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May 23, 2024

Commercial Energy Consumers Association of British Columbia
c/o Owen Bird Law Corporation
Vancouver Centre II
2900 – 733 Seymour Street
Vancouver, BC
V6B 0S6

Attention: Christopher P. Weafer

Dear Christopher P. Weafer:

Re: FortisBC Inc. (FBC)

Application for a Certificate of Public Convenience and Necessity for Approval of the Fruitvale Substation Project (Application)

Response to the Commercial Energy Consumers Association of British Columbia (CEC) Information Request (IR) No. 1

On February 29, FBC filed the Application referenced above. In accordance with the amended regulatory timetable established in British Columbia Utilities Commission Order G-100-24 for the review of the Application, FBC respectfully submits the attached response to CEC IR No. 1.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC INC.

Original signed:

Sarah Walsh

Attachments

cc (email only): Commission Secretary
Registered Interveners

Project Need

1. Reference: Exhibit B-1, page 13, page 17 and Exhibit A-6, BCUC IR 1.3.1

The FRU substation is located at 80 Mill Road in Fruitvale, BC, which is within the load centre, and supplies electricity to 1,140 customers. The station was constructed in the 1960s and has a footprint of approximately 640 m^2 with an irregular shape (the FRU substation property itself is approximately 1,400 m^2), as shown in Figures 3-3 and 3-4 below.

The FRU substation has a single 63/13 kV transformer, which is nominally rated 6/8 MVA and is referred to as the Fruitvale T1 transformer (FRU T1). The station is supplied by 20L through high voltage fuses and disconnects supported by wood framed structures. The station also has a 2.4 megavolt-ampere (MVAR) capacitor bank, metal-clad switchgear, and a small control building. The metal-clad switchgear contains all distribution line breakers and auxiliary equipment and is housed inside the control building. The station has two distribution lines, Fruitvale Feeder 1 (FRU1) and Fruitvale Feeder 2 (FRU2). FRU1 primarily supplies residential and commercial customers in the Fruitvale area, and FRU2 primarily supplies one large industrial customer. A ground level view of the FRU substation is provided in Figure 3-2 below.

The HER substation was constructed in the 1950s to supply an industrial customer adjacent to the property. This industrial customer has since shut down operations at this location. The substation now supplies electricity to 226 residential, commercial, and irrigation customers in the Park Siding area. As shown in Figure 3-6 below, the HER substation is approximately 9 km from the Village of Fruitvale, which is a significant distance from the load centre compared to the FRU substation.

3.1 Please complete the following tables of load data for each of FRU and HER substations:

Historical	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Annual Total Load (MWh)										
Peak Load (MW)										
Existing Substation Maximum Load										

Forecast	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Annual Total Load (MWh)										
Peak Load (MW)										
Existing Substation Maximum Load										
New FRU Substation Maximum Load										

1.1 Further to BCUC IR 1.3.1, please break down each table by customer group.

Response:

The table below provides the annual MWh broken down by customer group for the FRU and HER substations.

Station	Customer Group	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
FRU	COMMERCIAL/ INDUSTRIAL	9,050	9,231	9,088	9,303	9,655	9,850	9,993	10,604	10,568	10,898
	COMPANY USAGE	6	6	6	6	6	7	6	6	6	6
	RESIDENTIAL	12,875	12,934	11,509	13,471	13,145	12,490	12,492	12,405	12,551	12,805
	LIGHTING	184	185	181	177	175	185	168	164	151	139
	IRRIGATION	3	3	1	3	3	2	3	3	3	3
	TOTAL	**22,117**	**22,360**	**20,785**	**22,959**	**22,985**	**22,533**	**22,661**	**23,182**	**23,279**	**23,851**
HER	COMMERCIAL	288	181	170	188	240	393	406	340	264	289
	RESIDENTIAL	2,969	2,867	2,651	2,849	2,799	2,723	2,808	2,954	3,047	3,022
	LIGHTING	38	37	35	33	35	35	33	29	26	24
	IRRIGATION	23	35	26	35	28	27	23	34	30	32
	TOTAL	**3,318**	**3,120**	**2,882**	**3,104**	**3,102**	**3,178**	**3,269**	**3,356**	**3,367**	**3,367**

2. Reference: Exhibit B-1, pages 20-21

3.3.1.1 Fruitvale Substation Condition Issues

The FRU substation switchgear was manufactured in 1967 and is now 56 years old. The interrupting technology is more than 80 years old, and asbestos was used in the current interruption arc-chutes. A third-party qualified contractor performed a comprehensive condition assessment in 2017 of several stations with metal-clad switchgear on behalf of FBC, which is provided in Appendix A.[3] As shown in Appendix A, at the time of assessment, the FRU substation metal-clad switchgear had a health index of 31.25 percent (considered to be poor), an actual age of 50, and an effective age of 95 years.[4] The effective age represents the advanced/accelerated aging of the asset due to its condition. Based on this analysis, the third-party qualified contractor found that the FRU metal-clad switchgear was in the poorest condition of all stations evaluated and identified it as the highest priority for replacement.

Further, due to the aging of the components, the breakers are operating slowly and show signs of extensive arcing during fault interruption. Slow fault interruption could lead to an arc flash event, resulting in asbestos contamination of the control building. If this equipment were to fail catastrophically, it would be complicated to replace as the technology is now obsolete. Given current lead times, switchgear replacement could take up to one year and replacing the equipment on an urgent basis is likely to be more costly than through a planned upgrade. A failure of the switchgear would result in an outage to customers served by the FRU substation for as long as required to either replace the equipment or to install a mobile transformer. The impacts of an outage and limitations of a mobile transformer are discussed in Section 3.3.2 and shown in Figure 3-10 below.

