	2	3
10	Non-Monetary Preference	1	4	3	2
11	Achieve May 1, 2014 Objective?	Yes	No	No	Yes

Analysis of the costs and risks indicated that the HDD option was preferable from both monetary and non-monetary considerations. Non-monetary considerations include impact to operations (on-going safety and operating risks), construction and environmental risks, stakeholder and First Nations acceptance, exposure to natural hazards and vandalism, and aesthetics.

At the onset, FEI has been in regular communication with key stakeholders to ensure they were aware of the project and potential impacts. From 2011 to 2013, most of the communication was with PWGSC, the Mayor and Council of Fort Nelson (also known as the Northern Rockies Regional Municipality), and the Fort Nelson First Nation (FNFN). In October 2013, as the HDD option was presented to the Fort Nelson community through the Mayor and Council, with FNFN, and with an open house. Additionally, advertisements were placed in the local newspaper advised of the project. In early November, CBC Radio North conducted an interview with FEI to learn of the project.

[3] Total project costs are represented in as spent dollars.
[4] This option is not considered feasible due to estimated cost, permit requirements and FN objections.

In the intervening months until the Project can be completed, FEI implemented protection measures to improve the integrity of the north bank of the Muskwa River by selective placement of a large number of 500kg sandbags. The cost of this mitigation was approximately $250 thousand and was recorded as an operating expense in 2013. FEI will be observing the north bank over the next months to monitor the effectiveness of the protective measures. In the event that FEI cannot proceed with the pipeline crossing replacement prior to the spring freshet, FEI may be required to undertake additional protective measures to maintain pipeline integrity.

1.3 *REGULATORY HISTORY AND PURSUIT OF THE IP BRIDGE OPTION*

On February 24, 2011, the Commission issued Order No. G-27-11 and Reasons for Decision (the Decision), in the FEI Fort Nelson 2011 Revenue Requirements Application (2011 RRA). That Decision included acceptance of the Muskwa River Crossing project as then proposed as being in the public interest and approval of $3,015,650 of capital costs (excluding AFUDC). The project proposed then was attaching an intermediate pressure pipeline to the Muskwa River highway crossing, referred to as the IP Bridge Option. However, the Commission recognized that for that project to proceed, necessary approval from the Public Works and Government Services Canada ("PWGSC") was necessary. Specifically, the Commission stated (at page 7 of the Decision):

> *The Commission accepts the Muskwa Project using the IP Bridge Option alternative as being in the public interest as TGFN has presented sufficient evidence to justify project need, cost and alternative selection. The Commission accepts that the IP Bridge Option is a more desirable alternative than the HDD options due to the high risk of project failure, the in- stream alternatives which pose potential cost and environmental risk and an Aerial Pipeline Option which is undesirable due to high installation and high maintenance costs. The Commission also accepts TGFN's estimated IP Bridge Option project cost of $3,015,650.*
>
> *If TGFN determines that the IP Bridge Option alternative is no longer the desired alternative due to permitting or other matters or if the cost estimate of the IP Bridge Option exceeds the estimated costs included in the Evidentiary Update, TGFN is directed to advise the Commission, reconsider and investigate all of the remaining crossing options more closely with regard to cost, feasibility, risk assessment and appropriateness. TGFN will then provide a recommendation for the Muskwa Project along with the supporting documentation to the Commission for review and approval on an expedited basis. Further, if TGFN's best internal estimate of cost for the IP Bridge Option is expected to exceed $3,015,650, TGFN is to report such findings to the Commission within 30 days of such knowledge…*

On July 21, 2011, FEI filed a letter with the Commission, advising that:

1. The IP Bridge Option alternative was still the preferred alternative;

2. The approval process for IP Bridge Option with Public Works and Government Services Canada (PWGSC) was ongoing but would require an independent third-party review of gas pipelines on bridges in general, as well as FEI's application, and would result in a delay of six to eight weeks; and

3. There would be a $100 thousand increase in the estimated cost of the IP Bridge Option related to the PWGSC approval process, and an associated delay in installation to June 2012.

On August 4, 2011, the Commission acknowledged receipt of the letter (Log No. 37404). The increase in costs was included in FEI's Fort Nelson 2012-2013 Revenue Requirement Application, which received approval by Commission Order G-44-12.

FEI had subsequent conversations with Commission staff in February, May and July of 2012, advising them of continued delays as FEI was still negotiating with PWGSC for permission to install the pipeline on the bridge and FEI's ongoing efforts associated with the PWGSC approval.

In late 2012, in consideration of ongoing PWGSC requirements, FEI began review of the remaining crossing options more closely with regard to cost, feasibility, risk assessment and appropriateness, while continuing to pursue approval with PWGSC until May of 2013 when the FEI appeal to the Minister responsible for PWGSC was rejected. On May 17, 2013, the PWGSC Assistant Deputy Minister advised it was unable to accommodate a new pipeline on the bridge.

1.4 *THE PROPOSED PIPELINE CROSSING OPTION AND FLEXIBILITY*

With this Application, and as ordered by the Commission, FEI provides further evaluation of all remaining options with regard to cost, feasibility, risk assessment and appropriateness. FEI has also included an analysis of one additional solution (Micro-tunnelling Option) that was not available at the time of the 2011 RRA.

As a result of the further investigation of options, the HDD option stands out as the preferred solution due to cost, schedule, and risk allocation. FEI proposes to proceed with the HDD option that was originally proposed, but with a revised risk assessment and an updated cost estimate. This Application assumes that once the contract is released to the market, that the lowest cost solution that meets all requirements will be HDD construction. However, there remains the possibility that a contractor may propose a Micro-tunneling option that, depending on risk allocation, is more economical than an HDD option. Therefore, FEI wishes to retain flexibility in choosing the crossing methodology to permit the most economical crossing that meets all environmental, technical, and regulatory requirements.

1.5 REQUESTED REGULATORY REVIEW OF CPCN APPLICATION

The Commission indicated in the Decision, FEI's crossing option analysis and related cost, feasibility, risk assessment and appropriateness along with the supporting documentation would be reviewed and approvals provided on an expedited basis.

FEI accordingly is requesting on an expedited basis, approval for an additional $3.6 million in costs for a total of $6.7 million before AFUDC, including the original $3.1 million that is already included in customers' rates. FEI has an estimated in service date of May 2014, which will be prior to the 2014 Muskwa River freshet to be possible if the Commission's grant of the CPCN can be received by January, 2014.

The information presented in this Application accords with the guidelines set out in the Commission's *2010 Certificates of Public Convenience and Necessity Application Guidelines* (the Guidelines). Draft Orders are included in Appendix L.

To facilitate an expedited process, FEI believes that a Streamlined Review Process as outlined in Order G-37-12, with one round of Information Requests from the Commission and interveners, provides appropriate and efficient review for this Application. FEI submits the regulatory review of this Application should focus on the proposed, preferred HDD option and related issues, not on the need for the Project as the Commission has already approved the need for installing a pipeline crossing in FEI's 2011 RRA. The need for a pipeline crossing has not changed as further explained in Section 3 and the rationale supporting the need continues to be valid. Indeed, the reasons for the risks discussed in the 2011 RRA have intensified. Additionally, the Project is of a nature that uses known construction methods and final configuration is confined to the Alaska Highway road allowance with minimal impact to the surrounding communities and First Nations during construction and operation.

FEI respectfully requests that the Commission complete its process to review this Application and reach a decision by January 2014 as discussed above and further in the following sections of this Application. FEI proposes the following regulatory timetable:

Table 1-2: Proposed Regulatory Timetable

ACTION	DATES (2013 and 2014)
FEI files CPCN Application	Friday, November 29
Intervener Registration Deadline	Tuesday, December 10
Commission and Intervener Information Requests	Monday, December 23
FEI Response to Information Requests	Thursday, January 16
Streamlined Review Process	Thursday, January 23
Expected Commission Approval	Thursday, January 30

2. APPLICANT

2.1 NAME, ADDRESS AND NATURE OF BUSINESS OF THE APPLICANT

The Application is filed by FEI for a CPCN approval for the Project in the Fort Nelson Service Area (Fort Nelson or FEFN). FEFN is a service area within FEI that has its own rate base for the purposes of determining rates. FEFN is not a separate legal entity. Thus, in the Application, FEI or the Company will be used to refer to FortisBC Energy Inc. as it is the Project applicant where FEFN will be used where a distinction between FEI and FEFN is required.

FEI is a company incorporated under the laws of the Province of British Columbia and is a wholly-owned subsidiary of FortisBC Holdings Inc., which, in turn, is a wholly-owned subsidiary of Fortis Inc. FEI maintains an office and place of business at 16705 Fraser Highway, Surrey, British Columbia, V4N 0E8.

FEI is the largest natural gas distribution utility in British Columbia and provides sales and transportation services to residential, commercial, and industrial customers in more than 100 communities throughout British Columbia, with approximately 840,000 customers served. FEI's distribution network delivers gas to more than eighty percent of the natural gas customers in British Columbia.

2.1.1 Fort Nelson Service Area

As mentioned above, FEFN has its own rate base for the purposes of determining rates. FEFN currently serves approximately 2,400 customers. Operations in Fort Nelson consist of a transmission lateral from the nearby Spectra Energy Corporation processing plant to the town of Fort Nelson together with a gas distribution system. Also included in the service area is the distribution system in Prophet River.

2.2 FINANCIAL CAPACITY

FEI is regulated by the BCUC. FEI is capable of financing the Project either directly or through its parent, FortisBC Holdings Inc. FEI has credit ratings for senior unsecured debentures from Dominion Bond Rating Service and Moody's Investors Service of A and A3 respectively. FortisBC Holdings Inc. has credit ratings for senior unsecured debentures from Dominion Bond Rating Service and Moody's Investors Service of BBB (High) and Baa2 respectively.

2.3 TECHNICAL CAPACITY

FEI has designed and constructed a system of integrated high, intermediate and low-pressure pipelines and operates more than 40,900 kilometres of natural gas transmission and natural gas distribution mains and service lines in British Columbia. FEI's transmission and distribution infrastructure serves approximately 840,000 customers in British Columbia.

The Project will be managed by a team from FEI. The organization chart of the Project team is present in Figure 5-1. FEI will employ a qualified contractor for the construction of the Project, which is discussed in detail in Section 5.5.3 of the Application.

2.4 COMPANY CONTACT

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2.5 LEGAL COUNSEL

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2.6 ORGANIZATION OF THE APPLICATION

The remainder of the Application is organized as follows:

- Section 3 – Project Justification
- Section 4 – Options Analysis
- Section 5 – Project Description
- Section 6 – Project Cost Estimate
- Section 7 – Environmental and Socio-Economic Assessments
- Section 8 – Public Consultation
- Section 9 – First Nations Consultation

3. PROJECT JUSTIFICATION

By Order G-27-11 in FEFN's 2011 Revenue Requirement Application (2011 RRA) and the associated Reasons for Decision (the Decision), the Commission accepted the Project as being in the public interest and noted that FEFN had presented sufficient evidence to justify the project need. Specifically, the Commission stated (at page 7), that:

> *The Commission accepts the Muskwa Project using the IP Bridge Option alternative as being in the public interest as TGFN has presented sufficient evidence to justify project need, cost and alternative selection.*

The "Project Justification" provided in support of the Commission's Decision continues to be true today. Mainly, approximately 12 meters of pipeline had become exposed in the river thalweg and was at risk of damage from river action, which could lead to pipeline rupture loss of natural gas supply to customers in Fort Nelson. This risk has since intensified based on the recent inspection of late 2012 which found that pipe exposure has increased to approximately 20 meters.

In this section, the Company will summarize the Project justification provided in the 2011 RRA, followed by a discussion to demonstrate that while the consequences of failure have remained somewhat constant, the risks identified in the 2011 RRA have intensified and a pipeline crossing replacement is recommended prior to the next spring freshet.

3.1 *PROJECT JUSTIFICATION PROVIDED IN THE 2011 RRA*

In the 2011 RRA, the Company provided two main reasons for the Project:

1. the risk of pipeline failure because of loss of depth of cover at the river crossing due to river action and the expanding length of exposed pipeline in the river; and
2. the consequences of failure resulting in loss of gas supply to Fort Nelson customers downstream of the crossing.

These reasons remain today. Below, the Company will summarize these two main reasons previously articulated.

3.1.1 Pipeline Crossing and Inspection

The Company, as part of its pipeline integrity management program, completed an underwater survey of this pipeline crossing in September 2008. Depth of cover was found to be generally shallow across the whole crossing, including under the south bank gravel and sand bar.

Bank erosion persists along the north bank, which is commensurate with the meandering channel plan and the existence of the large bar on the south bank. The 2008 survey indicated there were approximately 12 metres of exposed pipe within the river on the north side of the

channel. In comparison, a 2004 survey had indicated approximately 0.5 to 1.0 metres (2-3 feet) of pipeline cover in the main channel.

3.1.2 Risk to Exposed Pipeline

For the pipeline that is exposed, there is a greater risk of critical damage via various scenarios. Each may result in an immediate impact on pipe integrity or potentially create a future integrity concern. These scenarios include:

- Line strike by a large boulder or cobble during a high flow event, resulting in a large dent with a gouge or potentially a line fracture;
- Ice jamming during spring break-up may impinge or dislodge the pipe causing denting, gouging, fracture, or severing;
- Line strike by a third party operating on the river in either a commercial or recreational fashion, potentially resulting in a dent, gouge or line fracture;
- Excessive pipe deflection caused by further erosion, resulting in an unsupported exposed length of pipe potentially being impacted by entrained river debris causing buckling or a failure of the pipe; and
- An unsupported length of pipe can be exposed to oscillations caused by the river current which, in turn, could result in fatigue and subsequent failure of the pipeline.

3.1.3 Consequence of Failure

The pipeline crossing the Muskwa River is the only source of natural gas for the community of Fort Nelson and is integral to the delivery of natural gas to customers. At the end of 2012, Fort Nelson natural gas customers include 1,947 residential, 443 small commercial, 31 large commercial, and 2 industrial. Of these customers, approximately 90 percent of the residential and commercial customers will be impacted directly by a potential outage of the river crossing. Currently, the industrial customers are located upstream of the river crossing and will not be impacted. Failure of the pipeline crossing would completely disable FEI's ability to supply natural gas to customers in Fort Nelson downstream of the crossing. As Fort Nelson is a northern community, the provision of natural gas for space heating is especially critical. Loss of the pipeline at this crossing would completely cut the delivery of natural gas to those members of the community downstream of the crossing, leaving customers to rely upon other forms of heat including wood or electricity, depending on how each home is equipped and could choose to permanently switch to these alternative energy sources. As the river crossing is close to the community, the line pack could not be relied upon for any meaningful time. FEI has estimated the line pack will support the community for less than 3 hours at +10 degree C and less than 30 minutes during a winter day of -20 degree C.

The loss of the pipeline is also hazardous to public safety and may impact the ability of vehicle traffic to traverse the Muskwa River Bridge or endanger any personnel that may be utilizing the adjacent river shoreline for recreational purposes.

3.2 *FURTHER JUSTIFICATION BASED ON 2010 AND 2012 SURVEYS AND 2013 RECENT OBSERVATIONS*

The Company re-inspected the Muskwa River pipeline crossing in 2010 (shore-based) and again in late 2012 (underwater). The 2012 survey, attached as Appendix A, revealed that the extent of pipeline exposure had increased to approximately 20 metres and a greater proportion of the pipeline circumference was exposed.

The Company has also observed that river action continues to erode the north bank at the pipeline crossing. There is a significant loss of pipeline cover at this location and the remaining pipeline cover has as little as 0.8 metres of cover within the bank. Previous surveys completed and ongoing monitoring of the pipeline indicates that the remaining pipeline cover in the river bank would likely be eroded further during the 2014 spring freshet. The key concern for the crossing is that the combined exposure of the pipe in the thalweg and the river bank is at higher risk of damage during the freshet for the same reasons noted in section 3.1.2.

Figures 3-1, 3-2, and 3-3 below show the extent of the north bank erosion including the area where the pipeline exits the river.

Figure 3-1: Bank Erosion at the Pipeline Crossing (July 2013)

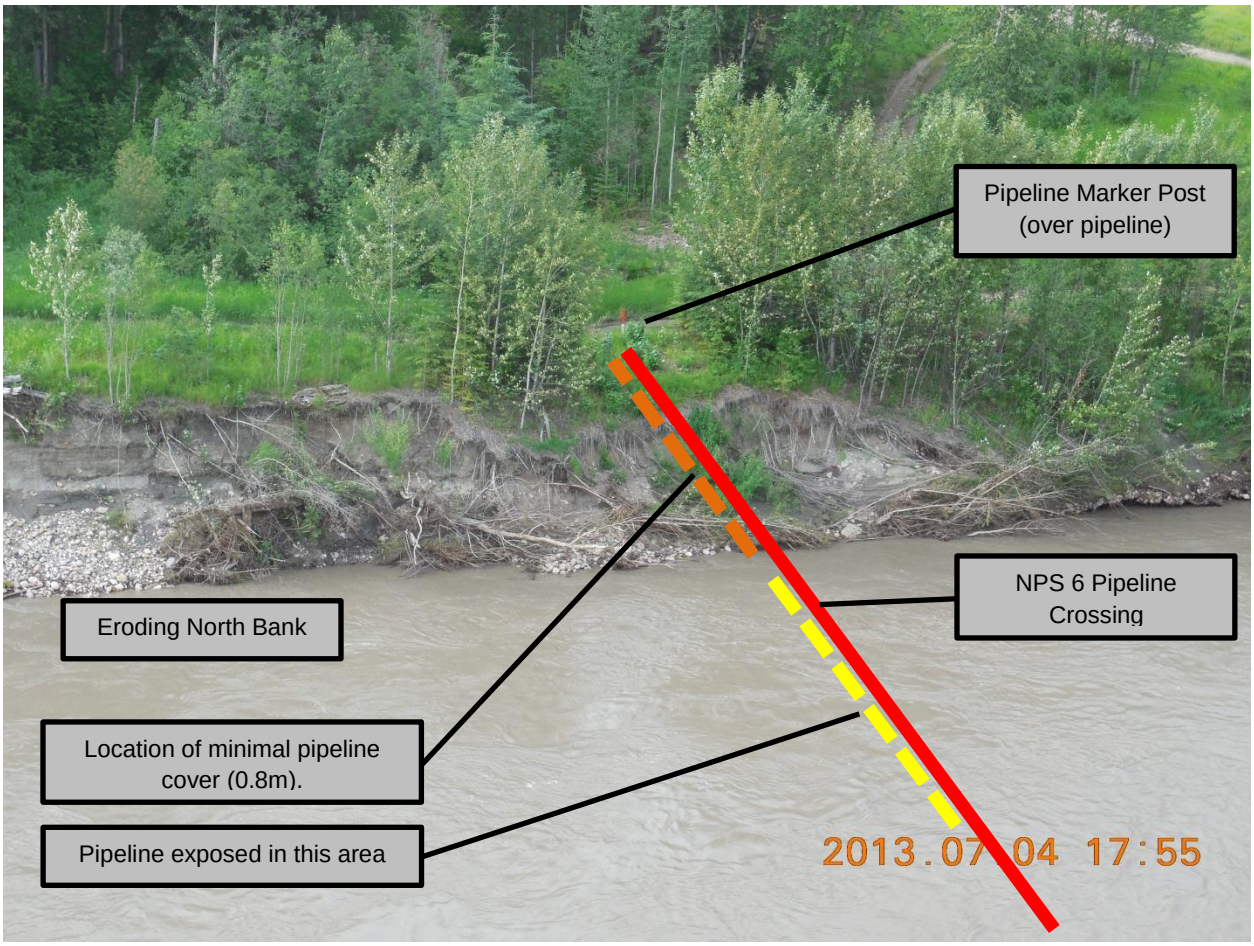


Figure 3-2: Bar Development and Bank Erosion Overview at the Crossing (Oct 2013)

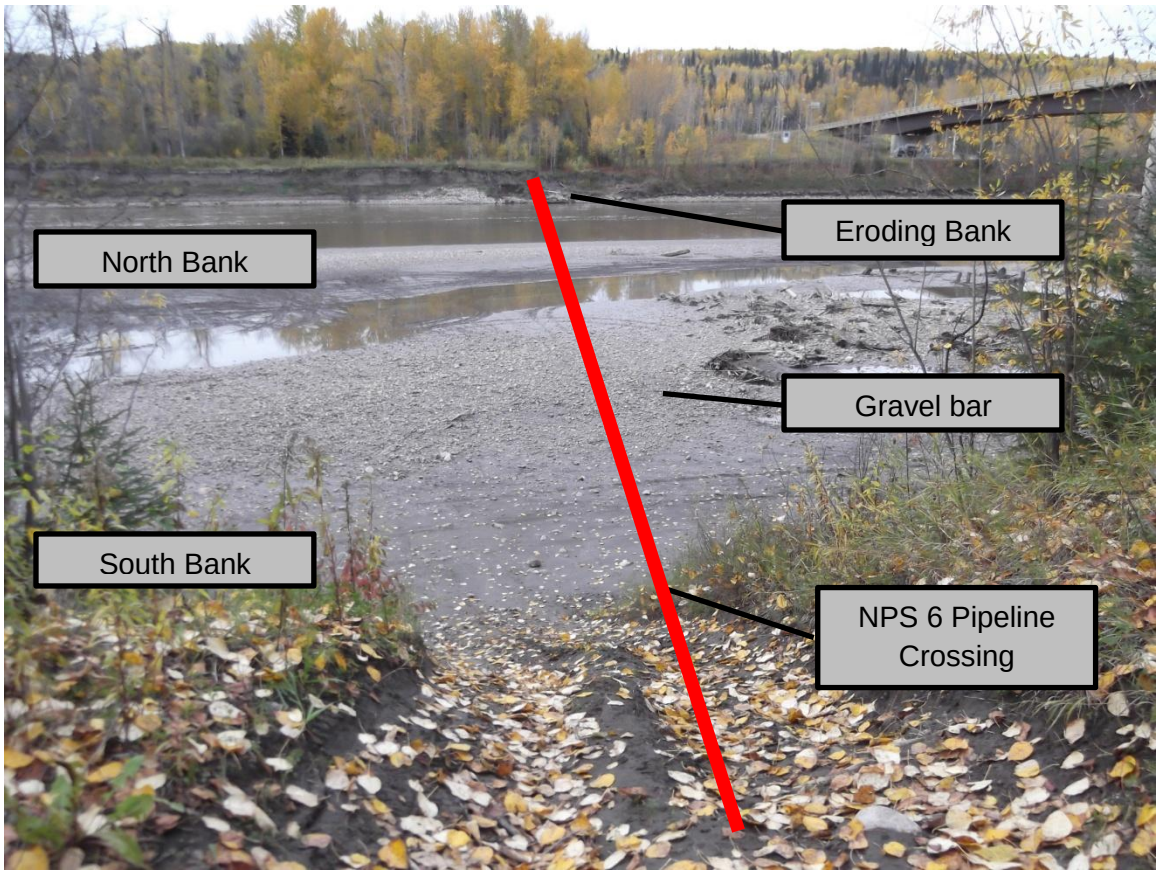
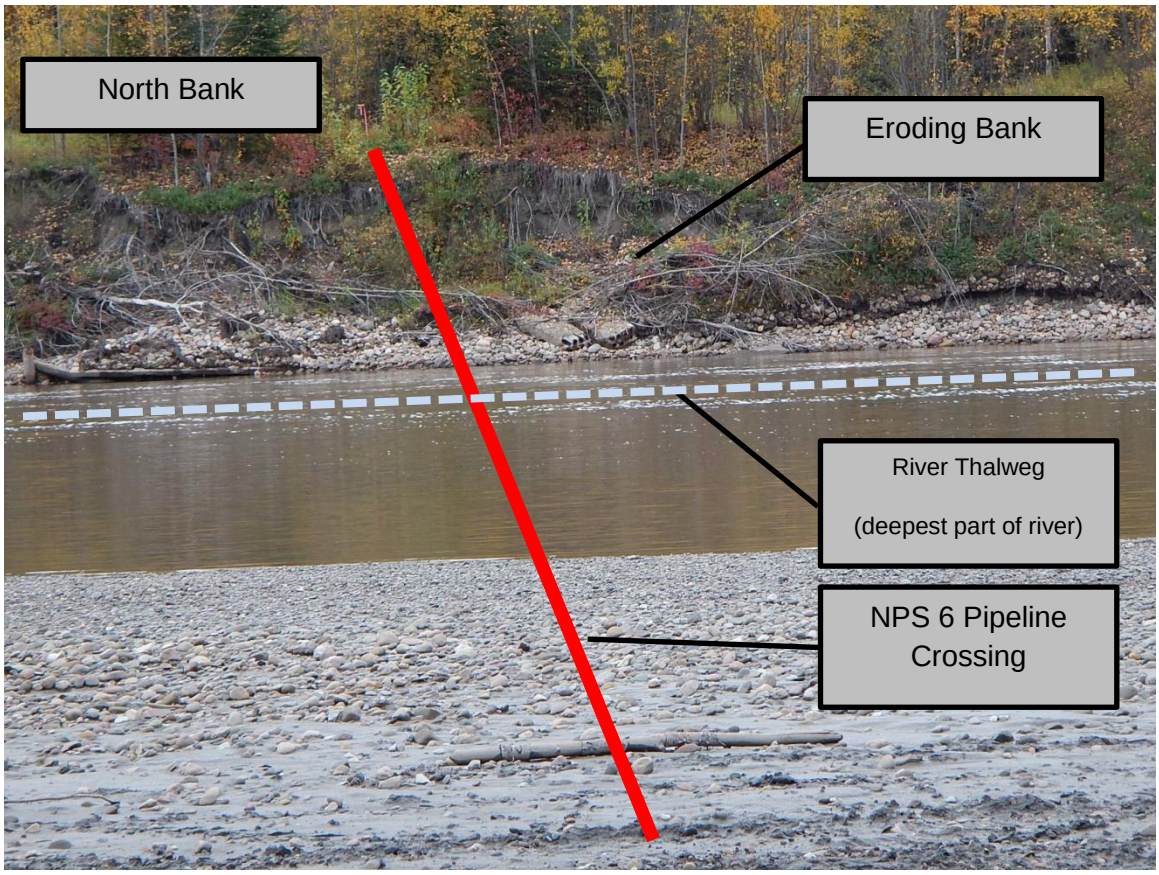


Figure 3-3: Bank Erosion at the Crossing (Oct 2013)



3.3 PROJECT NEED BY MAY 2014

The continuing loss of pipeline cover and minimal remaining cover on the north river bank is a cause for substantial concern. In its present condition, FEI is concerned that the spring 2014 freshet elevates the risk to the pipeline and therefore the desired and current project plan is to have a new pipeline crossing in place by May 2014.

In the intervening months until the Project can be completed, FEI implemented protection measures to improve the integrity of the north bank of the Muskwa River by selective placement of a large number of 500kg sandbags. The cost of this mitigation was approximately $250 thousand and was recorded as an operating expense in 2013. FEI will be observing the north bank over the next months to monitor the effectiveness of the protective measures. In the event that FEI cannot proceed with the pipeline crossing replacement prior to the spring freshet, FEI may be required to undertake additional protective measures to maintain pipeline integrity.

3.4 JUSTIFICATION SUMMARY

Based on the information currently available, and considering the growing length of exposed pipe in the river and river bank erosion and the consequences of failure, the Commission's

previous determination by Order No. G-27-11, that the project is in the public interest and that FEFN presented sufficient evidence to justify project need, remains appropriate.

The risk to the pipeline not only continues but has intensified because of the further exposure of the pipe in the river and minimal pipe cover because of the recent erosion of the north bank. The consequences of pipeline failure (loss of sole source of natural gas to most of Fort Nelson) remain the same.

FEFN considers there to be significant risk to the pipeline and that replacement of the pipeline crossing prior to the spring freshet is strongly advised. Therefore, FEFN recommends to the Commission that the pipeline crossing replacement be operational by May 1, 2014.

4. OPTIONS ANALYSIS

This section will describe:

- The objectives and requirements that FEI intends to meet with the options considered;
- The options considered and evaluated by FEI; and
- The preferred option selected by FEI.

4.1 *OBJECTIVES AND REQUIREMENTS*

As discussed in Section 3, the pipeline crossing of the Muskwa River has exposed pipe within the thalweg (deepest part) of the river channel and minimal pipeline cover in the north bank. FEI recommends replacement of the pipeline prior to the 2014 spring freshet.

Any new pipeline crossing considered and selected must account for the lifespan of the proposed crossing and future changes to the river water course (i.e. migration from its current path). This includes future variances in depth and bank erosion.

When installing a new natural gas pipeline crossing, there are currently two primary crossing methods that are generally accepted:

- below the river bed, using a trenched (open cut) or trenchless construction technique (HDD or microtunnelling); and
- above the river, using a dedicated aerial bridge support structure or using an existing bridge on which to install the new pipeline crossing.

Each option needs to satisfy current natural gas pipeline codes, the Company's engineering standards and operating requirements to ensure the long term integrity of the crossing, including:

- sufficient depth, or height above the river surface, such that the pipeline will not be at risk of damage from the river deepening over a long period of time;
- sufficient depth of cover in the banks such that the pipeline will not be at risk of damage from the river widening over a long period of time; and
- the option should deliver the solution that best suits the needs of the stakeholders and the Fort Nelson community by taking into consideration the cost, safety, environmental risk, construction risk, and regulatory requirements.

4.2 *OPTIONS CONSIDERED*

Since the exposed pipeline was first detected in 2008, FEI has investigated a number of options in determining a strategy to replace or repair the existing crossing. The options considered both

financial and non-financial evaluation outcomes and the options selection at each stage of the Project to date are detailed in the following sections.

4.2.1 Initial Options Considered (2010 for 2011 RRA)

The initial options considered to construct a new Muskwa River pipeline crossing included:

- Horizontal Directional Drill (HDD);
- HDD + Open Cut Hybrid (in-stream);
- Non-Isolated Open Cut (in-stream);
- Lowering of Live Existing Pipeline (in-stream);
- Armouring of Existing Pipeline - rip rap or concrete mats (in-stream);
- Intermediate Pressure (IP) Pipeline on Existing Alaska Highway Bridge with Transmission Pressure to IP pressure reducing station (IP Bridge option); and
- New Aerial Pipeline Bridge Crossing.

The Company rejected all the options requiring 'in-stream' work based on the environmental impact, permitting difficulties, and long term viability; however, a modified Open Cut option, involving isolation of the river channel, was retained due to the potential to manage and significantly reduce the potential environmental impact and also to validate the apparent low cost estimate of this option when presented in 2010.

The geotechnical investigation of the proposed pipeline crossing location indicated gravel layers that substantially increased the cost and risk of an HDD crossing option. In 2010, the HDD and IP Bridge Crossing options were progressed and the budget estimates updated to Class 3 accuracy. These cost estimates, detailed in Table 4-1, were included in the 2011 RRA and subsequent Evidentiary Update:

Table 4-1: Project Construction Cost Estimates in 2011 $ millions[5]

Option	Budget Estimate	Accuracy
HDD	4.09	Class 3
Isolated Open Cut ("in-stream")	2.10	Class 4
IP Bridge Crossing	2.57	Class 3
New Aerial Bridge Crossing	3.25	Class 4

In anticipation of the potentially significant increase in the cost estimate for the HDD Option, due to the anticipated challenging ground conditions detected by the geotechnical investigation, FEI

re-evaluated the remaining crossing alternatives in late 2010. A New Aerial Bridge Crossing and Isolated Open Cut option was considered but the high capital cost of construction, long term maintenance costs of the Aerial Crossing, and perceived construction and permitting challenges of the Isolated Open Cut reduced the attractiveness of these options.

Based on financial and non-financial analysis, the Company had determined that the IP Bridge option was the preferred option, and recommended this solution in the Evidentiary Update to its 2011 RRA.

4.2.2 Commission Order G-27-11

On February 24, 2011, the Commission issued Order No. G-27-11 and accompanying Decision. In its Decision, the Commission accepted the project as then proposed (the IP Bridge Option) being in the public interest and approved $3,015,650 of capital costs (excluding AFUDC). The Commission's Decision recognized that the IP Bridge Option was subject to the Company obtaining permitting from Public Works and Government Services Canada (PWGSC) to attach the pipeline to the Alaska Highway Bridge. The Decision also outlined a regulatory process if the permit could not be obtained or the costs of the IP Bridge Option would be higher than estimated. The Decision states (page 7):

> *The Commission accepts the Muskwa Project using the IP Bridge Option alternative as being in the public interest as TGFN has presented sufficient evidence to justify project need, cost and alternative selection. The Commission accepts that the IP Bridge Option is a more desirable alternative than the HDD options due to the high risk of project failure, the in-stream alternatives which pose potential cost and environmental risk and an Aerial Pipeline Option which is undesirable due to high installation and high maintenance costs. The Commission also accepts TGFN's estimated IP Bridge Option project cost of $3,015,650.*
>
> *If TGFN determines that the IP Bridge Option alternative is no longer the desired alternative due to permitting or other matters or if the cost estimate of the IP Bridge Option exceeds the estimated costs included in the Evidentiary Update,* ***TGFN is directed to advise the Commission, reconsider and investigate all of the remaining crossing options more closely with regard to cost, feasibility, risk assessment and appropriateness. TGFN will then provide a recommendation for the Muskwa Project along with the supporting documentation to the Commission for review and approval on an expedited basis.*** *Further, if TGFN's best internal estimate of cost for the IP Bridge Option is expected to exceed $3,015,650, TGFN is to report such findings to the Commission within 30 days of such knowledge. [emphasis added]*

In compliance with the above directive, FEFN filed a report with the Commission, advising that the IP Bridge Option alternative remained the preferred option, but with an increase in capital costs of approximately $100 thousand. The Commission approved by Order G-44-12 the increased cost that had been included in FEFN's 2012-2013 RRA.

4.2.3 PWGSC's Refusal of Permit

The IP Bridge Option that was approved by the Commission involved the reduction of the pipeline operating pressure to Intermediate Pressure (IP) by installation of a pressure reducing station just south of the south bank of the Muskwa River, and then crossing the river with a new pipeline attached to the Muskwa River highway bridge. This option became the crossing option that was most economical and met all requirements with minimal technical and environmental risks.

The challenge faced by FEI was that the bridge is owned by PWGSC and therefore FEI requires permission from PWGSC to use the bridge. PWGSC advised FEI that they would consider a design for a pipeline attachment if the design met with BC Ministry of Transportation and Infrastructure (MoTI) standards. FEI is familiar with these requirements and had recently completed the installation of IP natural gas pipelines on eleven bridges along the Sea to Sky Highway between Squamish and Whistler in time for the 2010 Olympic Games.

Qualified bridge engineers were used to determine the suitability of the bridge to safely attach a natural gas pipeline and to determine the seismic capacity of the bridge. The subsequent examination found that the bridge met FEI's requirements for pipeline attachment.

Following the assessment of the bridge and completion of a conceptual bridge crossing design, FEI made an informal application in January 2011 to PWGSC for permission to suspend the IP Pipeline from the Muskwa River highway bridge, followed by a formal application in March 2011.

