IN THE MATTER OF

FORTISBC ENERGY INC.

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY APPLICATION
FOR THE LOWER MAINLAND INTERMEDIATE PRESSURE SYSTEM
UPGRADE PROJECT

DECISION

October 16, 2015

Before:

D. A. Cote, Commissioner/Panel Chair
H. G. Harowitz, Commissioner
K. A. Keilty, Commissioner
N. E. MacMurchy, Commissioner
I. F. MacPhail, Commissioner

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EXECUTIVE SUMMARY

On December 19, 2014, FortisBC Energy Inc. (FEI, Company) filed its Application for a Certificate of Public Convenience and Necessity (CPCN) for the Lower Mainland Intermediate Pressure System Upgrade (LMIPSU) Projects which sought approval to construct and operate two intermediate pressure (IP) pipeline segments in the BC Lower Mainland to replace two existing segments (Application). The two projects are described as follows:

- A Nominal Pipe Size (NPS) 30" pipeline of approximately 20 km operating at 2070 kPa between Coquitlam Gate Station and the East 2nd Avenue & Woodland Station in East Vancouver to replace an existing NPS 20" pipeline (Coquitlam Gate IP Project);
- A small segment of NPS 30" pipeline between the Fraser Gate Station and East Kent Avenue and Elliot Street (Fraser Gate IP Project).

The Panel determines that the CPCN Guidelines have been met and finds the projects are in the public interest and grants a CPCN to FEI to construct and operate the Fraser Gate and Coquitlam Gate IP Projects as outlined in the Application and subsequent evidentiary update.

Coquitlam Gate IP Project

FEI submits that the existing pipeline is nearing the end of its expected service life as evidenced by the increasing frequency of gas leaks resulting from non-preventable active corrosion. After FEI's seventh reported leak, the Oil and Gas Commission (OGC) issued Order 2013-25 requiring the Company to complete and submit an assessment to the OGC. FEI's engineering assessment identified pipe replacement as the optimum solution as continuing the ongoing integrity and leak management as an alternative was unacceptable to the OGC. Based on the OGC's direction and the relative cost when compared to replacement, the Panel determines that replacement of the Coquitlam Gate IP pipeline is justified.

FEI reviewed five replacement alternatives with consideration given to three of these; Alternative 3 to replace in kind with NPS 20" at 1200 kPa, Alternative 4 to replace with NPS 24" at 2070 kPa and Alternative 6 to replace with NPS 30" at 2070 kPa. In addition to financial comparisons the key criteria considered in FEI's decision-making process was the ability to reduce risk, the provision of operational flexibility and full resiliency and constructability. The lowest cost solution is Alternative 3 with a capital cost estimate of $142.162 million based on a Class 4 estimate while the highest is Alternative 6 with a capital cost estimate of $199.053 based on a Class 3 estimate. The only alternative satisfying all of the criteria is Alternative 6 as it offers full resiliency and optimizes operational flexibility along with meeting all of the other criteria.

Pointing out that there is inherent uncertainty in developing 60 year forecasts and estimates of costs and being satisfied that the additional benefits are sufficient to justify the added costs, the Panel accepts Alternative 6 as the preferred alternative.

The route selection criteria are set out under four categories; community and stakeholders, environmental, technical and cost with a weighting attached to all non-financial criterion. This allowed a cumulative weighted score to be tabulated and ranking of route options informing the analysis required to select a preferred route. In

addition, FEI undertook to consult with residents and stakeholder groups. Residents and the City of Burnaby raised concern regarding the preferred route that had excluded Lougheed Highway. This resulted in further consultation being undertaken leading to an assessment that traffic disruptions along the Lougheed Highway were acceptable. Consequentially, the route was adjusted to accommodate the concerns raised. The Panel approves the revised proposed route and finds the route selection process has been sufficient.

The Panel agrees with FEI that trenchless construction should be used in certain circumstances but notes that sufficient evidence has not been provided to demonstrate that trenched construction is not possible or trenchless construction is necessary to minimize surface impact at identified crossing locations. The Panel directs FEI to report the following:

- The findings of more detailed site investigations and further justification of the construction method prior to commencement of construction at each crossing.
- The findings of detailed sub-surface investigations and once complete, an update of the project execution capital cost summary estimate.

FEI states the total anticipated cost of the Coquitlam Gate IP pipeline project is expected to be $242.825 million including Allowance for Funds Used During Construction (AFUDC) and abandonment costs equating to an annual impact of $11.40 annually in 2019 for a normal residential customer. FEI's estimate is based on AACE Class 3 level of project definition with the selection of contingency supported by a formal risk analysis. In addition to the capital costs there are application costs of $1.047 million and development costs of $2.382 million to be split between the two LMIPSU projects. FEI has requested deferral accounts for preparation of this Application and for development costs. The Panel finds the estimated project cost for the Coquitlam Gate IP Pipeline meets CPCN Guidelines and in addition approves the two requested deferral accounts.

Fraser Gate IP Project

FEI identifies the Fraser Gate IP pipeline serving approximately 171,000 customers as vulnerable to failure "due to [a] less than 1:2475 year seismic-induced ground movement event." FEI proposes to replace a 500 metre (subsequently reduced to approximately 280 metres) section of NPS 30" pipeline in the area of the Fraser Gate Station as it does not meet FEI's seismic criteria of resistance to a 1:2475 year event. As evidence FEI presented the results of third party studies including a seismic study, a loss of supply risk assessment and economic consequence analysis resulting from a hypothetical gas service interruption.

The Commercial Energy Consumers of British Columbia accepts the primary need for the Fraser Gate IP Project is for seismic vulnerability and acknowledges a full bore rupture due to a seismic event would require a complete shutdown with the potential for public safety and economic consequences. The British Columbia Old Age Pensioners' Organizations *et. al.* does not support Commission approval of the project stating there is no urgent need established to complete the project in the proposed timeframe and it can be deferred "for an extended period of time." The Panel finds that FEI has justified the need for the Fraser Gate IP Project noting that none of the interveners disputed FEI's evidence that the pipeline is vulnerable to failure in the event of a 1:2475 year seismic-induced ground movement event and its conclusion that this is a safety risk to its ratepayers. Further, the Panel is persuaded that the application of a 1:2475 seismic design criteria for the Fraser Gate IP Pipeline is appropriate.

FEI's proposed route has been reduced to 280 metres in length due to further study of soil conditions and seismic susceptibility. The Panel approves the new shorter route as proposed by FEI noting that FEI has properly assessed potential options and proposes a revision that was less disruptive to residents at a forecast cost that was significantly lower than initially proposed.

The forecast cost of the Fraser Gate IP pipeline project is $8.990 million in as spent dollars including AFUDC. This amounts to an annual 2019 bill impact of $.40 per typical residential customer. Estimates were based on AACE Class 3 level of project definition with the selection of contingency supported by a formal risk analysis. The Panel finds that the additional security resulting from the proposed pipeline upgrade justifies the cost and approves the project cost estimates.

Other Considerations

Other considerations addressed within the Decision included environmental, archaeological and socio-economic assessments, provincial government energy objectives, consultation processes and PBR base capital and O&M considerations. Most contentious of these is related to PBR base capital considerations where the issue arose as to whether the costs for Fraser Gate IP Project should be applied against FEI's base capital or whether it should be considered to be part of one project along with the Coquitlam Gate IP Project. The Panel identified two questions the Commission needs to consider:

1. Should the Fraser Gate IP and Coquitlam Gate IP Projects be grouped together? And, if so.
2. Should the Capital Exclusion Criteria Decision be applied to this Application?

The Panel finds there is some justification for combining the two projects under a single CPCN as there are potential regulatory savings. However, the Panel also finds that the projects are discrete and coordinating and managing them simultaneously does not require them to be part of the same CPCN. Given the lack of a definitive answer on this issue the Panel defers a determination on this matter to a future FEI PBR Annual Review where additional evidence can be presented and the parties given an opportunity to deal with this in the context of other PBR issues. As there is no determination on the first issue, the Panel considers there to be little value in examining whether the Capital Exclusion Criteria Decision should be applied.

In consideration of FEI's submissions with respect to the need for timely reporting on the progress of the CPCN the Panel established a reporting regimen with three elements:

- Quarterly Progress Reports starting in March 2016 outlining actual costs incurred to date, an updated forecast of costs and the status of project risks.
- Material Change Reports identifying and detailing any significant delays or cost variances and the reasons for the delay or material cost variance and FEI's consideration of potential options to address the issue.
- A Final Report including a breakdown of the final project costs compared to Application cost estimates with an explanation and justification of any material cost variances.

1.0 INTRODUCTION

1.1 The projects

FortisBC Energy Inc. (FEI, Company) filed its Application for a Certificate of Public Convenience and Necessity (CPCN) for the Lower Mainland Intermediate Pressure System Upgrade (LMIPSU) Projects (Application) on December 19, 2014. The Application seeks approval to construct and operate two intermediate pressure (IP) pipeline segments in the BC Lower Mainland to replace two existing segments. The first of these is a new Nominal Pipe Size (NPS) 30" IP pipeline operating at 2070 kilopascals (kPa) between Coquitlam Gate and the East 2nd Avenue & Woodland Station in East Vancouver, to replace approximately 20 kilometres (km) of existing NPS 20" pipeline which is nearing the end of its useful life (Coquitlam Gate IP Project). The second is to replace a small segment of NPS 30" pipeline between Fraser Gate Station and East Kent Avenue and Elliot Street (Fraser Gate IP Project) in South Vancouver for seismic upgrade reasons.

1.2 Approach to the decision

This decision has been separated into six sections.

Section 1 provides background and outlines the approvals to be addressed in the sections that follow.

Section 2 addresses the Coquitlam Gate IP Project providing a determination on the need for the project, an evaluation of alternatives to replace the existing pipeline and an outline of FEI's proposal for project design, construction and management.

Section 3 is similar to Section 2 but addresses these topics with specific reference to the Fraser Gate IP Project.

Section 4, titled 'Other Considerations', deals with the many issues which have been raised within the proceeding that require Panel review and determinations. Included among these are discussions on the consultation processes, the impact of these projects in terms of performance based rate-making (PBR) base capital considerations, environmental, archaeological and socio-economic assessments and Provincial Government Energy Objectives. Many of these issues apply to both the Coquitlam Gate and the Fraser Gate projects and have been included here to avoid unnecessary repetition in Sections 2 and 3.

Section 5 includes a Panel determination of the requested CPCN for the two pipeline projects.

Section 6 summarizes the Project reporting requirements.

1.3 The applicant

FEI is a wholly-owned subsidiary of FortisBC Holdings Inc., a wholly-owned subsidiary of Fortis Inc. It is incorporated under the laws of the Province of British Columbia. As the largest natural gas distribution utility in the province, it provides residential, commercial and industrial customers in more than 100 BC communities

with sales and transportation services. The Company operates over 42,200 km of natural gas transmission and distribution mains and service lines serving approximately 950,000 customers throughout the province.[1]

1.4 Approvals sought

Pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA), FEI has applied to the British Columbia Utilities Commission (the Commission, BCUC) for a CPCN to construct and operate two IP pipelines within the Vancouver Lower Mainland to replace existing segments. Specifically, the Company seeks approval to:

1. Construct and operate a new NPS 30" pipeline operating at 2070 kPa between Coquitlam Gate Station and East 2nd Avenue & Woodland Station to upgrade and replace an existing NPS 20" pipeline operating at 1200 kPa; and
2. Construct and operate a new NPS 30" pipeline operating at 1200 kPa between Fraser Gate Station and East Kent Avenue & Elliott Street to upgrade and replace an existing NPS 30" pipeline.[2]

Estimated capital costs for these projects as originally applied for total $262.184 million; $244.076 million for the Coquitlam Gate IP Project and $18,107 million for the Fraser Gate IP Project. The estimated costs are in as spent dollars and include Allowance for Funds Used During Construction (AFUDC) as well as abandonment/demolition costs. These amounts were adjusted downward to a total of $251.815 million in as spent dollars primarily due to a reduction in scope of the Fraser Gate IP Project resulting in savings of $9.1 million.[3]

In addition, FEI seeks approval of two new deferral accounts under sections 59-61 of the UCA to allow for deferral treatment of an estimated $1.047 million in costs for preparing this Application and $2.382 million in development costs. The Company proposes that both LMIPSU Application and development costs be included in rate base and amortized over three years, commencing January 1, 2016.[4]

1.5 Regulatory process

Following the filing of the Application on December 19, 2014, the Commission by Order G-1-15 dated January 5, 2015, issued a preliminary Regulatory Timetable which included a workshop and a procedural conference. At FEI's request the Commission, by letter on February 5, 2015, delayed the procedural conference until an evidentiary update and the responses to the first round of Information Requests (IRs) had been filed. On March 31, 2015, following submissions by the parties, the Commission anticipating an evidentiary update by April 30, 2015, issued a further Regulatory Timetable covering a second round of IRs. Parties were also provided an opportunity for submissions on the need for additional process subsequent to responses to the second round of IRs. On July 6, 2015, the Commission issued a Panel IR and determined that following responses to the second IR it would be appropriate to move to written argument and issued a timetable. FEI completed the review process by filing its Reply Argument on August 14, 2015.

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[1] Exhibit B-1, p. 13.
[2] Exhibit B-1, p. 1.
[3] Exhibit B-1-6, p. 3.
[4] Exhibit B-1, p. 1; Exhibit B-1-6, p. 4.

There were five registered interveners. Some did not actively participate in all parts of the regulatory process. The registered interveners were:

- Commercial Energy Consumers of British Columbia (CEC);
- Canadian Pipeline Advisory Council (CPAC);
- British Columbia Old Age Pensioners' Organization *et. al.* (BCOAPO);
- Frank Ong (representing residents of Highlawn Drive); and
- City of Burnaby.

2.0 COQUITLAM GATE PROJECT

2.1 Project description and key issues

As noted in Section 1.1, the Coquitlam Gate IP Project proposed by FEI involves the installation of approximately 20 km of NPS 30" pipeline operating at 2070 kPa between Coquitlam Gate Station and East 2nd Avenue & Woodland Station, to upgrade and replace an existing NPS 20" pipeline operating at 1200 kPa.[5] FEI submits that the existing pipeline, installed in 1958, is nearing the end of its expected service life as evidenced by the increasing frequency of gas leaks resulting from non-preventable active corrosion beneath disbonded field-applied coating at girth welds.[6] FEI submits that replacement of the existing pipeline is required to address this integrity related risk.[7]

The Coquitlam Gate IP Project as proposed by FEI will also provide operational flexibility and system resilience.[8] FEI submits that the requirement to replace the existing pipeline has provided a cost effective opportunity to restore operational flexibility and resiliency to the Metro Vancouver IP system through an increase in pipeline capacity in the Coquitlam Gate IP pipeline.[9]

The total capital cost of the replacement alternative proposed by FEI for the Coquitlam Gate IP Project, based on an AACE International (AACE) Class 3 estimate, is forecast to be $242.825 million in as spent 2014 dollars, including AFUDC of $12.351 million and abandonment/demolition costs of $4.169 million.[10] The impact to customer rates in 2019 (when the asset enters rate base) is approximately $0.12 per GJ or $11.40 per year for an average residential household and levelized over the 60 year analysis period is approximately $0.10 per GJ.[11]

The key issues to be addressed in determining whether the proposed Coquitlam Gate IP Project "is necessary for the public convenience and properly conserves the public interest"[12] are as follows:

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[5] Exhibit B-1, p. 1.
[6] Exhibit B-1, p. 17.
[7] FEI Final Argument, p. 2.
[8] FEI Final Argument, p. 3.
[9] Exhibit B-1, p. 29.
[10] Exhibit B-1-6, p. 13.
[11] Ibid., pp. 25–26.
[12] Section 45(8) of the UCA.

- Is the status quo of ongoing integrity and leak management sufficient, or does the safety risk require either rehabilitation or replacement of the existing pipeline?
- If the status quo is not acceptable, is rehabilitation a feasible and cost effective response?
- If replacement is required, do the benefits of restoring operational flexibility and providing resiliency outweigh the incremental costs of achieving them?
- Are the proposed project design, route selection, construction methodology, cost and schedule appropriate?

2.2 Project need

2.2.1 Description of the problem

In the Application, FEI states that the Coquitlam Gate IP pipeline is nearing the end of its service life due to an unacceptable frequency of gas leaks resulting from non-preventable active corrosion and based on a third party engineering assessment indicating that leak prevention cannot be effectively managed by maintenance activities.[13] FEI submits that rehabilitation will not fully address pipeline risk[14] and to address safety and regulatory concerns the pipeline requires replacement.[15]

2.2.2 Is rehabilitation or replacement of the Coquitlam Gate IP pipeline required?

FEI estimates the cost of rehabilitation of the existing Coquitlam pipeline to be $154 million in 2014 dollars. It has based this amount on an estimated 1,667 digs (every 12 metres) at an average cost of $92,200 per site. A replacement of the existing Coquitlam Gate NPS 20" pipeline operating at 1200 kPa is estimated to cost $142.1 million based on an AACE International (AACE) Class 4 project cost capital estimate.[16]

FEI justifies rejecting the status quo of ongoing integrity and leak management in favour of rehabilitation or replacement of the Coquitlam Gate IP pipeline as follows.

Leak history

The existing Coquitlam Gate IP pipeline was constructed in 1958 and since 1987 has experienced 15 instances where leaks have occurred due to non-preventable corrosion, seven of which occurred in 2013.[17] Review of the available data has not identified any factors other than the passage of time that would have contributed to the higher number of leaks on the Coquitlam Gate IP pipeline in 2013.[18] All leaks have occurred under the field applied coating at construction girth welds[19] over the entire length of the pipeline.[20]

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[13] Exhibit B-1, pp. 28–29.
[14] Exhibit B-11, BCUC IR 2.1.1.
[15] Exhibit b-1, pp. 28–29.
[16] Exhibit B-1, pp. 33–34.
[17] Exhibit B-1, p. 17; Exhibit B-4, BCUC IR 1.1.1, 1.1.1.5.
[18] Exhibit B-4, BCUC IR 1.1.1.5.
[19] Exhibit B-1, p. 17; Exhibit B-4, BCUC IR 1.1.1.
[20] Exhibit B-6, CEC IR 1.8.4.1.

Leak assessment

Based on its assessment, FEI submits that leaks on the Coquitlam Gate IP pipeline will continue and are expected to occur with increasing frequency. FEI's assessment is based on the following:

- Third party engineering assessments conclude that leak prevention cannot be effectively managed by maintenance activities. In response to an Oil and Gas Commission (OGC) order requiring FEI to conduct an engineering assessment of the pipeline,[21] FEI retained Dynamic Rick Assessment Systems Inc. (DRAS) to provide a quantitative reliability assessment of the Coquitlam Gate IP pipeline using excavation based data completed by FEI.[22] The Pipeline Quantitative Reliability Assessment Report completed by DRAS showed that while the probability of rupture is insignificant, the probability of failure by leak will escalate by 3.7 through the period 2013-2033.[23]
- Results of excavation and inspection of a total of 38 girth welds along the length of the existing NPS 20" Coquitlam Gate IP pipeline, including the 15 leak locations found that 74 percent have coating disbondment of the field-applied girth welds.[24] FEI submits that given sufficient time, it is expected future leaks will be distributed along the entire pipeline length.[25]
- The occurrence of cathodic protection (CP) shielding preventing CP currents from reaching the surface of pipe under disbonded coating resulting in the CP being ineffective in mitigating corrosion growth and leak prevention.[26]
- Above ground techniques in locating areas of disbondment are ineffective.[27]
- The use of in-line inspection, including tethered in-line inspection, is not viable because of low operating pressures and the expected presence of inside diameter restrictions.[28]
- Inability to practically or cost effectively modify the environment surrounding the pipeline to control the existence of groundwater and migration.[29] The corrosion rate under disbonded coating appears to correlate to the presence of ground water, and ground water existence and migration are not considered controllable factors along the length of the Coquitlam Gate IP pipeline.

Safety and risk management

FEI describes that the safety risk associated with increasing leak occurrence and risk of gas migration and accumulations in public areas is currently being managed through mitigation measures such as odourization, frequent leak surveys, and leak response.[30] FEI's position is that frequent leak detection minimizes but does not

[21] Exhibit B-1-1, Appendix 2, p. 3.
[22] Exhibit B-1, p. 26.
[23] Exhibit B-1-1, Appendix A-1.
[24] Exhibit B-4, BCUC IR 1.1.1.7, 1.2.2; Exhibit B-6, CEC IR 1.8.4.1.
[25] Exhibit B-4, BCUC IR 1.1.1.7, 1.2.2; Exhibit B-6, CEC IR 1.70.3.
[26] Exhibit B-1, p. 17; Exhibit B-4, BCUC IR 1.2.2.
[27] Exhibit B-1, p. 17.
[28] Exhibit B-4, BCUC IR 1.2.3; Exhibit B-11, BCUC IR 2.2.2; Exhibit B-14, CEC IR 2.8.1.1.
[29] Exhibit B-4, BCUC IR 1.1.1.7.2, BCUC IR 1.1.1.7.3.
[30] FEI Final Argument, para. 17.

eliminate the potential for gas migration and accumulation that could result in material safety concerns [31] and if a sufficient amount of gas accumulates and a source of ignition is present, the gas can ignite or explode, which presents a safety risk to those in proximity. [32]

In response to BCUC IR 1.1.3, FEI states that if natural gas accumulates to the point where the ratio of natural gas to air is in the range of 5 percent to 15 percent, there is a risk of explosion. FEI states that through active management of natural gas leaks it is able to mitigate safety concerns along the Coquitlam Gate pipeline. However, it acknowledges that this minimizes but does not eliminate potential gas migration and accumulation and related materiality concerns. FEI reports that "past leak response records indicate one occurrence of natural gas inside a storm sewer, and one occurrence of natural gas mitigation into a nearby building." [33]

Oil and Gas Commission considerations

After FEI's seventh reported leak in 2013, the OGC issued Order 2013-25 [34] on October 30, 2013, requiring FEI to, among other things, complete and submit an engineering assessment to the OGC. In its reasons for the order, OGC stated "the subject pipeline may pose a risk to public safety and the environment." [35] FEI's engineering assessment prepared in response to this order identified pipe replacement as an integral part of FEI's plan to maintain compliance with the *Oil and Gas Activities Act* (OGAA). [36] In its response to the OGC, FEI committed to pursuing replacement as the means to meeting the OGC requirements, subject to CPCN approval by the BCUC. [37]

In response to BCUC IR 2.1.1, the OGC states that it would not accept leak survey, leak detection and repair as a means to prevent spillage and that increased leak survey frequency is expected to reduce the consequence associated with a spillage but not prevent future leaks. [38] The OGC cites section 37(3) of the OGAA which requires that permit holders, aware that spillage is likely to occur, must make reasonable efforts to prevent or assist in containing or preventing spillage. [39] Further, the OGC states that for a permit holder to meet its regulatory obligations, it must demonstrate that the increased leak survey frequency is sufficient to ensure that the pipeline can continue to remain in service and not present undue risk to the public or the environment until the replacement line is commissioned. The OGC concludes that "it is not desirable to delay replacement until a pipeline is inoperable." [40]

FEI submits that the status quo of continuing ongoing integrity and leak management is not an appropriate alternative as it will not address the reliability, safety, or regulatory concerns associated with the unacceptable projected frequency of gas leaks. [41] FEI submits that this alternative may eventually put FEI in a position where it is no longer able to prevent, remediate the cause or contain and eliminate spillage which is required of a permit

[31] Exhibit B-4, BCUC IR 1.1.1.3.
[32] Exhibit B-6, CEC IR 1.72.1.
[33] Exhibit B-4, BCUC IR 1.1.3.
[34] Exhibit B-1-1, Appendix A-2.
[35] Exhibit B-1, p. 18.
[36] Exhibit B-1-1, Appendix A-3.
[37] Exhibit B-6, CEC IR 1.26.2.
[38] Exhibit B-11, BCUC IR 2.1.1, Attachment 1.1.
[39] Ibid.
[40] Ibid.
[41] FEI Final Argument, para. 47.

holder under section 37(1) of the OGAA.[42] Further, FEI has committed to replacement of the pipeline as an integral part of its response to OGC Order 2013-25 and not undertaking pipe replacement could result in the OGC finding that FEI has failed to comply with a provision of the OGAA.[43]

Intervener submissions

CEC submits that it is imperative that FEI provide a robust solution to address the OGC requirements and continued maintenance is not an acceptable option to the OGC in the long term.[44]

BCOAPO submits that the status quo is not acceptable to the OGC and carries some risk to public safety.[45]

Commission determination

The Panel finds that FEI has justified the need to rehabilitate or replace the Coquitlam Gate IP pipeline.