Additional equipment issues found at the FRU substation include hot spots on the 63 kV transmission switches FRU 20-1 and 20-2, which show signs of contact overheating during peak load conditions. To repair the switches, an outage to the FRU substation is required, and as such a mobile transformer will be needed. This issue continues to be monitored and if required will be addressed outside of the peak load season. The wood structures within the station are also in poor condition, requiring replacement.

Lastly, as previously discussed, the existing FRU substation is supplied by the transmission line 20L through high voltage fuses. A high voltage fuse is a simple device and relies on the best fuse size and curve that coordinates with the transformer load it is protecting. To coordinate with the transformer load, a large fuse size is typically required, which is slower to operate. Additionally, a fuse does not have SCADA or event recording capabilities, so it can be unclear whether the fuse opened or tripped for a fault. Due to the reasons above, high voltage fuses are slow and do not protect against all station faults, leading to larger transmission outages. Furthermore, a station design using high voltage fuses with distribution switchgear creates a higher arc flash hazard, increasing employee safety risk. Since the high voltage fuses can be slow to interrupt a transformer secondary fault, an arc flash event could destroy the switchgear building, and/or the upstream and downstream equipment. Due to the arc flash hazard posed by the enclosed switchgear at FRU, crew personnel are required to wear restrictive high level personal protective equipment (PPE) to perform any switching at this station. A fault inside the switchgear equipment can also result in an arc flash explosion that can damage surrounding equipment. To improve safety and reliability, new FBC substation designs replace high voltage fuses with high voltage circuit breakers.

2.1 Please provide a basic history of major maintenance activities/upgrades at the FRU and HER substations, and please provide the costs of major repairs and upgrades.

Response:

FBC provides the following tables which describe the major maintenance activities/upgrades at the FRU and HER substations since 2012. FBC does not have reliable major maintenance records prior to 2012. The tables include the costs associated with upgrades that were capitalized. FBC is not able to provide the costs associated with non-capital (i.e., maintenance) activities because these expenditures are not tracked to the work order or asset level.

Table 1: Major Upgrade/Maintenance Activities at FRU Substation (2012 to Present)

Date	Element	Description of Activity	Capital / Maintenance	Cost ($000s)
December 2012	FRU FDR1 & FDR2	Routine Breaker Maintenance	Maintenance	-
December 2012	FRU T1	Routine Power Transformer Maintenance	Maintenance	-
July 2014	FRU T1	LTC Filtration Remediation	Capital	4.2
October 2014	FRU T1	PCB Oil Replacement	Capital	34
September 2015	FRU T1	PCB Program-HV Bushing Replacement	Capital	33
November 2018	FRU FDR1 & FDR2	Arc-chutes Asbestos Testing	Maintenance	-
December 2018	FRU FDR1 & FDR2	Routine Breaker Maintenance	Maintenance	-
September 2019	FRU T1	LTC work and Oil Replacement	Maintenance	-
December 2019	FRU T1	Routine Power Transformer Maintenance	Maintenance	-
December 2024	FRU FDR1 & FDR2	Routine Breaker Maintenance	Maintenance	-

Table 2: Major Upgrade/Maintenance Activities at HER Substation (2012 to Present)

Date	Element	Description of Activity	Capital / Maintenance	Cost ($000s)
April 2014	HER T1- A	Oil Top-Up	Maintenance	-
April 2014	HER T1-A&C	Temperature Gauge Repair	Maintenance	-
September 2014	HER REG ABC	Routine Regulator Maintenance	Maintenance	-
August 2014	HER T1-ABC	Routine Power Transformer Maintenance	Maintenance	-
January 2015	HER T1 ABC	Oil Top-Up	Maintenance	-
March 2015	HER REG C	Regulator Failure - Replacement	Capital	24
November 2018	HER T1-A	Oil Top-up	Maintenance	-
December 2019	HER T1-B	Oil Top-up	Maintenance	-
June 2022	HER T1 ABC	Routine Power Transformer Maintenance	Maintenance	-
June 2022	HER T1 ABC	Routine Regulator Maintenance	Maintenance	-

2.2 Please provide an explanation for why the FRU switchgear experienced ‘advanced/accelerated aging’ and had deteriorated to the 31.25% condition by 2017, and please provide FBC’s best estimate of its current condition % if it has deteriorated further.

Response:

Health index and effective age calculations are ways of determining equipment condition and timelines in the equipment life cycle. Using its own methodology, METSCO performed the assessment based on information provided by FBC. The criteria categories used to determine the health index and effective age for the FRU switchgear is set out in Tables 5 through 15 in METSCO’s report (Appendix A to the Application).

The FRU switchgear actual age was 50 years in 2017. Accounting for the impact of equipment condition, METSCO calculated an effective age of 95 years. The elevated effective age is an indication that due to condition-health the evaluated equipment has exceeded its normal life expectancy.

FBC can identify the following quantitative factors that contributed to METSCO’s assessment of the 31.25 percent health index based on Tables 5 through 15:

- The switchgear was 50 years old in 2017 (Category D, Table 6 of Appendix A); and
- The switchgear circuit breaker contact resistance is outside the specification limit (Category E, Table 9 of Appendix A).

2024 maintenance records confirm that despite FBC’s efforts, the condition of the circuit breaker has not improved, and the breaker’s operating time is outside of the normal bandwidth. FBC is not able to provide an estimated percentage of further deterioration.

2.3 Please elaborate on how arcing can lead to asbestos contamination, and whether or not FBC has experienced this in the past.

Response:

Arcing in circuit breakers occurs when the current-carrying contacts of a circuit breaker open, resulting in an electric arc between the separating contacts. If supplied with enough energy (i.e., during breaker fault interruption), the arc may cause substantial damage, harm, fire, or injury.

Air magnetic breakers, like the ones used at the FRU substation, are a technology developed before the 1940s. Prior to the mid-1980s, breaker arc chutes were made from asbestos-containing compounds. During normal or fault current interruption, the arc chutes will crack and vaporize, releasing the asbestos particles into the air.

