



**FORTISBC ENERGY INC.**

**Application for a Certificate of Public  
Convenience and Necessity for the  
Pattullo Gas Line Replacement Project**

**Volume 2 – Amended Application**

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**December 15, 2020**

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## 1. APPLICATION

### 1.1 INTRODUCTION

FortisBC Energy Inc. (FEI or the Company) applies to the British Columbia Utilities Commission (BCUC), pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA), for a Certificate of Public Convenience and Necessity (CPCN) for the Pattullo Gas Line Replacement Project (PGR Project or Project) as described in ~~the application dated August 31, 2020, and as amended by the evidentiary update dated December 15, 2020 (collectively, the~~ Application).

FEI also applies for approval of a deferral account, entitled the PGR Application and Preliminary Stage Development Costs", pursuant to sections 59 to 61 of the UCA, to record the costs of preparing the Application, developing the PGR Project prior to approval of this Application, and the regulatory review process.

The PGR Project is needed to replace the distribution system capacity currently provided by FEI's distribution pressure gas line affixed on the Pattullo Bridge (Pattullo Gas Line), which must be decommissioned in 2023 prior to the demolition of the Pattullo Bridge by the Province.

As will be described in detail in Section 5 of the Application, the PGR Project consists of the following:

- Constructing and installing in the City of Burnaby a 508 mm gas line that will operate at a maximum operating pressure (MOP) of 2,070 kPa;
- Constructing and installing a new district pressure regulating station (PRS);
- Constructing and installing a 508 mm gas line that will operate at a MOP of 700 kPa to connect the PRS to the distribution system;
- Abandoning and removing the existing Pattullo Gate Station in the City of Surrey and approximately 800 m of 508 mm gas line operating at a MOP of 700 kPa affixed to the Pattullo Bridge;
- Abandoning in place approximately 1.2 km of the remaining 508 mm gas line operating at a MOP of 700 kPa from the Pattullo Gate Station to the intersection of McBride Boulevard and Royal Avenue; and
- Modifying approximately 5.5 km of the Livingston-Pattullo 457 mm transmission gas line and associated work due to the removal of the Pattullo Gate Station.

For clarity, in requesting a CPCN for the PGR Project, FEI is requesting that the BCUC approve each of the components of the PGR Project set out above as will be described in Section 5 of the Application.

In order to maintain the safe and reliable supply of natural gas to customers in Burnaby, New Westminster and Coquitlam, FEI must complete the PGR Project prior to the demolition of the existing Pattullo Bridge under which the Pattullo Gas Line is affixed. The Ministry of Transportation and Infrastructure (MoTI) has denied multiple requests from FEI for approval to

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1 install a replacement gas line on the new bridge being constructed to replace the Pattullo Bridge  
2 (New Bridge). FEI pursued and examined a number of other alternatives, including trenchless  
3 crossings, an aerial crossing of the Fraser River, a peak shaving facility, a virtual pipeline, and  
4 various overland gas line routes (i.e., that do not require a crossing of the Fraser River).  
5 However, after a comprehensive evaluation of all alternatives, FEI determined that an overland  
6 gas line route through the City of Burnaby is the only feasible solution that can be completed in  
7 advance of the MoTI's scheduled Pattullo Bridge demolition and meet the main Project objective  
8 of replacing the distribution system capacity currently provided by the Pattullo Gas Line.

9 FEI began consultation with the City of Burnaby on the Project in February 2020, and has  
10 continued to consult and negotiate with the City of Burnaby regarding the route for the Project  
11 since that time. On July 20, 2020 City of Burnaby Council passed a recommendation brought  
12 forward by the City's Finance Management Committee to "oppose the proposed FortisBC  
13 Pattullo Gas Line Replacement Project pipeline route through Burnaby".<sup>1</sup> On July 31, 2020, the  
14 City requested that FEI investigate a new route on Sperling Avenue (Sperling Route) in the City  
15 of Burnaby as an alternative to FEI's previously identified route on Gagliardi Way (Gagliardi  
16 Route). FEI investigated the Sperling Route and, based on an analysis of the alternatives using  
17 non-financial and financial weighted criteria, FEI has selected the Sperling Route as the  
18 preferred alternative for the PGR Project. The City is supportive of the Sperling Route.

19 In order to meet the stringent Project schedule requirements driven by the Province's Pattullo  
20 Bridge Replacement Project, FEI must initiate the detailed design and procurement of long lead  
21 material items in the first quarter of 2021. This will give FEI the necessary time to obtain all the  
22 required permits and approvals prior to executing and completing the construction of the new  
23 gas line in 2022. This would enable the decommissioning of the Pattullo Gas Line, Project  
24 completion and Project close-out activities, including the removal of the Pattullo Gas Line and all  
25 equipment in 2023, prior to the demolition of the Pattullo Bridge planned for the third quarter of  
26 2023.

27 To meet the Province's timelines, FEI is seeking an expedited regulatory review process. In  
28 order to commence the regulatory process, FEI filed the Application with a number of  
29 components incomplete. FEI has now completed the Application based on the Sperling Route,  
30 as the preferred alternative.

31 In addition, in order to commence the regulatory review process and meet the Project schedule,  
32 FEI is providing the PGR Project cost estimate at an AACE Class 4 level of project definition.  
33 While the BCUC's CPCN guidelines prescribe an AACE Class 3 level of estimate, FEI believes  
34 a Class 4 level of estimate is sufficient in this case, given that:

- FEI will have undertaken additional preliminary constructability and other site reviews to better define the Project scope than is ordinarily completed for a Class 4 cost estimate.

<sup>1</sup> See Burnaby Council Minutes, Page 7 Section 4.8. Online:  
<https://pub-burnaby.escribemeetings.com/FileStream.ashx?DocumentId=47967>

**Deleted:** At the time of filing this Application, FEI is investigating the feasibility

**Deleted:** As outlined in detail in Section 1.4, to

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**Deleted:** FEI will be filing an evidentiary update by the end of September 2020, the content of which will depend on FEI's continuing consultation with the City of Burnaby, other stakeholders and Indigenous communities. If

**Deleted:** determined by the end of September that the Sperling Route is not feasible or should not be pursued, then FEI anticipates that the preferred route for the Project will be the Gagliardi Route and that it will be able to provide the remaining information needed to complete the Application in its evidentiary update at the end of September. However, if FEI determines that the Sperling Route continues to look feasible and requires further investigation, then the evidentiary update will provide an update to the alternatives analysis, and provide a timeline for when FEI will be able to complete the Application. FEI currently anticipates that it could potentially complete

**Deleted:** , if determined to be the preferred route, by the end of November 2020. ¶  
Thus, whether in the first evidentiary update at the end of September, or the second at the end of November, FEI will provide:¶

<#>The results of FEI's consultation and negotiations with the City of Burnaby regarding the route for the Project (to be included in an addendum to Section 4 of the Application).  
A detailed description of the Project, including project components, final route selection process, basis of design and engineering, construction, project schedule and resourcing requirements,

**Deleted:** well as a qualitative risk assessment and the risk analysis and contingency estimate (to be included as Section 5 of the Application);¶

<#>The cost estimate, the assumptions upon which the financial analysis is based, and the rate impacts (to be included as Section 6 of the Application); ¶

<#>FEI's assessment of the potential environmental and archaeological impacts of the Project and measures to mitigate those potential impacts (to be included in Section 7 of the Application); and ¶

<#>FEI's public consultation and communication efforts regarding the Project and FEI's consultation with Indigenous communities potentially impacted by the Project (to be included as Section 8 of the Application). ¶

¶  
FEI respectfully requests that, with the filing of the initial information in the Application, the BCUC assign a Panel and have intervenor registrations prior to the first round of information requests (IRs), which would commence after filing of the evidentiary update at the end of September. FEI believes that this approach is necessary to complete the PGR Project in time to meet the Pattullo Bridge Replacement Project schedule.

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- The Project budget will include a contingency estimate, determined through a comprehensive risk identification process, detailed qualitative assessment and a risk quantification analysis using the latest revision of AACE International Recommended Practices.
- The need for the PGR Project is driven by the demolition of the Pattullo Bridge, and, as such, project cost is not a factor in determining need.
- FEI's alternatives analysis of available overland gas line route options based on "apples-to-apples" Class 5 estimates shows that the route through the City of Burnaby has the lowest rate impact, in addition to being the only option that can be constructed in time to meet the Project schedule. As such, a more defined level of Project cost is not needed for the analysis of project alternatives.
- While a Class 4 estimate has a wider accuracy range than a Class 3 estimate, only prudently incurred costs may be recovered from customers in rates in any case.

For these reasons, FEI requests that the BCUC accept a Class 4 estimate as providing sufficient information on which to make a determination of whether the Project is in the public interest. This will allow the regulatory process to proceed so that FEI can meet the Project schedule driven by the Province's replacement of the Pattullo Bridge.

All other information presented in the Application is consistent with the CPCN guidelines.

A draft Procedural Order and draft Final Order are included in Appendices B-1 and amended B-2 respectively.

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## 1.2 EXECUTIVE SUMMARY

### 1.2.1 Need to Replace the Capacity Provided by the Pattullo Gas Line

FEI needs to undertake the PGR Project due to the Province's Pattullo Bridge Replacement Project, which includes construction of a New Bridge and demolition of the Pattullo Bridge on which FEI's Pattullo Gas Line is affixed. As explained in detail in Section 3.3, FEI's existing Pattullo Gas Line and its location within its natural gas system is integral in providing the following key benefits:

- Distribution system capacity to supply natural gas to customers in the Cities of Burnaby, New Westminster and Coquitlam; and
- Resiliency to FEI's larger Metro Vancouver area.

Specifically, as described in detail in Section 3.5 of the Application, the Pattullo Gas Line currently supplies all or a portion of natural gas to approximately 35,000 customers in Burnaby, New Westminster and Coquitlam. Not replacing the existing system capacity of the Pattullo Gas Line would lead to a loss of gas supply to approximately 10,700 customers during the coldest days of the year when peak demand occurs. This includes approximately 2,100 customers in

Burnaby, 2,800 customers in New Westminster, and 5,800 customers in Coquitlam. Further, based on FEI's 20-year forecast, an additional 14,800 customers (for a total of approximately 25,500 customers) would be without gas during cold winter periods by 2039.

Therefore, FEI must replace the distribution system capacity of the Pattullo Gas Line prior to its decommissioning in 2023 to continue to provide safe and reliable natural gas supply to customers.

As explained in Sections 3.3.2 and 3.6 of the Application, in addition to distribution supply capacity, the Pattullo Gas Line provides system resiliency for customers in the Metro Vancouver area. By supporting flexible operation of the Metro Vancouver distribution system, this resiliency allows FEI to maintain safe and reliable supply to all customers during outages or failures of other feeds to the Metro Vancouver distribution system. FEI investigated and pursued alternatives that would replace both the distribution capacity and the system resiliency benefits of the Pattullo Gas Line. However, FEI has determined that there is no feasible Project alternative that would replace the system resiliency benefits of the Pattullo Gas Line, while also meeting the schedule constraints of the PGR Project. Therefore, FEI concluded that the resiliency benefits of the Pattullo Gas Line cannot be replaced at this time and another project or system improvement will have to be undertaken at a later date to restore Metro Vancouver's system resiliency.

### **1.2.2 Alternatives Analysis Concluded Overland Gas Line Alternative is only Feasible Option**

FEI conducted a comprehensive evaluation of the alternatives to meet the Project need and that would have the least impact, including consideration of technical design and scope complexity, cost, construction, environmental, archaeological and societal impacts, and impacts to FEI's existing system capacity and resiliency. FEI examined six alternatives and a number of sub-alternatives as listed below in Table 1-1, and described in further detail in Sections 4.3 and 4.4.

**Table 1-1: Alternatives and Sub-Alternatives Considered for PGR Project**

Alternatives and Sub-Alternatives Considered	
<b>Alternative 1</b>	<b>Attachment to the New Bridge</b>
<b>Alternative 2</b>	<b>Trenchless Crossing of the Fraser River</b> <ul style="list-style-type: none"> <li>1. Alternative 2A - High Pressure Horizontal Directional Drill (TP/IP HDD)</li> <li>2. Alternative 2B - Distribution Pressure Horizontal Directional Drill (DP HDD)</li> <li>3. Alternative 2C - Alternate High Pressure Horizontal Directional Drill (TP/IP)</li> <li>4. Alternative 2D - Other Trenchless Methodologies (Micro-tunneling)</li> </ul>
<b>Alternative 3</b>	<b>Through Richmond with Fraser River Crossing</b> <ul style="list-style-type: none"> <li>5. Alternative 3A - TP Gas Line with 1 Gate Station</li> <li>6. Alternative 3B - IP Gas Line with 1 Gate Station and 1 District Station</li> </ul>
<b>Alternative 4</b>	<b>Aerial Gas Line Crossing</b>

Alternatives and Sub-Alternatives Considered	
<b>Alternative 5</b>	<b>Peak Shaving Facility / Virtual Gas Line</b> 1. Alternative 5A - Liquefied Natural Gas (LNG) 2. Alternative 5B - Compressed Natural Gas (CNG)
<b>Alternative 6</b>	<b>Overland Gas Line</b> 1. Alternative 6A - Broadway and Gaglardi Way Corridor 2. Alternative 6B - Cape Horn Gate Corridor 3. Alternative 6C - Fraser Gate Corridor 4. Alternative 6D – Sperling Avenue Corridor

Alternative 1 is effectively a like-for-like replacement with the installation of a gas line on the New Bridge. FEI pursued this option from the time it initially received notice that it would need to decommission the Pattullo Gas Line and continued to pursue the option while simultaneously evaluating other alternatives until January 2020. FEI made multiple requests to MoTI for approval to install the gas line on the New Bridge. However, for the reasons explained in Section 4.3.1.1, MoTI denied FEI's requests. Without approval from MoTI, this alternative is not feasible.