In July 2011, PWGSC advised that they had no in-house capability to assess the FEI application and requested that FEI underwrite the cost of an independent technical review of the application and review of the practise of pipeline installations on highway bridges in other jurisdictions in western Canada. By September 2011, Fortis had accepted the terms of the report and agreed to underwrite the cost. The report was authored by KPMG with the full cooperation of FEI and its consultants. The report was released to FEI in late March 2012. The KPMG report was favourable to the FEI application with some minor conditions that FEI considered reasonably negotiable.

Unfortunately, in July 2012 PWGSC advised FEI that the request for permission to attach a natural gas pipeline to the Muskwa River Bridge had been denied.

According to PWGSC, "The Department has reviewed this request and will not permit the attachment to the bridge in view of the critical importance of the Alaska Highway and the viability of other crossing options."

FEI then responded by requesting a meeting with PWGSC officials because:

- FEI has established that installing natural gas pipelines on bridges is a practical alternative when other crossing options become cost prohibitive or technically unfeasible.

- The bridge crossing design meets BC MoTI requirements and all applicable technical standards.
- FEI has pipelines on bridges that are of equal if not greater "critical importance" to the transportation network (i.e. Ironworkers Bridge, Vancouver).
- The third party (KPMG) reviewed FEI's application, supporting engineering and environmental research and concurred that the application made sense.

In September 2012, FEI met with PWGSC staff in Gatineau, Quebec to understand their requirements and to present FEI requirements. Based on the meeting, FEI believed that a favourable outcome was still a possibility, but that FEI had to further evaluate the other technically viable crossing options.

PWGSC communicated to FEI in December 2012 that they considered that their decision was final. FEI met with PWGSC in January 2013 to advise PWGSC that FEI was preparing to file an application with the BCUC for greater funding and determine if there was further opportunity for dialogue. Unfortunately, PWGSC continued to express their position that the bridge is a vital transportation link, that there are other viable options and that they will not work with FEI to grant a permit to use the Muskwa River Bridge as a pipeline crossing.

FEI maintained communication to local politicians of the project status. In 2013, a Member of Parliament offered their support if FEI wrote to the Minister responsible for PWGSC to reconsider permitting. This was completed in March 2013. In May 2013, the Assistant Deputy Minister responded that the decision of PWGSC remained unchanged and that PWGSC would not permit the installation of a pipeline on the bridge. This letter ceased FEI's pursuit of the IP Bridge option, and evaluation of the remaining options continued. This letter is attached as Appendix B.

The IP Bridge Option was the least cost option by a significant margin, minimized the impact to FEFN's small rate base, and easily met all technical and environmental requirements. FEI pursued this option persistently in the belief that PWGSC would eventually grant permission and the Project could be undertaken with the least risk and cost to customers.

4.3 *OPTION ANALYSIS AFTER IP BRIDGE OPTION REJECTION*

Subsequent to PWGSC's refusal to permit use of the bridge for the pipeline attachment, and as directed by the Commission in Order G-27-11, FEI reconsidered and investigated all of the remaining crossing options more closely with regard to cost, feasibility, risk assessment and has also included an analysis of one additional solution (Micro-tunnelling Option) that was not available at the time of the 2011 RRA, as further explained below.

Similarly to the earlier option analysis and determination, the in-stream options continue to present significant environmental risk, challenging construction within the flowing river, and uncertain long term viability. Thus, the Company has not conducted any further evaluation of

the in-stream options except for the technically viable Isolated Open Cut Option (further discussed below).[6]

In late 2012, the Company considered the following remaining options to install a new pipeline crossing:

1. HDD;
2. In-stream Open Cut (isolated);
3. New Aerial Pipeline Bridge Crossing; and
4. Microtunnel.

FEFN sought AACE International Recommended Practice No. 17R-97 Class 3 cost estimates of these four options to ensure all were equally considered and evaluated using 2013 standards and cost estimates. This approach was deemed necessary to ensure the options were progressed to a level of project definition to adequately quantify the risk, design and construction challenges and cost. This facilitated a more robust and more timely option comparison and selection process.

Relevant project total budget costs, and crossing length, are shown in each option description below.

4.3.1 Horizontal Directional Drilling (HDD)

Project Capital Cost Estimate: $5.76 million (2013$)[7]

Crossing Length: 530m linear surface distance, 550m pipeline length (approximately)

HDD is a trenchless crossing technique that is frequently selected for any high value fish and fish habitat watercourse where suitable subsurface geology exists. The HDD process involves drilling an opening, or small diameter bore, usually approximately 50% larger than the gas pipe, from one side of the river to the other side. The gas pipe is then inserted into the prepared opening. The HDD drilling process is executed from ground level at either side of the river. There is no construction within the river required. Prior to setup of the HDD equipment some surface preparation (e.g. tree removal and grading) is necessary. The HDD equipment is setback sufficiently from the river's edge so as to minimize the impact on the river environment. The drill enters the ground at an angle (approximately 8 to 20 degrees) and extends from ground level adopting a curved 'u-shape' profile beneath the river and exits at ground level on the opposite side of the river (i.e. 'bank to bank'). The completed bore (hole) is then cleaned and prepared for insertion of the gas pipeline. The new pipeline is pulled into the prepared hole to complete the installation of the new gas pipeline under the river.

[6] For details of the in-stream options, please see pages 35 to 38 of the 2011 RRA.
[7] Estimate of $5.87 million in as spent dollars, please see Table 4-2 below for a breakdown of total costs in as spent dollars.

This option is similar to the HDD (peak to peak) considered in the 2011 RRA. This option, in comparison to the HDD + Open Cut Hybrid (low to high) Option, is longer because the HDD equipment is positioned outside of the river. However, the major advantage siting the HDD equipment outside the river is the significantly reduced environmental risk. The HDD + Open Cut Option would position the drilling equipment on the gravel bar, beside the water course (wetted area), within the river. Thus, to complete the new crossing, it would be necessary to open cut and excavate from the gravel bar back to the river bank.

The main advantages of the HDD Option include:

- no stream bed sediment disturbance;
- no disturbance of streambed or banks;
- stream flow is maintained;
- fish passages are maintained;
- vegetative buffer on both sides of the watercourse is maintained;
- clean-up of river bed and banks is minimized;
- a larger construction window;
- reclamation activities are reduced; and
- long-term maintenance requirements lower in comparison to the open cut installation, which may require periodic dive surveys, and aerial crossing options which require periodic inspection and maintenance.

The main disadvantage of HDD is construction risks presented by unforeseen underground conditions. While mitigated with sub-surface investigations, there always remains the possibility of significant drilling challenges with these unforeseen conditions. This is inherent with any underground construction.

The current Class 3 estimate of $5.76 million is inclusive of all project capital costs including project management, engineering, permitting, materials, construction and commissioning, and contingency. The 2010 Class 3 cost estimate was $4.09 million. The 2010 cost estimate was prepared using external FEI resources only, and by a different engineering consultant. The 2013 HDD construction cost estimate was prepared by Jacobs Associates in conjunction with FEI internal engineering resources; this integrated approach facilitated a more robust evaluation of project needs, resource requirements, and risks. Jacobs, who are trenchless and underground tunneling specialists, prepared the core HDD construction estimate and risk assessment, and FEI prepared the non-core construction costs. The resulting cost estimate has increased in most aspects with respect to the 2010 estimate; primarily with increases to the non-core construction costs of project management, engineering, inspections services, permit requirements, and risk contingency. The cost increases are due to:

- a greater understanding of the HDD construction risk profile, which warranted increased contingency to cover the residual risk after all feasible mitigation measures were considered;
- an underestimation of resource requirements for project management, engineering, and inspection services in the 2010 estimate;
- more stringent permitting requirements from OGC including higher expectations from stakeholders and First Nations; and
- increased materials costs.

4.3.2 Isolated Open Cut (in-stream trenched)

Project Capital Cost Estimate: $10.47 million (2013$)[8]

Crossing Length: 450m

This option would involve excavation of a trench across the river bed and extensive excavation of the river banks. The first step would be to excavate a localized bypass channel, approximately 300 long, 30m wide, and 3m deep, within the gravel bar on the south side of the existing pipeline crossing location. This would divert the river and facilitate isolation of the normal river channel. The river channel isolation is effected by driving two rows of vertical interlocking piles across the river channel on either side of the existing pipeline crossing; one row located upstream (west) and one row located downstream (east). The isolated section of river would then be dewatered and a trench for the new pipeline crossing excavated. The new gas pipeline would then be fabricated (welded, tested etc.) on the river bank, moved into position in the excavated trench, and then backfilled with suitable material to achieve the required depth of cover. The isolated river section would then be flooded, and the process involved in constructing the isolation and bypass channel would be reversed in order to reinstate the river channel to its original form.

In comparison to the Pipe Live Lowering Option and the Non-Isolated Open Cut Option considered in the 2011 RRA, this option would facilitate the construction of a more robust pipeline crossing as the construction is not required to take place within the continuously flowing river. This enhances the ability to install the new crossing pipe at required depth with sufficient cover to prevent future exposure. Also, this option significantly reduces the duration of the in-stream work as it would not involve construction equipment operating from barges within the river channel wetted area. Instead, the river disturbance would only occur during the initial bypass channel construction and installation of the isolation walls, and again at the end of the construction process. In the intervening construction period, the river disturbance, e.g. sediment disturbance, would be minimized, resulting in the lowest environmental impact of these three in-stream options.

[8] Estimate of $10.67 million in as spent dollars, please see Table 4-2 below for a breakdown of total costs in as spent dollars.

However, this option presents the following challenges:

- It requires an immense construction undertaking impacting a large area footprint;
- In comparison to the trenchless options, it requires additional permitting such as Department of Fisheries and Oceans (DFO) and the Navigable Waters Protection Act (NWPA);
- The construction disturbance area and post-construction reinstatement and remediation would have a high likelihood of opposition by local stakeholders and a high certainty of opposition by First Nations; and
- The construction window, which is constrained to periods at which the river level is lowest, would be in conflict with DFO's preference for in-stream work to occur when fish are most adaptable to disturbances (generally August).

The previous Class 4 estimate was $2.01 million. The current Class 3 estimate of $10.47 million is a significant increase and is the result of a fundamental flaw in the Class 4 cost estimate which was not detected previously. This option was, while technically viable, is usually only available as a crossing option of last resort. Communication with Fort Nelson First Nations indicated that they would be resistant to any river disturbance and DFO also directs that any in-stream options are only considered if all other options are not feasible. Thus, FEI minimized any resources to examine this option.

In late 2012, following the decision to re-examine the remaining options with greater scrutiny, further analysis revealed that the construction of an open cut in a river of this magnitude, with the material types found, requires channel reinforcement to ensure that the diverted river is safely contained. This channel reinforcement plus all related construction activities of the re-enforcement increased the cost dramatically. Other increases in the cost estimate are similarly related because of more stringent permitting requirements, and higher project management, design and inspection costs.

The Isolated Open-cut Option is not a feasible option when other crossing options remain that are less costly with reduced permitting challenges.

4.3.3 New Aerial Pipeline Bridge Crossing

Project Capital Cost Estimate: $7.36 million (2013$)[9]

Crossing Length: 350m (approximately)

This option comprises the construction of an above ground suspension-like support bridge across the Muskwa River onto which the new pipeline would be attached. This proposed

[9] Estimate of $7.5 million in as spent dollars ($7.0 million capital + $0.5 million O&M), please see Table 4-2 below for a breakdown of total costs in as spent dollars.

structural system has been employed successfully on other TP Pipeline aerial crossings in British Columbia. Two vertical towers would be constructed on either side of the Muskwa River beside the existing pipeline. The towers would be supported on a concrete foundation and stabilized via steel cables attached to the top of the towers then splayed and attached to anchors positioned in the ground around the base. A structure comprising steel cables would then be installed between each of the vertical towers and span across the river. The gas pipeline would be assembled on the ground, welded and tested prior to being erected by threading a steel cable through it and then pulling the pipe into position across the river and securing it to the bridge.

The advantage of the Aerial Crossing is that there is reasonable certainty of construction success because the construction risks are generally observable and therefore usually managed with more certainty. The proposed New Aerial Bridge Crossing would be situated adjacent to the existing Muskwa River Crossing and requires Crown land to establish a right of way to protect the structure. Additional TP pipeline, albeit minimal, is required to tie into the existing pipeline.

The disadvantage of the Aerial Bridge Crossing is potential objection by local stakeholders because of the aesthetics of the structure and its size. The construction of the Aerial Pipeline bridge Crossing will impact the riparian zone adjacent to the structure and FNFN have expressed strong concern of any option that will disturb the river or river bed. Additional disadvantages are the higher maintenance costs over the estimated 75 year life span of the structure and an ongoing safety concern regarding third party trespass onto the bridge structure. Another disadvantage of this option is the length of time (estimated to be one year) and cost to acquire permits, and additional efforts to manage probable stakeholder and certain First Nations objections.

The previous Class 4 estimate was $3.25 million. The current Class 3 estimate of $7.36 million reflects the more developed project scope which includes the effect of a longer span (larger site preparation and more materials, more difficult construction conditions due to subsurface conditions, higher materials costs, more stringent permitting requirements including additional rights of way, greater construction contingency allowance, and higher project management, design and inspection costs. This cost estimate also includes a $0.5 million net present value (NPV) of future maintenance and inspection over the estimated 75 year life of the structure.

4.3.4 Microtunnel

Project Capital Cost Estimate: $7.78 million (2013$)[10]

Crossing Length: 300m (approximately)

[10] Estimate of $7.93 million in as spent dollars, please see Table 4-2 below for a breakdown of total costs in as spent dollars.

Microtunnelling has been proposed as a potentially viable trenchless technique that, similar to HDD, could be used to install the new gas pipeline crossing and reduce the risk presented by the sub-surface gravel layers.

Microtunnelling involves a drilling process that would form an opening or tunnel beneath the river in which the new crossing pipeline would be inserted. Microtunnelling, however, involves a different construction technique than HDD. HDD forms a bore, or opening, slightly larger than the gas pipeline, and the opening is stabilized during the drilling process by filling the annulus with a special fluid which balances the underground pressures and prevents collapse of the drilled hole. The Microtunnelling process forms a relatively larger opening or Microtunnel (in this case approximately 1.2m in diameter), which is lined with a concrete sleeve to stabilize the annulus during and after the drilling process. The first step in a Microtunnel project would involve the construction of two shafts, one for jacking and one for receiving, aligned on each side of the river. The jacking shaft would be larger and deeper than the receiving shaft to accommodate the Microtunnel drill. In contrast to the HDD process where the main drilling equipment remains on the surface, the Microtunnel drill travels underground from the jacking shaft to the receiving shaft. Precast concrete sections, similar to large diameter concrete pipes, would be inserted behind the Microtunnel drilling machine as it advances through the ground. The Microtunnelling drill is located at the front of the pipe sections, or casings, and advanced through the ground by the hydraulic rams of the jacking station located in the launch shaft.

The Microtunnel Option offers many of the same advantages afforded by the HDD Option in terms of avoiding larger excavations and having less environmental impact. However, Microtunnelling is sensitive to the length of the crossing and equipment sizing and selection, usually increasing in size as length increases and therefore cost. To minimize these factors, the launch and reception shafts would be constructed as close as reasonably possible to each river bank. While this would reduce the Microtunnel drill length to 300m compared to the longer 550m HDD drill length, the launch and reception shafts would impact the riparian management zone. Also, to optimize the Microtunnel option for the Muskwa River crossing in terms of schedule and cost, it would be necessary to minimize the depth of the launch and reception shafts. To achieve this, it would be necessary to employ a curved tunnel profile which is more complex to design and construct compared to the HDD option.

4.4 *OPTIONS EVALUATION*

The Company conducted a financial and non-financial evaluation of the four options discussed above. To assist the evaluation, FEI engaged the following consultants to prepare up to date conceptual design and AACE Class 3 construction cost estimates and construction schedules for each option.[11] Each consultant was selected based on proven experience and technical knowledge in the respective crossing techniques.

- Jacobs Associates (Jacobs) - HDD and Microtunnel

[11] Some of the consultants that were engaged in the previous analysis were no longer available.

- Buckland & Taylor (B&T) – Aerial Crossing
- Worley Parsons Canada (WPC) - Isolated Open Cut

4.4.1 Financial Considerations

The financial evaluation consists of a capital cost budget estimate comparison for each of the four options. Each option was progressed to an AACE International Recommended Practice No. 17R-97 Class 3 level of definition which is presented in Table 4-2. FEI sought Class 3 cost estimates to ensure the options were progressed to a level of project definition to adequately quantify the risk, design and construction challenges and cost. This facilitated a more robust options comparison and selection process.

The option cost estimates shown below represent the estimated total cost of each option including project management, engineering, permits, materials procurement, and construction.

Table 4-2: Summary of Option Cost Estimates and Financial Analysis[12]

Summary of Financial Analysis	Option 1 HDD	Option 2 Isolated Open Cut	Option 3 Aerial Crossing	Option 4 Micro tunnel
Total Capital Cost ($ million) - As Spent $	5.87	10.67	6.98	7.93
Total Deferred Cost ($ million) - As Spent $	0.86	0.86	0.86	0.86
AFUDC ($million)	0.31	0.46	0.79	0.38
Total Project Cost ($ million) - As Spent $	7.04	11.99	8.63	9.16
75 yr NPV of O&M ($ million)- As Spent ($)	-	-	0.50	-
Levelized Rate Impact 25 Years ($ / GJ)	0.81	1.39	0.97	1.06
Levelized Incremental Revenue Requirement ($million)	0.2	0.4	0.3	0.3
Incremental Revenue Requirement PV 25 Years ($million)	6.1	10.5	7.3	8.0
Net Cash Flow NPV 25 Years ($million)	0.0	(0.0)	(0.0)	0.0

As shown above, the HDD Option is the least expensive option due to the shortest construction period and the efficiency offered in terms of installing the new pipeline crossing under the river with the least effort.

The differences between the HDD and Microtunnel construction techniques have been described in Section 4.3.4. These differences, especially the construction of the Microtunnel launch and reception shafts and the longer construction duration required for these, result in higher costs for the Microtunnel Option.

The extensive construction scope associated with the Isolated Open Cut option was detailed in Section 4.3.2. Relative to the other three options, this option would involve very extensive earth works associated with forming the diversion channel, damming the river and then excavating the

[12] Please refer to Appendices H-1 through H-4. The accuracy of each estimate is +30%/20%. The expected NPV of the O&M over the 75 year life of the Aerial Crossing option is approximately $0.5 million, the NPV of the forecast O&M over the analysis term of 25 years is approximately $0.2 million.

new pipeline trench across the river channel and onto the river banks. This disturbance then has a correspondingly large reinstatement and rehabilitation effort. These factors combine to make this the most expensive option.

The New Aerial Bridge Crossing Option is the second least expensive option with respect to capital costs. It would have a relatively smaller construction footprint compared to the Isolated Open Cut Option. The Aerial Crossing construction activities could be contained entirely outside of the river, but with some impact on the river riparian zone. The financial disadvantages with respect to this option are its long term maintenance requirements and significant permitting risks which would involve increased costs associated with the more complex permitting and consultation process. As noted above, the NPV of the annual operating costs is estimated to be approximately $0.5 million over the 75 year life of the project.

The non-financial advantages and disadvantages are explained in Section 4.4.2:

4.4.2 Non-Financial Considerations

The Company also considered the advantages and disadvantages of each option based on non-financial factors. The non-financial screening comprised three areas of analysis:

- Impact Assessment;
- Delivery Schedule; and
- Risk Assessment.

The impact assessment categories were selected to address the advantages and disadvantages of each option in terms of operational, environmental, social, and stakeholder requirements. Furthermore, the impact categories reflect the impacts and risks associated with each of the options selected to meet the Company's objectives and requirements to build a Project that will address the concerns identified in this Application.

Table 4-3 summarizes the impact assessment results.

1

Table 4-3: Impact Assessment

Vulnerability/Impact Category	Weight	Owner	Alternative #1 HDD		Alternative #2 Microtunnel		Alternative #3 Aerial Pipeline		Alternative #4 Isolated Open Cut	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Natural Hazards	10	Engineering	5	50	4	40	2	20	1	10
Construction Hazards	10	Engineering	3	30	3	30	3	30	3	30
Vandalism	10	Asset Mgmt	5	50	5	50	2	20	5	50
Safety	10	Asset Mgmt	2	20	2	20	3	30	3	30
Environmental	20	Env Affairs	5	50	5	50	2	20	1	10
Aesthetics	6	Comm Rel'ns	5	50	5	50	3	30	3	30
First Nations	8	Comm Rel'ns	5	50	5	50	2	20	1	10
Stakeholders	8	Comm Rel'ns	5	50	5	50	3	30	2	20
Land Issues	10	Property Svces	5	50	5	50	3	30	2	20
Operational Impact	8	Asset Mgmt	2	20	2	20	4	40	3	30
Totals	**100**			**420**		**410**		**270**		**240**
Ranking			**1**		**2**		**3**		**4**	

5	High value, best choice
4	Good value, better choice
3	Moderate value, good choice
2	Questionable value, cautious choice
1	Low value, questionable choice

Vulnerability Factors - Definitions	
Natural Hazards	Considers the vulnerability during operation of the built facilities to natural hazards including seismic impacts, bank stability, and river erosion.
Construction Hazards (Geo-hazards)	Considers the vulnerability of the facilities during construction to natural hazards including seismic impacts, bank stability, river erosion, and subsurface materials.
Vandalism	Considers the susceptability and attraction the faciliites may have to vandalism.
Safety	Considers the risk to the public in the event of a pipeline failure, and the risk to the well-being of employees and contractors during construction and performing maintenance or repairs. Also considers the vulnerability to third party damage.
Environmental	Considers the impact during construction and operation of the facilities to the environment including environmentally sensitive areas at the project site and downstream.
Aesthetics	Considers the visual effect of the proposed facilities that may be observed by residents and visitors in the Project area.
First Nations	Considers the effect of the project on the cultural values, economic well being, and quality of life for First Nations citizens.
Stakeholders	Considers the effect of the project on the cultural values, economic well being, and quality of life for Fort Nelson citizens and river users.
Land Issues	Considers the ability to acquire and maintain access rights necessary for construction and operation of the built facilities, the amount of land that is necessary for construction and operation, and effect on local residents.
Operational Impact	Considers the impact to employees and contractors to complete maintenance and repairs and impact to FEFN gas distribution system.

2

Table 4-4 shows that the HDD Option ranks the highest, followed by Microtunnel, Aerial Pipeline, and Isolated Open Cut. A summary of each of these follows.

The Isolated Open Cut Option would involve an inherently large construction footprint with significant impacts and risks including:

- massive river channel diversion;
- fish removal during stream isolation;
- river traffic restrictions;
- local stakeholders and river user impacts; and
- long term rehabilitation failure.

The Isolated Open Cut would provide questionable to low value and is a cautious to questionable choice for a new pipeline crossing to meet the objectives identified in Section 4.1. This option is ranked 4th in terms of non-financial analysis.

The Aerial Pipeline Option would be highly visible and have a high likelihood of stakeholder and First Nations objections. Construction activities would be contained entirely outside of the river, but with an impact on the river riparian zone. The challenges with respect to this option are its major long term negative impacts in terms of maintenance and permitting risks. This option has moderate value and would be a poor to good choice depending on the value under consideration. This option is ranked 3rd in terms non-financial analysis.

The HDD and Microtunnel Options both result in high values and are the best choices considering non-financial factors listed above. The key benefits of both of these options include:

- The reduced impact on the river environment;
- The low intrusive nature of the underground construction techniques;
- The lack of visible surface remnants after construction would be completed; and
- The relatively short term duration of the site rehabilitation period.

4.4.2.1 Option Delivery (Project Schedule) Considerations

The engineering consultants tasked with preparing the Class 3 construction budget estimates have also advised on construction scope, construction schedule estimates, and project construction restriction in terms of optimal construction windows (i.e. winter or summer construction) attached as Confidential Appendix C1, C2, and C3. The estimated duration for each option to progress from preliminary design phase to completion of the new crossing construction and to a fully commissioned pipeline crossing is detailed in Table 4-4.

Table 4-4: Option Project Duration

Option		Project Schedule (months)	Construction Restrictions
1	HDD	6	None
2	Isolated Open Cut	12	Sept-Jan
3	Aerial Crossing	12	None
4	Microtunnel	7	None

The Project schedule estimates include allowances for design, tender, permitting, construction and commissioning. The above table shows that neither the Isolated Open Cut Option nor the Aerial Crossing Option will satisfy the Company's objective to install a new pipeline crossing by May 2014 to mitigate the risk of pipeline damage during the 2014 spring freshet. The Isolated Open Cut Option has a 12 month project duration. However, the construction activities could only occur during low river level periods (i.e. September to November window); therefore, this option would delay the installation of a new pipeline crossing until the end 2014. The Aerial Crossing Option has a duration of 12 months, which would also delay the installation of a new pipeline crossing until the end 2014. The HDD and the Microtunnel Options have no restriction on the start of construction.

The Microtunnel Option has a relatively longer construction duration, compared to the HDD Option, due to larger and more complex underground construction equipment and techniques.

The HDD and Microtunnel options are the only two options that will allow the Company to replace the pipeline crossing prior to the spring 2014 freshet.

4.4.2.2 HDD and Microtunnel Unmitigated Risk Assessment

To quantify the risks associated with using HDD or Microtunnel techniques to install the new Muskwa River pipeline crossing, Jacobs completed a formal risk workshop during September 2013, with the full participation of FEFN, to identify and quantify the risks associated with the HDD and Microtunnel Option crossing methodology.

Table 4-5 below summarizes what was identified during the risk workshop, including the risk level (red – high, yellow – medium, green – low) and the corresponding number of unmitigated risks associated with the construction method or project issue. The Environmental and Contractual risks categorize project risks other than those associated with the HDD and Microtunnelling construction. Examples of Environmental risks include contamination from unplanned discharges, delay from remote northern location, and noise constraint restrictions. Examples of Contractual risks include low number of bidders, limited availability of equipment, and shortage of operators. The HDD Option has a lower number of overall unmitigated risks than the Microtunnelling Option and is also lower in each risk level category. The HDD Option has a lower unmitigated risk profile than the Microtunnelling method.

Table 4-5: Muskwa 2013 Risk Workshop – Unmitigated Risk Profile Summary

Risk Level	Microtunneling	HDD	Environmental	Contractual
Red	21	16	7	5
Yellow	15	11	9	3
Green	0	0	3	0
Total	36	27	19	8

The main unmitigated risks identified for the HDD Option include:

- The gravel stratum is deeper and/or more challenging than indicated in the geotechnical report;
- Gas pipeline coating damage (during pullback);
- HDD hole collapse;
- Difficulty installing the casings;
- Remote location causes delays during construction;
- Permitting delays; and
- Bid responses higher than projected.

The major construction risk from the above list is the possibility of a gravel layer existing deeper or more challenging to drill through than anticipated, and the possibility of a hole collapse. To mitigate this risk, Jacobs proposes the use of conductor casings (steel pipe sleeves) on both entry and exit sides of the crossing in order to isolate the drill path from gravel, cobbles, and boulders, detected by the geotechnical survey. The casings would mitigate the risk impact of HDD failure as the HDD drills through the gravel layers before it reaches the sand/silt layer, that exists below the gravel layer, and which is lower risk and more conducive to successful completion of the HDD drilling procedure. The cost estimate includes the supply, installation, and removal of the casings.

4.5 *CONCLUSION AND PREFERRED OPTION*

Of the four crossing options examined, HDD and Microtunnel are the only viable alternatives that allow the Company to install a new pipeline crossing by May 2014. Through the financial and non-financial evaluation of the four crossing alternatives, the Company has determined that the HDD option stands out as the preferred option due to cost, schedule, and risk allocation. The HDD option will allow for successful installation of a new NPS6 pipeline crossing under the Muskwa River by May 2014. However, FEFN recognises that there are construction and project risks associated with this technique that must be managed and mitigated. Design and Construction mitigation measures are described in the following Section 5, Project Description.

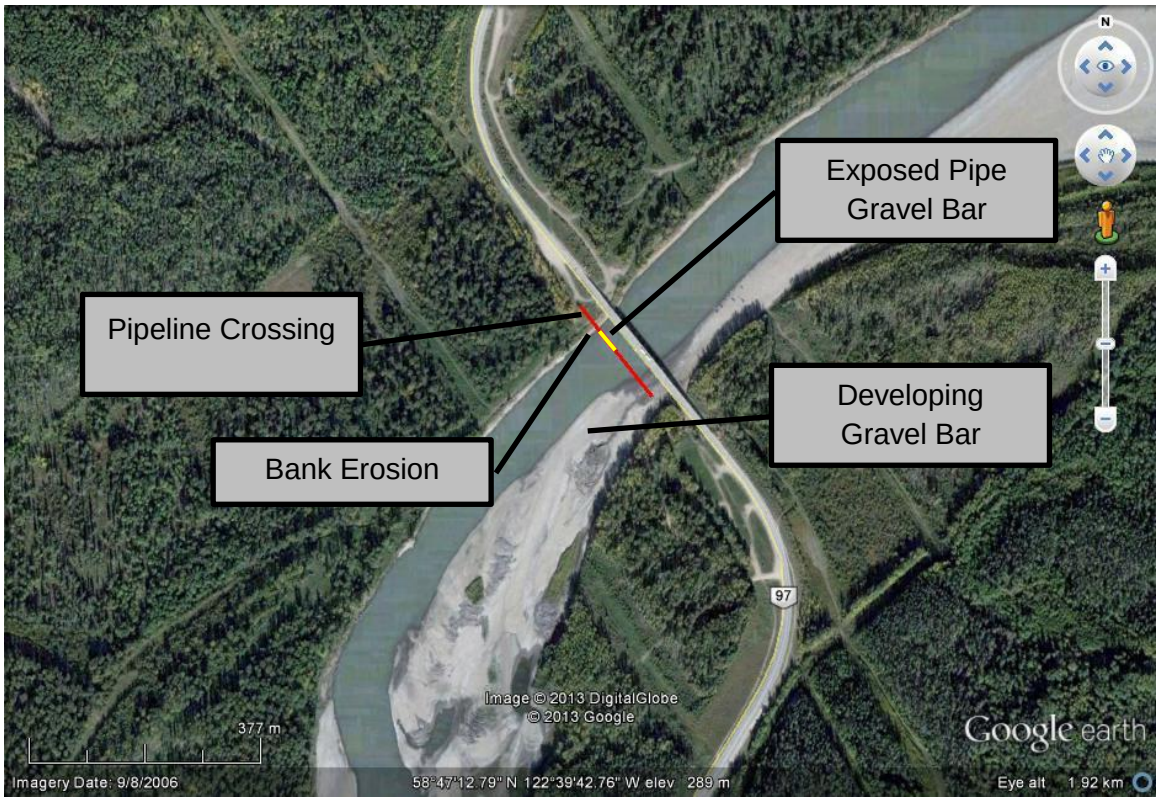
5. PROJECT DESCRIPTION

In this section, FEFN will describe the proposed Project in greater detail, including information on Project components, Project schedule, resource requirements, and Project risks and management.

5.1 INTRODUCTION

The Project involves constructing a new NPS6 pipeline river crossing to replace the existing NPS6 pipeline crossing. The existing pipeline crosses the Muskwa River adjacent to the Alaska Highway Bridge just south of Fort Nelson, BC, Canada. The pipeline at the crossing location is within the Alaska Highway road allowance and the replacement pipeline crossing proposes to maintain the same alignment. The proposed new pipeline crossing of the Muskwa River is the red line noted in Figure 5-1.

Figure 5-1: Proposed Muskwa River Pipeline Crossing



5.2 PROJECT COMPONENTS

The Project comprises the following major components:

- Construction and installation of a new approximately 550 m long NPS6 TP pipeline crossing by Horizontal Directional Drill (HDD) beneath the Muskwa River. The new

pipeline crossing will be positioned adjacent to the existing pipeline crossing and will, similar to the existing pipeline crossing, remain within the Alaska Highway land ownership boundary.

- Fabrication and installation of pipe crossover assemblies at each end of the new river crossing pipeline to interface the new pipeline crossing with the existing pipeline infrastructure.
- Completion of 'tie-in' procedures to connect the new crossing pipeline and crossover assemblies to the existing FEFN pipeline on either side of the river.
- Isolation, decommissioning, and abandonment of the existing NPS6 pipeline crossing.

5.3 *DESIGN AND CONSTRUCTION OF THE NPS6 HDD CROSSING*

This section describes the design and construction of the new pipeline crossing.

5.3.1 Crossing Pipeline Design

The crossing pipeline design will ensure compliance with all applicable FEI codes, standards and requirements. The main design considerations will include:

- Size: the proposed new crossing pipeline will be NPS 6 which is the same diameter of the existing crossing.
- Design Pressure: the design pressure of the new crossing pipeline will be 7,500 kPa; this is equivalent to the Maximum Allowable Operating Pressure (MAOP) of the existing FEI FN transmission pressure pipeline.
- Stress Analysis: the detailed design process will include a stress analysis to ensure that the selected pipe parameters (steel grade and wall thickness) will be in accordance with the requirements for construction via HDD, and the design codes and standards for subsequent operation as part of the existing FEFN pipeline.
- Protective Coating: the pipe external coating will be in accordance with FEI's standard for crossing pipeline construction using HDD. The coating will protect the pipe during the HDD installation process and also provide the necessary corrosion protection for the lifespan of the pipeline crossing (along with FEI pipeline cathodic protection system).
- Pressure Testing: the new crossing pipeline will be pressure tested before and after HDD installation to prove the integrity of the new pipeline at all stages of construction. The pressure test procedure and parameters will be in accordance with the Company's pressure test specifications.

5.3.2 Crossing Pipeline Fabrication

The new crossing pipe will be transported to the site by road in pipe lengths averaging 12m. These pipe sections will be delivered with protective external coating already applied during the

manufacturing process. Each pipe section will be positioned end to end onsite, and then welded together to form a continuous 550m long 'string' of pipeline. The main pipeline fabrication tasks include:

- layout and positioning of the pipe sections end-to-end;
- welding of each pipe section together;
- non-destructive testing of the welds using X-Ray inspection;
- hydrostatic pressure testing of the fabricated pipe crossing to prove the integrity of the fabricated crossing pipeline assembly;
- coating of the each weld area to match the pipe external coating; and
- testing of the completed pipe coating to ensure there are no coating defects.

The pre-fabricated crossing pipe will then be positioned and supported off the ground to prevent damage prior to insertion below the river after the HDD drilling process, as detailed in Section 5.3.7.4, is completed.

5.3.1 Right of Way

The existing river crossing pipeline is located within the Alaska Highway road allowance. The proposed new river crossing pipeline will also be located within the same road allowance; thus, no permanent additional Right of Way is required for this pipeline.

The HDD work pads will require additional construction space outside the Alaska Highway road allowance. Therefore, temporary land occupation is required in Crown land adjacent to the road allowance, which can be granted as part of the OGC permit.

5.3.2 Other Utilities

A telecommunications fibre-optic line is near the edge of the north bank of the river and will not be impacted by planned construction activities. Besides this and the FEFN existing gas pipeline, there are no other utilities within the construction impact zone. However, prior to construction start, site investigations will be completed to confirm this.