FBC has not experienced a switchgear arc flash event that has resulted in asbestos release.

2.4 Under what conditions, if any, would FBC repair the switches or any other portions of the FRU or HER substations prior to implementing the proposed Project?

<u>Response:</u>

The majority of the FRU and HER equipment is not supported by its original equipment manufacturer. Therefore, in the case of a failure, replacement is the only viable option (as opposed to maintenance).

This is the case for the following equipment at the FRU and HER substations:

- Dominion Cutout and Patton & Cooke switches (FRU 20-2, FRU CAP-, FRU MAIN-1, FRU TIE, HER REG-BP(ABC), HER FDR1-1, HER FDR 1-2, HER FDR 2-1, HER FDR 2-2, HER REG(ABC)-1 and 2, HER T1-1);
- FRU T1 Westinghouse USR type load tap changer; and
- FRU FDR1 and FDR2 air magnetic Westinghouse breakers.

Refurbishment of transformers of the vintage and MVA size of FRU T1 and HER T1 is not a viable option, as any major failure will result in transformer unavailability (up to three years).

3. Reference: Exhibit B-1, page 21

> ***3.3.1.2 Hearns Substation is at End of Life***
>
> HER T1 was manufactured in 1950 and is now 73 years old. HER T1 is comprised of three single phase units, collectively forming HER T1. Based on a condition assessment completed in 2023, FBC determined that HER T1 has reached the end of its useful life based on the insulation condition. Statistically, given the age of HER T1, the failure probability of this unit is estimated to be extremely high. Considering the condition of HER T1, the transformers must be replaced.
>
> Additional equipment issues found at the HER substation include the wood structures within the station, which are in poor condition, as shown in Figure 3-9 below.

3.1 Please provide further details of the insulation condition and why it results in the end of useful life.

<u>Response:</u>

Insulation condition refers to the dielectric, short-circuit, and mechanical strength of the transformer's solid insulation (paper/pressboard). The strength of the solid insulation determines the capability of the transformer to withstand normal, abnormal, and emergency operating conditions.

Attachment 1.1b provided in response to BCUC IR1 1.1 provides the condition and life assessment report for HER T1, concluding that HER T1 has reached end of life based upon the remaining insulation life.

3.2 Please describe how the failure probability of the unit was determined to be 'extremely high', and please provide any available probabilities associated with this rating.

<u>Response:</u>

Please refer to the response to BCUC IR1 1.1.

4. Reference: Exhibit B-1, pages 22 and 23-24

> **3.3.2 Reliability of Electricity Supply for Fruitvale and Surrounding Area**
>
> Reliability in the Fruitvale area is also impacted by the single transformer configuration of the existing FRU substation and this issue needs to be addressed as part of this Project.
>
> The existing FRU substation has only a single transformer (FRU T1), which supplies the two distribution lines FRU1 and FRU2. In the event of an unplanned FRU T1 outage (including due to a failure of the aging switchgear) during peak load conditions, a portion of customers can be transferred to the neighboring Beaver Park (BEP) substation, but 439 customers (39 percent of customers and 59 percent of load served by the FRU substation) would be without electricity, including an industrial customer. Load cannot be transferred to the HER substation as the HER T1 capacity is too small.
>
> Figure 3-10 shows the FRU customers that would be without service during a FRU T1 unplanned outage assuming historical peak load.

> The customers without power, identified in the figure above, would have to wait until a mobile transformer is transported to Fruitvale before service could be restored. For these customers, a minimum outage of 24 hours is expected, as this is the minimum amount of time it could take to transport the mobile transformer under optimal conditions from its central storage location in Castlegar, BC, and install it at the FRU substation. However, this outage duration could be extended to several days due to severe storm conditions or road restrictions, limiting FBC's ability to transport the mobile transformer when needed. Furthermore, if the mobile transformer was installed at another substation, FBC would either need to complete restoration at the other substation, which could take several days to several months depending on the circumstances, or, if available and not in use, a mobile transformer from the Okanagan region could be transported to the FRU substation, which is subject to many variables (road restrictions, environmental conditions, etc.) as the mobile transformer would need to travel over the Kootenay Pass and a distance of up to 340 km. Lastly, if an alternate mobile transformer had to be used at the FRU substation, the mobile transformer configuration may require modification before it could be installed, further impacting restoration of power to the community and the industrial customer.

> Mobile transformers are typically used for emergency or maintenance purposes and would not be an acceptable solution to supply customers for a long period if a transformer fails catastrophically. One drawback of a mobile transformer is that it does not have automatic voltage control and could result in power quality issues for customers. Also, the use of a mobile transformer for a long period of time at one location would affect other substations which may require it for emergency or maintenance purposes, impacting other customers and communities. When a mobile transformer is installed at a substation, it impacts FBC's overall restoration and planning for the remainder of the FBC system.

4.1 Please elaborate on why only a 'portion of customers' can be transferred to the neighbouring Beaver Park substation in the event of an unplanned FRU T1 outage.

Response:

Please refer to the response to BCUC IR1 7.1.

4.2 Please elaborate on the impacts from the lack of automatic voltage control on the mobile transformer, and please indicate if such a function would be available on a new mobile transformer.

Response:

FBC maintains system voltage regulation in accordance with *CSA C235-19 – Preferred Voltage Levels for AC Systems up to 50,000 V*. Considering that the mobile will be in-service for an extended period (up to 3 years) in the event of a transformer failure, the lack of voltage regulation could result in customer equipment damage or malfunction (e.g., flickering lights).

Because mobile transformers are designed to be transportable assets, they are designed with limited mechanical functionalities to prevent damage or mechanical failure caused by the repeated relocation. Incorporating an on-load tap changer onto a mobile transformer is not practical due to the number of moveable components, increased complexity of the design, and reduced reliability.

