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April 20, 2023

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, B.C.
V6Z 2N3

Attention: Patrick Wruck, Commission Secretary

Dear Patrick Wruck:

Re: FortisBC Energy Inc. (FEI)

Application for a Certificate of Public Convenience and Necessity (CPCN) for Approval of the Interior Transmission System Transmission Integrity Management Capabilities Project (Application)

Response to the British Columbia Utilities Commission (BCUC) Information Request (IR) No. 2

On September 20, 2022, FEI filed the Application referenced above. In accordance with the further regulatory timetable established in BCUC Order G-48-23, FEI respectfully submits the attached response to BCUC IR No. 2.

FEI requests that a portion of the response to BCUC IR2 26.2, which is redacted in the public version, be filed on a confidential basis pursuant to section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-72-23, in perpetuity. The confidential information contains commercially sensitive information that, if disclosed, FEI reasonably expects that its negotiating position with other parties may be prejudiced. A confidential version of the response has been provided to the BCUC and Interveners who have signed a Confidentiality Declaration and Undertaking.

For convenience and efficiency, if FEI has provided an internet address for referenced reports instead of attaching the documents to its IR responses, FEI intends for the referenced documents to form part of its IR responses and the evidentiary record in this proceeding.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Sarah Walsh

Attachments

cc (email only): Registered Parties

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A. PROJECT NEED AND JUSTIFICATION

18.0 Reference: PROJECT NEED AND JUSTIFICATION

Exhibit B-1, Section 3.4.4.2, p. 43; FEI 2023 Annual Review Delivery Rates proceeding, Exhibit B-4, RCIA IR 8.1

Prioritizing the Need for ITS TIMC Project

On page 43 of the FortisBC Energy Inc. (FEI) Application for a Certificate of Public Convenience and Necessity for the Interior Transmission System (ITS) Transmission Integrity Management Capabilities Project (TIMC) (Application), (FEI) states:

> With respect to the ITS, JANA's model estimates that cracking threats are the second highest threat for seven of the ITS pipelines identified as susceptible to cracking threats and third highest threat for the other two susceptible ITS pipelines.

On page 43 of the Application, FEI states: "threats that were more highly ranked than cracking on the ITS pipelines include: (1) third-party damage; and (2) natural hazards."

Further on page 43, FEI states that its Integrity Management Program – Pipeline (IMP-P) includes established activities to mitigate threats due to third-party damage and natural hazards, which are in accordance with standards and regulations or industry practice.

In response to Residential Consumer Intervener Association's Information Request (IR) 8.1 in the FEI Annual Review Delivery Rates proceeding, FEI provided chart below, from the Canadian Gas Association (CGA) showing the number of line damages per 1,000 line locate requests by province for the years 2017 to 2020.

18.1 Please provide a figure, similar to the figure above, showing the number of line damages per 1,000 line locate requests by FEI transmission system (Costal Transmission System (CTS), ITS, Vancouver Island Transmission System) for the years 2017 to 2020.

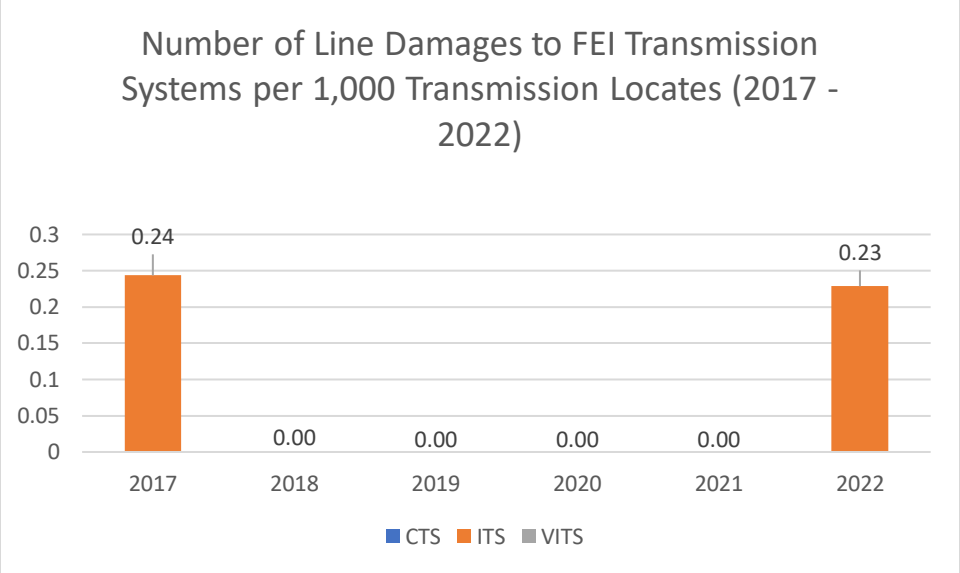
18.1.1 Please discuss any differences in line damage results between FEI transmission systems.

Response:

FEI had a total of two third-party line damages[1] to its transmission system between the years 2017 and 2022, both to the ITS. This information is represented in the graph below as a rate per thousand transmission locates. These events are sufficiently infrequent that FEI does not consider there to be any material differences in line damage results between FEI transmission systems.

Please note that the information in the chart from the Canadian Gas Association in the preamble is primarily driven by damages to, and the number of locates on, distribution systems, rather than transmission systems.

[1] The term "damage", in the context of the responses to BCUC IR2 18.1 and 18.2, describes a failure event that involved a release of natural gas.



18.2 Please discuss whether BC standards, regulations or industry practices with respect to the prevention of third-party damage to gas transmission pipelines are different as compared to those in other provinces.

18.2.1 If yes, please explain whether those differences in standards, regulations or industry practices between BC and other provinces contributed to the

Response:

FEI's understanding is that BC standards, regulations and industry practices with respect to the prevention of third-party damage to gas transmission pipelines are similar to those in other provinces. As explained in the response to BCUC IR1 18.1, the information in the chart from the Canadian Gas Association is primarily driven by damage to, and the number of locates on, distribution systems.

18.3 Please discuss the pros / cons of deferring the Project and alternatively diverting these pipeline integrity management expenditures towards enhancing mitigations which reduce the threats posed to the ITS from third party damage and natural hazards.

Response:

As discussed in the response to CEC IR1 26.1, FEI does not see any benefits that could be achieved from delaying the ITS TIMC Project. While FEI is committed to continually improving and advancing its IMP, and will continue to explore practical and cost-effective activities to manage third-party damage threats and natural hazards, it does not consider it appropriate to divert the pipeline integrity management expenditures proposed in the Application towards enhancing mitigations to reduce the threats posed to the ITS from third-party damage and natural hazards.

In particular, as explained in the response to CEC IR1 13.2.1, and based on FEI's current awareness of site-specific risks and industry practice, the utility's existing integrity management activities appropriately mitigate third-party damage threats and natural hazards threats for its transmission pipelines. FEI provided a detailed listing of the activities it uses to manage third-party damage threats and natural hazards in the response to BCUC IR1 3.3. On a year-to-year and ongoing basis, FEI assesses, prioritizes and allocates integrity management expenditures to these activities, including to address identified site-specific hazards (e.g., shallow depth of cover in a water crossing or in agricultural land, such as in response to extreme weather events or following analysis of collected depth of cover data).

In identifying EMAT ILI as the preferred alternative, FEI proposed a cost-effective means of managing credible cracking threats to its transmission pipelines. EMAT data will provide FEI with comparable pipeline condition knowledge to what exists for third-party and natural hazards (i.e., specific locations for mitigation). The additional information regarding the condition of pipelines on the ITS system provided by EMAT ILI will also enhance future prioritization of crack mitigation relative to other site-specific hazards.

Deferring the Project in favour of the unspecified mitigations referenced in the question would prevent FEI from keeping pace with evolving industry practice and regulatory expectations for managing the safety risk posed by cracking threats – thus making it more difficult to meet its obligations to ensure the safety and security of its pipeline operations. Further, and importantly, as cracking is a time-dependent threat, deferring the Project would also only increase the potential for failure over time.

Ultimately, undertaking the ITS Project on the timeline set out in the Project schedule (as set out in Section 5.5 of the Application) enables FEI to gather important integrity-related information on approximately 752 km of its ITS pipelines (i.e., whether actual cracking is present on the ITS) in a timely manner in order to mitigate the cracking threats to these ITS pipelines.

19.0 Reference: PROJECT NEED AND JUSTIFICATION

Exhibit B-1, Section 3.4.3.3, pp. 40-41; Exhibit B-4, BCUC IR 5.2

Planning Horizon for Completion of ITS TIMC Projects

On page 40 of the Application, FEI provides the following description of JANA Corporation's (JANA) analysis of stress corrosion cracking (SCC) crack growth rates:

> This analysis was conducted in conjunction with Dr. Chen of the University of Alberta, a recognized SCC expert researcher. Software developed by Dr. Chen, called Pipe-Online, was used for the analysis of SCC crack growth behaviour and to predict the remaining lifespan of a pipeline prior to cracks growing to failure. The analysis utilized pressure data from 54 pipeline locations in the CTS and ITS, 8 FEI detailed field inspection reports from integrity digs, and a summary of SCC findings from 14 dig excavations.