The next alternative that FEI evaluated was Alternative 2, a trenchless crossing of the Fraser River. FEI began pursuing this alternative in September 2018 after receiving MoTI's initial response in July 2018 denying FEI's request to install a gas line on the New Bridge. As explained in Section 4.3.2, after conducting preliminary designs, FEI engaged a drilling contractor as part of an early contractor involvement project delivery method to evaluate the constructability and feasibility of this alternative. FEI and the drilling contractor concluded in August 2019 that the drilling options were not feasible due to constructability issues and the low likelihood of successfully completing the drill and pipe installation.

After determining that Alternative 2 was not feasible, FEI proceeded to analyze all other alternatives beginning in August 2019. Due to the higher impact of these solutions, significant work on these alternatives was not started until more preferred options were deemed infeasible. Further, these remaining alternatives would not be like-for-like replacements, and would not be able to replace the resiliency benefits currently provided by the Pattullo Gas Line.

FEI screened out Alternatives 3, 4 and 5 based on their inability to meet the Project objectives as further explained in Section 4.3.3 through 4.3.5. This left Alternative 6: Overland Gas Line as the only feasible alternative to replace the system capacity provided by the Pattullo Gas Line while meeting Project schedule requirements.

Within Alternative 6, FEI identified three overland gas line route corridors (prior to the recent addition of 6D - the Sperling Route – as further explained below): 6A - Broadway and Gaglardi Way Corridor; 6B - Cape Horn Gate Corridor, and 6C - Fraser Gate Corridor. FEI compared the three route corridors using the financial and non-financial evaluation criteria in Table 1-2 below (specified in detail in Section 4.4.2).

Table 1-2: Alternatives Evaluation Criteria with Weightings

Evaluation Criteria	Weighting
<b>Non-Financial</b>	
1. Schedule Impacts	90%
2. Community, Indigenous and Stakeholder Impacts	
3. Environmental and Archaeological Impacts	
<b>Financial</b>	
4. Levelized Delivery Rate Impact	10%

FEI's evaluation of the three overland route corridors using the financial and non-financial criteria indicated that Alternative 6A (through the City of Burnaby) has the shortest schedule duration, least community impacts, and lowest financial impact based on AACE Class 5 conceptual cost estimates. Further, FEI concluded that Alternative 6A was the only route that could be constructed in time to allow FEI to decommission the Pattullo Gas Line before MoTI's scheduled demolition of the Pattullo Bridge.

FEI has been consulting and negotiating with the City of Burnaby regarding the route for the Project since February 2020. On July 31, 2020 the City requested that FEI investigate a new route option – the Sperling Route. FEI considers that it is important to determine if there is a feasible route that is supported by the City of Burnaby. If supported by the City, and other factors are favourable, the Sperling Route could be the most cost effective alternative for the PGR Project. Since July 31, 2020, FEI investigated the Sperling Route.

FEI evaluated both the Gaglardi Route and the Sperling Route at an AACE Class 4 level of definition using financial and non-financial weighted criteria. FEI's evaluation of the two routes against the financial and non-financial weighted criteria indicated that Alternative 6D, the Sperling Route, has the best overall weighted score. While the two alternatives are equivalent when compared financially, the Sperling Route was superior from a non-financial perspective, with less schedule impact and fewer community, indigenous and stakeholder impacts. Further, the City of Burnaby supports the route. Accordingly, FEI has selected Alternative 6D, the Sperling Route, as its preferred alternative for the Project.

### 1.2.3 Project Description

Section 5 of the Application includes a detailed description of the proposed Project, including project components, final route evaluation and selection process, basis of design and engineering, construction, project schedule and resourcing requirements, as well as a qualitative risk assessment and analysis and contingency estimate.

### 1.2.4 Project Costs and Rate Impact

The cost estimate for the PGR Project is \$175.354 million in as-spent dollars and including Allowance for Funds Used During Construction (AFUDC).

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**Deleted:** In an evidentiary update, FEI will provide the conclusion of its evaluation of the Sperling Route and analysis supporting FEI's preferred route for the Project. ¶

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**Deleted:** In an evidentiary update, FEI will provide Section 6 of the Application which will include the Project cost estimate and the assumptions upon which the financial analysis and the rate impacts are based. The Project cost estimate will be provided in as-spent dollars including the Allowance for Funds Used During Construction (AFUDC) and cost of removal of the Pattullo Gas Line. ¶

The Project will result an estimated delivery rate impact of 1.57 percent in 2025 when all construction, including abandonment/demolition, is completed and all capital costs have entered FEI's rate base. The average annual delivery rate impact over the four years from 2022 to 2025 is estimated to be 0.39 percent, which equates to an average bill increase of approximately \$1.62 per year for a residential customer, or cumulatively \$6.39 over four years.

The PGR Project costs and rate impacts are further described in Section 6 of the Application.

### 1.2.5 Environmental and Archaeological Evaluation

FEI has assessed the environmental and archaeological impacts of the Project. As described in Section 7 of the Application, FEI expects that the Project will have minimal environmental and archaeological impacts.

Based on environmental overview assessments, the environmental risks of the Project are low and any potential environmental impacts of the Project can be mitigated through the implementation of standard best management practices and mitigation measures.

FEI assessed the footprint of the Sperling Route for high-level archaeological constraints in an Archaeological Constraints Report (ACR), which concluded that the majority of the expected footprint is considered to have low archaeological potential within highly developed areas. FEI will be conducting an Archaeological Overview Assessment (AOA) for the Sperling Route in early 2021 to further assess the potential archaeological impacts. The AOA of the decommissioning component concluded that the proposed excavation locations are mostly located in areas of high archaeological potential due to an extensive history of occupation in the surrounding area. FEI will conduct an Archaeological Impact Assessment (AIA) for both the Sperling Route and decommissioning component to further assess potential archaeological and cultural impacts associated within areas of moderate and high archaeological potential identified in the AOAs. The AIA will provide a detailed assessment to allow for development of site specific mitigation strategies to offset any potential impacts associated with the Project.

### 1.2.6 Consultation and Engagement

As detailed in Section 8 of the Application, the consultation and engagement activities to the time of filing have been sufficient, appropriate and reasonable to meet the requirements of the BCUC CPCN Guidelines.

FEI considers consultation, engagement, and communication with the public, local government, Indigenous communities, and other stakeholders to be critical components of the PGR Project. FEI created a Consultation and Engagement Plan<sup>2</sup> that sets out the general approach to engagement, consultation and communications activities with respect to the PGR Project. Due

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<sup>2</sup> Filed as Appendix J-5. Consultation and Engagement plan includes Community Engagement, Indigenous Relations, and Communications Plan with respect to the Sperling Route.

1 to the COVID-19 pandemic, FEI has continued to assess and adjust its consultation and  
2 engagement approach and activities as necessary.

3 FEI has consulted and engaged extensively on the Project to date. FEI has used multiple  
4 communication and consultation methods to ensure that local stakeholders, including federal  
5 and provincial elected officials, local government, customers, residents, businesses,  
6 stakeholder groups, schools, places of worship, places of community gathering and permitting  
7 agencies have had the opportunity to become informed about the Project and provide their  
8 feedback. FEI has also engaged early with potentially impacted Indigenous groups in a  
9 thorough, timely and meaningful manner. FEI values the comments and feedback received, and  
10 has incorporated this feedback into its Project planning. Throughout its consultation and  
11 engagement, FEI has tracked issues and concerns that have been raised and will continue to  
12 address any outstanding items with respect to the Project.

**Deleted:** In an evidentiary update, FEI will provide Section 8 of the Application, which will describe FEI's public and other key stakeholders consultation and communication efforts regarding the Project, and FEI's consultation with Indigenous communities potentially impacted by the Project.

13 Further consultation and engagement activities will continue prior to and throughout construction  
14 to help inform the public, customers, residents, businesses, local government, other  
15 stakeholders and Indigenous groups about construction activities in their area in an effort to  
16 minimize impacts.

#### 17 **1.2.7 British Columbia's Energy Objectives and FEI's Long-Term Resource Plan**

18 In alignment with considerations for the issuance of a CPCN, FEI confirms that the Project was  
19 identified within FEI's most recent 2017 Long Term Gas Resource Plan (2017 LTGRP), and will  
20 support British Columbia's energy objective of encouraging economic development and the  
21 creation and retention of jobs. The Project is anticipated to have positive employment impacts  
22 and will contribute to the local economy of British Columbia.

#### 23 **1.2.8 Conclusion**

24 FEI submits that the Project is necessary and in the public interest. FEI requests that the BCUC  
25 grant a CPCN for the PGR Project as described in this Application.

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### 26 **1.3 APPROVALS SOUGHT**

#### 27 **1.3.1 CPCN for PGR Project**

28 Pursuant to sections 45 to 46 of the UCA, FEI requests that the BCUC grant a CPCN for the  
29 construction and operation of the PGR Project as described in the Application. In granting a  
30 CPCN for the PGR Project, FEI requests that the BCUC approve the components of the PGR  
31 Project as described in detail in Section 5 of the Application.

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#### 32 **1.3.2 Application and Preliminary Stage Development Costs Deferral Account**

33 Pursuant to sections 59 to 61 of the UCA, FEI requests approval of a deferral account, entitled  
34 the PGR Application and Preliminary Stage Development Costs", to capture the costs of the

**Deleted:** "



Application and regulatory review process, and certain costs of developing the PGR Project. The Application costs will include expenses incurred by FEI for the development of the Application for filing, and the regulatory review process such as legal fees, BCUC costs, hearing costs and BCUC-approved intervenor costs, a forecast of which is provided in the Application. The Preliminary Stage Development costs include expenses for Project management, engineering, and consultants for assessing the potential design and alternatives.

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For the Application costs, FEI has estimated \$350 thousand related to expenses incurred by FEI for the preparation and regulatory review process for the Application. For the Preliminary Stage Development costs, FEI is proposing to record \$2.507 million, which are the actual costs to January 31, 2020, less the tax deduction available for certain capitalized development costs incurred by FEI after January 31, 2020. The Application and Preliminary Stage Development costs are recorded in the proposed non-rate base deferral account on a net-of-tax basis, attracting FEI's weighted average cost of capital (WACC) until transfer to rate base. FEI proposes to transfer the balance in the deferral account to rate base on January 1, 2022 and commence amortization over a three-year period.

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**Deleted:** The balance of the Application and Development Costs deferral account is \$2.85 million.

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#### 1.4 PROPOSED REGULATORY PROCESS

As per the amended regulatory timetable established in BCUC Order G-253-20, FEI will provide a written submission on further process for the regulatory review of the Application by December 23, 2020.

FEI respectfully requests a Decision from the BCUC as soon as practicable. FEI plans to initiate the detailed design and procurement for the first phases of the Project in the first quarter of 2021. FEI plans to begin construction of the new gas line in the second quarter of 2022 and is expecting to have all construction complete by the fourth quarter of 2022. Based on this timeline, the removal of the Pattullo Gas Line is expected to be complete by the third quarter of 2023.

**Deleted:** As explained in Section 1.1, in order to maintain Project schedule requirements, FEI is proposing an accelerated regulatory review and approval process. FEI proposes that a round of IRs from the BCUC and intervenors followed by a Streamline Review Process (SRP) will provide for an appropriate and efficient review of the Application. The SRP will provide an opportunity for follow up questions directly to FEI. The format of the SRP has proven effective in addressing a variety of applications, and FEI believes that it is well-suited for this Project.¶  
If FEI has selected the Gagliardi Route as its preferred route and, therefore, is able to complete the Application in an evidentiary update at the end of September 2020, FEI proposes the regulatory timetable set out in Table 1-3 below. ¶  
**Table 1-3: Proposed Regulatory Timetable¶**  
**ACTION**

#### 1.5 ORGANIZATION OF THE APPLICATION

The Application provides detailed information in support of the approvals sought. The remainder of the Application is organized into the following sections:

- Section 2 provides an overview of the Applicant, and provides information on FEI's financial and technical capabilities to undertake the Project;
- Section 3 describes the need and justification for the Project;
- Section 4 describes the alternatives considered, the criteria for evaluating potentially feasible alternatives, and details the technical and financial evaluation of each of the these alternatives;



- 1 • Section 5 provides a detailed description of the Project, including project components,  
2 final route evaluation and selection process, basis of design and engineering,  
3 construction, project schedule and resourcing requirements, a qualitative risk  
4 assessment and analysis, and contingency estimate;
- 5 • Section 6 provides the Project cost estimate, the assumptions upon which the financial  
6 analysis is based, and the rate impacts;
- 7 • Section 7 provides an overview of the Project environment, including a discussion of the  
8 environmental and archaeological impacts the Project may have, and FEI's plans to  
9 mitigate those impacts;
- 10 • Section 8 discusses FEI's public consultation and communication efforts regarding the  
11 Project and FEI's engagement with Indigenous communities potentially impacted by the  
12 Project;
- 13 • Section 9 describes how the Project supports BC's energy objectives and its inclusion  
14 within FEI's most recent long-term resource plan; and
- 15 • Section 10 concludes this Application.