4.3 Please provide the cost of a mobile transformer, and please explain whether or not a mobile transformer could be located nearer to the Fruitvale site, or any other ways of reducing the potential outage time in the event of an outage.

Response:

FBC estimates that the cost to purchase a dedicated spare transformer sized at 20 MVA is approximately $1.8 million. An 18 MVA mobile transformer is estimated to cost $5 million to purchase. However, the existing FRU substation site is not large enough to permanently store a mobile transformer or a dedicated spare transformer. Also, as noted in Section 3.3.2 of the Application, FBC does not consider a mobile transformer to be an acceptable solution to supply customers for long periods of time as it does not have automatic voltage control and could result in power quality issues for customers.

When a mobile station or transformer is not being used for maintenance or emergency purposes, it is stored at the FBC Kootenay Operations Center in Castlegar. Due to the importance of this equipment, FBC stores the mobiles in a safe, covered location. This allows for periodic inspection and protection from the elements and vandalism. FBC does not have a closer location to Fruitvale to meet these mobile needs.

Outages are primarily dependent on mobile transport, set-up, and energization timelines. A minimum 24-hour outage is estimated for mobile installation which could be further increased by adverse weather conditions, road restrictions, or mobiles being used at other sites.

Alternatives and Justification

5. Reference: Exhibit B-1, page 26

Table 4-1: Summary of Alternatives Analysis

Alternative	Project Objectives	
	Equipment Condition and Aging Infrastructure	Reliability
Alternative 1: Status Quo	x	x
Alternative 2: Replace FRU and HER at Existing Locations	x	x
Alternative 3: New Substation at FRU or HER Sites	✓	x
Alternative 4: New Substation on New Property Close to Load Centre	✓	✓

5.1 FBC identifies 'Project Objectives' throughout the application, which the CEC deems to be 'Equipment Condition and Aging Infrastructure' and 'Reliability'. Please provide specifics/metrics as to the 'equipment and infrastructure' and 'reliability' objectives that FBC has established as the minimum requirements for this Project, including such metrics as SAIDI, SAIFI or CAIDI.

<u>Response:</u>

Based on the drivers of the Project need discussed in Section 3.3 of the Application, FBC identified the following two objectives for the Project, as set out on pages 19-20 of the Application:

1. Address the equipment condition issues and aging infrastructure at the Fruitvale and Hearns substations; and
2. Address the risk to the reliability of the electricity supply for Fruitvale and the surrounding area.

The specifics of these objectives are explained in Section 3 of the Application. The responses to BCUC IR1 1.1 and 1.2 explain in further detail why the FRU and HER equipment require replacement.

Section 4 of the Application is FBC's analysis of the alternatives to meet the Project objectives. FBC's chosen alternative, as described in Sections 4 and 5 of the Application, will meet the Project objectives.

FBC has not, however, established metrics as minimum requirements for this Project. Because SAIDI, SAIFI, and CAIDI metrics consider all unplanned and planned outages for all causes, not just transformer outages, these metrics are not relevant measures for determining the need for replacement of aging equipment at the FRU and HER substations.

Please also refer to the response to BCUC IR1 2.2.

6. Reference: Exhibit B-1 pages 27-28 and page 29

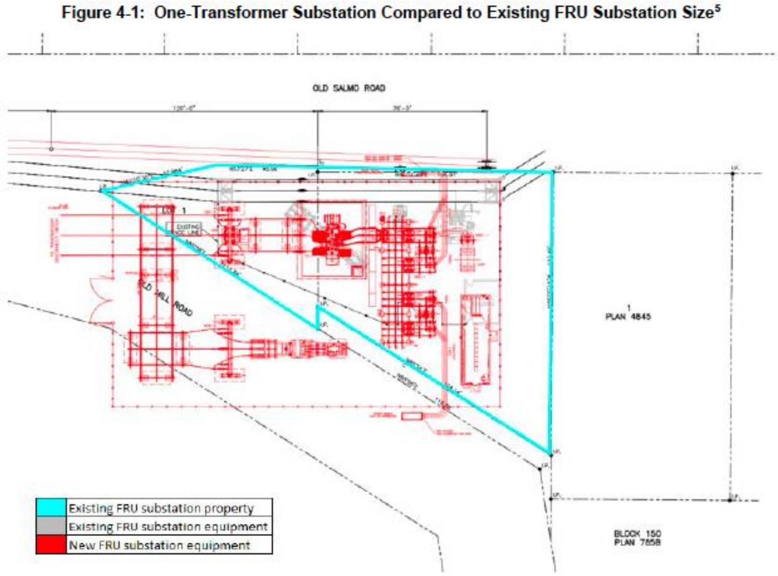
4.3.2.1 Replacing FRU Substation at Current Location Not Feasible

Replacing the switchgear and other equipment (including the transformer) at the FRU substation site is not a feasible alternative as the FRU substation would continue to have only one transformer. Therefore, this alternative does not meet Project objective #2 to address the risk of the reliability of electricity supply for Fruitvale and the surrounding area.

Further, even if replacing the FRU substation with only one transformer were an acceptable option, undertaking the required upgrades and replacements to address the equipment condition issues is not possible at the existing FRU substation site. The existing site is too small to accommodate a one-transformer substation that meets FBC's current design standards. The standard station footprint size for a typical 63 kV radial substation with either a single or two-transformer configuration is 4,736 m^2 (or 61.5 m by 77 m) with a minimum typical size of 2,500 m^2 (or 50 m by 50 m). In contrast, as discussed in Section 3.2, the existing FRU substation footprint is approximately 640 m^2 with an irregular shape (the FRU substation property itself is approximately 1,400 m^2); as a result, the existing location is too small to accommodate upgrades to the station equipment.

Figure 4-1 below shows how the footprint of a one-transformer substation that meets FBC's current design standards will not fit within the existing FRU substation property.

