Sarah Walsh
Director, Regulatory Affairs

Gas Regulatory Affairs Correspondence
Email: gas.regulatory.affairs@fortisbc.com

Electric Regulatory Affairs Correspondence
Email: electricity.regulatory.affairs@fortisbc.com

FortisBC
16705 Fraser Highway
Surrey, B.C. V4N 0E8
Tel: (778) 578-3861
Cell: (604) 230-7874
Fax: (604) 576-7074
www.fortisbc.com

May 23, 2024

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

Attention: Patrick Wruck, Commission Secretary

Dear Patrick Wruck:

Re: FortisBC Inc. (FBC)

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

Response to the British Columbia Utilities Commission (BCUC) Information Request (IR) No. 1

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

FBC requests that a portion of the responses to BCUC IR1 16.1 and 16.4 and CONFIDENTIAL Attachment 16.2 be filed on a confidential basis and held confidential by the BCUC in perpetuity, pursuant to Section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents, as set out in Order G-72-23. The responses and CONFIDENTIAL Attachment 16.2 contain information which pertains to private land for which FBC does not have permission to disclose publicly and other information which is commercially sensitive and market competitive information which, if disclosed publicly, could prejudice or influence future negotiations of contracts between FBC and suppliers or counterparties, which could result in higher costs for customers. FBC is unable to foresee a time when the information may no longer be confidential and, therefore, requests that the information remains confidential in perpetuity. A confidential version has been provided to the BCUC and Interveners who have signed a Confidentiality Declaration and Undertaking.

For convenience and efficiency, if FBC has provided an internet address for referenced reports instead of attaching the documents to its IR responses, FBC 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 INC.

Original signed:

Sarah Walsh

Attachments

cc (email only): Registered Interveners

Table of Contents **Page No.**

A. PROJECT NEED AND JUSTIFICATION

1.0 Reference: Project Need & Justification

Exhibit B-1 (Application), Section 3.2, p. 13; Section 3.3, p. 20; Section 3.3.1.1, p. 20; Section 3.3.1.2, p. 21; Appendix F-6, p. 1

Existing Substation Equipment Condition

On page 20 of the Application for a Certificate of Public Convenience and Necessity for the Fruitvale Substation Project (Application), FortisBC Inc. (FBC) identifies one of the drivers of the Fruitvale (FRU) Substation Project (Project) need as, "The condition of the equipment and age of infrastructure at both the FRU [Fruitvale] and HER [Hearns]substations."

Further on page 20 of the Application, FBC states:

> 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.
>
> […]
>
> Further, due to the aging of the components, the breakers are operating slowly and show signs of extensive arcing during fault interruption
>
> […]
>
> 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.

On page 13 of the Application, FBC states:

> 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.

On page 1 of Appendix F-6 to the Application, FBC responds to a question from the Beaver Valley Concerned Citizens (BVCC) regarding the historic issues with the FRU and HER substations as follows:

> The Hearns transformer (HER T1) is 73 years old and the Fruitvale transformer (FRU T1) is 37 years old. Given the age and condition of these units, each has been recommended to be replaced within 2-3 years.

On page 21 of the Application, FBC states:

> 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.

1.1 Please further explain the analysis supporting the conclusion to recommend the replacement of each of FRU T1 and HER T1 within 2-3 years.

1.1.1 Please explain the standard life for a transformer similar to FRU T1. In the response, please explain whether a 37 year-old transformer is generally at the end of its expected life.

Response:

As FRU T1 is not a standard power transformer, FBC is unable to provide a "standard life" for a transformer similar to FRU T1. Unlike the network transformers that have recently been installed such as for the Salmo substation, Beaver Park substation, and Playmor substation, FRU T1 is an industrial transformer that has been retrofitted over the years.

The FRU T1 condition was assessed in 2023. A copy of the *Condition and Life Assessment Report Fruitvale T1 Transformer* is provided as Attachment 1.1a. The report provides FBC's assessment of the inspection and testing results collected through FBC's maintenance program. In short, the following condition markers led to the recommendation for replacement of FRU T1 in the next two to three years:

- Deterioration in FRU T1 solid and liquid insulation, as explained in Attachment 1.1a.
- As explained above, FRU T1 is not a standard power transformer. FBC's design review of FRU T1 indicates that this unit was built to industrial transformer standards. The poorly

designed cooling system and the distribution regulator-type tap changers are characteristics of this classification. Industry statistics indicate that industrial transformers have a shorter useful life than network transformers.

- Based on industry statistics,[1] the estimated probability of failure of FRU T1 is upwards of 15 percent (1 in 7 chance of failure per year). Industry statistics indicate that probability of failure for industrial transformers exponentially increases after 20 years and there are no industrial transformers older than 50 years remaining in service.

In consideration of the current state of the equipment and the potential risk of failure, FBC concluded that FRU T1 should be replaced in the next two to three years.

The HER T1 condition was assessed in 2023. A copy of the *Condition and Life Assessment Report Hearns T1 Transformer* is provided as Attachment 1.1b. The report provides FBC's assessment of the inspection and testing results collected through FBC's maintenance program. In short, the following condition markers led to the recommendation for replacement of HER T1 ABC (3 single phase units) in the next two to three years:

- Deterioration in HER T1 solid and liquid insulation, as explained in Attachment 1.1b.
- HER T1 ABC is a network transformer. Industry statistics indicate that the probability of failure for network transformers exponentially increases after 40 years with no network transformers older than 70 years remaining in service. As HER T1 is 74 years old, it is estimated to have a high probability of failure.

In consideration of the current state of the equipment and the potential risk of failure, FBC concluded that HER T1 should be replaced in the next two to three years.

1.2 Please complete the following table for all major equipment at the: (i) FRU substation; and (ii) HER substation.

Equipment	Actual Age	Current Condition Summary	Requires Replacement?	Rationale if Replacement is Required

[1] ABB - Hitachi Fit at 50 white papers.

Response:

Table 1 provides the major equipment for the FRU substation.

Table 1: FRU Substation Major Equipment

Equipment	Actual Age	Current Condition Summary	Requires Replacement?	Rationale if Replacement is Required
FRU T1	37	Please refer to the response to BCUC IR1 1.1.	Yes. FBC report (Attachment 1.1a to BCUC IR1 1.1) recommends replacement in next 2-3 years.	Risk of failure due to condition.
FRU Switchgear	57	As per the third-party condition assessment report (Appendix A to the Application), the condition is poor.	Yes. Third-party condition assessment report (Appendix A to the Application) recommends immediate replacement.	Risk of failure due to poor condition. Attempts to repair were completed in 2018 and 2024, with no improvement to condition.
FRU FDR1 (Breaker)	57			
FRU FDR2 (Breaker)	57			
FRU CAP BNK-1 (Capacitor Bank)	22	Condition is suitable for operation.	No. Unit may be repurposed.	N/A

Table 2 provides the major equipment for the HER substation.

Table 2: HER Substation Major Equipment

Equipment	Actual Age	Current Condition Summary	Requires Replacement?	Rationale if Replacement is Required
HER T1	74	Please refer to the response to BCUC IR1 1.1.	Yes. FBC report (Attachment 1.1b to BCUC IR1 1.1) recommends replacement in next 2-3 years.	Risk of failure due to age and condition.
HER REG-A	24	Mid-life condition based on number of operations.	No. Unit may be repurposed.	N/A
HER REG-B	28	End-of-life condition based on number of operations.	Yes.	Based on FBC's experience, this unit is approaching the maximum number of operations before failure.
HER REG-C	12	Suitable to continue operation, installed in 2012.	No. Unit may be repurposed.	N/A

2.0 Reference: Project Need & Justification

Exhibit B-1, Section 3.3.2, p. 22; FBC 2024 Annual Review of Rates proceeding, Exhibit B-2, Table 13-11 p. 131, Table 13-12, p. 132

Reliability of Electrical Supply

On page 22 of the Application, FBC states:

> 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.

In the FBC 2024 Annual Review of Rates proceeding, in Exhibit B-2 FBC provided tables showing its reliability service quality indicators. Table 13-11 from page 131 shows FBC historical System Average Interruption Duration Index (SAIDI) results, reproduced below:

Table 13-11: Historical SAIDI Results

Description	2014	2015	2016	2017	2018	2019	2020	2021	2022	June 2023 YTD
Annual normalized results	2.32	2.13	2.10	4.05	3.15	2.45	3.17	4.27	2.42	3.21
Benchmark	2.22						3.22			
Threshold	2.62						4.52			

Table 13-12 from page 132 shows FBC historical System Average Interruption Frequency Index (SAIFI) results, reproduced below:

Table 13-12: Historical SAIFI Results

Description	2014	2015	2016	2017	2018	2019	2020	2021	2022	June 2023 YTD
Annual normalized results	1.64	1.56	1.34	1.78	1.73	1.21	1.64	2.08	1.52	1.48
Benchmark	1.64						1.57			
Threshold	2.50						2.19			

2.1 Please provide reliability statistics for the loads served by FRU and HER for each of the last 10 years. In the response, for each of FRU and HER, please identify:

(i) the number of unplanned outages per year;

(ii) the average length of each unplanned outage;

(iii) the cause of each unplanned outage;

(iv) annual normalized SAIDI for the substation; and

(v) annual normalized SAIFI for the substation.

2.1.1 Please explain how this performance compares to other similarly sized towns served by FBC and discuss the reason(s) for any differences.

Response:

In addition to providing the requested information for the FRU and HER substations, FBC also provides information on unplanned outages, SAIDI and SAIFI for the Beaver Park (BEP) and Salmo (SAL) substations, as these substations serve similarly sized towns as Fruitvale.

Excluding unplanned station outages resulting from a loss of transmission supply, between 2014 and 2023, the FRU, BEP and SAL substations did not experience a station unplanned outage, while the HER substation experienced 1 unplanned outage in 2015. The length of the unplanned outage in 2015 at the HER substation was 0.42 hours (i.e., 25 minutes).

The single unplanned outage at the HER substation in 2015 was a result of equipment failure due to vandalism of the HER T1 regulators causing a structure fire. Load was transferred to the FRU substation within 25 minutes while repairs were made. It took approximately 95 hours to repair the equipment damage at HER.

Below, FBC provides the annual normalized SAIDI and SAIFI for the FRU, HER, BEP and SAL substations. Annual normalized SAIDI and SAIFI consider all planned and unplanned outages but exclude Major Event Day outages.

It is important to note that SAIDI and SAIFI specifically measure average outage duration and average outage frequency, respectively, from the customer perspective and include all outages on the system that impact supply to customers, not just transformer outages at a substation. BEP, FRU, and SAL are rural stations that serve between 1,000 and 1,600 customers. HER is smaller, serving just over 200 customers. Since these are small, rural stations, a small increase or decrease in outages has a greater impact on the SAIDI and SAIFI statistics than on FBC's overall statistics, resulting in more significant changes year-to-year.

Table 1: Normalized SAIDI for the FRU, HER, BEP and SAL Substations

Station	SAIDI										
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2014-2023 Average
FRU	5.03	0.45	2.82	8.86	1.22	1.30	1.86	2.27	3.25	5.63	3.27
HER	14.16	5.47	7.36	6.53	7.25	0.23	10.99	2.07	5.37	7.67	6.71
BEP	0.90	0.52	3.61	3.66	5.42	1.26	1.64	1.59	2.99	7.03	2.86
SAL	3.56	1.48	1.14	4.11	2.40	0.15	6.56	14.90	10.40	3.83	4.85

With regard to the SAIDI results in Table 1 above for the HER substation, there are multiple factors that cause the average SAIDI to be higher than the other stations; however, the primary factor is its location on the transmission system. HER is usually the last station to be restored, which then affects all HER customers, as they are out longer than the other stations.