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## 2. APPLICANT

### 2.1 NAME, ADDRESS AND NATURE OF BUSINESS

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, providing sales and transportation services to residential, commercial, and industrial customers in more than 100 communities throughout British Columbia, with more than 1 million customers served throughout British Columbia. FEI's distribution network provides more than 95 percent of the natural gas energy delivered to customers in British Columbia.

### 2.2 FINANCIAL CAPACITY

FEI is regulated by the BCUC and is capable of financing the Project. FEI has credit ratings for senior unsecured debentures from Dominion Bond Rating Service Morningstar and Moody's Investors Service of A and A3, respectively.

### 2.3 TECHNICAL CAPACITY

FEI has designed and constructed a system of integrated high, intermediate and low-pressure pipelines, and operates approximately 50,000 kilometres of natural gas transmission and natural gas distribution mains and service lines in British Columbia. FEI has completed other large natural gas projects, and has the technical capacity to complete the Project.

### 2.4 COMPANY CONTACT

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9

## 3. PROJECT JUSTIFICATION

### 3.1 INTRODUCTION

The need to undertake the PGR Project arises from the Province's Pattullo Bridge Replacement Project, which includes the demolition of the Pattullo Bridge on which FEI's Pattullo Gas Line is affixed. The Pattullo Gas Line, which has been in operation since 1956, is integral to FEI's ability to supply natural gas to customers in Burnaby, New Westminster, and Coquitlam, and also provides resiliency benefits to FEI's Metro Vancouver natural gas system. FEI must, however, decommission the Pattullo Gas Line by the end of 2023 in advance of the scheduled demolition of the Pattullo Bridge. Therefore, in order to continue to deliver natural gas to existing customers in the cities of Burnaby, New Westminster and Coquitlam, the PGR Project is needed to replace the system capacity currently provided by the Pattullo Gas Line prior to its decommissioning.

The remainder of this section will provide details of the Project need and justification, as follows:

- Section 3.2 describes the Pattullo Gas Line and its location in relation to FEI's Metro Vancouver natural gas system;
- Section 3.3 describes the capacity and resiliency benefits of the Pattullo Gas Line;
- Section 3.4 describes the Province's Pattullo Bridge Replacement Project, including the timing of the demolition of the existing Pattullo Bridge which drives the need and required in-service date of the Project;
- Section 3.5 explains the need to replace the system capacity of the Pattullo Gas Line to continue to provide safe and reliable service to its customers; and
- Section 3.6 explains the need to replace the system resiliency benefits of the Pattullo Gas Line, which FEI has determined cannot be achieved by this Project.

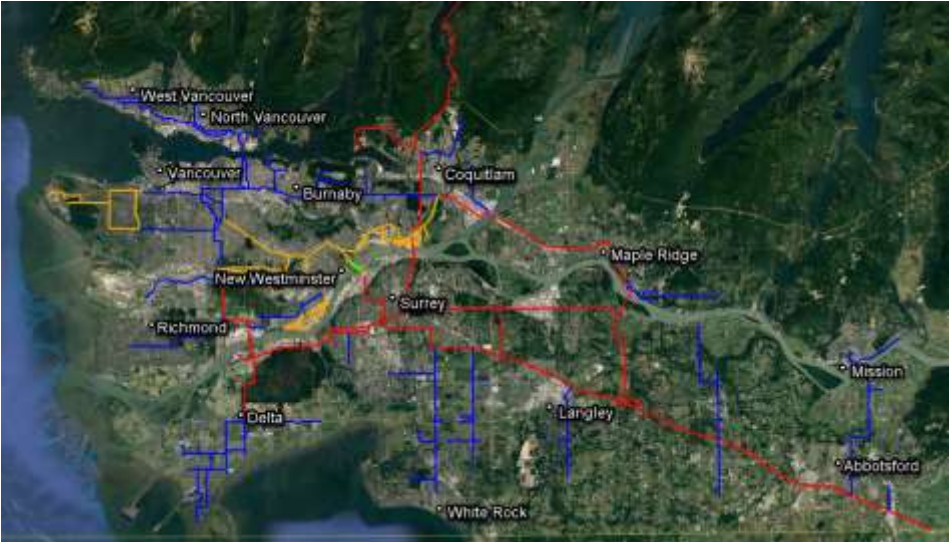
### 3.2 DESCRIPTION AND LOCATION OF THE PATTULLO GAS LINE

The Pattullo Gas Line is a nominal pipe size (NPS) 20 (508 mm outside diameter) distribution pressure (DP)<sup>3</sup> gas line affixed to the underside of the Pattullo Bridge, which spans the Fraser River from the City of Surrey to the City of New Westminster. FEI has operated the Pattullo Gas Line safely since its installation in 1956.

Figure 3-1 shows the Pattullo Gas Line (in green) in relation to FEI's Coastal Transmission System (CTS) and adjoining distribution system. The gas lines operating at transmission pressure (TP), which are shown in red, constitute the CTS.

<sup>3</sup> Distribution Pressure ( $\leq 700$  kPa).

Figure 3-1: Overview of FEI's CTS and Distribution System



Source: FEI data overlaid on Google Earth mapping

- TP gas lines operating at greater than 2069 kPa
- IP gas lines operating between 701 kPa and 2069 kPa
- DP gas lines operating at less than or equal to 700 kPa
- Pattullo gas line operating at less than or equal to 700 kPa

The TP gas lines transport gas from the FEI Huntingdon Station near Abbotsford into the Fraser Valley and Metro Vancouver areas to feed gate stations<sup>4</sup> located within various communities in the Lower Mainland. The IP gas lines transport the natural gas supply from the gate stations in a bi-directional corridor to numerous district stations, which in turn feed the DP system that serves customers in Metro Vancouver. Within this system, the Pattullo Gas Line is an integral component of FEI's Metro Vancouver IP and DP distribution system due to the system capacity and resiliency benefits it provides, as described in the following section.

<sup>4</sup> A gate station is a station that regulates the pressure of the gas stream prior to it entering a distribution system operating at a lower pressure and the gas usually requires preheating.

### 3.3 SIGNIFICANCE OF THE PATTULLO GAS LINE TO THE METRO VANCOUVER DISTRIBUTION SYSTEM

Although it is relatively short in length (as shown in Figure 3-1), the Pattullo Gas Line is a critical link in the gas supply to thousands of downstream customers. Specifically, it provides two key benefits:

1. Distribution system capacity to supply natural gas to customers in Burnaby, New Westminster and Coquitlam; and
2. Resiliency to FEI's larger Metro Vancouver area.

#### 3.3.1 Capacity to Serve Customers in Burnaby, New Westminster and Coquitlam

Today, the Pattullo Gas Line supplies all or a portion of natural gas to approximately 35,000 customers in Burnaby, New Westminster and Coquitlam.

The Pattullo Gas Line provides capacity to serve customers through the 700 kPa trunk distribution system, depicted in orange in Figure 3-2 below. This trunk distribution system is a subset of Metro Vancouver's distribution system spanning from the south east portion of Vancouver, from Elliott Street and South East Marine Drive (near Fraser Gate) to Como Lake Avenue and Westwood Street in Coquitlam (near Coquitlam Gate). The 700 kPa trunk distribution system supplies 14 regulating district stations, represented by the green stars in Figure 3-2, which feed gas into the 420 kPa distribution system that directly supplies residential, commercial and industrial customers.

Figure 3-2: Stations Supplying the Metro Vancouver 700 kPa Trunk Distribution System



As seen in the figure above, the trunk distribution system is fed at four points:

1. Pattullo Gate Station (via the Pattullo Gas Line);
2. Como Lake Avenue and Westwood Street District Station (fed by Coquitlam Gate);
3. Elliott Street and South East Marine Drive District Station (fed by Fraser Gate); and
4. 29<sup>th</sup> Avenue and Slocan Street District Station.

The length of the yellow arrows in the figure above represent the proportion of gas supplied from each station. As shown, the Pattullo Gas Line represents the largest and most significant feed into the 700 kPa trunk distribution system. In cold winter weather, the Pattullo Gas Line supplies over half of the gas entering the 700 kPa trunk distribution system.

The capacity benefits of the Pattullo Gas Line are discussed further in Section 3.3.

### 3.3.2 Resiliency for Metro Vancouver Distribution System

The Pattullo Gas Line also provides resiliency benefits to FEI's Metro Vancouver distribution system. As shown in Figure 3-3 below, the CTS supplies natural gas to the Metro Vancouver distribution system primarily through three gate stations:



1. Fraser Gate, located on East Kent Ave South near Kerr Street in Vancouver;
2. Coquitlam Gate, located on Spuraway Avenue near Mariner Way in Coquitlam; and
3. Pattullo Gate, located on 120th Street near Old Yale Road in Surrey.

**Figure 3-3: Gate Stations Feeding FEI's Metro Vancouver Distribution System**



The three gate stations shown in the figure above are independent feeds into the interconnected distribution system. Coquitlam Gate supplies the majority of gas required to serve customers in FEI's larger Metro Vancouver area, with Fraser Gate and Pattullo Gate (via the Pattullo Gas Line) contributing the remainder of the gas supply. Together, the three gate stations provide the capacity to support the vast majority of customers served by the Metro Vancouver distribution system.

With the recent system improvements completed as part of the Lower Mainland IP System Upgrade (LMIPSU) Project<sup>5</sup>, the Metro Vancouver distribution system is fully supported under peak day conditions if either Coquitlam Gate or Fraser Gate is out of service due to an unanticipated station failure or the failure of an upstream gas line supplying the station. However, the resiliency of the Metro Vancouver distribution system relies on the independent third feed from the Pattullo Gate station (through the Pattullo Gas Line) to support the 700 kPa trunk distribution system. The third feed from the existing Pattullo Gas Line leaves capability in

<sup>5</sup> BCUC Decision and Order C-11-15, dated October 16, 2015. Online: [https://www.bcuc.com/Documents/Proceedings/2015/DOC\\_44883\\_10-16-2015\\_FEI-LMIPSU-CPCN-Decision.pdf](https://www.bcuc.com/Documents/Proceedings/2015/DOC_44883_10-16-2015_FEI-LMIPSU-CPCN-Decision.pdf)



the Coquitlam and Fraser gate stations to compensate if supply from either is lost. This resiliency allows for flexibility in the operation of the distribution system and allows FEI to maintain reliable supply to its customers. The resiliency benefits of the Pattullo Gas Line and the impacts of PGR Project on FEI's system resiliency are discussed further in Section 3.6 and Section 4.4.2 of the Application.

### 3.4 *PATTULLO BRIDGE REPLACEMENT PROJECT*

FEI will lose the Pattullo Gas Line, and the benefits it provides, due to the Province's Pattullo Bridge Replacement Project, which includes the demolition of the Pattullo Bridge on which FEI's Pattullo Gas Line is affixed. The Pattullo Bridge Replacement Project has received an Environmental Assessment Certificate from the B.C. Environmental Assessment Office (EAO) under British Columbia's Environmental Assessment Act, as well as a Project and Environmental Review Project Permit from the Vancouver Fraser Port Authority. At the time of filing this Application, the Pattullo Bridge Replacement Project is in the design and construction phase.

The New Bridge is scheduled to open in fall 2023. The existing bridge will remain in use until the New Bridge is open to traffic. Once the New Bridge is open, the existing bridge will be removed.<sup>6</sup>

Based on the current Project schedule, demolition of the Pattullo Bridge is scheduled to proceed by the end of 2023 after the New Bridge opens. However, MoTI has indicated that it could occur earlier than this target date due to the nature of the performance based, design-build-finance contract it has entered into with its contractor who will be performing the construction and demolition work.

Prior to the demolition of the existing Pattullo Bridge, FEI will need to degasify and purge the existing Pattullo Gas Line to make it safe for removal, and abandon and/or remove all associated infrastructure, as well as complete any required modifications to the existing infrastructure upstream and downstream of the Pattullo Gas Line.

### 3.5 *FEI MUST REPLACE THE DISTRIBUTION SYSTEM CAPACITY PROVIDED BY THE PATTULLO GAS LINE*

Prior to the decommissioning of the Pattullo Gas Line, FEI must replace the distribution system capacity currently provided by the Pattullo Gas Line in order to continue to supply natural gas safely and reliably to customers in Burnaby, New Westminster and Coquitlam. The Pattullo Gas

<sup>6</sup> The Government of B.C.'s website for the Pattullo Bridge Replacement Project (<https://engage.gov.bc.ca/pattullobridge/>) provides details on the project. Transportation Investment Corporation, a provincial Crown corporation, is delivering and overseeing the project, and Fraser Crossing Partners has been awarded the contract to design and build the New Bridge. The Province will own and maintain the New Bridge when complete.