Figure 4-1: One-Transformer Substation Compared to Existing FRU Substation Size[5]



In addition to the technical constraint related to station footprint sizing, using the existing property presents a constructability challenge. If the existing site were used, the entire substation would need to be demolished prior to constructing the new substation. During construction, electricity supply must be maintained to customers served by the existing FRU substation. After demolishing the substation, a mobile transformer could be used to supply these customers during construction. However, given land constraints, siting the mobile transformer at the property during construction would not be possible, introducing an additional land challenge to find a temporary location for the mobile transformer. Assuming a temporary location could be acquired, distribution and transmission line upgrades may also be required depending on the temporary location selected for the mobile transformer.

4.3.3.1 New Substation at FRU Location Not Feasible

> Since the FRU substation cannot be entirely offloaded to neighbouring substations and given the challenges described in Section 3.3.2 of relying on a mobile transformer, a second transformer at the FRU substation ensures a redundant supply for FRU customers. Therefore, building a single new substation with a two-transformer configuration meets both Project objectives.

> Regarding the siting of the new two-transformer substation, FBC first considered utilizing the existing FRU substation land at 80 Mill Road in Fruitvale, as this site is close to the load centre. However, as explained in Alternative 2, the current footprint is too small to accommodate a station design meeting current FBC standards; therefore, an expansion of the existing site would be required. However, even if the adjacent neighbouring parcel was acquired, the property would still not meet the minimum station footprint requirement.
>
> Finally, even despite the technical constraint related to station footprint sizing, using the existing property presents the same constructability challenge described above in Section 4.3.2.1. The entire substation would need to be demolished prior to constructing the new substation and a mobile transformer would need to be used to supply these customers during construction.

6.1 It appears that two of FBC's alternatives were rejected due primarily to FBC's station design requirements and constructability challenges. Please elaborate on the FBC design standards and associated constraints and explain if these are:

- FBC specific constraints or industry standard or regulated by a specific authority;
- whether or not FBC has or may exceed the constraints where circumstances warrant; and
- if so, how this has been or could be accomplished.

Response:

Please refer to the response to BCUC IR1 7.4.

6.2 Please provide FBC's best estimate of the likelihood that distribution and transmission line upgrades and associated costs that would be required as a result of using the temporary transformer.

6.2.1 What additional benefits, if any, could be attributed to the upgrades if these were undertaken? Please discuss and explain whether or not these could add long-term advantages to the system.

Response:

FBC is not able to provide an estimate of likelihood or cost of any necessary distribution and/or transmission line upgrades as a result of using a mobile transformer as it is entirely dependent on the selected temporary location for the mobile transformer. As explained in Sections 4.3.2.1 and

4.3.3.1 of the Application (as referenced in the preamble to this IR) and in the response to BCUC IR1 7.4, the existing FRU site cannot even accommodate a one-transformer substation rebuild that meets FBC's current design standards. Therefore, there is no scenario where FBC would rebuild on the existing FRU site and FBC accordingly did not investigate the cost of undertaking distribution and transmission line upgrades to serve a mobile transformer at a temporary location.

However, to be responsive to CEC IR1 6.2.1, in a hypothetical situation where the existing station is rebuilt on the existing site and a temporary location is found for the mobile transformer during construction, the distribution and/or transmission line extensions and required upgrades (i.e., three phasing portions of a single-phase distribution line, etc.) would not have long-term advantages to the system. By changing the source of supply temporarily with the mobile transformer, the line extensions and upgrades needed to connect to the system would no longer be useful once the source of supply reverted back to the Fruitvale substation.

7. Reference: Exhibit B-1, pages 30 and 31

> ***4.3.3.2 New Substation at HER Location Not Practical***
>
> While the HER substation site near Park Siding is large enough to accommodate a new two-transformer substation, FBC rejected this option due to the HER substation's distance from the load centre. The load density of Fruitvale and the surrounding area is provided in Figure 4-2 below and shows that the load centre is located within the Village of Fruitvale.

> Relocating the New FRU Substation further from the load centre to the existing HER site would require a complete rebuild of the line infrastructure between the HER site and the load centre (Village of Fruitvale). This work would be required to ensure FBC adheres to the voltage and thermal limits discussed above. The rebuild would consist of two underbuilt distribution circuits beneath the 63 kV transmission line 20L and would require upgrades to the transmission line structures from wood to steel, as this material is stronger, more durable and requires fewer structures to accommodate the double circuit underbuild configuration. This work would significantly increase the Project costs (estimated to increase costs by as much as $10 million). This required infrastructure would be much larger and more visually impactful than the existing infrastructure, and would require additional statutory rights of way (SRW). A portion of the line rebuild would fall within the Agricultural Land Reserve (ALR), which could introduce additional project cost and schedule risk.
>
> In addition, the further a substation is sited from the load centre, the lower the customer reliability, as the electricity needs to travel through longer distribution lines to reach the end user, increasing exposure to outages for a significant number of customers. Distribution lines can experience outages due to various causes, such as vegetation, adverse weather, motor

7.1 Please provide the total cost range, with breakdown for the work that is estimated to increase the Project costs by 'as much as $10 million'.

<u>Response:</u>

Please refer to the response to BCUC IR1 5.6.

7.2 Please confirm that the increase would result in a total Project cost increase, and could not be partially or fully offset by savings in other areas.

<u>Response:</u>

FBC confirms that the required line upgrades would result in a total Project cost increase.