Table 2: Normalized SAIFI for the FRU, HER, BEP and SAL Substations

Station	SAIFI										
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2014-2023 Average
FRU	4.01	1.06	3.19	6.95	3.13	2.55	3.39	4.00	6.77	3.25	3.83
HER	2.05	3.17	3.09	5.55	3.85	0.49	4.70	3.22	5.32	3.89	3.53
BEP	3.25	2.05	4.56	5.12	4.55	0.82	3.51	1.93	4.63	5.53	3.60
SAL	2.72	2.37	3.14	4.28	2.34	0.05	5.04	7.62	3.48	4.00	3.50

2.2 Please discuss the expected reliability of the proposed new FRU substation. In the response, please compare this expected reliability to the historic reliability of the FRU and HER substations.

Response:

As discussed in Section 3.3.2 of the Application, the reliability this Project seeks to address is related to the single transformer configurations at the existing FRU and HER substations, where a transformer outage results in a complete station outage. The New FRU Substation will provide superior reliability compared to the existing FRU and HER substations in the event of a transformer outage. This second transformer will ensure minimal customer outages, if any, in the event of an unplanned transformer outage and will remove FBC's current reliance on a mobile transformer during planned transformer maintenance. Even though unplanned transformer outages are rare, the impact to customers can be significant, depending on the available backup supply. Relying on a mobile transformer can result in a minimum outage of 24 hours, which could extend several days depending on severe storm conditions, road restrictions, or availability of the mobile transformer at the time of the event. Another benefit of the New FRU Substation (and the installation of the second transformer) is that FBC will have more flexibility to use its mobile transformer at other substations when needed, thus improving the reliability of FBC's system.

SAIDI/SAIFI metrics measure all outages on the system that impact supply to customers. Therefore, if analyzing the reliability of the New FRU Substation compared to the existing FRU and HER substations through the use of SAIDI and SAIFI metrics, FBC expects that the New FRU Substation, if sited at the Grieve Location as proposed, will have similar reliability. Customers served from the New FRU Substation will still be impacted by the same causes of line outages (i.e., trees, weather, etc.). FBC notes that if the New FRU Substation were sited further from the load centre, such as at the HER substation location, it is expected that reliability as measured by SAIDI and SAIFI would be negatively impacted.

3.0 Reference: Project Need & Justification

Exhibit B-1, Appendix F-6, p. 2

Load Growth

On page 2 of Appendix F-6 to the Application, FBC states: "As described in the recent FBC 2023 Annual Review this project is driven by equipment condition issues and aging infrastructure at the Fruitvale and Hearns substations. This project is not driven by load growth."

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										

Response:

FBC provides the requested information in the tables below with the following clarifications:

- The category "Annual Total Load (MWh)" has been renamed as "Annual Total Energy (MWh)" because the units "MWh" represent energy. Further, as FBC does not forecast annual total energy on a feeder basis, only the historical annual total energy is provided in the tables below.
- The "Existing Substation Maximum Load" and "New FRU Substation Maximum Load" was interpreted to mean the maximum capacity available from the substation. This value is

constant from year to year and is therefore addressed here instead of in the tables. FRU T1 is nominally rated 8 MVA and HER T1 is nominally rated 1.875 MVA. The New FRU Substation will have two nominally rated 20 MVA transformers. However, the purpose of the second transformer is for redundancy, which means that either transformer must be able to carry all of the load, limiting the New FRU Substation maximum load to 20 MVA.

- The "FRU Peak Load (MW)" provided below is the winter peak load as the peak load occurs during the winter season which spans from November to February. Therefore, the peak values provided in the table could have occurred at any time from November of the listed year to February of the following year. For example, the 2014 peak load data below considers the range November 2014 to February 2015. Lastly, the forecast values do not consider impacts from potential new large loads, load growth due to fuel switching from other forms of heating to electric, or electric vehicles; therefore, forecast load levels are likely to be higher than shown.
- The "HER Peak Load (MW)" is identified as N/A for both the historical and forecast tables as there is no metering at the HER substation. Metering has not been installed at HER as the substation was planned to be decommissioned, and the maximum capacity of the substation is only 1.875 MVA.

Historical	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Fruitvale Annual Total Energy (MWh)	22,117	22,360	20,785	22,959	22,985	22,533	22,661	23,182	23,279	23,851
Hearns Annual Total Energy (MWh)	3,318	3,120	2,882	3,104	3,102	3,178	3,269	3,356	3,367	3,367
Fruitvale Peak Load (MW)	4.87	5.37	6.03	5.40	5.47	5.57	5.92	5.49	6.18	5.88
Hearns Peak Load (MW)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Forecast	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Fruitvale Annual Total Energy (MWh)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hearns Annual Total Energy (MWh)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fruitvale Peak Load (MW)	6.37	6.35	6.36	6.51	6.56	6.63	6.70	6.78	6.87	6.94
Hearns Peak Load (MW)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B. EVALUATION OF ALTERNATIVES

4.0 Reference: SITE SELECTION PROCESS

Exhibit B-1, Section 4.3.4, p. 32; Section 4.4, p. 32

New Property Identification

On page 32 of the Application, FBC states:

> The process for identifying the appropriate site was lengthy and complex. FBC considered many different properties and engaged in years of consultation and assessment activities to arrive at the preferred location.
>
> […] FBC identified and evaluated an extensive list of potential properties for the New FRU Substation. FBC considered bare properties and properties containing structures, as well as properties that were on and off the market. This search identified 18 possible locations for the New FRU Substation.

4.1 Please elaborate on the process FBC used to develop the list of 18 possible locations for the new FRU substation. In the response, please include a brief description of all desktop reviews that were performed, the scope of such reviews, any site visits by FBC staff with the purpose of site identification, or any other site identification activities.

4.1.1 Please confirm, or explain otherwise, that this process was consistent with previous FBC projects of a similar nature.

Response:

FBC's process for identifying locations for the New FRU Substation was generally consistent with the process used for past projects of a similar nature; however, FBC notes that the greenfield nature of this Project distinguishes it from FBC's recent projects (e.g., the A.S. Mawdsley Substation Rebuild CPCN project, the Playmor Substation Upgrade project, and the Beaver Park Substation Upgrade project).

FBC worked with its Lands department and engaged with the Village of Fruitvale, the public, and a local realtor throughout 2019 to 2023 to identify and review possible locations. Please refer to the response to BCUC IR1 13.5 regarding properties identified by the public. FBC considered bare properties and properties containing structures, as well as properties that were on and off the market. The 18 possible locations listed in the Application were identified through this process.

FBC completed a desktop review for each of the 18 possible locations. The desktop review consisted of evaluation of the following criteria between 2019 and 2022:

- Landowner Receptive to Sell;
- Parcel Size;
- Agricultural Land Reserve;

- Floodplain;
- Constructability Complexity;
- Transmission Extension Complexity (considers line routing, lands issues, etc.);
- Distribution Reconfiguration Complexity (considers line routing, lands issues, etc.); and
- Visual and Noise Impact.

The desktop review was expanded to also include the criteria below after incorporating feedback from stakeholders following the Design Workshop in April 2022.

- Community Land Use Impact;
- Electromagnetic Fields (EMF);
- Indigenous Reserve Lands;
- Indigenous Consultation Requirements;
- Property Rezoning;
- Customer Reliability Impact;
- Land Vacancy;
- Critical Habitat for Species at Risk;
- Archaeological Site within 250 metres;
- Operations Accessibility; and
- Relative Capital Cost.

FBC visited the Fruitvale area on several occasions and viewed the potential locations and surrounding neighborhood from nearby roadways and sidewalks.

FBC conducted site visits to select locations if they were deemed a possible candidate at that time. The site visits could include FBC representatives from Planning, Engineering, Project Management, Community and Indigenous Relations, and Environment. FBC performed site visits at the following properties:

- Property A (Mazzocchi Location);
- Property F;
- Old Salmo Road (Property #5);
- Highway 3B Property B (Property #8); and
- 2064 Grieve Road (FBC notes that it did not perform a site visit until after the property was purchased as FBC was not permitted to enter the site until it took ownership of the property).

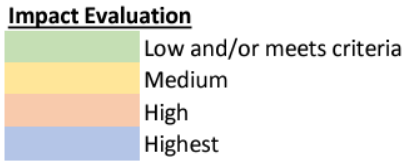
5.0 Reference: SITE SELECTION PROCESS

Exhibit B-1, Section 4.4.1, pp. 34-35; Section 1.1, p. 1; Section 4.3.3.2, p. 32; Section 4.4.2, pp. 36-40; Appendix B, p. 124 (pdf), footnotes 13–14

Site Evaluation

On p. 124 (pdf) in Appendix B to the Application, FBC provides a land evaluation matrix, scoring potential sites against several criteria for the new Fruitvale substation. FBC states the following in footnote 13 with regards to the customer reliability impact criteria: "Options located further from the load centre are considered to have a lower reliability benefit."

Further on page 124 (pdf), FBC provides the following scoring scale for each criteria in the land evaluation matrix:



5.1 Please explain any factors other than distance from the load centre considered in scoring a site's Customer Reliability Impact.

Response:

FBC evaluated the scoring of the Customer Reliability Impact based on the approximate distance from the load centre because distance from the load centre is the most impactful factor regarding Customer Reliability and encompasses other factors which would contribute to Customer Reliability. As described in Sections 4.3.3.2 and 4.4.1 of the Application, the distance from the load centre considers the potential outage causes along the proposed distribution/transmission line route (i.e., vegetation, proximity to roadways, etc.) and that, the longer the distribution/transmission line route, the more exposed customers are to potential outages.

5.2 Please discuss the distance from the load centre, or other factors, that would result in an impact evaluation of: (i) Low; (ii) Medium; (iii) High; and (iv) Highest.

Response:

The load centre for Fruitvale and the surrounding area is the Village of Fruitvale (town). Properties within the town were considered Low, properties near the town were considered Medium, and properties furthest from the town were considered High.

5.2.1 Please explain what FBC would consider to be an acceptable customer reliability impact score.

Response:

FBC did not assess the Customer Reliability Impact using a binary acceptable versus not acceptable criterion, but rather on a Low, Medium, and High scale, reflecting the fact that the lower the customer reliability impact the better. However, to be responsive, FBC considers that a score of Low is both acceptable and also the preferred Customer Reliability Impact score. FBC would only consider a property with a Customer Reliability Impact score of Medium as acceptable if it also met the other land evaluation criteria and no other more suitable options were available. FBC would not consider a score of High (or Highest) to be acceptable.

5.3 Please discuss the typical distance from the load centre for FBC substations of a similar size to the proposed new FRU substation.

Response:

There is no typical distance between FBC substations and their load centres. While FBC seeks to minimize the distance between a substation and its load centre where possible, a suitable location for a substation takes into account many factors, as illustrated by the Land Evaluation matrix, which means that a typical distance cannot be set.

Other similarly sized stations that have recently been rebuilt did not have similar land constraints and were rebuilt on the existing site or a slightly expanded site (i.e., the Salmo, Beaver Park, and Playmor substations).

On page 32 of the Application, FBC states:

> The HER substation location is far from the load centre; therefore, building the New FRU Substation on the existing HER property would not meet the objective of addressing reliability risks for the reasons set out above.