The Panel accepts that repair or rehabilitation of the Coquitlam Gate IP pipeline is required to address pipeline integrity issues resulting from increased frequency of actual and projected gas leaks due to non-preventable corrosion. Further, the Panel agrees that rehabilitation or replacement is required to ensure FEI is compliant with OGC requirements to prevent, remediate the cause or contain and eliminate spillage as required of a permit holder under section 37(1) of the OGAA.

2.2.3 Is rehabilitation of the existing pipeline feasible and cost effective?

FEI outlines that rehabilitation of the existing pipeline requires proactively excavating each girth weld location along the pipeline (approximately 1700 in total), inspecting for corrosion and repairing where necessary. In addition, multiple digs may be required to locate each weld as there are no technical methods to identify girth weld locations from above ground and some sections of the pipeline have increased depth of cover resulting in welds which are unusually deep making them extremely difficult to access.[46] FEI concludes that without excavating and inspecting the entire pipeline there will be some remaining pipeline risk.[47]

Consistent with FEI's position, in response to BCUC IR 2.1.1, Attachment 1, the OGC makes the following statement in its letter to FEI:

> Assuming the rehabilitation work is to dig up and inspect EVERY weld, this option would be considered by the OGC. FortisBC Energy Inc. (FEI) would also have to demonstrate that the rest of the pipeline is fit for service and continue the increased frequency leak survey on uninspected sections of the pipeline, until all the welds have been inspected and repaired where necessary. This approach is based on no increased leak frequency or size of leak being detected.[48]

[42] Exhibit B-1, p. 32.
[43] Ibid.
[44] CEC Final Argument, p. 6.
[45] BCOAPO Final Argument, p. 5.
[46] Exhibit B-1, p. 33.
[47] Exhibit B-11, BCUC IR 2.1.2.
[48] Exhibit B-11, BCUC IR 2.1.3.

FEI expects that the work to rehabilitate the Coquitlam Gate IP pipeline would take three to four years[49] and the estimated cost is in the range of $154 million in 2014 dollars.[50]

While constructible at significant expense, FEI submits that rehabilitation is not a feasible alternative because it does not fully address pipeline risk.[51]

Intervener submissions

CEC submits that it has evaluated the issue and, using its judgement of these factors, submits there is adequate justification for replacement of the pipeline.[52] CEC further submits "rehabilitation is technically challenging and may miss areas that require repair. Since the pipeline has already exceeded its expected life of 50 years, it is reasonable to assume that rehabilitation focused on the girth welds, and potentially misses some, and may not result in the longevity that might be provided by a new pipeline."[53] CEC also raises the concern that there is still some chance of the failure of the pipeline rehabilitation resulting in the requirement to replace the pipeline in the future.[54]

BCOAPO submits that rehabilitation is eliminated as an option because it is more expensive than replacing it with new equivalent pipe without fully mitigating potential future corrosion leaks.[55]

Commission determination

The Panel finds that the need to replace the Coquitlam Gate IP pipeline is justified.

While rehabilitating the Coquitlam Gate NPS 20" pipeline would be considered by the OGC, it would require that every weld be inspected. Moreover, FEI would also have to demonstrate that the rest of the pipeline was fit for service and, in addition, continue the increased survey on uninspected sections of the pipeline. No cost estimates have been provided to satisfy these provisions. Further, FEI has based its estimate on a dig occurring every 12 metres in spite of the fact that it has no technical methods to identify weld girth locations from above the ground. FEI acknowledges that multiple digs may be required to locate each weld. Based on this, the Panel places little weight on the FEI estimates for the number of required digs and resultant costs to rehabilitate the pipeline. Given this uncertainty and the fact that replacement in-kind with a new NSP pipeline operating at 1200 kPa has a lower estimated cost than rehabilitation of the existing pipeline, the Panel is persuaded that replacement of the existing pipeline is a more cost effective choice than rehabilitation of the existing pipeline.

2.3 Evaluation of replacement alternatives

Given the Coquitlam Gate IP pipeline's unpreventable corrosion and unacceptable frequency of leaks projected, FEI states that it has reliability, safety and regulatory risks. It also asserts that the pipeline capacity is not

[49] Exhibit B-6, CEC IR 1.27.1.
[50] Exhibit B-1, p. 34.
[51] FEI Final Argument, p. 19.
[52] CEC Final Argument, p. 6.
[53] Ibid.
[54] Ibid., p. 5.
[55] BCOAPO Final Argument, p. 5.

sufficient to back feed the Fraser Gate IP pipeline thereby providing operational flexibility or resiliency to the Metro IP system. Accordingly, it has identified the objectives of the Coquitlam Gate IP project as follows:

- Elimination of the elevated reliability, safety and regulatory risk of the existing pipeline.
- The provision of enough operational flexibility allowing for planned repairs and maintenance of the Fraser Gate IP pipeline.
- Provision of full system resilience allowing for supply to both the Coquitlam Gate and Fraser Gate IP pipelines from either of their respective stations 365 days a year.
- Address operational, safety and constructability factors to allow for space to work around existing structures.[56]

FEI identifies five pipeline replacement alternatives each of which varies in size or operating pressure. All of these would satisfy the objective of eliminating the reliability, safety and regulatory risk posed by the existing pipeline.[57] FEI states that it also considered the criteria requiring that at a minimum the pipeline design capacity had to "meet forecasted design degree day load (i.e. peak demand) for the 20 year planning period."[58]

- Alternative 3: Replace (in-kind) with NPS 20" at 1200 kPa
- Alternative 4: Replace with NPS 24" at 2070 kPa
- Alternative 5: Replace with NPS 36" at 1200 kPa
- Alternative 6: Replace with NPS 30" at 2070 kPa
- Alternative 7: Replace with NPS 42" at 1200 kPa

FEI eliminates Alternative 7 from further consideration, having identified prohibitive construction constraints associated with the installation of NPS 42" pipeline along the more densely developed sections of the route, and hence, provides no cost estimates for this alternative.[59] For the remaining four alternatives, FEI provides the following capital cost estimates:

Table 1 Capital Costs ($2014 millions)[60]

	Class 4	Class 3
Alternative 3	142.162	
Alternative 4	179.671	191.952
Alternative 5	205.448	
Alternative 6	201.282	199.053

[56] Exhibit B-1, p. 30.
[57] Ibid., p. 31.
[58] Exhibit B-4, BCUC IR 1.5.1.4; Exhibit B-1, p. 31.
[59] Exhibit B-1, p. 39.
[60] Ibid., B-1, p. 34, 36; Exhibit B-11, p. 49.

The least-cost option was Alternative 3. Worthy of note is that Alternative 3 and Alternative 5 are based on AACE Class 4 estimates (1 percent to 15 percent project definition) while Alternatives 4 and 6 were based on AACE Class 3 estimates (10 percent to 40 percent project definition).[61]

FEI states that the need to replace the pipeline presents a unique one-time opportunity to install additional capacity that would address two important objectives of operational flexibility and system resiliency.[62]

FEI presents its assessment of the relative merits of each alternative based on non-financial and financial factors, where operational flexibility and system resiliency figure prominently in the discussion of non-financial factors. The financial discussion incorporates the notion of operational risk, measuring the potential loss-of-service impact under each alternative.

2.3.1 Pipeline Design Load Methodology

FEI submits that it is designing the Coquitlam Gate IP Project to meet design peak hour demand[63] as it uses peak hour demand as a design basis in all distribution systems, including IP systems.[64] FEI explains: "For distribution systems, because of generally smaller pipe sizes and lower operating pressures there is insufficient gas contained within the pipeline (line-pack) to adequately support the hourly variations in demand. As a result, design capacity supports peak hour demand."[65]

FEI explains it determines peak hour demand using billing and temperature information from the preceding two year period. For customers billed monthly, daily demand versus mean daily temperature values are determined (or, when available, daily or hourly measurement data is used). Next, a linear regression is performed. The peak day demand for customers in the Metro IP system equates to a design degree day of -13 C mean daily temperature. The design degree day (DDD) peak demand values are then converted to an hourly demand by applying a peak hour factor (PHF). The PHF applied in models of the Lower Mainland region has remained consistent at 0.060 since 2005.[66] The peak hour demand for each customer is inserted into a network hydraulic model and it is placed at the point in the FEI network where the customer is located.[67]

FEI determines each community's annual peak hour load[68] increment by summing the product of each core rate class' account additions forecast for that year by the regional peak hour use per customer (UPC) for that rate class.[69] Peak hour UPC is assumed to remain constant over the 20 year planning period.[70]

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[61] Exhibit B-4, BCUC IR 1.20.1; Exhibit B-17, Panel IR 1.2.1.
[62] Exhibit B-1, p. 6.
[63] Exhibit B-4, BCUC IR 1.5.1.2.
[64] Ibid., BCUC IR 1.5.1.
[65] Ibid.
[66] Exhibit B-11, BCUC IR 2.8.1.3.
[67] Exhibit B-4, BCUC IR 1.5.1.
[68] Exhibit B-11, BCUC IR 2.9.1.
[69] Exhibit B-4, BCUC IR 1.5.1.
[70] Ibid., BCUC IR 1.6.6.

FEI submits that its network hydraulic models of the Metro IP system are built from current assessments of peak hour demand and these were used to determine the effectiveness of various Coquitlam Gate IP pipeline alternatives. FEI explains its modelling software can determine the expected flow and pressure at any point in the system and determine the impacts of changes to piping or station configurations.[71]

Intervener submissions

CEC submits that it has reviewed the evidence regarding load determination methodology and finds it to be appropriate. CEC recommends that the Commission accept and apply in its deliberations the FEI Load determinations.

Commission determination

The Panel accepts the load forecasting methodology as presented by FEI noting that it is consistent with past practice and its reliability has not been questioned by any of the parties.

2.3.2 Operational flexibility

FEI describes operational flexibility as "the ability to isolate a section of pipeline as required for planned or scheduled maintenance without impacting supply to customers."[72]

FEI summarizes the need to increase operational flexibility as follows:

> For a significant part of the service life of the Metro IP system, there has been sufficient capacity to provide operational flexibility in the system such that during warmer periods, the system could be supported for some period without the primary supply from Fraser Gate station. This allowed FEI an operational window to interrupt the supply from Fraser Gate station to facilitate planned work on the Fraser Gate IP pipeline that requires isolation of the flow. Over time and with growth in demand on the system, this operational flexibility has been eroded such that currently the existing NPS 20 Coquitlam Gate IP pipeline cannot be relied on to support the Metro IP System at any time of year without some support from Fraser Gate station, through the Fraser Gate IP pipeline.[73]

FEI points out that in the past there were maintenance windows where work could be carried out without the need for bypass in all segments of the Coquitlam Gate and Fraser Gate IP pipelines. Due to load growth this maintenance flexibility has eroded over time and "pipeline segments immediately downstream of the Fraser Gate Station require bypass piping to be installed at all times of the year, and pipeline segments downstream of Coquitlam Gate will require bypass piping to be installed in winter conditions. Over time, the operational flexibility will continue to erode, making routine maintenance more complicated and costly to perform, with increasing impact on the public."[74]

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[71] Exhibit B-4, BCUC IR 1.5.1.
[72] Exhibit B-1, p. 20.
[73] Ibid.
[74] Exhibit B-1, pp. 21–22.

In IR responses, FEI indicates that under Alternative 3 (in-kind replacement):

- Anticipated costs related to using a bypass for maintenance on the Fraser Gate pipeline are in the magnitude of $0.8 million per occurrence;[75]
- A significant amount of integrity work requiring bypass installations would not be expected on the Coquitlam Gate pipeline;[76]
- There would still be a need for temporary bypasses to accommodate all maintenance and repair work on most of the segments of the Fraser Gate pipeline at all times of the year, including integrity related work, road lowerings and pipe relocations;[77] and
- Although not currently forecast in FEI's long-term capital plans, it is likely that over time the Fraser Gate pipeline mainline valves will require replacement for integrity reasons, which would also require bypasses to be used.[78]

2.3.2.1 System Resiliency

FEI describes system resiliency as providing "the ability to isolate a section of pipeline on an emergency basis without impacting supply to customers. Like operational flexibility, system resiliency is achieved by having pipeline loops or multiple sources of supply within a system."[79] In the Glossary of Terms FEI defines resilience as:

- Ability to rebound quickly in case of equipment failure.
- Robustness and recovery characteristics of utility infrastructure and operations, which avoid or minimize interruptions of service during an extraordinary and hazardous event.
- A resilient system has the capacity to avoid or minimize interruptions of service during planned activities and/or equipment failure.[80]

In the context of this Application, FEI summarizes the case for providing system resiliency as follows:

> Unlike operational flexibility, where temporary bypass piping can be used to prevent downstream supply shortfalls during planned maintenance, emergency repairs must be conducted by shutting in a section of pipeline using the inline valves as quickly as possible to minimize the potential impact of escaping gas. Where insufficient supply downstream of the isolated segment exists, customers will be interrupted. Examples of events that could result in emergency shut downs include: third party damage (punctures), corrosion leaks, equipment failure and geotechnical, hydrotechnical or seismic failures… [I]n the event supply is interrupted from either Fraser Gate or Coquitlam Gate Station, under peak demand, the system is capacity constrained and a rapid pressure collapse along the system would occur impacting as many as 171,000 of the currently connected customers.[81]

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[75] Exhibit B-4, BCUC IR 1.3.5.
[76] Exhibit B-5, BCOAPO IR 1.3.7.
[77] Ibid.
[78] Ibid.
[79] Exhibit B-1, p. 22.
[80] Exhibit B-1-1, Appendix F.
[81] FEI Final Argument, pp. 10–11.

> An economic impact study shows that a gas supply interruption as a result of an unplanned failure of the Fraser Gate IP pipeline could be in the order of three weeks and the economic impact to the general public, customers and the Company could be in excess of $320 million.[82]

FEI provides information on the extent to which each of Alternatives 4 through 6 provide full system resiliency in future forecast periods. Alternative 6 provides full resiliency for a 60-year period while the number of days where resiliency is not achieved with Alternative 4 will continue to increase over the next 60 years.

Table 2 Days in a Normal Year that Full Resiliency is not Achieved[83]

Year	Alternative 4 (NPS 24 @ 2070 kPa)	Alternative 5 (NPS 36 @ 1200 kPa)	Alternative 6 (NPS 30 @ 2070 kPa)
2019	7 Days	3 Days	0 Days
2020	8 Days	3 Days	0 Days
2021	8 Days	3 Days	0 Days
2022	8 Days	3 Days	0 Days
2023	9 Days	3 Days	0 Days
2024	9 Days	3 Days	0 Days
2025	9 Days	3 Days	0 Days
2026	9 Days	3 Days	0 Days
2027	10 Days	4 Days	0 Days
2028	10 Days	4 Days	0 Days
2029	11 Days	4 Days	0 Days
2030	11 Days	4 Days	0 Days
2031	11 Days	4 Days	0 Days
2032	11 Days	4 Days	0 Days
2033	11 Days	4 Days	0 Days
2034	12 Days[1]	5 Days	0 Days
...	.....	.....	.....
2044	14 Days	6 Days	0 Days
...	.....	.....	.....
2054	17 Days	7 Days	0 Days
...	.....	.....	.....
2074	24 Days	11 Days	0 Days

In its financial analysis of alternatives, FEI introduces the concept of operational risk as a measure of loss-of-service impact, based on failure frequency rates (i.e. that would precipitate loss of service) and the associated financial costs.[84] The development of these estimates relies heavily on two consultant studies:

- A quantitative risk assessment (QRA) prepared by Dynamic Risk Assessment System, Inc. "to estimate the risk reduction benefit of undertaking the system reinforcements associated with the LMSU project… under design conditions to represent a reasonable worst case scenario;"[85] and
- An economic consequence of failure study prepared by HJ Ruitenbeek Resource Consulting Ltd. that provides "a quantitative estimate of the economic consequences of a credible worst case disruption in gas supply."[86]

[82] FEI Final Argument, p. 13.
[83] Exhibit B-11, BCUC IR 2.3.3.
[84] Exhibit B-1, p. 44.
[85] Exhibit B-1-1, Appendix A-10, p. 1.
[86] Ibid., Appendix A-5, p. 1.

As part of its response to an information request to provide the likelihood of a worst-case scenario occurring, FEI's consultant provides the following comments:

> [T]he failure frequency in Segment 1 downstream of Fraser Gate is estimated to be 0.00195 failures per year. This failure frequency is equivalent to stating that such a failure is expected statistically to occur approximately once in any 500 year period.
>
> An "estimate of the probability of a worst case scenario occurring" cannot be provided. Such a probability is the product of two numbers: (i) the failure frequency; and (ii) the contingent probability that the consequences occur within the set of outcomes that fall into a class characterized as "worst case"… [T]he consequences are likely to depend on factors such as actual outage numbers, time of outage, time of year, mitigation measures previously in place, and others… For "one in 500 year" events this is not tractable. It is thus not possible to determine the probability distribution of the consequences.[87]

Table 3 provides a comparison of all of the alternatives with respect to the non-financial objectives it has laid out.

Table 3 Coquitlam Gate IP Project Non-Financial Comparison[88]

Alternatives		Objectives/Requirements				Overall Assessment
		Reduce Pipeline Risk	Provide Sufficient Operational Flexibility	Provide Full System Resiliency	Constructible	
3	Replace Existing NPS 20 in kind	Meets Objective	Does not meet Objective[1]	Does not meet Objective	Meets Objective	Not Feasible
4	Replace with NPS 24 at 2070 kPa	Meets Objective	Meets Objective	Does not meet Objective[3]	Meets Objective	Feasible
5	Replace with NPS 36 at 1200 kPa	Meets Objective	Meets Objective	Does not meet Objective[4]	Meets Objective	Feasible
6	Replace with NPS 30 at 2070 kPa	Meets Objective	Meets Objective[2]	Meets Objective[2]	Meets Objective	Feasible
7	Replace with NPS 42 at 1200 kPa	Meets Objective	Meets Objective	Meets Objective	Does not meet Objective	Not Feasible

Alternatives 3 through 6 meet all of the objectives for reducing pipeline risk and constructability. FEI provides the following assessment of each of these alternatives vis-à-vis the remaining objectives of operational flexibility and resiliency:

[87] Exhibit B-11, BCUC IR 2.16.2.
[88] Exhibit B-1, p. 41.

- Alternative 3 does not meet either objective insofar as it does not provide the increased capacity to facilitate planned outages for system work (operational flexibility) and does not enhance resiliency of the Metro IP system;[89]
- Alternative 4 does provide operational flexibility by allowing for the repair and maintenance of the pipeline by avoiding the use of a bypass. However, there is insufficient capacity to supply backfeed capacity during the colder winter days;[90]
- Alternative 5 fulfills the need for operational flexibility but does not provide full resiliency to the Metro IP system resulting in the potential loss of supply to 47,500 customers during the coldest days of winter;[91] and
- Alternative 6 meets all objectives.[92]

Having set out its analysis of both operational flexibility and system resiliency, FEI eliminates Alternative 3 as this alternative does not provide any improvement in either measure.[93]

FEI also eliminates Alternative 5 from contention on the following basis:

> Alternative 6 and Alternative 5 have similar capital cost estimates at $232.985 million and $238.178 million respectively. However since Alternative 5 has a higher cost and does not offer the system resilience of Alternative 6, no further analysis has been undertaken.[94]

Thus, FEI has reduced the list of potential alternatives to two: Alternative 4 and Alternative 6. FEI presents the following summary of the comparative costs for Alternative 4 vs. Alternative 6.[95]

[89] Ibid., p. 35.
[90] Ibid., p. 36.
[91] Ibid., pp. 37-38.
[92] Exhibit B-1, pp. 38–39.
[93] Ibid., p. 42.
[94] Ibid., p. 44.
[95] Exhibit B-11, BCUC IR 2.15.1.

Table 4 Cost Estimates of Alternatives 4 and 6

	Alternative 4 Install NPS 24 pipeline at 2070 kPa Lougheed Route	Alternative 4 Install NPS 24 pipeline at 2070 kPa Lougheed Route	Alternative 6 Install NPS 30 pipeline at 2070 kPa Lougheed Route
AACE Estimate Accuracy	*Class 4*	*Class 3*	*Class 3*
Total Direct Capital Cost excl. AFUDC & includes Abandonment / Demolition (2014 $millions)	179.671	191.952	199.053
Total Direct Capital Cost excl. AFUDC (As-spent $millions)	207.958	222.261	230.474
AFUDC (as spent $millions)	11.254	11.896	12.351
Total As-spent includes Abandonment / Demolition & AFUDC ($millions)	219.212	234.157	242.825
Annual incremental gross O&M (2014 $millions)	0.055	0.055	0.055
Levelized Rate Impact – 60 Yr. ($ / GJ)	0.090	0.096	0.100
PV Incremental Cost of Service – 60 Yr. ($millions)	266.379	284.207	297.183

FEI submits that only Alternative 6 meets all of the stated objectives. It is constructible and eliminates the elevated reliability, safety and regulatory risks as well as providing operational flexibility facilitating planned outages and mitigating the risks and consequences associated with unplanned outages. Specifically, the choice of this option would provide full resiliency to the end of the planning period allowing work requiring the isolation of supply at either Coquitlam Gate or Fraser Gate Stations to be undertaken at any time of year. Moreover, such work would not incur additional bypass costs and where isolation of a work area is required due to emergency, there would not be significant customer outages and related costs.

Intervener submissions

BCOAPO argues that given the cost and disruption associated with replacing the entire pipeline, taking advantage of the opportunity to provide additional operational flexibility and resiliency is justified even at some increased cost.[96] And, FEI has provided sufficient evidence to support Alternative 6 as an acceptable option taking account of the lengthy expected service life, the reduction in operational risk, and the relatively modest incremental cost.[97]

CEC raises the following concerns with FEI's estimates of consequences arising from system failures:

- The Economic Impact study is heavily dependent upon the assumptions employed but is concerned with "with the extent to which refinement of evidence is suggested." CEC "submits that the best use of the information is as evidence of potentially large impact from service loss." In spite of these concerns CEC accepts the risk analysis as providing evidence of the potential significance of monetary values.
- The Quantitative Risk Assessment [QRA] results are largely dependent upon estimates drawn from the Economic Impact study, and the refinement of its results should not be afforded full confidence.[98]

[96] BCOAPO Final Argument, p. 6.
[97] Ibid., p. 7.
[98] CEC Final Argument, p. 8.