The line upgrades could potentially result in cost savings due to a reduction in scope of a future project identified in Section 6.4 of FBC's 2021 Long Term Electric Resource Plan (LTERP) to reconductor transmission line 20L to a higher ampacity, beginning in 2028/2029 (20L Upgrade). However, the 20L Upgrade is not expected to require a full rebuild of the transmission line between the Village of Fruitvale and the HER substation and will not require replacement of the transmission structures from wood to steel; rather, the line infrastructure would remain in a two-circuit configuration (one transmission, one distribution circuit). In contrast, as described in the response to BCUC IR1 5.6, building a new FRU substation at the HER site would require approximately 7.4 km of transmission and distribution line along Highway 3B between the Village of Fruitvale and the HER substation to be entirely rebuilt to accommodate the three-circuit configuration (one transmission circuit, two distribution circuits) and the existing wood structures would need to be replaced with steel. These line upgrades would include reconductoring the transmission circuit 20L to a higher ampacity conductor, which would ultimately accelerate and complete a portion of the 20L reconductoring required for the 20L Upgrade. FBC has not developed an estimate of the potential reduction in scope or cost.

7.3 Please briefly discuss the visual impacts, and whether or not they would specifically impact any local residents.

Response:

Please refer to the response to BCUC IR1 5.6.

8. Reference: Exhibit B-1, page 43

Subsequent to the BCUC's Order to file a CPCN application, and in consideration of stakeholder feedback and constructability impacts, FBC proceeded with completing Class 4 estimates for two siting options. Please refer to Confidential Appendix C for the engineering assessments. For ease of reference, FBC refers to these options as the "Highway 3B" option and the "Old Salmo Road" option based on their relative proximity and access to those roads[6]. Please refer to Figure 4-12 for an aerial view of these areas within the Grieve Location.

Figure 4-12: Highway 3B Option and Old Salmo Road Option within Grieve Location

8.1 Please identify what portion of the property that FBC purchased would be used for the Project.

Response:

Please refer to the Site Plan drawing provided in Confidential Appendix C-1 of the Application (pdf page 22 of 53).

8.2 Please explain whether or not FBC had the option to purchase a smaller portion and/or if FBC has the option to sell any portion not being used, and also please explain whether or not FBC may have alternative uses for any portion of the property not used for this Project.

Response:

No, FBC did not have the option to purchase a smaller portion of the Grieve Location property. Please refer to the response to Lenardon IR1 28.

9. Reference: Exhibit B-1, page 44

Table 4-3: Financial Evaluation Summary of Highway 3B and Old Salmo Road

	Highway 3B Option	Old Salmo Road Option
Project Capital Cost, 2023 $ ($ millions)	16.472	18.800
Escalation Applied from 2024 to 2026, As-Spent ($ millions)	0.860	0.985
AFUDC, As-Spent ($ millions)	1.535	1.743
Total Project Cost, incl. Escalation and AFUDC, AACE Class 4, As-spent ($ millions)	**18.867**	**21.528**
Incremental O&M Expense in 2027, As-Spent ($ millions)	(0.013)	(0.016)
Total PV of Incremental Revenue Requirement over 53 years ($ millions)	20.795	23.324
Levelized Rate Impact over 53 years (%)	0.29%	0.32%

As the above table shows, the Class 4 estimates for the Highway 3B Option and the Old Salmo Road Option are similar, with Highway 3B (the preferred option) approximately $2.661 million less than the Old Salmo Road Option.

While the financial results of the two options are similar, FBC determined through the completion of the Class 4 estimates that the Old Salmo Road Option had significantly higher impacts and challenges, including the following:

- Greater visual impact to the surrounding residents and the public passing by along the roadway (Old Salmo Road);
- Greater amount of civil and site preparation, likely resulting in retaining walls and extensive clearing of the forested area of the property;
- Greater risk for cost escalation due to civil and site preparation; and
- Accessibility challenges.

9.1 Please provide the cost ranges associated with a Class 4 estimate, and please confirm or otherwise explain that FBC's Class 4 cost estimate does not account for the increased civil and site preparation and clearing, and mitigation of accessibility challenges, and please explain why not.

<u>Response:</u>

Class 4 estimates have a cost range of -15% to -30% on the low end, and +20% to + 50% on the high end.

FBC included increased civil, site preparation, and mitigation of accessibility challenges in its Class 4 estimate for the Old Salmo Road Option. These increases account for the majority of the $2.66 million difference between the Old Salmo Road Option and the preferred Highway 3B Option. FBC also notes that without a geotechnical report, there is a higher risk of these costs escalating for the Old Salmo Road Option compared to the Highway 3B Option.

10. Reference: Exhibit B-1, page 45

> FBC accordingly selected 2064 Grieve Road as the location for the Project and has purchased the 9.61-acre parcel of land. Based on FBC's analysis of the potential site options at the Grieve Location, FBC has selected the Highway 3B Option as the preferred location for the New FRU Substation.

10.1 Please identify any options available to FBC to recoup the cost in the event that the Commission does not approve the CPCN or the proposed site. What other options would FBC have to make use of the site if it could not be sold?

Response:

If the BCUC did not approve the Application, FBC would need to review the reasons contained in the decision and determine how to proceed at that time.

Project Description

11. Reference: Exhibit B-1, pages 49-50

5.3.1 Station Scope of Work

The New FRU Substation will be built to accommodate two 20 MVA dual voltage transformers[8] with air-insulated bus works and four distribution lines, as well as a 2.4 MVAR capacitor bank. Three distribution lines will be fully installed at the time of construction, leaving space for a fourth distribution line when needed. The existing FRU and HER substations will also be decommissioned as part of this Project, as further described in Section 5.3.4.

A summary of the station work required for the New FRU Substation at the Grieve Location is set out below and provides for:

- Three 63 kV circuit breakers and isolation switches for 20L egress into the station.
- Two 20 MVA 63 kV / 13 / 26 kV auto transformers with secondary oil containment with oil-water separation and fire quenching stone.
- Seven 25 kV breakers.