5.3.3 Roads, Highways, and Railways

The Alaska Highway (Highway 97) is owned and managed by PWGSC. However, the land that the highway traverses is owned by the province of British Columbia and managed by the MoTI. Thus any part of the highway infrastructure (asphalt, bridges, etc.) is managed by PWGSC and road allowance usage is managed by MoTI.

The FEI pipeline is under permit with MoTI based in Fort St John. MoTI has jurisdiction of the road allowance and will forward any road allowance usage proposal to PWGSC. The proposed construction activity will require tree and vegetation removal and re-grading of some portions of

the highway grade to permit safe access for construction machinery. Following completion of the detailed design, FEI will apply for a permit from MoTI. Preliminary communication with MoTI indicates that acquiring a permit will not be difficult.

5.3.4 Noise Control

Normal construction noise will be present during the operation; however, the location of the proposed construction site is remote and is not expected to have any appreciable impact. The potential noise impacts are further addressed in the Environmental Assessment attached in Appendix D.

5.3.5 Safety and Security

The construction site safety and security will be maintained during the course of the installation, including all working and non-working hours inclusive of weekends. A comprehensive site specific safety plan will be developed by the HDD contractor in compliance with FEI standards and those authorities having jurisdiction.

5.3.6 Site Setup, Access and Egress

The HDD drilling equipment required is detailed in Section 5.3.7 and will be positioned on the north side and south side of the river crossing. A construction workpad will be setup on each side of the river crossing to accommodate the HDD equipment, materials, construction personnel, parking, and other support equipment necessary to complete the Project.

The pipe pre-fabrication, described in Section 5.3.7.4, will occur on the north side of the river. The new crossing pipeline 'string' will be aligned with the HDD drill and positioned beside the drill end point on the north bank. The crossing pipeline, prior to installation under the river, will be located on the road allowance and the existing FEI right of way.

The existing FEI pipeline crossing of the Muskwa River is within the Alaska Highway road allowance and the replacement pipeline crossing will also remain within the same road allowance. There are existing hard packed dirt access roads in place which traverse Crown land and lead to the Muskwa River. These roads will facilitate site set up and access from the highway to HDD work areas. Permission to use these roads will be acquired through the OGC permit application process. The existing roads will require surface preparation to facilitate the movement of construction equipment throughout the construction period. The surface preparation will involve the import, lay, and compacting of crush gravel.

To accommodate the HDD construction activities, it will be necessary to:

- upgrade the existing hard packed dirt access roads;
- remove existing trees to form the temporary HDD work pads either side of the river;
- grade and level the work pads;

- remove and stockpile the topsoil and organic material; and
- install work mats to facilitate vehicle and equipment movement.

Provisional equipment layout plans and site setup requirements for the HDD construction have been prepared, which are presented in Appendix E

5.3.7 HDD Design and Construction

The HDD detailed design and construction activities will be tailored to suit the ground conditions determined by the geotechnical investigation already completed.

5.3.7.1 Geotechnical Analysis Results

A geotechnical investigation was carried out between August and November 2010. The investigation consisted of soil interpretation through drilling and sampling test-holes along the proposed HDD drill path, and a total of four boreholes were drilled. A geophysical survey was also undertaken, and included land and overwater seismic refraction survey (using sound waves to detect and interpret the ground conditions) and ground penetrating radar (GPR).

The test-hole data indicated that along the proposed drill path, compact dense well-graded gravel and sand will be encountered at entry on both sides (north and south) of the river crossing. The gravel layers are underlain by hard silts with varying fractions of clay, sand, and gravel. The gravel condition presents a challenge for HDD in terms of successfully drilling through to the more favourable stiff and hard silt which underlies the gravel layer. While drilling through gravel layers is difficult, it can be, and has been, done before. Possible solutions to increase the chance of success of drilling through the gravels include:

- installing conductor casings (steel pipes) on each side of the river, using a hammering tool to drive them from the surface through the gravel layer;
- installing the casings using a special technique called ‘washover’ which facilitates insertion of the casing deeper or through the gravel layer;
- pre-excavating the gravel layer to lower the elevation of the drill rig through the gravel layers;
- pre-excavating an inclined trench and installing the casings into the trench instead of driving them through the ground. This mitigates the risk of encountering a boulder or other obstacle which could stop the casing insertion;
- using a special type of drilling fluid to aid the drilling process advance through the gravel layer;
- using a combination of the previous methods; and
- using two (2) HDD drill rigs situated on opposite banks to drill towards each other and intersect under the river. Intersect drills have been completed successfully in various

locations and geological settings. The major benefit is the reduced length of each drill; however, there is greater emphasis on directional control of the drill which would require the implementation and use of an appropriate guidance system and guidance procedures.

5.3.7.2 HDD Drill Path Design

The HDD engineering design will be completed by Jacobs who are HDD and tunneling design specialists. The HDD design will be an iterative process, taking into consideration the crossing pipeline design parameters detailed in Section 5.3.1, the Company's engineering standards, and the HDD drilling process requirements.

The HDD drill profile, or path, will extend from ground level adopting a curved 'u-shape' profile beneath the river and exit at ground level on the opposite side of the river (i.e. 'bank to bank'). The drill entry angles will be between 8-20 degrees which is typical for HDD; but, the exact angle will depend on the final detailed design. The drill path will extend at this angle and through the casings, which will be approximately 80m in length; the exact length will be confirmed during detailed design. The drill path will then be reoriented horizontally, via large radius curves, and traverse horizontally under the river bed. The precise depth beneath the river bed and the curve radii will form part of the detailed design. These drill path geometric components (such as vertical tangents, curves, and horizontal tangent) make up the overall drill profile and dictate the length of the HDD drill. Preliminary design work has indicated a drill length of approximately 550 m, and the entry/exit points would be located up to 150 m from each river bank. Should the intersect drill technique be adopted, each drill will progress from either side of the river crossing and intersect on the horizontal alignment below the river bed.

5.3.7.3 HDD Drilling Process

The major components of a HDD system include:

- Drill unit;
- Operators control cabin;
- Guidance system; and
- Drilling fluid management (cleaning and recirculation) system.

The HDD drill rig connects to the cutting bit via the drill string which comprises individual drill rods (drill pipes). The drill rig provides the motive power to execute the process and drill the underground opening. The guidance system ensures that the HDD achieves the necessary entry angle, radius of curvature, depth below the river and also exits at the correct location on the opposite side of the river. For an intersect drill (if used), the additional goal of the guidance systems is to ensure both drill paths align and meet (intersect) at the correct location. The drilling fluid will be specially engineered to continuously circulate through the hole as it is drilled to remove the drilled materials and keep the hole from collapsing (i.e. maintain hole integrity).

The drill fluid is a mixture of environmentally benign components. The drilling fluid management system is separate from the drilling rig. It separates and removes the drill cuttings (gravel, sand, etc.) entrained in the drilling fluid that circulates out of the hole and cleans and recirculates the fluid for reuse.

The first process step is to drill a carefully guided pilot hole that will deliver the drill bit to the surface at the specified exit point on the far side of the river, or, for an intersect drill, to the specified intersect point under the river. To successfully drill through the gravel layers, it will be necessary to implement one of the solutions previously described in Section 5.3.7.1.

The drill will enter from the surface through the prepared casings. When the pilot hole is completed, the drill tool will be removed from the drill rod and a cleaning tool will be attached. The HDD will then retract the drill and further remove any remaining debris from the hole and replace it with the drill fluid. The HDD will then extend the drill rods and the cleaning tool through the hole and once again exit on the far side. This process may be repeated until the hole is cleaned satisfactorily.

5.3.7.4 Crossing Pipeline Installation

The pre-fabricated crossing pipe, detailed in Section 5.3.2, will be repositioned in line with the opening at the end of the drilled and cleaned hole. After the final cleaning run the pre-fabricated gas pipeline will be attached to the drill rod. The HDD will retract and slowly pull the pre-fabricated gas pipeline under the river. The drilling fluid which filled the hole will be displaced as the gas pipeline is pulled into position. The displaced fluid will be carefully collected and safely disposed of. The drill fluid will aid the movement of the gas pipeline as it pulled from its ground level position through the surface opening and into the HDD drill hole.

5.3.8 Interface of New Crossing Pipeline with Existing Pipeline

After completion of the HDD and installation and testing of the new river crossing pipe, it will be necessary to connect the new crossing pipeline to the existing FEFN TP pipeline. This process will involve fabrication of ‘tie-in’ assemblies comprising short lengths of pipe, and pipe fittings designed to suit the relative positions of the new pipeline crossing and the existing pipeline. The assemblies will then be installed by FEI field crews who will execute the process of connecting the new crossing and the existing pipeline. FEI personnel will complete the interconnection without interrupting the normal flow of gas through the pipeline.

5.3.9 Existing Crossing Abandonment

The existing Muskwa River crossing pipeline will be isolated from the existing FEFN pipeline after commissioning of the new pipeline crossing. The old crossing will be abandoned in accordance with present standards and guidelines.

5.3.10 Restoration

The construction activities associated with the new river crossing pipeline construction will require preparation of a portion of the Crown land adjacent to the existing pipeline within the road allowance on each side of the river. The impacted areas will be reinstated and restored after the construction has been completed. This will include removal of all construction equipment, materials, and debris. Topsoil and/or organic material which was temporarily removed and stockpiled prior to construction will be redistributed across the surface. Any trees removed will be replanted with native species. The reinstatement will be completed in the growing season following completion of the construction activity. Fort Nelson First Nation has indicated a requirement to replant with native grasses, and this has been planned.

5.4 *PROJECT SCHEDULE*

The continuing loss of pipeline cover and minimum remaining cover on the north bank is cause for substantial concern and the current project plan is to have a new river crossing in place by May 2014. Conceptual engineering has been substantially completed, and construction is planned to start in March 2014 with completion by early May 2014, prior to the spring 2014 freshet. Specific activities and expected durations are as follows:

Table 5-1: Schedule Milestones

Activity	Date
Concept Development	Completed.
CPCN Preparation	Sept-Nov 2013
CPCN Filing	Nov 2013
CPCN Review and Approval	Jan 2014
Finalize Detailed Engineering	Jan 2014
OGC Permit Review and Approval	Jan 2014
Request for Quotation Issued	Jan 2014
Materials Delivery	Feb 2013
Award Construction Contract	Feb 2013
Construction Start	Mar 2014
In Service	May 2014
Reinstatement and Restoration	Q3 - Q4, 2014

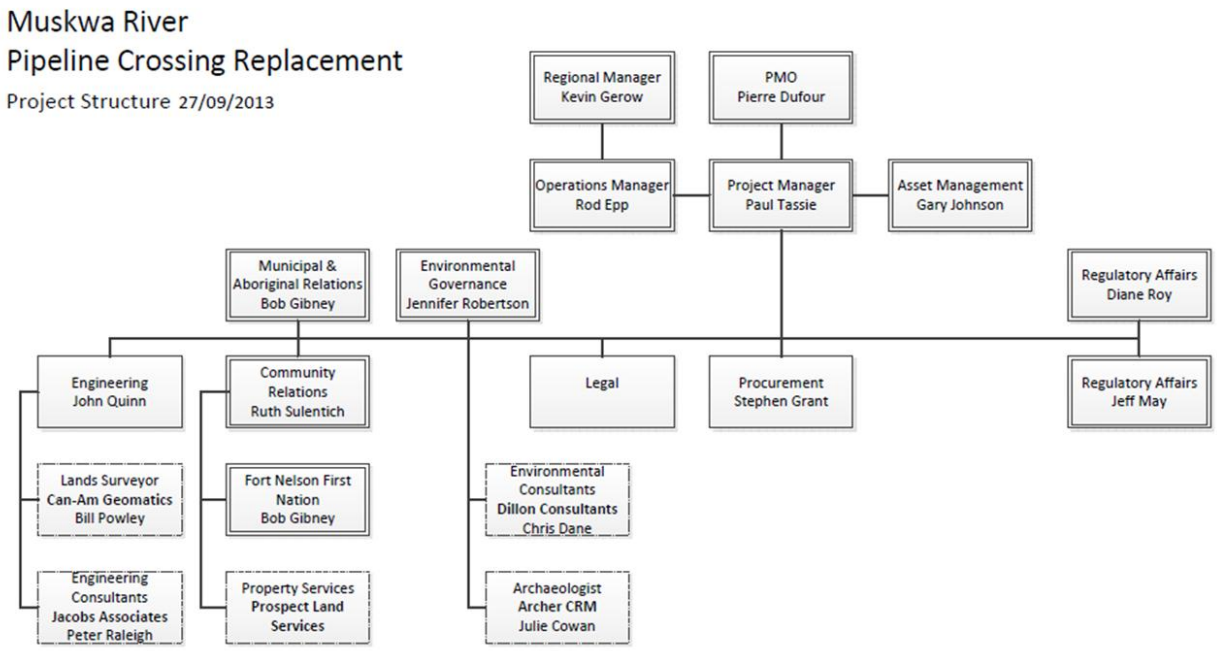
A more detailed schedule is attached as Appendix F.

5.5 RESOURCE REQUIREMENTS

5.5.1 Design and Quality Control

An FEI Project Manager will manage the Project and implement the execution plan for each phase of the Project. Figure 5-2 outlines the functional organization chart for management of this Project.

Figure 5-2: Organization Chart



The Executive Sponsor for the execution of the Project is Doyle Sam, P.Eng., Executive Vice-President, Network Service, Engineering and Generation. The Project Manager is Paul Tassie, P.Eng.

5.5.2 Design and Quality Control

The new crossing pipeline design will be coordinated by FEI Engineering, with Jacobs as the HDD specialist who have been engaged to assist FEI with the following project components:

- Detailed HDD engineering and design;
- Tender bid review and recommendation assistance; and
- HDD construction inspection.

Any specialized services required for environmental management, further geotechnical investigation and analysis, and construction inspection will be contracted to individuals and

companies possessing the demonstrated skills and experience to complete the work. These individuals and companies will be expected to ensure that public and worker safety, quality workmanship and environmental compliance are maintained throughout the Project. FEI operating personnel will ensure all facilities are efficiently placed into operation upon completion of construction and conform to FEFN standards and industry practices.

5.5.3 Construction Services

Potential prime construction contractors will be pre-qualified prior to the release of the tender documents. The construction will be subject to a competitive tender. At the close of the procurement process, FEI will select the bid that provides the best value (most cost effective and acceptable risk allocation).

5.5.4 Materials

All owner-supplied materials will be purchased by FEFN through the Company's standard procurement process. Owner supplied materials will be purchased through a competitive tender and awarded to the bidder that provides the best value.

5.6 *OTHER APPLICATIONS AND APPROVALS*

5.6.1 BC Oil and Gas Commission (OGC) Application

The construction and operation of the Project are governed by the *Oil and Gas Activities* Act and subject to the OGC regulation. The Project requires a Pipeline Application. FEFN plans to file the Pipeline Application in January 2014. A Pipeline Application is a significant process with considerable technical scrutiny on the Project by the OGC. Public and First Nations Consultation, archaeological requirements, design reviews, environmental permits/approvals for work in and around fish bearing streams are all components of the Pipeline Application. Each component must receive OGC approval prior to the start of construction, a significant regulatory process in addition to the CPCN approval by the BCUC. A Pipeline Application has taken up to one year for approval. However, it is expected that the OGC permits can be obtained to meet the project schedule. In summary, the expected OGC permits will include;

- OGC Pipeline Permit
- OGC Master License to Cut
- OGC Permit for Temporary Crown Land Occupation
- OGC Water Act

5.6.2 Other Pending or Anticipated Applications/Conditions

A qualified environmental professional working in conjunction with the Company's Environmental Affairs group will assist the Project in identifying permits/approvals required and

in the development of an Environmental Protection Plan including an Environmental Emergency Preparedness and Response Plan for the Project.

The Project is not expected to require an Environmental Assessment Certificate pursuant to the *British Columbia Environmental Assessment Act or a* screening under the *Canadian Environmental Assessment Act.*

Agency notifications, permits or approvals are anticipated under, but not limited to, the Fisheries Act, Water Act, and Navigable Waters Protection Act (NWPA). The terms and conditions outlined in these permits and approvals will be adhered to during the construction of the Project.

5.7 *RISK ANALYSIS AND MANAGEMENT*

Jacobs conducted a risk workshop which was attended by FEI and tailored specifically to analyse the preferred HDD Option and the Microtunnel Option. The risk analysis informed the estimating process and contingency calculation.

As discussed in Section 3 of the Application, the Company is targeting May 2014 as the Project completion date in order to avoid potential pipeline damage and possible gas supply loss due to the spring freshet. Based on FEFN's analysis, the highest risks for the Project are:

- issues with the HDD drilling operations;
- availability of suitably qualified trenchless drilling contractors to complete the project by May 2014; and
- permitting delays.

FEI will manage and endeavour to mitigate the risks by:

- anticipating all potential HDD failure mechanisms and preparing contingency plans;
- developing a flexible tender and construction strategy which will align the project needs with the market availability of trenchless drilling contractors; and
- timely submission of permit applications.

A summary of the major HDD risks identified in the risk analysis are presented in Table 5.3. The risk is defined as the product of the likelihood of occurrence and impact of occurrence. To quantify the mitigated risk impacts the likelihood, or probability of happening, and impact, in terms of cost or schedule delay, were rated against the following:

Table 5-2: Risk Probability and Impact Matrix

	Likelihood of Occurrence	Potential Impact of Occurrence
1	Very Unlikely (< 10% chance)	Very Low (<$10k or < 1 week)
2	Unlikely (10-30% chance)	Low ($10k-50k or 1-2 weeks)
3	Possible (31-50% chance)	Moderate ($50k-500k or 2-4 weeks)
4	Likely (51-80% chance)	High ($500k - $1M or 1-3 months)
5	Very Likely (>80% chance)	Very High (>$1M or > 3 months)

Design phase measures to minimize/eliminate the risk of occurrence, and construction measures to mitigate or reduce the consequence of occurrence are also detailed in the table.

The detailed results of the risk analysis and the resulting contingency are included in Confidential Appendix G.

Table 5-3: HDD –Risk Control Summary

Key Risk	Design/Construction Mitigation Measures	Mitigated Likelihood	Mitigated Impact
The gravel stratum is deeper than indicated in the geotechnical report.	Design: baseline anticipated geologic conditions; ensure adequate exploration is conducted; extend the crossing so the gravel layer is thinner. Construction: use washover casing; pre-excavate the gravels and replace with sand; excavate starter trench to drill from; monitor cuttings for evidence of gravels; monitor ground surface/river bottom for evidence of hydro fracture.	4	3
Damage to pipe coating (during pullback)	Design: thicken the pipe coating based on known geological conditions and require bore swabbing to be carried out prior to pulling pipe into hole. Construction: monitor hole and maintain pressure to keep hole open; ensure adequate swabbing of conductor casing pipe prior to pipe installation	4	3
Hole collapse	Design: specify percentage of overbore of hole, requirement of drilling fluid control procedure and specify use of fluid additives to ensure stable hole, fluid testing Construction: ensure starter casings extend to intended depth and correct elevation, provide onsite inspection, test drilling mud, modify the drilling mud	3	3
Difficulty installing HDD casing	Design: adequate geological info to inform selection of materials and equipment, identify previous successful strategies and implement, identify response plans, engage experienced HDD contractor Construction: pre-excavate a trench and place in an oversized casing into the gravels.	4	3
Permitting delays	Design: provide all necessary support to permitting such that early submission of permit requests may be made as soon as possible.	4	5
Delay due to FN response during OGC permitting	Design: consult with FN early in the process and provide information session with a forum to ask questions; address concerns and get buy-in to avoid delays. Construction: public outreach to FN in order to keep them informed on the progress of the work that effect their interest.	4	2
Remote location causes delays	Design: ensure contractor has experience working at remote sites; identify and plan for special project needs that have long lead times. Construction: identify sources for parts replacement	5	3

Key Risk	Design/Construction Mitigation Measures	Mitigated Likelihood	Mitigated Impact
Low number of bidders	Design: use alternative contracting methods; minimize contract size, allow for favorable contract conditions, conduct contractor outreach program, create partnering program to share risk; determine which method will provide the best price and highest number of bidders. Construction: risk involves pre-construction mitigation measures.	4	3
Bid responses higher than projected.	Design: prepare solid contract documents and drawings for robust crossing that will be attractive to bidders and allow risk sharing between owner and contractor; involve interested contractors prior to bid and allow them to comment on the project scope. Construction: risk involves pre-construction mitigation measures.	2	3

6. PROJECT COST ESTIMATE

The Company prepared the Project cost estimate based on AACE Class 3 specifications, in accordance with the CPCN Guidelines.

This section discusses:

- the Project cost estimate;
- the deferred CPCN Project development and Application costs;
- the financial impacts; and
- the accounting treatment of the costs.

6.1 *COST ESTIMATE DETAILS*

The total project cost estimate of $7.0 million (as spent dollars and including AFUDC) consists of capital costs, Project development costs and application costs. Each of these cost categories is discussed in further detail below.

Table 6-1: Total Project Costs, Including Deferred Charges and AFUDC ($ thousands)[13]

Line	Total Project Costs	Reference	Estimate in $2013 ($000s)	Estimate in $As-Spent ($000s)
1	Capital Costs	Table 6-2	5,762	5,869
2	Project Development Costs	Table 6-3	810	810
3	Application Costs	Table 6-5	50	50
4			**6,622**	**6,729**
5	AFUDC	Table 6-2, 6-5		311
6	**Total Project Costs**		**6,622**	**7,040**

6.1.1 Project Capital Cost Estimate

The capital cost of the Project, as shown in Table 6-2 below, is approximately $6.0 million[14] (as spent dollars and including AFUDC). This cost estimate is based on preliminary Project definition and design and the individual cost elements consist of historical costs, non-binding quotations and projections. The expected accuracy of the cost estimate is +30 percent to -20 percent consistent with AACE Class 3 estimate.

[13] As spent dollars determined using annual inflation rates as forecast by the Conference Board of Canada
[14] Schedule 6, Row 23 of Option 1-HDD financial schedules in Appendix H-1

Table 6-2: Capital Cost - CONFIDENTIAL[15]

This table redacted and filed confidentially.

The capital cost estimate is based on an in-service date of May 2014, the most recent studies and information currently available to FEI and 2013 market prices where applicable. In addition, the estimate excludes GST but includes 7 percent PST on materials.[16]

Although present regulations do not require the removal of abandoned pipe, the cost estimate for the Project includes an allowance for partial removal of the exposed pipe if circumstances warrant as shown in Table 6-2. The Company will remove any portions of the abandoned pipe that may be a potential hazard to river users. Complete removal is not likely because of the potential high cost and additional environmental damage during removal operations. Estimated site restoration costs are included in construction, installation and commissioning costs.

The estimated capital cost as shown in Table 6-2 will be the control budget, and cost reports will conform at a minimum to the level of detail as set out in Table 6-1. Project development and application costs will be tracked separately and are discussed below in Sections 6.1.2 and 6.1.3 respectively.

6.1.2 Project Development Costs

The Company has incurred costs for Project Management, Engineering, and consultants' costs for assessing the potential design and alternatives and associated costs prior to Commission approval of the Project. These Project development costs of approximately $0.8 million are not included in the capital cost estimate of $6.0 million (as shown in Table 6-2). As discussed in Section 4.2.1, FEFN first began its evaluation of the pipeline crossing options in 2009 resulting in costs as follows:

[15] As spent dollars determined using annual inflation rates forecast by the Conference Board of Canada
[16] FEFN, as a GST registrant, is entitled to recover the GST is pays on its taxable purchases and as such, the tax does not represent a net cost to the Company

Table 6-3: Project Development Cost Estimate

Description of Cost		approximate ($ thousands)
2009	Initial report on viability of remediation options	$40
2010	HDD detail cost estimate and risk assessment	$325
2011	Initial application to PWGSC for IP Bridge option	$60
2011-2013	Additional costs in support of PWGSC application (including third party analysis)	$165
2013	AACE Class 3 cost estimate of four viable crossing options	$220
Total		**$810**

Project development costs began in 2009 when FEFN commenced analysis of remediation options of the pipeline crossing. Approximately $40,000 was spent to prepare the initial report to determine the viability of various pipeline crossing remediation options. From this report, FEFN identified the HDD Option as the most cost-effective option and subsequently spent approximately $325,000 between July 2010 and December 2010 to gather the required engineering, geotechnical and environmental data for the detailed cost estimate and risk assessment of the HDD Option. Ultimately, based on the data gathered and then expert opinion, it was determined that the subsurface conditions caused the HDD Option cost estimate to increase substantially and create an unacceptable risk profile especially compared to the IP Bridge Option, which was less costly and had more manageable risks.

As discussed in Section 4.2.1, the IP Bridge Option was the next favoured option and was submitted as the preferred option in FEFN's Evidentiary Update to its 2011 RRA, and was ultimately approved by the Commission. Approximately, $60,000 was spent preparing the data to support the March 2011 permit application to PWGSC to attach the pipeline on the Muskwa River Bridge. This included additional engineering and environmental analysis to advise PWGSC of the financial, technical and environmental benefits of installing the pipeline on the Bridge as well as estimating the same risks of the other pipeline crossing options.

From the March 2011 permit application to May 2013, an additional $165,000 was spent in pursuing, supporting, and defending the IP Bridge Option, which included a $35,000 third party analysis of the permit application. These costs included additional engineering, project management, environmental consultants, and community relations.

In late 2012, partly in response to PWGSC requirements for further research on the other crossing options and partly in response to the increasing risk of the on-going pipeline exposure, FEFN took the step of obtaining AACE Class 3 cost estimates of the four remaining viable crossing options in order to assess them reliably, confidently, and to make a timely decision of which crossing option to pursue. The cost of acquiring this information is estimated to be $220,000 which includes additional engineering resources, environmental analysis, stakeholder contact, First Nations consultation, and archaeological review.

The expenditures related to the IP Bridge Option were necessary because the option had the lowest technical and environmental risks, was the least expensive and had been an acceptable practice on BC provincial bridges when other crossing options are cost prohibitive. As further discussed in Section 5, FEI pursued the IP Bridge Option, consistent with the Commission's determination, to the Minister responsible for PWGSC but was not successful.

Of the estimated Project development costs of $0.8 million, approximately $710 thousand has been incurred to date, with a remaining $100 thousand in expected costs to be incurred by the end of 2013. The proposed accounting treatment and recovery of the Project development costs is discussed in Section 6.3.2 below.

6.1.3 Application Costs

The estimated application costs are $50 thousand and include costs for legal review, Commission costs and Commission approved intervener costs and has been prepared assuming a Streamlined Review Process.

6.2 *FINANCIAL ANALYSIS*

The Company has prepared a financial analysis for the Project cost estimates, which includes the incremental cost of service, cash flow and incremental rate impacts over 25 years.

Table 6-3 below presents a summary of the financial schedules included in Appendix H. The levelized total impact of the Project is an increase of approximately $0.81 per GJ compared to existing 2013 rates. For a typical FEFN residential customer consuming an average of 140 GJ per year, this equates to approximately $113 per year. For a rate 2.1 general Commercial Service customer consuming approximately 460 GJs per year, this equates to approximately $373 per year.

As noted in Section 1.5, approved delivery rates for 2013 already include $3.1 million in capital costs associated with the Project based on the 2011 approval. Therefore, the delivery rates of FEFN customers already include the impact of a portion of the Project costs. Further, the Muskwa River Crossing rate base deferral account was first created in 2011 to capture the cost of service of the Project that had been recovered from customers through delivery rates and hold customers whole regardless of the delay in the Project. This account was extended to 2012 and 2013, and the Company has requested extension to 2014 in its Application for Deferral Account Treatment for 2014 and Changes to the Revenue Stabilization Adjustment Mechanism (RSAM) Rider filed on October 11, 2013. The Company expects that this account will be amortized commencing in 2015.

Therefore, the net incremental impact of the total Project costs (i.e. reflecting the incremental capital cost not currently included in rate base) offset by the amortization of the existing Muskwa River Crossing rate base deferral account is an increase on a levelized basis of approximately $0.41 per GJ compared to existing 2013 rates. For a typical Residential customer consuming an average of 140 GJ per year, this equates to approximately $57 per year. For a rate 2.1

general Commercial Service customer consuming approximately 460 GJs per year, this equates to approximately $189 per year.

Table 6-4: Financial Analysis of the HDD Option[17]

	Total Project Impact	Incremental Project Impact (as compared to Existing Rates)
Total Direct Cost ($ million) - As Spent $	5.87	2.69
Total Deferred Cost ($ million) - As Spent $	0.86	0.86
AFUDC ($million)	0.31	0.21
Total Project Cost ($ million) - As Spent $	7.04	3.76
2015 Rate impact ($/GJ)	1.54	0.23
Levelized Rate Impact 25 Years ($ / GJ)	0.81	0.41
Levelized Incremental Revenue Requirement ($million)	0.2	0.1
Incremental Revenue Requirement PV 25 Years ($million)	6.1	3.0
Net Cash Flow NPV 25 Years ($million)	0.0	0.0
2015 Rate Base ($million)	6.6	3.3

6.3 *ACCOUNTING TREATMENT*

6.3.1 Capital Costs

The capital costs shown in Table 6-2 above, will be held in work-in-progress until the beginning of the year after the asset is available for use. The Project is forecasted to be in service in May 2014 and will be closed to gas plant in service on January 1, 2015 assuming that the Commission approves FEI's requested treatment of CPCNs in its 2014-2018 PBR Application, and extends that treatment to FEFN. Depreciation provisions will commence on January 1, 2015.

In accordance with the Commission's currently approved treatment, removal costs, if incurred, will be added to the Negative Salvage Provision/Cost deferral account.[18]

6.3.2 The Muskwa River Crossing Project Cost Deferral Account (non-rate base)

FEI is seeking Commission approval under Sections 59-61 of the Act for deferral treatment of Project development and application costs.

[17] Please refer to Appendix H-1
[18] BCUC Order G-44-12

FEI is seeking approval to add these deferred costs to a new non-rate base deferral account, the Muskwa River Crossing Project Costs Deferral Account, on a net-of-tax basis attracting AFUDC. At the beginning of 2015 the deferral account would be included in rate base, and no further AFUDC would be charged to the deferral account. FEI is requesting a three year amortization period to commence in 2015. To mitigate the rate impact on customers, FEI would also agree to a BCUC determination to include deferral costs in capital costs which would have a longer amortization.

The forecast balance of deferred costs as at December 31, 2014 is summarized in table 6-5 below.

Table 6-5: Summary of Deferred Costs ($ thousands)

Project Development Costs (Table 6-3)	$	810
Application Costs		50
Tax Offset		(221)
AFUDC		130
Total Deferred Costs	$	769

7. ENVIRONMENTAL AND SOCIO-ECONOMIC ASSESSMENTS

FEI has assessed the environmental, archaeological and socio-economic impacts from the Project. Based on FEI's assessments, impacts to the environmental and archaeological resources from the Project are minimal and can be mitigated through the implementation of standard best management practices and mitigation measures. There is also expected to be a limited socio-economic impact to the regional area resulting from the Project.

7.1 *ENVIRONMENTAL ASSESSMENT*

FEI retained Dillon Consulting Limited[19] (Dillon) to conduct a preliminary environmental assessment of the Project.

The assessment is based on a desk-top review of available information, previous studies completed by Environmental Dynamics Inc. (EDI), and Dillon's field studies to determine the biophysical characteristics supported within the Project Area. The assessment was undertaken to identify and describe the potential Project risks and impacts to the biophysical environment from the Project and to provide a basis for the completion of a more detailed assessment to be completed once BCUC approval of this Application is received and prior to construction commencement.

Based on this preliminary assessment, the overall environmental risk is low and any potential environmental impacts from the Project can be mitigated through standard environmental protection and mitigation measures.

7.1.1 Preliminary Environmental Assessment

The results of the work undertaken by Dillon are outlined in the Muskwa River Crossing Preliminary Environmental Assessment report, a copy of which is attached as Appendix D. The report summarizes that:

- there are no sensitive environmental areas identified within 100 m of the pipeline segment;
- fish habitat was not observed to be unique or considered high value (e.g., critical spawning or rearing areas) at the proposed crossing location;
- land disturbance will occur within a portion of the adjacent crown land and within the Alaska Highway right-of-way; and
- the potential for residual environmental effects can be avoided or mitigated by following applicable provincial and federal guidelines and through the application of standard best management practices and mitigation measures.

[19] Dillon Consulting Limited provides consultants in planning, engineering, environmental sciences and management, with over 750 employees across Canada.

Table 7 in the assessment report (Appendix D) outlines proposed mitigation measures to avoid, minimize and reduce potential residual effects of the Project on valued ecological components. FEI will follow these measures where applicable during construction.

Based on the environmental assessment work completed by Dillon to-date, it is expected that the Project will require provincial approval pursuant to Section 9 of the *Water Act* and federal approval pursuant to the *Navigable Waters Protection Act*. Authorization under Section 35(2) of the federal *Fisheries Act* is not expected to be required given that the harmful alteration, destruction or disturbance to fish and/or fish habitat can likely be avoided in project design. A Master License to Cut will be required for the removal of non-merchantable Crown timber within proposed laydown areas. Following BCUC approval of this Application, FEI, with the assistance of Dillon, will undertake a detailed environmental impact assessment based on the detailed design, confirm regulatory requirements and prepare and submit the requisite notifications and approval applications to the relevant agencies.

7.1.2 Further Plans

Valued ecological components, sensitivities, constraints, and potential Project-related environmental impacts have been documented in the preliminary Environmental Assessment report prepared by Dillon on behalf of FEI. All environmental regulatory permits, licences, and approvals have been identified and requisite notifications and applications will be prepared and submitted during the detailed engineering design phase of the Project.

Site-specific mitigation strategies will be developed in the detailed engineering design phase to protect known valued components and mitigate or offset any potential negative impacts to these components during the construction phase of the Project. Environmental specifications and a detailed Environmental Management Plan will be prepared by Dillon and FEI, and will be included as part of the Project tendering process to ensure the contractor(s) are aware of the Project's environmental requirements in addition to FEI's internal applicable environmental standards. As part of the tendering process, the contractor will be required to commit to compliance with these documents in addition to preparing and submitting the following plans for approval by FEI:

1. Control Plan for Uncontrolled Release of Drilling Fluids (Frac-out)
2. Environmental Incident and Emergency Response Plan;
3. Erosion and Sediment Control Plan;
4. Solid Waste Management and Demolition, Land Clearing and Construction Waste Management Plan; and
5. Hazardous Waste Management Plan.

These strategies and measures will be implemented, managed, and maintained by the contractor under the supervision of a Qualified Environmental Professional. Environmental

monitoring will also be undertaken by a Qualified Environmental Professional during all environmentally sensitive phases of the Project. The designated environmental monitor will have the authority to suspend work in the event that construction-related activities are observed to be out of compliance with the Environmental Management Plan, environmental specifications, any terms and conditions specified in the permits, licences, and approvals issued for the Project or the Contractor's own supplied plans.

7.2 *ARCHAEOLOGY*

On September 29, 2013, a Preliminary Field Reconnaissance (PFR) of the potential areas of ground disturbance on the northern and southern banks of the Muskwa River, west of the Highway 97 (Alaska Highway) Muskwa River bridge, was undertaken by ARCHER CRM Partnership (ARCHER), with field participation by Fort Nelson First Nation, to assess the potential for archaeological and/or cultural heritage resources within the Project area and to determine the requirements for an Archaeological Impact Assessment (AIA) prior to ground disturbing activities. Portions of the study area overlap with a previous PFR conducted by ARCHER in 2010.