CEC urges the Commission to apply heavy emphasis to the costs and general merits of each alternative, and give the results of the QRA "somewhat less weight in its deliberations."[99] CEC notes that if no consideration is given to the QRA analysis, Alternative 6 is approximately $13 million more costly than the next best alternative (Alternative 4). This represents a $0.004/GJ impact on levelized rates."[100]

Notwithstanding those reservations, CEC submits that the softer issues should be taken into account in evaluation of the public interest, and hence, CEC recommends Alternative 6 as the preferred alternative.[101]

Commission determination

The Panel makes the following initial findings in terms of arriving at a preferred alternative:

- **Alternative 7 is not a viable alternative on the grounds that it is not constructible; and**
- **Alternative 5 is not viable in that it is the highest cost alternative, yet does not provide the benefits associated with at least one lower cost alternative (i.e. Alternative 6).**

We are left with three alternatives to review:

- Alternative 3: Replace (in-kind) with NPS 20" at 1200 kPa;
- Alternative 4: Replace with NPS 24" at 2070 kPa; or
- Alternative 6: Replace with NPS 30" at 2070 kPa.

The Panel agrees that while not a mandatory requirement, restoring operational flexibility and improving system resiliency are worthy objectives for this project, and merit inclusion in the decision framework. However, we consider Alternative 3 a viable alternative as it fully meets the requirements for safety. At a capital cost estimate of $142 million, Alternative 3 appears significantly less costly to construct than either Alternative 4 or Alternative 6. However, as noted earlier, Class 4 estimates are usually based on a much lower degree of project definition than Class 3 estimates.

The question is, then, do the anticipated benefits in terms of improved operational flexibility and/or system resiliency achieved by either Alternative 4 or Alternative 6 justify their incremental costs?

With regard to operational flexibility, we note that the evidence shows that the frequency of anticipated future planned maintenance situations needing a bypass on the Coquitlam Gate IP pipeline under Alternative 3 are likely to be few. However, temporary bypasses would be required to accommodate all maintenance and repair work on the Fraser Gate IP pipeline. In short, major disruptions in supply and/or service are not anticipated on the Coquitlam Gate IP pipeline but if Alternative 3 were considered, there would be a need for bypasses around the work area for all maintenance and repairs on the Fraser Gate IP pipeline that require an outage. The Panel notes that while there are no estimates as to the frequency of such bypass requirements, given the age of the

[99] Ibid., p. 10.
[100] Ibid., p. 15–16.
[101] Ibid., p. 16.

Fraser Gate IP pipeline, it could be expected to be greater than for the Coquitlam Gate IP pipeline. At an anticipated maximum cost of approximately $0.8 million per occurrence to install a bypass, if or when needed, the Panel, while unable to quantify the number of times a bypass would be needed, must consider this in reaching a determination on the most appropriate alternative. At the least, the choice of Alternative 3 would result in a bypass requirement for the proposed the Fraser Gate project in this Application.

Pertaining to system resiliency, the Panel places little weight on the precision of the quantification of costs and risks associated with the various alternatives. Our reasons include the following:

- The estimates are based solely on a worst-case pipeline failure occurring on a design day, and apparently also at the worst time of day;
- The estimates of economic consequence arising from such a worst-case pipeline failure are based on a further set of subjective evaluations of worst-case economic events; and
- The absence of a probability being assigned to such a combination of worst-case outcomes is problematic.

On balance, the Panel views FEI's approach as putting extensive weight on the potential severity of a worst-case event, not sufficiently tempered by the very low probability of such an event ever happening.

However, while the Panel cannot rely on the specific quantification as outlined in the QRA report we agree with CEC that it provides evidence as to the potential significance of a major disruption. Hence, we take the view that FEI's description of system resiliency impacts and the quantification of operational risk are useful in directional terms but cannot be relied upon as accurate estimates of potential cost or risk.

For the reasons outlined, in evaluating the relative merits of the alternatives, the Panel takes a more subjective view of the trade-offs between capital costs and downstream benefits associated with improved operational flexibility and system resiliency (i.e. as opposed to relying on a specific set of cost-benefit calculations).

We therefore summarize our assessment of the three viable alternatives as follows:

- Alternative 3 provides a satisfactory solution to pipeline risk and safety issues and $142 million (Class 4 estimate) is the lowest cost alternative that serves the immediate and specific need that precipitates this Application. That said, it fails to take advantage of the unique opportunity to enhance operational flexibility and system resiliency and, as a result, there would be bypass costs where disruptions occur. In addition it has not has not been tested by the more rigorous Class 3 estimate required by the CPCN Guidelines and the cost estimate for Alternative 3 has a significantly wider range of accuracy.

- Alternative 4 provides the desired gain in operational flexibility and goes considerable distance in improving system resiliency but as noted, over the next 60 years there will be an increasing number of days each year where full resiliency will not be achieved. In addition, even if there is allowance for a 10 percent lower peak forecast it will not allow for full resiliency.[102]

[102] Exhibit B-11, BCUC IR 2.4.3.

- Alternative 6 provides an improvement in operational flexibility and system resiliency outcomes when compared against Alternative 4, by providing flexibility and resiliency on all days of the year. When compared to Alternative 4 cost estimates, these added benefits come at an incremental capital cost of approximately $8 million, or a present value of cost of service over the 60 year life of $13 million. The impact of completing the Coquitlam Gate IP project as proposed with Alternative 6 on a typical FEI residential customer is estimated by FEI to be approximately $11.40 in 2019.[103]

On balance, given the inherent uncertainty in developing 60-year forecasts and estimates of the costs and benefits associated with various event outcomes, **the Panel is satisfied that FEI has presented sufficient evidence to support its contention that Alternative 6 provides sufficient additional benefits to justify the added costs and accepts Alternative 6 as the preferred alternative**.

2.3.3 Design and engineering

FEI states that the project will be designed in accordance with its internal standards, OGC regulations, the Canadian Standards Association (CSA) Standard Z662[104] and other applicable industry codes and standards. The applicable industry standards and specifications are listed in Table 5.[105]

Table 5 Applicable Industry Standards and Specifications[106]

Document	Description
CSA Z662-11	Oil and Gas Pipeline Systems
CSA Z245.1-07	Steel Pipe
CSA Z245.11-09	Steel Fittings
CSA Z245.12-09	Steel Flanges
CSA Z245.20-10	External Fusion Bond Epoxy Coating for Steel Pipe
CSA C22.3 No. 6	Principles and Practices of Electrical Coordination Between Pipelines and Electric Supply Lines
CAN/CSA-G40.21-04	Specification for Structural Quality Steels
API RP 1102-2007	Steel Pipelines Crossing Railroads and Highways, 7th Edition
TC E-10	Government of Canada, Transport Canada: Standards Respecting Pipeline Crossings Under Railways
CPR 2.39	Pipeline and Cable Installations Within Railway Right of Ways
OCC-1-2005	Recommended practice for Control of External Corrosion on Buried or Submerged Metallic Piping Systems

2.3.3.1 Modification requirements

Given the higher gas flow rate and the higher maximum operating pressure (MOP) of upgrading the system to an NPS 30" pipeline operating at 2070 kPa, FEI must deal with a number of modifications to existing infrastructure.

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[103] Exhibit B-1-6, p. 25.
[104] Exhibit B-1, p. 48.
[105] Ibid.
[106] Exhibit B-1, p. 48.

Coquitlam Gate station

Because the capacity of the NPS 30" Coquitlam Gate pipeline is greater than the current pipeline, an upgrade will be required for the Coquitlam Gate Station infrastructure. Specifically, there will be a requirement to upgrade the mechanical, civil and electrical and controls infrastructure by installing larger equipment and pipework.

Integration with existing gas distribution system

FEI notes that there are a number of IP lateral offtakes along the Coquitlam Gate pipeline route connecting the district stations and industrial customers to the main pipeline and lowering the gas pressure from 1200 kPa to 420 kPa. Industrial customers and district stations in close proximity to the existing Coquitlam Gate pipeline will require station and lateral pipeline upgrades to meet the higher MOP of the new NPS 30" pipeline. Four district stations will require upgrading to reduce the pipeline pressure from 2070 kPa to 420 kPa. In addition, short interconnecting laterals will be replaced with new pipe suited to the 2070 kPa pressure of the new NPS 30" pipeline.

Those located more remotely and connected by a longer lateral pipeline will require a new station to be constructed at the interface between the Coquitlam Gate pipeline and the IP laterals in order to reduce the pressure from 2070 kPa to the lateral line MOP of 1200 kPa. FEI states that a total of five new pressure reduction stations will be required along the Coquitlam Gate pipeline route.

Interface with Fraser Gate pipeline

The Coquitlam Gate pipeline interfaces directly with the Fraser Gate pipeline at the East 2nd Avenue and Woodland station. Currently they have a common operating pressure of 1200 kPa. Because the Coquitlam Gate pipeline will now operate at a higher operating pressure, there will be a need to construct an IP/IP control station to regulate pressure from 2070 kPa to 1200 kPa.

Bi-directional capability

To ensure the NPS 30" Coquitlam Gate pipeline integrates with the Coquitlam Gate IP system and the Fraser Gate IP system and provides flexibility in achieving full Metro IP System resiliency there is a need for facilities to provide automatic reverse flow capabilities to flow gas between the Fraser Gate and the Coquitlam Gate systems. This will allow gas to flow from the Coquitlam Gate IP pipeline into the Fraser Gate IP pipeline in the event of a disruption requiring the system to be shut in or, where required, in the opposite direction.[107]

[107] Exhibit B-1, pp. 51–53.

2.3.3.2 Pipeline design

Table 6 lists Coquitlam Gate IP pipeline and lateral pipeline upgrade main design parameters.

Table 6 Coquitlam Gate IP Pipeline Specification Details

Details	Values
Pipeline Length	19,700 m
Pipeline Outside Diameter/Nominal Pipe Size)	762 mm/NPS 30
Maximum Operating Pressure (MOP)	2,070 kPa (300psi)
Pipeline Material Grade/Specified Minimum Yield Strength (SMYS)	359 MPa (X52)
Maximum Hoop Stress (as a % of SMYS)	<30%
Pipeline Buried Depth (min)	1.2m to top of pipe
Design Temperature	50 degC
Pipe External Coating	Fusion Bonded Epoxy (FBE)

FEI notes that relatively short IP lateral pipelines and related IP/DP district stations in proximity to the pipeline requiring upgrades to suit the higher MOP of the new pipeline will be constructed to the same specifications as those listed in Table 6.

FEI reports that the pipe specification process for the proposed new Coquitlam Gate NPS 30" pipeline is in line with industry practices and meets all code requirements as outlined in CSA Z662-11.[108]

2.3.3.3 In-line inspection

FEI, in its proposed design of the Coquitlam Gate IP Project, included the provision of an in-line inspection (ILI) capability. The purpose of including this capability is to provide, over the expected life of the pipeline, a means to identify and mitigate specific pipeline hazards such as corrosion.

The pipeline design has incorporated certain features and elements to facilitate the utilization of ILI. These include the following:

- Pipeline bends with radii at least 3 to 5 times the pipeline diameter;
- Full bore mainline block valves to permit unrestricted passage of an ILI tool;
- Launcher at the pipeline inlet for tool insertion and to control propulsion through the pipeline; and
- Receiver at the pipeline outlet to receive and extract the ILI tool.[109]

ILI tools fall into three main categories: geometry (to detect dents or distortions in the pipe), metal loss (to detect corrosion, manufacturing and gouge anomalies), and crack detection.[110] Currently low-pressure crack

[108] Ibid., pp. 53–54.
[109] Exhibit B-1, p. 58.
[110] Exhibit B-6, CEC IR 1.39.1, 1.39.2.

detection tools are not available for gas pipelines.[111] FEI anticipates that over time more ILI tools will be developed that are suitable for pipelines operating at 2070 kPa. It bases this conclusion on its observation of technology development and the recent commercialization efforts related to low-pressure/low-flow and self-propelled (robotic) ILI tools.[112]

FEI expects that the use of ILI tools will maximize asset life by identifying where mitigation efforts are required. It is seen as reducing failure risk and enabling more targeted mitigation programs.[113] FEI estimates that the cost of insuring pipeline bends that will accommodate ILI tools is immaterial given the minimum pipeline induction bend radius required for directional change.[114] Full bore mainline block valves are necessary to provide unrestricted access to pipeline cleaning pigs, caliper pigs and commissioning train pigs that are required to be run during pipeline commission. Therefore, the only incremental cost to provide ILI capability is the cost of the ILI launcher and the ILI receiver that is estimated to be $1.9 million.

Intervener submissions

CEC submits that the inclusion of the capability to use ILI tools is appropriate and will extend the assets 'expected life'. CEC calculates the annual cost of ILI tools to be $31 thousand. If even a small increase in asset life results or an improvement is made in the risk mitigation decisions, it believes this adequately justifies the annual cost. It further argues that the ILI tools may reduce the operating and maintenance (O&M) requirements of the pipeline and, if so, should be considered by the Commission as to whether the use of these tools is significant enough to reconsider the O&M formula. The CEC recommends the BCUC approve the incorporation of ILI tools in the project design.[115]

2.3.3.4 Corrosion protection

Coating

FEI submits its proposed industry standard Fusion Bonded Epoxy (FBE) and field applied liquid epoxy at girth welds will be subject to strict application procedures as well as a greater level of inspection and quality control than when the existing pipeline was constructed and differs from the applied coating which is exhibiting corrosion and leaks in the existing pipeline.[116] In addition, FEI indicates that its proposed coating is to be compatible with CP in the case of coating disbondment, damage or degradation. This will provide further protection from corrosion.[117]

Intervener submissions

Based on its review of the evidence CEC submits that new coatings are unlikely to result in a similar pattern of corrosion that occurred in the original pipeline.[118]

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[111] Exhibit B-6, CEC IR 1.39.3.
[112] Exhibit B-14, CEC IR 2.10.1.
[113] Exhibit B-14, CEC IR 2.8.1.2, 2.9.1.
[114] Exhibit B-4, BCUC IR 1.14.2.
[115] CEC Final Argument, pp. 16–17.
[116] FEI Final Argument, p. 37.
[117] Exhibit B-6, CEC IR 1.3.1.2.
[118] CEC Final Argument, p. 17.

Cathodic protection

FEI outlines that CP, which is required by the CSA Z662 standard, is used with coatings to provide secondary defense against external corrosion.[119] FEI states that the CP system for the existing NPS 20" Coquitlam Gate IP pipeline is in satisfactory condition, has sufficient capacity to provide protection to the new pipeline[120] and is not expected to require replacement.[121]

Intervener submissions

CEC submits that if it is possible to use the existing system it would be cost effective and recommends that the Commission rely on FEI's final determination of the appropriate CP to employ.[122]

2.3.3.5 Handling of abandoned pipe

For the Coquitlam Gate IP and the Fraser Gate IP Projects FEI proposes to abandon the existing pipelines in place. In order to prevent soil and groundwater contamination and the potential for the corroded pipe to act as a conduit, moving contaminants present in the surrounding soil to other points along the pipeline, FEI proposes a number of steps. After commissioning the new NPS 30" pipeline, the Company proposes the following:

- Empty the abandoned pipe of any service fluids;
- Cut the abandoned pipeline into shorter segments;
- Purge, clean, cap and seal the segments;
- Physically separate the abandoned pipe from any in-service piping;
- Remove the abandoned pipeline's cathodic protection; and
- Where warranted, fill the segments with structural grout to prevent pipeline collapse.[123]

Abandoning pipe is governed by a number of regulations including CSA Z662 and section 40 of the OGAA. Requirements are prescribed under section 11 of the Pipeline Regulation. FEI must comply with all federal and provincial regulatory requirements including the *Environmental Management Act* and associated regulations.

There were a number of reasons FEI decided to abandon the pipe in place rather than remove it. These include the following:

- The need to maintain the existing pipe in service until the new pipe is commissioned;
- Removal would face significant logistical and construction challenges given the urban location and the development that has occurred since the pipe was installed;
- Removal of pipe from parks and sensitive environmental areas could result in environmental impacts;

[119] Exhibit B-1, p. 59.
[120] Exhibit B-4, BCUC IR 1.11.5.
[121] Ibid., BCUC IR 1.11.6.
[122] CEC Final Argument, p. 17.
[123] Exhibit B-1, pp. 63, 117; Exhibit B-6, CEC IR 1.45.1, 1.45.7.

- Removal would incur traffic impacts for pipe located beneath active roadways;
- Removal of pipe from beneath roads, railways and other utilities increases the risk of damage to third party assets, disrupting services to homes and businesses;
- Removal along residential streets would result in disturbances such as noise and dust; and
- The cost of removal is estimated to be about $75 million compared to the estimate of $3.1 million to abandon the pipeline in place.[124]

Intervener submissions

CEC submits that FEI's proposed abandonments plans, including the discontinuance of cathodic protection, are appropriate and should be approved by the Commission.

Commission determination

The Panel finds the design and engineering work done to date on the new Coquitlam Gate IP pipeline and associated facilities to be satisfactory for this stage of the project.

FEI has identified a number of modification requirements which must be undertaken to allow for successful completion of the project. The Panel accepts that in upgrading the size of pipe to 30 inches and increasing the operating pressure to 2070 kPa there is a need to upgrade facilities to allow for the effective interface with both the existing distribution system and other pipelines.

The Panel finds the inclusion of the ILI capability as part of the project design and construction to be appropriate. In our view there is a growing capability for low-pressure in-line inspection tools to provide a useful means of providing increased safety and reliability at minimal cost. We note that CEC questions whether the use of these tools will result in significant savings which may justify a change to the PBR O&M base. Our view is that concerns such as these related to the two projects are more appropriately addressed during the Annual Review process.

Concerning proposed CP measures, the Panel accepts FEI's proposed coating and CP measures as being appropriate for the pipeline projects. The upgrade in coatings used and greater attention to the level of inspection and quality control is likely to result in fewer issues with corrosion in the future. Use of the existing CP system would also be advantageous and cost effective if possible. **The Panel directs FEI to provide an update on this as part of its ongoing reporting for both the Coquitlam Gate and the Fraser Gate IP Projects when further information is available.**

The Panel approves FEI's abandonment plans and discontinuance of CP as proposed for both the Coquitlam Gate and Fraser Gate IP Projects. The steps FEI plans to take to minimize environmental and social impacts are appropriate as they are both cost effective and result in a minimum of disruption. Further, the Panel notes that the interveners raised no concerns concerning pipeline abandonment.

[124] Exhibit B-6, CEC IR 1.45.4.

2.3.4 Route selection

Selection of preferred route

FEI describes the pipeline route evaluation process in Section 3.3.4 of the Application and supporting Appendix A-17 filed with the Application and Section 2.3.2 of the evidentiary update, including the Addendum to Appendix A-17. The final routing goal is to be safe, environmentally acceptable, constructible (practical) and economically sound. FEI states that pipeline routing is an iterative process starting with a 'corridor of interest' narrowing down at each design stage to a more defined route as more data is acquired.

The first step in the process is the identification of one or more pipeline corridors of a size to encapsulate the area of feasible route options. Once available data pertaining to feasible route options has been gathered, the options are further refined through desktop analysis and consultation with stakeholders, landowners and the community.[125]

FEI has identified a route corridor between Coquitlam Gate Station and East 2nd and Woodland Station, sectionalized the route and considered route alternatives within each section using the non-financial and financial evaluation criteria set out in Table 7.[126]

Table 7 Pipeline Route Evaluation Criteria Definitions[127]

Category 1: Community and Stakeholder Criteria	
Health and Safety	Considers the risks to the community, stakeholders, employees, and contractors during construction of the pipeline.
Socio-Economic	Considers the effect of the Project on the cultural values, economic well-being, and daily life for local stakeholders and citizens during construction of the pipeline.
Land Ownership and Use	Considers the number of landowners, existing and future plans for land usage and development, easement width, ability to acquire and maintain access rights necessary for construction and operation of the pipeline, the amount of land that is necessary for construction and the effect on local residents.
Category 2: Environmental Criteria	
Ecology	Considers the impact during construction of the pipeline to the environment including environmentally sensitive areas along the project site.
Cultural Heritage	Considers the impact during construction of the pipeline to known archaeology and culturally sensitive areas at the Project site.
Human Environment	Considers the impact of the Project to the human environment including noise, local emissions, aesthetics, nuisance factor and the short and long term visual effect that may be observed by residents and visitors in the project area.

[125] Exhibit B-1, pp. 64–65.
[126] Ibid., pp. 72–73.
[127] Exhibit B-1, pp. 72–73.

Category 3: Technical Criteria	
Engineering	Considers the engineering and design effort to meet all statutory codes and regulations to result in the optimum pipeline system.
Construction	Considers the existing above and below ground constraints in terms of pipeline construction activities, pipe laying productivity, requirement for non-standard higher risk construction techniques and construction footprint.
Operation	Considers long term impacts including those to employees and contractors to maintain the pipeline integrity and complete maintenance and repairs. Also considers impacts to adjacent development and third party land ownership and use.
System Interface	Considers the challenges with interfacing the new pipeline and facilities into the existing gas distribution system infrastructure.
Adjacent Infrastructure	Considers the potential impacts on adjacent (existing and planned) facilities and buried/above ground utility infrastructure and risk to longevity and safe operation of the gas pipeline and facilities from adjacent infrastructure.
Natural Hazards	Considers the vulnerability during operation of the pipeline and built facilities to natural hazards including seismic impacts, ground contamination, tree root encroachment etc.
Category 4: Cost	
Cost	Considers the least cost project solution that meets community, environmental, and technical criteria while cognisant of impacts to the rate base.

FEI applied a weighting to the non-financial criteria with a high weighting afforded to those evaluation criteria associated with health, safety and the environment. Each route alternative was then given an impact evaluation score. The cumulative weighted score for each alternative was then tabulated and route options ranked. Cost estimates were also prepared and ranked for each route option to ensure an economic route is selected without compromising safety or the environment and minimizing the overall pipeline impact and local impact.[128] To select the preferred route alignment, FEI compared the non-financial rankings to the cost rankings. In several route sections the highest ranked non-financial route section alternative was also the least cost.[129] For route sections where the highest ranked non-financial was not the least cost, FEI assessed the cost differential and determined that the difference was within a reasonable percentage (less than 5 percent). FEI concluded that a difference of less than this amount was not sufficient to influence the preferred route selection since the differences would be within the accuracy ranges of the AACE Class 3 and 5 estimates.[130]

Based on its analysis, FEI selected a preferred route that excluded the Lougheed Highway. This option had been identified as a route option for some of the route sections but had lower scores due to traffic disruption from multiple lane closures during construction. FEI acknowledged that further analysis was being conducted on Sections 5 and 6 due to concerns raised during ongoing consultation with the City of Burnaby.[131]

After completing the consultation process with the City of Burnaby, FEI revised its original route selection of two sections of the route to a parallel route along the Lougheed Highway. FEI completed an updated analysis and updated its preferred route selection accordingly. The revised route selection used the same methodology as in the Application, addressed concerns raised by the City of Burnaby and residents and based on a letter from the

[128] Ibid., pp. 73–77.
[129] Ibid., pp. 77–80.
[130] Exhibit B-4, BCUC IR 1.16.1.
[131] Exhibit B-1, pp. 79–80.