In response to BCUC IR 5.2, FEI stated:

> For clarity, Dr. Chen's analysis was used by FEI to inform the credibility of cracking threats on its transmission pipelines, not to identify a suitable mitigation timeframe. A suitable mitigation timeframe of any identified pipeline cracks can only be determined through quality pipeline condition data, such as the data collected through the use of EMAT [[electro-magnetic acoustic transducer] ILI [in-line inspection].

19.1 Please explain whether JANA and/or Dr. Chen consider Dr. Chen's analysis is sufficient to determine a suitable mitigation timeframe.

Response:

No, JANA does not consider Dr. Chen's analysis is sufficient to determine a suitable mitigation timeframe.

JANA's statements on the record from the CTS TIMC proceeding explain their position that the purpose of Dr. Chen's analysis was not to inform time-to-failure estimates (also referred to as lifetime estimates). For example:

- In the response to CTS TIMC, BCUC IR1 2.6, JANA stated: "The purpose of the assessment, however, was not to develop explicit lifetime estimates" (i.e., the expected time-to-failure).
- In the response to CTS TIMC, CEC IR1 18.2, JANA stated:

> The purpose of the analysis was not to define explicit times to failure (as there is not complete characterization of the cracking in the FEI system as

would be provided by EMAT ILI analysis), but to assess if there was the potential for cracks to grow to failure given the FEI system conditions.

- In the response to CTS TIMC, CEC IR1 23.2, JANA stated:

  It is not possible to provide a probability curve for cracks growing to failure from 5 to 85 years as the actual distribution of cracks within the pipeline system is not known. This type of information could possibly be provided by EMAT ILI if a large number of cracks were found by the ILI tool.

20.0 Reference: PROJECT NEED AND JUSTIFICATION

Exhibit B-1, Section 3.4.3.3, p. 41, Appendix C, p. 1, Appendix R, p. 5; Exhibit B-4,

BCUC IR 8.4; Exhibit B-8, RCIA IR 11.5.1

Heavy Wall Pipeline Segment Modification

In response to RCIA IR 11.5.1, FEI stated:

> Other than at the three proposed locations, FEI cannot determine with high confidence where the EMAT ILI tool may experience a speed excursion prior to the baseline EMAT run. Further, minor speed excursions may not result in invalid inspection data.
>
> However, given that MFL tool speed excursions can provide a reasonable indication of where EMAT tool speed excursions may occur and impact the inspection data collected, FEI provides the lengths and percentages of each pipeline affected by speed excursions during historical MFL tool runs in the table below. FEI has bolded the pipelines where it proposes to proactively modify heavy wall segments (one on SAV VER 323 and two on KIN PRI 323 pipeline) under the ITS TIMC Project to remove speed excursions.

Further in response to RCIA IR 11.5.1, FEI provided the following table:

Pipeline ID	Approx. length of pipeline (km)	Including speed excursions caused by 3 heavy wall locations		Excluding speed excursions caused by 3 heavy wall locations	
		No. of speed excursion events	Approx. total length of pipe affected by speed excursions (m) / % of total pipeline length	No. of speed excursion events	Approx. total length of pipe affected by speed excursions (m) / % of total pipeline length
SAV VER 323	**143**	**9**	**576 / 0.40%**	**8**	**383 / 0.27%**
VER PEN 323	99	3	103 / 0.10%	3	103 / 0.10%
GRF TRA 273	60	9	640 / 1.07%	9	640 / 1.07%
OLI GRF 273	95	5	218 / 0.23%	5	218 / 0.23%
PEN OLI 273	30	3	391 / 1.30%	3	391 / 1.30%
KIN PRI 323	**67**	**23**	**1152 / 1.72%**	**21**	**817 / 1.22%**
PRI OLI 323	95	9	221 / 0.23%	9	221 / 0.23%
YAH TRA 323	163	4	94 / 0.06%	4	94 / 0.06%

In response to BCUC IR 8.4, FEI provided a list of steps it will take if an EMAT ILI tool speed excursion is identified following an ILI test run.

20.1 Please confirm, or explain otherwise, that the table reproduced above in response to RCIA IR 11.5.1 shows that FEI anticipates that EMAT ILI tools will experience speed excursions for certain lengths of pipeline even with the heavy wall pipe

segment replacements (i.e. column listing length of speed excursion per pipeline excluding those caused by 3 heavy wall locations).

20.1.1 Please explain whether FEI anticipates it will need to implement the actions listed in response to BCUC IR 8.4 for the lengths of pipeline which may experience EMAT ILI tool speed excursions even with the heavy wall pipe segment replacements.

Response:

Not confirmed. FEI anticipates that EMAT ILI tools *could* experience speed excursions for certain lengths of pipeline, even with the heavy-wall pipe segment replacements, but that the data collected on those segments may be usable.

As explained in the response to RCIA IR1 11.4, FEI is not proposing proactive replacements in locations where the velocity of the MFL-C tool generally did not exceed its maximum velocity for data collection. In particular, with respect to these sections of pipeline, FEI expects that: (1) it may be able to rely on the data if a degraded specification is available; or (2) it may be able to address potential blind spots more cost-effectively through an alternate method (e.g., expose and recoat or replacement) and that the scope of such work could be optimized based on EMAT ILI data. For segments where a speed excursion occurs, FEI will implement the actions listed in the response to BCUC IR1 8.4.

Moreover, as explained in the response to BCUC IR1 8.5, FEI selected the three heavy-wall pipe segments for proactive replacement because, based on previous ILI MFL tool performance, FEI has a high confidence that EMAT tool speed excursions will occur at these locations, resulting in unusable data. Based on the expected lengths of pipeline impacted by the speed excursion, proactive replacement is also the most cost-effective means of assessing cracking threats at these locations.

20.2 Please explain why the approximate total lengths of pipe affected by speed excursions, excluding those caused by the 3 heavy wall locations, are acceptable to FEI.

Response:

Please refer to the response to BCUC IR2 20.1.

On page 5 of Appendix R to the Application, FEI states:

> …the CPCN process enables the ability to adapt to the circumstances of individual projects that have varying drivers and justifications. Similarly, the method by which a utility demonstrates that an incremental improvement in risk is justified, in order to assess the cost and benefits to ratepayers of a proposed project, will vary by project and by the type of risk(s) that it seeks to mitigate.

On page 41 of the Application, FEI states:

> …to estimate the relative safety risk level of cracking threats to FEI's transmission pipelines and inform the priority and urgency of its TIMC projects, FEI contracted JANA to conduct a baseline, system-level, safety QRA.

Further on page 41 of the Application, FEI states:

> The purpose of a system-level QRA [quantitative risk assessment] is to assess the overall threats to the pipeline system at a level that enables identification of general system risk and the threats driving that risk, to identify where additional integrity management activities may be warranted. Where significant risk and/or significant consequence is identified, mitigation approaches can be identified and evaluated to reduce the level of risk or to monitor for conditions that can result in those significant consequences, such as ruptures. [Emphasis added]

20.3 Please confirm the total cost of the Pipeline Alteration scope component (i.e. the three heavy wall pipe replacements) of the Project.

Response:

FEI provided the total cost of the Pipeline Alterations proposed as part of the ITS TIMC Project (including owner's costs and contingency) in the response to BCOAPO IR1 3.2 ($8.986 million in Amended Table 5-2), reproduced below for ease of reference.

Amended Table 5-2: Pipelines Within Project Scope

Pipeline	Approximate Length (km)	Number of Alterations	Summary of Alterations	Capital Cost Estimate ($ millions)
Savona Vernon 323	143	1	Replacement of one approximately 80 metre heavy wall pipe segment and bends on either side of the crossing at Cherry Creek (kP 16.9).[4] Replacement pipe and fittings to match upstream and downstream line pipe wall thickness. **(Event 1)**	3.774
Vernon Penticton 323	99	N/A	No mitigations required.	
Penticton Oliver 273	30	N/A	No mitigations required.	
Oliver Grand Forks 273	95	N/A	No mitigations required.	
Grand Forks Trail 273	60	N/A	No mitigations required.	
Kingsvale Princeton 323	67	2	Replacement of two 2.5 metre heavy wall pipe segments at kP 39.4. Replacement pipe to match upstream and downstream line pipe wall thickness. **(Event 29)** Replacement of one heavy wall above ground valve assembly at block valve assembly KO-3[5] (kP 47.7). Replacement to match upstream and downstream line pipe wall thickness. This includes replacement of bends, fittings and other heavy wall features. **(Event 31)**	2.995 2.217
Princeton Oliver 323	95	N/A	No mitigations required.	
East Kootenay Link 323	163	N/A	No mitigations required.	
Total Pipeline Alterations Cost Estimate ($ millions)				**8.986**

20.4 Please discuss the specific consequences that could result at the locations of the three heavy wall pipeline replacements, including downstream of these locations, if FEI does not pursue the proposed proactive pipe segment replacements.