- One 25 kV 2.4 MVAR capacitor bank.
- Three 25 kV distribution feeders (to be operated at 13 kV) leaving the station via underground cables.
- Station will contain all necessary isolation and bypass switches, surge arrestors, support structures, conduit, grounding, connectors, and buswork.
- All necessary protection, control, metering, and telecom equipment will be housed in a control building.
- A concrete or screening fence.

Further details of the Project's station scope are included in Confidential Appendix C-1.

11.1 Please identify, and provide rationale for, any aspects of the station scope of work that exceeds the minimum requirements to replace the aging equipment and infrastructure and/or provide similar reliability to that currently available.

Response:

All the planned work that is set out in the station scope of work is required for the New FRU Substation and nothing is included that is not required.

12. Reference: Exhibit B-1, page 50

5.3.2 Transmission Line Scope of Work

Preliminary transmission line engineering was completed to support project definition work, and to evaluate structure types and configurations. Transmission system modifications identified for the Project are associated with 20 Line.

The transmission work aims to install a 260 m in-and-out overhead transmission line configuration to supply the New FRU Substation. Transmission line work related to the decommissioning of the existing FRU and HER substations is further described in Section 5.3.4.

A summary of the transmission work required to supply the New FRU Substation at the Grieve Location is set out below:

- Clearing of trees for an approximately 26 m wide corridor along the north-east side of the property for the new transmission line alignment.
- Approximately 520 m of new 63 kV transmission line (260 m in and 260 m out).
- Replacement of one existing single circuit wood pole structure.
- Installation of nine new single circuit wood pole structures.
- Installation of two new double circuit composite pole structures.
- Installation of inline jumpers between the in and out alignments near Old Salmo Road.

Preliminary drawings showing the Site Plan for the New FRU Substation are included in Confidential Appendix C-1. Further details of the Project's transmission scope are included in Confidential Appendix C-2.

12.1 Please identify, and provide rationale for, any aspects of the Transmission Line scope of work that exceeds the minimum requirements to replace the aging equipment and infrastructure and provide similar reliability to that currently available.

<u>Response:</u>

All the planned work that is set out in the scope of work is required for the New FRU Substation.

The transmission line scope of work identified in the preamble above is required to reconfigure the transmission line infrastructure to accommodate the New FRU Substation at the Grieve Location.

13. Reference: Exhibit B-1, pages 50-51

5.3.3 Distribution Line Modifications

The distribution work includes the installation of three distribution lines, leaving space for a fourth distribution line when needed, and includes installing two gang-operated airbreak

switches. Additionally, the existing Hearns feeder (HER1) will be permanently offloaded to the New FRU Substation. Distribution line work related to the decommissioning of the existing FRU and HER substations is further described in Section 5.3.4.

A summary of the distribution work required for constructing the New FRU Substation is set out below:

- Install feeder egress cables from three new FRU station breakers (fourth station breaker provisioned for future distribution line when needed).
- Install three 750 KCMIL risers with solid disconnects.
- Install two gang-operated airbreak switches acting as new feeder ties.
- Trenching and conduit installation along Old Salmo Road as well as on the Grieve Location property.
- Reconfigure existing line infrastructure as required to accommodate substation location.

Further details of the Project's distribution scope are included in Confidential Appendix C-3.

13.1 Please identify, and provide rationale for, any aspects of the Distribution Line scope of work that exceeds the minimum requirements to replace the aging equipment and infrastructure and provide similar reliability to that currently available.

<u>Response:</u>

All the planned work that is set out in the scope of work is required for the New FRU Substation and nothing is included that is not required.

The distribution line work identified in the preamble above is required to reconfigure the distribution line infrastructure to accommodate the new source of supply from the Grieve Location. FBC notes that the distribution line work is related to new infrastructure and does not include replacing existing distribution line infrastructure due to equipment condition or aging infrastructure issues.

14. Reference: Exhibit B-1, page 52

> A summary of the transmission and distribution work required to accommodate the decommissioning of the existing HER substation is as follows:
>
> - Replace structure 20L293 with a 63 kV deadend structure with distribution underbuild and salvage the 63 kV switch HER 20-1.
> - Replace structure 20L294 with a 63 kV light angle structure with distribution underbuild.
> - Replace structure 20L295 with a 63 kV deadend structure with distribution underbuild and salvage the 63 kV switch HER 20-2.
> - Splice and transfer the existing 2/0 ACSR Quail between the two deadend structures.
> - Salvage structure 20L294A.
> - Salvage existing HER1 distribution line tying into HER substation.
>
> FBC intends to retain the FRU and HER sites as they will be used for various purposes in the future and, as exemplified by the search for a location for the New FRU Substation, acquiring new land can be very challenging. At this time, FBC is intending to use the FRU and HER sites as lay down yards, however, additional uses are likely to arise in the future for these sites. For instance, FBC is considering installing reactive compensation at the HER site to support transmission line voltage when needed.

14.1 Please elaborate further on the 'various purposes' each of the two sites will be used for, why they will be required, and please provide timelines for each identified use.

14.1.1 Please explain why these purposes could not be included in the new Project site, which the CEC understands to be larger than required for the Project.

14.2 Please discuss the option of selling either the HER or FRU sites and provide quantification for any value that could be received from the sale/lease of each site.

<u>Response:</u>

As noted in the Application, FBC's intended immediate use for the FRU and HER sites is to use them as lay down yards. Beyond the immediate use as a lay down yard, FBC has not yet determined what each site will be used for and therefore cannot provide any timelines.

The HER site will be useful for purposes in both the immediate future and in the long term, and FBC is not considering selling or leasing this site at this time. For example, FBC is considering installing reactive compensation at the HER site because of its location on the transmission system to support end of line voltage. Installing reactive compensation to support end of line voltage would not be useful at the Grieve Location.