City of Burnaby, assessed that traffic disruptions along the Lougheed Highway were acceptable. This resulted in a minor reduction in the project cost.[132]

The revised proposed route and relative position to the existing route is detailed in the table below.[133]

Table 8 Coquitlam Gate IP Project New Proposed Pipeline Route Details

Section	Existing NPS 20 Coquitlam IP route	New Proposed NPS 30 Coquitlam IP route	Relative Position
1	Como Lake Avenue	Como Lake Avenue	Parallel in same road
2	Como Lake Avenue	Como Lake Avenue	Parallel in same road
3	Como Lake Avenue and Broadway	Como Lake Avenue and Broadway	Parallel in same road
4	Broadway	Broadway	Parallel in same road
5	Broadway	Lougheed Highway	Parallel (offset one street south)
6	Springer Avenue, Halifax Street, Brentlawn Drive, Lane adjacent to Brentwood Town Centre, Halifax Street, 2nd Avenue	Lougheed Highway, Madison Avenue, Douglas Road, Graveley Street	Parallel (within a few blocks)
7	East 2nd Avenue	East 1st Avenue	Parallel Street (offset one street north)

FEI submits its route selection process explicitly considered cost and optimizes its community and stakeholder and environmental criteria for a relatively small additional incremental cost difference.[134]

FEI states that should the Commission approve a CPCN to construct and operate the entire Coquitlam Gate IP Project, it will proceed with detailed design (routing and engineering) to achieve a fully engineered and defined final pipeline route alignment. FEI proposes that in the event the Commission approved routing is no longer considered feasible and another route emerges as a feasible alternative after detailed design, FEI will update the Commission about the alternative route, including any project cost and schedule impacts and additional consultation that may be required. The Company submits that the requirement for further review would be based on the extent of the proposed route change and suggests that a minor change may require little or no review while a significant change may require a more detailed Commission review.[135]

Intervener submissions

CEC submits that "FEI has conducted a thorough review of the options and addressed the key requirements in selecting the route corridor and has adequately presented its case for the preferred route along the Lougheed highway."[136] The CEC recommends approval of the proposed route at this time but states that it is reasonable to

[132] Exhibit B-1-6, pp. 7, 10–12; Exhibit C5-2.
[133] Exhibit B-1-6, pp. 9–10.
[134] FEI Final Argument, p. 41.
[135] Exhibit B-11, BCUC IR 2.10.1.
[136] CEC Final Argument, p. 18.

have a process in place to address potential issues as they arise and FEI's proposed manner to address route changes is appropriate.[137]

BCOAPO does not take issue with proposed route selection. However, in BCOAPO's view there remains significant uncertainty as to the final routing of this project and it is concerned that further proposed route changes may be an issue as the final routing has an impact both on the community and the cost of the project. BCOAPO states that it is unclear the Commission can approve the final routing due to the level of uncertainty concerning it. For this reason, BCOAPO submits that FEI should be required to provide a final report on routing to be reviewed by the Commission and interested parties.[138]

FEI reply

FEI submits there is no significant uncertainty as to the final routing and it is simply indicating that the Commission will be updated in the event that an approved routing is no longer considered feasible during the detailed design and engineering phase. FEI submits there is no basis for a final report on routing as proposed by BCOAPO.[139]

Commission determination

The Panel finds that the route selection process, including consideration of the non-financial impacts, has been sufficient. In addition, we accept that further adjustments to the route are not likely.

FEI during the consultation process has effectively dealt with concerns raised by the City of Burnaby on behalf of some residents and adjusted the route to accommodate those concerns. Moreover, the impact of the revisions in the evidentiary update to a select a parallel route along the Lougheed Highway resulted in a minor reduction to project cost. Further, none of the interveners took issue with the proposed route although BCOAPO has raised concern with regard to whether further changes will be required. The Panel notes that there was no evidence to suggest that significant route changes would be required. Therefore, we do not consider it necessary to provide a final routing report as suggested by BCOAPO. However, in the event changes are required, the Panel agrees with the parties that there will be a need to update and advise the Commission on route changes.

2.3.4.1 Route changes

As noted, while unlikely, it is possible that further adjustments to the route could be required. If, after detailed design, another route emerges as a feasible alternative, FEI proposes the following process:

> …to update the Commission about the alternative route, including any project cost and schedule impacts and additional consultation that may be required. FEI expects the requirement for further review would be based on the extent of the proposed route change. While a minor

[137] Ibid., p. 19.
[138] BCOAPO Final Argument, p. 8.
[139] FEI Reply Argument, p. 7.

change may require little or no review, a significant change may require a more detailed Commission review.[140]

Intervener submissions

CEC submits that significant route changes are unlikely but it is reasonable for a process to be in place to deal with such issues as they arise. It considers FEI's approach to management of route changes to be appropriate.[141]

BCOAPO notes that there is significant uncertainty as to the final routing of the pipeline. Further, it states that this combined with potential challenges due to inadequate First Nations consultation, the cost of accommodation, unknown subsoil conditions and inability to obtain permits in a timely manner could result in cost increases in the tens of millions of dollars. Because of this, BCOAPO recommends that FEI be required to provide a final report on routing which includes a Class 1 estimate.[142]

FEI reply

FEI submits that there is no "significant uncertainty" related to the final routing as stated by BCOAPO. FEI acknowledges that a detailed design for a fully engineered final pipeline route alignment will occur after granting the CPCN. However, it asserts that if the approved routing is no longer feasible it will update the Commission in the event another route emerges as a feasible alternative. FEI also asserts that it will provide regular progress reports to the Commission and therefore there is no need for final report on routing as suggested by BCOAPO.

FEI submits it has provided a Class 3 estimate for the preferred alternative in the Application as required by the CPCN Guidelines and BCOAPO did not make any information requests on this subject, or attempt to define what a Class 1 estimate entails. FEI explains that a highly accurate estimate would not be achievable in this case until the project is sufficiently advanced such that the detailed project design is completed, that all contracts are in place, and most contingency can be released; a point at which the project could not be terminated without having already incurred significant costs and potentially termination penalties. FEI is not aware of, and BCOAPO has certainly not noted, any past requirement for Class 1 estimates from the Commission.[143]

Commission determination

The Panel agrees with FEI that there is no "significant uncertainty" related to the final routing and agrees with CEC that significant route changes are unlikely and it is reasonable for a process to be in place to deal with such issues as they arise. The Panel acknowledges the detailed design of a fully engineered final pipeline route alignment has not yet occurred. Therefore, there is some chance the final pipeline route alignment will require adjustment. It would be expected that different route alignment changes present different risks, costs and consultation requirements. Therefore, there is a need for ongoing oversight of the project and a requirement to

[140] Exhibit B-11, BCUC IR 2.10.1.
[141] CEC Final Argument, p. 19.
[142] BCOAPO Final Argument, pp. 8–9.
[143] FEI Reply Argument, pp. 7–8.

update the Commission on any proposed route alignment change and approval from the Commission for any material route alignment change before commencing construction on the new alignment.

Accordingly, **the Panel directs FEI to report to the Commission on all proposed route alignment changes**. If the proposed route alignment change is material, for instance, the route moves to a different road, FEI must seek approval from the Commission for the change to the route at least 90 days before construction is proposed to commence on the new alignment. In the application for a material change to the route alignment, FEI is to include the justification, cost, schedule, risks, and consultation.

The Panel agrees with FEI that a final report on routing, which includes a Class 1 estimate, is not required for a CPCN application. A highly accurate estimate would not be achievable until the detailed project design is completed and all contracts are in place. However, as noted throughout this decision, the Panel expects FEI to refine and update project cost estimates as the project progresses and to provide this information to the Commission in a timely manner.

The Panel agrees with the parties that there will be a need to update and advise the Commission on route changes. The process for and content of any such updates is discussed further in Section 6.

The Panel approves the Coquitlam Gate IP pipeline route as proposed.

2.3.5 Construction methodology

Trenched and trenchless construction total approximately 58 percent of the base cost estimate. These components are identified as the key risk drivers for the overall project capital cost, and have the largest potential impact on the project cost. [144] Given this, it is appropriate for the Panel to consider whether the construction methods have been sufficiently defined and justified.

In its Final Argument, FEI submits that the Coquitlam Gate IP pipeline will be constructed by one pipeline construction contractor beginning in the summer of 2018. FEI explains that the construction of the pipeline will traverse areas including arterial traffic routes, residential streets, green areas and streams and this will present different construction challenges and constraints and require specific construction techniques. Trenchless construction will be used in areas where it is not possible to excavate a trench or it is necessary to minimize the surface impact. The final determination of the most appropriate method will be site specific for each crossing location and may involve different trenchless techniques for different locations.

FEI explains the detailed engineering phase of the Project will commence after approval of the CPCN, and include a suite of site investigations and site surveys which will further inform the project team in terms of sub-surface uncertainty and risk. At the trenchless locations, deeper boreholes, down-hole testing, sampling and off-site lab testing and geophysical profiling will be utilized to build a complete picture of the sub-surface conditions. As the project develops, the detailed design, routing and construction planning will be developed

[144] Exhibit B-4, BCUC IR 1.23.1.

and tailored to mitigate identified risks associated with trenched and trenchless pipeline construction and installation where feasible, will be based on the site investigations findings and analysis. Residual risk that cannot be mitigated through existing controls or a risk treatment plan will be mitigated through appropriate contingency allocation.[145]

In response to BCUC confidential information requests FEI elaborates on why it assumed trenchless construction at certain crossings and notes the estimated cost of these crossings using trenched construction is less expensive. FEI also confirms, if it is determined that these crossings could be constructed using trenched construction, then trenchless equipment will not be required, and instead excavators will open cut the crossing and install the pipeline using typical trenched techniques.[146]

In its Final Argument, FEI also submits:

> A detailed mitigation plan to address the specific construction impacts at each location will be developed in conjunction with further route design to finalize an exact pipeline alignment. A key aspect of this effort will also involve identification and mitigation of impacts to institutional access, emergency response routes, emergency services mobilization and pedestrian and public transit. The development of Project plans to implement appropriate mitigation measures will involve ongoing consultation with affected municipalities, major stakeholders and local residents, transit operators, and businesses, and will minimize disruptions to the communities as much as possible. Examples of possible measures to reduce the impacts to accesses, pedestrian and public transit include tailored construction staging, construction scheduling and timing, temporary rerouting of bicycle lanes and bus routes including temporary relocation of bus stops, coupled with appropriate signage, messaging and early warning and notification.[147]

Intervener submissions

"The CEC is satisfied with the construction proposal and recommends the Commission accept the construction proposal as appropriate."[148]

Commission determination

The Panel agrees with FEI that trenchless construction should be used in areas where it is not possible to excavate a trench or necessary to minimize the surface impact. However, FEI has not provided sufficient evidence to demonstrate that trenched construction is not possible or that trenchless construction is necessary to minimize the surface impact at the crossing locations identified the Application. As such, the Panel considers there is a need for FEI to further investigate site conditions and further justify the construction methods for these crossings before commencing construction.

Accordingly, **the Panel directs FEI to report the findings of more detailed site investigations at the proposed trenchless crossings and provide further justification of the construction method prior to commencing construction at each crossing.** After the detailed site investigations are complete, FEI must update the project

[145] FEI Final Argument, pp. 44–45.
[146] Exhibit B-4-1, BCUC IR 1.1.1–1.1.4.1, 1.3.1, 1.3.2; Exhibit B-12, BCUC IR 2.1.1–2.1.5.
[147] FEI Final Argument, p. 45.
[148] CEC Final Argument, p. 20.

execution capital cost summary estimate and submit this information to the Commission. The estimate accuracy range and the project contingency amount should be updated at this time. FEI is to discuss any changes to risk and project schedule that result from the findings of the detailed site investigations.

Similarly, the Panel notes that FEI has not yet performed detailed sub-surface investigations at the proposed trenchless construction locations and we consider this information valuable as it would better inform the project cost and risks. For that reason, **the Panel directs FEI to report the findings of the detailed sub-surface investigations and update the project execution capital cost summary estimate after the sub-surface investigations are complete**. The estimate accuracy range and the project contingency amount should also be updated at this time. FEI is to discuss any changes to risk and project schedule that result.

The Panel notes that in most cases the risks and costs of trenchless construction are higher than trenched construction. Given the potential for a material difference, **the Panel directs FEI to report on any changes from trenched construction to trenchless construction prior to commencing construction as part of its quarterly progress reports outlined in Section 6.1.**

The Panel finds FEI's plan to develop a detailed mitigation plan to address the specific construction impacts at each location in conjunction with finalizing an exact pipeline alignment is appropriate.

2.3.6 Project schedule and other application requirements

Project schedule

The Coquitlam Gate IP Project is proposed to be undertaken starting in 2018. Table 9 provides a listing of key milestones and estimated completion dates.[149]

Table 9 Coquitlam Gate IP Project Schedule Milestones

Activity	Date
Concept Development	Completed
CPCN Preparation	July 2013 – Dec. 2014
CPCN Filing	Dec. 2014
CPCN Approval	Q3 2015
Start Detailed Engineering, material specification and contract development	Oct. 2015
Materials Tendering and Orders Placed	Aug. 2016
Award Contractor	June 2017
Submit OGC Application	Sept. 2017
OGC Pipeline Approval	Jan. 2018
Materials Delivery	Mar. 2018
Construction Start	April 2018
In Service	Nov. 2018
Restoration	June 2019

[149] Exhibit B-1, p. 90.

In order to meet the 2018 proposed in-service date, FEI has requested Commission approval of the CPCN prior to the end of December 2015 so that detailed routing and design can begin in early 2016 to enable procurement of long lead materials in late 2016.[150]

Other application requirements

Construction and operation of pipelines is subject to OGC regulation and governed by the OGAA. As noted in Table 9, FEI expects to file its pipeline application with the OGC in September of 2017. The pipeline application is a significant undertaking and FEI expects considerable project technical scrutiny from the OGC. Components of the Application include:

- Public and First Nations consultation;
- Land or access rights;
- Archaeological requirements;
- Design reviews; and
- Environmental permits and approvals.

OGC approval is required for each component prior to the start of construction.

Municipal permits

FEI is currently identifying all municipal and city permits required to ensure construction and installation of the Fraser Gate IP pipeline meets all bylaws and guidelines and will acquire them prior to the start of construction.

Other pending or anticipated applications

FEI has identified other pending or anticipated applications. Highway 1 and 1st Avenue interchange areas are under the jurisdiction of the Ministry of Transportation and Infrastructure and, as a result, FEI will be required to obtain Highway Use Permits. FEI states that other agency notifications, permits or approvals are anticipated including under the *Fisheries Act, Species at Risk Act, Water Act*, and *Heritage Conservation Act*. The project is not expected to require an Environmental Assessment Certificate pursuant to the *British Columbia Environmental Assessment Act* or require a screening under the *Canadian Environmental Assessment Act*, 2012.

In addition, the Coquitlam Gate IP Project may involve the acquisition of new land and access rights for an approximate 70 metres of the proposed route alignment between Boundary Road and Highway 1. FEI will finalize any new land and access right negotiations once approval of this Application is received.[151]

[150] FEI Final Argument, p. 47.
[151] Exhibit B-1, pp. 92–93.

Commission determination

The Panel finds that the project schedule and preparatory work for filing its OGC application and other required permits and applications to be reasonable. The Panel directs FEI to provide regular updates on these items in accordance with reporting requirements as laid out in Section 6.1.

2.3.7 Project costs and accounting treatment

FEI states that the total anticipated cost of the Coquitlam Gate IP pipeline project is expected to be $242.825 million in as spent dollars. This includes $12.351 million in AFUDC and abandonment/demolition costs of $4.169 million. The project will have a levelized rate impact over 60 years of $0.100/GJ. As noted previously, this equates in 2019 to an annual impact of $11.40 for a normal residential customer.[152]

FEI's estimate is based on AACE Class 3 level of project definition and design. Individual cost elements consist of historical costs, non-binding quotations and projections with an expected cost accuracy estimate in line with the Class 3 estimate. FEI states that its estimates are based on the most recent studies and available information with the pipeline expected to be in service by October 2018. The annual escalation rate is 4.5 percent. This is based on the ten-year average escalation rates as per Statistics Canada for industrial construction and line pipe for 2002 to 2012.[153]

FEI conducted a formal risk analysis, including a Monte Carlo analysis, of the project and used the results in determining the appropriate contingency. The Monte Carlo P10/P90 risk range and the P50 value results in accuracy range of -16.3 percent/+21.7 percent. This is in line with the AACE Class 3 estimate level of accuracy and confirms FEI's selection of a prudent contingency amount.[154]

The project Class 3 capital cost estimate was revised to reflect the new selected preferred route selection. The new route alignment has resulted in an overall reduction in the Class 3 cost estimate impacting owner's costs, materials, and construction costs. FEI states that the same risk profile applies to the new route selection and the same contingency is therefore applied to the Class 3 cost estimate.[155]

The accounting treatment proposed by FEI is to assign the costs to accounts on the following basis:

- Gas Plant in Service: $226.306 million (capital cost) plus $12.235 million AFUDC
- Negative Salvage Deferral Account: $4.169 million (abandonment/demolition costs) plus $0.115 million AFUDC[156]

The allocation of costs will be in accordance with Generally Accepted Accounting Principles (GAAP) and the Uniform System of Accounts for Gas Companies.[157]

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[152] Exhibit B-1-6, pp. 13, 25.
[153] Exhibit B-1, pp. 95–101; Exhibit B-13, BCOAPO IR 2.2.1, 2.2.2
[154] Ibid., pp. 100–101.
[155] Exhibit B-1-6, pp. 14–15.
[156] Ibid., p. 13.
[157] Exhibit B-5, BCOAPO IR 1.5.4.

In addition to the capital costs there are LMIPSU Application costs and LMIPSU Development costs. The application costs include legal costs, consultant costs, Commission costs and Commission approved intervener costs. The development costs include costs for project management, engineering and consultant's costs for assessing the potential design and alternatives and associated costs incurred prior to Commission approval of the projects.[158]

FEI is requesting approval under sections 59-61 of the UCA to add these costs to two new deferral accounts (LMIPSU Application Costs account and LMIPSU Development Costs account), attracting the weighted average cost of capital until they enter rate base on January 1, 2016. FEI proposes a three-year amortization period for both accounts.[159]

The estimated LMIPSU Application cost (includes both projects) is $1.307 million in as spent dollars, plus $0.080 million in weighted average cost of capital (WACC) return, less a tax offset of $0.340 million for a total of $1.047 million.[160]

The estimated LMIPSU Development cost for both projects is $2.929 million in as spent dollars, plus $0.215 million in AFUDC, less a tax offset of $0.762 million for a total of $2.382 million. Of the total, 93 percent is attributed to the Coquitlam Gate IP Project and 7 percent to the Fraser Gate IP Project.[161]

Intervener submissions

CEC submits that FEI has the requisite expertise to design and develop the proposed project in accordance with best practices and recommends the Commission accept the proposed project design subject to the correction of any flaws that may be identified. CEC submits the project is appropriately costed at a Class 3 estimate level.[162]

BCOAPO does not specifically provide its view on the project cost estimate or the contingency. However, BCOAPO submits that based on the AACE Class 3 cost estimates provided and the potential for other changes "it is not unreasonable to suppose costs could increase by tens of millions of dollars above the current cost estimate." BCOAPO proposes the establishment of a deferral account to capture the difference between the current Class 3 estimate and the actual construction costs.

If the project is approved by the Commission BCOAPO recommends that FEI be required to submit a Class 1 estimate. If the Class 1 estimate is materially different from the estimate in the application, BCOAPO proposes an 'abbreviated' hearing in which FEI would be required to explain these changes. BCOAPO further suggests the Commission could establish a variance account from which the utility would book costs that would be subject to disallowance if it were found that the utility had not acted prudently or failed to put in place adequate mechanisms to contain costs.[163]

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[158] Exhibit B-1, p. 139.
[159] Exhibit B-1, p. 139.
[160] Exhibit B-1-6, p. 25.
[161] Ibid., Table 4-3, p. 27.
[162] CEC Final Argument, p. 16.
[163] BCOAPO Final Argument, p. 9.

BCOAPO does not oppose the recovery of the LMIPSU application and development costs. However, it argues that these costs should attract FEI's short term interest rate rather than an interest expense equal to the WACC.[164]

FEI reply

FEI's position with respect to the creation of a deferral account to capture the difference between the applied for costs and the actual costs is that such an account is contrary to the presumption of prudence inherent in current regulatory practice. FEI sees that creating such an account assumes that any amount over the forecast costs is sufficient to rebut the presumption of prudence and trigger a prudency review.[165] FEI further states that the Commission has the ability to oversee the progress of the projects and has tools, such as a prudency review to examine costs incurred for the project if required.[166]

FEI further argues that BCOAPO's call for the submission of a Class 1 estimate should be rejected because:

- It is not a practical or reasonable approach;
- FEI has filed a Class 3 estimate as required by the CPCN Guidelines and to go beyond this would incur unnecessary costs that would be borne by FEI customers;
- FEI is unaware of any previous requirement by the Commission for any project to file a Class 1 estimate; and
- The filing of a Class 1 estimate would have no material impact on subsequent project costs.[167]

With respect to BCOAPO's submission that the LMIPSU application and development deferral accounts should attract interest at FEI's short term interest rate rather than the WACC, FEI argues that BCOAPO has not provided a persuasive justification for its proposal which is contrary to the current practice in FEI. The Commission has consistently approved interest based on WACC for FEI in other CPCNs such as the Huntingdon Station Bypass and the Muskwa River Crossing.[168]

Commission determination

The Panel finds that the estimated project cost of the Coquitlam Gate IP Project meets the CPCN Guidelines and the proposed accounting treatment of the costs incurred is appropriate. Additionally, the Panel approves the establishment of two new deferral accounts, the LMIPSU Application Costs account and the LMIPSU Development Costs account. Both accounts are to attract interest at the WACC until entering into rate base. The accounts are to be transferred to rate base and amortized over a three-year period commencing January 1, 2016.

The Panel recognizes that, as discussed in Section 2.4.4, an amendment to the estimated cost may occur when greater certainty is obtained as to the amount of trenchless construction that will be needed.

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[164] Ibid., p. 10.
[165] Exhibit B-13, BCOAPO IR 2.2.3.
[166] Ibid., BCOAPO IR 2.2.4.
[167] FEI Reply Argument, pp. 8–10.
[168] Ibid., p. 12.

The Panel based its determination on the Class 3 cost evidence provided and notes that no party challenged the validity of the AACE Class 3 estimate. Nonetheless, we do acknowledge BCOAPO's submission that there are various factors that could lead to a cost overrun beyond the parameters of a Class 3 estimate. **However, the Panel finds the proposals that BCOAPO puts forward with respect to the establishment of a variance account and requiring FEI to file a Class 1 estimate to be unnecessary and could impose unnecessary costs on FEI customers.** The Commission oversight as set out in Section 6.1, coupled with the ability of the Commission to invoke a prudency review if warranted, provides an appropriate balance in terms of protection of FEI ratepayers and regulatory efficiency.