Response:

If FEI does not undertake proactive replacement of the three heavy-wall pipe segments, FEI has high confidence that the EMAT ILI tool will experience a speed excursion and the data collected downstream of these locations will not be usable. Without usable EMAT data, FEI will not know if or where cracking is located within these segments. To ensure crack mitigation on these segments, FEI would then be required to utilize one of the following options:

Option 1: Complete the heavy-wall replacements and re-run the EMAT ILI tool to obtain usable data; or

Option 2: Use an alternate method to mitigate cracking on pipe impacted by the speed excursion. These methods may include exposing and recoating, or replacing the impacted pipe.

Both of these options would be more costly than proactive replacement of heavy-wall pipe sections at these locations for the following reasons:

- Option 1 would include the cost of the heavy-wall replacement, plus the additional costs associated with re-running the ILI tool ($1.5 to $2.5 million). Please refer to Amended Table 5-2 provided in the response to BCOAPO IR1 3.2 for the cost of each heavy-wall replacement.
- As explained in Table 5-4 of the Application, the length of each heavy-wall replacement is significantly shorter than the length of downstream pipe impacted by a speed excursion at the three proposed locations. Therefore, Option 2 would result in the exposure and recoat or replacement of a significantly longer segment of pipe, resulting in higher costs.

20.5 Please quantify and compare the safety risk level of the SAV VER 323 and KIN PRI 323 pipeline segments prior to and following the replacement of the three heavy wall pipe segments.

Response:

In the absence of EMAT data, the estimated quantified system-level safety risk of the SAV VER 323 and KIN PRI 323 pipelines was informed by industry historic failure rates. These estimates are provided in Tables 119 and 167 of Confidential Appendix B-2 to the Application.

While cracking that may exist within the heavy-wall pipe segments will be mitigated through their replacement, the system-level safety risk estimates of the SAV VER 323 and KIN PRI 323 pipelines will remain materially unchanged because, as shown in the table below, the length of pipe being replaced is insignificant as compared to the full length of those pipelines. However, the replacements will allow for improved overall data collection on these pipelines, which FEI can then act upon to improve their associated safety risk estimates.

Table 1: Percentage of SAV VER 323 and KIN PRI 323 Pipelines Proposed to be Replaced

Pipeline	Total length of proposed heavy wall pipe replacements	Total length of pipeline	% of pipeline being replaced through proposed heavy wall pipe replacements
SAV VER 323	60 to 80 m	143 km	0.04% to 0.06%
KIN PRI 323	20 m	67 km	0.03%

FEI proposes to proactively replace the three heavy-wall pipe segments to ensure usable EMAT data is collected on the SAV VER 323 and KIN PRI 323 pipelines. Usable data allows FEI to determine the location and size of cracking, which FEI can then address in a targeted manner (through integrity digs and associated pipeline repairs) to reduce the safety risk resulting from cracking threats.

20.6 Please explain whether FEI has a minimum total length of pipe affected by speed excursions that it targets for each of its ITS pipelines prior to running an EMAT ILI tool.

20.6.1 If FEI has a minimum total length of pipe affected by speed excursions that it targets, please provide this minimum length and explain how it was determined.

20.6.2 If not, please explain why such a target is not required.

Response:

FEI does not have a minimum total length of pipe affected by speed excursions that it targets for each ITS pipeline prior to running an EMAT ILI tool.

Such a minimum is not required or, indeed, useful as speed excursions do not all have an equivalent impact on FEI's coverage for crack mitigation. For example, a degraded data specification may be available for some speed excursions. A degraded data specification is where accepted engineering methods of increasing conservatism in the data analysis can be used to account for less than full resolution data.

20.7 Please explain why FEI proposes to reduce the total length of pipe affected by speed excursions on the SAV VER 323 pipeline from 576m to 383m by replacing a heavy wall pipe segment, however FEI does not propose to proactively modify any pipe segments on the GFR TRA 273 pipeline to reduce the total length of pipe affected by speed excursions to below 640m.

Response:

FEI's selection of proactive heavy-wall pipe replacements is not based on the total length of pipe affected by speed excursions or on a minimum target length of pipeline with speed excursions.

As discussed in the responses to RCIA IR1 11.4 and BCUC IR2 20.4, FEI proposes to replace heavy-wall segments where FEI has high confidence that a speed excursion will occur, resulting in areas where unusable data will be collected, and where proactive replacement is the most cost-effective choice.

FEI does not have this same level of confidence in the speed excursions observed on the GRF TRA 273 pipeline and, therefore, has not proposed to proactively replace heavy-wall segments on this pipeline until after the baseline EMAT ILI run when the tool's performance is known.

20.8 In determining the need to pursue proactive heavy wall pipeline replacements, please explain how FEI balances the cost of this scope against the magnitude of the resulting risk reduction.

Response:

In deciding to pursue the heavy-wall pipeline replacements proposed in the Project scope, FEI weighed the scope associated with proactive pipeline replacement against the scope associated with exposing, inspecting and recoating the pipeline (PLE) or replacing the pipeline (PLR) after the EMAT ILI tool run.

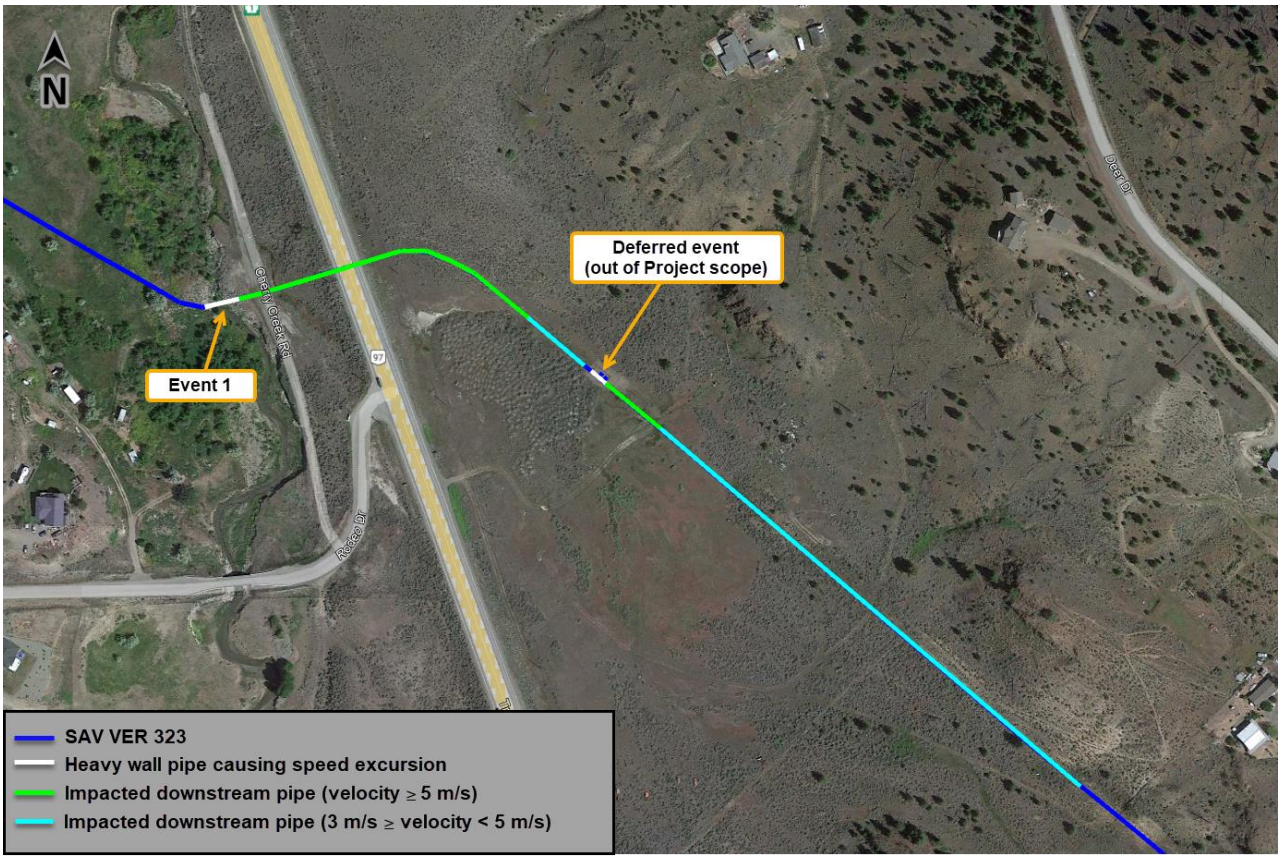
At the three locations proposed in the Application, FEI expects that proactive replacement of the heavy-wall pipe will be less costly and disruptive than reactive mitigation using a PLE or PLR method for the reasons outlined below:

Event 1 – SAV VER 323

The following image, which is also provided in the response to BCUC IR2 22.1, shows the cause of the speed excursions, as well as its severity in alignment with Section 3 of Appendix F to the Application. The image illustrates how short the segment of heavy-wall pipe causing the speed excursion is in relation to the impacted downstream pipe. If FEI were instead required to mitigate cracking on the downstream impacted pipe (after obtaining unusable data collected by the EMAT ILI run), FEI would need to expose significantly more pipe than the proposed heavy-wall modification. Moreover, exposing the downstream pipe may also require replacement of the Trans-Canada Highway crossing, resulting in higher costs.