On page 34 of the Application, FBC states:

> Two of the locations – Atco Woods Products Property A and the Former Atco Wood Products Property – are in close proximity to the existing HER substation….these two locations were rejected due to their distance from the load centre (Village of Fruitvale).

5.4 Please explain why FBC did not assess the HER substation on the land evaluation matrix (but included other sites that were screened out due to their distance to the load centre).

Response:

The HER substation location was evaluated as part of Alternative 3: Replace the FRU and HER Substations with a New Substation on Either the Existing FRU or HER Sites (Section 4.3.3). More specifically, FBC concluded in Section 4.3.3.2 that the HER location would not meet the objective of addressing reliability risks due to its distance from the load centre.

FBC notes that Alternative 4: Replace the FRU and HER Substation with a New Substation on a New Property included the land evaluation matrix to screen *new* properties under consideration for the New FRU Substation and therefore the HER location was not included.

FBC included Properties 1 and 2 in the land evaluation matrix despite also being screened out due to distance from the load centre because these two properties were recommended to FBC by stakeholders (see Section 8.1.1 of the Application).

5.5 Please provide a land evaluation matrix row for the existing HER substation site.

Response:

Please refer to Attachment 5.5 for the updated Land Evaluation Matrix. The HER substation is identified as Location #10.

On page 35 of the Application, FBC states:

> Siting the substation at either of these locations (Atco Wood Products – Property A, Former Atco Wood Products Property) [parenthesis added], which are further from the load centre, would require completely rebuilding the line infrastructure between these sites and the load centre (Village of Fruitvale). […] The cost of this line work would be significant (as much as $10 million dollars).

On page 124 (pdf) of Appendix B to the Application, in footnote 14, FBC states following regarding the column Relative Capital Cost: "Relative to the other alternative locations, and considers the Transmission Extension Complexity, Distribution Reconfiguration Complexity and Constructability Complexity. No estimating completed."

5.6 Please provide a rough cost range for the Relative Capital Cost to warrant each of the following scores:

i) Low;

ii) Medium;

iii) High; and

iv) Highest.

Response:

As identified in the preamble above, a cost estimate was not developed for each location. Therefore, there is no specific cost range associated with Low, Medium, High, and Highest.

The "Relative Capital Cost" criterion is meant to convey, at a high level, a location's expected capital cost relative to other locations. FBC used this approach as it would not be reasonable to develop cost estimates for each location (as many of the properties would be eliminated for reasons unrelated to the Relative Capital Cost). Instead, FBC considered criteria that influence the Relative Capital Cost, including the "Transmission Extension Complexity", "Distribution Reconfiguration Complexity", and "Constructability Complexity". For example, a location is likely to be more costly if the transmission extension, distribution reconfiguration, and/or constructability is anticipated to be complex, and therefore these locations received a higher Relative Capital Cost score.

For illustrative purposes, and to respond to BCUC IR1 5.7, FBC developed a high-level Class 5 estimate for: (i) Atco Wood Products – Property A; (ii) Former Atco Wood Products Property; and (iii) the HER substation.

As explained in Sections 4.4.3.2 and 4.4.1 of the Application, relocating the existing FRU substation to these three locations would require extensive line upgrades, which are the driver for FBC scoring these properties as "Highest" for the Relative Capital Cost criterion. The scope for these line upgrades considers the following:

- Approximately 7.4 km of the transmission and distribution line along Highway 3B, between the Village of Fruitvale and the HER substation, would need to be entirely rebuilt to accommodate a three-circuit configuration (one transmission circuit and two distribution circuits).
- The new line infrastructure would be supported by steel poles and a new conductor would be strung for each circuit.

- One distribution circuit would supply the town and the second distribution circuit would be extended to a large industrial customer along Highway 3B.
- Distribution underground crossings would be required with the BC Hydro 500 kV and 230 kV transmission lines.
- Additional miscellaneous distribution related costs would be required, such as voltage regulators, station class arresters, and switches.

The high-level Class 5 cost estimate to complete the work described above is provided in the table below. As per AACE guidelines, a Class 5 estimate has an accuracy of -30% to +50%.

Line Upgrade High-Level Cost Summary	Cost ($ millions)
Rebuild to triple circuit 7.4 km from 20L196 to existing HER substation	8.1
Industrial customer distribution extension	0.4
Distribution underground crossing at BC Hydro 500 kV & 230 kV	0.6
Distribution miscellaneous costs (voltage regulators, station class arresters, etc.)	0.5
Total Cost	**9.6**

FBC notes the following additional considerations with respect to undertaking the required line upgrade work for these locations:

- The above estimate does not account for costs related to bringing a third distribution circuit to the Village of Fruitvale, when and if required. If permitted by the Ministry of Transportation (MOTI), the third circuit would be built on the other side of Highway 3B, resulting in line infrastructure on both sides of the highway between the Village of Fruitvale and the HER substation (approximately 7.4 km).
- There have been a significant number of structure replacements on transmission line 20L as part of FBC's ongoing transmission line rehabilitation program. Rebuilding the 7.4 km stretch with new steel structures would result in FBC needing to replace structures that have recently been replaced and are still in good working order.
- SAIDI and SAIFI metrics would likely be impacted given the load centre (Village of Fruitvale) is a significant distance from the source of supply (i.e., the area around the HER substation). As the electricity would need to travel through longer distribution lines to reach the end user, exposure to outages would increase.
- The triple circuit configuration also impacts reliability as most outages related to distribution lines and lower voltage transmission (60 kV) are caused by trees and storms. The proposed 7.4 km stretch of triple circuit line infrastructure would be in close proximity to trees. As all infrastructure is on the same structure, a single tree could potentially result in outages to all three circuits.

- The triple circuit line infrastructure would be much larger and more visually impactful than the existing infrastructure.[2] Furthermore, if a third distribution circuit was required, line infrastructure would exist on both sides of the highway for approximately 7.4 km.
- The triple circuit infrastructure will require additional statutory rights of way (SRW), introducing a lands risk.
- A portion of the triple circuit infrastructure will be located within the Agricultural Land Reserve (ALR), which will require approval to install new facilities and potentially delay project timelines.

For the Atco Wood Products – Property A and Former Atco Wood Products Property, the additional capital cost compared to the Grieve Location (at a Class 5 level of definition) would be approximately $9.6 million, as shown in the above table. This assumes that all other project costs, including the land acquisition cost, are approximately equal to the Grieve Location.

For the HER substation, the incremental $9.6 million capital cost would be slightly offset by the cost of the Grieve Location land, as FBC would not incur land acquisition costs for the existing HER substation. However, as shown in Table 6-1 of the Application, the land cost for the Grieve Location is less than $1 million of the total capital cost, so the incremental capital cost is still estimated to be $8 to $9 million. Further, the land cost for the Grieve Location is known (as the property is purchased), whereas, as explained above, the incremental capital cost for the line upgrades is only at a Class 5 level of definition and may be higher due to the factors described in this IR response.

5.7 Please provide a high-level cost summary or range if the Project was constructed on:

(i) Atco Wood Products – Property A;

(ii) Former Atco Wood Products Property; and

(iii) the existing HER substation site.

Response:

Please refer to the response to BCUC IR1 5.6.

[2] When responding to this IR, FBC discovered an error in the Land Evaluation Matrix filed as Appendix B to the Application. The Visual & Noise Impact rating for the Atco Wood Products – Property A and the Former Atco Wood Products Property should have been rated as High due to the visual impact resulting from the triple circuit line infrastructure. FBC has filed a corrected Appendix B as an erratum to the Application.

On page 36 of the Application, FBC states: "A number of available sites considered by FBC were ultimately rejected because the potential for flooding, challenging terrain, and/or the need to reconfigure transmission and distribution line infrastructure resulted in the sites being unfeasible."

On pages 38 to 40 of the Application, FBC screened out several potential sites for the new FRU substation, as summarized in the BCUC staff generated table below:

Location Name	Reason for Rejection
Atco Wood Products Property C (Site # 6)	• Extremely challenging and very costly construction due to elevation profile • Potential station impact from falling trees during extreme weather
Highway 3B Property A (Site #7)	• Extremely challenging and very costly construction due to elevation profile • Potential station impact from falling trees during extreme weather • Additional Project cost and schedule risk due to portion of required line infrastructure falling within ALR
Highway 3B Property B (Site #8)	• Potential station impact from falling trees during extreme weather • Additional Project cost and schedule risk due to portion of required line infrastructure falling within ALR • Increased Project costs due to distance from the load centre

5.8 Please explain whether FBC considers constructing a substation on complex terrain that may be impacted by falling trees to be an acceptable risk that may be mitigated, or an unacceptable risk. In the response, please discuss the magnitude of costs to mitigate the risk.

Response:

FBC reviewed each location on a case-by-case basis.

For example, the Atco Wood Products Property C (Site #6) and the Highway 3B Property A (Site #7) both have extreme elevation profiles. In those cases, FBC considers the complexity of the terrain to be unacceptable. FBC has never constructed a substation on land with similar profiles to these properties.

With regard to the Highway 3B Property B (Site #8), where the elevation profile was not as extreme, FBC performed a site visit to evaluate the property in January 2023. Based on the site visit, FBC determined that the risk of falling trees was unacceptable on the mountain side of the property. While FBC considered ways to mitigate the risk of falling trees through removing trees around the area of the substation, this would not entirely address the risk, as the steep terrain could still result in trees situated considerably far from the substation and outside of the property boundaries falling down the mountainside and potentially causing damage to the substation.

Thus, FBC ultimately considered the complexity of the terrain to be unacceptable. FBC is unable to provide a cost estimate to mitigate this risk because the magnitude of the costs would be dependent on the property and the amount of land that would require tree removal.

FBC has constructed substations on land with similar profiles to that of Highway 3B Property B and has experienced challenges and events that have informed FBC's criteria for the siting of substations. The Cottonwood (COT) substation, situated near Nelson, BC, was built in 2006 and is located at the base of a mountain. The substation was damaged in 2020 when multiple trees fell down the mountain onto the substation during an extreme weather event. To mitigate the risk of another tree falling on the substation, the entire property surrounding the substation was cleared of trees and the risk of falling trees has been mitigated for this substation. However, as discussed above, similar tree removal may not adequately address the risk for a substation built at the Highway 3B Property B site, as the steep terrain could still result in trees situated considerably far from the substation and outside of the property boundaries falling down the mountainside and potentially causing damage to the substation.

Highway 3B Property B is also partially within the floodplain and impacted by spring runoff. FBC's Ruckles (RUC) substation, situated in Grand Forks, BC, is also located within a floodplain. In 2017, FBC received approval of capital expenditures to rebuild the RUC substation to address issues of age and its location in the identified flood zone of the Kettle River. In 2018, FBC undertook work to rebuild the substation on the existing site by raising the site above projected flood levels. In May 2018, significant areas of Grand Forks, including the old Ruckles Substation, experienced extensive flooding. This forced the de-energization of the old station to manage the extreme safety hazards associated with flooded high voltage equipment. Although not all aspects of the project were complete, construction of the new station was sufficiently advanced that the electrical infrastructure was available to provide safe and reliable service. FBC was able to expedite the remaining commissioning and only a short unplanned outage occurred before load was transferred from the unserviceable equipment in the old Ruckles Substation to the new substation equipment. FBC's experience with the RUC substation further supports FBC's assessment that it is unacceptable to relocate an existing substation that does not currently reside within a floodplain into a floodplain or area where overland flooding is a known issue. The existing FRU substation does not reside within a floodplain or have overland flooding issues.