The PFR concludes that both the northern and southern areas of potential ground disturbance do not contain areas of archaeological potential due to the high levels of previous ground disturbance from construction of the former and present Muskwa River bridge, as well as the previous construction of the existing natural gas pipeline and existing All Terrain Vehicle (ATV) and recreational vehicle trails and roads built within and adjacent to the study area. However, there may be the possibility of deeply buried archaeological deposits and a "Chance Find Procedure" is thus recommended in the event archaeological material is found. No recorded archaeological sites occur within or adjacent to the study area.

7.2.1 Preliminary Field Reconnaissance

The results of the work undertaken by ARCHER are outlined in the *"Preliminary Field Reconnaissance of Proposed Fortis BC Drill Sites in b-43-B, 94-J-15, W6M and c-43-B, 94-J-15, W6M and related Facilities"* report included in Appendix I. This report summarizes that:

- No recorded archaeological sites are within or adjacent to the proposed areas of ground disturbance.
- The study area does not contain areas of moderate or high potential with regards to archaeological resources.

7.2.2 Further Plans

Based on the PFR, no further archaeological assessments are required within the proposed development footprint.

Archaeological specifications, including an archaeological chance find procedure, will be part of the Project tendering process to ensure the contractor(s) are aware of archaeological requirements in the event that an unrecorded archaeological site or resources are encountered during construction.

7.3 SOCIO ECONOMIC IMPACT

The economic impact of the Project to the regional area where the Project is to be constructed is expected to be limited. The construction contract and the major materials will likely be procured from out-of-province sources given the specialized nature of the work. However, opportunities for local employment will be encouraged and expenditures by the small work force will be of some benefit to local businesses in Fort Nelson. Most of the professional services, such as geotechnical engineering and environmental assessments have been or will be provided by personnel based in B.C., with some provided by personnel in the local area.

Project activities may temporarily affect recreational opportunities in the Project area. Specifically, access to the unregulated boat launch area(s) via the existing road and trail will be impacted. These impacts are expected to be temporary in nature as full access will be maintained during construction and will be restored once the Project is operational. Construction activities are expected to take place between March and May of 2014. This construction period is outside the hunting and fishing seasons and when the need for access to the boat launch is not frequent. Temporary access to the boat launch will be provided during the staging and construction phases to ensure continued access to the Muskwa River.

The City of Fort Nelson has been informed of the Project and will be consulted on pertinent issues as the Project proceeds.

7.4 CONCLUSION

Any potential environmental, archaeological, or socio-economic impacts associated with the Project are expected to be minimal and can be mitigated through the implementation of standard best management practices and mitigation measures. FEI will implement all applicable best management practices as determined appropriate by a Qualified Environmental Professional or a Professional Archaeologist.

8. PUBLIC CONSULTATION

Public consultation and communication are integral components of FEI's project development process. The details of the consultation plan and activities that have occurred to date with respect to the Project are provided in this section, which is organized as follows:

- An overview of the public consultation plan;
- A list of Project stakeholders;
- A summary of consultation activities to date and input received; and
- On-going consultation plans.

FEFN has also engaged First Nations communities and leadership in the area. This is discussed separately in Section 9.

8.1 *CONSULTATION APPROACH*

The focus of the Company's public consultation plan is to ensure that land owners and community stakeholders in FEFN are informed about the Project, have access to Project information, and are encouraged to provide input that may be factored into the decision-making process as the Project progresses. The Company's consultation responsibilities and coordination is the responsibility of FEI's Community Relations department. Consultation activities include:

- Communication of the Project with the pertinent government agencies
- Communication of the Project with local residents
- Meetings, presentations and conversations with MoTI and PWGSC
- Communication with Northern Rockies Regional Municipality
- Open houses
- Project information on FEI's website
- Postal code mail out
- Ads in local newspaper(s)
- Free media stories – capturing project details print and radio

Section 8.3.1 provides specific consultation activities regarding the initial IP Bridge Option and Section 8.3.2 provides completed and planned consultation activities regarding the newly proposed HDD Option.

8.2 PROJECT STAKEHOLDERS OTHER THAN FIRST NATIONS

FEI has identified, engaged and solicited feedback from community stakeholders and potentially affected parties. They include:

- Residents living within one kilometre of the Project site;
- Northern Rockies Regional Municipality (NRRM);
- Fort Nelson Chamber of Commerce;
- Federal Department of Public Works (Public Works and Government Services Canada);
- BC Ministry of the Environment;
- BC Ministry of Transportation and Infrastructure;
- BC Oil and Gas Commission;
- Department of Fisheries and Ocean Canada;
- Transport Canada; and
- Muskwa River users for fishing and boating.

As the Project progresses, these parties, where appropriate, will continued to be informed of the Project.

8.3 SUMMARY OF CONSULTATIVE ACTIVITIES AND INPUT RECEIVED AND ADDRESSED TO DATE

8.3.1 Consultation Activities Regarding the IP Bridge Option from 2010 to 2013

When FEI started to consider a pipe crossing replacement project in Fort Nelson, FEI representatives from Community Relations contacted stakeholders, including the general manager of the Fort Nelson Chamber of Commerce, and administrators of the NRRM.

When the IP Bridge Option became the preferred option to install the pipeline crossing, FEI, while maintaining its communication with the representatives of Fort Nelson, focused its consultation activities on meetings, presentations and conversations with PWGSC, which occurred from 2010 to 2013, to pursue the IP Bridge Option. As discussed in Section 4.2.3, PWGSC rejected FEI's proposal to attach the pipeline across the Muskwa river bridge in May 2013.

The following table provides a summary of the activities from June 2010 to June 2013.

Activities	Dates
Initial communication of project with government agencies	June 2010
Initial communication of project with local residents	July 2010
Meetings, presentations and conversations with PWGSC	2010 to 2013
Telecom information meeting with Mayor Bill Streeper, NRRM	August 2010
Presentation to NRRM Mayor and Council	September 2011
Letter to Minister responsible for PWGSC, Rona Ambrose & copy to local Member of Parliament, Bob Zimmer	March, 2013[20]
Meeting with NRRM Mayor and Council	June 2013
Meeting with the General Manager of the Chamber of Commerce	June 2013

Through these activities, FEI has shown its commitment to working with those stakeholders and communities potentially impacted by the proposed pipeline crossing.

8.3.2 Consultation Activities Regarding HDD Crossing Option

Subsequent to PWGSC's denial of the required permit for the IP Bridge Option, FEI re-focused its public consultation activities on the Project that is proposed in this Application. The following activities have taken place to date:

- Community Relations department has maintained regular contact through phone calls and face to face meetings with the NRRM administrator.
- The Fort Nelson Chamber of Commerce was also kept up to date on the status of the proposed pipe river crossing by way of face to face meetings as well as email correspondence.
- FEFN held two open houses in Fort Nelson in October 2013. Updated information on the Project and the HDD Option was provided during these two open houses. The invitation to, and the presentation material provided during, the open houses are attached as Appendix J1 and J2. One of the open houses was targeted to local residents, while the other was targeted to the NRRM Council.
- In October 2013, FEI presented the HDD Option and the proposed Project timelines to the NRRM Mayor and Council.
- Also in October, FEI participated in a CBC radio interview regarding the Project.
- As part of the MoTI permit requirements to work in the highway corridor, FEI continues to work with, and informs, PWGSC on any changes within the road allowance to ensure vehicle traffic is minimally impeded.

[20] FEI's letter to Minister responsible for PWGSC, Rona Ambrose and copy to local Member of Parliament, Bob Zimmer requesting reconsideration of the PGWSC denial to install a pipeline on the Muskwa River Bridge is attached as Appendix J3.

8.3.3 Input Received Regarding the Project

During the open houses held in October 2013, questions were received on how the Project would impact FEFN customer rates. It was explained that the average residential customer would see an approximately $100 per year increase in their natural gas bills. As a comparison, the Company also explained that the IP Bridge Option that FEI previously proposed was about half the cost.

During the presentation to the NRRM Mayor and Council in October 2013, NRRM wanted to ensure the sizing of the pipeline would ensure sufficient capacity for a growing municipality. NRRM is anticipating a large population increase due to LNG projects anticipated in the community. If these anticipated projects come to fruition, the Mayor and the Council would like to be assured that the new pipeline will supply sufficient capacity and not require an upgrade. FEI informed the Mayor and Council that although the pipeline planned is adequately sized based on recent population growth figures, FEI would review the pipeline capacity to determine what population projections would be served.

At both the open houses as well as during the presentation to the NRRM Mayor and Council, reliability of the current pipeline prior to the planned replacement was discussed by FEI. FEI explained that the Company has an emergency plan in place to address the situation; however, the community could likely be without natural gas service for 2-3 days.

8.4 *CONSULTATION PLAN GOING FORWARD*

FEI is committed to continuing consultation with stakeholders if the Project is approved, and will continue to work with Fort Nelson residents, the NRRM, the Mayor and Council, the Fort Nelson Chamber of Commerce to ensure that they are kept informed as the Project progresses and have ways to provide input to FEI. In particular, FEI plans to:

- Issue a postal code mail out with project information in January 2014;
- Notify the Fort Nelson community about the Project by placing an advertisement in the local FEFN newspaper at the start of the Project. The ad will provide residents and stakeholders with information regarding Project timelines, traffic implications and where to direct questions about the Project;
- Provide a further ad in newspaper when the Project is completed; and
- Maintain a Website, which can be found at: http://www.fortisbc.com/About/ProjectsPlanning/GasUtility/NewOngoingProjects/Pages/Muskwa.aspx/fortisbc.com/muskwa.

8.5 *CONCLUSION – SUFFICIENCY OF THE CONSULTATION PROCESS*

As discussed in Section 5.1 of the Application, the infrastructure of the proposed Project will only impact the land on either side of the Muskwa River Crossing, within the road allowance,

though construction activity will require the use of a small portion of the adjacent Crown land on both sides of the Muskwa River. This Project is expected to have no or minimal impact to the NRRM and surrounding areas.

FEI believes that the public consultation activities to the time of filing, as described in Section 8.3.2 above, have been appropriate with respect to the Project given the limited impact of the Project, and have met the expectations of interested parties. Further consultation activities are planned in the coming months as outlined in Section 8.4 above. FEI will continue to consult with stakeholders about the Project schedule, construction activities and requirements, and public safety.

It is FEI's intent that good relationships with local residence and businesses will be maintained through all phases of the Project. FEI will make every attempt to minimize Project impact, maintain the Project schedule and preserve our good relationships with stakeholders.

9. FIRST NATIONS CONSULTATION

9.1 INTRODUCTION

This section describes how First Nations have been engaged with respect to FEI's proposed pipeline crossing and particularly with the HDD Option that is proposed in the Application.

Because of the location of the Project, the only First Nation that is potentially impacted is the Fort Nelson First Nation. Thus, the consultation activities are focused on communications with FNFN.

Below, FEI will first outline the Company's First Nation engagement approach and identification of potentially impacted First Nations, followed by a summary of its early activities with respect to the pipeline crossing replacement, information on engagement activities with respect to the proposed Project, and a discussion of the Company's plan going forward. The evidence of First Nation engagement is current to October, 2013.

9.2 CONSULTATION APPROACH

The primary objective of FEI's engagement efforts for the Project is to ensure that First Nations whose Aboriginal interests may be potentially affected by the Project are identified and are provided updated information on the nature and progress of the Project. FEI also tries to mitigate or avoid any potential adverse impact on First Nations' interests during the Project development and construction where appropriate.

The proposed HDD Project will be located within the Alaska Highway road allowance, therefore, it is unlikely that any Aboriginal rights and title will be impacted. The highway is within claimed FNFN traditional use land. As the Project is within the OGC jurisdiction, FEI is required to provide information as required by the OGC, to the FNFN, the First Nation that has a potential concern for and interest in the Project. Also, any Crown land occupied during Project construction will be for temporary workspace only.

First Nations with any potential interests in the general area of the Project have been identified when the Company was first considering a pipeline crossing replacement, such as the IP Bridge Crossing Option. As further explained below in Section 9.3, FNFN is the First Nation that has been identified to have potential interest in the Project. It has been informed of the scope of the current proposed Project, and will continue to be updated where appropriate during the Project construction.

9.3 IDENTIFICATION OF FIRST NATIONS WHICH MAY HAVE AN INTEREST

The Muskwa River is within the traditional territory of FNFN. Treaty 8 Tribal Association has also been identified for communication because FNFN is a member of this Association.

9.3.1 Fort Nelson First Nation

The FNFN reserve is located 7 km's south of the town of Fort Nelson in the northeastern corner of British Columbia. The community is located at Mile 293-295 on the Alaska Highway. The FNFN has roughly 638 band members living on and off reserve.

The FNFN is one of five First Nations that belong to the Treaty 8 Tribal Association discussed below.

9.3.2 Treaty 8 Tribal Association

The Treaty 8 Tribal Association represents five First Nations in Northeastern BC. Its membership consists of a council of five Treaty 8 Tribal Association Chiefs of member and non-member First Nations. Each Nation is governed by a Chief and Council, with their mandate derived from their membership. The approximate aboriginal population of the Treaty 8 Tribal Association territory is 2500-3000.

FEI will notify and communicate with Treaty 8 Tribal Association regarding the Project. A letter will be sent out to lands department explaining the project along with timelines. Contact information will be provided in the event the Council has any questions.

9.3.3 Consultation Activities

Beginning in 2010, conversations and face-to-face meetings have been held with the Director of Land for the FNFN about FEI's plan to install a pipeline crossing the Muskwa River including the preference for the IP Bridge Option. In more recent months, after May 2013 when the PWGSC rejected the Company's permit in order to complete the IP Bridge Option, the Company has re-focused its engagement activities by providing information on the currently proposed Project – the HDD Option. FNFN has been informed of the current scope of the Project. The Company's Project Manager along with the Senior Aboriginal Relations Manager have had face-to-face meetings with FNFN to ensure they are kept up to date on the Project status and the currently proposed option. Specifically,

- On June 17, 2013, FEI's representative met with Lana Lowe, the Director of Land for the FNFN, and discussed the HDD Option for the pipeline crossing replacement.
- On October 28, 2013, FEI's representative met with Alexis Jorgensen, the Environmental Technician for FNFN, to review the HDD project plan.

Additionally, FEI is working with the FNFN to identify employment opportunities for FNFN members throughout the construction of the Project.

It is the Company's intent to ensure that FNFN has up to date information on the Project as the Project progresses and as necessary.

9.4 FEEDBACK ON PROJECT TO DATE

When FEI was pursuing the IP Bridge Option, the FNFN wrote a letter to FEI indicating its support of that Option. The letter is attached as Appendix K.

October 28, 2013, during discussion with the FNFN representatives, the FNFN expressed its concern with the mitigation and avoidance of archaeological and heritage sites. FEI is working with the FNFN to ensure that the sites identified are avoided throughout the Project.

Additionally, at the October 28th meeting the FNFN requested that the impacted site be restored to its original condition upon the Project completion. It was explained to the FNFN that FEI would restore the area and would work with FNFN to restore the native plant species.

9.5 FUTURE PLAN FOR FIRST NATIONS CONSULTATION

9.5.1 OGC Process Regarding First Nations Consultation

FEI is in the process of submitting an application to the OGC for the Project. The OGC is the Crown agency responsible for the First Nations consultation, and, if necessary, accommodation of First Nations' interests. The OGC's First Nations consultation process is documented in its Pipeline Permit Application Manual, Pipeline Operations Manual, and Facilities Application and Operations Manual.

Under the OGC process, FEI as the Project proponent is responsible for conducting preliminary discussions with the identified First Nations, and for providing documentation such as Project descriptions, maps and drawings to First Nations to facilitate the OGC process. On October 28th the project manager reviewed a presentation which is attached as Appendix J2 with the FNFN lands department going over the proposed project in detail. FEI's engagement activities that have taken place to the filing of the OGC application will be forwarded to the OGC for its consideration when FEI files its application with the OGC in early January 2014.

Once the OGC process for First Nation engagement is communicated to FEI, meetings will be arranged with FNFN for further discussion. A band council resolution will also be requested.

FEI's continued consultation efforts will be in concert with the OGC's efforts as outlined in the OGC's manual. FEI anticipates completing the OGC First Nations consultation process in a timely matter.

9.5.2 Consultation Plan Going Forward

While it is unlikely that any Aboriginal rights and title will be impacted (see Section 9.6 below), FEI will continue to work with the FNFN to ensure that any potential for impact will be mitigated or avoided. For instance, as described in Section 7.2, a recent PFR study concluded that both the northern and southern areas of potential ground disturbance do not contain areas of archaeological potential, but a "Chance Find Procedure" was recommended in the event

archaeological material is found. This recommendation will be incorporated into the Project tendering process in the event of a find.

FEI has developed a positive working relationship with FNFN through past projects, and intends to continue to enhance these relationships. FEI will also continue the following activities in the first quarter of 2014 and moving forward:

- Provide timely information and updates regarding the Project and the regulatory process where appropriate;
- Provide timely and comprehensive responses to any questions, concerns or requests for information regarding the Project;
- Engage in discussions to further identify any potential impacts of the Project on aboriginal interests, and seek to avoid, mitigate or accommodate any potential impacts if necessary; and
- Continue to encourage feedback from the FNFN.

9.6 *SUFFICIENCY OF FEI'S ENGAGEMENT PROCESS WITH FNFN TO DATE*

As discussed above, the Project will be within the Alaska Bridge highway road allowance, and the land has thus been disturbed. It is unlikely that any Aboriginal rights and title will be impacted**.** In addition, any Crown land occupied during Project construction will be for temporary workspace and will be restored following construction.

As mentioned above, FEI will ensure a chance find procedure is incorporated into the Project tendering process in the event that unrecorded archaeological resources are encountered.

FNFN and Treaty 8 Tribal Association are the First Nation groups identified with potential interest in the general area of the Project and have been provided, and will be continued to be provided, with information on the Project. No significant concerns, with the exception of the mitigation and avoidance of archaeological and heritage sites and the request for restoration, have been raised as of October 29, 2013. Any further concerns will be addressed by the Company as appropriate.

Accordingly, FEI believes that the level of First Nation engagement undertaken at this stage of the Project is appropriate given only one First Nation, FNFN, was identified to have a potential interest in the Project area, and no aboriginal rights and title are affected.

It is FEI's intention and regular practise to continue liaising with the FNFN as the Project progresses. Additionally, FEI's continued consultation efforts will be in concert with the OGC's efforts as part of the OGC application process.

Appendix A

MUSKWA RIVER CROSSING 2012 DIVE INSPECTION REPORT

Edmonton Office:
8350 1st Street, NW
Edmonton, AB T6P 1X2
Tel. (780) 400-2260
Fax (780) 400-2261
24 Hrs 1-800-328-3494

Date: Oct. 22-26, 2012

Fortis BC Energy
16705 Fraser Highway
Surrey BC
V4N 0E8

Attention: **Mujib Rahman**

Enclosed is a report for services provided by Northern Underwater Systems completed on **Oct. 24 2012 for Fortis BC Energy.** If you require further information, please contact our office at 1-800-328-3494.

Sincerely,
N.U.S. Group

Castlegar Office:
130 Crescent St.
Castlegar, B.C. V1N-1B1
Tel. (250) 365-3200
Fax (250) 365-3201
24hrs. 1-800-328-3494

Date: Oct. 31 2012

Job Scope: To video inspect a gas pipeline on the Muskwa River, Ft. Nelson BC

N.U.S. Personnel:		
	Dive Supervisor:	John Rilkoff
	Diver:	Alvie Ostrikoff
	Standby Diver:	Kevin Vervaeke
	Tender:	Keith Sannes

Summary of Work/Findings:

October 24 2012

NUS arrives at the Muskwa River site at approximately noon and begins a site inspection for possible launch sites for the dive boat and also to inspect for any potential areas of hazard to the workers involved. After some time of inspecting both sides of the river the dive crew is finally able to establish an area for a launch site. There was approximately 8-10 inches of snow on the ground and the temperature was minus five. The river had a slight downstream current with approximately 2-3 inches of ice formation on both sides. The river had been running very muddy with virtually zero visibility to the diver which was quite evident on the video.
The boat was safely launched at approximately 14:00 hrs. and prepares for the video, beginning from the North side of the Muskwa River (Ft. Nelson). The bank condition on the North side of the river appeared to be sloughed into the river with some trees in the water at shoreline. NUS anchors their dive boat slightly upstream of the approximate area of the pipeline
and begins the inspection when all appears to be safe to do so.
Please note water level is assumed to be at 292.06 meters elevation, as per FortisBC survey dated November 7, 2012.

Start of dive **14:29**

- Diver leaves surface and reaches river bottom and reports of slight current and rocky bottom, of course visibility 0-2 inches maximum. Diver locates a large object which appeared to be concrete, continues searching by hand sweeping the bottom. Topside crew giving directions to diver, of approximate line up of pipe by monitoring his bubbles.
- Diver then begins to make his way towards shore under the ice cover, recording bottom conditions. No evident depressions or humps to report, although rock material had became larger as inspection got closer to the shoreline.
- Diver breaks up through the ice to gain his bearings, closer to the shoreline, then moving slightly down stream to get closer to location. No evidence of the pipeline had been discovered up to this point.
- Diver then begins inspecting bottom moving towards the south direction. (Ft.St. John) sweeping along the bottom for any indications of the pipe. The bottom material had changed from larger rock to a finer compact sand and smaller cobble. The shallower depths appeared to have more current as the diver approached the south shoreline. Diver reports of moving into a sand bar almost to the very edge of the south shore. Bottom conditions remained very flat.

- Diver then reverses direction and makes his way back towards the North shore again while being monitored by the topside crew for direction. The bottom material appeared to change from fine sand to compact sand and cobble to larger rocks as inspection continued on towards the North shore.
- Diver to stand by at current location while topside crew relocates the dive boat to the North side. The diver then gets direction from topside to move downstream to get back on location. Diver reports of no depressions or humps of material that could give indication of the pipe.
- Diver begins into deeper water and reports of the current being slower and also bottom material becoming of larger rocks. Diver then reports of a large boulder that was in the general area from the beginning of the inspection, and concentrates searching in that area.
- Diver finally discovers the pipe in approximately 12 feet of water and manages to get close enough to the bottom to see a yellow jacket coating and begins to follow it towards the south shore to where it becomes buried again. Diver then reports of how much exposed pipe is above ground before being buried again.

Note: For the translation of how the diver explains the exposure of the actual pipe above ground, he reports it as 12 0'clock to 5 o'clock being the upstream section of the pipe and 12 o'clock to 8 o'clock as being the downstream section, facing in the south direction. Included in this report I will give approximate percentages of how much of the pipe is exposed above river bottom.

Pipe exposure out of river bottom

Note: Due to the fact that the divers visibility was very limited and working against a current, a measuring device was not possible, having the diver pace off approximate distances using arms lengths (6ft.) while recording the exposure and conditions of the pipe was the method used.

NOTE:

Pipe exposure starts mid-channel and continues to approximately 6 foot water depth about 20 feet from north shore.

Beginning of exposed pipe 0-6 ft – Center of channel

Pipe is exposed from the 1o'clock of the upstream to the 10 o'clock downstream, approximately 25% of visible pipe. The yellow jacket protection on the pipe had been in good condition. Bottom material was a compact sand mixed with a fine cobble stone.

6-12 ft. The pipe to this distance is exposed from the 1 position to the 10 position, 25% exposed. Pipe is in good condition with no evident damage to the jacket.

Bottom material was consistent.

12-18 ft. Approximate exposure 2-9 position, 40% exposed. At approximately the 14ft. distance a band of tape material surrounded the pipe, unidentifiable. The jacket coating had been in good condition with no signs of damage. Bottom material was slightly of larger cobble, 3 in. minus mixed with sand.

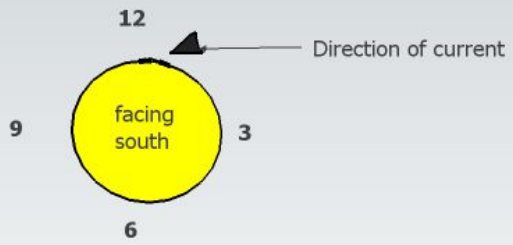
18-24 ft. Pipe is exposed from 3-9 position, 50%. Diver reports of a band of the same yellow jacket material wrapping around the pipe, all is in good condition with no signs of damage to the jacket. An area at about the **24 ft**. distance had been identified as very little material making contact with the bottom at the 6 o'clock position, at about a hands width, but still buried on the downstream to the 9 o'clock position.

24-30 ft. Pipe is exposed from 6-8 position, 80%. Diver reports the pipe to be in good condition with no signs of damage to the jacket protection. Bottom material is of rock approx. 5 in. minus

Material gradually becoming larger as diver approaches south side.
30-36 ft. Pipe is exposed from 6-9 position, 75%. Diver reports the pipe is slightly exposed, for approximately 1 ft. at the 6 position where it enters a concrete casing.
The pipe enters a concrete casing at the 36 ft. distance. Diver reports that a type of CSP culvert material had cased the concrete which had surrounded the pipe. The pipe continues in a concrete casing for 14 feet, to a cumulative distance of 50 feet of pipe, so far.
The pipe at this distance had been in good condition with no signs of damage to the protective jacket. Bottom material had been a mix of silt and larger rock from 12 in. minus.

- Diver then measures off the length from the end of concrete to where the pipe enters into an area of larger boulder (1 ft. minus) material towards the shoreline. The concrete is buried from 3-9 position, 50% exposed, prior to being buried into the larger rock material. This distance was noted as **14** ft. for a total of **64** linear feet of exposed pipe.
- A brief stop in video, while topside crew repositions the dive boat to the North shore.
- The diver revisits the pipe entering the boulder area.
- Diver is now in very shallow water and manages to push up through the ice and verify location towards the South shoreline. Diver was approximately 10 ft from the bank in about 4 to 5 feet of water.
- Inspection completed and diver returns to the boat at 15:46.

Please refer to the accompanying sketch below.

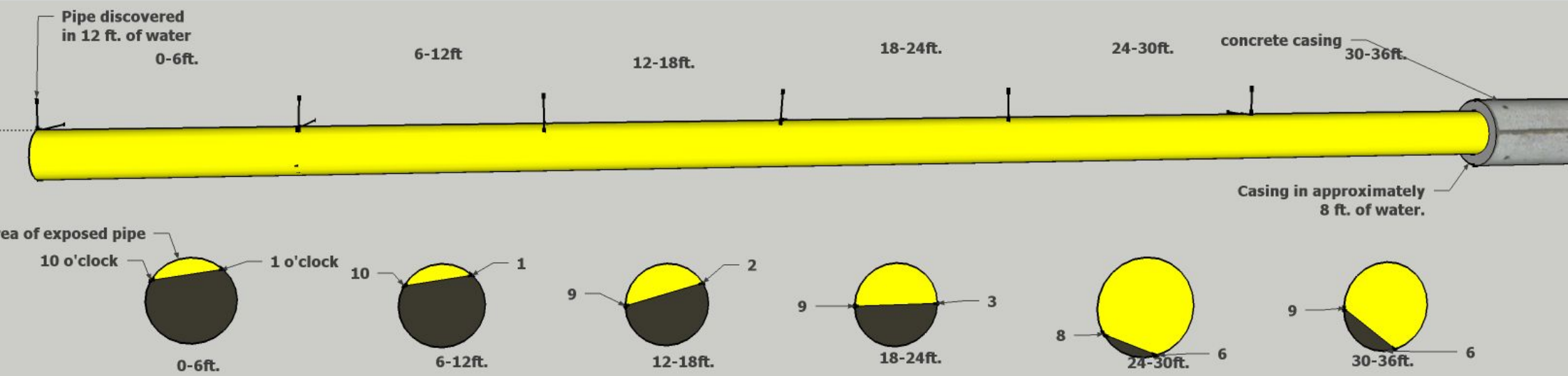


South

Diagram of pipeline from exposure to concrete casing.

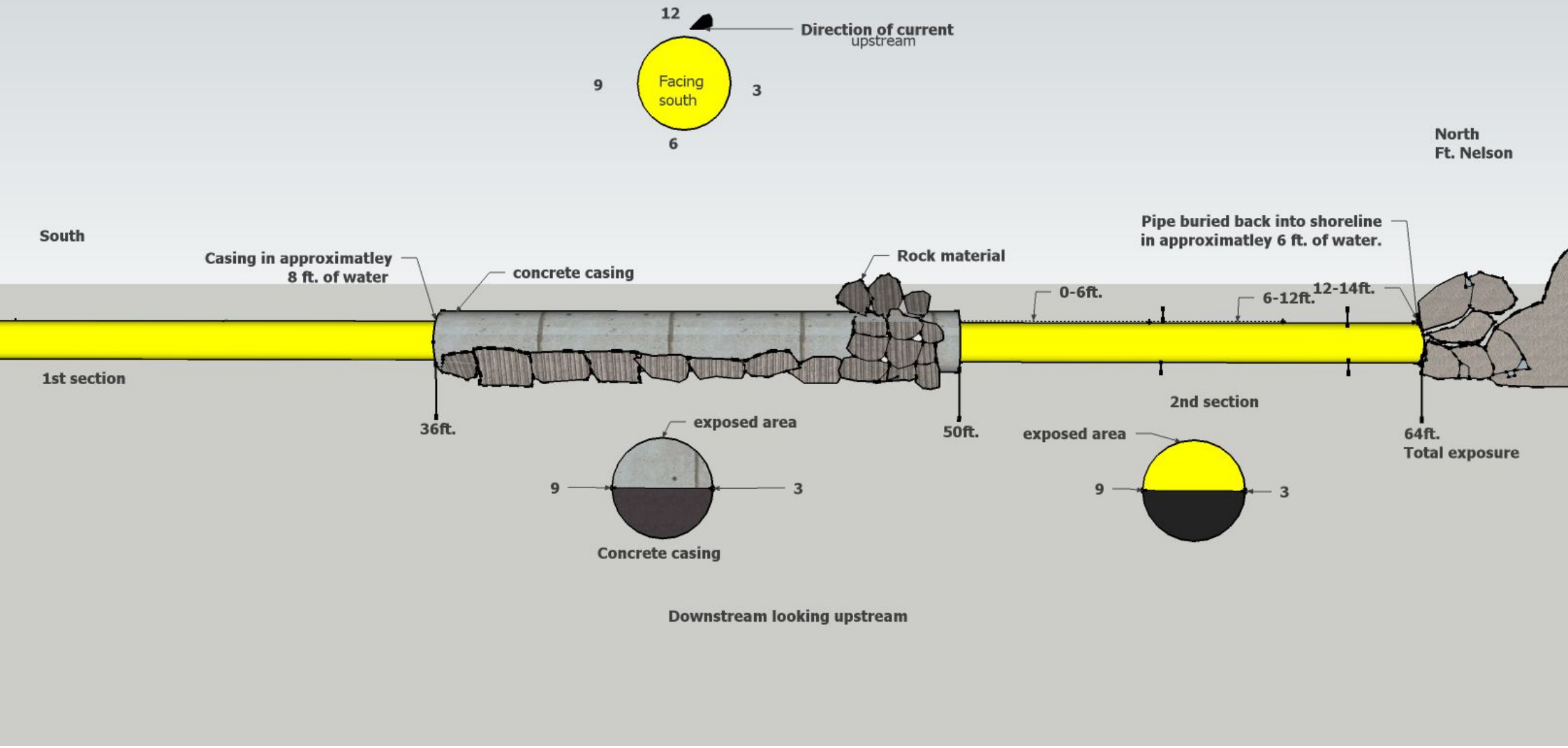
North

Ft. Nelson



View of pipe from downstream looking upstream

Continued.


12
Direction of current
upstream
9
Facing
south
3
6
North
Ft. Nelson
South
Pipe buried back into shoreline
in approximatley 6 ft. of water.
Casing in approximatley
8 ft. of water
concrete casing
Rock material
0-6ft.
6-12ft.
12-14ft.
1st section
2nd section
36ft.
50ft.
64ft.
Total exposure
exposed area
exposed area
9
3
9
3
Concrete casing
Downstream looking upstream

Appendix B

PWGSC RESPONSE LETTER, DATED MAY 17, 2013

Travaux publics et Services gouvernementaux Canada
Public Works and Government Services Canada

Direction générale des biens immobiliers
Real Property Branch

Sous-ministre adjoint
Assistant Deputy Minister

MAY 17 2013

Mr. Bob Gibney
Senior Manager
Municipal and Aboriginal Relations
FortisBC Inc.
1975 Springfield Road, Suite 100
Kelowna, British Columbia V1Y 7V7

Dear Mr. Gibney:

This is further to your letter of March 25, 2013, concerning your request to attach a natural gas pipeline on the Muskwa River Bridge.

I understand that the current pipeline must be replaced. However, I have reviewed your request again, and unfortunately Public Works and Government Services Canada (PWGSC) is unable to accommodate a new pipeline on the bridge.

As you are aware, the practice of attaching natural gas pipelines to a bridge is universally discouraged and requests for new installations are not approved if other more practical alternatives exist. This practice is based on the inherent security and safety risks associated with pipelines attached to bridge structures, however remote.

The Muskwa River Bridge is a key component of the PWGSC-managed Alaska Highway and is a critical asset in the transportation network of the region. Given its role as, effectively, the only road serving the northern-eastern part of British Columbia, any closure or reduction in service of the Muskwa River Bridge due to a pipeline accident would severely hamper not only transportation within Canada, but also between Canada and the United States.

.../2

I understand you have also approached PWGSC for the installation of an emergency pipeline to the bridge, should it be required. We have indicated that should an emergency pipeline be required, FortisBC would be allowed to temporarily install a pipeline on the Muskwa River Bridge, subject to conditions.

I trust this responds to your concerns.

Yours sincerely,

Pierre-marc Mongeau
Assistant Deputy Minister
Real Property Branch

c.c.: Office of Mr. Bob Zimmer, MP
Prince George—Peace River

Appendix C1

BUCKLAND AND TAYLOR COST ESTIMATE REPORT – AERIAL PIPELINE CROSSING

FILED CONFIDENTIALLY

Appendix C2

JACOBS ASSOC. COST ESTIMATE REPORT – HDD AND MICROTUNNELING

FILED CONFIDENTIALLY

Appendix C3

WORLEY PARSON COST ESTIMATE REPORT – ISOLATED OPEN CUT

FILED CONFIDENTIALLY

Appendix D

PRELIMINARY ENVIRONMENTAL AND SOCIO-ECONOMIC ASSESSMENT REPORT

FortisBC – Muskwa River Crossing Project

Fort Nelson, BC

Preliminary Environmental and Socio-economic Assessment

November 2013

Submitted to:
FortisBC
16705 Fraser Highway
Surrey, BC
V4N 5R8
Attention: Mr. Paul Tassie, P.Eng.

Submitted by:
Dillon Consulting Limited
3820 Cessna Drive
Suite 510
Richmond, BC
V7B 0A2
Contact: Chris Dane, Associate

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TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

FortisBC Energy Inc. (FortisBC) is proposing to replace a 6" lateral natural gas pipeline crossing under the Muskwa River, near Fort Nelson, BC. The project is formally referred to as the "Muskwa River Crossing Project", or hereafter as the "Project".