1 Line currently supplies all or a portion of natural gas to approximately 35,000 customers in these  
2 cities. The area where these customers are located is outlined in yellow in Figure 3-4 below.

3 **Figure 3-4: 10,700 Customers Impacted by Loss of Pattullo Gas Line Feed in 2020**



4  
5 Without the Pattullo Gas Line, the area shaded in red in Figure 3-4 would have inadequate gas  
6 supply. This represents the distribution area supplied by one regulating district station in  
7 southwest Coquitlam and two regulating district stations in New Westminster, all of which are  
8 fed from the 700 kPa trunk distribution system. Based on FEI's 2020 peak demand projection<sup>7</sup>,  
9 during the coldest days of the year when peak demand occurs, and without support from the  
10 Pattullo Gas Line, these district stations would have inadequate inlet pressure leading to a loss  
11 of gas supply. This includes approximately 2,100 customers in Burnaby, 2,800 customers in  
12 New Westminster, and 5,800 customers in Coquitlam. This represents a disruption in service to  
13 approximately 10,700 residential, commercial, and industrial customers who rely on natural gas  
14 to provide necessary heat and hot water for their homes and businesses.

15 Based on 2020 customer peak demand projections, the customers in the area shaded in yellow  
16 (and outside the red region) in Figure 3-4 above could continue to receive service without the  
17 Pattullo Gas Line. This is because of the relative proximity of the customers in the yellow-

<sup>7</sup> Peak demand conditions occur in cold winter when consumer space heating demands are highest. To design reliable distribution systems FEI projects system peak demand based on coldest weather conditions likely to occur 1 in 20 years.

shaded area to either Fraser Gate or Coquitlam Gate and the capacity of these Gate stations to accept some of the load currently provided by the Pattullo Gas Line. This illustrates the resiliency of the current system.

However, without replacement of the Pattullo Gas Line, the impacted area in red would expand as customer load grows over time. Based on FEI's 20-year forecast, by 2039 an additional 14,800 customers (for a total of approximately 25,500 customers) would be without gas during cold winter periods. This is illustrated in Figure 3-5 below.

**Figure 3-5: 25,500 Customers Impacted by Loss of Pattullo Gas Line Feed in 2039**



In summary, FEI must replace the distribution system capacity of the Pattullo Gas Line prior to its decommissioning in 2023 to continue safe and reliable natural gas supply to existing customers. While the number of customers that would be left without safe and reliable service would grow over time, the need to replace the distribution system capacity of the Pattullo Gas Line is not driven by load growth or an increase in customers' peak demand. Rather, even based on current (2020) customer loads, 10,700 customers would be left without safe and reliable service. Thus, any variation from FEI's load forecast in the area, including any sustained impacts of the COVID-19 pandemic, would not impact the need for the Project. In short, in order to continue providing natural gas service safely and reliably to customers in Burnaby, New Westminster and Coquitlam, FEI must replace the distribution system capacity currently provided by the Pattullo Gas Line prior to its decommissioning in 2023.

### 3.6 IMPACTS OF THE PGR PROJECT ON FEI'S METRO VANCOUVER DISTRIBUTION SYSTEM RESILIENCY

As discussed in Section 3.3.2, the resiliency benefits of the Pattullo Gas Line allow for the full capacity of the Metro Vancouver distribution system to be maintained should Coquitlam Gate or Fraser Gate station be unable to supply gas into the distribution system. If the Pattullo Gas Line is removed without replacement, and if the gas supply from either Coquitlam Gate or Fraser Gate station is lost, the sole remaining gate station would need to compensate for both the loss of the Pattullo Gas Line supply and the failed gate station. Under this scenario, the resiliency of the system is eroded and there is insufficient capacity to support the lost station. This represents a loss of resiliency, as the remaining gate station could only support customers in warmer weather when system demand is lower.

As explained in detail in Section 4, FEI examined a number of alternatives for the PGR Project that would replace both the capacity and resiliency benefits currently provided by the Pattullo Gas Line. However, FEI determined that there is no feasible project alternative that would replace the system resiliency currently provided by the Pattullo Gas Line and meet the schedule requirements of the Project. This is further discussed in Section 4.4.2.

### 3.7 CONCLUSION ON PROJECT NEED AND JUSTIFICATION

FEI must undertake the PGR Project due to the Province's Pattullo Bridge Replacement Project, which requires FEI to decommission the Pattullo Gas Line in 2023. The Pattullo Gas Line provides vital capacity and system resiliency benefits to the Metro Vancouver distribution system. If the Pattullo Gas Line is not replaced, it will result in the loss of safe and reliable gas supply to thousands of customers in Burnaby, New Westminster and Coquitlam.

Therefore, the PGR Project is required and needs to meet following objectives:

1. Replace the distribution system capacity currently provided by the Pattullo Gas Line to maintain the safe and reliable supply of natural gas to customers; and
2. Complete the PGR Project in advance of the scheduled Pattullo Bridge demolition to ensure continued gas supply to its customers.

A desirable secondary objective would be to also replace the resiliency benefits provided by the existing Pattullo Gas Line. However, as discussed above, FEI has determined that it cannot replace the distribution system resiliency benefits of the Pattullo Gas Line at this time. Therefore, another project or system improvements will be undertaken to restore the Metro Vancouver system resiliency at a later date.

## 4. ALTERNATIVES EVALUATION

### 4.1 INTRODUCTION

FEI evaluated numerous alternatives for the PGR Project to identify a solution that meets the Project objectives and has the least impact in terms of technical design, scope, complexity, cost, construction, environmental, archaeological and societal impacts, along with consideration of impacts to FEI's existing system capacity and resiliency.

FEI initially pursued alternatives that would have the least impact and would replace both the capacity and resiliency benefits of the Pattullo Gas Line. The obvious least overall impact solution would be to attach a replacement gas line to the New Bridge. FEI pursued the installation of a gas line on the New Bridge, which MoTI would not approve, and investigated a trenchless crossing of the Fraser River, which was found to be not feasible. FEI then considered various other alternatives to meet the project need, including through Richmond and across the Fraser River, an aerial crossing near the site of the Pattullo Bridge, a peak shaving facility or virtual pipeline, and overland gas line routes. Ultimately, FEI determined that an overland gas line routed through the City of Burnaby had the least impact, and would be the only solution available that can be implemented prior to the time when FEI must decommission the Pattullo Gas Line. FEI's consultation and negotiations with the City of Burnaby regarding the route for the Project have been ongoing and resulted in the identification of two feasible alternatives, referred to as the Gagliardi Route and the Sperling Route. Based on an analysis of these two alternatives using financial and non-financial weighted criteria, FEI chose the Sperling Route as its preferred alternative for the Project, which is supported by the City of Burnaby.

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The remainder of this section will provide details of the Project alternatives analysis and organized as follows:

- Section 4.2 provides an overview of the alternatives analysis, including the timeline of FEI's analysis.
- Section 4.3 describes FEI's analysis of the alternatives that were determined to be not feasible.
- Section 4.4 describes the overland gas line route options for the Project, and FEI's analysis of the route options based on financial and non-financial criteria. This section also describes FEI's ongoing consultation and negotiations with the City of Burnaby regarding a route for the Project.

### 4.2 OVERVIEW OF ALTERNATIVES ANALYSIS

The alternatives and sub-alternatives FEI identified and evaluated are listed in Table 4-1 below, and described in detail in Sections 4.3 and 4.4.

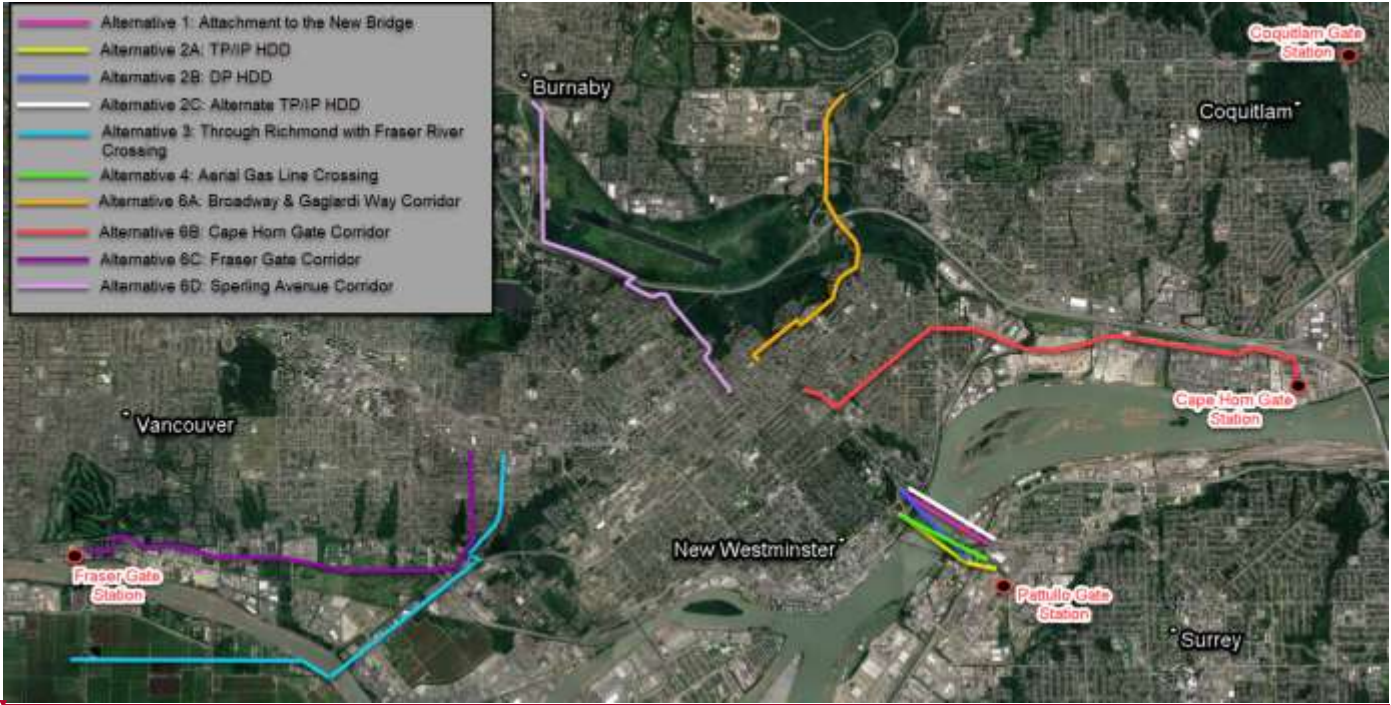
**Table 4-1: Alternatives and Sub-Alternatives Considered for PGR Project**

Alternatives and Sub-Alternatives Considered	
<b>Alternative 1</b>	<b>Attachment to the New Bridge</b>
<b>Alternative 2</b>	<b>Trenchless Crossing of the Fraser River</b> <ul style="list-style-type: none"> <li>Alternative 2A - High Pressure Horizontal Directional Drill (TP/IP HDD)</li> <li>Alternative 2B - Distribution Pressure Horizontal Directional Drill (DP HDD)</li> <li>Alternative 2C - Alternate High Pressure Horizontal Directional Drill (TP/IP)</li> <li>Alternative 2D - Other Trenchless Methodologies (Micro-tunneling)</li> </ul>
<b>Alternative 3</b>	<b>Through Richmond with Fraser River Crossing</b> <ul style="list-style-type: none"> <li>Alternative 3A - TP Gas Line with 1 Gate Station</li> <li>Alternative 3B - IP Gas Line with 1 Gate Station and 1 District Station</li> </ul>
<b>Alternative 4</b>	<b>Aerial Gas Line Crossing</b>
<b>Alternative 5</b>	<b>Peak Shaving Facility / Virtual Gas Line</b> <ul style="list-style-type: none"> <li>Alternative 5A - Liquefied Natural Gas (LNG)</li> <li>Alternative 5B - Compressed Natural Gas (CNG)</li> </ul>
<b>Alternative 6</b>	<b>Overland Gas Line</b> <ul style="list-style-type: none"> <li>Alternative 6A - Broadway and Gagliardi Way Corridor</li> <li>Alternative 6B - Cape Horn Gate Corridor</li> <li>Alternative 6C - Fraser Gate Corridor</li> <li>Alternative 6D – Sperling Avenue Corridor</li> </ul>

These alternatives are shown in Figure 4-1 below. Alternative 5 is not shown as locations for a peak shaving facility and injection sites associated with a virtual gas line were never identified.



Figure 4-1: Map of PGR Project Alternatives



FEI conducted a comprehensive evaluation of these alternatives with a focus and priority on the solutions with the least impact.