5.9 Please explain whether FBC has ever constructed a substation on land with elevation profiles similar to that of Atco Wood Products Property C, Highway 3B Property A, or Highway 3B Property B. If yes, please provide a brief description of the project(s) and discuss any lessons learned.

Response:

Please refer to the response to BCUC IR1 5.8.

6.0 Reference: SITE SELECTION PROCESS

Exhibit B-1, Section 4.4.2, pp. 37, 41; Section 4.5, p. 42; Section 4.5.1, p. 44; Section 8.1.5, Table 8-3, pp 76 to 78, Appendix B, p. 124 (pdf); FBC Application for CPCN of the A.S. Mawdsley Terminal Station Project proceeding, Exhibit B-1, Section 4.2, p. 33

Land Evaluation Matrix

On page 33 of Exhibit B-1 in the Application for a CPCN for the A.S. Mawdsley Terminal Station Project (FBC Mawdsley CPCN), FBC provided the scoring applied to each of the non-financial criteria for the assessment of FBC Mawdsley project alternatives:

Score	Impact Evaluation
3	Best Choice
2	Good Choice
1	Acceptable Choice
0	Poor Choice

Further on the same page, FBC provided the following list of non-financial evaluation criteria and weights for the assessment of FBC Mawdsley project alternatives:

Category	Criteria	Individual Weight[22]
Infrastructure	System Reliability	7.2%
	Potential for Future Expansion	8.8%
Safety	Personnel Safety	4.9%
	Construction Safety	4.9%
	Ground Grid Integrity	5.2%
Environmental & Archeological	Ecological	8.1%
	Air-quality, GHG Reductions	6.8%
	Archaeology	8.1%
Community & Stakeholder Relations	Land Use & Adjacent Infrastructure	5.4%
	Community Impact	7.2%
	Economic Growth	5.4%
Indigenous	Indigenous Relations	8.0%
Technical	Land Availability	4.0%
	Constructability	8.0%
	Operations Accessibility and Operability	8.0%
	Total	**100%**

On page 124 (pdf) in Appendix B to the Application, FBC provides a land evaluation matrix, evaluating the potential sites for the new FRU substation with the following criteria (table below prepared by BCUC staff):

Category	Criteria
Land Ownership and Use	Landowner Receptive to Sell
	Property Rezoning
	Land Vacant
	Indigenous Reserve Lands
	Agricultural Land Reserve
Environmental, Archaeological, and Hazards	Floodplain
	Critical Habitat for Species at Risk

	Archaeological Site within 250m
	EMF Impact
Technical	Parcel Size
	Transmission Extension Complexity
	Distribution Reconfiguration Complexity
	Constructability Complexity
	Operations Accessibility
Community and Stakeholder Relations	Visual and Noise Impact
	Community Land Use Impact
	Indigenous Consultation Requirements
	Customer Reliability Impact
	Relative Capital Cost

Further on the same page, FBC provides the scoring applied to the land evaluation matrix:

Impact Evaluation

- Low and/or meets criteria
- Medium
- High
- Highest

6.1 Please explain why individual weights and numerical scoring were not assigned to the land evaluation criteria for the Project and discuss FBC's rationale for this approach. In the response, please compare the approach used for the Project with the approach taken in the FBC Mawdsley project.

Response:

FBC generally uses individual weighting and numerical scoring to evaluate viable alternatives against one another to determine which alternative is the best option. However, in this case FBC did not individually weight or numerically score the properties in the Land Evaluation Matrix because there was only one suitable alternative. The other alternative locations contained in the Land Evaluation Matrix were not able to meet certain important criteria for the building of a new substation and thus were considered unsuitable and removed from consideration.

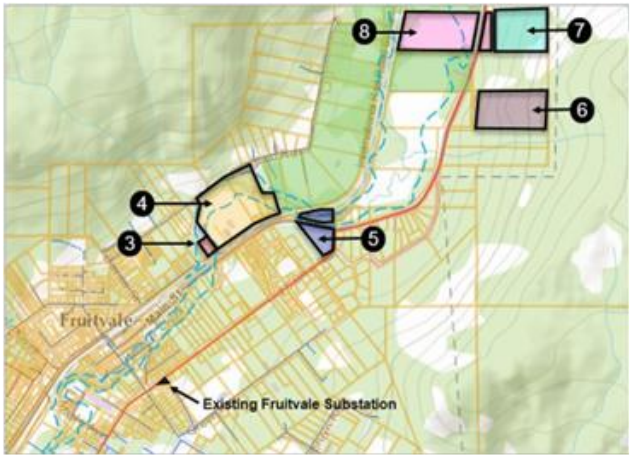
In contrast, FBC's A.S. Mawdsley Terminal Station project had two alternatives that met the project objectives and required further evaluation. Thus, in that case, scoring and weighting the evaluation criteria for the two alternatives was used to determine FBC's preferred project alternative.

On page 124 (pdf) in Appendix B to the Application, in footnote 10, FBC states the following regarding the visual and noise impact criteria: "Considers the visual and noise impact on the community from the new station, transmission, and/or distribution infrastructure."

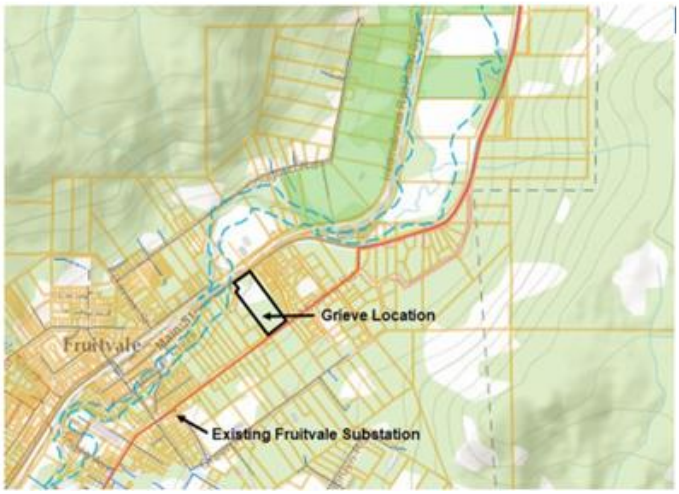
BCUC staff have partially recreated the land evaluation matrix from Appendix B below, showing the visual and noise impact scores:

Site Number	Location Name	Visual and Noise Impact
1	Atco Wood Products – Property A	Low
2	Former Atco Wood Products Property	Low
3	Hepburn Road	Medium
4	Atco Wood Products – Property B	Low
5	Old Salmo Road	Low
6	Highway 3B – Property A	Medium
7	Atco Wood Products – Property C	Medium
8	Highway 3B – Property B	Low
9	2064 Grieve Road	Medium

On page 37 of the Application, FBC provides a map view of the sites 3 through 8:



On page 41 of the Application, FBC provides a map view of the 2064 Grieve Road location:



6.2 Please explain what FBC considers to be a "Highest", "High", "Medium", and "Low" score for visual and noise impact.

Response:

FBC scored the Visual and Noise Impact based on how the public could be impacted by the new substation or line infrastructure. FBC considered the impact to permanent residences adjacent to the proposed location and to the public (e.g., traffic along major roadways and adjacent community spaces). In scoring the impact, FBC considered several factors, such as the number of adjacent permanent residences, whether the substation and related infrastructure can easily be seen by neighbouring properties or the public along roadways, and if the substation would blend into the existing ambient noise of the surrounding area and existing facilities.

FBC determined that none of the properties merited a "Highest" scoring because this scoring was reserved for criteria that could not be resolved or were considered unacceptable. For example, a landowner not willing to sell or the property size being too small were considered unresolvable, and relocating the substation to a floodplain or a very high relative capital cost were considered unacceptable.

Please refer to the following table which sets out the reasoning for the scoring of each of the nine properties.

Site #	Location	Score	Scoring Reasoning
1	Atco Wood Products – Property A	High[3]	• The required triple circuit line infrastructure (7.4 km) would be much larger and more visually impactful than the existing infrastructure to adjacent properties and would be more visible to traffic on Highway 3B. Please refer to the response to BCUC IR1 5.6 for more details on the line upgrades. • Substation infrastructure is expected to have minimal impact due to limited adjacent permanent residences, and distance from town.

[3] Please refer to the response to BCUC IR1 5.6 for an explanation of the error noted in the original scoring of the Visual & Noise Impact for this property.

Site #	Location	Score	Scoring Reasoning
2	Former Atco Wood Products Property	High[4]	• The required triple circuit line infrastructure (7.4 km) would be much larger and more visually impactful than the existing infrastructure to adjacent properties and would be more visible to traffic on Highway 3B. Please refer to the response to BCUC IR1 5.6 for more details on the line upgrades. • Substation infrastructure is expected to have minimal impact due to limited adjacent permanent residences, and distance from town.
3	Hepburn Road	Medium	• Potential to visually impact several adjacent properties related to both new station and line infrastructure.
4	Atco Wood Products – Property B	Low	• Property was proposed by the landowner. • Limited adjacent permanent residences. • The property would be next to the mill, which is an industrialized area. • Minimal noise disturbance. Equipment noise will blend into existing ambient noise because the site is within an industrial area.
5	Old Salmo Road	Low	• Property was proposed by the landowner. • Limited adjacent permanent residences.
6	Highway 3B – Property A	Medium	• Substation and line infrastructure would be situated at an elevated position on the mountainside, visible to Highway 3B traffic. • Infrastructure would be visible to a few nearby residences due to the location's elevated position. • Not expected to have an impact on as many permanent residences as the Grieve Location.
7	Atco Wood Products – Property C	Medium	• Substation and line infrastructure would be situated at an elevated position on the mountainside, visible from Highway 3B traffic. • Infrastructure would be visible to a few nearby residences due to the location's elevated position. • Not expected to have an impact on as many permanent residences as the Grieve Location. • The required triple circuit line infrastructure (1 km) would be much larger and more visually impactful than the existing infrastructure to adjacent properties and would be more visible to traffic on Highway 3B.
8	Highway 3B – Property B	Medium[5]	• The required triple circuit line infrastructure (1.5 km) would be much larger and more visually impactful than the existing infrastructure to adjacent properties and would be more visible to traffic on Highway 3B. • Substation infrastructure is expected to have minimal impact due to limited adjacent permanent residences, and distance from town.

[4] Please refer to the response to BCUC IR1 5.6 for an explanation of the error noted in the original scoring of the Visual & Noise Impact for this property.

[5] When responding to this IR, FBC discovered an error in the Land Evaluation Matrix filed as Appendix B to the Application. The Visual & Noise Impact rating for Highway 3B – Property B should have been rated as Medium due to the visual impact resulting from the triple circuit line infrastructure. FBC has filed a corrected Appendix B as an erratum to the Application.

Site #	Location	Score	Scoring Reasoning
9	2064 Grieve Road (Grieve Location)	Medium	• Potential to visually impact several adjacent properties from both station and line infrastructure. • Depending on substation location within the property, the infrastructure could also potentially be visible from the nearby major roadways. • Depending on substation location within the property, minimal noise disturbance. Equipment noise will blend into existing ambient noise because the site is adjacent to an industrial site.

6.3 Please explain why FBC assigned the 2064 Grieve Road location a score of "Medium" for visual and noise impact.

Response:

Please refer to the response to BCUC IR1 6.2.