According to Section 46(1) of the *Utilities Commission Act* (1996), the Project will require a Certificate of Public Convenience and Necessity (CPCN). Dillon Consulting Limited (Dillon) was retained by FortisBC to undertake a preliminary environmental and socio-economic scoping assessment to support FortisBC's CPCN application. The 2010 *CPCN Application Guidelines* document was used to scope this report.

The purpose/scope of this preliminary environmental and socio-economic assessment was to determine:

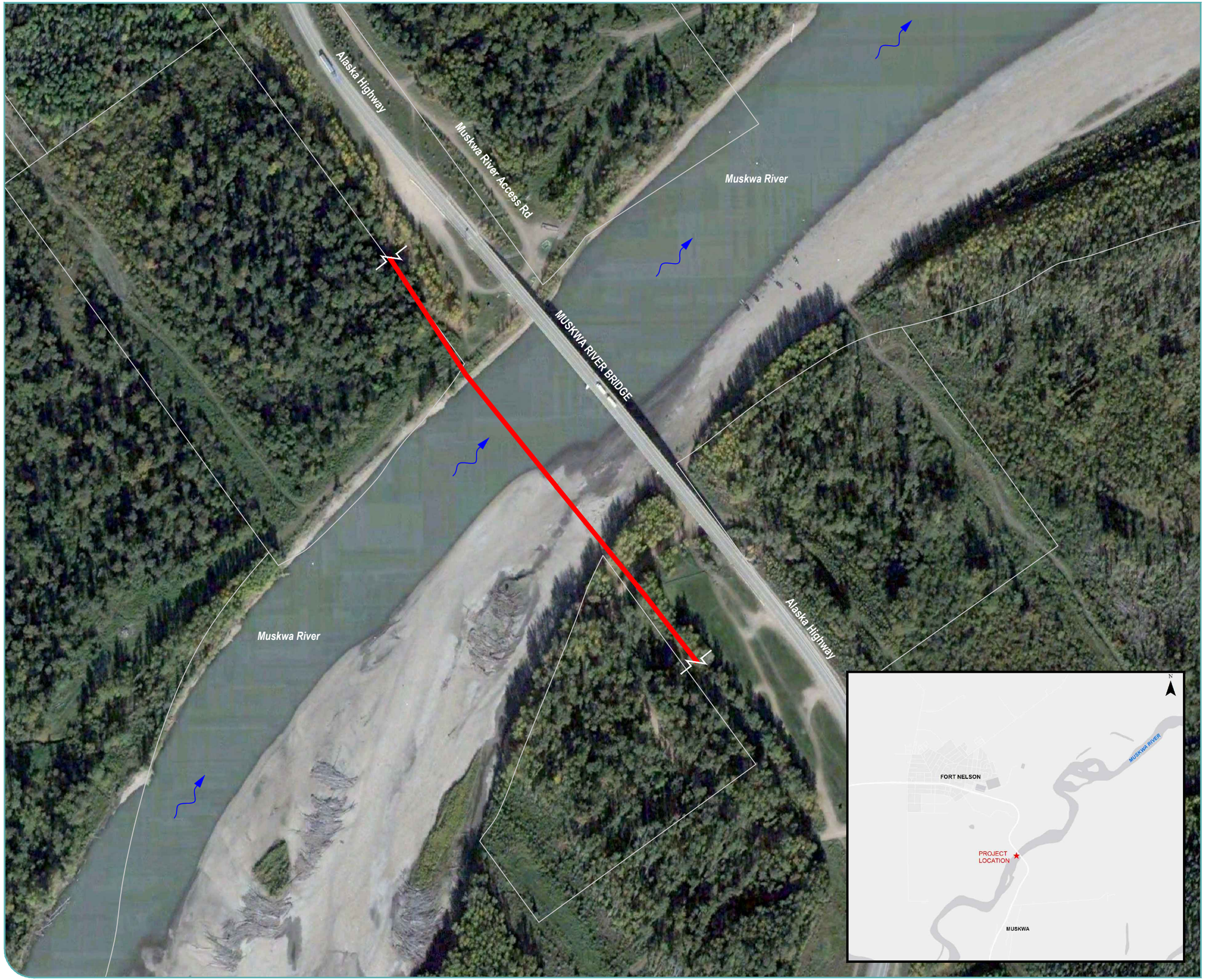
- Environmental and/or socio-economic resources/constraints present within or adjacent to the pipeline alignment;
- Environmental and/or socio-economic risks posed by the project;
- Mitigation measures proposed to protect the natural and socio-economic environment; and
- Regulatory permits, licenses, and approvals required in support of project development.

The environmental and socio-economic overview assessment included the following six general categories:

1. Current Land Use;
2. Surficial Soils;
3. Natural Environment;
4. Species at Risk;
5. Archaeological; and
6. Socio-Economic.

1.1 Project Scope

An existing 6" FortisBC pipeline carrying natural gas under the Muskwa River is presently at risk due to severe channel scour which has resulted in a 20 m area of exposure in the thalweg of the watercourse. This pipeline carries natural gas to the town of Fort Nelson, British Columbia and is located approximately 75 m upstream of the Alaska Highway Bridge crossing (Figure 1). From 2008-2013,



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FORT NELSON LATERAL 6" MUSKWA RIVER CROSSING PROJECT, FORT NELSON, BC

PROJECT LOCATION OVERVIEW MAP

FIGURE 1

- PIPELINE ALIGNMENT
- LOT BOUNDARIES
- DIRECTION OF FLOW
- WATER BODY

SCALE 1:3,000

0 25 50 100m

N

MAP/DRAWING INFORMATION
Orthographic image from Google Earth Pro

CREATED BY: TLR
CHECKED BY: PEK
DESIGNED BY: PEK

File Location:
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DILLON CONSULTING

PROJECT #: 12-7144

STATUS: FINAL

DATE: NOVEMBER 2013

FortisBC retained engineering, geotechnical and environmental consultants to conduct a variety of studies evaluating various alternatives to manage the risk associated with the exposed pipeline, including:

- Trenchless [Horizontal Directional Drill (HDD) or Microtunnel (MT)] crossing of the Muskwa River to replace and abandon the existing crossing;
- Open cut crossing of the Muskwa River to replace the existing crossing;
- Instream remediation of the existing pipeline using armouring;
- New aerial pipeline crossing to replace and abandon the existing line; and
- Installation of a new pipeline crossing fixed to the existing Alaska Highway Bridge to replace and abandon the existing line.

In October 2013, FortisBC installed emergency and temporary mitigation measures to provide protection over the exposed pipeline section, consisting of large sandbags. Understanding that the pipeline was proposed for replacement in 2014, this approach was determined to be a practical, cost-effective temporary protection option, which provided sufficient interim mitigation against bank erosion, toe scour, and damage from debris and ice at the pipeline crossing.

Following evaluations of various alternatives to manage the risk associated with the exposed pipeline, FortisBC has determined that a trenchless construction option to replace and abandon (in place) the existing crossing is the most viable long term crossing alternative. The two trenchless crossing methodologies currently being considered are:

1.2 Horizontal Directional Drilling (HDD)

Horizontal Directional Drilling is defined as “A steerable system for the installation of pipes, conduits, and cables in a shallow arc using a surfaced launched drilling rig. Traditionally HDD is applied to large scale crossings such as rivers in which a fluid filled pilot hole is drilled without rotating the drill string, and this is then enlarged by a wash over pipe and back reamer to the size required by the product.” (Trenchless Data Service, 2000). This technology has been in existence since the 1970s. It is an efficient, safe, cost effective method for river crossing bores and is the current industry standard for trenchless technology for bores between 2 and 48-inch diameters and 600 ft. to 1,800 ft. in length.

1.3 Microtunnel (MT)

Micro tunneling is a process that uses a remotely controlled, Micro tunnel boring machine combined with a pipe jacking technique to directly install product pipelines underground in a single pass. Micro tunnelling crossings differ from high-pressure directional drilled crossings, in that no high pressurized mud systems are required in operation, thereby avoiding the risk of sediment release due to frac out.

1.4 Project General Arrangement

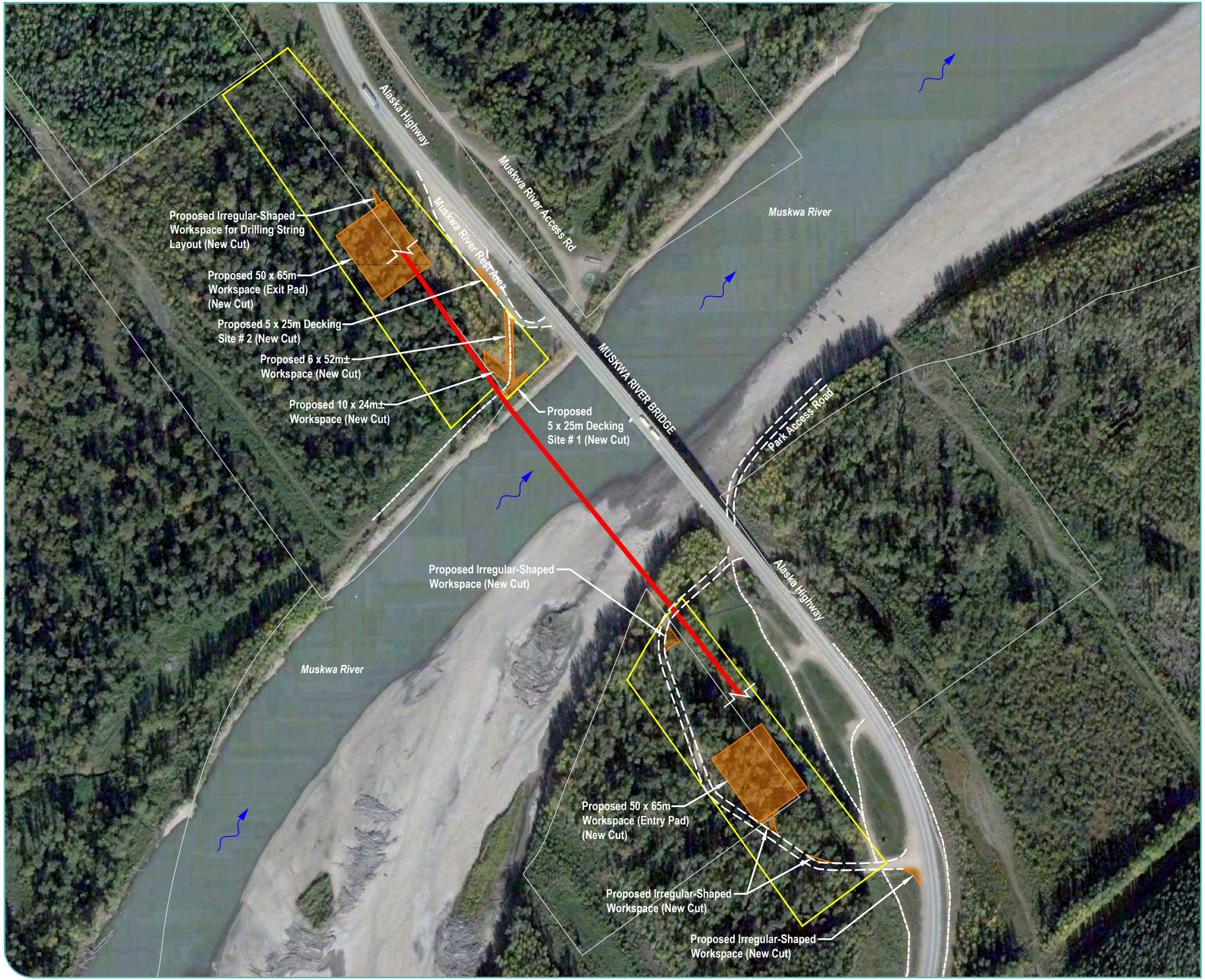
The entry point and drill rig staging is proposed to be positioned on the south side of the Muskwa River at approximate UTM, 10T 6516164, 519736, and the drill head exit point and drill string lay lay-down area is proposed to be located on the River's north side at approximately 10T 6516599, 519424. Decking sites are proposed to be located on the north side of river at 10T 6516487, 519533 (Site #1) and 10T 6516571, 519510 (Site #2).

The total anticipated ground disturbance is likely to be limited to the entry pad (50 m x 65 m cleared workspace) and exit pad (50 m x 65 m cleared workspace) plus additional space within the existing right-of-way for pipeline storage and stringing (6 m x 500 m). The entry/exit pads may move laterally along the drill path to accommodate future design changes. However, any disturbed areas will be limited to that area defined by the ground disturbance limits (total area of 2.8 hectares (ha) on the north side and 2.2 ha on the south side) illustrated on Figure 2.

All proposed crossing-related activities are expected to occur within the FortisBC right-of-way CG 789, the Alaska Highway right-of-way, and on adjacent Crown land (DL 1630 and DL 1632). On the south side of the River, it is proposed that construction equipment be mobilized from an existing access road. Equipment mobilization will also require the development and clearing of a new access road on the north side. Figure 2 illustrates the general arrangement of the proposed activities.

On the north side of the river, an access trail (new cut) is proposed within the Riparian Reserve Zone (within 50 metres of Muskwa River high water mark). On the south side of the Muskwa River, a small irregular-shaped workspace (new cut) is proposed within the Riparian Reserve Zone.

The anticipated project construction schedule is from mid-February to May 31, 2014, subject to approvals and contractor availability.



FORTIS BC™

FORT NELSON LATERAL 6" MUSKWA RIVER CROSSING PROJECT, FORT NELSON, BC

PROPOSED WORK SPACE
FIGURE 2

- PIPELINE ALIGNMENT
- LOT BOUNDARIES
- DIRECTION OF FLOW
- WATER BODY
- GRAVEL ROAD
- TRAIL
- PROPOSED WORKSPACE
- GROUND DISTURBANCE LIMIT

SCALE 1:3,000

0 25 50 100m

N

MAP/DRAWING INFORMATION
Orthographic image from Google Earth Pro

CREATED BY: TLR
CHECKED BY: PEK
DESIGNED BY: PEK

File Location:
g:\cad\127144\03-reports\127144-00-site-fig2.dwg
November, 12, 2013 12:04 PM

DILLON CONSULTING

PROJECT #: 12-7144
STATUS: FINAL
DATE: NOVEMBER 2013

1.5 Methods

The environmental and socio-economic overview assessment summarizes findings from previous studies and supplemental walk-through assessments by Dillon in August and October 2013 in support of this Project. The Project area was assessed according to the six categories outlined above. In preparation of this document, Dillon utilized ortho-imagery and reviewed a number of information resources, including site and project-specific assessments and reports completed for the Muskwa River crossing from 2008 to 2013. A list of information resources used in the desktop study is provided in Table 1. A description of the data collection methods and study areas for each of the categories is provided below.

Table 1: Records and Resources Searched and Analysed

Record Source	Records Reviewed
Provincial Government	
DataBC Data Distribution Service	Masked and non-masked occurrences of sensitive species; Watercourses and water bodies
Ministry of Environment	Site Registry for contaminated sites, Fisheries Inventory: Fisheries Information Summary System
BC Conservation Data Centre – Mapped Known Locations of Species at Risk	Accessed in October 2013 to determine the locations of known occurrences of non-masked Species at Risk.
Federal Government	
Species at Risk Public Registry	Accessed to determine status of non-masked occurrences as a Species at Risk
Geological Survey of Canada	Reviewed surficial geology mapping
Municipality	
Northern Rockies Regional Municipality (2012)	Reviewed the Official Community Plan for land use mapping
Pipeline Crossing Location and Project-Specific Reports (2008-2013)	
BGC Engineering (2008)	Stage 3 Hydrotechnical Surveys, Muskwa River KP 17.3 Fort Nelson Lateral 4' Pipeline
Environmental Dynamics Inc. (2010)	Muskwa River Natural Gas Pipeline Crossing – Environmental Baseline
Chinook Engineering (2010)	Muskwa River Crossing, Fort Nelson BC – Class 4 Pipeline Estimating Package (Riprap Remediation Options)
Chinook Engineering (2010)	TP168.3mm Muskwa River Crossing – Front End Engineering Design (FEED)
Environmental Dynamics Inc. and BGC Engineering (2011)	Muskwa River Natural Gas Pipeline, Risk Assessment of Selected Crossing Options
Dillon Consulting Limited (2012)	Fort Nelson Lateral 4" Muskwa Crossing – Environmental Review of Instream Crossing Options
ARCHER CRM Partnership (2010 and 2013)	Preliminary Field Reconnaissance of Proposed Fortis BC Drill Sites in b-43-B, 94-J-15, W6M and c-43-B, 94-J-15, W6M and related Facilities"

Record Source	Records Reviewed
Other Resources	
Fisheries and Oceans Canada (2013)	Accessed for watercourse names and classifications
Google Earth Pro and Google Maps	Northern BC ortho-imagery
FortisBC	Watercourse crossing information, pipeline routes and archaeological information

1.5.1 Land Use

Land use designations, parks and Environmentally Sensitive Areas (ESAs) were determined within the vicinity of the Project area from Northern Rockies Regional Municipality Official Community Plan and/or other resources identified in Table 1.

1.5.2 Surficial Soils

Surficial soil investigations were undertaken along both sides of the Muskwa River near the proposed crossing in 2010, by Environmental Dynamics Inc. Historical mapping from the Geological Survey of Canada (1980) and Agriculture and Agri-Food Canada Detailed Soil Survey digital data (2013) was also reviewed for soil classifications and surficial geology information in the Project area.

1.5.3 Natural Environment

In 2010, aquatic and terrestrial habitat in the vicinity of the proposed Project area was investigated by a team of biologists from Environmental Dynamics Inc., of Prince George, BC. The team documented existing fish and fish habitat, terrestrial wildlife capability, soils characteristics, and vegetation composition. Dillon has conducted further environmental background reviews and assessments, as well as ground truthing exercises (2013) at the Project site. Site visits completed in 2013 were intended to provide supplemental/confirmatory information related to existing conditions and its attributes, such as the aquatic and terrestrial habitat characteristics, and fish and wildlife use of the Muskwa River, and its riparian and upland habitat. Ortho-imagery obtained from Google Earth/Maps has also been assessed for supplemental information.

1.5.4 Species at Risk

Species-at-risk with the potential to occur in the Project area were identified using occurrence records from the provincial BC Conservation Data Centre (BC CDC) and federal *Species at Risk Act* (SARA) listings. The SARA Public Registry was accessed to collect information on species-at-risk that may potentially occur within or adjacent to the Project area and to determine their current status under the *Act*. The SARA website contains a searchable mapping utility that lists potential federally-listed species that may be present in a given area. Of note, only species placed on Schedule 1 of SARA receive full regulatory protection.

The BC Species and Ecosystems Explorer and CDC rare element occurrence mapping webpage was also accessed to retrieve available records of provincially-listed rare wildlife, plants and ecological communities within the study area. The provincial ranking system includes Red and Blue-listed species or ecosystems.

The BC MoE defines the "Red-list" as the following:

> *"Includes any ecological community, and indigenous species and subspecies that is extirpated, endangered, or threatened in British Columbia. Extirpated elements no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered elements are facing imminent extirpation or extinction. Threatened elements are likely to become endangered if limiting factors are not reversed. Red-listed species and sub-species may be legally designated as, or may be considered candidates for legal designation as Extirpated, Endangered or Threatened under the Wildlife Act.* (http://www.env.gov.bc.ca/wld/faq. htm#2) *Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation."* (http://www.env.gov.bc.ca/atrisk/red-blue.htm)

The BC MoE defines the "Blue-List" as the following:

> *"Includes any ecological community, and indigenous species and subspecies considered to be of special concern (formerly vulnerable) in British Columbia. Elements are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed elements are at risk, but are not Extirpated, Endangered or Threatened."* (http://www.env.gov.bc.ca/atrisk/red-blue.htm)

The Red-list includes any indigenous species or sub-species that are considered to be "Extirpated", "Endangered" or "Threatened" in BC. Definitions of the status categories for the CDC are:

- "Extirpated" species no longer occur in British Columbia but do occur elsewhere in Canada or other countries;
- "Endangered" elements are facing imminent extirpation or extinction; and
- "Threatened" elements are likely to become "Endangered" if limiting factors are not reversed.

Species or sub-species on the Blue-list are of "Special Concern" as they are considered to be vulnerable or particularly sensitive to human activities or natural events. Blue-listed taxa are at-risk, but are not Extirpated, Endangered, or Threatened. The CDC does not make laws about managing or conserving species-at-risk or their habitats, but it maintains a database that can inform government decisions on legal designation of species-at-risk.

Dillon also identified species-at-risk which could potentially occur within the Project area based on desktop review and a CDC records review. Habitat suitability assessed at both the desktop and field

level, the list of species generated represents those that have the potential to utilize habitat in the general area of the Project.

1.5.5 Archaeological Assessment

A Preliminary Field Reconnaissance (PFR) of the potential areas of ground disturbance on the northern and southern banks of the Muskwa River, west of the Muskwa Bridge, was undertaken in September 2013 by ARCHER CRM Partnership (ARCHER), with field participation by Fort Nelson Fort Nation, to assess the potential for archaeological and/or cultural heritage resources within the Project area and to determine the requirements for an Archaeological Impact Assessment (AIA) prior to ground disturbing activities. Portions of the study area overlap with a previous PFR conducted by ARCHER in 2010.

2.0 ENVIRONMENTAL OVERVIEW

This section provides a description of environmental and socio-economic information collected for the proposed Project area using the methods described in Section 1.2 above.

2.1 Land Use and Zoning

The Project area falls entirely within the Northern Rockies Regional Municipality. According to the Municipality's Official Community Plan (OCP) (2011), the pipeline segment, related construction and mobilization areas, and associated 100 m buffer area has a Major Parks land use designation. Adjacent land use designations within the larger study area include: Utilities on northeast side of Muskwa River Bridge; Open Space designation along north bank, beginning approximately 250 m upstream of Project area; and Resource Conservation land use area to the north and northwest of the Project area, and on the south side of the Muskwa River to the south and southwest of the proposed Project boundaries. The FortisBC right-of-way and proposed staging areas are within the Fort Nelson Enhanced Resource Development Zone, the Alaska Highway right-of-way and various Crown land parcels with designations DL 1630 and DL 1632. The Project area is not located within the Agricultural Land Reserve.

2.1.1 Environmentally Sensitive Areas

The Regional Municipality of the Northern Rockies OCP did not identify High Sensitivity ESAs within 100 m of the pipeline alignment.

2.2 Surficial Soils

Three soil sampling pits were dug by EDI (2010) on the south side of the river, and two on the north. The soil pits were excavated to an average depth of 50 cm and further probed to an average depth of 80 cm. Soils occurring in the study area were characterized by a sandy loam to silty loam matrix with low coarse fragment content on the approach to the Muskwa River and in the alluvial floodplain along the banks of Muskwa River. The soils in the floodplain were mainly comprised of sand and silt that have been

deposited during previous flood events. Leaf litter from the mostly cottonwood forest and understory shrubs has resulted in a thick well developed LFH layer approximately 10 to 12 cm thick.

2.3 Contaminated Sites

No potential contaminated sites or environmental concerns (*i.e.* former industrial land use, waste management or fuel dispensing) related to contamination were identified within 40 m of the proposed Project area.

2.4 Natural Environment

2.4.1 Aquatic Resources

Watercourses identified within 100 m of the proposed pipeline crossing location are limited to the Muskwa River. The proposed Project site is located between the Prophet River upstream (10 km), and the Fort Nelson River downstream (12 km). These watercourses are outlined below in Table 2.

Table 2: Major Watercourses Identified within 10 km of the Muskwa River Crossing

Watercourse	Classification	Mapped Watercourse	Distance to Pipeline
Muskwa River	S-1	Yes	Crossing
Prophet River (upstream of crossing)	S-1	Yes	10 km (upstream)
Fort Nelson River (downstream of crossing)	S-1	Yes	12 km (downstream)

The Muskwa River flows for approximately 260 km as part of the Mackenzie River system (EDI and BCG, 2011). In August 2010, EDI performed fish and fish habitat sampling at 12 stations along the Muskwa River, including the kilometer post 17+300, at the pipeline crossing. Fish species identified within the Muskwa River during the 2010 study are listed in Table 3 (EDI, 2010). All species observed are considered secure or apparently secure in BC.

Table 3: Fish species captured in the Muskwa River in August 2010.

Species	Scientific Name	Provincial S-Rank*
Arctic Grayling	*Thymallus arcticus*	S4
Flathead Chub	*Platygobio gracilis*	S4
Lake Chub	*Couesius plumbeus*	S5
Longnose Dace	*Rhinichthys cataractae*	S5
Longnose Sucker	*Catostomus catostomus*	S5
Mountain Whitefish	*Prosopium williamsoni*	S5
Northern Pike	*Esox Lucius*	S5
Spoonhead Sculpin	*Cottus ricei*	S4
Trout-perch	*Percopsis omiscomaycus*	S4
Walleye	*Sander vitreus*	S4/S5

*S4 – Apparently Secure; S5 - Secure

The Muskwa River in the vicinity of the crossing exhibits run morphology with minimal cover, deep glides and high turbidity. Large woody debris, debris jams, and willows are present on the gravel bar at the crossing (south side of river), and provide some cover during high flow periods. Channel substrates are composed predominantly of gravel and small cobble, with some locations consisting of fine sediments. The high north bank is actively eroding at the crossing location and fish habitat was not observed to be unique at the crossing location; however, it is expected that this area would support summer rearing opportunities for resident sport fish and non-sport fish species (EDI 2010). The closest high value habitat to the proposed pipeline crossing site is located approximately 1.5 km downstream.

Critical spawning habitats (or any other high-value features) have not been identified within the vicinity of the crossing. Based on review of available background information, Dillon characterizes habitat potential at the crossing as moderate for sport fish.

2.4.2 Terrestrial Resources

2.4.2.1 Vegetation

A 2011 report by EDI and BGC describes the terrestrial environment in the vicinity of the Project area, is reflective of a mature vegetation community typically found within the Boreal White and Black Spruce (BWBS) biogeoclimatic zone. There is evidence of previous anthropomorphic disturbance within the plant community. During 2010 field studies, a total of seven vegetation plots were sampled in the vicinity of the proposed crossing. A plot radius of 11 m was used to determine tree cover and a plot radius of 3 m to capture herb/shrub composition. At each site, general site features, such as overall species richness and diversity, degree and extent of specific features, plant species and communities,

floristic and structural heterogeneity, and indicator species were documented. Percent cover of all trees, shrubs, forbs, graminoids, mosses and lichens were determined. Evidence of past disturbance, plant invasion (exotic species), scarification, uncharacteristic site features, ecological isolation, insularity, etc. were noted.

Plant community and species composition within undisturbed areas was relatively uniform throughout the study area. Forest cover was composed predominantly of black cottonwood, with lesser components of white spruce, trembling aspen, and paper birch. Shrub species included alder, willow species, red-osier dogwood, and prickly rose. Only six herb species were recorded; bracken fern, Canada goldenrod, horsetail, trailing raspberry, twinflower, and wild strawberry. No rare plant species or plant communities or species-at-risk were observed near the crossing. In addition, no Red or Blue-listed species or ecological communities were identified within the B.C. Conservation Data Centre database (MOE, 2013).

2.4.2.2 Wildlife and Wildlife Habitat

As stated, the Muskwa River pipeline crossing location lies within the BWBS Biogeoclimatic zone which supports a diverse number of wildlife species. Wildlife values in the immediate Project area, as described by EDI and BGC (2011), consist primarily of foraging habitat, as well as staging and migration areas for a variety of terrestrial wildlife common to the Fort Nelson area. During 2010 field studies conducted by EDI, wildlife encounter ground survey transects were performed within and adjacent to the pipeline right-of-way on both the north and south sides of the Muskwa River. A number of species indicators (e.g. tracks or scat) were detected, including black bear, deer, fox, lynx, and moose. A black bear was also observed on a gravel bar immediately downstream of the Muskwa River Bridge (~200 m downstream of pipeline crossing). Avian species inhabiting the Project area included common raven, hairy woodpecker, black-capped chickadee, red-tailed hawk, and red-eyed vireo. Barn swallow nests were noted beneath the bridge, on the south side.

2.4.2.3 Riparian Area

Riparian areas associated with the study area provide forage habitat and staging and stop-over migration areas for a variety of mammals and avian species. The deciduous forests in the Muskwa valley provide productive habitats for ungulates (moose, deer), songbirds including warblers, thrushes, vireos, and flycatchers, and small mammals including snowshoe hare and deer mouse. Wildlife habitat at the proposed pipeline crossing site is typical of riverine habitats in the Fort Nelson area, and overall habitat quality appears to have been degraded by past land clearing and the proximity of the crossing site to Highway 97 (Alaska Highway).

During average flow conditions the bankfull width of the Muskwa River within the Project area is approximately 200 m and the wetted width is approximately 100 m with a mean depth of 2.5 m (EDI and

BCG, 2011). According to the Forest Planning and Practices Regulation under the *Forest and Ranges Practices Act*, this section of the Muskwa River has a stream riparian class of S1-A; therefore, the Riparian Management Area consists of a 50 m Riparian Management Zone and a 50 m Riparian Reserve Zone.

It must be noted that there are inconsistencies in riparian classification in the studies and reports cited. The FEED Study (Chinook Engineering 2010b) assumed the classification of the Muskwa River to be a S1-B stream. The Risk Assessment Report (EDI and BGC 2011) classified this portion of the Muskwa River as S1-A. In Dillon's opinion, the Muskwa River at the Project location is appropriately classified as a S1-A riparian class.

2.5 Species at Risk

The database search identified a total of eight unmasked species-at-risk (all vertebrates) as having the potential to occur within the Northern Rockies Regional Municipality. The likelihood of any species-at-risk being present at or near the Project location is considered very low based on the suitability of available habitat. These species are listed and described below in Table 4.

Table 4: Species-at-Risk Observed or Having the Potential to Occupy Habitat within Muskwa River Crossing Area

Species		Status in Canada (SARA)	COSEWIC Status	Provincial Status	Habitat	Observation and Distribution Details	Likelihood of Occurrence at Project Location
Scientific Name	Common Name						
Vertebrates							
Anaxyus boreas	Western Toad	Schedule 1 Special Concern (2012)	Special Concern (2012)	Blue	Western Toads use three different types of habitat: breeding habitats, terrestrial summer range, and winter hibernation sites. Preferred breeding sites are permanent or temporary water bodies that have shallow sandy bottoms. They may roam far from standing water, but they prefer damp conditions. Western Toads spend much of their time underground: though they are capable of digging their own burrows in loose soils, they generally shelter in small mammal burrows, beneath logs, and within rock crevices.	Western Toads are found west of the Rocky Mountains, from Mexico to southern Alaska. They are found in semi-arid and wet forested regions of B.C. They can be found at elevations from sea level to at least 2250 m.	Low - Moderate

Species		Status in Canada (SARA)	COSEWIC Status	Provincial Status	Habitat	Observation and Distribution Details	Likelihood of Occurrence at Project Location
Scientific Name	Common Name						
Bos bison athabascae	Wood Bison	Schedule 1 Threatened (2003)	Threatened (2000)	Red	Wet sedge meadows are the preferred winter habitat; willow savannahs are preferred in summer; no distinct habitat preference in fall. Generally found in wooded habitats.	At present, free-ranging herds are scattered from the southwestern Yukon and the Great Slave Lake area of the Northwest Territories, south and east through northeastern British Columbia and northern Alberta to central Manitoba.	Nil
Gulo gulo luscus	Wolverine, luscus subspecies	-	Special Concern (2003)	Blue	A wide variety of forested and tundra habitats is used by wolverines in wilderness areas. Habitats must have an adequate year-round supply of food that consists of smaller prey species, such as rodents and snowshoe hares, used more in summer, and the carcasses of larger animals, like moose and caribou, which are an important part of the winter diet.	In Canada, they are found in northern forested wilderness areas across the country, in alpine tundra of the western mountains, and in arctic tundra.	Low

Species		Status in Canada (SARA)	COSEWIC Status	Provincial Status	Habitat	Observation and Distribution Details	Likelihood of Occurrence at Project Location
Scientific Name	Common Name						
Pekania pennant	Fisher	-		Blue	Fishers inhabit upland and lowland forests, including coniferous, mixed, and deciduous forests. They occur primarily in dense coniferous or mixed forests, including early successional forest with dense overhead cover (Thomas et al. 1993). Fishers commonly use hardwood stands in summer but prefer coniferous or mixed forests in winter.	Small population in British Columbia, but found throughout most of province.	Low
Rangifer tarandus pop. 14	Caribou (boreal population)	Schedule 1 Threatened (2003)	Threatened (2002)	Red	Boreal Caribou preferentially use peatlands throughout the year and forested habitat to a lesser extent.	Lowlands of northeastern British Columbia throughout the year and do not have access to mountainous terrain.	Low
Rangifer tarandus pop. 15	Caribou (northern mountain population)	Schedule 1 Special Concern (2005)	Threatened/ Special Concern (2002)	Blue	Caribou (northern mountain population) typically use low elevation pine forests or windswept alpine slopes during winter, where they can crater for terrestrial lichens, and mountainous terrain during the summer months.	Northern British Columbia to Southern Yukon and southwestern areas of Northwest Territories.	Low

Species		Status in Canada (SARA)	COSEWIC Status	Provincial Status	Habitat	Observation and Distribution Details	Likelihood of Occurrence at Project Location
Scientific Name	Common Name						
Salvelinus confluentus	Bull Trout	-	Special Concern (2012)	Blue	Bottom of deep pools in cold rivers and large tributary streams, often in moderate to fast current watercourses. Relatively stable stream flow, low levels of fine substrate sediments, high stream channel complexity with various cover types, temperatures not exceeding about 15 C, and the presence of suitable corridors for movement between suitable winter and summer habitats.	North-south distribution in coastal and mountain areas of Pacific Northwest, between approximately 48 and 61 degrees N latitude, north to the Yukon and Liard river drainages in northern British Columbia and adjacent Yukon Territory.	Low
Ursus arctos	Grizzly Bear	-	Special Concern (2002)	Blue	Found mostly in arctic tundra, alpine tundra, and subalpine mountain forests. Most populations require huge areas of suitable habitat. Common only where food is abundant and concentrated (e.g., salmon runs, caribou calving grounds).	Common only in Alaska, parts of the Yukon, northern and coastal British Columbia, and portions of the northern Rocky Mountains.	Nil

"-" no current designation

2.6 Socio-Economic Overview

The Project area is located entirely within the Northern Rockies Regional Municipality (NRRM). The NRRM was incorporated in 2009, which amalgamated the Town of Fort Nelson and the Northern Rockies Regional District. Located approximately 8 km from the Project area, Fort Nelson is the largest community in the NRRM with a population of approximately 4,800, and is recognized as the administrative centre of the region (NRRM, 2012). According to the NRRM, Fort Nelson is currently experiencing steady growth. However, it is expected to experience accelerated growth over the next several years due to substantial investments in shale gas development in the area (NRRM, 2012). Located at Mile 300 of the Alaska Highway, Fort Nelson is also a major stop for travelers on their way to and from Alaska.