FEI notes that the image below also shows an example of a deferred heavy-wall replacement. Unlike Event 1, this heavy-wall segment did not cause the MFL-C tool to travel above its maximum velocity for data collection (7 m/s). As a result, and due to the shorter length of the speed excursion, FEI chose to defer replacement of the heavy-wall pipe at this location for the following reasons:

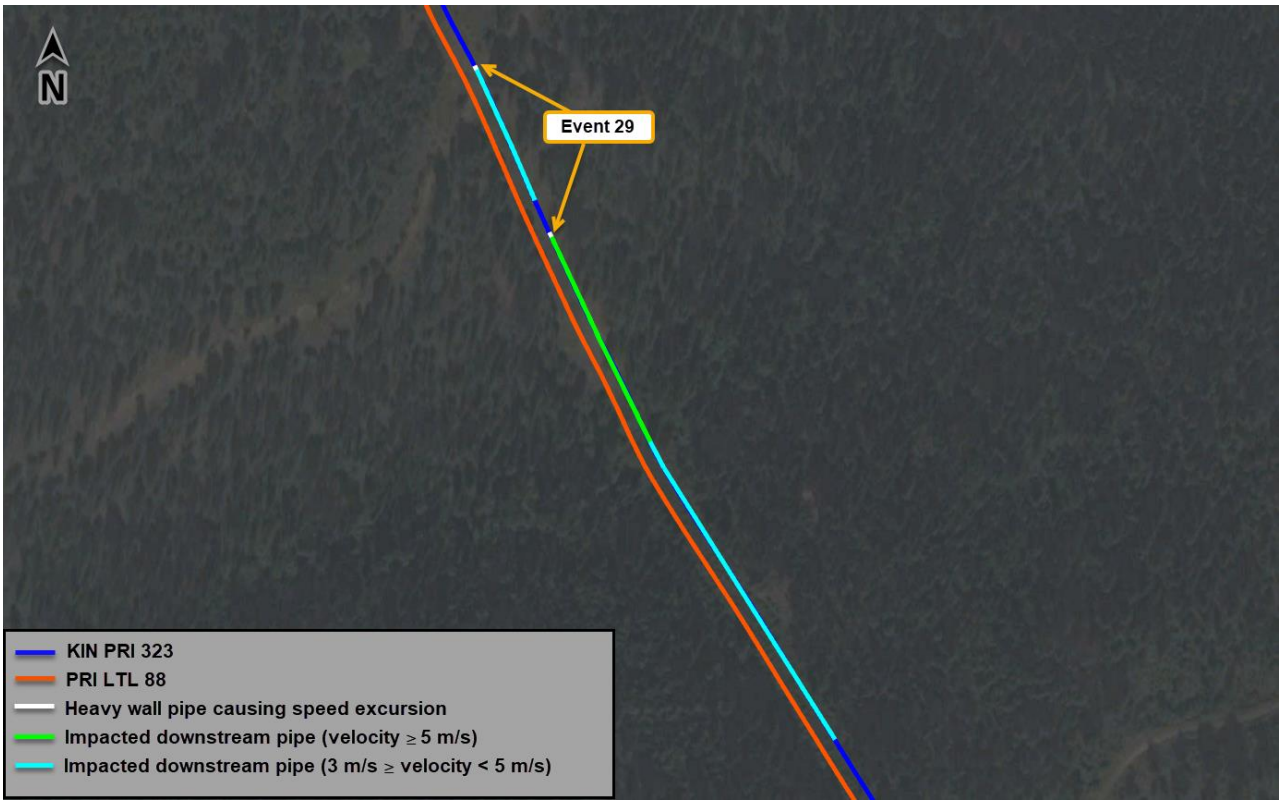
- The tool may nonetheless gather usable data if it only marginally exceeds the maximum velocity for full resolution data;
- It may be more cost-effective to mitigate cracking after the EMAT ILI run due to the relative lengths and terrain; and
- There may be improved tool performance through the deferred heavy-wall segment as a result of mitigating the upstream speed excursion through the replacement of Event 1.



Event 29 – KIN PRI 323

The following image, which is also provided in the response to BCUC IR2 22.1, shows that the segments of heavy-wall pipe causing the speed excursion are much shorter in relation to the impacted downstream pipe. If FEI were instead required to mitigate cracking on the downstream impacted pipe (after obtaining unusable data collected by the EMAT ILI run), FEI would need to expose significantly more pipe, resulting in higher costs.

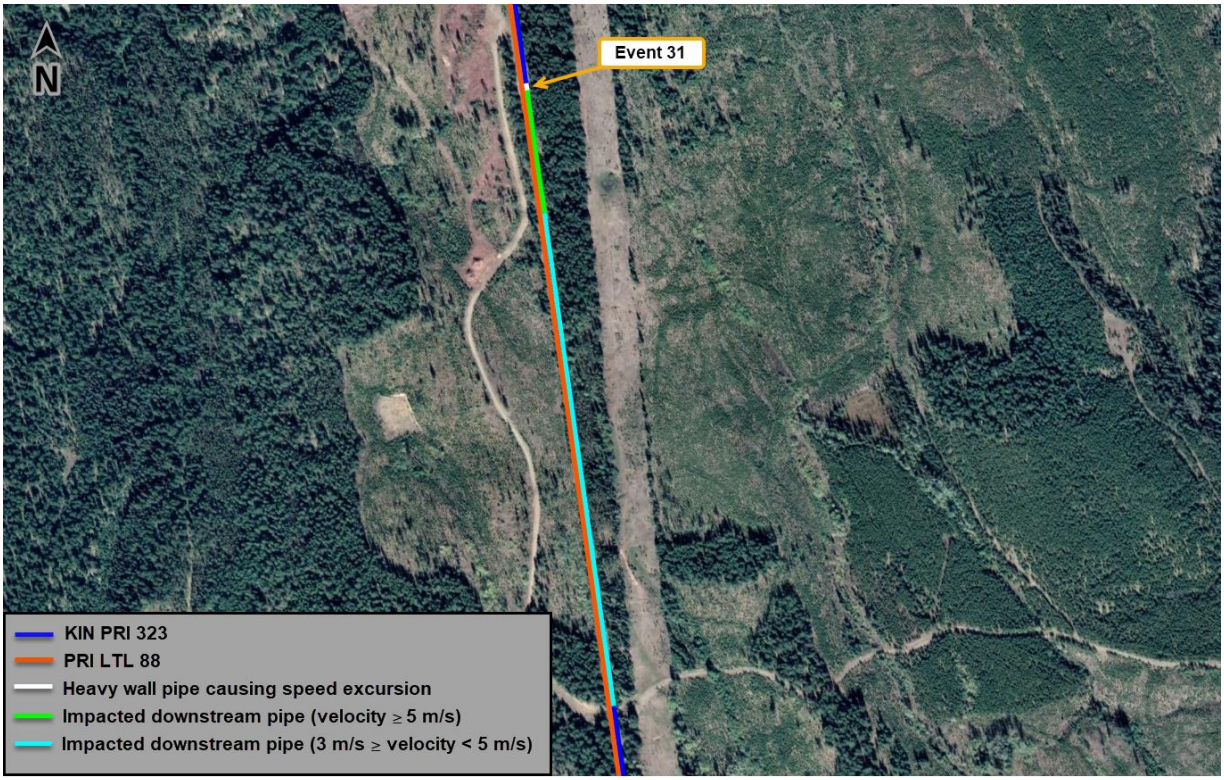
1



2

3 ***Event 31 – KIN PRI 323***

4 The following image, which is also provided in the response to BCUC IR2 22.1, shows that the
5 segment of heavy-wall pipe causing the speed excursion is much shorter in relation to the
6 impacted downstream pipe. If FEI were instead required to mitigate cracking on the downstream
7 impacted pipe (after obtaining unusable data collected by the EMAT ILI run), FEI would need to
8 expose significantly more pipe, resulting in higher costs.