6.4 Please explain why the Highway 3B – Property A and Atco Wood Products – Property C sites were assigned a score of "Medium" for visual and noise impact and Atco Wood Products – Property B and Old Salmo Road sites were scored "Low." In the response, please explain whether the Highway 3B – Property A and Atco Wood Products – Property C would have the same visual and noise impact as the 2064 Grieve Road location, considering the locations with respect to the Village of Fruitvale population centre.

Response:

Please refer to the response to BCUC IR1 6.2.

On page 42 of the Application, FBC states:

> As noted above, the Grieve Location is 9.61 acres. The size of the property has enabled FBC to consider various sites for the substation. [...]FBC proceeded with completing Class 4 estimates for two siting options (at the Grieve location) [parenthesis added]. FBC refers to these options as the "Highway 3B" option and the "Old Salmo Road" option.

On page 44 of the Application, FBC states the following, with regards to the Old Salmo Road option in comparison to the Highway 3B option: "Greater visual impact to the surrounding residents and the public passing by along the roadway."

6.5 Please provide separate land evaluation matrix rows for each of the Highway 3B option and the Old Salmo Road option at the Grieve location.

Response:

Please refer to Attachment 6.5 for the requested Land Evaluation Matrix rows for each of the Highway 3B Option and the Old Salmo Road Option at the Grieve Location. Please note that the scoring for these options within 2064 Grieve Road has been done in relation to each other and **not** to all the other locations outside of the Grieve Location. Therefore, the scoring in Attachment 6.5 cannot be compared against the scoring provided in Appendix B to the Application. For example, the overall "Visual & Noise Impact" scoring for the Grieve Location, as shown in Appendix B, is Medium; however, when comparing the Highway 3B Option to the Old Salmo Road Option, the Highway 3B Option is scored as Low for Visual & Noise Impact, while the Old Salmo Road Option is scored as Medium.

In the context of determining the preferred option for the location of the substation within the Grieve Location, the scoring provided in Attachment 6.5 shows that the Highway 3B Option is the preferred option without needing to complete a weighting.

On page 124 (pdf) in Appendix B to the Application, in footnote 11, FBC states the following regarding the community land use impact criteria: "Considers the impact of the proposed facilities on the current land use by the community (i.e. community activities, parking lot, etc)."

In Table 8-3 on pages 77 to 78 of the Application, FBC provides the following as concerns identified by the public regarding the Grieve Location, chosen as the site for the new FRU substation:

- 2064 Grieve Road is historically significant to some residents

6.6 Please explain why FBC assigned the 2064 Grieve Road location a score of "Low" for community land use impact, considering the historical significance of the location to some residents.

Response:

The Community Land Use criterion was scored Low for the Grieve Location as the site is privately owned land and is not located next to public infrastructure such as a park, school, ball field or daycare. The Grieve Location is not used for public parking and, as a privately owned lot, it does

not impact public land use. This property is not designated as a Heritage site and the land zoning for this parcel, as determined by the Regional District, allows for utility use.

7.0 Reference: DESCRIPTION AND EVALUATION OF ALTERNATIVES

Exhibit B-1, Section 4.2, p. 25, Table 4-1, p. 26; Section 3.3.2, p. 22; Section 4.3.2.1, pp. 27-28; Appendix B

Alternative Identification

On page 25 of the Application, FBC states the following objectives for the Project:

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

Further on page 25 of the Application, FBC states:

> The following four alternatives were identified and considered for the Project:
>
> - Alternative 1: Status Quo
> - Alternative 2: Replace both the FRU and HER Substations at Existing Locations
> - Alternative 3: Replace the FRU and HER Substations with a New Substation on Either the Existing FRU Site or the Existing HER Site
> - Alternative 4: Replace the FRU and HER Substations with a New Substation on a New Property

On page 26 of the Application, FBC provides Table 4-1, assessing each Project alternative against the Project objectives:

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	✓	✓

On page 22 of the Application, FBC states the following regarding electricity supply to Fruitvale and the surrounding area:

> 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.

7.1 Please identify the distance of the BEP substation from the Fruitvale load centre.

Response:

The distance from the BEP substation to the Fruitvale load centre is approximately 8 km.

The BEP substation and the FRU substation are interconnected by a single distribution tie. The amount of load that can be supplied by any distribution line is constrained by both voltage and thermal limits. A distribution line can only carry a maximum amount of current, and voltage drops as electricity travels away from the substation to the load centre. Since there is only a single distribution tie between BEP and FRU, transferring all FRU load to BEP would exceed the thermal capacity of the distribution line and result in low voltage outside CSA voltage limits for customers in the Fruitvale area. Therefore, to ensure thermal and voltage limits are met, only a portion of FRU load can be transferred to BEP.

Expanding the BEP substation to serve all the electricity supply to Fruitvale and the surrounding area is not a practical solution. The BEP substation is a similar distance from the Fruitvale load centre as the HER substation and therefore would face similar challenges supplying Fruitvale load as from the HER substation (as described in Sections 4.3.3.2 and Section 4.4.1 of the Application). For instance, due to the BEP substation's distance from the Fruitvale load centre, costly line upgrades would be required, and there would be a reduction in reliable service to the Village of Fruitvale because the load centre would be exposed to more outages along the long distribution lines running back to the BEP substation. Further, the BEP substation is on an archaeological site; therefore, an expansion of the site to accommodate the entire Fruitvale supply would be complex.

7.2 Please explain whether it would be feasible to expand the BEP substation to provide 100 percent of the electricity supply to Fruitvale and the surrounding area.

7.2.1 If yes, please explain why FBC did not include the expansion of BEP as a feasible Project alternative.

Response:

Please refer to the response to BCUC IR1 7.1.

On page 27 of the Application, FBC states the following with regards to Alternative 2: Replace FRU and HER at Existing Locations:

> 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 m2 (or 61.5m by 77 m) with a minimum typical size of 2,500 m2 (or 50 m by 50 m).

7.3 Please confirm, or explain otherwise, that if the transformer at the existing FRU substation were able to be replaced, Alternative 2 would meet the equipment condition and aging infrastructure Project criteria, as outlined in Table 4-1.

Response:

Not confirmed.

As described in Section 3.3.1.1 of the Application, the equipment condition issues at the FRU substation are also related to the age and condition of the switchgear. Following a third-party comprehensive condition assessment (included as Appendix A to the Application), the switchgear at the FRU substation was identified as the highest priority for replacement across all of the FBC substations evaluated.

Please refer to the response to BCUC IR1 7.4 which explains why the FRU substation equipment cannot be replaced like-for-like. Alternative 2 does not meet the Condition and Aging Infrastructure objective because there is not enough space at the existing FRU site to accommodate new equipment.

7.4 Please explain whether FBC considered a non-standard substation design in order to accommodate a one or two-transformer configuration at the existing FRU substation. If not, please explain why not.

7.4.1 If a non-standard design was considered, please discuss the results of any analysis and explain why it was not considered to be a feasible alternative. In the response, please provide examples of non-standard FBC substations of a similar size.

Response:

The FRU substation cannot be replaced with a like-for-like design. The existing site is too small to accommodate a substation that meets FBC's current design standards, which follow good utility practices, Centre for Energy Advancement through Technological Innovation (CEATI) practices, and Institute of Electrical and Electronics Engineers (IEEE) standards and guidelines. For redundancy and to remove FBC's reliance on a mobile transformer during maintenance, current FBC design standards consider a two-transformer station design along with a high side breaker ring bus configuration for optimal switching. This design ensures reliability of supply to customers.

While FBC did consider non-standard designs at the existing site, for both a one transformer and two transformer option, FBC-specific constraints follow industry practices, standards and guidelines to provide reliable power to customers and ensure safety to the public and FBC employees that maintain the substations. Specifically, FBC is not able to replace or refurbish only the equipment that is in poor condition in the FRU substation and is not able to design a substation to fit the property that would also ensure it is following good utility practice, CEATI practices, and IEEE standards and guidelines.

Even with a non-standard layout or non-standard equipment, the property is still too small due to the size of the required equipment (particularly the two large power transformers, circuit breakers, and switching equipment needed to protect them) and the access required around the equipment for maintenance purposes. If only one transformer were installed, space would still be required for the mobile transformer to be able to take the transformer out of service for maintenance.

The FRU substation is supplied by the transmission line 20L through high voltage fuses. High voltage fuses are simple protective devices that are slower to operate, do not provide visibility to the System Control Centre, and do not have event recording capabilities. FBC no longer installs high voltage fuses to protect substation transformers that are 10 MVA or larger as per the IEEE C37.91 standard. As described in the responses to BCUC IR1 1.1 and 1.2, FRU T1 also requires replacement. The minimum transformer size installed for new projects at FBC substations is 20 MVA. As such, high voltage fuses cannot be used for the New FRU Substation design. The high voltage fuses will be replaced with high voltage breakers, which take up more space and make the FRU substation property not feasible.

FBC's design standards also ensure adequate protection of station equipment, which is not compromised and limited. This standard protection along with load/short circuit interrupting devices such as circuit breakers ensures station equipment is isolated quickly during any fault situations to avoid catastrophic failures.

Good utility practice and IEEE standards also recommend oil containment for power transformers in substations, which the existing FRU substation does not currently have for the transformer, and this would require additional space.

The FRU substation property is one of the smallest in the FBC service territory. FBC is planning to replace high side fusing in similarly sized non-standard FBC legacy substations with transformers 10 MVA or larger with circuit breakers or circuit switchers.

7.5 Please explain whether FBC has constructed any 63 kV radial substations, based on current design standards, with a footprint of less than 2,500 m2. If yes, please provide a brief description of each project, explain the design and discuss any pros and cons of such an approach.

Response:

FBC has constructed two stations, the rebuilt Salmo and Playmor substations, that are less than 2,500 m^2 and were based on the design standards at the time. The Salmo substation is 1,700 m^2 and Playmor is 2,200 m^2. However, while operating the Salmo and Playmor substations, FBC determined that more space is required around the substation equipment to maintain it and allow for maintenance vehicle access to each piece of equipment. Based on this experience, FBC increased the minimum typical size to 2,500 m^2. FBC notes that the existing FRU substation footprint is even smaller than the Salmo and Playmor substations, at approximately 1,400 m^2 and is an irregular shape (i.e., not all the space is usable).

C. PROJECT DESCRIPTION

8.0 Reference: Project Description
Exhibit B-1, Section 5.2, pp. 46-47
Project Cost Estimate

On pages 46 to 47 of the Application, FBC states:

> FBC's cost estimate for the Project is based on an AACE Class 4 level of definition. FBC recognizes that the BCUC's CPCN Guidelines contemplate the inclusion of a cost estimate at an AACE Class 3 level of definition. However, FBC has not undertaken a Class 3 cost estimate at the time of filing this Application, as a Class 3 estimate first required FBC to determine where on the Grieve Location that the station would be sited. FBC did not decide on station siting within the Grieve Location until early in February 2024. Further, as the Class 3 cost estimate cannot be completed during winter conditions (i.e., snow-free conditions are required) in Fruitvale, the earliest FBC anticipates that it could have a Class 3 estimate completed is July 2024.

8.1 Please provide an update on the anticipated timing and development of a Class 3 estimate for the Project.

Response:

The timing for the next cost estimate that FBC anticipates developing for the Project would be following a BCUC decision for the Project should a CPCN be granted. If the BCUC grants a CPCN for the Project, FBC would complete the detailed design for the Project, which includes an Issue For Construction (IFC) package that is more detailed than a Class 3 estimate and will result in a detailed control budget for reporting purposes.