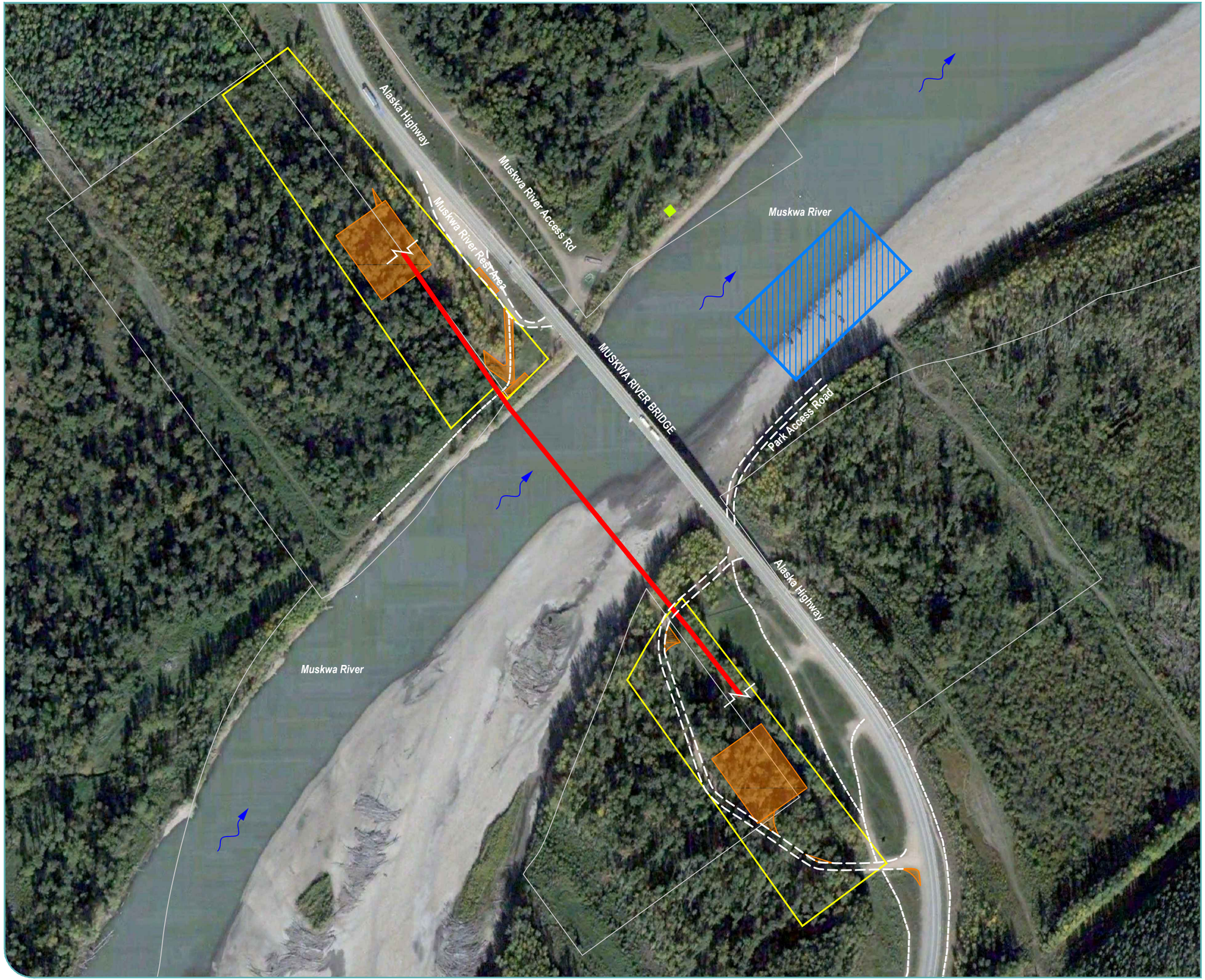
2.6.1 Recreation

Due to its proximity to Fort Nelson, the Muskwa River provides recreational opportunities for local residents and tourists, including:

- Hunting – The Muskwa River is considered a major conduit for hunting activities involving First Nations, guide outfitters and recreational hunters. The hunting season typically begins in mid-August and continues through to October. Boat traffic on the Muskwa River increases significantly during the hunting season (EPI, 2011).
- Boating/Paddling – The Alaska Highway Bridge is adjacent to a primary access point for the Muskwa River. The gravel bar on the south bank serves as an unregulated boat launch and is accessed via a gravel road from the Alaska Highway (see Figure 3). The Muskwa River is recognized as a Class One river and is also utilized by non-motorized boating enthusiasts (Tourism Northern Rockies, 2013).
- Sport Fishing – The Muskwa River is utilized for sport fishing. A variety of fish species are fished in the river including Artic grayling, bull trout, burbot, chum salmon, and mountain whitefish (Woods, 2001).

2.6.2 Infrastructure

The Muskwa River is a primary water source for Fort Nelson. The pump house and water intake are located downstream of the Project area at geographic coordinates UTM 10N 6516508, 519775. Withdrawal from the river is suspended in the spring and summer due to increased turbidity. During this time Fort Nelson obtains its water supply from several reservoirs. Given the location of the water intake the Project is not considered to generate impacts to water supply (EPI, 2011).



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FORT NELSON LATERAL 6" MUSKWA RIVER CROSSING PROJECT, FORT NELSON, BC

SOCIO-ECONOMIC OVERVIEW
FIGURE 3

- PIPELINE ALIGNMENT
- LOT BOUNDARIES
- DIRECTION OF FLOW
- WATER BODY
- GRAVEL ROAD
- TRAIL
- PROPOSED WORKSPACE
- GROUND DISTURBANCE LIMIT
- BOAT LAUNCH AREA
- PUMP HOUSE (APPROXIMATE LOCATION)

SCALE 1:3,000
0 25 50 100m

N

MAP/DRAWING INFORMATION
Orthographic image from Google Earth Pro

CREATED BY: TLR
CHECKED BY: PEK
DESIGNED BY: PEK

File Location:
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DILLON CONSULTING

PROJECT #: 12-7144
STATUS: FINAL
DATE: NOVEMBER 2013

2.6.3 Industry

Blue Canyon Concrete currently extracts gravel from bars on the Muskwa River for commercial purposes. The nearest operations are located approximately 2 km upstream of the Muskwa pipeline crossing. Due to the significant distance between the Project area and the gravel extraction activities, the pipeline crossing is not considered to have an impact on water levels or geomorphic processes at the extraction site (EPI, 2011).

2.7 Archaeological Assessment (Preliminary Field Reconnaissance)

In 2010, ARCHER CRM Partnership conducted a preliminary field reconnaissance of the existing FortisBC pipeline crossing location. A second PFR was conducted in 2013 to confirm the findings from 2010 based on revised disturbance areas.

The PFR concludes that both the northern and southern areas of potential ground disturbance do not contain areas of archaeological potential due to the high levels of previous ground disturbance due to construction of the past and present Muskwa Bridge, as well as the construction of the natural gas pipeline and existing ATV and roads built within the Project area. However, there may be the possibility of deeply buried archaeological deposits and a "Chance Find Procedure" is recommended in the event archaeological material is found. No recorded archaeological sites occur within or adjacent to the Project area.

The results of the work undertaken by the ARCHER are outlined in the "*Preliminary Field Reconnaissance of Proposed Fortis BC Drill Sites in b-43-B, 94-J-15, W6M and c-43-B, 94-J-15, W6M and related Facilities*" report (2013). This report summarizes that:

- No recorded archaeological sites are within or adjacent to the proposed areas of ground disturbance.
- The Project area does not contain areas of moderate or high potential with regards to archaeological resources.

Based on the PFR, it is recommended that no further archaeological concerns are warranted within the proposed development footprint.

3.0 REGULATORY OVERVIEW

To assist FortisBC in the early planning phases of the Project, this section provides an overview of relevant environmental legislation and the regulatory requirements anticipated for the Project, including the identification of environment permits, approvals, and licenses that will be required in order to comply with environmental requirements of authorities having jurisdiction. The requirements may include applicable federal and provincial environmental legislation, regulations, permits, licenses, approvals, agreements, and rules applicable to the scope of work.

3.1 BC Environmental Management Act

The *Environmental Management Act* (EMA) was enacted in July 2004, combining the old *Waste Management Act* and a previous version of the EMA. The EMA brings provisions from both those Acts into one statute by providing an authorization framework and environmental management tools to protect human health and the quality of water, land and air in British Columbia.

It will be FortisBC's responsibility to ensure liquid and solid waste management (e.g., soil stockpiles, drilling fluid handling/recovery, hydrostatic test water discharge, construction waste, etc.) complies with regulations under the EMA: Waste Discharge Regulations; Oil and Gas Waste Regulation; *Fisheries Act*: Section 36; Spill Reporting Regulations; and Hazardous Waste Regulations.

Furthermore, if soil, groundwater, sediment or soil vapour at a site contains a hazardous waste or substance exceeding provincial environmental quality standards, that site will also be subjected to the Contaminated Sites Regulation (CSR).

In the absence of detailed information, Dillon recommends that earthworks should allow for potential reactive management of contaminated soils and groundwater (if encountered) during excavation. If contaminated soils and/or groundwater require removal from the site, they should be transported to an approved disposal facility and must comply with all applicable rules and regulations.

3.2 Fisheries Act

The *Fisheries Act* is the primary federal legislation providing protection for all fish, fish habitat and water quality and is administered by Fisheries and Oceans Canada (DFO) and Environment Canada.

Fish habitat is defined as "spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes." This definition indicates that all watercourses (including ditches) that provide a significant source of water, food or nutrients to a fish-bearing stream are considered fish habitat even if they do not contain fish and/or if they only have temporary or seasonal flows. This definition also indicates that not only the watercourse

itself, but also the vegetated streamside (i.e., riparian) areas which provide nutrients and shade to the stream, are considered fish habitat.

The *Fisheries Act* prohibits the harmful alteration, disruption or destruction (HADD) of fish habitat unless the HADD is authorized by DFO. The operational requirements of the Project have the potential to result in the temporal disturbance of riparian vegetation adjacent to the north and south banks of the Muskwa River. Owing to the final general arrangement of the operational areas and the potential impacts to river-side habitats, the Project has the potential to result in a HADD of fish habitat. Although there is a potential for impact, at this point in the planning process, it is anticipated that the degree of riparian ground disturbance will be minor and temporal in nature and productive capacity can be wholly restored post construction. As such, notification by way of a Project Review Application Form (PRAF) will be required to be submitted to DFO (Pacific Region) outlining the Project scope, risk to fish and fish habitat, and confirming adherence to the proposed conditions outlined in one of either the High Pressure Directional Drilling or Punch and Bore Crossing Operational Statements.

DFO's Operational Statements are designed to streamline regulatory review of activities considered to be of *low-risk to fish and fish habitat*. Under this initiative, horizontal directional drilling and punch and bore crossings are identified as two of twelve low-risk activities in BC. As such, FortisBC is only required to submit a 14-day notification to DFO subject to incorporation of a series of measures and conditions into their plans. The specific HDD and Punch and Bore Crossing Operational Statements outline measures and conditions for avoiding the harmful alteration, disruption or destruction to fish habitat, therefore ensuring compliance with subsection 35(1) of the *Fisheries Act.* The Operational Statements are adapted in each DFO Region to complement existing Provincial legislation, standards and specific environmental conditions. Under the Operational guideline, FortisBC can proceed with High Pressure Directional Drilling activities at any time subject to adherence to the following conditions:

- There is a low risk of frac-out, supported by a geotechnical assessment;
- An emergency frac-out response plan is in place that outlines the protocol to monitor, contain and clean-up a potential frac-out event; and
- The Measures to Protect Fish and Fish Habitat are incorporated into the Environmental Management Plan (EMP) for the Project (as outlined in the Operational Statement).

Likewise, Punch and Bore activities can proceed at any time subject to adherence to the following conditions:

- the crossing is not a wet open-cut crossing and there is no in-water works of any kind;
- the crossing site does not occur at a stream location involving known fish spawning habitat;

- the crossing technique will not damage the stream bed or bank and thereby negatively impact fish or fish habitat; and
- The Measures to Protect Fish and Fish Habitat are incorporated into the Environmental Management Plan (EMP) for the Project (as outlined in the Operational Statement).

3.3 BC Water Act

The *Water Act* is the main provincial statute regulating water resources in BC. One of the provisions of the *Water Act* provides conditions related to 'changes in and about a stream', which means:

- Any modification to the nature of the stream including the land, vegetation, natural environment or flow of water within the stream; or
- Any activity or construction within the stream channel that has or may have an impact on a stream.

It is an offence to divert or use water, or alter a stream, without formal approval from the MFLNRO, or in the case of FortisBC, the provincial Oil and Gas Commission (OGC). Section 9 of the *Water Act* ensures that water quality, riparian habitat, and the rights of licensed water users are not compromised.

A Conditional Approval for Application for Changes In and About a Stream, pursuant to Section 9 of the *Water Act* R.S.B.C. 1996, Chap. 483 will be required from the BC OGC pursuant to Section 17 of the Oil and Gas Commission Act, S.B.C. 1998, Chap. 39 prior to the initiation of the project.

An Approval pursuant to Section 8 of the *Water Act* "Short-term Use of Water" will be required from the BC OGC in the event that the short-term diversion or withdrawal/use of water is contemplated for this Project.

3.4 Navigable Waters Protection Act

Transport Canada's Navigable Waters Protection Program (NWPP) supports the regulation of works constructed or placed in, on, over, under, through, or across, navigable waters in Canada.

As part of the Omnibus Budget Bill (C-45), the federal government introduced amendments to the *Navigable Waters Protection Act* (NWPA). Once enacted, the *Act* will be referred to as the *Navigation Protection Act (NPA)* to reflect changes from its historical intent. Only 162 water bodies that will be listed on Schedule 2 of the *Act* will require regulatory approval for works that interfere with navigation built in, on, over, under, through or across navigable waters prior to their construction; the Muskwa River is not identified on Schedule 2. Importantly, pipelines will no longer be considered under the definition of 'work' in the *NPA*, and therefore will not require an approval for instream construction once the *Act* comes into effect.

It is anticipated that the amendments to the *NWPA* will come into force in April 2014. However, until such time, the *NWPA* remains in force and therefore, provisions for approvals of proposed works related to navigable waters continue to apply under the *NWPA* up to and until the *NPA* takes effect.

Since the project does not meet all of the listed criteria outlined in the Minor Works Order, an Approval pursuant to subsections 5(1) and (3) of the *NWPA* will be required if Project is initiated prior to *NPA* implementation.

3.5 BC Wildlife Act

Section 34 of the BC *Wildlife Act* prohibits possessing, taking or destroying (i) a bird or its egg, (ii) and the destruction of an egg or an active nest of any bird species and prohibits the destruction of a nest of a Bald Eagle, Osprey, Peregrine Falcon, Gyrfalcon, Great-blue Heron or Burrowing Owl, regardless of whether it is occupied.

Any land clearing activities scheduled between April 1 and August 15 will require a bird nest survey completed by a Qualified Environmental Professional (QEP). Should an active bird nest be discovered, an appropriate buffer will be retained around the nest until the nest is no longer active (subject to re-assessment by the QEP).

3.6 Migratory Birds Convention Act

The federal *Migratory Birds Convention Act* prohibits the taking or killing of migratory bird nests and eggs, and the deposition of harmful substances in areas frequented by migratory birds. Vegetation removal that will affect trees used by all birds and other wildlife should be avoided while they are breeding, nesting, roosting or rearing young.

3.7 Species at Risk Act

The *Species at Risk Act* (SARA) is a federal Act that provides legislative protection to species (and their critical habitat), that are assessed as Extirpated, Extinct or Threatened and are listed on Schedule 1 of the Act. Schedule 1 is the official list of species-at-risk in Canada as determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

The definitions for the four status categories for species that are considered to be at-risk are as follows:

- “Extirpated” species no longer exist in their former range in Canada;
- “Endangered” species are at risk of imminent extirpation or extinction;
- “Threatened” species are likely to become “Endangered” if nothing is done to reverse the factors leading to extirpation or extinction; and

- "Species of Special Concern" are at risk to become "Threatened" or "Endangered" due to a combination of biological characteristic and identified threats.

The purpose of SARA is to:

> "*prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened*" (SARA Section 6, 2002).

The protection of wildlife and their habitat is provided in SARA in Sections 32 and 33:

> "*No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species*" (SARA Section 32(1), 2002).

> "*No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada*" (SARA Section 33, 2002).

SARA Permits

SARA contains prohibitions against the killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling or trading of individuals of Endangered, Threatened and Extirpated species listed in Schedule 1 of the Act. The Act also contains a prohibition against the damage or destruction of their residences (*e.g.,* nest or den). According to SARA Section 73, a scientific research permit is required by anyone conducting activities that may affect species listed in Schedule 1 of SARA or contravening the Act's general or critical habitat prohibitions (Sections 32-36).

Permits may be issued for the following purposes:

- The activity is scientific research relating to the conservation of the species and conducted by qualified persons;
- The activity benefits the species or is required to enhance its chance of survival in the wild; or
- Affecting the species is incidental to the carrying out of the activity.

In addition, all of the following pre-conditions must be met:

- All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted;

- All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals; and
- The activity will not jeopardize the survival or recovery of the species.

Section 78 enables the Province of BC to issue permits affecting provincially-managed species-at-risk, having the same effect as, and meeting the requirements of a Section 73 permit. As such, if the trapping and relocation of a provincially-listed species-at-risk is required for the Project, a permit must also be obtained through the Permit and Authorization Service Bureau facilitated through the MFLNRO. A general *Wildlife Act* permit as well as an Animal Care form is required for any scientific/research purposes that require trapping or handling live wildlife, including species-at-risk.

Based on field assessments conducted to date, results of desktop environmental review and overall knowledge of the Project area, Dillon has determined the potential of provincially-listed species-at-risk occurring within the proposed Project area to be very unlikely. Residual impacts to species-at-risk are also considered very unlikely.

3.8 Master Licence to Cut

A Master License to Cut (MLTC) is required and must be approved by the BC OGC where the removal of Crown timber is required to conduct oil and gas activity. It is expected that (at a minimum), the removal of approximately 0.65 ha of non-merchantable Crown timber (i.e., predominantly poplar and trembling aspen) will be required as part of this Project.

4.0 ENVIRONMENTAL RISKS, EFFECTS AND PROPOSED MITIGATION MEASURES

This section describes the potential effects of the Project on the environment based on proposed scope of work and the environmental features present within the Project study area and also the associated mitigation measures and Best Management Practices (BMPs) proposed to minimize environmental effects.

4.1 Project Interaction with the Environment

Environmental effects may occur during both the site preparation and during construction phases of the Project. A key component of the environmental assessment process is identification of components of the natural environment that could be potentially affected by, or have an influence on, a Project. Table 5 presents an interaction matrix for the Project, highlighting the environmental components that may interact with Project construction and operations. Physical activities will occur during Project construction, including: establishment of site access/egress and laydown areas; site clearing and grading; construction; abandonment, and operations/maintenance.

The environmental components that may be affected by Project construction activities include: aquatic resources (*i.e.,* fish and fish habitat and surface water quality); terrestrial resources (*i.e.,* vegetation and wildlife resources); and species-at-risk. Operational activities may result in impacts to aquatic resources (*i.e.,* surface water quality).

Table 5: Project Environmental and Socio-Economic Interaction Matrix.

Project Activities	Aquatic Resources			Terrestrial Resources		Species at Risk	Soil and Topography	Recreation
	Fish and Fish Habitat	Surface Water Quality	Groundwater	Vegetation	Wildlife			
Site Access/Egress	X	X		X	X	X	X	X
Materials/ Equipment Storage				X				X
Site Preparation	X	X	X	X	X	X	X	X
Hydrostatic Testing		X	X					X
Pipeline Construction and Abandonment	X	X	X	X	X		X	X
Water Management	X	X	X					X
Landscape Restoration				X				X
Operations/Maintenance				X				

4.2 Project Risk Assessment

This section provides a high level overview of the various environmental risks associated with the Project based on assessment of the Project scope, existing environment and the regulatory requirements. Mitigation measures are also provided to address each of the assessed risks.

4.2.1 Fish and Wildlife Resources

Given the proximity of the Project to semi-mature forests and fish habitat, the potential for adverse impacts to occur to the natural environment is considered moderate. Fish habitat includes instream and riparian areas and the Project has the potential to disrupt or alter both.

The existing riparian habitat adjacent to the Muskwa River is considered to be fish habitat and is typically protected by streamside setback areas considered in the project design. Based on the S-1A stream riparian class designation in this section of the Muskwa River, the Riparian Management Area consists of a 50 m Riparian Management Zone (perpendicular to the watercourse top of bank) and a 50 m Riparian Reserve Zone. Disruption of this area should be minimized where possible. If disturbance occurs, FortisBC should plan to undertake site restoration activities immediately following construction.

A qualified Environmental Monitor should be assigned to the Project and present during all work conducted in sensitive habitats. The role of the Environmental Monitor is important to assisting FortisBC and the Contractor with limiting the environmental effects of the Project.

In order to reduce risk of disturbance of active bird nests, the MFLNRO has developed a regional 'reduced risk' timing window for land clearing activities. The window of least risk for nesting migratory birds in the Peace Region is between August 15 and March 15. Land clearing activities are recommended during this window to prevent potential contravention of the *Wildlife Act* and the *Migratory Bird Convention Act*. Any clearing conducted outside of the timing window (*i.e.,* between April 1 and August 15) must be preceded by a bird nest sweep conducted by a qualified professional.

4.2.2 Drilling Fluid Handling and Recovery

Trenchless Construction, i) High Pressure Directional Drilling Fluid Handling and Recovery, and ii) MT Drilling Fluid Handling and Recovery has the potential to affect aquatic and terrestrial resources through the release of hydraulic drilling fluids beneath or directly adjacent to the Muskwa River and other onsite drainage pathways. FortisBC should include in its project EMP, a Monitoring and Emergency Response Plan for Hydraulic Fluid Loss to evaluate and respond to potential hydraulic fluid losses to the environment. The Plan should indicate how drilling fluids used in the operation including, but not limited to drilling of the pilot hole, reaming of a larger size diameter hole, and pullback of the pipeline will be managed.

The use of drilling fluids or drilling fluid additives may also contain toxic constituents which may be harmful to aquatic and terrestrial fauna. Copies of Material Data Sheets (MSDS) and any available ecotoxicology reports for the drilling fluids and drilling fluids additives proposed to be used during the Project should be supplied for review by FortisBC.

4.2.3 Contaminated Sites

No contaminated sites in the Project area were identified; therefore, probability of risk due to contaminants in the Project area is very low. In the absence of detailed information, Dillon recommends that FortisBC should allow for potential reactive management of contaminated soils and groundwater (if encountered) during excavation. If contaminated soils and/or groundwater require removal from the site, they should be transported to an approved facility and must comply with all applicable rules and regulations.

4.2.4 Water Quality and Quantity

Any water discharged to the surrounding aquatic environment must not exceed existing surface water conditions or, if not, must not exceed federal (Canadian Council of Ministers of the Environment [CCME] Environmental Quality Guidelines for the Protection of Aquatic Life) and provincial (BC Approved or

Working Water Quality Guidelines) water quality standards at the time of discharge. Any water that is known to exceed existing surface water quality conditions should either be suitably treated or prevented from discharging directly into potential fish and amphibian habitat. Failure to meet these criteria may result in water quality considered to be deleterious to aquatic life.

The disposal of hydrostatic test water to land must be done so in compliance with the Oil and Gas Waste Regulations (OGWR). FortisBC must take responsibility for the sampling and environmental analyses required to document compliance with the OGWR requirements and for obtaining any authorizations or approvals for the disposal of hydrostatic test water from the OGC.

Active erosion and sediment control will also be required during Project construction to minimize the mobilization of exposed soil materials, which can function as a deleterious substance at certain concentrations. Site-specific mitigation measures should be developed and communicated within the Project EMP.

4.2.5 Species at Risk

Based on field assessments conducted to date, results of desktop environmental review and overall knowledge of the Project area, Dillon has determined the potential of provincially and federally-listed species-at-risk occurring within the proposed Project area to be very low. Residual impacts to species-at-risk are also considered very low.

Dillon recommends that a detailed ground-based assessment be completed by a terrestrial biologist in the Project area prior to vegetation and tree removal to determine the potential immediate presence of species-at-risk. Although very unlikely, based on the results of the assessment, a general wildlife permit and a Species-at-Risk permit may be required if a relocation of a rare species is required, in consultation with Environment Canada and the Province.

4.2.6 Socio-Economic

Project activities may temporally impact recreational opportunities in the Project area. Specifically, access to the unregulated boat launch area via the existing road and trail may be impacted. These impacts are expected to be temporal in nature as full access will be maintained during construction and restored once the Project is operational. Construction activities are expected to take place between March and May. The construction period is outside the hunting and fishing seasons, when the need for access to the boat launch is not as critical. During construction, temporary access to the boat launch will be provided during the staging and construction phases to ensure continued access to the Muskwa River.

The economic impact of the Project to the regional area is expected to be limited. However, opportunities for local employment will be encouraged and expenditures by the small work force will be of some benefit to local businesses.

4.2.7 Environmental Permitting and Approvals

The Project will require a variety of environmental permits and notifications prior to proceeding. Details regarding the anticipated environmental approvals are outlined below in Table 6.

Table 6: Potential Environmental Approvals

Permit, Approval, or License	Government Agency	Expected Timeframe following Submission
Notification of Work (PRAF) and Operational Statement for High Pressure Horizontal Drilling or Punch and Bore Crossings	Department of Fisheries and Oceans Canada	<30 days
Section 5, *Navigable Waters Protection Act* - Request for Work Approval	Transport Canada	3 months
Section 9, *Water Act* Approval for Changes in and About a Stream	British Columbia Oil & Gas Commission	3 months
Section 8, *Water Act* Approval for Short-term Use of Water	British Columbia Oil & Gas Commission	3 months
Master License to Cut (MLTC)	British Columbia Oil & Gas Commission	<30 days

Proper planning and reporting is required to submit the permit, approval, and license applications on time. Provided the appropriate level of detail is submitted, the expected timeframes for obtaining the permit or permits are generally reliable; however, is subject to work load and availability of regulatory agency staff. If FortisBC Project timelines are firm, then it is recommended to submit permit and approval applications in advance of December 15, 2013.

4.3 Anticipated Environmental Effects and Recommended BMPs

Additional relevant environmental standards, guidelines and BMPs for protection of fish and wildlife are also contained within the following documents:

- BC Oil and Gas Commission (2013), Environmental Protection and Management Guide (Version 1.9), Section 3 and 4;
- BC MOE (2013), Standards and Best Practices for Instream Works, Version 1.0;
- DFO Operational Statement - High Pressure Directional Drilling;

- DFO Operational Statement – Punch and Bore Crossings;
- CAPP, CEPA & CGA (2005), Pipeline Associated Watercourse Crossings. Prepared by TERA Environmental Consultants and Salmo Consulting Inc. Calgary, Alberta;
- Department of Fisheries and Oceans Canada. Freshwater Intake End of Pipe Fish Screen Guidelines;
- DFO and Ministry of Environmental, Land and Parks. 1992. Land Development Guidelines for the Protection of Aquatic Habitat; and
- Ministry of Water, Land and Air Protection (MWLAP). 2004. Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia.

Table 7 outlines the potential effects of the Project, the relevant BMPs, and the significance of residual effects (if applicable) on natural features within the pipeline crossing location.

Table 7: Potential Effects, BMPs and the Significance of Residual Effects Associated with Project Activities.

Significant Natural Feature Affected by Activity	Project Phase & Activity	Potential Negative/Positive Effect(s)	Frequency of Effect	Duration of Effect	Proposed BMPs	Significance of Residual Effects
AQUATIC RESOURCES						
Fish, Fish Habitat and Aquatic Life of Muskwa River	*Site Preparation* Land Clearing, Soil Stripping, Grubbing and Grading	Temporary disturbance to fish habitat resulting in: • Reduced input of food and nutrients to aquatic habitat; • Reduced bank stability and ability to trap sediment from upland areas; • Increased erosion, sedimentation and water turbidity; • Potential for runoff carrying contaminants into aquatic habitat; and • Disturbance and/or loss of riparian vegetation.	On-going during Site Preparation Phase and through construction (to lesser extent) until site restoration is completed	Temporary during Site Preparation and Construction phases	• Maintain surface water flow in all drainages to ensure the volume of water reaching downstream fish habitat is not significantly altered; • Minimize removal/disturbance of vegetation adjacent to waterbody; • Maximize distance of all construction equipment from the edge of aquatic habitat; • Develop and implement an erosion and sediment control plan prior to site preparation activities; • Erosion and sediment control structures should be monitored and maintained regularly to ensure that they remain fully functional; • The work area should be clearly defined with flagging and fencing to minimize encroachment into adjacent habitat; and	Low Residual Effects resulting from temporary disturbance to fish habitat

Significant Natural Feature Affected by Activity	Project Phase & Activity	Potential Negative/Positive Effect(s)	Frequency of Effect	Duration of Effect	Proposed BMPs	Significance of Residual Effects
					• Use existing access roads or stable grades where possible.	
	Construction - Pipeline installation – HDD/MT Drilling Site Access/Egress	• Potential for imported material to enter adjacent habitat (aquatic and terrestrial) as a result of increased surface water runoff and ground disturbance; and • Potential for accidental spills or contamination of soil and/or surface runoff.	Only during Construction Phase	Temporary during Construction Phase	• Maintain or provide vegetative buffers; • Maintain flow conveyance throughout construction; • Minimize duration of instream work and time crossings around sensitive fish life stages (fish timing windows); and • Avoid construction during rain events where possible.	Low Residual Effects
	Site Preparation, Construction and Operations – Machinery and active pipeline	• Potential for spills or leaks of oil, gas, diesel and hydraulic fluid; runoff of contaminated soil and/or surface runoff may impact water quality and aquatic life in downstream receiving waters.	During Site Preparation and Construction phases	Potential throughout project lifespan	• A spill response plan will be developed by FortisBC or the chosen contractor prior to commencement of the works to document the appropriate measures to be implemented should fuel, oil or other hazardous materials be spilled or otherwise involuntarily released.	No Residual Effect. In the event of a spill, the area will be remediated.

Significant Natural Feature Affected by Activity	Project Phase & Activity	Potential Negative/Positive Effect(s)	Frequency of Effect	Duration of Effect	Proposed BMPs	Significance of Residual Effects
TERRESTRIAL RESOURCES						
Terrestrial Habitat	*Site Preparation, Construction* – Land Clearing, Soil Stripping, Grubbing and Grading, pipeline installation – HDD/MT Drilling, site access/egress	• Direct loss (i.e., removal) of vegetation which may reduce the quantity and quality of available habitat; • Loss of plant richness; • Increased susceptibility to erosion; • Changes in soil moisture and compaction; • Decreased cover/shade; • Increased vulnerability of the cleared area to invasion by non-native species; and • Disturbance to wildlife.	On-going during the Site Preparation and Construction phases	Temporary during Site Preparation and Construction Phases	• Minimize removal of vegetation; • Store construction materials on previously disturbed areas where possible, to prevent additional vegetation disturbance; • If topsoil or other materials must be stored in undisturbed areas, ensure it is placed on a tarp or other form of ground cover; • Re-vegetate all disturbed areas following construction; • Monitor areas of disturbance following construction to assess establishment of invasive plant species; • Properly remove invasive species where encountered during Project development; • Control noxious weeds prior to disturbance and during the restoration phase, in accordance with the BC Weed Control Act; and	Minor Residual Effect

Significant Natural Feature Affected by Activity	Project Phase & Activity	Potential Negative/Positive Effect(s)	Frequency of Effect	Duration of Effect	Proposed BMPs	Significance of Residual Effects
					• Ensure that existing weeds are removed prior to producing seed, and rhizomes are not transferred from site to site within soil material used for site restoration.	
Wildlife	*Site Preparation* – Land Clearing, Soil Stripping, Grubbing and Grading *Construction* - Pipeline installation (HDD/MT Drilling), Site Access/Egress	• Reduced habitat availability due to the removal of vegetation; • Localized temporary displacement of wildlife due to noise and vibration; and • Disturbance/incidental mortality to wildlife.	On-going during Site Preparation and Construction phases	Temporary during Site Preparation and Construction Stages	• Minimize encroachment into terrestrial habitat; • Retain existing vegetation and use existing access roads/trails where possible; • Minimize duration of construction activities and schedule construction activities outside of the bird nesting window for the area (April 1 to August 15); • Conduct bird nest surveys if vegetation clearing is required within the breeding bird nesting window; and • Re-vegetate disturbed area with fast growing native species.	No Residual Effect

Significant Natural Feature Affected by Activity	Project Phase & Activity	Potential Negative/Positive Effect(s)	Frequency of Effect	Duration of Effect	Proposed BMPs	Significance of Residual Effects
Recreation	*Site Preparation* (Site Access, Materials Storage), Construction, and Landscape Restoration	Temporary disruption to the boat launch area.	On-going during site preparation, construction, and restoration phases.	Temporary during site preparation, construction, and restoration phases.	• Provide temporary alternative access to the boat launch area; and • Complete project construction outside of the peak river use period (i.e. outside of the hunting season – August to October).	No Residual Effects – full access to the boat launch area will be restored.
Boating	*Site Preparation* (Site Access, Materials Storage), Construction, and Landscape Restoration	Temporary disruption to the boat launch area.	On-going during site preparation, construction, and restoration phases.	Temporary during site preparation, construction, and restoration phases.	• Provide temporary alternative access to the boat launch area.	No Residual Effects – full access to the boat launch area will be restored.
Sport Fishing	*Site Preparation* (Site Access, Materials Storage), Construction, and Landscape Restoration	Temporary disruption to the boat launch area.	On-going during site preparation, construction, and restoration phases.	Temporary during site preparation, construction, and restoration phases.	• Provide temporary alternative access to the boat launch area; and • Complete construction activities outside of the peak fishing season (i.e. summer months).	No Residual Effects – full access to the boat launch area will be restored.
Economic Development (Job creation and business opportunities)	*Construction and Landscape Restoration*	Temporary employment and business opportunities for local residents and businesses.	On-going during site preparation, construction, and restoration phases.	Temporary during site preparation, construction, and restoration phases.	• Post job ads in local papers and through other local employment agencies; and • Source supplies/ services through local businesses where practical and cost-effective.	Low residual effect

5.0 SUMMARY

This report was prepared in support of FortisBC's CPCN Application for the Muskwa River Crossing Project and is based on information provided to, or obtained by Dillon as indicated in the report, and applies solely to site conditions and the regulatory and planning frameworks existing at the time of the study.

This report identified a variety of factors that present risk to the Project in the form of additional cost and activities requiring permits or approvals, which may present potential constraints to the Project timeframe. The key identified risks are as follows:

- Given the proximity of the Project to mature forests and Class S-1 fish habitat, there is a moderate potential for adverse impacts to occur to the natural environment. Provided activities are conducted in accordance with applicable provincial and federal guidelines and standard best management practices, it is expected that the potential for residual environmental effects can be mitigated or avoided altogether.
- Environmental regulatory permits, licenses and approvals will be required in support of the project. It is expected that the Project will require provincial approval pursuant to Section 9 of the *Water Act* and federal approval pursuant to the *Navigable Waters Protection Act*. An Operational Statement notification is required to be submitted to DFO and a Master License to Cut will be required from the OGC for the removal of non-merchantable Crown timber within the proposed laydown areas.