With regard to the existing FRU site, FBC may consider selling this property in the future. However, at least in the short-term, FBC intends to utilize the FRU site as a lay down yard. Subsequent to the New FRU Substation being fully built and operational, FBC will assess all the sites and will consider their potential future uses and FBC's anticipated future needs. Accordingly, FBC has no information to provide on the value of selling or leasing the FRU site.

Project Cost Estimate

15. Reference: Exhibit B-1, pages 60-61

Table 6-3: Financial Analysis of the Project

Line	Particular	Total	Reference (Conf. App. D)
1	Total Capital Costs to Electric Plant in Service ($ millions)	18.302	Schedule 6, Line 37
2	Total Removal Costs to Accumulated Depreciation ($ millions)	0.565	Schedule 6, Sum of Line 38 - Line 37
3	**Total Project Cost ($ millions)**	**18.867**	**Line 1 + Line 2**
4	Incremental Sustainment Capital	5.336	Schedule 6, Sum of Line 30 (2027-2076)
5	**Total Incremental Capital Costs over 53 years ($ millions)**	**24.203**	**Line 3 + Line 4**
6			
7	Incremental Rate Base in 2027 ($ millions)	18.446	Schedule 5, Line 11 (2027)
8	Incremental Revenue Requirement in 2027 ($millions)	1.440	Schedule 1, Line 9 (2027)
9	**PV of Incremental Revenue Requirement 53 years ($ millions)**	**20.795**	**Schedule 9, Line 25**
10			
11	Rate Impact in 2027, compared to 2024 Approved (%)	0.31%	Schedule 9, Line 28 (2027)
12	**Levelized Rate Impact 53 years (%)**	**0.29%**	**Schedule 9, Line 32**
13	Levelized Rate Impact 53 years ($/MWh)	0.376	Schedule 9, Line 45

The financial evaluation of the Project includes the following assumptions:

- **Project Capital and Removal Costs:** Base capital cost estimate of $18.867 million in as-spent dollars, as discussed in Section 6.2.
- **Future Incremental Sustainment Capital:** The financial evaluation over the 53-year period includes proxies for the future replacement cost of the poles, towers and fixtures, and conductors and devices of the Project. The timing of these replacement costs is assumed to be based on the approved depreciation rate of 39 years for the transmission poles, towers and fixtures, and conductors and devices, and 42 years for the distribution conductors and devices, as detailed in FBC's most recently approved depreciation study (for example, the 50-year post-Project analysis period includes the one-time replacement of the transmission poles, tower and fixtures, and conductors and devices in 2065, as well as the distribution conductors and devices in 2068).
- **Incremental O&M:** FBC expects that ongoing maintenance spending will be reduced by eliminating the O&M expenditures associated the existing HER and FRU substations, which will be decommissioned and replaced with the New FRU Substation. The incremental Project O&M in 2027 (i.e., when all assets enter rate base) is estimated to be a savings of $13.444 thousand in as-spent dollars, relating to substation equipment, plus annual inflation as discussed below. Over a 12-year O&M window (based on switch and transformer maintenance that occurs every 12 years), the average incremental O&M savings is approximately $5.842 thousand per year. The incremental O&M can be found in Confidential Appendix D, Schedule 2.
- **Property Tax:** Incremental property tax of $0.130 million, in as-spent dollars, is estimated to be incurred from 2027 onwards because of new infrastructure. This incremental amount will be partially offset by the removal of the existing FRU and HER substations.
- **Inflation:** From 2027 onward, annual inflation of 2 percent is applied to the incremental O&M, property tax and future sustainment capital costs during the post-Project analysis period, which is in line with the Bank of Canada inflation target of 2 percent.

15.1 FBC includes approximately $5 million in 'incremental' sustainment capital. Please explain why the sustainment capital related to poles, towers and fixtures exceeds that which would have been required in a do-nothing or business as normal scenario (i.e., not necessarily related to the project).

Response:

The $5.336 million in incremental sustainment capital shown on Line 4 of Table 6-3 and described on pages 60 and 61 of the Application are for the one-time future replacement costs of the new assets resulting from the Project at the end of their expected service life and prior to the end of the financial evaluation period. As these are new assets related to the Project, they are appropriately included as incremental sustainment capital. The new assets that will be placed in-service due to the Project are transmission poles, towers and fixtures, and transmission conductors and devices, with an expected end of life in 2065, and distribution conductors and devices with an expected end of life in 2068.

Consultation

16. Reference: Exhibit B-1, Section 8.1 (entirety), page 76-77 and D Exhibits

> ***8.1 FBC IS UNDERTAKING APPROPRIATE CONSULTATION WITH STAKEHOLDERS***
>
> FBC's goal throughout consultation with stakeholders has been to ensure they are informed about the Project, are encouraged to offer feedback, and have an opportunity to provide input to inform FBC's decision-making.
>
> The most common areas of interest regarding the Grieve Location specifically were location, site selection, zoning, visual impact, wildlife values, and loss of agricultural land. Other interests included the loss of trees, EMF, lighting, proximity to residential area, and property values.

16.1 Please provide FBC's definition of 'stakeholders' as it relates to the Grieve property.

<u>Response:</u>

FBC's definition of "stakeholders" as it relates to the Grieve Location includes:

1. the neighbouring properties, and
2. an individual, a group of individuals, organizations, or a political entity with a stake in the outcome of the decision to proceed with the Project.

This definition corresponds with the practices laid out by the International Association for Public Participation. FBC's method for identifying stakeholders is provided in the response to BCUC IR1 13.1.

16.2 FBC describes a series of consultation activities and feedback it has received from neighbouring property owners including that summarized in Table 8-3 (pages 77-81). The CEC notes that several stakeholders have provided Letters of Comment (D Exhibits) since this Application has been submitted. Please identify any concerns raised either in these Exhibits, or elsewhere that are additional to those identified in the application, and if applicable update Table 8-3.

<u>Response:</u>

Please refer to the response to BCOAPO IR1 13.3.