8.2 In general, please discuss how Class 4 cost estimates typically compare to Class 3 cost estimates for FBC projects. Please provide specific examples of recent FBC projects of a similar nature to the Fruitvale Substation Project.

Response:

For Class 4 estimates, engineering is between 1% and 15% complete, with an accuracy range of -15% to -30% on the low end, and +20% to + 50% on the high end. For Class 3 estimates, engineering is between 10% and 40% complete, with an accuracy range of -10% to -20% on the low end, and +10% to +30% on the high end.

Recent similar projects where Class 3 and Class 4 estimates were completed include the A.S. Mawdsley (ASM) Terminal Station CPCN project, as well as the Beaver Park, Salmo, and Playmor station rebuilds. The Class 3 estimate for the ASM CPCN project increased from the initial Class 4 estimate by 32 percent. The Class 3 estimates for the Beaver Park, Salmo and Playmor station rebuild projects increased from the initial Class 4 estimates by 8 percent, 20 percent, and 12 percent, respectively.

As explained on pages 47 to 48 of the Application, FBC did not undertake a Class 3 estimate for the Fruitvale Project due to the delays caused by the length of time required to determine where to site the substation and the need to proceed with the Project to address the reliability risk to customers of any further delay.

FBC has a reasonably high level of confidence regarding its Class 4 estimate for the Fruitvale Project. As explained on pages 47 to 48 of the Application, FBC used the recently completed Playmor and Beaver Park substation projects to inform its Class 4 estimate, and there is a relatively narrow scope and limited risks to the Project. Further, as explained in the response to BCOAPO IR1 14.2, the power transformers have already been purchased and the overall contingency of the estimate has been reduced to reflect the increase in accuracy.

9.0 Reference: Project Description

Exhibit B-1, Section 5.6, Table 5-1, p. 54; Section 5.7, Table 5-2, pp. 54-56;

Project Construction Risk Mitigation

On page 54 of the Application, FBC provides Table 5-1: Project Schedule, part of which is reproduced below.

Task Name	Duration	Start	Finish
Civil construction/underground electrical	140 days	May 2025	November 2025
Physical construction	125 days	August 2025	January 2026
Electrical construction	115 days	October 2025	March 2026

On pages 54 to 56 of the Application, FBC provides Table 5-2: Project Risks that outlines the identified risks, mitigating actions and likelihood of occurrence for each risk.

9.1 Please explain how FBC has considered construction during winter months in its assessment of risks. In the response, please identify any mitigating actions FBC has identified. If not considered, please explain why not.

Response:

The risk associated with work during the winter months is related to increased costs for concrete installations due to heating and hoarding[6]. FBC is mitigating this risk by scheduling foundation installations during Spring/Summer/Fall 2025.

9.2 Please discuss any risk of service interruptions for FBC's customers during construction and commissioning of the new FRU substation and identify any mitigating actions that will be taken by FBC.

Response:

FBC does not anticipate any service interruptions during construction or commissioning of the New FRU Substation. Once the substation is fully constructed/commissioned, a detailed staging plan and crew coordination will be used to transition customers over to the New Fruitvale Substation with little or no outage times for customers.

[6] Heating and hoarding refer to building structures over and around the concrete area, which can then be heated so that the concrete can cure safely.

D. PROJECT COSTS

10.0 Reference: PROJECT COSTS, FINANCIAL ANALYSIS, ACCOUNTING TREATMENT AND RATE IMPACT

Exhibit B-1, Section 6.3, pp. 60-61; Confidential Exhibit B-1-1, Appendix D Preferred Alternative Hwy 3B: Capital Spending - CONFIDENTIAL, Schedule 6

Future Incremental Sustainment Capital

On page 60 of the Application, FBC states that line 4 of Table 6-3 includes incremental sustainment capital of $5.336 million, which FBC notes is the sum of Line 30 Schedule 6 of the confidential Appendix D (Exhibit B-1-1). Further, on page 60, FBC notes that the present value (PV) of the Project's incremental revenue requirement is approximately $20.795 million, and the levelized rate impact is 0.29 percent over the 53-year analysis period.

On page 61 of the Application, FBC states:

> 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.

10.1 Please reconcile the $5.336 million in Table 6-3 with the sum of line 30 (2027-2076), Schedule 6 from the confidential Exhibit B-1-1, and confirm that all future replacement costs of the poles, towers and fixtures, and conductors and devices are included in the sustainment capital projections in both figures.

10.1.1 If not confirmed, please update Table 6-3 and/or Schedule 6 to include all elements of sustainment capital and provide an updated calculation of the PV of the Project's incremental revenue requirement and the levelized rate impact.

Response:

FBC confirms that all future replacement costs are included in the sustainment capital projections in both figures.

To produce the financial schedules (including Schedule 6) in Confidential Appendix D of the Application in a one-page format, FBC only showed every fifth year starting from 2033 to 2076 over the 53-year analysis period. Thus, the years between every fifth year starting from 2033 were hidden in the Excel model included in Confidential Exhibit B-1-1, which were used to print the financial schedules in Confidential Appendix D. As a result, the values in the column for year 2065 are readily visible in the one-page format while the values in the column for year 2068 are hidden and would be visible if expanded. This column grouping does not impact the calculations within Schedule 6, and the identified replacement costs are included in the financial analysis over the 53-year period.

Table 1 below provides a reconciliation of the future one-time replacement costs for the transmission poles, towers, and fixtures, as well as the transmission conductors and devices in 2065 and the one-time replacement costs for the distribution conductors and devices in 2068. The total future replacement cost included as sustainment capital is $5.336 million, as shown on Line 4 of Table 6-3 of the Application.

Table 1: Total Replacement Costs Included in Schedule 6 from Confidential Exhibit B-1-1 ($ millions)

Line	Particular	Total	Reference
1	Transmission, Poles, Towers & Fixtures	2.454	Schedule 6, Line 13, Year 2065
2	Transmission, Conductors & Devices	0.180	Schedule 6, Line 14, Year 2065
3	Distribution, Conductors & Devices	2.703	Schedule 6, Line 16, Year 2068
4	**Total**	**5.336**	**Schedule 6, Sum of Line 30 (2027-2076)**

11.0 Reference: PROJECT COSTS, FINANCIAL ANALYSIS, ACCOUNTING TREATMENT AND RATE IMPACT

Exhibit B-1, Section 6.4.3, p. 62, footnote 18; Section 6.3, pp. 60-61; Confidential Exhibit B-1-1, Appendix D - Preferred Alternative Hwy 3B: Accumulated Depreciation & Amortization, Schedule 8

Retirement of Existing Assets

On page 62 of the Application, FBC notes that the book value of the decommissioned assets is projected to be $0.846 million by the end of 2026. Further, FEI states that these: "decommissioned assets will be retired from FBC's rate base by crediting the original value of $1.735 million to FBC's plant-in-service and debiting the same amount in accumulated depreciation, which is reflected in the opening balance of 2027 at the same time when all new assets enter FBC's rate base, as shown in Confidential Appendix D, Schedule 7."

Footnote 18 on page 62 of the Application states, "Based on the original acquisition value of $1.735 million and accumulated depreciation of $0.889 million estimated at the end of 2026."

On page 60 of the Application, FBC notes that the PV of the Project's incremental revenue requirement is approximately $20.795 million, and the levelized rate impact is 0.29 percent over the 53-year analysis period.

11.1 Please explain if and how the book value of the decommissioned assets is intended to be recovered from ratepayers.

11.1.1 Please explain whether the recovery of the book value of the decommissioned assets is included in the calculation of the present value of the Project's incremental revenue requirement of approximately $20,795 million. If not, and if this amount is intended to be recovered from ratepayers, please update the relevant financial schedules, the PV of the incremental revenue requirement of the project, and the levelized rate impact to include the recovery of the $0.846 million.

11.1.2 Please clarify why $1.735 million is debited from the opening balance of the accumulated depreciation in 2027 when the accumulated depreciation of the decommissioned assets is estimated at $0.889 million at the end of 2026.

Response:

FBC's treatment of the decommissioned assets shown in the financial analysis included in Confidential Appendix D of the Application is consistent with the established regulatory practice that aligns with the BCUC's Uniform System of Accounts and is fundamental to the use of group asset accounting.

When assets are retired from service resulting from ordinary causes reasonably covered by depreciation provisions, the appropriate plant accounts are credited with the ledger value of the assets retired (i.e., the original value of the assets) and a like amount is concurrently charged to accumulated depreciation. As such, the loss on the decommissioned assets is not recorded as an accounting entry. Under group accounting, the depreciation rates of each asset class are reviewed and updated periodically with new depreciation studies that are filed with the BCUC for approval. At the time of each study, the depreciation rates of each asset class would be adjusted by factoring in any accumulated gains or losses in the asset class over the period between the last study and the current study. This will ensure the accumulated gains or losses will then be returned to or recovered from customers through the new depreciation rates in future FBC revenue requirements.

Following the established treatment as described above, the present value (PV) of incremental revenue requirement of $20.795 million shown on Table 6-3 of the Application reflects the impacts of crediting the $1.735 million original value of the decommissioned assets in 2027 to gross plant-in-service, as shown in Confidential Appendix D, Schedule 7, Line 8, and debiting the same amount to accumulated depreciation in the opening balance of 2027 as shown in Confidential Appendix D, Schedule 8, Line 8. As the accumulated depreciation of the assets meant to be decommissioned due to the Project is estimated to be $0.889 million at the end of 2026, the incremental effect of the Project means the remaining projected book value of $0.846 million (i.e., $1.735 million less $0.889 million) will be included in FBC's accumulated depreciation when the original value of the asset of $1.735 million is debited to accumulated depreciation. In accordance with the established treatment described above, this $0.846 million of remaining projected book value (i.e., the loss) will then be recovered through an adjustment to future depreciation rates.

Given there are many factors that would be considered during a depreciation study, including various gains or losses within each asset class that might or might not be related to the Project, a forecast of future depreciation rates for each asset class is not possible without a detailed depreciation study. As such, only the currently approved depreciation rates are used for the purposes of the financial analysis. This approach is consistent with past CPCN projects reviewed and approved by the BCUC, including the A.S. Mawdsley Terminal Station CPCN project (Order C-6-23), the Kelowna Bulk Transformer Addition CPCN project (Order C-4-20), the Grand Forks Terminal Station Reliability CPCN project (Order C-2-19), and the Corra Linn Dam Spillway Gates project (Order C-1-17).

For context and understanding of the group accounting method used by FBC and other utilities in Canada for retirement of plant, FBC provides a summary below from FortisBC Energy Inc.'s (FEI) 2012-2013 Revenue Requirement Application (pages 289 to 290):

> Historically, the FEU have followed recognized regulatory group accounting procedures in accounting for their property plant and equipment. The FEU also adhere to the BCUC Uniform System of Accounts, unless modified by Commission order. Under both of these procedures, on retirement of depreciable gas plant, Accumulated Depreciation is charged with the ledger value of the gas plant retired and the cost of removal less amounts recovered for salvage and insurance. It is

> only in rare cases where the forces of retirement are outside of the forces that were contemplated in determining depreciation rates that gains and losses on depreciable plant would be recognized in income. Therefore, under historical practice, all normal course gains and losses on retirement of assets are included in accumulated depreciation.
>
> This treatment is appropriate since group depreciation rates are set to recover the asset values over the average service life of the asset group, so that we expect some assets to be retired before their net book value reaches zero; others would be retired after their net book value reaches zero; and overall the gain/loss amount included in accumulated depreciation will have an immaterial value, with any material amounts recovered through changes to future depreciation rates. When depreciation rates are not adjusted to reflect the shorter service lives of assets, or retirements occur in a different pattern than was expected in the last accepted depreciation study, then the loss amount can build in accumulated depreciation.