Given that it would be the most straightforward and overall least impact solution, FEI first pursued a like-for-like replacement with Alternative 1 via an installation of the replacement Pattullo Gas Line on the New Bridge. FEI diligently pursued this alternative with multiple requests to MoTI, complete with supporting documentation, from the time it first received written notice in June 2017 to move the Pattullo Gas Line or cease transmission of gas. FEI pursued this alternative while simultaneously evaluating other alternatives until it received final verbal confirmation from MoTI in January 2020 that the installation of FEI's gas line on the New Bridge would not be allowed. Section 4.3.1 below explains the reasons why MoTI denied FEI's requests. While FEI considered that the new replacement gas line could be designed for safe and reliable long-term operations with no material safety impacts to the New Bridge or its users, without agreement from MoTI's chief engineer to allow the attachment, this alternative is not feasible.

The next alternative evaluated was Alternative 2, a trenchless crossing of the Fraser River. FEI began to pursue this alternative in September 2018 after receipt of MoTI's initial response in July 2018 denying FEI's request to install a gas line on the New Bridge. As explained in Section 4.3.2, after conducting preliminary designs, FEI engaged a drilling contractor using an early contractor involvement project delivery method to evaluate the constructability and feasibility of this alternative. However, FEI and the drilling contractor concluded in August 2019 that the drill options were not feasible due to constructability issues and the high likelihood of hydraulic failures that could lead to a frac-out<sup>8</sup> in the Fraser River.

After determining that Alternative 2 was not feasible, FEI proceeded to analyse all other alternatives beginning in August 2019. These remaining alternatives would not be like-for-like replacements, and would not be able to replace the resiliency benefits currently provided by the Pattullo Gas Line.

FEI screened out Alternatives 3, 4 and 5 as they could not meet the Project objectives as further explained in Sections 4.3.3 through 4.3.5.

The only remaining potentially feasible alternative was Alternative 6: Overland Gas Line. FEI analysed and evaluated the route options for this alternative based on the evaluation criteria specified in Section 4.4.2, which included choosing a cost effective feasible solution that minimizes impacts to the project schedule, environment and the public and Indigenous communities. Out of the three Overland Gas Line alternatives originally evaluated (i.e Alternatives 6A, 6B and 6C), Alternative 6A - Broadway & Gagliardi Way Corridor has the shortest schedule duration, least community impacts, and lowest financial impact based on AACE Class 5 conceptual cost estimates. FEI began consulting with the City of Burnaby on the

<sup>8</sup> Frac-out is defined as the uncontrolled release of drilling fluid through fractured bedrock or flows into the rock and sand that surrounds the bedrock and travels toward the surface.



route for the Project in February 2020 and its consultation and negotiations continue at the time of filing this Application, including investigation of an alternative route in the City of Burnaby (Sperling Route). Details regarding the evaluation of the Overland Gas Line alternatives are provided in Section 4.4.

The remainder of Section 4 describes in further detail FEI's analysis of alternatives determined to be not feasible, and the analysis of the Overland Gas Line alternative based on financial and non-financial evaluation criteria, as well as FEI's ongoing consultation and negotiations with the City of Burnaby.

### 4.3 ALTERNATIVES INVESTIGATED BUT DEEMED NOT FEASIBLE

FEI evaluated a number of alternatives to meet the Project's objectives and requirements that were ultimately determined to be not feasible. A summary of the assessment for each of the alternatives considered is provided in Table 4-2 below, with the reasons described in detail in the sections below.

Table 4-2: Assessment Summary of PGR Project Alternatives

Alternatives Considered	Feasibility
1. Attachment to the New Bridge	Not Feasible
2. Trenchless Crossing of the Fraser River (Alternatives 2A, 2B, 2C and 2D)	Not Feasible
3. Through Richmond with Fraser River Crossing (Alternatives 3A, 3B and 3C)	Not Feasible
4. Aerial Gas Line Crossing	Not Feasible
5. Peak Shaving / Virtual Gas Line (Alternatives 5A and 5B)	Not Feasible
6. Overland Gas Line (Alternatives 6A, 6B, 6C and 6D)	Potentially Feasible

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#### 4.3.1 Alternative 1 - Attachment to the New Bridge Not Feasible Based on MoTI's Refusal to Permit

This alternative involves the installation of an NPS 20 (508 mm OD) DP gas line on the underside of the New Bridge similar to the current gas line on the Pattullo Bridge. As shown in Figure 4-2 below, on the south side of the bridge, the gas line would tie into the NPS 20 DP gas line near Highway 17 (South Fraser Perimeter Road) in the City of Surrey. On the north side of the Bridge, the gas line would tie into the NPS 20 DP gas line on McBride Boulevard in the City of New Westminster.

Figure 4-2: Map of Attachment to the New Bridge Alternative



#### 4.3.1.1 Analysis of Alternative 1

FEI pursued Alternative 1 - Attachment to the New Bridge, through multiple submissions to TransLink and MoTI in an effort to obtain approval to install a natural gas line on the New Bridge.

In a letter dated July 3, 2018 MoTI communicated its decision to not allow FEI to install a replacement natural gas line on the New Bridge. The rationale provided was as follows:<sup>10</sup>

1. MoTI's Utility Policy Manual notes that while DP and IP natural pipelines can sometimes be accommodated on provincial bridges, such pipelines are only considered when other crossing alternates are not feasible or if the alternate approaches result in environmental risk or other sensitivities. Fortis has developed potential alternate solutions.
2. MoTI's policies of restricting natural gas pipelines on bridges are in line with other North American jurisdictions, where such installations are highly discouraged and only allowed as a last resort when no other feasible crossing alternative exists.
3. The New Bridge will be designed as a lifeline structure with the highest standard of seismic design, requiring the New Bridge to be usable by traffic after a seismic event for both emergency response and economic recovery. The bridge is a key link between communities. The presence of a natural gas pipeline represents a significant risk to the reliability of the structure post a major seismic event that impacts the Greater Vancouver region.

<sup>10</sup> The letter from MoTI to FEI, dated July 3, 2018 is attached as Appendix A-1 to the Application.

In a letter dated September 28, 2018 (see Appendix A-2), FEI responded to MoTI to emphasize the following:

1. The gas line on the New Bridge will be designed to the same seismic design requirements as that of the bridge (1:2475);
2. FortisBC will be responsible for all the costs related to the installation and subsequent maintenance of the gas line on the New Bridge; and
3. Remote controlled valves, similar to ones installed on a number of gas lines in the Lower mainland, will be installed in the line at both ends of the New Bridge. These valves could be closed when an event that could affect the integrity of the lines is detected to ensure gas does not flow through it.

In a subsequent letter from MoTI to FEI dated October 30, 2018 (see Appendix A-3), MoTI reaffirmed its initial position, stating:

The New Bridge will be designed as a lifeline structure and will be a vital link between communities should there be a significant seismic event. The ongoing integrity of the bridge will be key to facilitating an effective response and recovery plan after such an event. Given this context, and the fact that there are other options open to Fortis, MoTI does not intend to revisit the decision taken on this matter.<sup>11</sup>

FEI believes that installing a replacement gas line on the New Bridge would have the least impact, and therefore it continued to pursue this alternative with multiple attempts to meet with MoTI's chief engineer to discuss the reasons as provided and to discuss any design modifications to meet the new lifeline design criteria. MoTI verbally confirmed that its decision was final in January 2020. Having exhausted all possibilities for approval by MoTI, FEI concluded that this alternative was not feasible.

#### **4.3.2 Alternative 2 – Trenchless Crossing of the Fraser River Not Feasible Based on Significant Construction Challenges**

FEI evaluated several options for a trenchless crossing of the Fraser River near the Pattullo Bridge, including three horizontal directional drill (HDD) alignments and other trenchless crossing methods. FEI engaged a drilling contractor as part of an early contractor involvement project delivery method to further assess these alternatives. All of the proposed sub-alternatives were identified as not being constructible and had other technical issues and risks which could not be adequately addressed or cost effectively mitigated using risk mitigation techniques. As a result, FEI determined that these alternatives were not feasible.

The description and analysis of these alternatives are provided below.

<sup>11</sup> The letter from MoTI to FEI, dated October 30, 2018 is attached as Appendix A-3 to the Application.

#### 4.3.2.1 Alternative 2A – High Pressure HDD (TP/IP HDD)

This alternative involves the installation of an NPS 12 (323 mm) TP or IP gas line across the Fraser River via an HDD (#1) near the Pattullo Bridge. The drill entry point would be located in a grassed clearing immediately east of Dufferin Street in the City of New Westminster and would exit in a rail storage yard on the south side of the Fraser River in the City of Surrey. The new pipe would be strung and welded together along Highway 17 as shown in blue in Figure 4-3 below. The length of the HDD would be approximately 1,063 meters. The drill path would cross under the existing Pattullo Bridge.

On the south end, the gas line would require additional onshore piping to connect to the existing Pattullo Gate Station via a shorter HDD (#2) approximately 391 meters under Highway 17 and the Burlington Northern Santa Fe (BNSF) Railway. On the north end, a new pressure regulating station would be required to reduce the gas pressure to 700 kPa and a new DP gas line would be required to tie into the NPS 20 DP gas line on McBride Boulevard, as shown in purple in Figure 4-3.

Figure 4-3: Map of High Pressure Horizontal Directional Drill (TP/IP HDD) Alternative



##### 4.3.2.1.1 ANALYSIS OF ALTERNATIVE 2A

FEI determined this alternative with the TP/IP HDD alignment shown in Figure 4-3 above was not feasible due to the compounding impacts of the following challenges:

- The HDD alignment crosses below or beside piers of the Pattullo Bridge, which would likely destabilize the existing structure. Considering that the bridge structure must remain operational during the construction of the New Bridge, there is no cost effective risk mitigation that FEI could identify to safely address this issue;

- There is an increased likelihood of a significant environmental event due to increased risk of frac-out causing an uncontrolled release of drilling fluid under the Fraser River due to:
  - elevation differences between entry and river bottom; and
  - soft soil conditions which cannot resist the drilling pressure;
- Limited workspace resulting in the likelihood of overstressing the pipe or damaging the pipe coating during construction and pullback; and
- Conflicts with Highway 17, SkyTrain tunnel and railroad crossings, creating potential for significant transportation system closures.

#### 4.3.2.2 Alternative 2B – Distribution Pressure HDD (DP HDD)

This alternative involves the installation of an NPS 20 (508 mm) DP gas line across the Fraser River via an HDD near the Pattullo Bridge. The drill entry point would be located in a rail storage yard on the south side of the Fraser River in the City of Surrey and would exit on the east side of McBride Boulevard in the City of New Westminster. The new pipe would be strung and welded together along McBride Boulevard as shown in blue in Figure 4-4. The length of the HDD would be approximately 1,293 meters. The drill path (shown in green) would cross under the Pattullo Bridge, the New Bridge, and the Canadian National (CN) Rail bridge.

On the south end, the gas line would require additional onshore piping and would tie into the existing NPS 20 DP gas line near Highway 17, as shown in purple in Figure 4-4 below. On the north end, the gas line would tie into the existing NPS 20 DP gas line on McBride Boulevard between two existing block valves.

**Figure 4-4: Map of Distribution Pressure Horizontal Directional Drill (DP HDD) Alternative**



1 **4.3.2.2.1 ANALYSIS OF ALTERNATIVE 2B**

2 FEI determined the DP HDD alignment shown in Figure 4-4 above was not feasible due to the  
3 compounding impacts of the following issues and risks:

- 4 • The HDD alignment crosses below and beside piers of the CN Rail bridge which has the  
5 potential to destabilize the structure. There is no cost effective risk mitigation strategy  
6 that FEI could identify to safely address this issue and keep the bridge operational. CN  
7 Rail will not grant a crossing permit to FEI, which is required for execution of this  
8 alternative;
- 9 • Increased likelihood of a significant environmental event due to increased risk of frac-out  
10 causing an uncontrolled release of drilling fluid under the Fraser River;
- 11 • Significant traffic disruption during pipeline string out construction and testing on  
12 McBride Boulevard, precipitating lane closures for several months; and
- 13 • The proposed HDD entry location is in conflict with the future development plans by the  
14 property owner. There is no feasible alternate location.

15 **4.3.2.3 Alternative 2C – Alternate High Pressure HDD (TP/IP HDD) Alignment**

16 This alternative involves the installation of an NPS 12 (323 mm) gas line across the Fraser River  
17 near the New Bridge, as shown below in Figure 4-5. There would be drill entry points on each  
18 side of the Fraser River that would meet in the middle. The new pipe would be strung and  
19 welded together along McBride Boulevard. The length of the HDD would be approximately  
20 1,340 meters. The drill path would run parallel and approximately 16 metres upstream (on the  
21 North side) of the alignment of the New Bridge.

22 On the south end, the gas line would require additional onshore piping to connect to the Pattullo  
23 Gate Station via a short HDD under Highway 17 and SFR Railway, shown in red in Figure 4-5.  
24 On the north end, a new pressure regulating station would be required where the gas pressure  
25 would be reduced to 700 kPa and a new DP gas line would be tied into the NPS 20 DP gas line  
26 on McBride Boulevard, as shown in purple in Figure 4-5.