As discussed in Section 5.3 of the Application, FEI requires full coverage for crack mitigation on each of the eight ITS pipelines included as part of the ITS TIMC Project because cracking has the potential to cause a failure by rupture in these pipelines. EMAT ILI tool runs can identify the location and sizing of certain types of cracking, which FEI can then address in a targeted manner (through integrity digs and associated pipeline repairs) to reduce the safety risk resulting from threats of this kind. Importantly, however, if an EMAT ILI tool fails to collect usable data due to a speed excursion caused by a heavy-wall pipe, then FEI must use an alternative method to mitigate potential cracking threats (e.g., expose and recoat or replace the pipeline segment). As noted above, this approach would be more costly and disruptive than proactively replacing the heavy-wall pipe at the three proposed locations.

Ultimately, as discussed in the response to BCUC IR2 20.4 and based on previous ILI tool performance, FEI has high confidence that the three heavy-wall pipe replacements included in the Project scope will cause speed excursions and result in areas where the EMAT ILI tool fails to collect usable data. FEI can only understand the magnitude of resulting risk reduction once the baseline EMAT ILI tool runs are complete, cracking information is collected and necessary repairs are completed. Therefore, without these replacements, FEI will be unable to confirm and/or reduce the risk of cracking within these segments without further inspection.

On page 1 of Appendix C, the BC Oil and Gas Commission (BC OGC or Commission) states:

> The Commission understands that the Transmission Integrity Management Capabilities (TIMC) Project will be part of FEI's plan to address the identified integrity concerns. The Commission is supportive of FEI taking action to address its known integrity concerns and to ensure that it meets its requirements as a permit holder under the Oil and Gas Activities Act.

20.9 Please explain whether the BC Energy Regulator (previously the BC OGC) would continue to support the Project if the proactive pipeline modifications currently proposed were removed from the scope of work.

Response:

As noted in the preamble, the BC Energy Regulator is supportive of FEI "taking action to address known integrity concerns", such as those the proposed ITS TIMC Project seeks to address. Therefore, while FEI does not anticipate the BC Energy Regulator's position to change due to a reduction in the Project scope, the BC Energy Regulator's position supports FEI's proposed proactive pipeline modifications as these modifications are actions to address known integrity concerns.

B. DESCRIPTION AND EVALUATION OF ALTERNATIVES

21.0 Reference: DESCRIPTION AND EVALAUTION OF ALTERNATIVES

Exhibit B-1, Section 3.4.4.1, p. 41; Section 3.4.4.2, p. 43; Section 4.2, p. 58;

Section 4.3.3, p. 70; Section 4.3.1, p. 68

Evaluation Criteria – Method Effectiveness

On page 41 of the Application, FEI states:

> The purpose of a system-level QRA is to assess the overall threats to the pipeline system at a level that enables identification of general system risk and the threats driving that risk, to identify where additional integrity management activities may be warranted. Where significant risk and/or significant consequence is identified, mitigation approaches can be identified and evaluated to reduce the level of risk or to monitor for conditions that can result in those significant consequences, such as ruptures.

On page 43 of the Application, FEI states:

> With respect to the ITS, JANA's model estimates that cracking threats are the second highest threat for seven of the ITS pipelines identified as susceptible to cracking threats and third highest threat for the other two susceptible ITS pipelines.

Further on page 43 of the Application, FEI states: "threats that were more highly ranked than cracking on the ITS pipelines include: (1) third-party damage; and (2) natural hazards."

On page 58 of the Application, FEI states that it considered six alternatives to mitigate cracking threats on the 8 ITS pipelines.

On page 70 of the Application, FEI provides Table 4-3, reproduced below, showing a summary of FEI's assessment of the six alternatives against non-financial and financial evaluation criteria, including Method Effectiveness.

Table 4-3: Summary of Alternatives Assessment

	Non-Financial			Financial
	Method Effectiveness	Implementation Complexity	Community and Environmental Impacts	Relative Cost
Alternative 1: SCCDA	×	✓	-	n/a
Alternative 2: PRS	✓	×	✓	n/a
Alternative 3: HSTP	-	×	~	n/a
Alternative 4: EMAT ILI	✓	✓	✓	✓
Alternative 5: PLR	✓	~	~	×
Alternative 6: PLE	✓	~	~	×

On page 68 of the Application, FEI explains that the Method Effectiveness criterion considers the effectiveness of the alternative in enhancing its ability to mitigate in-service pipeline failures resulting from time-dependent cracking threats.

21.1 Please discuss each alternative's effectiveness in mitigating the threat of third-party damage and natural hazards, and in reducing the overall risk to the ITS.

Response:

Consistent with the definition set out in Section 4.3.1.1a (page 68) of the Application, FEI considers that the "Method Effectiveness" criterion includes measuring the effectiveness of each alternative in enhancing FEI's ability to mitigate in-service pipeline failures resulting from third-party damage and/or natural hazards.

FEI provides its assessment of the effectiveness of the six alternatives in mitigating third-party damage and natural hazards in the table below. PLR is the only alternative that is effective in mitigating third-party damage and natural hazards and, therefore, is capable of reducing the overall risk to the ITS. Despite both alternatives being technically feasible, as explained in Section 4.5 of the Application, there is an order of magnitude difference in costs between EMAT ILI and PLR; therefore, the PLR alternative was considered cost prohibitive.

	Method Effectiveness
Alternative 1: SCCDA	×
Alternative 2: PRS	×
Alternative 3: HSTP	×
Alternative 4: EMAT ILI	×
Alternative 5: PLR	✓
Alternative 6: PLE	×

A discussion regarding the effectiveness of each alternative is provided below:

- **Alternative 1 (SCCDA):** SCCDA is not able to mitigate any other threats, including third-party damage and natural hazards, as the approach is designed specifically for the identification of SCC on the pipeline. As explained in Section 4.4.1 of the Application, SCCDA was also found to be not feasible for mitigating cracking threats.
- **Alternative 2 (PRS)**: While reducing the maximum operating pressure of a pipeline to below 30 percent of SMYS is generally regarded as effective for managing pressure-dependent threats like cracking or corrosion, as third-party damage and natural hazards are not pressure-dependent threats, pressure reduction cannot effectively or sufficiently address these threats.
- **Alternative 3 (HSTP)**: Hydrostatic pressure testing does not mitigate impacts external to the pipeline, like those caused by third-party damage or natural hazards, which may result in conditions that exceed the pipeline's design criteria. Instead, hydrostatic pressure testing assesses the structural integrity of the pipeline to ensure that it is fit for its intended design use.
- **Alternative 4 (EMAT ILI):** EMAT ILI is not capable of collecting the information needed to identify potential third-party or natural hazard damage. As discussed in the response to BCUC IR1 3.3, FEI relies on other types of ILI tools to acquire this information. This ILI information, in conjunction with the other activities listed in the response to BCUC IR1 3.3, is used to investigate and mitigate potential integrity threats caused by third-party damage and natural hazards.
- **Alternative 5 (PLR):** Pipeline replacement is a highly effective method for mitigating third-party damage and natural hazards as the pipeline can be designed and constructed to withstand third-party equipment impacts and certain environmental, geological and seismic conditions. As discussed in the response to BCUC IR1 3.3, PLR is one of the site-specific hazard control measures listed for depth-of-cover monitoring in relation to third-party damage mitigation.
- **Alternative 6 (PLE):** Unlike PLR, pipeline exposure and recoat does not mitigate impacts from third-party damage and natural hazards because the properties of the vintage pipeline remain unchanged. The original install years of the eight ITS pipelines range from 1957 to 1975, and pipeline manufacturing, construction practices, and material properties have improved since this time period.

21.2 Please provide a table, similar to Table 4-3, showing an assessment of the effectiveness of the six alternatives in mitigating the threat of third-party damage and natural hazards to the ITS.

Response:

Please refer to the response to BCUC IR2 21.1.

C. PROJECT DESCRIPTION

22.0 Reference: PROJECT DESCRIPTION

Exhibit B-4, BCUC IR 8.1

ITS TIMC Project Scope – Heavy-Wall Pipe Modifications

In response to BCUC IR 8.1, FEI provided an example figure of a magnetic flux leakage-circumferential (MFL-C) tool speed excursion that occurred in a residential area of Kamloops. FEI states that it chose to defer replacement of the heavy wall pipe at this location until after the EMAT ILI tool is run.

22.1 Please provide similar images illustrating the "Heavy wall pipe causing speed excursion" and "impacted downstream pipe" for the locations of "Heavy-Wall Pipe Modification Scope" included in Table 5-4 of the Application.