An excerpt from the BCUC Uniform System of Accounts explains this more fully (pages 21 to 22):

> The group system contemplates that some part of the investment in a group of assets probably will be recovered through salvage realizations and that probably there will be variations in the service lives of the assets constituting the group, even among assets of the same class. The depreciation provision determined for the group is a weighted average of the various individual provisions reflecting the individual expectancies of life and salvage for the respective assets in the group. It is not the intention of this classification to require the company to keep records of the accumulated depreciation of each unit of plant. For purposes of analysis, however, each company shall maintain subsidiary records in which accumulated depreciation is subdivided according to the utility department to which applicable, or to each group of plant accounts. When the retirement or disposal of any individual asset in a group occurs under circumstances reasonably provided for through accumulated depreciation, it may be assumed such provision has been made. Thus, whether the period of service is less or greater than average, accumulated depreciation attributable to an asset at the time of retirement under such circumstances, is equal to the cost, except for that portion reasonably assumed recoverable through salvage realization.

E. ENVIRONMENTAL AND ARCHAEOLOGY

12.0 Reference: ARCHAEOLOGY

Exhibit B-1, Section 7.2, p. 66; FBC Mawdsley CPCN proceeding, Exhibit B-1, Section 7.2, p. 62

Archaeological Impact Assessment

On page 66 of the Application, FBC states:

> FBC and Nupqu will complete an archaeological impact assessment (AIA) of the selected substation site. The AIA will be conducted under a *Heritage Conservation Act* (HCA) Section 12.2 Inspection Permit and be designed to identify and evaluate any archaeological resources within the selected substation site and provide recommendations on the management of archaeological resources during Project activities.

On page 62 of Exhibit B-1 in the FBC Mawdsley CPCN Application, FBC stated:

> A permit will be required under Section 12.2 of the Heritage Conservation Act in order to undertake the AIA, which FBC will obtain. In addition, Indigenous cultural heritage investigation permits will be obtained if identified as necessary during engagement with the Indigenous communities whose traditional territory overlap the Project area.

12.1 Please explain whether FBC has obtained the permit required under section 12.2 of the HCA.

12.1.1 If not, please describe the process for obtaining the permit and identify the current stage of the process. Please also discuss any potential impacts to the Project scope, schedule or cost should the permitting process result in delays.

Response:

Nupqu, on behalf of FBC, holds HCA Section 12.2 multi-assessment permit 2022-0110, which is applicable to completing archaeological impact assessments (AIAs) of proposed FBC developments within the Selkirk and Rocky Mountain Natural Resource Districts. FBC plans to undertake Project-related AIA works under this permit.

12.2 Please confirm, or explain otherwise, that FBC has identified that no Indigenous cultural heritage investigation permits are required to be obtained for the Project.

Response:

As of May 1, 2024, FBC understands there are eight Indigenous communities and organizations with territories overlapping the Project footprint;[7] two of these currently have Indigenous cultural heritage investigation permit processes. FBC will refresh these numbers prior to undertaking the AIA and obtain any Indigenous cultural heritage investigation permits required at that time. Identifying required Indigenous cultural heritage investigation permits is facilitated through the Notice of Intent that is required to be submitted to Indigenous communities in advance of undertaking the AIA under an HCA Section 12.2 multi-assessment permit.

[7] Contacts for First Nation Consultation Areas Public Map Service (https://maps.gov.bc.ca/ess/hm/cadb/).

F. CONSULTATION AND ENGAGEMENT

13.0 Reference: CONSULTATION AND ENGAGEMENT

Exhibit B-1, Section 8, p. 67; Section 8.1, p. 68; Section 8.1.1, p. 70; Section 8.1.4, p. 73; Section 8.1.5, p. 76; Section 8.1.7, p. 81

Process and Stakeholder Identification

On page 67 of the Application, FBC states:

> FBC's consultation and engagement activities for the Project provide stakeholders and rights holders, including residents, landowners, businesses, organizations, local governments, and Indigenous communities, a meaningful opportunity to learn about the Project, provide feedback, and provide input to FBC to inform decision making. Engagement with stakeholders and rights holders is ongoing and will continue throughout the duration of the Project.

On page 68 of the Application, FBC states:

> Throughout this four-year process, FBC has engaged with stakeholders, including the Village of Fruitvale, the Regional District of Kootenay Boundary (RDKB), Scouts Canada, Beaver Valley Minor Soccer, Beaver Valley Concerned Citizens (BVCC), area residents, landowners, industry, and businesses.
>
> The focus of FBC's interactions with stakeholders has been to create a dialogue with interested parties, explain the need for the Project, present FBC's preferred location for the Project, and listen to stakeholder feedback.

13.1 Please discuss FBC's process to identify Project stakeholders for engagement efforts.

Response:

FBC uses a consistent approach when identifying stakeholders for substation projects and prioritizes stakeholders that are in close proximity to the Project.

To determine potentially impacted property owners, FBC first generates a list of property owners within a 300-meter radius of the site. Next, FBC undertakes a desktop review of this list which may result in the addition or removal of property owners based on the specific site characteristics. During this review, a field assessment of the neighbourhood also takes place to ensure all potentially impacted stakeholders are captured. FBC used this process for both the Mazzocchi Location and the Grieve Location as part of the Fruitvale Project's development process. FBC used this same process for the ASM CPCN project.[8]

[8] Approved by Order C-6-23.

FBC also determines which local governments are impacted by the project. The Regional District of Kootenay Boundary (RDKB) and the Village of Fruitvale were identified as stakeholders for the Fruitvale Project. The local MLAs and MPs are also identified as stakeholders and kept informed about the Project.

FBC may learn of additional stakeholders as the Project progresses. For example, while the Mazzocchi Location was being considered, Beaver Valley Minor Soccer demonstrated interest in the Project and became a stakeholder because they identified themselves as users of the community park adjacent to the proposed site.

13.2 Please compare FBC's stakeholder consultation process for the Project to other FBC projects of a similar nature. In the response, please provide an explanation of, and rationale for, any differences in the consultation process as compared to other projects.

Response

FBC confirms that its stakeholder consultation process for the Project has been generally similar to the processes for its other recent projects, including the ASM Terminal Station CPCN project. FBC also used a similar consultation process for the Kootenay Operations Centre (KOC) CPCN project, which was the most recent FBC greenfield project regionally. For each of these projects, FBC's public consultation focused on potentially impacted landowners, local government stakeholders, and stakeholders with an asserted interest.

FBC notes that there are always some differences between projects, and the level of consultation should match the level of community interest in the project. For the ASM project, FBC received a small number of individualized follow-up questions after sending the initial notification. FBC responded to those questions directly and no further action was required. For the KOC project located in Castlegar, the City of Trail was directly impacted. As such, consultation around that project also included Trail and the Regional District of Kootenay Boundary, who were invited to that project's information session in Castlegar.

In this instance, FBC has been discussing the Fruitvale Substation Project with the residents of Fruitvale and the surrounding Beaver Valley since 2019, and the information gathered was incorporated directly into Project decision making. This is described in Sections 8.1.1, 8.1.2 and 8.1.3 of the Application. This led to FBC expanding its Land Evaluation Matrix and exploring all locations brought forward by the public and others.

13.3 Please explain whether, at any time during the consultation process, FBC modified or considered modifying its consultation approach in response to the level of public interest or feedback received. If not, please explain why not.

Response:

Please refer to the responses to BCUC IR1 13.1 and 13.2.

On page 70 of the Application, FBC states:

> In April 2022, FBC invited stakeholders with an asserted interest in the Project to an upcoming design workshop to discuss the property characteristics needed for siting, review the Project locations FBC had investigated, solicit ideas for other locations, share substation design and layout information, address Project safety, and learn about general stakeholder interests for the Project that would apply to any location (Appendix F-4). The meeting occurred on April 6, 2022, and included participants from Scouts BC and BC Minor Soccer, the Fruitvale Mayor and Council and Fruitvale Chief Administrative Officer, the RDKB Area A Director, and area residents. The design workshop resulted in six new site recommendations brought forward by stakeholders and investigated by FBC.

13.4 Please explain what is meant by "asserted interest" and discuss how FBC identified the appropriate stakeholders to invite to the April 2022 design workshop.

Response:

In addition to the process to identify Project stakeholders described in the response to BCUC IR1 13.1, a stakeholder with an "asserted interest" refers to someone who demonstrates a high level of interest in the project after the initial notification. For example, multiple email inquiries with in-depth questions from a stakeholder or repeat correspondence to FBC about the project would generally result in FBC classifying that stakeholder as having an asserted interest.

The following table summarizes the stakeholders identified as having an asserted interest and the reasons that these stakeholders were invited to the Design Workshop.

Stakeholder	Reason for Invitation to Design Workshop
Area residents – Walnut Ave	Adjacent landowners/residents who live in close proximity to the Project.
Area residents – Fruitvale Area	Residents in the Fruitvale area who had multiple in-depth questions about the Project.
Beaver Valley Concerned Citizens (BVCC)	A local group with repeat correspondence to FBC about the Project.
BC Minor Soccer	A frequent user of the park adjacent to the Mazzocchi Location.

Stakeholder	Reason for Invitation to Design Workshop
Scouts BC	Landowner of Mazzocchi Park.
Village of Fruitvale Mayor of Montrose RDKB Area A Director	Local government.

13.5 Please explain whether there were any opportunities for the general public to identify possible Project locations. If yes, please describe the locations suggested, any resulting actions and analysis undertaken by FBC and discuss the feasibility of the locations suggested. If there were not any opportunities, please explain why not.

Response:

Yes, the general public was able to submit possible Project locations through the following channels:

- Directly to FBC's Community and Indigenous Relations Manager;
- During the public open house hosted by FBC on December 1, 2021;
- During the Design Workshop hosted by FBC on April 6, 2022;
- By emailing getinvolved@fortisbc.com, a Project inbox provided to the public by FBC spokesperson Nicole Brown during media interviews about the Project; and
- By contacting FBC through its social media, website, or Contact Centres.

Of the 18 new properties evaluated by FBC, the following 11 were proposed by the public:

- Property A (Mazzocchi Location)
- Property F
- Property G
- Property H
- Property I
- Atco Wood Products Property A (#1)
- Former Atco Wood Products Property (#2)
- Atco Wood Products Property B (#4)
- Old Salmo Road (#5)
- Highway 3B Property A (#7)

- Highway 3B Property B (#8)

Of these 11 locations, FBC undertook site visits at the Mazzocchi Location, Property F, Old Salmo Road, and the Highway 3B Property. Please refer to the response to BCUC IR1 4.1 for further details.

The feasibility of the Atco Wood Products Property A, Former Atco Wood Products Property, Atco Wood Products Property B, Old Salmo Road, Highway 3B Property A, and Highway 3B Property B are described in Section 4.4 and Appendix B of the Application.

Please also refer to Confidential Attachment 16.2 provided in the response to BCUC IR1 16.2 for the Land Evaluation Matrix for Properties A through I.