This report was prepared by Dillon for the sole benefit of FortisBC. The material in this report reflects Dillon's best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. If you have any questions regarding the findings contained herein, please do not hesitate to contact the undersigned at 604-278-7847.

Sincerely,

DILLON CONSULTING LIMITED

Chris Dane
Project Manager

Paul Koke
Project Coordinator

6.0 REFERENCES

British Columbia Ministry of Environment. 2010. Technical Guidance on Contaminated Sites: Water Use Determination. Version 2. 8 pages. http://www.env.gov.bc.ca/epd/remediation/guidance/technical/pdf/tg06.pdf.

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APPENDIX A

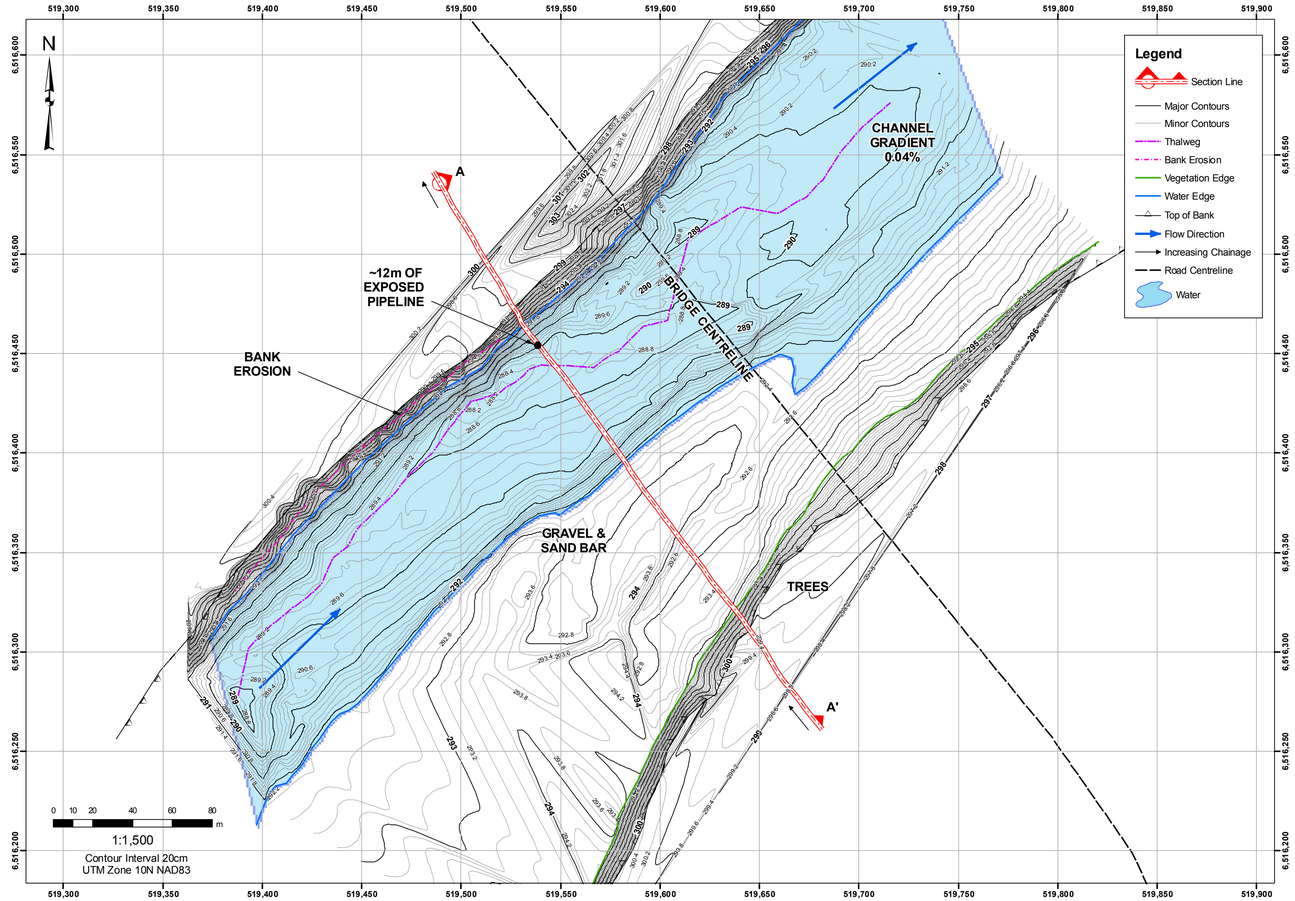
Figures and Supplemental Information

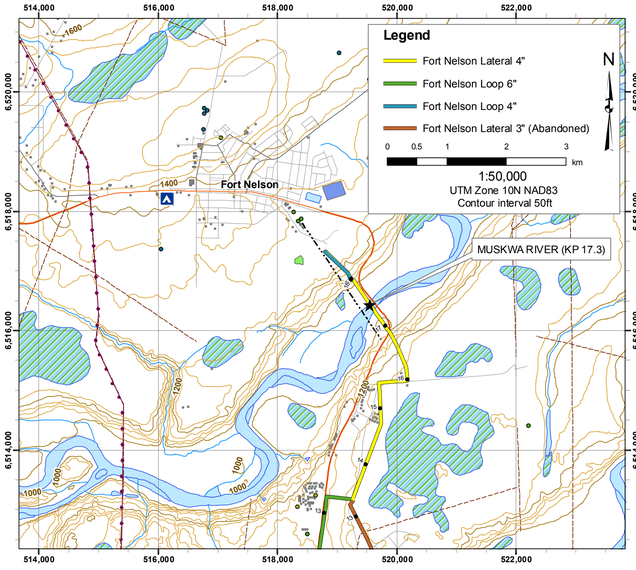
PHOTO 1: Looking upstream from mid-channel over the centreline.

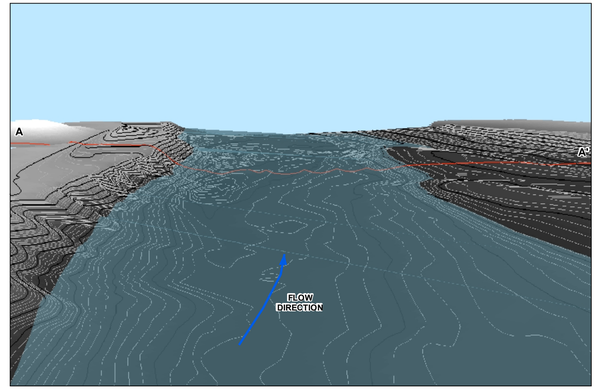
PHOTO 2: Looking at the left (northwest) bank along the centreline from the right bank. The centreline is located at the cut above the diagonally positioned log. Note the bank erosion to the left of the centreline.

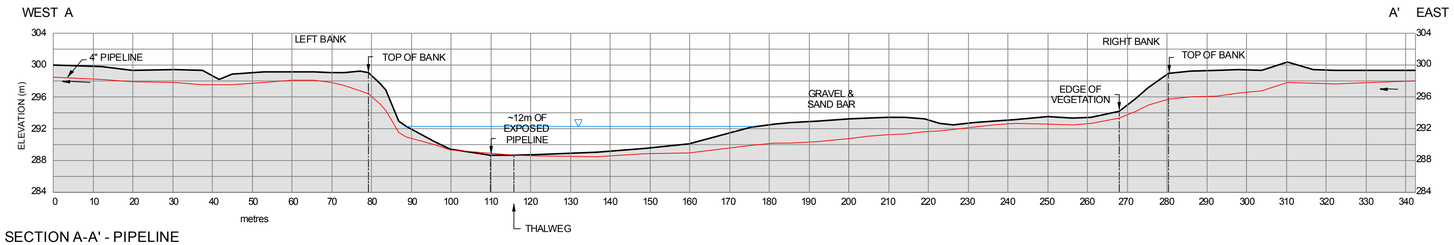
PHOTO 3: Looking downstream at the bridge from mid-channel over the centreline.

PHOTO 4: Looking at the right (southeast) bank along the centreline from the left bank. The subject and the cut between the trees mark the centreline location.









SECTION A-A' - PIPELINE
PROFILE VIEW DIRECTION - NORTHEAST
PROFILE SCALE = 1:750
PROFILE VE = 2x

NOTES:

1. SURVEY COMPLETED ON SEPTEMBER 28, 2008 BY MIDWEST SURVEYS INC.
2. HORIZONTAL DATUM: NAD 83 VERTICAL DATUM: CVD 28.
3. HORIZONTAL POSITIONS ARE BASED ON A UNIVERSAL TRANSVERSE MERCATOR PROJECTION, REFERENCE MERIDIAN 117W Zone 11.
4. ELEVATIONS ARE ORTHOMETRIC HEIGHTS IN METRES, BASED ON GPS OBSERVATIONS AND GEOID MODEL GSD 95.
5. PIPE LOCATION PERFORMED USING A RADIO DETECTION PLX-2 PIPELINE CURRENT MAPPER.
6. GPS LOCATION PERFORMED USING A TRIMBLE R8GNSS RTK SYSTEM SUPPORTED WITH TRIMBLE 5800 ROVER RECEIVERS
7. DEPTH SOUNDING PERFORMED USING A ODOM-ECHOTRAC CV 100 ALL DIGITAL SINGLE BEAM ECHO SOUNDER
8. TOPOGRAPHIC SURVEY PERFORMED USING LEICA TC703 OR TC405 TOTAL STATIONS
9. LOCATION PLAN BASE DATA FROM CANVEC (NATURAL RESOURCES CANADA)

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	NOV 2008
DRAWN:	MIB
DESIGNED:	AP
CHECKED:	EL
APPROVED:	ML

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: TERASEN GAS INC.

PROJECT: STAGE 3 HYDROTECHNICAL SURVEYS

TITLE: MUSKWA RIVER KP 17.3
FORT NELSON LATERAL 4" PIPELINE

PROJECT No.:	DWG No.	REV.:
0093-065-04	3	

DL 1633
(Crown Land)

Area 3
DL 1633
Plan EPP12880

Area 5
DL 1633
Plan EPP12880

Area 7
DL 1633
Plan EPP12880

Area 6
DL 1633
Plan EPP12880

Area 2 DL 1633 Plan EPP12880

DL 1633

Area 4 DL 1633 Plan EPP12880

Area 8 DL 1633 Plan EPP12880

DL 1631
(Crown Land)

DL 1632
(Crown Land)

DL 1630
(Crown Land)

MUSKWA RIVER

ALASKA HIGHWAY Plan H543

Existing Road (Nelson Hill)

Existing Road

Edge of Water

Bridge Abutment

Bridge

Drainage Pipe

Barrier

Sign

Road Plan 22575

Trail

Retaining Wall

Pullout

Tin Shack

1 in 200 Year Flood Level

Flooded Area

Drill Hole 1

Drill Hole #2

Drill Hole 3

Drill Hole 4

Ditch

Wooden Culvert

Top of Bank

Bottom of Bank

Poplar to 100cms

Poplar to 80cms

Poplar to 20cms

Buried Utilities Detected
Contact BC ONECALL
(1-800-474-6886) For
Confirmation At Least 48hrs
Prior To Construction.

Northwestel Fibre Optics

Sandbar

Old Abutment

Log Jam

Existing Road

43

BC Hydro

Powerline

R/W

Plan CG786

PRELIMINARY PLAN
October 30, 2013
FOR PLANNING PURPOSES ONLY

CONTOUR INTERVAL = 0.5m

NOTES:

All underground facilities shown were located with electronic locators and may be subject to error. Actual locations should be verified independently by the contractor in field prior to any crossings.

LEGEND:

Drainage shown thus:
Seismic Line shown thus:
Vegetation Change shown thus:
Buried Pipe shown thus:
Buried Cable shown thus: C
Buried Telephone Cable shown thus: T
Overhead Powerlines shown thus: P
Crossing Numbers shown thus: 1
Powerpole & guy wire shown thus: PP
Cut block boundary shown thus:
Top of bank/break in slope
Above ground pipe shown thus:
Fence line shown thus: X
A.L.R. boundary shown thus: A.L.R.

PIPE SPECIFICATIONS

THE LINE WILL CARRY:
OUTSIDE DIAMETER:
WALL THICKNESS:
PIPE MATERIAL:
MAX. OPER. PRESS.:
TEST PRESSURE:
MIN. YIELD:
PROTECTION:
INSULATION:
CATHODIC PROT.:

No.	REVISIONS	BY	DATE (YY/MM/DD)	CKD
0	Original Plan Issued	JMS	13/08/02	BP

APPROVED BY

PROJECT ENGINEER

FORTIS BC

TOPO SURVEY FOR MUSKWA RIVER PIPELINE REPLACEMENT

can-am geomatics
can-am geomatics bc
Fort Nelson, B.C.
www.canam.com
Phone: 250.774.7881
Toll Free: 1.877.870.7881
Fax: 250.774.7882

BCGS 94J.077
SCALE = 1 : 1,000
10 0 20 40 60
METRES
SHEET 2 OF 3

FIELD: FORT NELSON
CAN-AM FILE: N20130130
CLIENT FILE:
AFE No.:
CAD FILE: N20130130TP-0
LAND FILE:
DATE: 13/08/01
EPASS:

0 REVISION

APPENDIX B

Site Photographs

Photo 1. Aerial view of Muskwa River pipeline crossing location, facing north.

Photo 2. Above view (from helicopter) of pipeline crossing location and proposed work area (north bank), facing downstream.

Photo 3. Facing upstream (southwest), looking at pipeline crossing location and proposed work area from the Alaska Highway (Hwy #97).

Photo 4. Proposed construction access trail from the Alaska Highway (Hwy #97) to work area on north side of Muskwa River.

Photo 5. Riparian area and river bank at proposed work area, facing upstream (southwest direction).

Photo 6. Eroded bank (representative of bank conditions throughout most of work area) at the northeast extent of the proposed work area, facing downstream (northeast).

Photo 7. At access trail on south side of Muskwa River (on pipeline alignment), facing north.

Photo 8. Above view, facing south along pipeline aligment, looking at south side work space.

Appendix E
HDD PRELIMINARY EQUIPMENT LAYOUT AND SITE SETUP PLAN

PROPOSED AREAS WITHIN ALASKA HIGHWAY

FEATURE	EXISTING CUT		NEW CUT		TOTAL	
Workspaces	0.50ha	1.24ac	0.38ha	0.94ac	0.88ha	2.18ac
Decking Sites	0.01ha	0.02ac	0.01ha	0.02ac	0.02ha	0.04ac
TOTAL AREA REQ'D	**0.51ha**	**1.26ac**	**0.39ha**	**0.96ac**	**0.90ha**	**2.22ac**

PROPOSED AREAS REQUIRED IN CROWN LAND

FEATURE	EXISTING CUT		NEW CUT		TOTAL	
Workspaces	0.01ha	0.02ac	0.53ha	1.31ac	0.54ha	1.33ac
Decking Sites	0.00ha	0.00ac	0.00ha	0.00ac	0.00ha	0.00ac
TOTAL AREA REQ'D	**0.01ha**	**0.02ac**	**0.53ha**	**1.31ac**	**0.54ha**	**1.33ac**

TOTAL PROJECT AREAS REQUIRED

FEATURE	EXISTING CUT		NEW CUT		TOTAL	
Workspaces	0.51ha	1.26ac	0.91ha	2.25ac	1.42ha	3.51ac
Decking Sites	0.01ha	0.02ac	0.01ha	0.02ac	0.02ha	0.04ac
TOTAL AREA REQ'D	**0.52ha**	**1.28ac**	**0.92ha**	**2.27ac**	**1.44ha**	**3.55ac**

Source of Volume Estimate:
Forest Cover Maps (VRI Data)
Volume Summary of Merchantable Timber (estimated)
Coniferous Xm^3 Deciduous Xm^3
Volume Summary of Non-Merchantable Timber (estimated)
Coniferous Xm^3 Deciduous Xm^3

AUXILIARY CO-ORDINATES NAD 83 UTM

DESCRIPTION	NORTHING	EASTING
Entry Pad	6516164	519736
Exit Pad	6516599	519424
Decking Site #1	6516487	519533
Decking Site #2	6516571	519510

The proposed P/L R/W does not fall within the Agricultural Land Reserve (A.L.R.)
Project is within the Fort Nelson Enhanced Resource Development Zone.
Project to be flagged prior to construction.
Project is within the North OGC Zone.
Multi Season Construction Conditions

CROSS SECTION

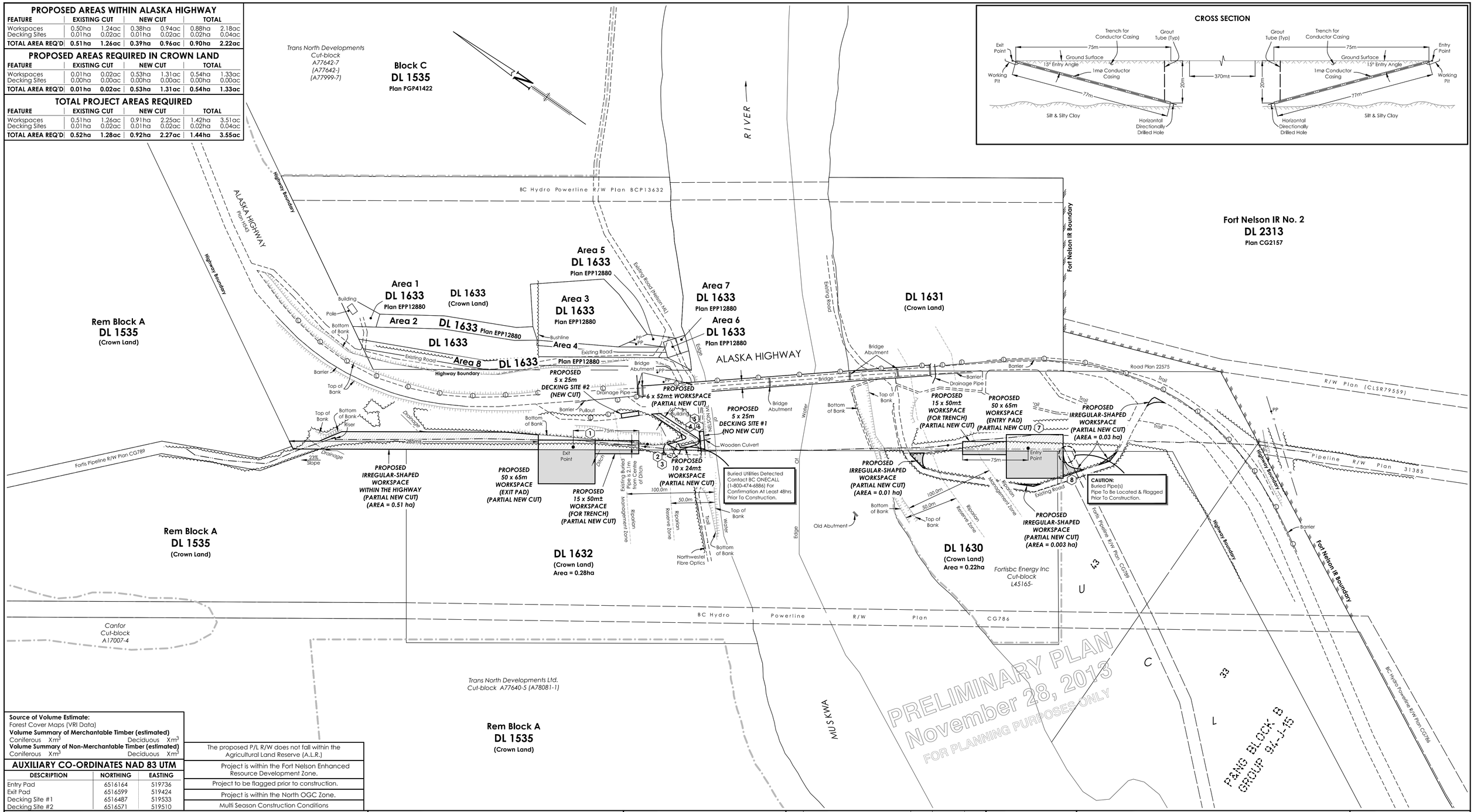


TABLE OF CROSSINGS

No.	DESCRIPTION	NORTHING	EASTING	OWNER	DWG No.
1	Existing Buried Pipe	6516591	519458	Fortis	N/A
2	Buried Cable	6516514	519507	Northwestel	N/A
3	Existing Buried Pipe	6516503	519509	Fortis	N/A
4	Wooden Culvert	6516494	519524	MOTH	N/A
5	Wooden Culvert	6516488	519531	MOTH	N/A
6	Nelson ML	6516487	519533	Canfor	N/A
7	Existing Buried Pipe	6516186	519749	Fortis	N/A
8	Pipeline R/W Plan CG789	6516118	519749	Fortis	N/A

NOTES:

All underground facilities shown were located with electronic locators and may be subject to error. Actual locations should be verified independently by the contractor in field prior to any crossings.

LEGEND:

Drainage shown thus:
Seismic Line shown thus:
Vegetation Change shown thus:
Buried Pipe shown thus:
Buried Cable shown thus: C
Buried Telephone Cable shown thus: T
Overhead Powerlines shown thus: P
Crossing Numbers shown thus: 1
Powerpole & guy wire shown thus: PP
Cut block boundary shown thus:
Top of bank/break in slope
Above ground pipe shown thus:
Fence line shown thus: X
Bushline shown thus:

PIPE SPECIFICATIONS

THE LINE WILL CARRY:
OUTSIDE DIAMETER:
WALL THICKNESS:
PIPE MATERIAL:
MAX. OPER. PRESS.:
TEST PRESSURE:
MIN. YIELD:
PROTECTION:
INSULATION:
CATHODIC PROT.:

No.	REVISIONS	BY	DATE (YY/MM/DD)	CKD
0	Original Plan Issued	RM	11/05/09	BP
1	Added Entry and Exit Pads	JMS	13/11/28	BP

APPROVED BY

PROJECT ENGINEER

FORTIS BC

PLAN SHOWING PROPOSED DRILL SITES IN b-43-B/94-J-15 AND c-43-B/94-J-15 AND RELATED FACILITIES

can-am geomatics®
can-am geomatics bc Phone: 250.774.7881
Fort Nelson, B.C. Toll Free: 1.877.870.7881
www.canam.com Fax: 250.774.7882

BCGS 94J.077
SCALE = 1 : 2,000
20 0 40 80 120
METRES
SHEET 1 OF 1

FORTIS BC

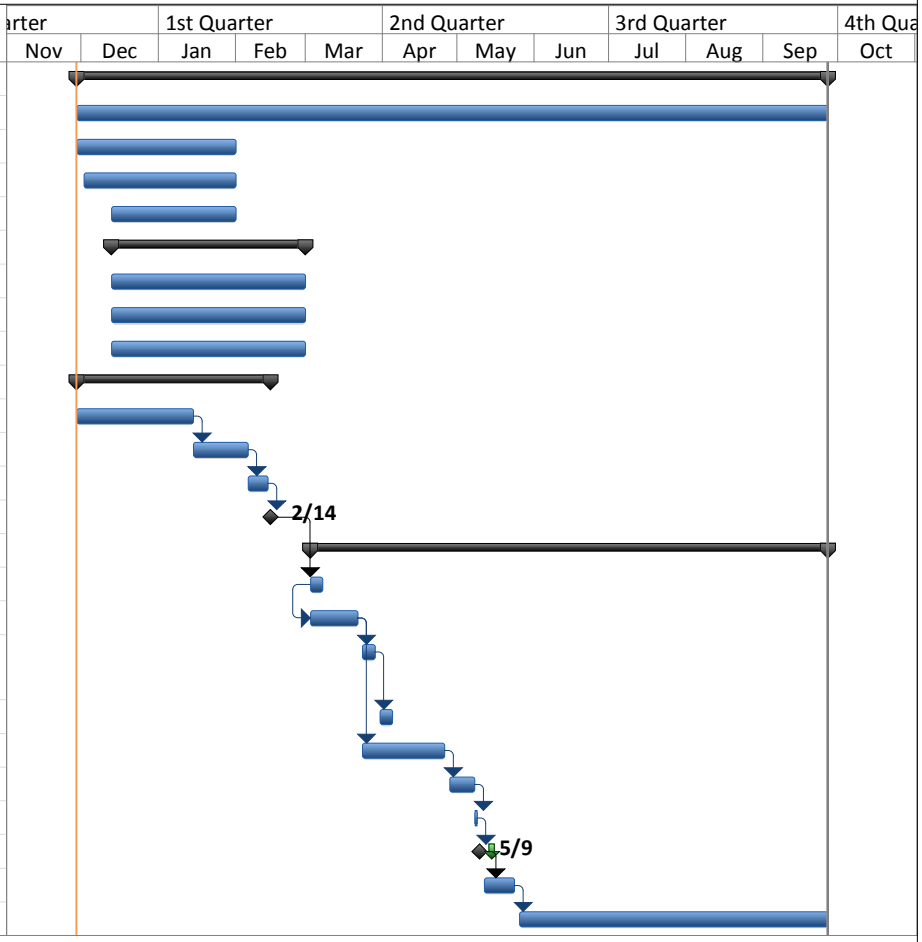
FIELD: FORT NELSON
CAN-AM FILE: N20100126
CLIENT FILE:
AFE No.:
CAD FILE: N20100126PL01
LAND FILE:
DATE: 11/05/09
EPASS:

1 REVISION

Appendix F
PROJECT SCHEDULE

FORTISBC ENERGY INC.
MUSKWA RIVER CROSSING CPCN APPLICATION
PROJECT SCHEDULE

ID	WBS	Task Name	Duration	Start	Finish
1	**1**	**PERMITTING AND DESIGN**	**216 days?**	**Fri 11/29/13**	**Fri 9/26/14**
2	1.1	Stakeholder Consultation	216 days?	Fri 11/29/13	Fri 9/26/14
3	1.2	BCUC Application Review & Approval	46 days?	Fri 11/29/13	Fri 1/31/14
4	1.3	Finalize Design	45 days	Mon 12/2/13	Fri 1/31/14
5	1.4	OGC Application	36 days?	Fri 12/13/13	Fri 1/31/14
6	**2**	**MAJOR MATERIALS**	**56 days**	**Fri 12/13/13**	**Fri 2/28/14**
7	2.1	Linepipe	56 days	Fri 12/13/13	Fri 2/28/14
8	2.2	Linepipe Fittings	56 days	Fri 12/13/13	Fri 2/28/14
9	2.3	Stop-Off Fittings	56 days	Fri 12/13/13	Fri 2/28/14
10	**3**	**CONTRACTING**	**56 days?**	**Fri 11/29/13**	**Fri 2/14/14**
11	3.1	Project Notification	33 days	Fri 11/29/13	Tue 1/14/14
12	3.2	RFQ Bid Process	16 days	Wed 1/15/14	Wed 2/5/14
13	3.3	RFQ Bid Evaluation & Approval	6 days	Thu 2/6/14	Thu 2/13/14
14	3.4	Award Contract	1 day?	Fri 2/14/14	Fri 2/14/14
15	**4**	**CONSTRUCTION & COMMISSIONING**	**150 days**	**Mon 3/3/14**	**Fri 9/26/14**
16	4.1	Mobilise	5 days	Mon 3/3/14	Fri 3/7/14
17	4.2	Site Prep (clearing, grading, matting)	15 days	Mon 3/3/14	Fri 3/21/14
18	4.3	Prefabricate, Test, Coat, Dry Pipe String	5 days	Mon 3/24/14	Fri 3/28/14
19	4.4	Prefabricate Tie-In Assemblies	5 days	Mon 3/31/14	Fri 4/4/14
20	4.5	Complete HDD Process	25 days	Mon 3/24/14	Fri 4/25/14
21	4.6	Tie-In New Crossing Pipeline	8 days	Mon 4/28/14	Wed 5/7/14
22	4.7	Commission New Crossing Pipeline	1 day	Thu 5/8/14	Thu 5/8/14
23	4.8	New Crossing In-Service	1 day	Fri 5/9/14	Fri 5/9/14
24	4.9	De-Mobilization and Clean Up	10 days	Mon 5/12/14	Fri 5/23/14
25	4.10	Site Restoration/Reinstatement	90 days	Mon 5/26/14	Fri 9/26/14



Project: Muskwa Xing Replacemen
Date: Fri 11/29/13

Task
Split
Milestone
Summary
Project Summary
Manual Summary
Deadline
Progress

Appendix G

HDD RISK ANALYSIS AND CONTINGENCY PLAN

FILED CONFIDENTIALLY

Appendix H

FINANCIAL SCHEDULES

FILED CONFIDENTIALLY

Appendix I

PRELIMINARY FIELD RECONNAISSANCE OF PROPOSED DRILL SITES AND RELATED FACILITIES

ARCHER

Preliminary Field Reconnaissance (PFR) Assessment No. 10293

For use by Archaeological Permitting Section only

OGC / ILMB #	

1 Administrative Information

1.1	**Date**	November 6, 2013	1.2	**Survey/Plan #**	N/A
1.3	**Report Title**	Preliminary Field Reconnaissance of Proposed FortisBC Drill Sites in b-43-B, 94-J-15, W6M and c-43-B, 94-J-15, W6M and related Facilities.			
1.4	**Permit #**	N/A	1.5	**Project Officer**	N/A
1.6	**Permit Holder**	N/A	1.7	**Field Lead**	Remi Farvacque
1.8	**Proponent**	FortisBC	1.9	**Contact**	Paul Tassie

2 Study Area Information

2.1	**Land Use Activity**	*Oil & Gas*, *Residential, Major Transportation Corridor*
2.2	**Components & size**	• Northern Limits of Ground Disturbance (2.71 ha.) • Southern Limits of Ground Disturbance (2.08 ha.)
2.3	**Method of PFR**	*Foot.*

2.4	**Sites, Revisit**	None	2.5	**Sites, New**	None
2.6	**Borden Block**	IeRp	2.7	**NTS Map**	94-J-15

2.8	**Geographic Location**	Approximate center: NAD 83 UTM Zone 10 UTM Coordinates: N.6516164, E.519736.
2.9	**Access**	Road access to the site: from Fort Nelson BC travel south on Highway 97 to the Muskwa River Bridge (approximately 2.1 Km).
2.10	**Methodology**	The Study Area was surveyed by one (1) crew of two (2) crew members walking through the development, in a manner that would enable maximum coverage depending on visibility and archaeological potential of the area. CMTs in or adjacent to the Study Area were not sought given the absence of mature timber.

2.11	**Field Crew**	Remi Farvacque (Field Director), Eva Needlay (Fort Nelson First Nation).	2.12	**Date of PFR**	September 29, 2013

***Report Submission Date**: Original Submission: 06-Nov-13, Resubmission: N/A*

2.13 Comments

At the request of Paul Tassie of FortisBC, a PFR was completed regarding drill sites and related facilities to replace the existing pipeline due to erosion caused by the Muskwa River. Significant impacts and changes to the landscape have been identified through interpretation of current satellite imagery in conjunction with field surveys and an air photo taken of the area May 5, 1966 (Roll # BC5181-147). Impacts include erosion from the Muskwa River and construction of the Muskwa River Bridge.

The purpose of this PFR was to identify terrain features with a potential to contain archaeological remains. The proposed areas of ground disturbance were inspected by foot. If areas of high archaeological potential were identified they were to be marked for further assessment. A large portion of the proposed development has been previously disturbed due to highway, bridge, gravel road and existing pipeline right of way construction. Due to the annual flooding of the Muskwa River, it is likely if cultural material is present that it is buried beneath deep, multiple layers of sediment or has been removed by fluvial activity. No areas of potential were noted within the proposed development boundaries, as such it is recommended that no further archaeological concerns be warranted within the proposed development footprint. However, it is recommended that FortisBC have a 'Chance Find' procedure in place should any archaeological remains be discovered in during ground disturbance activities.

Previously ARCHER conducted a PFR on an overlapping project regarding a natural gas pipeline right of way (ARCHER CRM Partnership, 2010). No areas of potential were noted within or adjacent to the proposed development due to large areas of previous disturbance and poor drainage. As such, it was recommended that no further archaeological concerns were warranted within the proposed development footprint (See Figure 1).

3 All Known Archaeological Sites Within 250 m

Site no.	*Direction & distance from Study Area*	*Type*	*Possibility of impact*
None			
Previously recorded archaeological site information obtained from RAAD on November 6, 2013			

4 Five Closest Known Archaeological Sites Between 250 & 5000 m

Site no.	*Direction & distance from Study Area*	*Type*	*Possibility of impact*
IeRq-005	Approximately 3.5 Km northwest	Lithic	Low
IeRq-001	Approximately 4.5 Km southwest	Lithic	Low
Previously recorded archaeological site information obtained from RAAD on November 6, 2013			

5 Study Area Environment

5.1 Northern Limits of Ground Disturbance (2.71 ha.) *Figure 1*

5.2 Survey Coverage

100 %, by foot.

5.3 Footprint Demarcated?

☐ Yes
☑ No

5.4 Terrain & Vegetation Cover

The study area located north of the Muskwa River is flat and featureless to southwest sloping terrain (approximately 1°) and contains areas of standing water. In areas where previous construction activities occurred within the study area, vegetation mostly consists of mixed grasses with scattered young willow and poplar. The remainder of the proposed development contains mature poplar, cottonwood, willow, scattered white spruce and mixed grasses.

5.5 Previous Disturbances / Ground visibility

Areas adjacent to the highway have been heavily disturbed, with a constructed pull out. Several access roads and trails are located throughout with push piles evident. An existing berm is located on the west side of the right of way and cuts into the east bank of gravel fill from highway and bridge construction. Heavy vehicle and ATV traffic has impacted the area.

Ground visibility varies from low to high. In vegetated areas, visibility is generally low due to tall, thick ground cover. In disturbed, grassy areas, visibility is generally high due to a lack of ground cover. Surface exposures exist along road access within the proposed development and were visually assessed for cultural remains with negative results.

***Report Submission Date**: Original Submission: 06-Nov-13, Resubmission: N/A*

5.6	**Potential**	*Subsurface:* No, the subject development is located on sloping or featureless terrain with high levels of disturbance evident and does not contain any unassessed distinct vegetation or other terrain characteristics that predict the presence of archaeological remains. *Pre AD 1846 CMT:* No, the subject development does not contain any distinct commonly used to predict the presence of CMTs within this region.
5.7	**Results**	No locations exhibiting archaeological potential were noted. No CMTs were identified.