The Panel finds FEI's proposed accounting treatment for capital costs to be in accordance with GAAP and the Uniform System of Accounts for Gas Companies and notes that, apart from BCOAPO's proposal for a variance account, no party took issue with it.

All parties supported the recovery of the LMIPSU application and development costs. The Panel considers BCOAPO's submission to apply FEI's short-term interest rate to these costs rather than the WACC is not persuasive and lacks an evidentiary basis. **For this reason the Panel finds the setting of the interest rate should continue to follow the practice that has been applied to previous FEI CPCNs and be based on FEI's WACC.**

3.0 FRASER GATE PROJECT

3.1 Project description and key issues

FEI identifies the Fraser Gate IP pipeline as being "vulnerable to failure due to less than 1:2475 year seismic-induced ground movement event." It serves approximately 171,000 customers and is a major natural gas supply source to Vancouver, Burnaby and the North Shore. Located in an urban area in South Vancouver, FEI states that its failure due to a seismic event could potentially impact these customers for a prolonged period of time.[169]

In its Application, FEI described the Fraser Gate IP Project as involving the replacement of a section of NPS 30" pipeline operating at 1200 kPa totalling approximately 500 metres. The pipeline section in question was constructed and commissioned in 1958 and extends from the Fraser Gate Station located at the 2700 block of East Kent Avenue through to the corner of East Kent Avenue and Elliot Street in South Vancouver. The pipeline specifications called for a like sized NPS 30" pipeline to replace the existing pipeline section which does not meet FEI's seismic criteria of resistance to a 1:2475 year event.[170]

FEI indicates that it has subsequently undertaken further study of soil conditions and seismic analysis as outlined in its response to BCUC IR 1.31.4. The information request queried whether it would be prudent and cost-effective to drill additional test holes in the affected area. Additional subsurface information was collected in March and April of 2015 that, in conjunction with the seismic analysis, allowed for a change to the amount of pipe that needed to be replaced and still meet the seismic criteria based on technical considerations. As a result,

[169] Ibid., pp. 102–106.
[170] Exhibit B-1, p. 102.

FEI has revised the scope of the Fraser Gate IP Project. It will now involve replacing 280 metres of pipeline rather than the 500 metres that had originally been proposed.[171]

There are a number of issues arising with respect to the Fraser Gate IP Project. Key among these are those that relate to whether there is a need for the project or whether it could be delayed or put off indefinitely. In its review of FEI's project proposal, the Panel considers a number of issues. Included among these are the following:

- Is FEI's reliance on a 1:2475 year event criteria reasonable?
- Is the seismic analysis of soil conditions sufficiently compelling to justify moving forward with the project?
- What weight should be placed on the estimates of economic and financial impacts of a failure of the Fraser Gate IP pipeline?
- Has FEI proposed the optimal alternative in terms of satisfying the need for the project and doing so in a cost effective manner?

This section will review these issues, among others, and provide determinations on whether the Fraser Gate IP Project should proceed and if so, how this can be best accomplished.

3.2 Project need

3.2.1 Description of the problem

FEI's primary reason for upgrading approximately 280 metres of NPS 30" pipeline near Fraser Gate Station is the pipeline's vulnerability to a 1:2475 year seismic event. In justifying the need for the project, FEI has evaluated the potential failure of the Fraser Gate pipeline against safety and economic consequences of such a failure.

FEI states that its Integrity Management Program (IMP) provides a systematic and comprehensive approach for the management of risks related to hazards to FEI's pipeline assets. One activity element of the FEI's IMP is Seismic Hazard Management which reviews pipeline assets to ensure that pressure integrity is maintained so that asset failure does not pose a hazard to the public following a 1:2475 year seismic event. Existing assets are subject to periodic reviews undertaken by FEI and completed at a level of detail appropriate to an assessed hazard. FEI states that a segment of the Fraser Gate pipeline is vulnerable to failure due to less than 1:2475 year seismic induced ground movement.[172]

The safety concern related to the seismic vulnerability of the pipeline is influenced by a number of factors including the predicted pipeline failure mode and population density of the surrounding area. Relying upon a widely referenced methodology outlined in a paper, "A Model for Sizing High Consequence Areas Associated with Natural Gas Pipelines, Gas Research Institute (GRI), 2000", FEI estimates the immediate vicinity threat of a pipeline hazard area to be a radius 83 metres for this pipeline. Noting that a review of the East Kent Avenue

[171] Exhibit B-1-6, p. 19.
[172] Exhibit B-1, p. 102.

shows there are residential dwellings on the north side of the street, FEI states that a "full-bore rupture of the pipeline resulting from a seismic event could therefore result in significant public safety issues."

An outage of the Fraser Gate pipeline due to a seismic event by FEI's estimates could impact up to 171,000 customers. FEI has estimated economic losses that could exceed $320 million for the general public, customers and the company in the event of a pipeline failure.[173]

3.2.2 Third party studies

FEI states that to assess the need and justification for the Fraser Gate IP Project it engaged third party experts and its internal staff to conduct studies and reviews. These included the preparation of a seismic study, a loss of supply assessment as well as an economic consequence of failure study.

Seismic study

Due to an identified seismic vulnerability on a Fraser Gate IP segment, DG Honegger Consulting (DGHC) was engaged in 2012 to produce a site specific summary report (Summary Report) designed to capture the level of pipeline vulnerability and provide recommendations. In the Summary Report DGHC confirmed that the major hazard identified in previous studies it relied upon "related to liquefaction and subsequent lateral spread displacement of river banks crossed by the pipelines." One such study, a Site-Specific Seismic Vulnerability Assessment of pipeline segments near Fraser Gate Station prepared by Golder Associates (Golder) was appended to the Summary Report.

DGHC reports that East Kent Avenue North (north of the railway tracks) lies outside the limits of potentially liquefiable soil deposits but Golder estimates that for a return period of 1:2475 years ground displacement hazards for the portion on the south side of the street "include lateral spread displacement of 1.6 m toward the river and settlement of 0.03 m." The spread displacement for 475 years was estimated lower at 0.3 metres. In addition, the DGHC summary report states that Pipeline Research Council International guidelines stipulate the allowable compression strain for pressure integrity is 1.8 percent considering the ratio of wall thickness to pipe diameter and based on this, the horizontal displacement capacity is approximately 0.5 metres. Although this is greater than the 475-year displacement estimate, it is well below the 1.6 metre estimate for a 1:2475 year event.

DGHC provided two options to improve pipeline response: replace the existing pipeline with a higher grade of steel and thicker pipe wall or relocate the pipeline to East Kent Avenue North thereby avoiding the hazard.[174]

Loss of supply risk assessment

FEI reports that its System Capacity Planning group undertook a study using hydraulic models in order to determine the potential number of customers impacted by the loss of specific pipeline segments. The results show that if the Fraser Gate IP system were to go out of service it could impact up to 171,000 customers.[175]

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[173] Exhibit B-1, p. 103.
[174] Exhibit B-1-1, Appendix A-4, p. 1.
[175] Ibid., Appendix A-9, p. 18.

Economic consequence analysis of hypothetical gas service interruptions in the BC Lower Mainland

FEI retained HJ Ruitenbeek Resource Consulting Ltd. to prepare a report on the economic consequences of potential natural gas service interruptions in the Lower Mainland. The report was designed to provide an economic assessment of potential economic costs resulting from unplanned outages impacting FEI's natural gas delivery operation. The study considered the following cost categories:

- Direct fixed expenditures resulting from the outage;
- Relight costs;
- Revenue losses; and
- Service disruption costs.

As noted by the author, the work has been scoped to provide a quantitative estimate of the economic consequences of a credible worst-case disruption of the gas supply in specific areas within the Lower Mainland and "[o]utages and interruptions of the sort described in the report are rare events."[176]

The report indicates that a service interruption in the Fraser Gate IP pipeline could result in costs of over $320 million.[177]

3.2.3 Reliance on 1:2475-year event criteria

In accordance with CSA Z662, the governing code for this pipeline, and consistent with industry practice, FEI seismic design guideline DES-09-02 requires an assessment of potential seismic risks and stipulates that pipeline design must be sufficient to withstand seismic loadings for an event with a return period of 1:2475 years (2.5 percent probability of exceedance over 50 years). The standard further requires that this be used as a basis for "evaluating the level of strengthening needed for both new and existing pipelines."[178] FEI states that its seismic criteria is in alignment with both the 2005 Building Code of Canada and its understanding of what other Lower Mainland critical utility infrastructure operators apply as minimum criteria.[179] Further, FEI confirms that the two transmission pipelines supplying Fraser Gate Station can withstand a 1:2475 year seismic event.[180]

3.2.4 Operational flexibility and system resiliency

FEI describes the Fraser Gate IP pipeline and the Coquitlam Gate IP pipeline as single point of failure pipelines. This is because currently, if either pipeline fails there is no alternate supply for all of the customers in the other pipeline segment to be supplied during all periods. Lack of a back-up capacity can mean "there is no efficient way to isolate stations or pipeline segments for in-service repair, replacement or reconfiguration for an alternative feed without adversely impacting supply to customers." FEI's position is that while both the

[176] Ibid., Appendix A-5, pp. 1–2, 8.
[177] Ibid., p. 5, Table ES-2a, Segment 1.
[178] Ibid., Appendix A-28, p. 1; Exhibit B-1, p. 102.
[179] Exhibit B-1, p. 103.
[180] Exhibit B-4, BCUC IR 1.33.2.

Coquitlam Gate and the Fraser Gate IP pipeline projects will individually improve system integrity and safety, "only together will they allow for full system resiliency…."[181]

Since the matters of operational flexibility and system resilience have been addressed in Section 2.3 no further description of these factors with reference to the Fraser Gate IP pipeline is required.

Intervener submissions

CEC submits that with the exception of the portion of the pipeline in question, the Fraser Gate pipeline system has had no leaks and is capable of withstanding a 1:2475 year seismic event. However, CEC acknowledges that a full bore rupture of the Fraser Gate IP pipeline due to a seismic event would require a complete shutdown and could result in significant public safety and economic consequences. Further, it notes that in spite of the revised understanding of the extent of soil susceptibility due to ground displacement, the estimates of the likelihood of a seismic event are not altered.

CEC accepts that the primary need for the Fraser Gate project is for seismic vulnerability as opposed to system condition making it different from Coquitlam Gate. However, it submits that this description can lead to inadequate analysis as a result of failing to consider all the options such as that resulting from BCUC's information requests (resulting in a reduction of the scope of the project). CEC submits that the "review of alternatives as a result of the regulatory process has resulted in an improved alternative being identified providing significant benefit to customers."[182]

BCOAPO is not in support of the Commission approving a CPCN for the Fraser Gate IP Project. BCOAPO's position is that FEI has not demonstrated the need for the project at this time nor has it demonstrated the benefits of moving ahead with the project in conjunction with the Coquitlam Gate IP Project. It submits there has been no urgent need established to complete the project in the proposed timeframe and the project can be safely deferred "for an extended period of time."[183] The need for immediate action in response to a threat to the pipeline as proposed by FEI should be considered within the context of the likelihood of such an event occurring. In its view the chance of a 1:2475 seismic-induced ground movement event occurring in the near future is highly unlikely.

Concerning FEI's safety consequences, BCOAPO submits that the Company does not detail the types of public safety issues that could arise or whether there were strategies to mitigate such an event. It also points out that FEI does not address technologies which could be employed to shut off the pipeline.

With respect to FEI's assessment of service interruption potential and economic consequences, BCOAPO has two concerns:

i) In considering the consequences of service interruption, FEI fails to consider the impact of the Coquitlam Gate IP pipeline; and

ii) The figure used to calculate economic consequences is not reliable.

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[181] Exhibit B-1, pp. 20–25; FEI Reply Argument, p. 6.
[182] CEC Final Argument, pp. 24–25.
[183] BCOAPO Final Argument, p. 11.

BCOAPO submits that FEI fails to address the interplay between the Fraser Gate IP and Coquitlam Gate IP pipelines stating that if the preferred Coquitlam Gate option is approved there will be full resiliency. Further, a disruption of the magnitude required to result in catastrophic failure would also "likely have catastrophic impacts on the residential, commercial and industrial services on that line." Moreover, "many utility services would likely be disrupted and the actual economic costs would be largely dependent [on] which utility was last to provide resumption of service."[184]

FEI reply

FEI states that BCOAPO's position as to the Fraser Gate IP Project need rests on three mistaken premises:

i) Identified seismic vulnerabilities and consequences should be ignored.

ii) The Coquitlam Gate IP Project alone will remove seismic vulnerability associated with a portion of the Fraser Gate IP pipeline; and

iii) High consequence, but lower likelihood, risks should not be mitigated.[185]

FEI states that the UCA obligates it to maintain its equipment in a condition to allow it to provide service to the public that is in all respects adequate, safe, efficient, just and reasonable. It points out that its seismic hazard management activity is designed to ensure pressure integrity is maintained following ground displacements related to an earthquake and will not pose a hazard to the public when there is a failure of identified assets. [186]

The 1:2475 year return period standard is not arbitrary and CSA Z662, the Oil and Pipeline Systems technical code, requires the anticipated seismic loading be part of oil or gas pipeline design criteria. Further, FEI's seismic design guideline DES-09-02 requires that pipeline design be sufficient to withstand a 1:2475 year event. FEI states that the proposed portion of the pipeline to be replaced and upgraded is a particularly vulnerable part of the system. The remainder of the Fraser Gate IP pipeline has been judged satisfactory to withstand a 1:2475 year seismic event as are the two transmission pipelines supplying the Fraser Gate Station.[187]

FEI states that the safety concern related to pipeline seismic vulnerability is influenced by factors like predicted pipeline failure mode and population density. Further, the 83 metre hazard area radius is an estimate and given the urban nature of the site, a full-bore pipeline rupture "presents obvious and significant safety issues." Concerning BCOAPO's submission that the chance of a seismic-induced ground movement is highly unlikely, FEI points out that BCOAPO fails to explain why it should not follow the applicable standards for this Fraser Gate IP pipeline segment or why this should be an exception to FEI's seismic hazard management process. FEI asserts that BCOAPO, with no evidentiary basis, speculates on other alternatives but failed to canvass these alternatives in the workshop or two rounds of IRs. [188]

FEI considers system resiliency to be an important matter stating that completing both projects would result in a resilience to serve customers through potential future failure events as well as for repairs. It disagrees with

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[184] BCOAPO Final Argument, pp. 14–15.
[185] FEI Final Argument, p. 13.
[186] FEI Reply Argument, pp. 13–14.
[187] FEI Reply Argument, p. 15; Exhibit B-4, BCUC IR 1.29.1.5, 1.33.2; Exhibit B-6, CEC IR 1.54.1.
[188] FEI Reply Argument, pp. 16–17.

BCOAPO's assertion that there will be full resiliency if the Coquitlam Gate is approved. In the event of a full-bore rupture resulting from a seismic event, the Coquitlam Gate IP pipeline capacity could be exceeded thereby resulting in system outages. The potential consequence of such an event could impact up to 171,000 customers with economic loss impacts.[189]

Commission determination

The Panel finds that FEI has justified the need for the Fraser Gate IP Project.

As a utility FEI is required by section 38 of the UCA to provide "a service to the public that the commission considers is in all respects adequate, safe, efficient, just and reasonable." FEI has identified the Fraser Gate IP pipeline as being vulnerable to failure in the event of a 1:2475 year seismic-induced ground movement event and has concluded that this is a safety risk to its ratepayers. In reaching this conclusion, the Company has relied upon studies conducted by experts in this field such as DGHC that have supported the position that the pipeline could not withstand a 1:2475 year seismic-induced ground displacement event. DGHC have also noted that a seismic vulnerability assessment prepared by Golder will directly impact residents within the hazard area. None of the interveners disputed this evidence and therefore the Panel concludes that these estimates can be relied upon and accepts them.

The Panel is not persuaded by FEI's assertions that completion of this work will impact resiliency. As noted in Section 2.3, FEI describes system resiliency as the ability to isolate pipeline sections in an emergency without impacting supply to its customers. In our view replacing the vulnerable section of pipe as proposed by FEI will result in a reduction of the risk of a major emergency event occurring. However, it does not improve resiliency as it does little to improve handling of such an event if it were to occur.

A second related question is whether the 1:2475 year event criteria as relied upon by FEI is reasonable. The Panel considers it important to have standards in place that are both practical and reasonable and reflect the risk to the safety of ratepayers and nearby residents. FEI has made a compelling argument that relying on criteria based on a 1:2475 year seismic event is not only reasonable but is consistent with industry practice. In addition, its seismic design guideline DES-09-02 has been in place for some time and is reflected in the two transmission pipelines leading into the Fraser Gate Station. The Panel notes that CEC takes no issue with the 1:2475 year criteria and BCOAPO provides no reason as to why the existing criteria should not be followed. Given this evidence the Panel is persuaded that the application of 1:2475 year seismic design criteria for this segment of the Fraser Gate IP pipeline is appropriate and accepts it.

The Panel acknowledges the position of BCOAPO with regard to the likelihood of a 1:2475 year seismic event occurring, but question whether the project can be safely deferred over an extended period. We note that BCOAPO provided no recommendation as to when it is appropriate to complete the project.

While not determinative, the Panel places little weight on the economic analysis of hypothetical gas service interruption as provided by FEI. As commented upon in Section 2.3, the study submitted represents a worst-case scenario and needs additional rigor if it is to be relied upon.

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[189] Ibid., pp. 16–17.

3.3 Evaluation of alternative options

3.3.1 Introduction

Given that the Fraser Gate IP pipeline has been identified as vulnerable to failure due to a less than 1:2475 year seismic ground movement, FEI has described the objectives of any alternative to be considered as follows:

- Achieve FEI's seismic criteria of resistance to a 1:2475 year event;
- Mitigate the safety risk posed by the pipeline as a result of seismic vulnerability;
- Mitigate the economic risk posed by the pipeline as a result of seismic vulnerability; and
- Address constructability, operational and safety factors, such as routing constraints, proximity to adjacent utilities and appropriate construction techniques, limiting interruption of flow of gas during construction and commissioning and allowing sufficient space to work around existing piping and components.[190]

3.3.2 Review of pipeline alternatives and route considerations

FEI states that it considered two alternatives; do nothing or abandon the existing pipeline segment and replace with a like pipeline with a higher grade of steel and thicker pipe wall in order to mitigate the seismic risk.

Alternative 1 – Do nothing

FEI notes that "Do Nothing" will prolong the risk and does not meet any of the objectives for the project. Therefore, this alternative was rejected outright.

Alternative 2 – Pipeline replacement

In its Application FEI proposes replacing the existing segment of the Fraser Gate IP pipeline with a new 500 metre section of NPS 30" pipeline from the outlet of the Fraser Gate Station to the corner of East Kent Avenue and Elliot Street. FEI states that the pipe design, material selection, construction and testing will ensure the Company's design objective of maintaining pressure integrity while posing no hazard to the public following ground displacements from a major earthquake. The project cost estimate was $14.855 million (based on a Class 3 estimate, 2014 dollars, excluding AFUDC).[191]

As noted in Section 3.1, the Company revised the scope of the project as a result of further study of soil conditions and seismic analysis. It conducted additional review of seismic susceptibility along with its experts at Test Hole AH95-2 and there is no earthquake-induced hazard threat to the pipeline from that location to the west and north. It also conducted further test holes to determine more precisely where soils change and initiated further seismic analysis to determine the appropriate length of pipeline replacement to avoid unacceptable stress in the transition zone between new and existing pipe. The proposed scope has now been revised to replace approximately 280 metres of NPS 30" pipeline. The new pipe will extend from the Fraser Gate

[190] Exhibit B-1, pp. 106–107.
[191] Ibid., pp. 107–108.

Station to a point 30 metres east of where the existing NPS 30" pipeline goes north to pass beneath the Canadian Pacific rail line. The revision results in a revised forecast of $8.990 million in as spent dollars including AFUDC of $0.419 million.[192]

BCUC IRs 2.20.2 to 2.20.5 examined the potential of addressing the problem by ground improvement as compared to the proposed replacement of pipeline. FEI reports that this approach would face several challenges and would cost significantly more.[193]

Intervener submissions

CEC takes issue with the FEI's characterization of the do nothing option as unacceptable or not feasible and submits that this is not really an alternative. CEC submits there is a potential for inadequate analysis as defining alternatives at this level fails to allow "the subdivision of options within a feasible direction to enable examination of true alternative." In this case, FEI was challenged with respect to the requirement to replace a full 500 metre section of pipeline. When the Commission asked the Company whether it would be prudent to examine additional test hole data, the alternative proposed by the Commission was superior and less expensive than the option proposed by FEI. CEC submits that a review of the alternatives resulting from the regulatory process resulted in an improved alternative of significant benefit to customers. This should be approved.[194]

Commission determination

The Panel accepts the proposed change of scope for the Fraser Gate IP pipeline and finds the approximately 280 metre NPS 30" pipeline operating at 1200 kPa as proposed by FEI to be the optimum alternative.

The Panel considers the additional analysis conducted by FEI to determine that the shorter 280 metre pipeline meets the requirements of the project is a significant benefit to ratepayers. Not only are there cost benefits related to the scope change but, in addition, the reduction in scope will lead to a corresponding reduction in the amount of disruption caused by the project and in the Panel's view, the amount of time required to complete it.

3.4 Project design and management

3.4.1 Introduction

As outlined in the Application and evidentiary update, the project scope includes the design, routing, construction and commissioning of what will now be approximately 280 metres of new and upgraded NPS 30" pipeline. The main project components are:

- The NPS 30" Fraser Gate IP pipeline that will operate at a MOP of 1200 kPa;
- The pipeline will be designed in accordance with CSA Z662 Section 12 for 'Gas 3 Distribution Systems' to operate at hoop stresses of less than 30 percent of the specified minimum yield strength of the line pipe; and

[192] Exhibit B-1-6, pp. 19, 22; Exhibit B-1-1, p. 20.
[193] Exhibit B-11, BCUC IR 2.20.2–2.20.5.
[194] CEC Final Argument, pp. 25–26.

- The pipeline design will follow the FEI Seismic Design Guideline (DES-09-02).

FEI states that the pipeline is to be constructed and installed predominantly within existing road allowance as within an urban environment, transportation corridors provide the most feasible alignment opportunities.[195]

The Panel notes that there are a number of areas in Section 2 of this decision, the Coquitlam Gate IP Project, where there have been findings or determinations that are applicable to the Fraser Gate IP Project. These include ILI capability, the CP system and abandonment plans. To avoid unnecessary repetition these will not be addressed again in this section.

3.4.2 Design and engineering

Design, construction and operation of pipelines for natural gas must be in accordance with OGC regulations and CSA Standard Z662-11 "Oil and Gas Pipeline Systems." Therefore, in addition to adherence to FEI internal standards, the Fraser Gate IP Project will be developed in accordance with any applicable statutory standards and codes. The list of applicable industry standards and specifications for this project are identical to the Coquitlam Gate IP Project and have been listed in Table 5 in Section 2.3.2.[196]

Concerning pipe specification, FEI states that the steel grade was increased to one higher than what is required for hoop stress. Based on the completed preliminary design work, the wall thickness and steel grade selected are 11.1 millimetres and Grade 483 respectively. Further seismic and stress analysis will be completed to validate these during the detailed design phase.

CSA Z662 requires external coatings as a first level of defense against corrosion. FEI has chosen an outer wrap to be comprised of an anti-corrosion coating layer and a 90 millimetre layer of reinforced concrete. This coating has been selected due to its durability, high quality industry acceptance and its conduciveness to an urban location.