Figure 4-5: Map of Alternate High Pressure HDD (TP/IP HDD) Alignment<sup>12</sup>



#### 4.3.2.3.1 ANALYSIS OF ALTERNATIVE 2C

The footprint of this alternative is fully contained within the Pattullo Bridge Replacement Project footprint (refer to bolded and yellow areas in Figure 4-5), and therefore would have required coordination between FEI and the design build contractor for the Pattullo Bridge Replacement Project. However, as this alternative was identified during MoTI's competitive bidding process, FEI's requirements could not have been incorporated in the scope of the Pattullo Bridge Replacement Project without change orders being put to MoTI, for which MoTI indicated they would not be responsible. FEI determined this alternative was not feasible due to the compounding impacts of the following challenges:

- Added complexity with project coordination for workspace requirements and access points for both FEI's project and the Pattullo Bridge Replacement Project;
- The MoTI Design Build Finance (DBF) contract limits FEI's ability to negotiate coordination with the Pattullo Bridge Replacement Project, as FEI's project requirements were not incorporated in their original scope;
- The close proximity of the crossing to the New Bridge alignment creates design and construction risks as location and size of bridge pier foundations would not be available prior to detailed design of the HDD;
- Impact on a known archaeological site – the indigenous village site in the City of Surrey;

<sup>12</sup> Image taken from MoTI Pattullo Bridge Replacement Project Business Case Scope Sketches, May 2018.

- Significant traffic disruption during pipeline stringing, construction, and testing on McBride Boulevard, resulting in road lane closures for several months;
- Permitting challenges due to multiple railway crossings; and
- Compounding schedule effects to both FEI and the Pattullo Bridge Replacement Project should the HDD fail on the first attempt due to uncertain geological profile.

#### 4.3.2.4 Alternative 2D – Other Trenchless Methodologies

Given that the HDD alternatives were not feasible, FEI requested that the drilling contractor perform an analysis of alternate trenchless methodologies to cross the Fraser River within proximity to the Pattullo Bridge. The other methodologies reviewed by the construction contractor included micro-tunnelling and direct pipe. The construction contractor found that the most promising technology would be micro-tunnelling, which is a method of constructing a tunnel that involves underground installation of a casing pipe, without removal of the ground above the pipe and without requiring entry by personnel. However, the construction contractor concluded that none of the trenchless technologies would be successful at crossing the Fraser River in this area, for the following reasons:

- A crossing length in excess of 750 meters and a depth of at least 70 metres to avoid liquefaction induced flow would make it the longest and deepest attempted micro-tunnel in North America, as of the date of the study. Typical lengths and depths are 600 metres and 35 metres, respectively;
- The required hydrostatic pressure to accommodate the depth would be twice what current technologies are capable of withstanding;
- Geotechnical data indicated that mixed ground (till, cobble and bedrock) would be encountered, which would cause cutter head selection challenges and/or replacements (based upon similar infrastructure projects in the vicinity); cutter head replacements at this depth would require an airlock system, increasing the diameter of the boring machine to at least 2.0 m; and
- Limited availability of experienced contractors in North America to meet the Project schedule.

#### 4.3.3 Alternative 3 – Through Richmond with Fraser River Crossing Screened Out Based on Inability to Meet Schedule Requirements

This alternative involves gas line installations in the Cities of Richmond and Burnaby and a trenchless crossing of the Fraser River. There are two configurations to achieve this alternative:

- Alternative 3A - TP Gas Line with one Gate Station; and
- Alternative 3B - IP Gas Line with one Gate Station and one District Station.

Both of these configurations were screened out based on their inability to meet the Project schedule objective. The description and analysis of these two configurations are provided in sections below.



#### 4.3.3.1 Alternative 3A – TP Gas Line with 1 Gate Station

This alternative involves the installation of an NPS 12 (323 mm) TP gas line for approximately 4,000 metres in the City of Richmond which would tie into the TIL FRA 508<sup>13</sup> and NIC FRA 610<sup>14</sup> gas lines, near Cambie Road and No. 7 Road (see blue line in Figure 4-6). A trenchless crossing (either HDD or micro-tunnel) of the north arm of the Fraser River would be required between the Cities of Richmond and Burnaby. The gas would be fed to a new TP/DP gate station (shown in purple) at Byrne Road and Mountbatten Street in the City of Burnaby, where the gas pressure would be reduced to 700 kPa. Approximately 4,000 metres of NPS 20 (508 mm) 700 kPa DP gas line would be installed along Byrne Road, continuing north onto Gilley Avenue to tie-in to the DP 700 kPa system at Gilley Avenue and Beresford Street (see green line in Figure 4-6).

Figure 4-6: Map of Richmond – TP to DP Alternative



#### 4.3.3.2 Alternative 3B – IP Gas Line with 1 Gate Station and 1 District Station

This alternative would tie into the TIL FRA 508<sup>13</sup> and NIC FRA 610<sup>14</sup> gas lines at the same location as Alternative 3A described above, which would be fed directly into a new TP/IP gate station (shown in yellow in Figure 4-7 below). The gas pressure would be reduced to 1,200 kPa (i.e., intermediate pressure) and approximately 8,000 metres of NPS 20 (508 mm) IP gas line would be installed along the same route as above to Gilley Avenue and Beresford Street (see light blue line), including a trenchless crossing of the Fraser River. At Gilley Avenue and

<sup>13</sup> Tilbury to Fraser Gate 508mm Outer Diameter (OD) operating at 4020 kPa.

<sup>14</sup> Nichol to Fraser Gate 610mm OD operating at 4020 kPa.

Beresford Street, a new IP/DP district station (shown in purple) would reduce the gas pressure to 700 kPa and tie into the existing DP 700 system.

**Figure 4-7: Map of Richmond – TP to IP to DP Alternative**



#### **4.3.3.3 Analysis of Alternatives 3A and 3B**

FEI determined that the Through Richmond with Fraser River Crossing Alternatives 3A and 3B were not feasible for the following reasons:

1. A significant portion of the Richmond section of this alternative includes acquiring new Statutory Right-of-Way (SRW) across private farmland which has a significant public impact. The SRW is required to be 18 metres wide for the TP alternative and 10 metres wide for the IP alternative. Further, the IP alternative would require the acquisition of land in Richmond for a new TP/IP gate station. Approximately 30 individual properties identified along the proposed route in Richmond are in the Agricultural Land Reserve, requiring approval from the Agricultural Land Commission for a gas line corridor. The time required for negotiations with landowners, in addition to a subsequent application to the Agricultural Land Commission, would exceed the Project schedule requirements.
2. There is a lack of existing geotechnical information to depths sufficient to adequately characterize the geotechnical risks at the crossing location for the trenchless Fraser River crossing in this location. Therefore, to assess the feasibility of this alternative, an extensive borehole drilling program in the Fraser River would be required and would involve several lengthy permit applications. FEI has recent experience with an HDD

crossing project<sup>15</sup> approximately 3,700 metres downstream of this location that required substantial geotechnical information. Even with the comprehensive geotechnical data, the project experienced several challenges in successfully completing the HDD causing significant delay from the original schedule.

For the reasons outlined above, FEI concluded that these alternatives pose a significant project schedule risk and cannot be constructed prior to the Pattullo Bridge demolition and decommissioning. As a result, FEI determined that this alternative is not feasible.

#### 4.3.4 Alternative 4 – Aerial Gas Line Crossing Screened Out Based on Inability to Meet Schedule Requirements

This alternative involves the construction of an aerial gas line support structure across the Fraser River near the Pattullo Bridge. The structure would support an NPS 20 (508 mm) 700 kPa DP gas line which would tie-in to the existing Pattullo Gate Station in the City of Surrey and the NPS 20 DP gas line near McBride Boulevard in the City of New Westminster as shown in Figure 4-8 below. In addition to the evaluation of FEI building its own support structure, FEI reviewed the feasibility of using the existing Pattullo Bridge piers upon decommissioning of the bridge for the aerial crossing. However, it was determined that this option would not allow FEI to meet the Project schedule requirements.

Figure 4-8: Map of Aerial Gas Line Crossing



<sup>15</sup> BCUC Decision and Order C-02-09, dated March 12, 2009. Online: [https://www.bcuc.com/Documents/Proceedings/2009/DOC\\_21279\\_TGI%20Fraser%20River%20Crossing%20Decision.pdf](https://www.bcuc.com/Documents/Proceedings/2009/DOC_21279_TGI%20Fraser%20River%20Crossing%20Decision.pdf)

#### 4.3.4.1 Analysis of Alternative 4

FEI determined that the Aerial Gas Line Crossing alternative was not feasible because it could not meet the Project's objective to be completed in advance of the scheduled Pattullo Bridge demolition, for the following reasons:

1. Due to the high impact structural requirements of an aerial crossing of the Fraser River, there are several long lead-time permits required for in-river geotechnical investigations and for the construction phase. Several of the identified permits must be filed sequentially with approval prior to design activities followed by construction start. This long lead-time permitting process prevents this alternative from meeting the project schedule timelines. The permits required include but are not limited to:

a) Environmental Assessment Certificate (EAC)	2 to 2.5 years
b) MoTI Approvals	6 to 12 months
c) Section 11 Water Sustainability Act Approval	1 to 1.5 years
d) Fisheries Act Authorization	4 to 6+ months
e) Vancouver Fraser Port Authority Project and Environmental Review	6 to 8 months

2. The proximity in both time and location to MoTI's Pattullo Bridge Replacement Project would result in challenges associated with cumulative effects of the two projects. It is likely that the Cities of Surrey and New Westminster, Indigenous communities and the public would take an increased interest in an aerial gas line crossing due to the visual impact, and perceived fisheries or watercourse impacts. As a result, FEI does not expect that it could complete the stakeholder engagement and consultation process in time to meet Project schedule requirements.

#### 4.3.5 Alternative 5 – Peak Shaving Facility / Virtual Gas Line

This alternative involves supplementing the City of New Westminster DP system using a peak shaving facility or virtual gas line. A virtual gas line consists of compressing and transporting natural gas via trucks from a supply location to a pressure reduction station without the need for permanent transmission gas line infrastructure. Without the existing Pattullo Gas Line or replacement, there would be a need for a virtual gas line or peak shaving facility to meet customer demand through the winter.

A peak shaving facility or virtual gas line would be required when temperatures drop below minus 1°C. Within the New Westminster area, it is normal for temperatures to drop to minus 1°C or below in late fall and winter, sometimes for extended periods.

Under peak demand conditions (approximately minus 12°C), the peak shaving facility or virtual gas line would need to deliver approximately 100,500 standard cubic metres per hour (Sm<sup>3</sup>/hr)

of gas into the system. For comparison, FEI's legacy Tilbury LNG peak shaving facility has a send-out capability of approximately 172,000 Sm<sup>3</sup>/hr of gas.

There are two delivery alternatives (LNG and CNG) described below, by which the required demand or load could be supplied using a peak shaving facility or virtual gas line. Both of these sub-alternatives were determined to be not feasible for the reasons outlined below.

#### **4.3.5.1 Alternative 5A – LNG**

To meet the capacity shortfall at peak demand and generate 100,500 Sm<sup>3</sup>/hr of gas, approximately 167 m<sup>3</sup> of LNG would be required (LNG has an volumetric energy density approximately 600 times greater than that of atmospheric pressure natural gas). If this load were supplied via a virtual gas line, approximately 4 LNG trailers per hour would be required. If this load were supplied by a peak shaving facility, approximately 28,000 m<sup>3</sup> of LNG would need to be stored to provide a one-week supply during peak demand conditions. A tank similar to the size of the legacy Tilbury LNG storage tank (26,000 m<sup>3</sup>) would be need to be constructed in Burnaby, New Westminster or Coquitlam.

##### **4.3.5.1.1 ANALYSIS OF ALTERNATIVE 5A**

During peak demand, four LNG trailers per hour would be required to supply the required load via a virtual gas line. Any interruption in the delivery and injection of LNG, such as traffic disruption between Tilbury LNG and the injection point in New Westminster, could result in the loss of pressure in the system and significant customer outages. Therefore, this solution is not feasible.

To supply the above demand during peak periods, a peak shaving facility with an LNG storage tank comparable to the legacy Tilbury LNG storage tank (0.6 BCF) would be required. A large area of land would need to be acquired and rezoned in order to build an LNG storage facility with setbacks sufficient to meet the requirements of CSA Z276-18 Liquefied Natural Gas (LNG) – Production, storage and handling. Finding an appropriate site for a tank of this size within New Westminster, Burnaby or Coquitlam would be challenging, and the timeline to complete this alternative would exceed the Project schedule requirements.

#### **4.3.5.2 Alternative 5B – CNG**

CNG provides a much lower energy density when compared to LNG and is therefore limited in its ability to meet demand. The energy density differential means that significantly more trailers and / or a larger storage tank would be required to deliver equivalent quantities of gas.

##### **4.3.5.2.1 ANALYSIS OF ALTERNATIVE 5B**

Since LNG is not able to meet the large capacity requirement, CNG is also not feasible since it has a smaller volumetric ratio (LNG has an energy density many times greater than that of compressed natural gas). For comparison, during peak demand approximately 12 CNG trucks

per hour would be required to supply the required load via virtual gas line. This would not be feasible.

#### 4.4 EVALUATION OF OVERLAND GAS LINE ALTERNATIVE

This section describes FEI's evaluation of Alternative 6 and its sub-alternatives (route corridors) to replace the system capacity provided by the Pattullo Gas Line while meeting project schedule requirements.