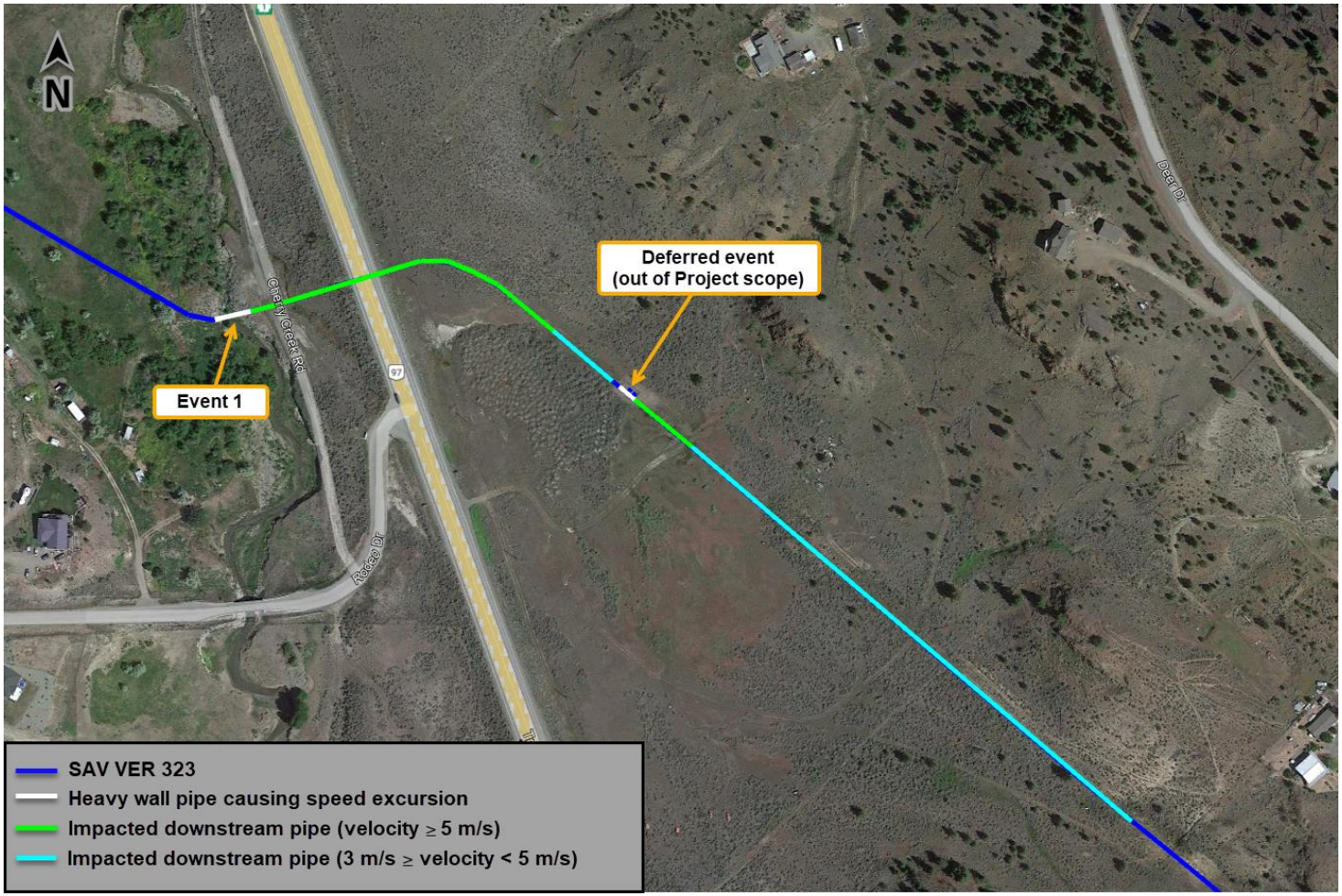
Response:

Please refer to the figures below in relation to each of the three proposed heavy-wall pipe modifications included in Table 5-4 of the Application. Corresponding velocity plots are also provided in the response to RCIA IR2 21.3.

The lengths of downstream pipe impacted by speed excursions in Table 5-4 of the Application are limited to segments where the MFL-C tool was traveling above the maximum velocity for full resolution data (5 m/s as per Section 3 of Appendix F to the Application). These lengths are represented in green in the figures below.

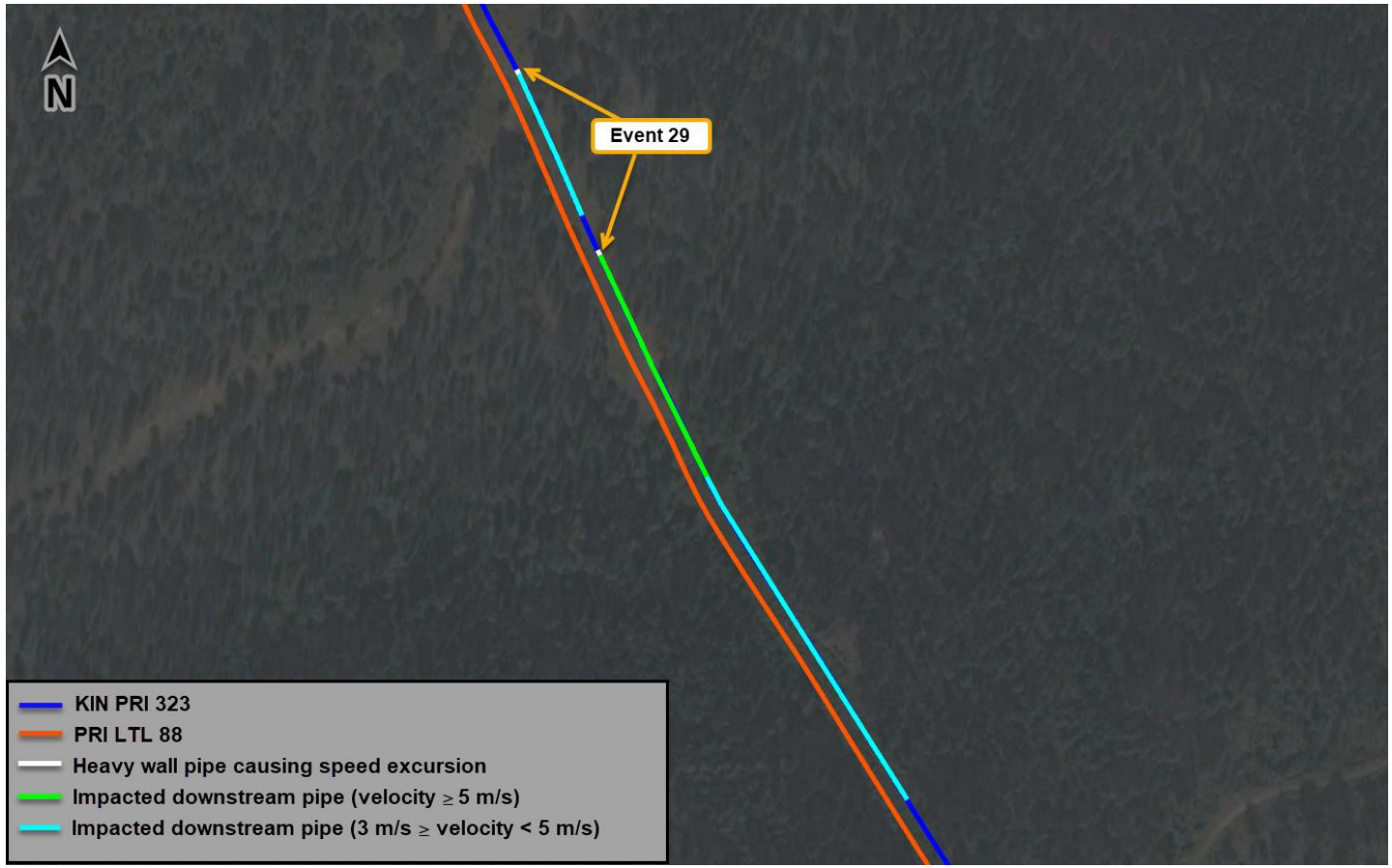
FEI has also depicted the lengths of downstream pipe where the MFL-C tool was traveling above its optimal velocity range of 1 to 3 m/s as per Section 3 of Appendix F to the Application, but below its maximum velocity for full resolution (5 m/s). These lengths are represented in light blue in the figures below.