FEI confirms that there is no requirement for design upgrades, modifications or station replacements as part of the segment replacement for the NPS 30" Fraser Gate IP pipeline. It also confirms that management of the pipeline integrity will continue to be within the IMP. Activities will include the following:

- Monitoring of the CP system in accordance with regulatory requirements and industry practice.
- Third-party damage prevention activities including the permits and inspection process and safety awareness programs for the public.

Operations and maintenance activities will continue as before with the Company's standards and procedures for IP pipelines and stations.

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[195] Exhibit B-1, pp. 111–112.
[196] Exhibit B-1, p. 114.

In its Application FEI noted that it expected the majority of the replacement pipeline would be located within existing road allowances with a small portion in areas which may require new land or access rights. Due to the reduction in the route length of the replacement segment to 280 metres, FEI confirms that all of the work will now be undertaken within the existing road allowance. FEI confirms that any existing NPS 30" pipeline will be abandoned in place once the new pipeline is operating.

As the proposed pipeline replacement is occurring in urban areas, the Company acknowledges that the installation work will be done in proximity to existing adjacent utilities and a significant number of utility infrastructure services will be encountered. FEI has contacted major stakeholders including British Columbia Hydro and Power Authority, Metro Vancouver and Translink regarding these activities and will continue to liaise with them and address concerns during the detailed design and engineering work.[197]

Commission determination

The Panel finds the design and engineering work done to date on the section of the Fraser Gate IP pipeline and associated facilities to be satisfactory for this stage of the project and addresses the related issues in a reasonable manner.

3.4.3 Route selection

3.4.3.1 Background

FEI states that the routing process for the Fraser Gate NPS 30" IP pipeline follows industry practice with consideration given to CSA Z662-11 Oil and Gas Pipeline Systems recommendations. In this instance, the typical approach to routing a pipeline has been tailored due to the urban nature of the pipeline and unique challenges. Route options have been evaluated against established criteria to establish the preferred option. A final stage in the routing process will involve the development of detailed routing and engineering for the preferred alternative. This involves further stakeholder and public consultation, detailed engineering, and comprehensive site inspections.[198]

FEI states that the first step in the process is based on the existing NPS 30" IP pipeline route at the East Kent Avenue location and established a route assessment corridor. To ensure all feasible route options are captured, the selected corridor extends beyond the existing pipeline alignment on either side and allows for options around perceived routing obstacles along the existing pipeline alignment. Municipality and major stakeholder feedback, online sources, cartographic, engineering, and environmental constraint surveys were used to inform FEI of key constraints including geological and above and below ground man-made infrastructure. Following establishment of a route corridor, FEI identified feasible alternative route alignments within that route corridor.[199]

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[197] Exhibit B-1, pp. 114–117; Exhibit B-1-6, p. 21.
[198] Ibid., pp. 117–118.
[199] Ibid., p. 118.

Preferred route option selection

FEI has identified three alternative East Kent Avenue area route options for the Fraser Gate IP pipeline replacement segment:

1. Route Option 1: is routed in the East Kent Avenue South roadway from Fraser Gate to Elliot Street. In the Application this included a short section within Gladstone Park.
2. Route Option 2: is located within East Kent Avenue North from Fraser Gate Station to Elliot Street (north of existing rail lines).
3. Route Option 3: travels north from the Fraser Gate Station, then east on Kent to Jellicoe Street and then west along Marine Drive to the intersection of Elliot and Marine Drive.

Route Option 1 was originally projected to be 540 metres in length but as discussed in Section 3.3.2, this was later reduced to 280 metres due to a further study of soil conditions and seismic susceptibility. Route Option 2 is approximately 540 metres long and Route Option 3 is significantly longer at 1,000 metres.[200] A summary of the screening of selection criteria and scoring for Fraser Gate IP pipeline options is presented in Table 10. The evaluation methodology, when applied to the options listed in the Application, resulted in Option 1 (along East Kent Avenue South) as being the preferred route.

[200] Exhibit B-1, pp. 119–120.

Table 10 Fraser Gate IP Pipeline Route Options Screening Matrix[201]

Fraser IP Route Selection

Option		1		2		3	
Length (m)		540		600		1050	
Impact and Vulnerability Considerations	Weight	East Kent Avenue South		East Kent Avenue North		Jellicoe Street + Marine Drive	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Community/Stakeholder							
Health and Safety	15	4	60	3	45	2	30
Socio-Economic	15	4	60	3	45	2	30
Land Ownership and Use	5	2	10	3	15	4	20
Environmental							
Ecology	5	2	10	2	10	4	20
Cultural Heritage	5	5	25	5	25	5	25
Human Environment	15	2	30	2	30	3	45
Engineering/Technical							
Pipeline Engineering/Design	5	4	20	2	10	3	15
Pipeline Construction	10	4	40	2	20	3	30
Pipeline Operation	5	4	20	2	10	3	15
System interface	5	2	10	2	10	2	10
Adjacent Utilities	5	4	20	2	10	3	15
Natural Hazards	10	3	30	4	40	4	40
Totals	100		335		270		295
Ranking		1		3		2	
Relative Cost		100%		112%		213%	
Cost Ranking		1		2		3	

Route Option 2 scored significantly lower than Route Option 1 (270 versus 335) primarily due to the high density of third party utilities that would need to be relocated, the need for construction in close proximity to residential properties and commercial interests and the level of traffic disruption that would result. In addition, the cost of Route Option 2 was higher. Route Option 3 scored lower to Route Option 1 (295 to 335) due to the pipeline length necessitating a longer construction window and resulting in greater community and stakeholder impacts than with Route Option 2. In addition, Route Option 3 was more than double the cost. Therefore, Route Option 1 was the preferred choice with the highest ranking and the lowest cost.[202] Worthy of note is the fact that Route Option 1 has been shortened to 280 metres and no longer has any right of way issues.[203]

[201] Exhibit B-1, p. 127.
[202] Ibid., pp. 127–128.
[203] Exhibit B-1-6, p. 21.

Commission determination

The Panel approves the route for the Fraser Gate IP Project as proposed by FEI. In our view FEI has appropriately assessed potential route options and proposes an option that is less disruptive to residents. In addition, it has done so at a significantly lower forecast cost than initially proposed.

3.4.4 Construction methodology

In the Application, FEI explains that the Fraser Gate IP pipeline is to be constructed with the same pipeline construction contractor as the Coquitlam Gate IP Project.[204] It also states that construction management for the Fraser Gate IP Project will include noise, safety, security, and traffic controls.[205]

In the evidentiary update FEI explains that since the length of pipe has been reduced, it has eliminated the need to install new pipeline under the Canadian Pacific Rail line requiring trenchless construction.[206] As a result, only the In Street Method is now required.

In response to BCUC IRs, FEI clarifies that after the replacement NPS 30" Coquitlam Gate IP pipeline it will be possible to isolate the Fraser Gate IP pipeline without the use of a bypass. FEI explains that this is because the increased capacity of the NPS 30" Coquitlam Gate IP pipeline will be capable of supplying the Metro IP system without any supply required from Fraser Gate. This results in a cost saving of $1.4 million.[207]

Commission determination

The Panel finds that FEI's proposal to use one pipeline construction contractor for both projects, to install the Fraser Gate IP pipeline using In Street Methods, and to use noise, safety, security, and traffic controls is appropriate.

3.4.5 Project schedule and other application requirements

Project schedule

The Fraser Gate IP pipeline project is proposed to be undertaken starting in 2018. Table 11 provides a listing of key milestones and estimated completion dates.

[204] Exhibit B-1, p. 128.
[205] Ibid., pp. 130–131.
[206] Exhibit B-1-6, p. 120.
[207] Exhibit B-4, BCUC IR 1.3.6.

Table 11 Fraser Gate IP Project Schedule Milestones

Activity	Date
Conceptual Development	Completed.
CPCN Preparation	July 2013 – Dec 2014
CPCN Filing	Dec. 2014
CPCN Approval	Q3. 2015
Start of Detailed Engineering, materials specification and contract development	Oct. 2015
Materials Tendering and Orders Placed	Aug. 2016
Submit OGC Application	Sept. 2017
OGC Pipeline Approval	Jan. 2018
Award Contractor	June 2017
Materials Delivery	March 2018
Construction Start	July 2018
In Service	Nov. 2018
Restoration	June 2019

Other application requirements

Construction and operation of pipelines is subject to OGC regulation and governed by the OGAA. As noted in Table 3.2, FEI expects to file its pipeline application with the OGC in September of 2017. The pipeline application is a significant undertaking and FEI expects considerable project technical scrutiny from the OGC. Components of the application include:

- Public and First Nations consultation;
- Land or access rights;
- Archaeological requirements;
- Design reviews; and
- Environmental permits and approvals.

OGC approval is required for each component prior to the start of construction.[208]

Municipal permits

FEI is currently identifying all municipal and city permits required to ensure construction and installation of the Fraser Gate IP pipeline meets all bylaws and guidelines and will acquire them prior to the start of construction.

[208] Exhibit B-1, p. 132.

Other pending or anticipated applications

FEI states that agency notifications are anticipated under, but not limited to, the *Fisheries Act*, *Species at Risk Act*, *Water Act*, and *Heritage Conservation Act*. Additional notifications, permits or approvals may be required from the City of Vancouver and the Agricultural Land Commission. FEI does not expect the project will require an Environmental Assessment certificate or require screening under the Canadian *Environmental Assessment Act, 2012*.[209]

Commission determination

The Panel finds the preparatory work and the project schedule as prepared by FEI to be reasonable and will allow the project to proceed on a timely basis.

3.4.6 Project costs and ratepayer impact

FEI states that the total anticipated cost of the Fraser Gate IP pipeline project is expected to be $8.990 million in as spent dollars (including $0.419 million in AFUDC). The LMIPSU development costs estimated to apply to the Fraser Gate IP Project are $0.210 million in as spent dollars plus interest of $0.013 million less a tax offset of $0.055 million for a total of $.168 million. For a typical residential customer consuming 95 GJ per year this would equate to an annual impact of approximately $0.40 in 2019.[210]

The cost of the project is substantially less than the original Class 3 estimate of $18.107 million in as spent dollars (including AFUDC) as the cost estimate has been revised and now reflects the reduced scope of the project.[211] Materials costs have decreased along with construction costs due to the decrease in project length. In addition, construction costs have been favourably impacted by the elimination of the need for the trenchless crossing of the Canadian Pacific Rail line that had been proposed.[212] Cost estimates were validated with assistance of WorleyParsons.[213]

Cost estimates are based on an AACE Class 3 level of project definition and design. Individual cost elements consist of historical costs, non-binding quotations, and projections with an expected cost accuracy estimate of +30 percent to -20 percent. FEI states that its estimates are based on the most recent studies and available information with the pipeline expected to be in service by October 2018. An annual escalation rate of 4.5 percent is used. This is based on the ten-year average escalation rates as per Statistics Canada for industrial construction and line pipe for 2002 to 2012.[214]

FEI conducted a formal risk analysis, including a Monte Carlo analysis, of the project and used the results in determining the appropriate contingency. The Monte Carlo P10/P90 risk range and the P50 value results in an

[209] Exhibit B-1, p. 133.
[210] Exhibit B-1-6, pp. 22, 25, 27.
[211] Exhibit B-1-6, pp. 22, 40–41.
[212] Ibid., p. 20.
[213] Exhibit B-1, p. 134.
[214] Exhibit B-1, p. 133.

accuracy range of -21.1 percent to +28.9 percent. This is in line with the AACE Class 3 estimate level of accuracy and FEI states it confirms the selection of a prudent contingency amount.[215]

The financial evaluation of the revised preferred alternative is outlined in Table 12. FEI has made its evaluations over a 60-year period as this is consistent with the assumed useful life of the assets.

Table 12 Updated Fraser Gate IP Project Financial Analysis[216]

	Reduced Scope Alternative 2 – Route Option 1 – East Kent Ave South
Estimate Accuracy	Class 3
Total Direct Capital Cost excl. AFUDC (2014 $millions)	7.378
Total Direct Capital Cost excl. AFUDC (As-spent ($millions)	8.572
AFUDC (as spent ($millions)	0.419
Total As-spent ($millions)	8.990
Annual Gross O&M (2014 $millions)	0.001
Levelized Rate Impact $ / GJ – 60 Yr.	0.004
PV Incremental Cost of Service – 60 Yr. ($millions)	10.764

Intervener submissions

CEC supports the Fraser Gate IP pipeline project design as proposed by FEI. Specifically, CEC submits it is satisfied with the design specifications and the route option selected (as revised) and considers them appropriate. In addition, CEC points out that the bill impact on large and small commercial customers is small and considers the cost is warranted given the additional seismic security the project provides to ratepayers. CEC states that Commission approval of the project is appropriate.[217]

In the event the project is approved, BCOAPO accepts FEI's proposed routing but raises concern with the wide variability of costs related to a Class 3 estimate. Consistent with its position on the Coquitlam Gate IP Project, BCOAPO recommends a variance account be established to capture the difference between projected and actual costs.[218]

Commission determination

The Panel finds that the additional security resulting from an upgrade of 280 metres of pipeline to justify the cost and therefore, the estimated project cost of the Fraser Gate IP Project and the proposed accounting treatment for the costs incurred is approved.

[215] Ibid., p. 135.
[216] Exhibit B-1-6, p. 24.
[217] CEC Final Argument, pp. 26–27.
[218] BCOAPO Final Argument, pp. 12–13.

The Class 3 estimate combined with Commission oversight of the project as set out in Section 6.1 provides a reasonable assurance with respect to the projected cost of the project and that actual incurred costs are appropriate. Moreover, the impact on ratepayers is minimal.

The Panel finds the proposals that BCOAPO puts forward with respect to the establishment of a variance account to deal with differences between the estimated costs and actual costs to be unnecessary. The Commission oversight as set out in Section 6.1, coupled with the ability of the Commission to invoke a prudency review if warranted, provides an appropriate balance in terms of protection of FEI ratepayers and regulatory efficiency.

4.0 OTHER CONSIDERATIONS

4.1 Environmental, archaeological and socio-economic assessments

FEI has assessed the environmental, archaeological and socio-economic impacts from the projects. FEI states that the projects are expected to have minimal environmental and archaeological impacts and these can be mitigated through implementing standard best management practices. It further states that a socio-economic impact assessment study was undertaken and indicates the potential for the projects to have a net positive impact to residents and businesses. These include additional employment, economic benefits for businesses and improving the long term natural gas supply. In addition, any short term disruption is expected to be minor if appropriate mitigation measures are taken and no long term negative effects are expected to result.

A preliminary environmental assessment, an archaeological overview assessment and a socio-economic review have been completed. FEI advised that further assessments will be undertaken once approval of the Application from the Commission is obtained.[219]

Environmental

The results of the preliminary environmental assessment undertaken by Dillon Consulting (Dillon) are included in a report titled 'FEI – Lower Mainland Natural Gas System Upgrades: Metro Vancouver Reinforcements Environmental Overview Assessment' (Environmental Overview Assessment).[220] The assessment included review of current land use, soils and surficial geology, contaminated sites, natural environment, and species at risk.[221]

The Environmental Overview Assessment identified natural features that could potentially be impacted by the projects' construction as well as areas of potential contamination that could impact the projects' construction, costs and timelines. The Environmental Overview Assessment identified significant natural features such as fish, wildlife, and terrestrial habitat along the two IP pipeline segments that could be impacted during construction unless mitigated. FEI submits it will follow the best management practices and mitigation measures applicable to the IP pipeline replacements during construction.[222]

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[219] Exhibit B-1, pp. 141, 145; Exhibit B-1-1, Appendices B-1, B-2 and B-3.
[220] Exhibit B-1-1, Appendix B-1.
[221] Exhibit B-1, p. 142.
[222] Ibid., p. 143.

FEI states that a detailed environmental assessment will be prepared and site-specific strategies will be developed to offset any potential negative impacts associated with the projects. In addition, detailed environmental specifications will be prepared as part of the tendering process to ensure contractors are aware of environmental requirements and FEI's internal environmental standards.[223]

Archaeological

The results of an Archaeological Overview Assessment (AOA) of the projects undertaken by Stantec Consulting Ltd. (Stantec) are included in the Application.[224] The AOA reviewed the potential for archaeological and/or cultural heritage resources within the two project areas to determine the requirements for an Architectural Impact Assessment (AIA) prior to ground disturbing activities. The work done is based on a desktop review of available information and a preliminary field reconnaissance of the entire area of the projects.[225]

For the Fraser Gate and Coquitlam Gate IP Projects the AOA concluded that the majority of both projects have low archaeological potential due to the amount of previous disturbance by development activities. Areas around fish-bearing streams have been provisionally assessed as having high archaeological potential and an AIA has been recommended. FEI states that following approval of this Application and prior to construction of the projects, a detailed AIA will be undertaken.

The AOA indicates the following:

- There are no recorded archaeological sites within 500 metres of the area of the projects;
- Most of the area of the projects was evaluated as having low archaeological potential and therefore not requiring any further archaeological assessment; and
- Four unnamed creek crossings at the south base of Burnaby Mountain have a high archaeological potential, and therefore require an AIA.

FEI states that following approval of this Application and prior to construction of the projects, a detailed AIA will be undertaken. Archaeological and cultural impacts in the four creek crossings will be further assessed during the AIA, and detailed archaeological specifications will be prepared and used as part of the tendering process.[226] The AIA process includes First Nations representatives in the archaeological work. The final AIA report must be reviewed and accepted by the Archaeological Branch of the BC Ministry of Forests, Lands and Natural Resources for the required permit to be issued. The AIA final report will also be considered by the OGC in its permitting process.

[223] Ibid., p. 144.
[224] Exhibit B-1-1, Appendix B-2.
[225] Exhibit B-1, p. 144.
[226] Ibid., p. 145.

Socio-Economic

FEI also retained Dillon to undertake a socio-economic impact assessment study of the proposed routes.[227]

The study makes several recommendations for mitigation and management of potential adverse effects and the monitoring of the impacts of the projects during construction. These include compliance with municipal noise bylaws and limiting traffic access restrictions to businesses and residents. It also suggests that a traffic management plan can address temporary disturbances to vehicular traffic by reducing areas of residential and commercial on street parking for short periods of time.

The Dillon report also concluded that the construction projects have the potential for positive employment impacts and will contribute to the local economy in the Vancouver Lower Mainland and beyond. In addition, 'spin-offs' such as increased demand for local hospitality services and restaurants for employees working on the construction sites will be created. FEI estimates the economic benefits of the two upgrades will be approximately $216 million.[228]

Intervener submissions

CEC noted that that the projects are expected to have minimal archaeological environmental impacts with any impacts capable of being mitigated through the implementation of standard best management practices. CEC recommends that the Commission find the archaeological, environmental and socio-economic impacts to be acceptable.[229]

BCOAPO accepts FEI's evidence that the projects are a low environment and socio-economic risk. BCOAPO supports the need for an AIA but due to its potential relevance, it is of the view that the Company should be required to file the completed AIA with the Commission, with copies for review provided to interveners and affected First Nations.[230]

FEI reply

FEI submits that while a detailed AIA will be undertaken once the Commission grants approval, it will not be finalized until construction is completed. FEI also submits that a detailed copy of the AIA can be filed with the Commission with copies for interveners once it has been completed, but it sees little point to this as it would not assist in the determination of whether the project should proceed due to the timing of the completed report.[231]

Further, FEI points out that the completed AIA is already provided to First Nations as part of the Archae ological Branch's permitting process.

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[227] Exhibit B-1-1, Appendix B-3.
[228] Exhibit B-1, p. 147.
[229] CEC Final Argument, pp. 32–33.
[230] BCOAPO Final Argument, p. 17.
[231] FEI Reply Argument, p. 19.

Commission determination

The Panel finds the work to date done by FEI on archaeological, environmental and socio-economic assessments and impacts to be reasonable and accepts them.

Studies have indicated that the projects will have a positive socio economic impact and that environmental impacts can be mitigated by best management practices that FEI has indicated it is prepared to implement.

Concerning the archaeological assessment, the Panel is persuaded that FEI has dealt appropriately with the work that has been done to date. The final AIA report is not complete but once it is it will be assessed by both the BC Ministry of Forests, Lands and Natural Resources and the OGC in two separate permitting processes. Thus, the Panel has assessed the archaeological work to date as appropriate and is not persuaded there is value in requiring the AIA report be distributed to all parties once this decision has been issued.

4.2 Provincial government energy objectives

The Commission's CPCN Guidelines require an applicant to discuss how an applied for project advances the government's energy objectives as set out in the *Clean Energy Act,* Part 1-BC Energy Objectives (Appendix A). In the event there is no direct linkage with the energy objectives the project proponent must discuss how it does not hamper other projects or initiatives undertaken by the applicant or others, from advancing these energy objectives.[232]

FEI states that based on the results of the socio-economic report prepared by Dillon,[233] it considers the Coquitlam Gate and Fraser Gate IP Projects support the following British Columbia energy objective found in section 2(k) of the *Clean Energy Act* which is: *"to encourage economic development and the creation and retention of jobs'."*[234] This report determined that the construction of these projects has potentially positive employment impacts and will contribute to the local economy in the Lower Mainland. It also found that initiating this construction will have economic spin-offs such as increased demand for local hospitality services.[235]

Commission determination

The Panel finds that the Coquitlam Gate and Fraser Gate IP Projects, as described in the Application satisfy section 2(k) of the Provincial Government Energy Objectives. We accept they will have a positive impact on the economy through job creation and economic benefits to the community. Moreover, these projects in no way hamper other projects or initiatives promoting the advancement of these energy objectives.

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[232] 2010 Certificate of Public Convenience and Necessity Application Guidelines, p. 11.
[233] Exhibit B-1-1, Appendix B-3.
[234] Exhibit B-1, p. 148.
[235] Ibid., p. 148.

4.3 Consultation processes

4.3.1 Public consultation

FEI states that the projects are designed to deliver continued safe and reliable supply of natural gas to FEI customers in the Lower Mainland and public consultation and communication are integral components of FEI's project development process.[236]

Communications and consultation plan

FEI states the focus of the FEI's public communication and consultation plan is to ensure residents, land owners, community stakeholders and other interested and affected parties are informed about the projects, have access to information and receive encouragement to provide input to the decision-making process. Its main public consultation goal is the creation of a dialogue with interested parties, where the need for the projects is explained and project options are considered. In addition, FEI wants to ensure that interested parties are made aware that FEI must consider environmental impacts, constructability, and rate impacts resulting from the projects in making a final decision. Activities in support of this include:

1. Communication regarding the projects with the pertinent government agencies at the federal, provincial, municipal and regional levels;
2. Communication regarding the projects with local residents; and
3. Meetings, presentations and conversations with stakeholders.[237]

Issues identification

FEI states that the project team identified key concerns that are expected to be raised by landowners, residents, businesses, and other community stakeholders that would potentially be impacted by the projects and gathered information to address concerns. The list of anticipated concerns included route selection, traffic disruption, public consultation process, impact to the environment, legacies, co-ordination of work, safety of pipelines and business opportunities.[238]

Public consultation activities input received

Primary means of communication with the public was designed to solicit feedback from affected parties. Consultation involved:

- In May 2014 residents within 200 metres of the IP pipeline were mailed a notice outlining the project scope and invite them to information sessions;
- Daily and community newspaper advertisements with respect to information sessions were placed prior to the sessions; and

[236] Exhibit B-1, p. 150.
[237] Ibid., pp. 150–151.
[238] Ibid., p. 154.