6 Study Area Environment

6.1 Southern Limits of Ground Disturbance (2.08 ha.) *Figure 1*

6.2	**Survey Coverage**	100 %, by foot.	6.3	**Footprint Demarcated?**	☐ Yes ☑ No
6.4	**Terrain & Vegetation Cover**	The study area located south of the Muskwa River is flat and featureless to northwest sloping terrain (approximately 1°) with a low lying wet area located near the western boundary. In areas where previous construction activities occurred within the proposed development, vegetation mostly consists of mixed grasses with scattered young willow and poplar. The remainder of the proposed development contains mature poplar, cottonwood, willow, scattered white spruce and mixed grasses.			
6.5	**Previous Disturbances / Ground visibility**	Areas adjacent to the highway have been heavily disturbed, with a constructed pull out. Several access roads and trails are located throughout with push piles evident. The existing FortisBC natural gas pipeline has impacted a significant portion of the study area, with large berms on either side of the study area. Heavy vehicle and ATV traffic has impacted the area. Ground visibility varies from low to high. In vegetated areas, visibility is generally low due to tall, thick ground cover. In disturbed, grassy areas, visibility is generally high due to a lack of ground cover. Surface exposures exist along road access within the proposed development and were visually assessed for cultural remains with negative results.			
6.6	**Potential**	*Subsurface:* No, the subject development is located on sloping or featureless terrain with high levels of disturbance evident and does not contain any unassessed distinct vegetation or other terrain characteristics that predict the presence of archaeological remains. *Pre AD 1846 CMT:* No, the subject development does not contain any distinct commonly used to predict the presence of CMTs within this region.			
6.7	**Results**	No locations exhibiting archaeological potential were noted. No CMTs were identified.			

7 Recommendations

Our preliminary field reconnaissance of the proposed FortisBC Drill Sites in b-43-B, 94-J-15, W6M and c-43-B, 94-J-15, W6M and related Facilities did not result in the identification of cultural heritage remains protected by the *Heritage Conservation Act.* No locations with predictable archaeological potential were identified as lying in conflict with the Study Area as illustrated in Figure 1. As such, it is recommended that no further archaeological concerns be expressed for the Study Area as illustrated in Figure 1 and as documented in this report. However it is recommended that FortisBC have a 'Chance Find' procedure in place should any archaeological remains be discovered during drilling activities.

The Study Areas illustrated on the attached maps indicate areas subject to archaeological assessment, unless otherwise noted. If Final Plans differ, the results of this assessment may not be applicable in part or in whole.

To address the prospect of unanticipated archaeological remains being discovered, it is recommended that the proponent inform its employees and contractors of this possibility. If archaeological materials or other heritage remains are uncovered during construction, work in the area of the find must immediately cease and the Archaeology Branch and/or ARCHER informed. It is recommended that the proponent also promptly inform the relevant First Nations concerning any unanticipated archaeological findings.

It was not the intent of this study to identify, evaluate, or comment on the presence or absence of Aboriginal Rights in the study area. Completion of this study does not "abrogate or derogate from aboriginal treaty rights"

***Report Submission Date**: Original Submission: 06-Nov-13, Resubmission: N/A*

(Heritage Conservation Act Sec. 8). The study was conducted without prejudice to First Nations Treaty Negotiations, aboriginal rights or aboriginal title.

I concur that the above information is true given available information.

Sincerely,

Julie Cowie, *B.A., RPCA.*
Permit holder

8 References Cited

National Air Photo Library
1966 BC5181, photo 147 (Aerial photographs). 1:32,000. BC Air Photo Warehouse.

ARCHER CRM Partnership
2010 PFR of Proposed EDI Environmental Dynamics Inc. Natural Gas Upgrade. Consultant file # 9007. Prepared for EDI Environmental Dynamics, BC.

Subject Report Citation:

ARCHER CRM Partnership
2013 PFR of Proposed FortisBC Drill Sites in b-43-B, 94-J-15, W6M and c-43-B, 94-J-15, W6M and related Facilities. Consultant file # 10293. Prepared for FortisBC.

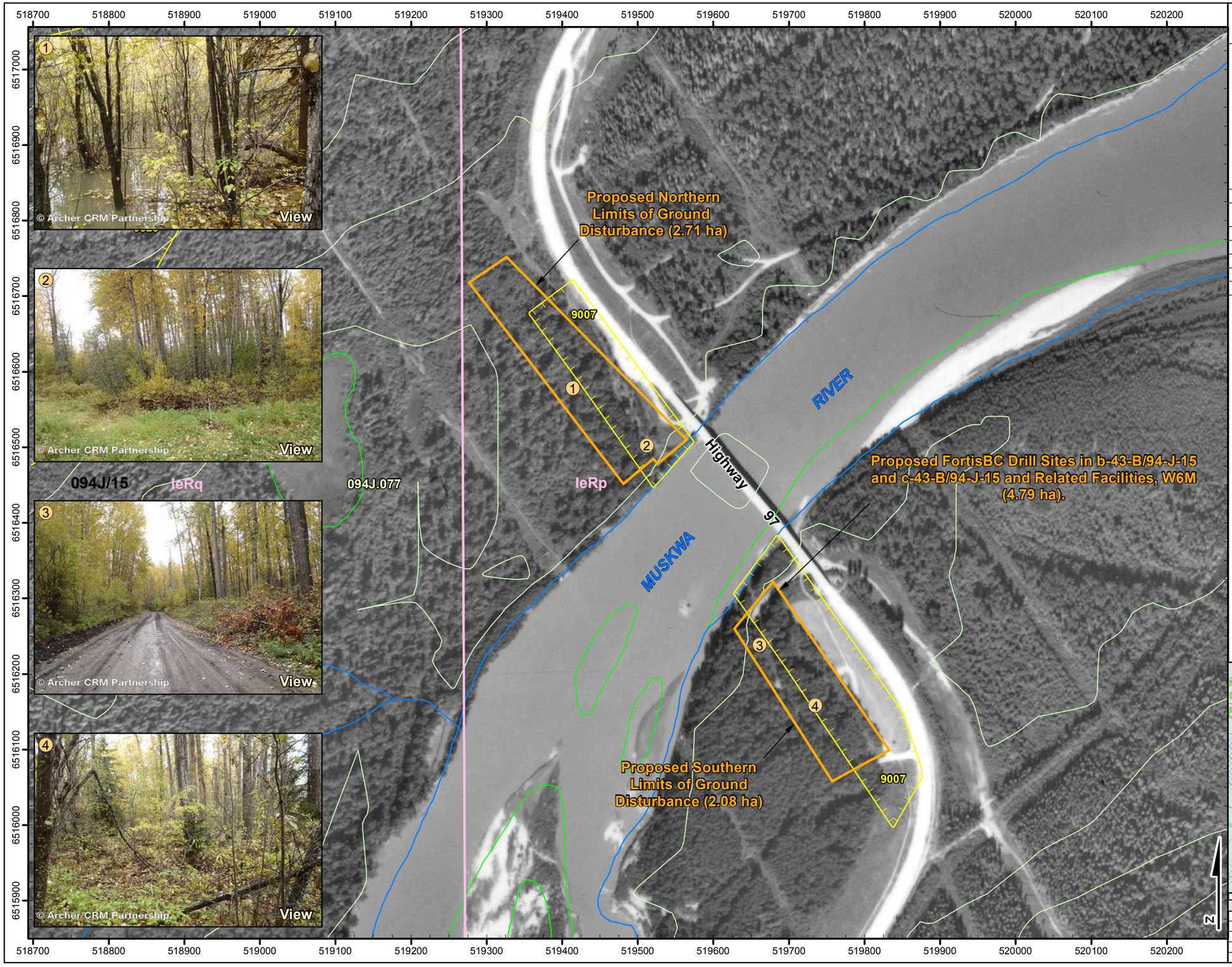
9 Contacts

Individual	*Association*	*Phone*	*Fax*	*E-mail*
Paul Tassie	FortisBC	250.558.3131	250.558.3105	Paul.Tassie@fortisbc.com
Bob Gibney	FortisBC	250.469.8006	250.717.0802	Bob.Gibney@fortisbc.com
Glen Hurley	FortisBC	604.576.7119	604.592.7530	Glen.Hurley@fortisbc.com
Alexis Jorgensen	Fort Nelson First Nation	250.774.6313	250.774.6317	Alexis.Jorgensen@fnnation.ca
Cynthia Burke	Fort Nelson First Nation	250.774.6313	250.774.6317	Cynthia.burke@fnnation.ca
Madeline Burke	Fort Nelson First Nation	250.774.6313	250.774.6317	Madeline.burke@fnnation.ca

10 Archaeology Branch Information

MAIL:	LOCATION:	CONTACT:
Archaeology Branch Ministry of Forests, Lands and Natural Resource Operations PO Box 9816, Stn Prov Govt Victoria BC, V8W 9W3	#3 - 1250 Quadra Street, Victoria, BC V8W 2K7	Reception (250) 953-3334 Fax (250) 953-3340

***Report Submission Date**: Original Submission: 06-Nov-13, Resubmission: N/A*



ARCHER
www.ArcherCRM.ca

Preliminary Field Reconnaissance

Proposed FortisBC Drill Sites in b-43-B/94-J-15 and c-43-B/94-J-15 and Related Facilities, W6M.

Figure: 1 **Page: 5**

Archer Project:	**10293**
Proponent:	**FortisBC**
HCA Permit:	**N/A**
Client File:	**N/A**
Surveyor's File:	**N/A**
NTS Map Reference:	**094J/15**
BCGS Map Reference:	**094J.077**

Legend

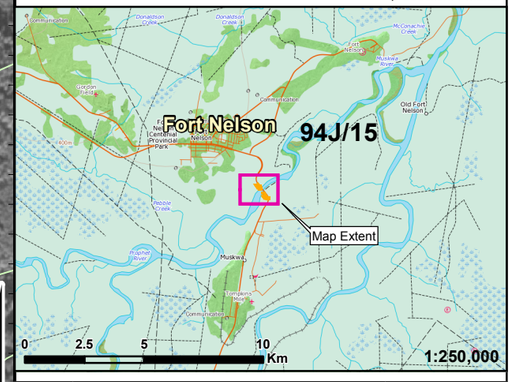
- Archaeological Site (location verified)
- Archaeological Site (location unverified)
- Development Boundary
- Previous Archer Project
- BC Geographic System Grid
- Borden Grid (archaeology)
- National Topographic System Grid
- River/ Lake
- Wetland
- Contour (20 m)
- (1) Photo Location

0 25 50 100 (m)

1:5,000

Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter

production: FMahar



Version	Detail	Date
0	Original	05-Nov-2013

Appendix J1
OPEN HOUSE INVITATION

FORTIS BC™

FortisBC invites residents of Fort Nelson to a public information session

To review a new project important to your community

FortisBC is planning to replace the portion of the Fort Nelson natural gas pipeline that crosses the Muskwa River because the pipeline is nearing the end of its lifespan. Please attend our information sessions to learn more.

Presentation to Regional Council (public welcome) **Municipal Hall - Bearpit Room** 5319 -50th Avenue South, Fort Nelson **Date:** October 28, 2013 **Time:** 5 p.m. – 6 p.m.	**Woodland Inn - Aspen Room** 3995 -50th Avenue South, Fort Nelson **Date:** October 29, 2013 **Time:** 8 a.m. – 10 a.m.

For more information, please call FortisBC at **250-868-4502**.

Appendix J2
OPEN HOUSE PRESENTATION

Muskwa River proposed pipeline replacement project

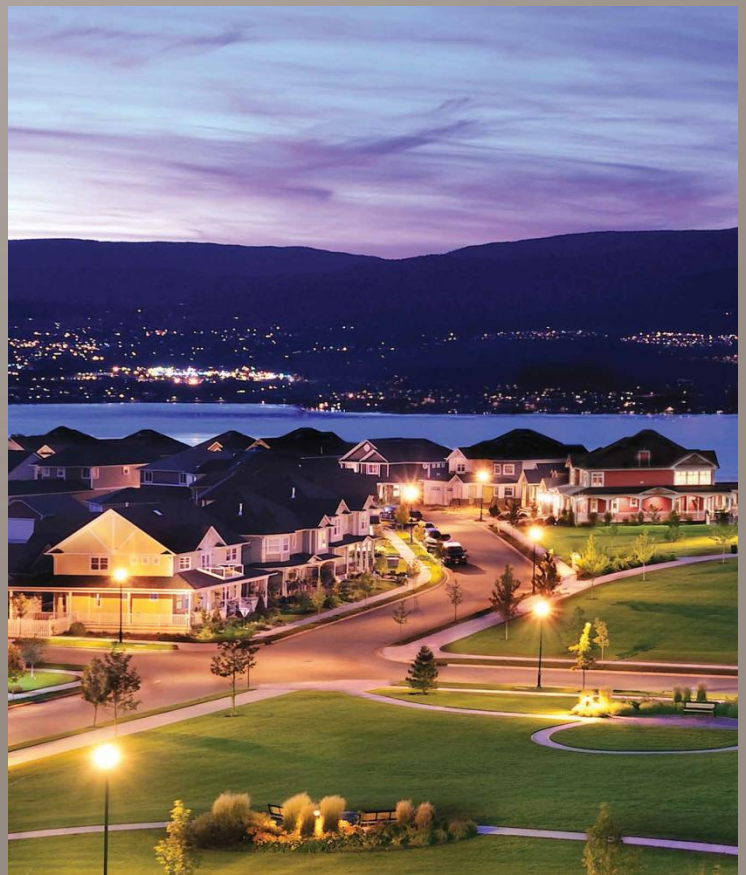
Presentation for Fort Nelson residents

FortisBC Communications

October 2013

Energy solutions for every customer

FortisBC works hard to ensure the energy our customers rely on is there whenever they need it. From electricity and natural gas, including natural gas for transportation, to propane and thermal energy, we provide solutions.



Number of customers FortisBC serves:

1.1 million

Number of communities served:

135

Number of people FortisBC employs throughout the province:

2,200

Fort Nelson’s natural gas pipeline

- FortisBC has been serving residents in Fort Nelson for approximately 50 years.
- The natural gas pipeline to the community was put in service in the 1960s. It transports gas from the Spectra plant about 20 kilometres south of the community, adjacent to the Alaska Highway, through the Muskwa River and into Fort Nelson.
- It is the sole source of natural gas for Fort Nelson residents.

Why the pipeline needs to be replaced

- During our regular inspection, we discovered a portion of the pipeline was exposed due to action from the Muskwa River.
- Now it must either be replaced or repaired. FortisBC recommends replacing the pipeline.
- We want to ensure our pipeline system is updated to the latest industry standards and that any potential risks associated with action from the Muskwa River are alleviated.

Possible pipeline solutions

FortisBC has researched available techniques to construct the pipeline across the Muskwa River. The project is expected to cost approximately $5 million.

Options to build under the river:

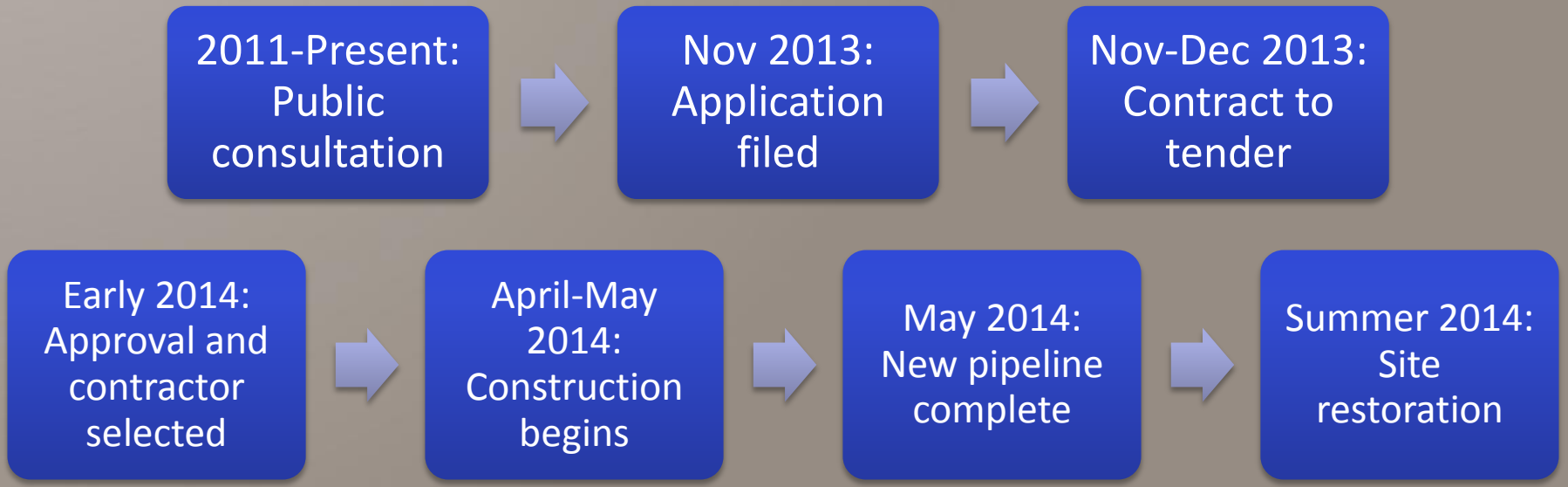
- horizontal drilling: *recommended*
- micro-tunnelling

Options to build over or through the river:

- aerial pipeline
- in-stream crossing
- bridge crossing

Project timeline

FortisBC is planning to have the replacement pipeline complete by May 2014. Here are the major steps to completion.



Appendix J3

FEI FORT NELSON LETTER TO MINISTER AMBROSE, DATED MARCH 25, 2013

FORTIS BC™

Bob Gibney
Sr. Manager,
Municipal & Aboriginal Relations

FortisBC Inc.
Suite 100
1975 Springfield Road
Kelowna, BC V1Y 7V7
Tel: 250-490-5141

bob.gibney@fortisbc.com
www.fortisbc.com

March 25, 2013

Honourable Rona Ambrose, P.C., M.P.
Minister of Public Works and Government Services
and Minister for Status of Woman
Place du Portage, Phase III, Room 18A1
11 Laurier Street
Gatineau, Quebec K1A 0S5

Dear Minister,

RE: FortisBC Natural Gas Pipeline - Muskwa River Crossing

FortisBC is having a challenge obtaining *Public Works and Government Services* Canada (PWGSC) approval for the installation of a replacement natural gas pipeline crossing on the Muskwa River bridge, which is the single natural gas service for the Northern community of Fort Nelson, British Columbia and Fort Nelson First Nations natural gas customers.

Currently at the Muskwa River pipeline crossing, the natural gas pipeline is exposed to abrasion from the elements, in the river bed and work must be undertaken to replace it immediately. Pipeline failure would result in over 2,000 homes and businesses being without natural gas for a number of days or even weeks.

Through substantial research FortisBC has concluded that the most viable solution for customers is to utilize the adjacent bridge that crosses the Muskwa River. Other crossing options face significantly higher environmental, technical, and permitting risks as well as greater project costs, which are passed on to our customers in Fort Nelson.

The bridge is managed by PWGSC. FortisBC submitted an application March, 2011 to install the pipeline on the Muskwa River Bridge. On July, 2012 the FortisBC application was denied. An appeal was heard in September, 2012 and PWGSC confirmed that permission would not be granted.

FortisBC advocates the use of the bridge to support the Fort Nelson pipeline. In our experience, natural gas pipelines are installed and operated on bridges economically, safely, and with minimal risk. Most recently a similar natural gas pipeline was built over several bridges to support the natural gas pipeline to Whistler, British Columbia.

FortisBC respectfully asks that your office reconsider the decision made by PWGSC.

Yours sincerely,

Bob Gibney

cc: Mr. Bob Zimmer, M.P. Prince George - Peace River
Attachments

Northern Rockies Regional Municipality
Municipal Office 5319 - 50th Avenue South
Bag Service 399, Fort Nelson, BC V0C 1R0
Tel 250.774.2541 Fax 250.774.6794
www.northernrockies.ca

September 15, 2011

FortisBC Energy Inc.
16705 Fraser Highway
Surrey, BC V4N 0E8

Attention: Bob Gibney
Senior Manager Corporate Services and Aboriginal Affairs

Re: Muskwa River Gas Pipeline Crossing

Dear Mr. Gibney,

Thank you for attending our September 12, 2011 Regional Council Meeting and delivering your presentation on the Muskwa River pipeline crossing. I would like to take this opportunity, on behalf of Regional Council, to extend our full support for FortisBC's application to Public Works and Government Services Canada (PWGSC) as presented.

We understand that the application involves the installation of a new natural gas pipeline on the Muskwa River highway bridge to replace the existing, deteriorating pipeline in the river. Having been shown several other options for the river crossing, we agree that using the bridge to carry the pipeline is appropriate and acceptable; especially given FortisBC's lengthy experience with pipeline bridge crossings.

Fort Nelson is a rapidly growing community with increasing demand on infrastructure and energy. We therefore recognize the importance of having a more secure pipeline river crossing to provide our community with natural gas and support the use of the Muskwa River Bridge to do so.

Sincerely,

Bill Streeper, Mayor

Fort Nelson First Nation
Lands Department
RR#1 Mile 295
Fort Nelson, B.C., V0C 1R0
Phone: 250-774-6313
Fax: 250-774-6317
katherine.wolfenden@fnnation.ca

December 7th, 2012

Via Email: John.Lorenz@pwgsc-tpsgc.gc.ca

John Lorenz
Public Works & Government Services
Portfolio Director-Engineering
580- 800 Burrard Street
Vancouver, BC
V6Z 2V8

Dear Mr. Lorenz;

The Fort Nelson First Nation has received communication from FortisBC Energy Inc regarding the status of the proposed replacement of their pipeline crossing of the Muskwa River adjacent to our reserve and within our core traditional territory.

Fort Nelson First Nation objects to any project that may harm or disrupt our rivers, lands and waters and therefore requests project proponents to strongly consider this in the evaluation of their options.

We understand that FortisBC desires to attach the pipeline to the Muskwa River bridge and that this option is, by far, the least risk to our river and lands. Therefore, Fort Nelson First Nation supports this option.

We encourage FortisBC and Public Works Canada to respect our objection and work together to enable the safe attachment of the pipeline to the bridge in order to protect our environment and continue to provide natural gas to the community of Fort Nelson.

Sincerely,

Lana Lowe,
Director, Lands & Resources
Fort Nelson First Nation

Appendix K

FORT NELSON FIRST NATIONS LETTER OF SUPPORT, DATED DECEMBER 7, 2012

Fort Nelson First Nation
Lands Department
RR#1 Mile 295
Fort Nelson, B.C., V0C 1R0
Phone: 250-774-6313
Fax: 250-774-6317
katherine.wolfenden@fnnation.ca

December 7th, 2012

Via Email: John.Lorenz@pwgsc-tpsgc.gc.ca

John Lorenz
Public Works & Government Services
Portfolio Director-Engineering
580- 800 Burrard Street
Vancouver, BC
V6Z 2V8

Dear Mr. Lorenz;

The Fort Nelson First Nation has received communication from FortisBC Energy Inc regarding the status of the proposed replacement of their pipeline crossing of the Muskwa River adjacent to our reserve and within our core traditional territory.

Fort Nelson First Nation objects to any project that may harm or disrupt our rivers, lands and waters and therefore requests project proponents to strongly consider this in the evaluation of their options.

We understand that FortisBC desires to attach the pipeline to the Muskwa River bridge and that this option is, by far, the least risk to our river and lands. Therefore, Fort Nelson First Nation supports this option.

We encourage FortisBC and Public Works Canada to respect our objection and work together to enable the safe attachment of the pipeline to the bridge in order to protect our environment and continue to provide natural gas to the community of Fort Nelson.

Sincerely,

Lana Lowe,
Director, Lands & Resources
Fort Nelson First Nation

Cc. Paddy Whidden, Government of Canada, Program Director
Cc. Cynthia Burke, FNFN Lands Department
Cc. Bob Gibney, Fortis BC

Appendix L

DRAFT ORDERS AND UNDERTAKING OF CONFIDENTIALITY

SIXTH FLOOR, 900 HOWE STREET, BOX 250
VANCOUVER, BC V6Z 2N3 CANADA
web site: http://www.bcuc.com

BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER

TELEPHONE: (604) 660-4700
BC TOLL FREE: 1-800-663-1385
FACSIMILE: (604) 660-1102

DRAFT ORDER

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by FortisBC Energy Inc.
For a Certificate of Public Convenience and Necessity for the Muskwa River TP Pipeline Crossing for the Fort Nelson Service Area

BEFORE:

(Date)

WHEREAS:

A. On November 29, 2013, FortisBC Energy Inc. (FEI) applied (the Application) to the British Columbia Utilities Commission (the Commission), pursuant to sections 45 and 46 of the *Utilities Commission Act* (the Act), for a Certificate of Public Convenience and Necessity (CPCN) to construct and operate a Nominal Pipe Size (NPS) 6 (inch) transmission pressure (TP) pipeline that crosses the Muskwa River (the Project) in replacement of the existing NPS 6 pipeline crossing in FEI's Fort Nelson service area (FEFN or Fort Nelson) as described in the Application;

B. FEI has also sought Commission approval under sections 59-61 of the Act for deferral treatment of costs for preparing this CPCN Application and for Project development costs, both of which will be recorded to a new non-rate base deferral account called the Muskwa River Crossing Project Costs Deferral Account on a net-of-tax basis attracting AFUDC until December 31, 2014, and for amortization over a three year period starting in 2015;

C. The Project as applied for consists of replacement of the existing NPS6 pipeline crossing in Fort Nelson, BC with a NPS6 pipeline crossing, to be installed by trenchless construction and to be in service by May 1, 2014;

D. FEI has estimated the capital cost of the Project to be approximately $6.7 million, not including Allowance for Funds Used During Construction (AFUDC);

E. By Order G-XX-13 dated <date>, the Commission established a Streamlined Review Process for the review of the Application and a Regulatory Timetable;

F. The Commission has reviewed and considered the Application, the evidence and submissions and has determined that the Project is in the public interest and that a CPCN for the Project should be granted to FEI for the Project.

NOW THEREFORE the Commission orders as follows:

1. Pursuant to Sections 45 and 46 of the Utilities Commission Act, a Certificate of Public Convenience and Necessity is granted to FEI for the entirety of the Project, as applied for in the Application.

2. Pursuant to sections 59-61 of the Act, the deferral treatment and the amortization period for the Muskwa River Crossing Project Costs Deferral Account as applied for are granted. FEI shall record the costs of preparing the Application and the Project development costs in the non-Rate Base Muskwa River Crossing Project Costs Deferral Account on a net-of-tax basis which will attract AFUDC until December 31, 2014. On January 1, 2015, the Muskwa River Crossing Project Costs Deferral Account will be included in Rate Base and will be amortized over a three year period starting in 2015 through 2017.

3. FEI shall file with the Commission within 30 days of the end of each reporting period Quarterly Progress Reports on the Project using a format similar to that used in the Kootenay River Crossing Upgrade Project. The Quarterly Progress Reports will address in some detail the risks that the Project is experiencing, the options available to address the risks, the actions that FEI is taking to deal with the risks and the likely impact on the Project schedule and cost.

4. FEI shall file with the Commission a Final Report, within six months of the end or substantial completion of the Project, that provides a complete breakdown of the final costs of the Project, compares these costs to the cost estimate in the Application, and provides an explanation and justification of material cost variances.

DATED at the City of Vancouver, In the Province of British Columbia, this XX day of <MONTH>, 2013.

BY ORDER

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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER

TELEPHONE: (604) 660-4700
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DRAFT PROCEDURAL ORDER

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by FortisBC Energy Inc.
For a Certificate of Public Convenience and Necessity for the Muskwa River TP Pipeline Crossing for the Fort Nelson Service Area

BEFORE:

(Date)

WHEREAS:

A. On November 29, 2013, FortisBC Energy Inc. (FEI) applied (the Application) to the British Columbia Utilities Commission (the Commission), pursuant to sections 45 and 46 of the *Utilities Commission Act* (the Act), for a Certificate of Public Convenience and Necessity (CPCN) to construct and operate a Nominal Pipe Size (NPS) 6 (inch) transmission pressure (TP) pipeline that crosses the Muskwa River (the Project) in replacement of the existing NPS 6 pipeline crossing in FEI's Fort Nelson service area (FEFN or Fort Nelson) as described in the Application;

B. FEI has also sought Commission approval under sections 59-61 of the Act for deferral treatment of costs for preparing this CPCN Application and for Project development costs, both of which will be recorded to a new non-rate base deferral account called the Muskwa River Crossing Project Costs Deferral Account on a net-of-tax basis attracting AFUDC until December 31, 2014, and for amortization over a three year period starting in 2015;

C. The Project as applied for consists of replacement of the existing NPS6 pipeline crossing in Fort Nelson, BC with a NPS6 pipeline crossing, to be installed by trenchless construction and to be in service by May 1, 2014;

D. FEI has estimated the capital cost of the Project to be approximately $6.7 million, not including Allowance for Funds Used During Construction (AFUDC);

E. The Commission has determined that a public hearing process is necessary to review the Application;

NOW THEREFORE the Commission orders as follows:

1. The Application will be examined by way of a Streamlined Review Process and the Regulatory Timetable attached as Appendix A has been established.

2. FEI will publish, as soon as possible, in display-ad format, the Notice attached as Appendix B to this Order, in appropriate local news publications in the Fort Nelson area.

3. The Application, together with any supporting materials, will be made available for inspection at the FortisBC Energy Utilities, 16705 Fraser Highway, Surrey, BC, V4N 0E8, and at the British Columbia Utilities Commission, Sixth Floor, 900 Howe Street, Vancouver, BC, V6Z 2N3 and will also be available on the FortisBC Energy Utilities website at www.fortisbc.com and on the BCUC website at www.bcuc.com.

4. Interveners or Interested Parties should register with the Commission, in writing or electronic submission, by Tuesday, December 10, 2013. Interveners should specifically state the nature of their interest in the Application and identify generally the nature of the issues that they may intend to pursue during the proceeding and the nature and extent of their anticipated involvement in the review process.

DATED at the City of Vancouver, In the Province of British Columbia, this day of <month> 2013.

BY ORDER

Attachment

An Application by FortisBC Energy Inc.
For a Certificate of Public Convenience and Necessity for the Muskwa River TP Pipeline Crossing for the Fort Nelson Service Area

REGULATORY AGENDA AND TIMETABLE

ACTION	DATE (2013 and 2014)
Intervener Registration	Tuesday, December 10
Commission and Intervener Information Request No. 1	Monday, December 23
FEI Response to Information Request No. 1	Thursday, January 16
Streamlined Review Process	Thursday, January 23
Expected Commission Approval	Thursday, January 30

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An Application by FortisBC Energy Inc.
For a Certificate of Public Convenience and Necessity for the Muskwa River TP Pipeline Crossing for the Fort Nelson Service Area

NOTICE OF APPLICATION AND STREAMLINED REVIEW PROCESS

DATE:	Thursday, January 23, 2014
TIME:	9:00am to 12:00pm
LOCATION:	Commission Hearing Room, 12th Floor, 1125 Howe Street, Vancouver

THE APPLICATION

On November 29, 2013, FortisBC Energy Inc. (FEI) applied (the Application) to the British Columbia Utilities Commission (the Commission), pursuant to sections 45 and 46 of the *Utilities Commission Act* (the Act), for a Certificate of Public Convenience and Necessity (CPCN) to construct and operate a Nominal Pipe Size (NPS) 6 (inch) transmission pressure (TP) pipeline that crosses the Muskwa River (the Project) in replacement of the existing NPS 6 pipeline crossing in FEI's Fort Nelson service area (FEFN or Fort Nelson) as described in the Application;

FEI has also sought Commission approval under sections 59-61 of the Act for deferral treatment of costs for preparing this CPCN Application and for Project development costs, both of which will be recorded to a new non-rate base deferral account called the Muskwa River Crossing Project Costs Deferral Account on a net-of-tax basis attracting AFUDC until December 31, 2014, and for amortization over a three year period starting in 2015;

The Project as applied for consists of replacement of the existing NPS6 pipeline crossing in Fort Nelson, BC with a NPS6 pipeline crossing, to be installed by trenchless construction and to be in service by May 1, 2014;

FEI has estimated the capital cost of the Project to be approximately $6.7 million, not including Allowance for Funds Used During Construction (AFUDC);

THE REGULATORY PROCESS

British Columbia Utilities Commission (Commission) Order G-xx-13 established a Regulatory Timetable for the review of the Application by way of a Streamlined Review Process.

The detailed Regulatory Timetable can be reviewed on the Commission's website at www.bcuc.com>Current Applications>[name of proceeding].

REGISTERING TO PARTICIPATE

Persons who wish to actively participate in this proceeding should register as Interveners with the Commission in writing by Tuesday, December 10, 2013, and should identify the issues that they intend to pursue as well as the nature and extent of their anticipated involvement in the review process. Interveners will receive email notice of all correspondence and filed documents. An e-mail address should be provided if available.

Persons not expecting to actively participate, but who have an interest in the proceeding, should register as Interested Parties with the Commission in writing, by Tuesday, December 10, 2013 identifying their interest in the Application. Interested Parties will receive a copy of the Application and a copy of the Commission's Decision when issued.

PUBLIC INSPECTION OF DOCUMENTS

This Application and supporting material will be made available for inspection at the FortisBC Energy Utilities Office, 16705 Fraser Highway, Surrey, BC, V4N 0E8, and at the British Columbia Utilities Commission, Sixth Floor, 900 Howe Street, Vancouver, B.C., V6Z 2N3 and will also be available on the BCUC website at www.bcuc.com and the FortisBC Energy Utilities website at www.fortisbc.com.

All submissions and/or correspondence received from active participants or the general public relating to the Application will be placed on the public record and posted to the Commission's website.

FURTHER INFORMATION

For further information, please contact Ms. Erica Hamilton, Commission Secretary, by telephone (604) 660-4700 or B.C. Toll Free at 1-800-663-1385, by fax (604) 660-1102, or by Email Commission.Secretary@bcuc.com.

FortisBC Energy Inc. (the Company)

Application for a Certificate of Public Convenience and Necessity to Construct and Operate a Transmission Pressure Pipeline Crossing of the Muskwa River (the Application)

UNDERTAKING OF CONFIDENTIALITY

I, _____, am a participant acting for _____
(full name) (name of organization)

in the matter of the review of the above noted Application.

In this capacity, I request access to the confidential information in the Application and any related confidential materials filed in the proceeding including information requests, responses and submissions related to confidential information in the Application. I understand that the execution of this undertaking is a condition of an Order of the Commission, and the Commission may enforce this Undertaking pursuant to the provisions of the *Administrative Tribunals Act.*

I hereby undertake

a) to use the information disclosed under the conditions of the Undertaking exclusively for duties performed in respect of this proceeding;
b) not to divulge information disclosed under the conditions of this Undertaking except to a person granted access to such information or to staff of the Commission;
c) not to reproduce, in any manner, information disclosed under the conditions of this Undertaking except for purposes of the proceeding;
d) to keep confidential and to protect the information disclosed under the conditions of this Undertaking, including by means of filing information requests that refer to confidential materials separately, in confidence, such that they are available only to those individuals who have executed this Undertaking;
e) to return to the Company, under the direction of the Commission, all documents and materials containing information disclosed under the conditions of this Undertaking, including notes and memoranda based on such information, or to destroy such documents and materials and to file with the Commission a certification of destruction at the end of the proceeding or within a reasonable time after the end of my participation in the proceeding; and
f) to report promptly to the Commission any violation of this Undertaking.

Dated at _____ this _____day of _____, 2013.

Signature: _____

Name: _____
(please print)

Address: _____

Telephone: _____

Fax: _____

E-mail: _____