Figure 1: Event 1 – SAV VER 323



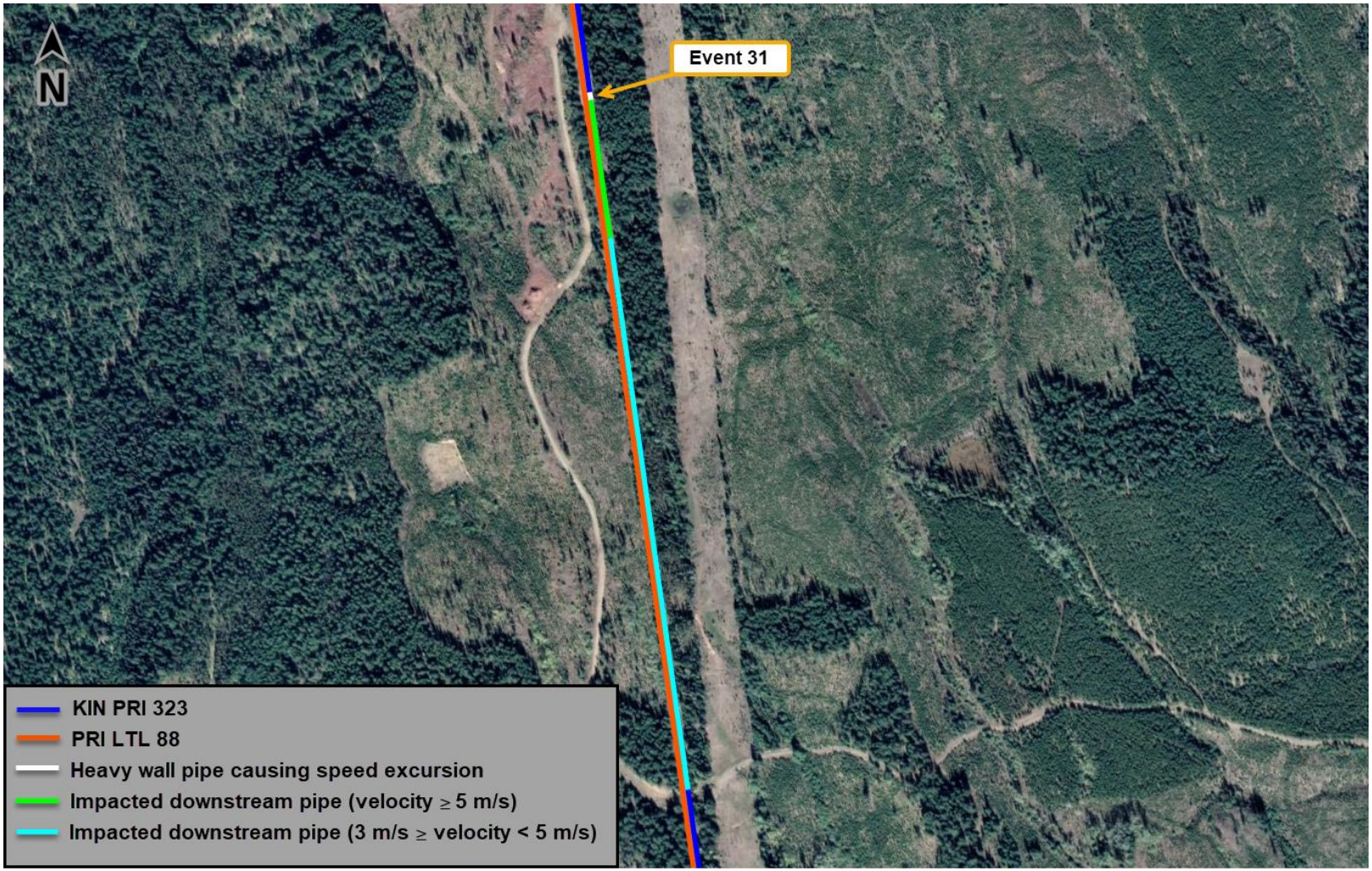
*__Note:__ the length of heavy-wall pipe causing speed excursion shown in the image is approximately 25 metres long; however, the length of pipe to be replaced (as provided in Table 5-4) is longer due to the crossing design methodology.

Figure 2: Event 29 – KIN PRI 323



*__Note:__ the MFL-C tool travelled outside its optimal velocity range following the first 2.5 metre heavy-wall segment, leading to a more severe speed excursion after passing through the second 2.5 metre heavy-wall segment. The combination of these two heavy-wall segments resulted in the tool travelling above its maximum velocity for data collection. Please refer to the velocity plot for Event 29 provided in the response to RCIA IR2 21.3 depicting the tool's behaviour through these two heavy-wall pipe segments.

Figure 3: Event 31 – KIN PRI 323



23.0 Reference: PROJECT DESCRIPTION

Exhibit B-1, Section 7.2.1.3, p. 128, Section 7.3.2, pp. 133-134

Pipeline Modification Construction Risks

On page 128 of the Application, FEI provides Table 7-3, reproduced below:

Table 7-3: Aquatic Resources in Proximity to Pipeline Events and Project Facilities

Event / Facility	Watercourse Name	Distance to Event / Facility	Waterbody Type	Provincial Waterbody Classification
KIN PRI Event 29	Allison Creek	Immediately south	Stream	Could not be accessed in the field due to access constraints. Will be assessed during development of the Project's Environmental Management Plan.
Oliver Y Control Station	Okanagan River	68 m west	Stream	S1B
Savona Compressor Station	Un-named stream	80 m west	Stream	S6
Savona Compressor Station	Un-named stream	Immediately north	Stream	S6
SAV VER Event 1	Cherry Creek	Immediately west	Stream	S2
SN-7	Three un-named streams	Immediately southwest	Non-classified drainages	Non-classified drainages
		30 m west		
		100 m west		

On pages 133 and 134 of the Application, FEI provides Table 7-7, partially reproduced below:

Table 7-7: Summary of Archaeological Recommendations

Event/Facility	Archaeological Potential	Recommended Action
Pipeline Events		
KIN PRI 323 Event 29	High	AIA
KIN PRI 323 Event 31	Low to moderate	PFR
SAV VER 323 Event 1	Low to moderate	PFR

23.1 Please discuss the relative risk of proactively modifying the heavy-wall pipe sections to avoid potential compromised EMAT ILI tool data versus project construction risks, such as proximity to aquatic resources and Archeological potential.

Response:

FEI intends to employ best management practices and mitigation measures to minimize and avoid the potential archaeological and environmental impacts caused by the Project. As such, FEI considers the relative risk of proactively modifying these heavy-wall pipe sections is lower than the Project construction risk.

Based on previous ILI tool performance, FEI has high confidence that the three heavy-wall pipe replacements included in the Project scope will cause speed excursions and result in areas where the EMAT ILI tool fails to collect usable data. In particular, if FEI does not replace these heavy-wall pipe sections, larger sections of the pipe downstream of the heavy-wall pipe will need to be exposed for site-specific assessment and may be replaced, resulting in greater potential impacts to the aquatic environment and archaeological resources.

Please refer to the response to BCUC IR2 22.1 for images illustrating the length of downstream pipe impacted by speed excursions caused by each heavy-wall pipe segment.

D. FINANCIAL ANALYSIS

24.0 Reference: FINANCIAL ANALYSIS
Exhibit B-7, CEC IR 33.3
Rate Analysis

In response to Commercial Energy Consumers Association of BC's (CEC) IR 33.3, FEI provided a table, reproduced below, which shows the PV of incremental revenue requirement and levelized delivery rate impact over a 30-year, 40-year, and 50-year period.

Table 1: ITS TIMC Project Financial Analysis over 30, 40, 50, and 70-year Periods

	30 Years	40 Years	50 Years	70 Years (As-Filed)
Total PV of Annual Revenue Requirement ($000s)	73,653	83,066	88,023	93,621
Levelized % Increase on 2022 Delivery Rate	0.52%	0.54%	0.54%	0.54%

24.1 Please explain whether the rate impact shown for the 30-year, 40-year, and 50-year period is based on the assumption that the assets will be depreciated for the equivalent time period (i.e. – 30-year, 40-year, and 50-year, respectively).

24.1.1 If not, please provide a similar table showing the rate impact and project financial analysis if the assets are depreciated over a 30-year, 40-year, and 50-year period.

Response:

The financial analysis and levelized delivery rate impacts presented in the response to CEC IR1 33.3 were based on the same 65-year average service life of transmission mains pooled assets from FEI's most recently approved depreciation study.[2] As further explained in the responses to CEC IR1 33.1 and 33.2, FEI expects its pipelines will continue to be used and useful regardless of the amounts of conventional natural gas, hydrogen, or some blend of renewable and low carbon gases and conventional natural gas that may be blended into the system. As such, the use of a 65-year average service life for the ITS pipelines continues to be reasonable and appropriate.

However, in order to be responsive, FEI provides Table 1 below which shows the PV of incremental revenue requirement and levelized delivery rate impact with the assumption that the assets will be depreciated over a 30-year, 40-year, and 50-year period. As the table below demonstrates, there is no material difference in the levelized delivery rate impact for the different depreciation periods. This is attributable to the fact that although the depreciation expense would be higher due to the shorter depreciation period (or higher depreciation rate), the higher

[2] Approved as part of Decision and Order G-165-20.

depreciation expense would be largely offset by the reduction in earned return given the accelerated reduction in the value of FEI's rate base.