- Various electronic communication methods were employed to communicate information along with bill inserts.

FEI consulted with government representatives, as well as business groups and community associations and other utilities and stakeholders.[239] The most significant concern raised was by Highlawn Drive residents who requested FEI to reconsider its route proposal. As outlined in Section 2.3.2, this led to further consultation with the City of Burnaby and a revision of the route selection of two route sections. This bypassed the Highlawn Drive residents in favour of a route paralleling the Lougheed Highway.

FEI submits that engagement with business owners is underway and is ongoing and the Company has committed to work closely with its contractor and affected businesses to ensure any agreements and understandings related to access to businesses are fulfilled. FEI submits its consultation activities to date are sufficient and meet the requirements of the CPCN Guidelines.[240]

Intervener submissions

Both CEC and BCOAPO consider the public consultations conducted by FEI with respect to the Coquitlam Gate and Fraser Gate IP Projects to be acceptable.[241]

Commission determination

The Panel finds the public consultation conducted by FEI with respect to the Coquitlam Gate and Fraser Gate IP Projects to be adequate and meet the requirements of the CPCN Guidelines.

FEI has provided information with respect to its public consultation process and issues which have arisen. Most importantly the Company was able to deal with concerns in an effective manner. As a result, FEI undertook to revise its route on the Coquitlam Gate IP Project and satisfy the concerns raised by some residents and the City of Burnaby. In addition, FEI has acknowledged the need for ongoing communication over the construction process and is committed to working with its contractor and affected business parties to address concerns as they arise.

4.3.2 First Nations consultation

FEI states that the projects are located within traditional territories of the Coast Salish Peoples, in particular, the Tsleil-Waututh First Nation, Squamish Nation, Kwikwetlem First Nation, Stó:lō, Musqueam Indian Band, Semiahmoo First Nation and Tsawwassen First Nation. However, they do not cross any First Nations reserve lands and FEI submits that the potential impact of the projects on First Nations' rights and title is limited.[242]

FEI identifies that OGC is the Crown agency responsible for First Nations consultation and, if required, accommodation of First Nations' interests. Under OGC's process, FEI as the proponent for the projects, is

[239] Exhibit B-1, pp. 163–170; Exhibit B-4, BCUC IR 1.57.1, 2.11.1.
[240] FEI Final Argument, pp. 65–66.
[241] CEC Final Argument, p. 33; BCOAPO Final Argument, p. 17.
[242] Exhibit B-1, p. 173.

responsible for conducting preliminary discussions with identified First Nations and providing documentation to facilitate the OGC process.[243] The OGC has not delegated the duty to consult to FEI.

FEI states it is committed to engaging with potentially affected First Nations to ensure they are:

- informed about the projects;
- aware of potential adverse or beneficial impacts to First Nation interests; and
- provided an opportunity to provide project input.[244]

Engagement Activities

Between October 2013 and July 2014 FEI began engaging with the seven First Nations that were identified as having traditional territories within which the project would be located. FEI initially sent an introductory letter to all seven First Nations which included a description of the project and/or a fact sheet or map.

FEI received no response to this letter from four of the First Nations. For the three First Nations that responded, Kwikwetlem, Tsleil-Waututh, and Squamish, FEI either met with the First Nation to discuss the project further or provided materials specifically requested by the First Nation.[245, 246]

FEI states that the potential for the projects to impact First Nations interests is confined to impacts on archaeological sites, if any, from construction activities associated with the pipeline upgrades. As discussed in Section 4.1, FEI's contractor conducted an AOA, which determined that four creek crossings have high archeological potential and that a further AIA is required. First Nations' representatives will be involved in the AIA work.[247]

FEI asserts that the level of First Nations engagement undertaken at this stage of the Fraser Gate and Coquitlam Gate IP pipeline projects is appropriate. FEI submits that First Nations with any potential interests in the general area of the two projects have been provided with, and will be continued to be provided with, project information. FEI notes that no significant concerns have been raised and that its continued engagement efforts will be in concert with those of OGC as part of the OGC application process.[248]

Intervener submissions

CEC recommends that the Commission find the consultation activities and the costs acceptable.[249]

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[243] Ibid., p. 179.
[244] Ibid., p. 174.
[245] Exhibit B-1, p. 177.
[246] Exhibit B-1-1, Appendix D-1.
[247] Exhibit B-1, pp. 179–180.
[248] Ibid., p. 180.
[249] CEC Final Argument, p. 33.

BCOAPO submits that FEI should make more effort to engage with the First Nations who may be impacted by the project.

BCOAPO points out that the Commission's CPCN Guidelines require that a utility provide "evidence that the First Nation has been notified of the filing of the application with the Commission and has been informed on how to raise outstanding concerns with the Commission." Based on the evidence filed, the Company did not update the affected First Nations when it filed its application with the Commission in December of 2014. In addition, FEI did not provide details of the Commission process or how the First Nations could raise any outstanding concerns with the Commission.

BCOAPO states that four of the seven First Nations contacted did not respond to the initial letter (Tsawassen First Nation, Semiahmoo First Nation, People of the River Referrals Office, and Musqueam First Nations) and FEI made no further attempt to contact or follow up with these First Nations and "refuses to provide them with further updates on the application." BCOAPO states that FEI only provided the update on routing of the Coquitlam Gate IP Project to the three First Nations responding to the Company's initial correspondence. It argues that even if it was accepted that those First Nations did not respond because of non-interest in the proposals, the affected First Nations should be informed if the proposal has changed. BCOAPO points out that only one letter was sent and could have been missed. It considers it prudent for FEI to "check in" with First Nations to ensure they were not interested in further updates.[250]

FEI reply

FEI submits there has been no refusal to provide information to First Nations. It contends that the change in the Coquitlam Gate IP Project preferred routing described in the evidentiary update "was within the same general vicinity as the initial preferred routing." In order to respect First Nations' administrative capacity, the Company provided the update to those First Nations who had previously expressed an interest in the project. FEI reiterates that First Nations consultation is an ongoing process and if a request for information or material is made during the ongoing engagement with First Nations, it will attempt to accommodate the request. FEI intends to continue liaising with First Nations as the projects progress with the OGC permit application process.[251]

Commission determination

The Panel finds that First Nations engagement efforts to date are acceptable. FEI has identified First Nations who assert rights in the project area, notified them of the projects and has been responsive to those First Nations who engaged with it. The Panel accepts FEI's position that to respect the First Nations administrative capacity, it provided updates to those First Nations who had engaged. The Panel is aware that there is a reciprocal responsibility on First Nations to engage with proponents.

Moreover, FEI has outlined its plans for further engagement in conjunction with the OGC permit application process.

[250] BCOAPO Final Argument, pp. 17–18.
[251] FEI Reply Argument, p. 20.

The Panel notes that the OGC is the Crown agency responsible for First Nations consultation and that consultation is ongoing. FEI is only responsible for conducting preliminary discussions with identified First Nations and providing documentation for the OGC review process. The adequacy of First Nations consultation will be addressed by the OGC.

4.4 PBR base capital considerations

Concern has been raised by interveners with regard to whether the Fraser Gate IP Project should be combined with the Coquitlam Gate IP Project as part of this CPCN or be considered separately.[252]

This issue has arisen due to the recent PBR Capital Exclusion Criteria Order G-120-15 and Reasons for Decision issued on July 22, 2015. Key directives with an impact on the current decision are the following:

- FEI's PBR capital materiality threshold was set at $15 million. This is $10 million greater than the $5 million set in the FEI PBR Decision.[253] Under FEI's PBR, capital expenditures in excess of the materiality threshold are excluded from the PBR base capital while amounts less than this are to be charged against the allotted PBR base capital; and
- For any capital project application that exceeds the PBR materiality threshold of $15 million, FEI is required to demonstrate to the Commission that the project is not a result of combining smaller projects and that actual costs fall above the PBR threshold.[254]

In its Application, FEI estimates the cost of the Fraser Gate IP Project to be $18.107 million in as spent dollars (including AFUDC).[255] This is significantly above the PBR capital threshold in place at that time. As noted in Sections 3.1 and 3.3.2, FEI was able to modify the scope of the Fraser Gate IP Project and cost estimates were reduced to a more modest spend of $8.990 million (including AFUDC).[256] Given the Commission's decision on raising the materiality threshold to $15 million, this project would be charged to base capital if this part of the project were to be separated from the Application which combines it with the Coquitlam Gate IP Project.

Given this background there are two questions the Commission must consider:

1. Should the Fraser Gate IP and Coquitlam Gate IP Projects be grouped together? And, if so;
2. Should the Capital Exclusion Criteria Decision be applied to this Application?

4.4.1 Grouping of the two projects

In support of its position, FEI states the following:

> While each of the individual Projects noted above is a stand-alone project that is justified on its own merits in this CPCN, and can be constructed independently of the other Project, FEI has

[252] CEC Final Argument, pp. 30–32; BCOAPO Final Argument, pp. 15–17.
[253] Multi-Year Performance Based Ratemaking Plan for 2014 through 2018, pp. 167, 181; PBR Capital Exclusion Decision, p. 12.
[254] PBR Capital Exclusion Decision, Order G-120-15, p. 2.
[255] Exhibit B-1, p. 133.
[256] Exhibit B-1-6, p. 22.

grouped the two projects into this one CPCN due to the fact that they are related, complement one another and will provide regulatory and construction efficiencies if they are addressed at the same time.[257]

More specifically, FEI in response to the potential separation of the two projects lists the following factors as having the potential to result in increased costs:

1. Contractor mobilization and demobilization, which would be shared between the two IP Projects, would increase to the full cost if the Fraser Gate IP Project was undertaken independently;

2. Independent pipe orders would not avail of the economy of scale associated with the larger pipe order for both IP Projects, and would therefore incur additional procurement costs due to the smaller order quantity for the Fraser Gate IP Project;

3. It is likely that the Coquitlam Gate IP pipeline contractor would not be available or interested in the much smaller scope of the Fraser Gate IP Project; therefore, knowledge and productivity gain from the Coquitlam Gate IP Project would be lost which could result in reduced pipeline productivity and an increased construction schedule;

4. A different pipeline contractor would require retesting and requalification to FEI procedures and standards, including revised pipeline test plans and hydrostatic test heads; and

5. If the Fraser Gate IP Project is constructed independently of, and prior to, the Coquitlam Gate IP Project, a temporary bypass would be required.

Fortis estimates that these factors could increase project costs by $2.7 to $3.2 million. This could be reduced by $1.4 million if the Fraser Gate Project were completed following the Coquitlam Gate Project since a temporary bypass would not be required.[258]

Intervener submissions

CEC submits that significant savings can be achieved if the two projects are managed simultaneously and recommends that this be done. While acknowledging the potential for regulatory savings, CEC does not consider it necessary to group the projects under one CPCN to achieve these savings. It argues the projects are relatively discrete and stand-alone.[259]

BCOAPO takes the position that the Fraser Gate IP Project should be considered separately from the Coquitlam project and because it falls considerably below the threshold set for PBR capital exclusions, it should be completed with sustainment capital. In its view FEI has not established there is a requirement for the two projects to be constructed together.

[257] Exhibit B-1, p. 8.
[258] Exhibit B-14, CEC IR 2.3.1.
[259] CEC Final Argument, pp. 27, 30.

BCOAPO remains "hesitant" to rely on the factors as outlined by FEI as justification for enjoining the projects given "the relative certainty that there will be savings in the bypass cost if the projects are undertaken independently."[260]

FEI reply

Fortis argues that while both projects can be constructed independently and justified on their own merits, there is significant overlap. Both share common attributes, use the same contractor and leverage economies of scale in materials procurement. Therefore, there are significant benefits that can be achieved by coordinating the construction of the projects.[261]

Commission determination

The Panel finds that there is some justification for combining the Coquitlam Gate IP and the Fraser Gate IP Projects under a single CPCN as there is potential for regulatory savings by combining them rather than having separate CPCN applications. However, the Panel also finds these projects to be discrete with each having their own set of issues and the benefits of them being coordinated and managed simultaneously does not require them to be part of the same CPCN. FEI has acknowledged that these projects are stand-alone and can be justified on their own merits.

This would not be at issue were it not for the PBR regimen currently in place which requires projects to be categorized as either part of the formula spending envelope (base capital) or outside of it. The Panel's findings provide some support to the view that there is greater regulatory efficiency by combining the projects under a single CPCN but also are clear in stating that the projects are discrete and the benefits of being managed simultaneously do not require them to be part of the same application. Therefore, the question of whether the projects should be combined under one CPCN and whether the Fraser Gate IP Project should be excluded from the PBR base capital is not definitively answered**.** Given this lack of clarity the Panel considers the PBR Annual Review process as the most appropriate forum to determine the intent of the original decision and how it should be applied. Accordingly, a determination on this matter is deferred to a future FEI PBR Annual Review where additional evidence (if required) can be presented and the parties are given the opportunity to deal with this issue in the context of other PBR issues.

As there is no determination on whether the two projects should be combined under a single CPCN, the Panel considers there to be little value in examining whether the Capital Exclusion Criteria Decision should be applied to this Application at this time and defers the matter to a future FEI PBR Annual Review.

4.5 Implications for PBR base O&M

In the performance based ratemaking proceeding the Commission stated:

> To the extent that a project results in a reduction of maintenance expenditures, the utility will have the opportunity to underspend its maintenance spending envelope. The Panel

[260] BCOAPO Final Argument, pp. 11, 15–17.
[261] FEI Reply Argument, pp. 4–5.

> recommends that, if capital associated with a particular CPCN is excluded from the formula, the CPCN review of that project should include an assessment by the Commission of any potential impact of the project on O&M. If appropriate, an adjustment to the formula based O&M spending envelope should then be made.[262]

One issue raised in the proceeding is whether lower leak repair or survey costs that would result from the Coquitlam Gate IP Project warrants an adjustment to the O&M envelope. FEI confirmed that while $69.2 million of operations O&M was embedded in the base for the 2014-2019 PBR, this amount only included the standard annual leak survey costs for the entire FEI system. It did not include the 2013 actual and unplanned repair and survey costs. Therefore, the PBR formula is not applied to these costs.[263]

FEI is forecasting increased O&M spending from the Coquitlam Gate IP Project over its 60-year life. The increased costs are due to:

- Internal labour costs for valve inspections and instrument and meter maintenance of $15 thousand per year;
- Internal labour costs for valve maintenance of $10 thousand per year;
- Costs for vegetation and leak survey of $3 thousand per year; and
- Increased facilities operating lease charges of $28 thousand per year.

As the Coquitlam Gate IP Project is scheduled to be in service in November 2018, FEI has not forecast any incremental O&M in 2018 apart from facilities charges and anticipates no O&M savings associated with the Coquitlam Gate or the Fraser Gate IP Projects. For this reason it finds no basis on which the formula O&M could be reduced.[264]

FEI estimates the annual incremental gross O&M cost increase due to the Coquitlam Gate IP Project to be $55 thousand per year[265] and for the Fraser Gate IP Project to be $1 thousand per year.[266] With respect to the estimated Coquitlam Gate and Fraser Gate IP Project O&M cost increases, FEI has not proposed an increase in the base O&M. FEI asserts that no adjustment to the PBR O&M base is required as a result of the projects.[267]

Intervener submissions

CEC submits that the estimated increase in annual incremental O&M is not significant and an adjustment to the PBR formula is not required. CEC further submits that FEI has provided a reasonable explanation as to the accounting for the increased O&M due to leaks and is satisfied that only $25,000 of Coquitlam Gate IP leak costs (based on cost expenditures in the 2008 to 2010 period) was included in the 2013 base O&M for PBR for this

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[262] Order G-138-14, FortisBC Energy Inc. Multi-Year Performance Based Ratemaking Plan for 2014 through 2018, p. 182.
[263] Exhibit B-4, BCUC IR 1.24.1.
[264] Exhibit B-4, BCUC IR 1.24.2.
[265] Exhibit B-1-6, p. 16.
[266] Exhibit B-1-6, p. 24.
[267] FEI Final Argument, pp. 61–62.

purpose. Further, CEC accepts that any savings due to reduced leaks will not accrue until at least 2018, and will therefore not make a significant difference under PBR.[268]

CEC recommends the Commission not adjust the PBR base for O&M savings from this project.[269]

BCOAPO argues that an adjustment should be made to the PBR O&M base due to savings that will occur once the Coquitlam Gate IP Project is in place. BCOAPO submits that there is an implicit $25,000 embedded in the 2013 base due to leak repair costs incurred on the Coquitlam Gate IP during the 2008 to 2010 period but does acknowledge that savings will not occur until the project comes into service.

BCOAPO submits that the projected increases in O&M costs from the project should not be reflected in an increase in the PBR Base O&M due to the fact that the PBR formula results in more money available for O&M each year.

BCOAPO also submits that the avoided costs related to the Coquitlam Gate IP Project are $1.3 million per year growing to $5.8 million by 2035. During the term of the PBR BCOAPO asserts that the avoided costs are on average approximately $1.6 million, more than offsetting any increased O&M from the project.[270]

FEI reply

FEI finds no merit in BCOAPO's submissions. Although the approved 2013 O&M would have been $25 thousand lower without the Coquitlam Gate IP leak repair costs, FEI points out there were no further incremental costs included in either the original $320 thousand net sustainable cost or the further $220 thousand increase to the net sustainable cost used in determining the 2013 O&M Base. As stated by FEI:

> The 2013 Base did not consider the higher leak repair or survey costs experienced in 2013 or higher costs in the future that would likely be incurred with respect to the NPS 20 Coquitlam Gate IP pipeline in the absence of this Project. However there was an implicit consideration of the $25 thousand of costs that were embedded in developing the 2013 approved.[271]

Commission determination

The Panel accepts that any savings due to reduced leak repair costs will not be realized until 2018 at the earliest when the pipeline is expected to enter service. Thus, there is no urgency to deal with this issue. Notwithstanding this, the Panel considers the PBR Annual Review process as the appropriate forum to deal with issues related to changes in PBR Base O&M. If after a review of the evidence and submissions in this proceeding parties still have concerns, they are invited to make submissions on this matter at a future PBR Annual Review.

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[268] CEC Final Argument, pp. 23–24.
[269] Ibid., p. 24.
[270] BCOAPO Final Argument, p. 10.
[271] FEI Reply Argument, p. 11.

5.0 CPCN DETERMINATION

Subject to and in accordance with the findings, approvals and determinations in this decision, the Panel finds the projects are in the public interest and grants a CPCN to FEI to construct and operate the Fraser Gate and Coquitlam Gate IP Projects as outlined in the Application and subsequent evidentiary update.

The Panel has reviewed the evidence and in accordance with the findings in this decision has determined that the CPCN Guidelines have been met and approval is warranted.

6.0 CPCN REPORTING REQUIREMENTS

6.1 General reporting requirements

FEI's draft order included in the Application proposes wording that "FEI shall file with the Commission within 30 days of the end of each reporting period Quarterly Progress Reports on the Projects. The Quarterly Progress Reports will address in some detail the risks that the Projects are experiencing, the options available to address the risks, the actions that FEI is taking to deal with the risks and the likely impact on Projects' schedule and cost."[272]

In the draft order, FEI also included wording that FEI shall file with the Commission a final report, including a publicly available version, within six months of the end or substantial completion of the projects, that provides a complete breakdown of the final costs, compares these costs to the cost estimates included in Confidential Appendices E-3-1 and E-3-2 of the Application, and provides an explanation and justification of material cost variances.[273]

In its responses to information requests, FEI states the following with respect to reporting:

- Updated cost estimate information will be provided to the Commission if requested as part of the periodic reporting process.[274]
- FEI expects to file regular progress reports with the Commission allowing the Commission to remain apprised of the progress of the projects.[275]
- The Commission retains oversight of the projects and FEI has responsibility for ongoing management of project execution. It is appropriate to expect that FEI will execute the projects prudently.[276]
- FEI will use project management best practices throughout the lifecycle of the projects and these project controls will be used to manage and mitigate potential cost issues, any risk events that may impact the projects' costs and to recognize variances from the cost management plans.[277]

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[272] Exhibit B-1-1, Appendix G-2.
[273] Ibid.
[274] Exhibit B-4, BCUC IR 1.44.1.
[275] Exhibit B-13, BCOAPO IR 2.2.3.
[276] Exhibit B-5, BCOAPO IR 1.5.5.
[277] Ibid., BCOAPO IR 1.5.2.

- Through periodic reporting, the Commission has the ability to oversee the progress of the projects and has tools available to examine costs incurred after the fact.[278]
- The regular quarterly progress reports that FEI expects to be filing with the Commission will address in some detail the costs as incurred or anticipated to be incurred, risks the projects are experiencing, the options available to address those risks, and the actions FEI is taking to deal with the risks and the likely impact on schedule and costs.[279]

In addition to providing quarterly and final reports to the Commission, FEI also considers a requirement for reporting of significant delays or material cost variances to be appropriate.[280] FEI states that these reporting requirements strike an appropriate balance between the Commission's oversight of the execution of the projects and the Company's responsibility for the ongoing management of the projects.[281]

Commission determination

The Panel agrees with FEI that reporting of significant delays or material cost variances is appropriate and also agrees that the reporting anticipated by FEI strikes an appropriate balance between the Commissions' oversight of the execution of the projects and the Company's responsibility for the ongoing management of the projects.

In addition to the specific construction related updates to be provided under Sections 2.3.3, 2.3.5, 2.3.6 and route change updates under Section 2.3.4 the Panel directs FEI to file the following reports in the manner described below.

1. **Quarterly Progress Reports**

   Each report is required to detail:

   i. **Actual costs incurred to date compared to the CPCN estimate highlighting variances with an explanation and justification of significant variances;**

   ii. **Updated forecast of costs, highlighting the reasons for significant changes in project costs anticipated to be incurred; and**

   iii. **The status of project risks, highlighting the status of identified risks, changes in and additions to risks, the options available to address the risks, the actions that FEI is taking to deal with the risks and the likely impact on the projects' schedule and cost.**

   The Quarterly Progress Reports should be structured similar to the requirements outlined in Appendix A to Order C-2-09.

   The first report is for the period ending March 31, 2016. Quarterly reports are to be submitted within 30 days of the end of each quarterly reporting period.

[278] Ibid., BCOAPO IR 1.5.5; Exhibit B-13, BCOAPO IR 2.2.3.
[279] Ibid., BCOAPO IR 1.5.2.
[280] Ibid., BCOAPO IR 1.5.5.
[281] Ibid.

2. **Material Change Report**

   The report should identify and detail any significant delays (i.e. greater than 6 months) or material cost variances (i.e. greater than 10 percent of the execution capital cost summary total that approval of this CPCN is based on). These must be reported to the Commission as soon as practicable or within 30 days or if within the 30 days be included in the Quarterly Progress Report. The Material Change Report must highlight the reasons for the delay or material cost variance, FEI's consideration of the options available and actions FEI is taking to address the issue.

3. **A Final Report**

   The Final Report must include a breakdown of the final costs of the projects compared to the cost estimates included in Confidential Appendices E-3-1 and E-3-2 of the Application and provide an explanation and justification of any material cost variances of 10 percent or more from the execution capital cost summary total that approval of this CPCN is based on.

The Final Report must be filed within six months of substantial completion or the in-service date of the projects, whichever is earlier.