##### 4.4.1 Alternative 6 – Overland Gas Line

The Overland Gas Line alternative includes gas line installations in the Cities of Burnaby, Coquitlam, New Westminster and / or Vancouver.

Potential route corridors were identified by completing a search over a broad area between available start and end points to interface with existing infrastructure. An ideal 'straight line' route of interest between these points is identified so that key issues and constraints affecting the selection of the route can be plotted and assessed. Through this process, three potential route corridors were identified and evaluated. Also, as mentioned above in Section 4.1 of the Application, FEI's consultation and negotiations with the City of Burnaby regarding the route for the Project resulted in the identification of the fourth route option (Sperling Route). The description and evaluation of all four route corridors are provided in the sections below.

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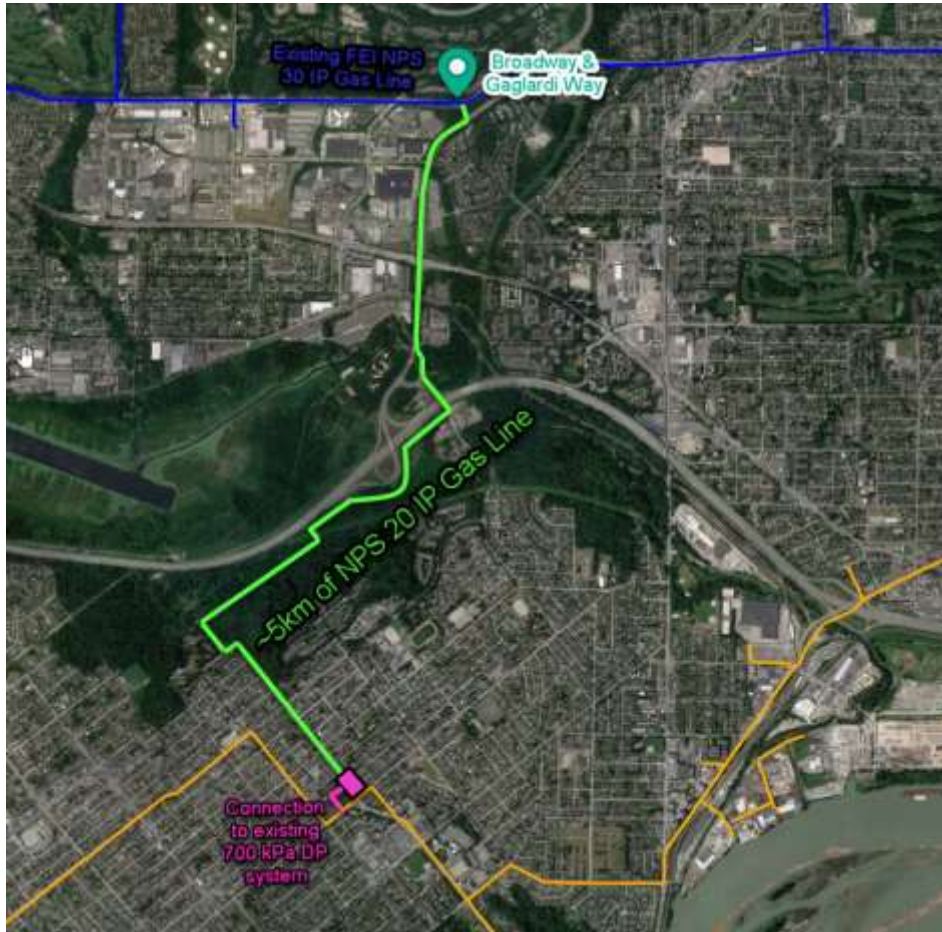
##### 4.4.1.1 Alternative 6A – Broadway and Gagliardi Way Corridor

As shown in Figure 4-9 below, the Broadway and Gagliardi Way Corridor option involves the installation of approximately 5 km of NPS 20 (508 mm) IP gas line in the City of Burnaby (see green line). The gas line would tie into the newly constructed NPS 30 (762 mm) Coquitlam to Vancouver IP gas line<sup>16</sup> at Broadway and Gagliardi Way. The IP gas line would then continue south towards the City of New Westminster and feed a new district station (shown in purple) to be located near the intersection of McBride Boulevard and 10<sup>th</sup> Avenue in the City of New Westminster. A short connection would be required between the district station outlet and the existing DP 700 kPa system. Refer to Figure 4-9 for a map of the corridor.

<sup>16</sup> BCUC Order C-11-15, dated October 16, 2015.



Figure 4-9: Map of Broadway and Gaglardi Way Route Corridor



#### 4.4.1.2 Alternative 6B – Cape Horn Gate Corridor

As shown in Figure 4-10 below, the Cape Horn Gate Corridor option involves the installation of approximately 8 km of NPS 20 IP gas line in the Cities of Coquitlam and Burnaby (see light blue line). A new TP/IP gate station (shown in yellow) would tie-in to the NPS 20 (508 mm) TP gas line within the Cape Horn Gate Station in the City of Coquitlam. The NPS 20 IP gas line would continue west to a new IP/DP district station (shown in purple) located near the intersection of McBride Boulevard and 10<sup>th</sup> Avenue in the City of New Westminster. A short connection would



be required between the IP/DP district station outlet and the DP 700 kPa system. Refer to Figure 4-10 for a map of the corridor.

**Figure 4-10: Map of Cape Horn Gate Route Corridor**



#### **4.4.1.3 Alternative 6C – Fraser Gate Corridor**

The Fraser Gate Corridor option involves the installation of approximately 7 km of NPS 20 (508 mm) IP gas line starting at Fraser Gate Station in the City of Vancouver (see yellow line) and continuing east to a new IP/DP district station (shown in purple) located near the intersection of Beresford Street and Buller Avenue in the City of Burnaby. A short connection would be required between the district station outlet and the DP 700 kPa system. Refer to Figure 4-11 for route map of the corridor.

**Figure 4-11: Map of Fraser Gate Route Corridor**



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#### 4.4.1.4 Alternative 6D – Sperling Avenue Corridor

As part of FEI's ongoing consultation and negotiation with the City of Burnaby, on July 31, 2020, City of Burnaby staff requested that FEI investigate Alternative 6D. FEI has now completed its investigation and analysis for Alternative 6D (the Sperling Route). The detailed route description and analysis is provided below in Section 4.4.4.2.

**Deleted:** At the time of filing this Application, FEI is investigating the feasibility of Alternative 6D. FEI will provide a description of this route in an evidentiary update, after it has consulted with the City of Burnaby and other stakeholders.

#### 4.4.2 Evaluation Of Alternatives 6A, 6B and 6C

Prior to the identification of Alternative 6D, FEI evaluated Alternatives 6A, 6B and 6C using non-financial and financial criteria.

The non-financial and financial evaluation criteria that FEI used to compare the three Overland Gas Line route corridors are listed below and discussed in detail in Sections 4.4.2.1 and 4.4.2.2 below.

##### 1. Non-Financial Criteria:

- Schedule Impacts
- Community, Indigenous and Stakeholder Impacts
- Environmental and Archaeological Impacts

##### 2. Financial Criterion:

- Levelized Delivery Rate Impact

Moved up [1]: Figure 4-11: Map of Fraser Gate Route Corridor



The replacement of FEI's distribution system resiliency was not included as a criterion in the Overland Gas Line alternatives evaluation as all three route corridors would erode the existing system resiliency by requiring other major gate stations in the system to provide the capacity previously provided by the Pattullo Gas Line. Alternatives 6A and 6C will shift the Pattullo Gas Line load onto Coquitlam Gate and Fraser Gate, respectively, consuming a portion of the available capacity in the Transmission pressure gas lines feeding these stations and the IP gas lines leaving these stations. Similarly, Alternative 6B erodes resiliency by either:

- Consuming a portion of the transmission gas lines' capacity feeding Coquitlam Gate, thereby effectively limiting the available supply from Coquitlam Gate station should Fraser Gate fail; or
- Consuming a portion of the available capacity at the gas lines into or out of Fraser Gate should the Port Mann crossing supplying Cape Horn and Coquitlam Gate stations fail.

As described in Section 3.6, this results in Coquitlam Gate and Fraser Gate being unable to support customers on cold winter days should either one of the stations be lost.

#### 4.4.2.1 Non-Financial

The following non-financial evaluation criteria were used to evaluate the three route corridors:

1. **Schedule Impacts:** the ability to ensure the new system will be in-service to meet the MoTI schedule, impacted by several factors including:
  - Estimated timelines for meaningful engagement to obtain the necessary permit approvals required for project execution; and
  - Estimated timelines for construction with regard to municipal bylaws which restrict working hours, traffic management staging as required by the City, working in and around existing third party utilities and construction methodologies.
2. **Community, Indigenous and Stakeholder Impacts:** each route corridor would have varying challenges that would affect the project from a cost and feasibility perspective including:
  - Community infrastructure along the route corridor directly impacted during construction such as schools, hospitals, recreation centres, etc.;
  - Private properties and businesses along the route corridors directly impacted during construction; and
  - Indigenous communities directly impacted by Project.

3. **Environmental and Archaeological Impacts:** each route corridor would have varying challenges that would affect construction and the continued long term operation of each route corridor including:

- Presence of federally and/or provincially at-risk species, critical habitat, fish-bearing watercourses, or fish habitat;
- Presence of unique habitats or greenspaces (e.g., wetlands, parks or forested areas); and
- Presence of known archaeological and/or heritage sites and relative importance to Indigenous groups (if known).

#### 4.4.2.2 Financial

The following financial criterion was used to evaluate three route corridors:

1. **Levelized Delivery Rate Impact:** Ability for an alternative to be completed with the lowest possible delivery rate impact over the approximate financial life of the asset (i.e., 68-year analysis period) for the PGR Project. Alternatives that minimize the levelized delivery rate impact to FEI's non-bypass customers score the highest.

FEI considered the long-term rate impact to FEI's non-bypass customers by financially comparing the present value (PV) of the incremental revenue requirement as well as the levelized delivery rate impact over the 68-year analysis period<sup>17</sup> for the three Overland Gas Line alternatives based on the estimated capital cost and operating cost. These cost estimates were based on information available in March 2020,<sup>18</sup> and are considered to be AACE Class 5 estimates. The cost estimates were benchmarked against the LMIPSU Project. The LMIPSU Project is a particularly relevant benchmark, as it was recently completed and faced similar urban construction challenges that would be expected for the three overland routes considered for the PGR Project. For a fair comparison, future replacement costs in terms of sustainment capital over the 68-year analysis period for each Overland Gas Line alternatives are included.

#### 4.4.2.3 Scoring and Weighting

Table 4-3 below shows the weighting applied for the PGR Project between non-financial and financial criteria, and also shows the weightings within the non-financial and financial criteria as described in Section 4.4.2 above. The weightings were determined through collaborative discussions with FEI's subject matter experts. In order to meet the stringent PGR Project schedule requirements driven by the Pattullo Bridge Replacement Project, FEI weighted

<sup>17</sup> The 68-year analysis period is based on 65 years of post-project analysis period plus three prior years for the estimated construction schedule of the Project from 2020 to 2023 (when all new assets are in-service by 2023). The 65-year post-project analysis period is chosen based on the average service life (ASL) for the distribution main pool asset account (which includes the intermediate pressure pipelines) as shown in FEI's 2017 Depreciation Study, approved by BCUC Order G-165-20 as part of FEI's 2020-2024 Multi-Year Rate Plan (MRP) Application.

<sup>18</sup> FEI's Class 5 cost estimate in this section for Alternative 6A does not take into account recent information gained from FEI's consultation and negotiations with the City of Burnaby over the course of 2020. Refer to Section 4.4.4.

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schedule impacts highest. For non-financial evaluation criteria, each overland alternative was scored by subject matter leads based on system analysis and experience of similar projects using a scale from 1 to 3 as defined in Table 4-4 below. For financial criteria, the Overland Gas Line alternatives (6A, 6B and 6C) were evaluated from the lowest levelized delivery rate impact to the highest using a scale from 1 to 3.

**Table 4-3: Weightings within Non-Financial and Financial Criteria**

Evaluation Criteria	Weighting
<b>Non-Financial</b>	<b>90%</b>
<ul style="list-style-type: none"> <li>Schedule Impacts</li> <li>Community, Indigenous and Stakeholder Impacts</li> <li>Environmental and Archaeological Impacts</li> </ul>	(54%) (22.5%) (13.5%)
<b>Financial</b>	<b>10%</b>
<ul style="list-style-type: none"> <li>Levelized Delivery Rate Impact</li> </ul>	

**Table 4-4: Non-Financial Evaluation Scoring Definitions**

Score	Impact Evaluation
<b>3</b>	Good Choice: Minimal concerns or risks with some positive impact
<b>2</b>	Acceptable Choice: Moderate concerns and risks; or medium positive impact
<b>1</b>	Poor Choice: Significant concerns or risks; no positive impact

#### 4.4.2.4 Non-Financial Evaluation Summary

Table 4-5 below provides a summary of the weighted scores and a rationale for this scoring against the non-financial evaluation criteria of Schedule Impacts, Community, Indigenous and Stakeholder Impacts, and Environmental and Archaeological Impacts. For reasons outlined in Table 4-5 below, Alternative 6A – Broadway and Gaglardi Way Route Corridor was found to be superior to Alternatives 6B and 6C based on the highest weighted score using all non-financial criteria. Furthermore, based on the significant schedule impacts (see reasons in Table 4-5 below), it was determined that Alternatives 6B and 6C would not meet Project schedule requirements and were therefore considered to be not feasible.