Table 1: ITS TIMC Project Financial Analysis over 30, 40, 50 and 70-year Periods

	30 Years	40 Years	50 Years	70 Years (As-Filed)
Total PV of Annual Revenue Requirement ($000s)	81,968	86,833	89,395	93,621
Levelized % Increase on 2022 Delivery Rate	0.58%	0.56%	0.55%	0.54%

25.0 Reference: FINANCIAL ANALYSIS

Exhibit B-1, Section 5.9.1.1, p. 110; Exhibit B-6, BCOAPO IR 3.2; Exhibit B-7, CEC IR 30.2

Financial Review

In response to CEC IR 30.2, requesting FEI to identify any aspects of the cost estimate, particularly that which were prepared by FEI, that were not subject to an external, independent review, FEI stated:

> The areas of the base cost estimate that were not subjected to an external, independent review include the construction costs prepared by FEI in Line 1 of Table 5-5 of the Application for the modification to control and safety systems (Section 5.4.4.2 of the Application), the SN-4 pressure regulating station (PRS) (Appendix G-4 to the Application), and the owner's costs prepared by FEI in Line 2 of Table 5-5 of the Application.
>
> All other aspects of the base cost estimate were subject to an external independent review.

On page 110 of the Application, FEI provides the Project Capital Budget in a table which has been reproduced below:

Table 5-5: Project Capital Budget

Line	Item	Amount ($millions)
1	Construction Cost Estimate (Contractor + FEI)	$50.231
2	Owners Costs (FEI)	$8.133
3	**Subtotal Construction Base Cost Estimate ($2022-Q2)**	**$58.364**
4	CPCN Application Costs	$0.400
5	Pre-Construction Development Costs	$3.665
6	Contingency	$5.900
7	**Subtotal Project Cost Estimate ($2021-Q4)**	**$68.328**
8	Cost Escalation Estimate	$7.630
9	Management Reserve	$5.000
10	**Sub-Total Project Cost Estimate (As-Spent)**	**$80.958**
11	AFUDC	$4.513
12	Income Tax Recovery[84]	$(0.883)
13	**Total Project Cost Estimate (As-Spent)**	**$84.588**

In response to British Columbia Old Age Pensioners' Organization et al.'s (BCOAPO) IR 3.2, FEI provided a table with facilities within project scope which has been reproduced in part below:

Amended Table 5-3: Facilities Within Project Scope

Facility	Associated Pipelines	Summary of Alterations	Capital Cost Estimate ($ millions)
Savona Compressor Station	SAV VER 323	Modification to one pig barrel.	1.760
SN-3 (Kamloops)	SAV VER 323	Addition of clamp-on ultrasonic flowmeter, power and telemetry.	3.919
SN-4 (Kamloops)	SAV VER 323	Addition of temporary pressure regulating capability (PRS)	3.015

25.1 Please explain why these cost estimates (construction costs prepared by FEI in Line 1 of Table 5-5 of the Application of $50.231 million, the SN-4 PRS with a capital cost estimate of $3.015 million and the owner's costs prepared by FEI of $8.133 million) were not subject to external review.

Response:

First, with respect to the construction costs identified in Line 1 of Table 5-5 of the Application, FEI determined an external independent review would not provide additional validation or assurance of the cost estimate as the associated construction activities are not complex and FEI has recent data to support the cost of similar work. For example, the modifications to the control and safety system at five existing facilities are limited to the on-site installation of pressure safety valves onto existing flanges, plug-in modifications to existing pressure switches and minor reprogramming of existing control systems.

Second, FEI based the design and cost estimate for the SN-4 PRS on that of the Cary Road Station PRS completed by Tetra Tech (one of FEI's pre-approved independent consultants). That cost estimate was subjected to an external independent review and, as such, FEI determined that the similarity in scope between the two sites did not warrant an additional independent review.

Finally, the owner's cost estimate was based on a project-specific organization developed by the FEI project management team and internal subject matter experts. Given the project- and organizationally-specific nature of this work, FEI determined that an external review was not necessary. The Project organization chart was developed and resources allocated to reflect the Project scope and complexity. The cost estimate was developed by FEI's project management team and reviewed and verified through multiple internal reviews.

E. CONSULTATION AND ENGAGEMENT

26.0 Reference: CONSULTATION AND ENGAGEMENT
Exhibit B-1, Section 8.3.6, p. 149; Exhibit B-4, BCUC IR 15.2
Capacity Funding

On page 149 of the Application, FEI states:

> As the Project progresses, FEI will continue to follow up and address concerns that have been identified as part of our early engagement efforts. FEI will support Indigenous engagement activities through capacity funding if requested and will reach out to Indigenous groups during the procurement process to identify employment and contract opportunities.

In response to BCUC IR 15.2, FEI stated:

> FEI's typical practice is to offer capacity funding to Indigenous groups throughout the project lifecycle to facilitate Indigenous engagement with respect to assessing the project's potential impacts on their Indigenous rights and interests. This funding is generally provided on a case-by-case basis depending on the level of engagement required in light of the potential impact to the Indigenous groups and their desired level of engagement.
>
> FEI has working relationships with many Indigenous groups who are aware that FEI provides capacity funding to support engagement. Furthermore, FEI generally informs potentially impacted Indigenous groups of the availability of capacity funding as part of project engagement.

26.1 Please describe the kinds of activities and expenses that capacity funding would typically support.

Response:

Capacity funding for projects like the ITS TIMC would typically support the expenses incurred by Indigenous communities associated with:

- Holding member meetings and engagements with FEI staff;
- Holding public community meetings where required;
- Reviewing and providing feedback on project information such as archaeological and environmental reports;
- Participating in the Environmental and Archaeological Overview Assessments; and
- Participating in construction activities such as environmental and archaeology monitoring.

26.2 Based on past projects in the region and/or forecasts specific to this project, please provide a general estimate of how much FEI would anticipate providing to First Nations to support engagement capacity on a project of this size and anticipated impact.

Response:

A portion of this response is redacted pursuant to Section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-72-23, in perpetuity. The redaction has been made as it contains commercially sensitive information that, if disclosed, FEI reasonably expects that its negotiating position with other parties may be prejudiced. A confidential version of this response is being filed with the BCUC under separate cover.

Based on prior engagement activities for sustainment projects of a similar scope to the individual pipeline and facility upgrades as part of the ITS TIMC Project, FEI anticipates offering capacity funding of approximately [redacted] to communities that request funding.

Since filing the response to BCUC IR1 15.2, FEI has not received any formal requests to support engagement capacity from Indigenous groups, or any indication that such requests will be forthcoming. Due to the locations, nature, scale and scope of the work, FEI anticipates minimal Project interest, and as a result, minimal requests for capacity funding.

27.0 Reference: CONSULTATION AND ENGAGEMENT

Exhibit B-1, Section 8.2 – 8.3

Consultation update

27.1 Please provide an update regarding any public consultation activities FEI has completed with stakeholders noted in Section 8.2 of the Application since the filing of the Application, including any outcomes from these activities.

Response:

Since filing the Application, two notifications were made to stakeholders:

- On September 27, 2022, a notification letter was sent to all stakeholders listed in Appendix M to the Application. The letter summarized the Project scope, stated the Application was made to the BCUC on September 20, 2022, provided a link to the FEI Project website and included details for the local Project team contact. The letter also included a link to the BCUC for further information on how to register as an interested party or submit a request to intervene in the regulatory process, and by when.
- Between November 23 and December 8, 2022, additional notifications were distributed in compliance with Order G-320-22. Notification was made to those parties who may have an interest in or be affected by the Application, including a Public Notice in print/display-ad format in appropriate news publications in local and provincial newspapers, notice of the Application on FEI's website and social media platforms, and weekly reminder notices on each platform until the conclusion of the intervener registration period.

There were no responses to the notifications, and to date, there are no outstanding concerns or further issues raised by stakeholders. FEI will continue with its public consultation activities throughout the Project lifecycle and will address any issues or concerns that may arise in the future.

27.2 Please provide an update regarding FEI's consultation with potentially impacted Indigenous groups, such as those identified in Section 8.3 of the Application, since the filing of the Application. Please include a summary of any outcomes from these activities.

Response:

FEI received the following two written responses to the notification of filing the Application with the BCUC.

- On February 21, 2023, Upper Similkameen Indian Band (USIB) reiterated its request to actively participate in any studies performed within the group's area of interest and that a USIB field monitor be present during construction.

- On March 28, 2023, Penticton Indian Band offered conditional approval for the proposed activities within its area of responsibility and requested that a cultural heritage monitor be present during construction.

Both of these requests will be completed during the applicable Project phase. While FEI has not received any other requests for additional engagement from the potentially impacted Indigenous groups identified in Section 8.3 of the Application since filing the Application, FEI will continue to proactively provide detailed Project information to potentially affected Indigenous groups.