7.0 SUMMARY OF DIRECTIVES

This Summary is provided for the convenience of readers. In the event of any difference between the Directions in this Summary and those in the body of the decision, the wording in the decision shall prevail.

	Directive	**Page**
1.	The Panel finds that FEI has justified the need to rehabilitate or replace the Coquitlam Gate IP pipeline.	7
2.	The Panel finds that the need to replace the Coquitlam Gate IP pipeline is justified.	8
3.	The Panel makes the following initial findings in terms of arriving at a preferred alternative: • Alternative 7 is not a viable alternative on the grounds that it is not constructible; and • Alternative 5 is not viable in that it is the highest cost alternative, yet does not provide the benefits associated with at least one lower cost alternative (i.e. Alternative 6).	17
4.	The Panel is satisfied that FEI has presented sufficient evidence to support its contention that Alternative 6 provides sufficient additional benefits to justify the added costs and accepts Alternative 6 as the preferred alternative.	19
5.	The Panel finds the design and engineering work done to date on the new Coquitlam Gate IP pipeline and associated facilities to be satisfactory for this stage of the project.	24
6.	The Panel finds the inclusion of the ILI capability as part of the project design and construction to be appropriate.	24

	Directive	Page
7.	The Panel directs FEI to provide an update on this as part of its ongoing reporting for both the Coquitlam Gate and the Fraser Gate IP Projects when further information is available.	24
8.	The Panel approves FEI's abandonment plans and discontinuance of CP as proposed for both the Coquitlam Gate and Fraser Gate IP Projects.	24
9.	The Panel finds that the route selection process, including consideration of the non-financial impacts, has been sufficient.	28
10.	The Panel directs FEI to report to the Commission on all proposed route alignment changes.	30
11.	The Panel approves the Coquitlam Gate IP pipeline route as proposed.	30
12.	The Panel directs FEI to report the findings of more detailed site investigations at the proposed trenchless crossings and provide further justification of the construction method prior to commencing construction at each crossing.	31
13.	The Panel directs FEI to report the findings of the detailed sub-surface investigations and update the project execution capital cost summary estimate after the sub-surface investigations are complete.	32
14.	The Panel directs FEI to report on any changes from trenched construction to trenchless construction prior to commencing construction as part of its quarterly progress reports outlined in Section 6.1.	32
15.	The Panel finds FEI's plan to develop a detailed mitigation plan to address the specific construction impacts at each location in conjunction with finalizing an exact pipeline alignment is appropriate.	32
16.	The Panel finds that the project schedule and preparatory work for filing its OGC application and other required permits and applications to be reasonable. The Panel directs FEI to provide regular updates on these items in accordance with reporting requirements as laid out in Section 6.1.	34
17.	The Panel finds that the estimated project cost of the Coquitlam Gate IP Project meets the CPCN Guidelines and the proposed accounting treatment of the costs incurred is appropriate. Additionally, the Panel approves the establishment of two new deferral accounts, the LMIPSU Application Costs account and the LMIPSU Development Costs Account.	36
18.	The Panel finds the proposals that BCOAPO puts forward with respect to the establishment of a variance account and requiring FEI to file a Class 1 estimate to be unnecessary and could impose unnecessary costs on FEI customers.	37
19.	The Panel finds FEI's proposed accounting treatment for capital costs to be in accordance with GAAP and the Uniform System of Accounts for Gas Companies and notes that, apart from BCOAPO's proposal for a variance account, no party took issue with it.	37

	Directive	Page
20.	For this reason the Panel finds the setting of the interest rate should continue to follow the practice that has been applied to previous FEI CPCNs and be based on FEI's WACC.	37
21.	The Panel finds that FEI has justified the need for the Fraser Gate IP Project.	43
22.	The Panel accepts the proposed change of scope for the Fraser Gate IP pipeline and finds the approximately 280 metre NPS 30" pipeline operating at 1200 kPa as proposed by FEI to be the optimum alternative.	45
23.	The Panel finds the design and engineering work done to date on the section of the Fraser Gate IP pipeline and associated facilities to be satisfactory for this stage of the project and addresses the related issues in a reasonable manner.	47
24.	The Panel approves the route for the Fraser Gate IP Project as proposed by FEI.	50
25.	The Panel finds that FEI's proposal to use one pipeline construction contractor for both projects, to install the Fraser Gate IP pipeline using In Street Methods, and to use noise, safety, security, and traffic controls is appropriate.	50
26.	The Panel finds the preparatory work and the project schedule as prepared by FEI to be reasonable and will allow the project to proceed on a timely basis.	52
27.	The Panel finds that the additional security resulting from an upgrade of 280 metres of pipeline to justify the cost and therefore, the estimated project cost of the Fraser Gate IP Project and the proposed accounting treatment for the costs incurred is approved.	53
28.	The Panel finds the proposals that BCOAPO puts forward with respect to the establishment of a variance account to deal with differences between the estimated costs and actual costs to be unnecessary.	54
29.	The Panel finds the work to date done by FEI on archaeological, environmental and socio-economic assessments and impacts to be reasonable and accepts them.	57
30.	The Panel finds that the Coquitlam Gate and Fraser Gate IP Projects, as described in the Application satisfy section 2(k) of the Provincial Government Energy Objectives.	57
31.	The Panel finds the public consultation conducted by FEI with respect to the Coquitlam Gate and Fraser Gate IP Projects to be adequate and meet the requirements of the CPCN Guidelines.	59
32.	The Panel finds that First Nations engagement efforts to date are acceptable.	61
33.	The Panel finds that there is some justification for combining the Coquitlam Gate IP and the Fraser Gate IP Projects under a single CPCN as there is potential for regulatory savings by combining them rather than having separate CPCN applications. However, the Panel also finds these projects to be discrete with each having their own set of issues and the benefits of them being coordinated and managed simultaneously does not re quire them to be part of the same CPCN.	64

	Directive	Page
34.	Subject to and in accordance with the findings, approvals and determinations in this decision, the Panel finds the projects are in the public interest and grants a CPCN to FEI to construct and operate the Fraser Gate and Coquitlam Gate IP Projects as outlined in the Application and subsequent evidentiary update. The Panel has reviewed the evidence and in accordance with the findings in this decision has determined that the CPCN Guidelines have been met and approval is warranted.	67
35.	In addition to the specific construction related updates to be provided under Sections 2.3.3, 2.3.5, 2.3.6 and route change updates under Section 2.3.4 the Panel directs FEI to file the following reports in the manner described below. **1. Quarterly Progress Reports** Each report is required to detail: i. Actual costs incurred to date compared to the CPCN estimate highlighting variances with an explanation and justification of significant variances; ii. Updated forecast of costs, highlighting the reasons for significant changes in project costs anticipated to be incurred; and iii. The status of project risks, highlighting the status of identified risks, changes in and additions to risks, the options available to address the risks, the actions that FEI is taking to deal with the risks and the likely impact on the projects' schedule and cost. The Quarterly Progress Reports should be structured similar to the requirements outlined in Appendix A to Order C-2-09. The first report is for the period ending March 31, 2016. Quarterly reports are to be submitted within 30 days of the end of each quarterly reporting period. **2. Material Change Report** The report should identify and detail any significant delays (i.e. greater than 6 months) or material cost variances (i.e. greater than 10 percent of the execution capital cost summary total that approval of this CPCN is based on). These must be reported to the Commission as soon as practicable or within 30 days or if within the 30 days be included in the Quarterly Progress Report. The Material Change Report must highlight the reasons for the delay or material cost variance, FEI's consideration of the options available and actions FEI is taking to address the issue. **3. A Final Report** The Final Report must include a breakdown of the final costs of the projects compared to the cost estimates included in Confidential Appendices E-3-1 and E-3-2 of the Application and provide an explanation and justification of any material cost variances of 10 percent or more from the execution capital cost summary total that approval of this CPCN is based on.	68-69

DATED at the City of Vancouver, in the Province of British Columbia, this 16th day of October 2015.

Original Signed By

D. A. Cote
Panel Chair/Commissioner

Original Signed By

H. G. Harowitz
Commissioner

Original Signed By

K. A. Keilty
Commissioner

Original Signed By

N. E. MacMurchy
Commissioner

Original Signed By

I. F. MacPhail
Commissioner

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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER C-11-15

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IN THE MATTER OF
the *Utilities Commission Act*, RSBC 1996, Chapter 473

and

FortisBC Energy Inc.
Certificate of Public Convenience and Necessity Application
for the Lower Mainland Intermediate Pressure System Upgrade Projects

BEFORE: D. A. Cote, Panel Chair/Commissioner
N. E. MacMurchy, Commissioner
K. A. Keilty, Commissioner
H. G. Harowitz, Commissioner
I. F. MacPhail, Commissioner

October 16, 2015

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

WHEREAS:

A. On December 19, 2014, FortisBC Energy Inc. (FEI) submitted an Application among other things for a Certificate of Public Convenience and Necessity (CPCN) to the British Columbia Utilities Commission (Commission) pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA) to construct and operate two replacement pipeline segments in the Lower Mainland near Vancouver, BC (Application);

B. In its Application, FEI seeks approval for the following:

   a. Construct and operate a new Nominal Pipe Size (NPS) 30" IP pipeline operating at 2070 kPa between Coquitlam Gate Station and East 2nd Avenue & Woodland Station to upgrade and replace an existing NPS 20" IP pipeline operating at 1200 kPa (Coquitlam Gate IP Project); and

   b. Construct and operate a new NPS 30 IP pipeline operating at 1200 kPa between Fraser Gate Station and East Kent Avenue & Elliott Street to upgrade and replace an existing NPS 30" IP pipeline (Fraser Gate IP Project);

C. FEI also seeks Commission approval pursuant to sections 59-61 of the UCA for two new deferral accounts; the LMIPSU Application Cost Deferral Account and the LMIPSU Development Cost Deferral Account;

.../2

D. On January 5, 2015, by Order G-1-15, the Commission issued a preliminary Regulatory Timetable including one round of information requests (IRs) and set a Procedural Conference for February 10, 2015. On February 4, 2015, by letter, FEI submitted a request to delay the Procedural Conference until after FEI files both the first round IRs responses and an evidentiary update. FEI indicated that it would be conducting further analysis on the Coquitlam Gate IP Project to determine if a route option along Lougheed Highway is feasible;

E. On April 30, 2015, FEI filed the evidentiary update which among other matters included a preferred new route option for the Coquitlam Gate IP Project and a reduction in the length of pipe for the Fraser Gate IP Project;

F. By letter, on July 6, 2015, the Commission issued a Panel IR and established that proceeding with written argument was appropriate and issued a timetable; and

G. The Commission has reviewed the evidence in this proceeding and finds that certain approvals are necessary and in the public interest.

NOW THEREFORE the British Columbia Utilities Commission orders as follows:

1. Pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA), a Certificate of Public Convenience and Necessity is granted to FortisBC Energy Inc. (FEI) to construct and operate:
    a. the Coquitlam Gate IP Project along the preferred route option that follows Lougheed Highway through Sections 5 and 6; and
    b. the Fraser Gate IP Project for the shorter 280m pipeline segment.

2. Pursuant to sections 59 to 61 of the UCA, the deferral treatment and the amortization for the development costs is approved. FEI shall establish the Lower Mainland Intermediate Pressure System Upgrade (LMIPSU) Project Development Costs deferral account to record the project development costs. This account will attract the weighted average cost of capital (WACC) until it is included in rate base. The account is to be transferred to rate base and amortized over a three-year period commencing January 1, 2016.

3. Pursuant to sections 59 to 61 of the UCA, recording costs of preparing the Application in a deferral account is approved. FEI shall establish the LMIPSU Application Costs deferral account to record the costs of preparing the Application. This account will attract the WACC until it is included in rate base. The account is to be transferred to rate base and amortized over a three-year period commencing January 1, 2016.

4. FEI is directed to comply with all the directives of the Commission set out in the Decision issued concurrently with this order.

DATED at the City of Vancouver, in the Province of British Columbia, this 16th day of October 2015.

BY ORDER

Original Signed By:

D. A. Cote
Panel Chair/Commissioner

Clean Energy Act
[SBC 2010] CHAPTER 22

British Columbia's energy objectives

2 The following comprise British Columbia's energy objectives:

(a) to achieve electricity self-sufficiency;

(b) to take demand-side measures and to conserve energy, including the objective of the authority reducing its expected increase in demand for electricity by the year 2020 by at least 66%;

(c) to generate at least 93% of the electricity in British Columbia from clean or renewable resources and to build the infrastructure necessary to transmit that electricity;

(d) to use and foster the development in British Columbia of innovative technologies that support energy conservation and efficiency and the use of clean or renewable resources;

(e) to ensure the authority's ratepayers receive the benefits of the heritage assets and to ensure the benefits of the heritage contract under the *BC Hydro Public Power Legacy and Heritage Contract Act* continue to accrue to the authority's ratepayers;

(f) to ensure the authority's rates remain among the most competitive of rates charged by public utilities in North America;

(g) to reduce BC greenhouse gas emissions

(i) by 2012 and for each subsequent calendar year to at least 6% less than the level of those emissions in 2007,

(ii) by 2016 and for each subsequent calendar year to at least 18% less than the level of those emissions in 2007,

(iii) by 2020 and for each subsequent calendar year to at least 33% less than the level of those emissions in 2007,

(iv) by 2050 and for each subsequent calendar year to at least 80% less than the level of those emissions in 2007, and

(v) by such other amounts as determined under the *Greenhouse Gas Reduction Targets Act*;

(h) to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia;

(i) to encourage communities to reduce greenhouse gas emissions and use energy efficiently;

(j) to reduce waste by encouraging the use of waste heat, biogas and biomass;

(k) to encourage economic development and the creation and retention of jobs;

(l) to foster the development of first nation and rural communities through the use and development of clean or renewable resources;

(m) to maximize the value, including the incremental value of the resources being clean or renewable resources, of British Columbia's generation and transmission assets for the benefit of British Columbia;

(n) to be a net exporter of electricity from clean or renewable resources with the intention of benefiting all British Columbians and reducing greenhouse gas emissions in regions in which British Columbia trades electricity while protecting the interests of persons who receive or may receive service in British Columbia;

(o) to achieve British Columbia's energy objectives without the use of nuclear power;

(p) to ensure the commission, under the *Utilities Commission Act*, continues to regulate the authority with respect to domestic rates but not with respect to expenditures for export, except as provided by this Act.

LIST OF ACRONYMS

AFUDC	Allowance for Funds Used During Construction
AIA	Architectural Impact Assessment
AOA	Archaeological Overview Assessment
Application	December 19, 2014 Lower Mainland Intermediate Pressure System Upgrade Projects
BCOAPO	British Columbia Old Age Pensioners' Organization et. al.
CEC	Commercial Energy Consumers of British Columbia
Commission, BCUC	British Columbia Utilities Commission
Coquitlam Gate IP Project	Coquitlam Gate and the East 2nd Avenue & Woodland Station in East Vancouver pipeline replacement project
CP	cathodic protection
CPAC	Canadian Pipeline Advisory Council
CPCN	Certificate of Public Convenience and Necessity
CSA	Canadian Standards Association
DGHC	DG Honegger Consulting
Dillon	Dillon Consulting
DRAS	Dynamic Rick Assessment Systems Inc.
FBE	Fusion Bonded Epoxy
FEI, Company	FortisBC Energy Inc.
Fraser Gate IP Project	Fraser Gate Station and East Kent Avenue and Elliot Street seismic upgrade
GAAP	Generally Accepted Accounting Principles
Golder	Golder Associates
GRI	Gas Research Institute
ILI	in-line inspection
IMP	Integrity Management Program
IP	Intermediate Pressure
IRs	Information Request
Kilopascals	kPa
km	Kilometres
LMIPSU	Lower Mainland Intermediate Pressure System Upgrade

MOP	maximum operating pressure
Nominal Pipe Size	NPS
OGAA	Oil and Gas Activities Act
OGC	Oil and Gas Commission
PBR	performance based rate
QRA	quantitative risk assessment
UCA	*Utilities Commission Act*
WACC	weighted average cost of capital

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

and

FortisBC Energy Inc.
Application for a Certificate of Public Convenience and Necessity
for the Lower Mainland Intermediate Pressure System Upgrade Projects
EXHIBIT LIST

Exhibit No.	Description
COMMISSION DOCUMENTS	
A-1	Letter dated December 29, 2014 - Appointing the Commission Panel for the review of the FortisBC Energy Inc. Application for a Certificate of Public Convenience and Necessity for the Lower Mainland Intermediate Pressure System Upgrade Projects
A-2	Letter dated January 5, 2014 – Order G-1-15 establishing the preliminary Regulatory Timetable and Public Notice
A-3	Letter dated February 5, 2015 – Notice of Procedural Conference Postponement
A-4	Letter dated February 12, 2015 – Commission Information Request No. 1 to FEI
A-5	**CONFIDENTIAL** Letter dated February 12, 2015 – Confidential Commission Information Request No. 1 to FEI
A-6	Letter dated March 18, 2015 – Request for comments on further process
A-7	Letter dated March 31, 2015 – Further review process and possible regulatory timetable
A-8	Letter dated May 19, 2015 – Commission Information Request No. 2 to FEI
A-9	**CONFIDENTIAL** Letter dated May 19, 2015 – Confidential Commission Information Request No. 2 to FEI
A-10	Letter dated June 2, 2015 – Request for Comments on FEI's request for Clarification of BCUC IR No. 2 (Exhibit B-9)
A-11	Letter dated June 12, 2015 – Clarification regarding FEI responses to BCUC IR-2
A-12	Letter dated July 6, 2015 – Timetable for further process and Panel Information Request No. 1

Exhibit No.	Description
APPLICANT DOCUMENTS	
B-1	**FORTISBC ENERGY INC. (FEI)** Letter dated December 19, 2014 - Application for a Certificate of Public Convenience and Necessity for the Lower Mainland Intermediate Pressure System Upgrade Projects
B-1-1	Letter dated December 19, 2014 – Non Confidential Appendices
B-1-2	**CONFIDENTIAL** Letter dated December 19, 2014 - Confidential Appendices
B-1-3	Letter dated January 19, 2015 – Errata to Appendix A-9
B-1-4	Letter dated April 24, 2015 - Errata to the Application
B-1-5	**CONFIDENTIAL** Letter dated April 24, 2015 - Confidential Errata to Appendix E
B-1-6	Letter dated April 30, 2015 – Evidentiary Update
B-1-7	**CONFIDENTIAL** Letter dated April 30, 2015 - Confidential Evidentiary Update Appendices
B-1-8	Letter dated April 30, 2015 - Public Evidentiary Update Appendices
B-2	Letter dated February 3, 2015 – FEI Submitting Workshop Materials
B-3	Letter dated February 4, 2015 – FEI Submitting Recommendation to Delay Procedural Conference
B-4	Letter dated March 12, 2015 – FEI Submitting responses to BCUC Information Request No. 1
B-4-1	**CONFIDENTIAL** Letter dated March 12, 2015 – FEI Submitting responses to BCUC Information Request No. 1
B-4-2	**CONFIDENTIAL** Letter dated March 12, 2015 – FEI Submitting responses to BCUC Information Request No. 1, Questions 21 Series and Attachment 47.1.1
B-5	Letter dated March 12, 2015 – FEI Submitting responses to BCOAPO Information Request No. 1
B-6	Letter dated March 12, 2015 – FEI Submitting responses to CEC Information Request No. 1
B-6-1	**CONFIDENTIAL** Letter dated March 12, 2015 – FEI Submitting responses to CEC Information Request No. 1.21.3
B-7	Letter dated March 23, 2015 – FEI Submission on Further Process
B-8	Letter dated March 26, 2015 – FEI Reply Submission on Further Process
B-9	Letter dated May 28, 2015 – FEI Request for Clarification of BCUC IR No. 2

Exhibit No.	Description
B-10	Letter dated June 8, 2015 - FEI Reply Comments on Exhibit B-9
B-11	Letter dated June 18, 2015 - FEI Response to BCUC IR No. 2
B-11-1	**CONFIDENTIAL** Letter dated June 18, 2015 - FEI Confidential Response to BCUC IR No. 2 11.5 and 13.1
B-12	**CONFIDENTIAL** Letter dated June 18, 2015 - FEI Response to Confidential BCUC IR No. 2
B-13	Letter dated June 18, 2015 - FEI Response to BCOAPO IR No. 2
B-14	Letter dated June 18, 2015 - FEI Response to CEC IR No. 2
B-15	Letter dated June 25, 2015 - FEI Submission on Further Process
B-16	Letter dated June 29, 2015 - FEI Reply Submission on Further Process
B-17	Letter dated July 10, 2015 - FEI Response to Panel IR No. 1
B-17-1	**CONFIDENTIAL** Letter dated July 10, 2015 - FEI Confidential Response to Panel IR No. 1

INTERVENER DOCUMENTS

C1-1	**COMMERCIAL ENERGY CONSUMERS ASSOCIATION OF BRITISH COLUMBIA (CEC)** Letter dated January 8, 2015 – Request for Intervener Status by Christopher Weafer
C1-2	Letter dated February 19, 2015 – CEC Submitting IR No. 1
C1-3	Letter dated March 24, 2015 – CEC Submission on Further Process
C1-4	Letter dated May 26, 2015 – CEC Submitting IR No. 2
C1-5	Letter dated June 4, 2015 – CEC Submission regarding Exhibit B-9
C1-6	Letter dated June 25, 2015 - CEC Submission on Further Process
C2-1	**CANADIAN PIPELINE ADVISORY COUNCIL (CPAC)** Letter and Online Registration dated January 14, 2015 – Request for Intervener Status by Gary Kroeker
C3-1	**BRITISH COLUMBIA PENSIONERS' AND SENIORS' ORGANIZATION, ACTIVE SUPPORT AGAINST POVERTY, BC COALITION OF PEOPLE WITH DISABILITIES, COUNSEL OF SENIOR CITIZENS' ORGANIZATIONS OF BC, AND THE TENANT RESOURCE AND ADVISORY CENTRE (BCOAPO)** Letter dated January 19, 2015 – Request for Intervener Status by Tannis Braithwaite, Lobat Sadrehashemi and Mark Garner
C3-2	Letter dated February 19, 2015 – BCOAPO Submitting IR No. 1

Exhibit No.	Description
C3-3	Letter dated March 23, 2015 - BCOAPO Submitting Comments on Suspending Process
C3-4	Letter dated May 26, 2015 – BCOAPO Submitting IR No. 2
C3-5	Letter dated June 4, 2015 – BCOAPO Submission regarding Exhibit B-9
C3-6	Letter dated June 25, 2015 - BCOAPO Submission on Further Process
C4-1	**ONG, FRANK (ONG)** Letter dated January 21, 2015 – Request for Intervener Status by Frank Ong
C4-2	Letter dated February 19, 2015 – Ong Submitting Comments
C4-3	Letter dated February 26, 2015 – Ong Submitting Confidential Undertaking
C5-1	**CITY OF BURNABY (BURNABY)** Letter and Online Registration dated January 26, 2015 – Request for Intervener Status by Leon Gous
C5-2	Letter dated March 6, 2015 – Burnaby Submitting Comments
C5-3	Letter dated March 27, 2015 – Burnaby Submitting Response to Exhibit A-6

INTERESTED PARTY DOCUMENTS

No submissions received.

LETTERS OF COMMENT

No submissions received.