**Table 4-5: Non-Financial Evaluation Summary of Overland Gas Line Route Corridors**

Criterion	Alternative 6A: Broadway & Gaglardi Way Corridor	Alternative 6B: Cape Horn Gate Corridor	Alternative 6C: Fraser Gate Corridor
<b>Schedule Impacts</b>	<b>3</b>	<b>1</b>	<b>1</b>

Criterion	Alternative 6A: Broadway & Gagliardi Way Corridor	Alternative 6B: Cape Horn Gate Corridor	Alternative 6C: Fraser Gate Corridor
<b>(Weighting – 60%)</b>	<ul style="list-style-type: none"> <li>Project does not cross private land so no private land SRW negotiations are required</li> <li>Permitting required from one municipality</li> <li>Overall less congestion of third party utilities in route corridor compared to other alternatives</li> </ul>	<ul style="list-style-type: none"> <li>Requires negotiations with private landowners for RoW access and is expected to be a lengthy process</li> <li>Increased complexity and coordination required due to permitting from two municipalities</li> <li>High congestion of third party utilities along/near United Boulevard leading to increased complexity for construction</li> </ul>	<ul style="list-style-type: none"> <li>Requires negotiations with private landowners for RoW access and is expected to be a lengthy process</li> <li>Increased complexity and coordination required due to permitting from two municipalities</li> <li>High congestion of third party utilities along Buller Ave leads to increased complexity for construction</li> </ul>
<b>Community, Indigenous and Stakeholder Impacts</b>  <b>(Weighting – 25%)</b>	<p>3</p> <ul style="list-style-type: none"> <li>Less than 10 businesses potentially impacted</li> <li>Minimal impact to private lands</li> </ul>	<p>1</p> <ul style="list-style-type: none"> <li>More than 100 businesses potentially impacted</li> <li>Some impacts to private lands</li> </ul>	<p>1</p> <ul style="list-style-type: none"> <li>More than 50 businesses potentially impacted</li> <li>Significant impacts to private lands</li> <li>Impacts City of Vancouver without any system benefit to constituents</li> </ul>
<b>Environmental and Archaeological Impacts</b>  <b>(Weighting – 15%)</b>	<p>1</p> <ul style="list-style-type: none"> <li>Critical habitat for several at-risk species; however mitigation available through re-routing</li> <li>Several fish-bearing watercourses, including the Brunette River</li> <li>Crosses, or is located within close proximity to</li> </ul>	<p>1</p> <ul style="list-style-type: none"> <li>Intersects with Critical Habitat in surrounding multiple watercourse, within the Brunette River</li> <li>Several watercourses are red-coded (fish-bearing) creeks</li> <li>Potential for</li> </ul>	<p>3</p> <ul style="list-style-type: none"> <li>Low environmental interactions</li> <li>Low likelihood of impacting fish or fish habitat</li> <li>No known archaeological or heritage sites</li> </ul>

Criterion	Alternative 6A: Broadway & Gagliardi Way Corridor	Alternative 6B: Cape Horn Gate Corridor	Alternative 6C: Fraser Gate Corridor
	wetlands and riparian areas <ul style="list-style-type: none"> <li>Known archaeological site; however, mitigation available through micro-routing<sup>19</sup>,</li> <li>Known heritage site</li> </ul>	encountering contaminated soil, or water <ul style="list-style-type: none"> <li>Does not interact directly with any known archaeological or heritage sites</li> <li>Close proximity to known sites in New Westminster and proximity to Fraser River increases likelihood of chance finds</li> </ul>	
<b>Weighted Total<sup>1</sup></b>	<b>2.7</b>	<b>1.3</b>	<b>1.3</b>

Note:

<sup>1</sup> Weighted total is calculated for each alternative by multiplying the score for each criterion with its associated weighting and then summing the scores. The maximum possible weighted total is 3.

#### 1 4.4.2.5 Financial Evaluation Summary

2 Table 4-6 below shows the financial comparison between the three overland gas line route  
 3 corridors in terms of levelized delivery rate impact over a 68-year analysis period to FEI's non-  
 4 bypass customers. As discussed in Section 4.4.2.3, the Overland Gas Line alternatives  
 5 (Alternatives 6A, 6B and 6C) were evaluated financially from the highest levelized delivery rate  
 6 impact to the lowest using a scale from 1 to 3 (i.e., a score of 3 for the lowest levelized rate  
 7 impact), which is also shown in Table 4-6 below. Based on their financial evaluation, Alternative  
 8 6A: Broadway and Gagliardi Way Corridor has the lowest levelized delivery rate impact to FEI's  
 9 non-bypass customers.

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10 **Table 4-6: Financial Evaluation Summary**

	Alternative 6A: Broadway and Gagliardi Way Corridor	Alternative 6B: Cape Horn Gate Corridor	Alternative 6C: Fraser Gate Corridor
<b>Total Capital Costs, AACE Class 5, 2019 (\$ millions)</b>	122.2	184.3	167.3

<sup>19</sup> Micro-routing analysis will be conducted during the detailed design phase of the Project.

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	Alternative 6A: Broadway and Gagliardi Way Corridor	Alternative 6B: Cape Horn Gate Corridor	Alternative 6C: Fraser Gate Corridor
PV of Incremental Revenue Requirement <sup>20</sup> over <u>68</u> years (\$ millions)	125.6	189.6	171.2
Levelized Delivery Rate Impact over <u>68</u> years (in \$/GJ)	0.036	0.055	0.049
Average Residential UPC (in GJ/yr)	90	90	90
Average Residential Bill Impact per year over <u>68</u> years (in \$)	3.2	5.0	4.4
Financial Evaluation Score	3	1	2

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#### 1 4.4.2.6 Summary of Assessment of Alternatives 6A, 6B and 6C

2 The following Table 4-7 provides a summary of FEI's assessment of the three route corridors  
3 against all evaluation criteria.

4 Table 4-7: Overall Alternative Evaluation Summary

Criterion	Weighting	Alternative 6A: Score	Alternative 6B: Score	Alternative 6C: Score
Schedule Impacts	54%	3	1	1
Community, Indigenous and Stakeholder Impacts	22.5%	3	1	1
Environmental and Archaeological Impacts	13.5%	1	1	3
Rate Impact	10%	3	1	2
<b>Weighted Score:<sup>1</sup></b>	100%	2.73	1	1.37

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<sup>20</sup> The incremental revenue requirements have been discounted at the after tax cost of capital based on FEI's capital structure, rate of return, and income tax rate for 2021 as approved under BCUC Order G-319-20.

Note:

<sup>1</sup> Weighted total is calculated for each alternative by multiplying the weighted score for each criterion with its associated overall weighting, and then summing these scores. The maximum possible weighted total is 3.

FEI's evaluation of the three Overland Gas Line route corridors against the financial and non-financial weighted criteria (as shown in table above), the Broadway and Gagliardi Way Corridor had the overall least schedule, community, and financial impact based on AACE Class 5 capital cost estimates.

**4.4.3 Ongoing Consultation and Negotiation with City of Burnaby**

FEI first presented Alternative 6A to the City of Burnaby staff on February 11, 2020 and has continued to consult and negotiate with the City since that time. Over the course of 2020, FEI has discussed with the City the merits of the identified route in the Broadway and Gagliardi Way Corridor - the Gagliardi Route. On July 20, 2020 City of Burnaby Council passed a recommendation brought forward by the City's Finance Management Committee to "oppose the proposed FortisBC Pattullo Gas Line Replacement Project pipeline route through Burnaby".<sup>21</sup> On July 31, 2020, the City requested that FEI investigate a new route on Sperling Avenue in the City of Burnaby – the Sperling Route. FEI ~~investigated and developed~~ the Sperling Route ~~to an AACE Class 4 level of definition.~~

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**4.4.4 Evaluation of Feasible Alternatives: Gagliardi Route and the Sperling Route**

~~[see new section]~~

**Deleted:** Over the course of September 2020, FEI will be continuing to investigate the feasibility of the Sperling Route and whether it would be supported by the City of Burnaby. If it is feasible and supported by the City, the Sperling Route may be the most cost effective alternative for the Project. If the Sperling Route is determined not to be feasible or is not supported by the City, or is otherwise not preferred, then FEI anticipates that it will complete its Application based on the Gagliardi Route as its preferred route for the Project.¶ FEI will file the remainder of its alternatives analysis, including its determination regarding the preferred route for the Project, in an evidentiary update. ¶

<sup>21</sup> See Burnaby Council Minutes, Page 7 Section 4.8. Online: <https://pub-burnaby.escrimemeetings.com/FileStream.ashx?DocumentId=47967>

1 **5. PROJECT DESCRIPTION**

- 2 FEI will file Section 5 of the Application in an evidentiary update.

1 **6. PROJECT COST ESTIMATE**

- 2 FEI will file Section 6 of the Application in an evidentiary update.

1 **7. ENVIRONMENT AND ARCHAEOLOGY**

- 2 FEI will file Section 7 of the Application in an evidentiary update.

1 **8. CONSULTATION**

- 2 FEI will file Section 8 of the Application in an evidentiary update.

## 9. PROVINCIAL GOVERNMENT ENERGY OBJECTIVES AND LONG TERM RESOURCE PLAN

### 9.1 INTRODUCTION

This section discusses the factors that section 46(3.1) of the UCA states the BCUC must consider when determining whether to issue a CPCN:

- (a) the applicability of British Columbia's energy objectives,
- (b) the most recent long-term resource plan filed by the public utility under section 44.1, if any, and
- (c) the extent to which the application for the certificate is consistent with the applicable requirements under sections 6 and 19 of the *Clean Energy Act* (CEA).

Sections 6 and 19 of the CEA as referred to in (c) above, do not apply to FEI. FEI addresses the other two requirements below.

### 9.2 BRITISH COLUMBIA'S ENERGY OBJECTIVES

The Project will support the British Columbia energy objective in section 2(k) of the CEA "to encourage economic development and the creation and retention of jobs". The Project will support this objective by creating jobs and contributing to the local economy. The PGR Project will create jobs in BC through FEI's contractor, and result in the procurement of goods and services from locally owned and operated vendors and subcontractors. The increase in use of local dining and lodging accommodations during construction will also benefit the economy.

FEI will work with Indigenous and local leaders and organizations to develop the local workforce, support local businesses, and connect them to Project opportunities. For example, to promote Indigenous and other local participation in the Project, FEI will host business-to-business and worker-to-business networking events as appropriate, and where they can meet safety requirements associated with the COVID-19 pandemic. These events would facilitate introductions between Indigenous and other local business owners, members of the local workforce, and connect them to contract and employment opportunities.

### 9.3 LONG TERM RESOURCE PLAN

The PGR Project is described in Section 6.4 of FEI's most recently filed 2017 LTGRP. At the time of filing the 2017 LTGRP, MoTI (via TransLink) had indicated the existing bridge would be demolished and replaced by the end of 2021, and had directed FEI to remove its existing gas line by the end of 2021. Based on MoTI's current Pattullo Bridge replacement project schedule, demolition is now anticipated to proceed in 2023. Otherwise, the Project remains consistent with the 2017 LTGRP.



## 10. CONCLUSION

FEI submits that the PGR Project is in the public interest and should be approved.

As set out in Section 3 of the Application, it is clear that the PGR Project is necessary to replace the system capacity currently provided by the Pattullo Gas Line, which must be decommissioned. FEI must undertake the PGR Project to continue to provide safe and reliable natural gas service to customers residing in the communities of Burnaby, New Westminster and Coquitlam who rely on all or portion of their gas supply from the Pattullo Gas Line.

As described in Section 4 of the Application, FEI conducted a thorough evaluation of the alternatives for the PGR Project and has proposed a solution that meets the Project objectives and has the least impact in terms of technical design and scope complexity, cost, construction environmental, archaeological and societal impacts, and impacts to FEI's existing system capacity and resiliency. While a like-for-like replacement of the Pattullo Gas Line would have been desirable, MoTI rejected FEI's requests to attach a gas line on the New Bridge, and a trenchless crossing of the Fraser River was not feasible. Further, FEI's analysis of other alternatives demonstrated that an overland gas line was the only feasible alternative. FEI's evaluation of the Overland Gas Line route options showed that the route in the City of Burnaby has the least impact, and the only solution that can be implemented prior to the time when FEI must decommission the Pattullo Gas Line.

FEI completed its alternative analysis and determined that the Sperling Route is the preferred alternative for the Project. FEI has provided a detailed description of the PGR Project, including its cost and rate impacts, an evaluation of the potential environmental and archaeological impacts of the Project, as well as FEI's thorough consultation with stakeholders and Indigenous communities on the PGR Project.

The Company requests that the BCUC grant a CPCN for the PGR Project and approve the PGR Application and Preliminary Stage Development Costs deferral account as requested.

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