On page 81 of the Application, FBC states:

> Consultation and communication with stakeholders has been useful and productive, and has been incorporated into FBC's plans for the Project, including through FBC's ongoing collaboration on station aesthetics. FBC will maintain open communication with residents, landowners, businesses, and other stakeholders through all phases of the Project. Specifically, FBC is committed to:
>
> - Continuing to respond directly to email, telephone, and in-person questions received;
> - Sharing stakeholder interests with FBC's Project Planning Team;
> - Working with residents on greening, screening, and station aesthetics; and
> - Notifying residents of the Regulatory timetable

13.6 Please describe FBC's plans for any further in-person consultation with stakeholders.

Response:

FBC will continue to conduct in-person consultation with neighbouring property owners to discuss feedback on greening, screening, and station aesthetics. Please refer to the response to BCUC IR1 14.4 for additional details. FBC will also continue to respond to all questions from identified stakeholders. During construction, FBC will also work with the surrounding property owners to mitigate issues related to construction.

14.0 Reference: CONSULTATION AND ENGAGEMENT

Exhibit B-1, Section 8.1, Table 8-3, p. 77

Visual Screening

In Table 8-3 on page 77 of the Application, with respect to "concern that the Project will be visually unappealing and that vegetation should be used to screen the Project," raised through public consultation, FBC states:

> FBC recognizes that residents would prefer to see as little electrical infrastructure as possible.
>
> FBC continues to seek input from residents on individual greening and screening suggestions for their property sightlines.
>
> FBC will implement reasonable measures to mitigate visual impacts through the use of fencing, shrubs, or trees, provided that FBC's safety standards and operational needs are met.

14.1 Please describe how residents' concern with the visual impact of the Project influenced the selection of the site chosen within the Grieve property and the chosen mitigation efforts.

Response:

As described in Section 4.5.1 of the Application, FBC determined that the visual impact to residents would be greater if the Project was constructed at the Old Salmo Road Option. This factored into FBC's selection of the Highway 3B Option as the preferred site.

FBC recognizes that the Project will be visible regardless of the location; however, construction at the Old Salmo Road Option would result in the removal of all the trees on the upper area of the property. In addition, the Old Salmo Road Option sits on a sloping terrain, which means the possibility of a retaining wall being built which would be visible to adjacent properties with limited visual mitigation options.

Construction at the Highway 3B Option will allow the majority of the treed area to be left undisturbed, which provides more options for visual mitigation. Finally, the Highway 3B Option is directly adjacent to the industrial site across Highway 3B.

14.2 Please describe what FBC considers to be "reasonable measures" to mitigate visual impacts, including a budget for visual impact mitigation for the Project.

14.2.1 Please discuss how these measures align with feedback received from residents.

Response:

The following are examples of measures taken on previous projects to mitigate visual impacts which could be reasonably taken for this Project:

- Concrete station fencing. FBC is open to feedback on options for concrete wall height and color that would be acceptable to area residents and complimentary to the neighborhood aesthetics.
- Murals or other artwork on concrete fencing.
- Low lying maintenance free vegetation or shrubs planted outside the fence line.
- Providing vegetation to adjacent property owners on a case-by-case basis.
- Limiting lighting at night to only be in use when night work is required in the station.

Not all decisions related to station aesthetics will be finalized prior to commencing planning and construction. FBC will work in collaboration with the adjacent property owners to incorporate their input into appropriate aesthetic improvements to the extent possible.

FBC has allocated funds as follows for the Project:

- $134 thousand for concrete fencing and footings;
- $15 thousand for site rehab (planting and seeding); and
- $25 thousand for native plant restoration.

Community feedback requested that the electrical infrastructure be hidden as much as possible and that the natural characteristics of the property be retained to the extent possible. FBC acknowledges its electrical infrastructure will be visible, but the measures identified above and other suitable options brought forward by the surrounding property owners will mitigate the impacts.

14.3 Please provide a mock-up of the view from a property adjacent to the Grieve location that clearly indicates how FBC anticipates it will mitigate visual impacts through the use of fencing, vegetation or other means.

Response:

FBC's discussions with landowners about individual sightlines and the plan to mitigate their visual impacts are ongoing. A mock-up view from an adjacent property will vary from landowner to landowner based on their individual sightlines, the vegetation within the resident's property lines, including vegetation that may be planted as an outcome of case-by-case discussions with

residents, and the final placement of the substation on the property. Therefore, a single mock-up would not provide a reasonable representation for any or all residents given the above considerations.

However, please refer to Attachment 14.3 and the below pictures which provide examples of FBC's existing substations where fencing and vegetation have been used for screening to show some of the options available to residents.

14.4 Please explain how FBC intends to work with residents on: (i) greening; (ii) screening; and (iii) station aesthetics.

Response:

FBC intends to work with residents on greening, screening, and station aesthetics by:

- Continuing to be available to receive feedback from residents about station aesthetics;
- Sharing recent examples of the concrete fencing and low-lying vegetation FBC has used for similar projects. For example, the fencing can be made to blend in with the existing landscape or to be a bold and colorful feature, whichever the residents prefer;
- Continuing to conduct site visits with individual landowners;
- Discussing vegetation options within the resident's property on a case-by-case basis; and
- Using the feedback collected from residents to inform FBC's decision making.

Please refer to Attachment 14.3 provided in the response to BCUC IR1 14.3 for examples of station fencing options that have been used for screening FBC's substations.

14.4.1 Please provide an example of a previous project that FBC worked with residents on greening, screening and station aesthetics and discuss any lessons learned.

Response:

FBC recently completed two station upgrades in the region: (i) a substation upgrade at its Salmo station in downtown Salmo; and (ii) a substation upgrade at the Beaver Park station near Trail.

During the Salmo station upgrade, FBC worked with the community of Salmo to:

- Replace the chain link fence with solid 9-foot-high concrete fencing;
- Hire an Indigenous artist, at the request of the Village of Salmo, to paint murals on the concrete wall. The following year, the Village requested that more of the wall be painted and FBC agreed to fund this request;
- Pave around the exterior of the station, reducing dust. At the request of the Village, FBC also paved the alley adjacent to the station leading into the firehall;
- Build a cedar fence along the closest neighbor's property; and
- Install lower decibel rated transformers.

During the Beaver Park station upgrade, FBC worked with the neighbour to:

- Plant trees near the station;
- Hydroseed the property;
- Reinstall a gate at the neighbour's request; and
- Install lower decibel rated transformers.

The main lesson learned on these projects and others is to have a clear line of communication between the surrounding residents and the FBC project team. Once construction begins, providing the residents with direct contact to the FBC project team makes communication more effective and allows the project to meet the needs of the neighborhood more efficiently.

15.0 Reference: CONSULTATION AND ENGAGEMENT

Exhibit B-1, Section 8.1.1, p. 70; Section 8.1, pp. 72–74

Community Engagement and Feedback

On page 70 of the Application, FBC states: "On December 1, 2021, FBC held a public open house to answer questions and hear feedback from the community about the Project."

On pages 73 to 74 of the Application, FBC states:

> BVCC also requested that the June 1, 2023 meeting be opened to the broader public and for FBC to share information about its property search to date, including the cost for each location. […] While BVCC expressed interest in attending the June 1, 2023 meeting, discussed further below, the purpose of that meeting was to engage directly with neighbouring residents. Accordingly, FBC kept the June 1, 2023 meeting as an invitation-only event.

15.1 Please explain additional opportunities for feedback from the broader public on the Project since June 1, 2023. In the response, for each engagement session, please include the time, location, presentation materials and feedback received. If there have not been any, please explain why not.

Response:

FBC's Community and Indigenous Relations team continues to receive and respond to feedback from the broader public about the Project through its established channels.[9] Feedback is generally received from the broader public in the form of emails, which are recorded in the Engagement Log (see Appendix F-1 of the Application) and letters of comment received recently by the BCUC. Overall, this feedback is aligned with the feedback that FBC has received from the surrounding residents.

At this time, FBC is not currently planning any formal meetings for the broader public. However, FBC plans to continue organizing in-person meetings with adjacent landowners to discuss greening, screening and aesthetics.

On page 70 of the Application, FBC states: "After the Village of Fruitvale voted against selling the Mazzocchi Location, the feedback collected to date was used to guide FBC's subsequent property search and, ultimately, the decision to build at the Grieve location."

[9] Contact information for the key Community and Indigenous Relations Manager is provided on all stakeholder correspondence. In addition, feedback can be submitted by contacting getinvolved@fortisbc.com as stated by FBC spokespersons during several media interviews about the Project.

On page 72 of the Application, FBC states: "After the Grieve Location was determined to be suitable, FBC entered the process to secure the site and inform neighboring residents."

15.2 Please explain the formal opportunities, such as an open house, for the broader public to provide feedback or ask questions during either: (i) the property search after the Mazzocchi location was determined to be unavailable; or (ii) the period after the Grieve location was selected. In the response, please describe each opportunity, including: (a) date, time and location, (b) description of materials presented by FBC, and (c) the level of participation from the community (number of participants, if available).

Response:

FBC received considerable feedback regarding stakeholder interests in the Project through its engagement from 2019 to 2022 and through the public rezoning process related to the Mazzocchi Location. FBC used this feedback to guide its subsequent property search and as a result, it did not initiate any formal opportunities for the broader public to provide additional feedback or ask questions after the Design Workshop in April 2022. However, during this time FBC continued to receive site recommendations from the general public. These locations were all considered; however, there was no acceptable site brought forward.

Immediately after the Grieve Location was selected, FBC issued a notification letter to residents on May 4, 2023 and began to receive formal responses to site selection. FBC held a formal meeting with adjacent landowners on June 1, 2023 (see Appendix F-8 of the Application) and then continued to collect information and questions from the broader public through the informal opportunities described in the response to BCUC IR1 15.1. FBC notes that the information brought forward by the adjacent landowners, formally and informally, aligns with the feedback recorded prior to June 1, 2023.

On page 72 of the Application, FBC states:

> FBC also considered the Grieve Location based on the input previously received from stakeholders throughout more than three years of engagement. The Grieve Location is not close to public infrastructure, and development would not impact public parking. FBC determined it could work with stakeholders to address their remaining interests raised during the engagement process (e.g., safety, station aesthetics, siting, and noise interests).

15.3 Please discuss the specific feedback received prior to the Village of Fruitvale voting against selling the Mazzocchi location that was used to guide the subsequent property search and selection of the Grieve location. In the response,

please explain how this feedback was used to guide FBC's property search and identify any Project changes that occurred as a result of the feedback received.

15.3.1 Please explain whether this feedback was based on Project information specific to the Mazzocchi location. If so, please discuss its relevance to the property search and selection of the Grieve location.

Response:

As discussed in the response to BCUC IR1 4.1, FBC incorporated the following considerations into its Land Evaluation Matrix subsequent to the Village of Fruitvale voting against selling the Mazzocchi Location. These considerations were informed by the feedback received from stakeholders after the Design Workshop:

- Community Land Use Impact;
- EMF Impact;
- Indian Reserve Lands;
- Indigenous Consultation Requirements;
- Property Rezoning;
- Customer Reliability Impact;
- Land Vacancy;
- Critical Habitat for Species at Risk;
- Archaeological Site within 250 metres;
- Operations Accessibility; and
- Relative Capital Cost.

FBC applied this feedback when reviewing potential locations for the Project. Based on the experience with the Mazzocchi Location, FBC considered that properties used by the public, or properties adjacent to public spaces, may not be supported by the community. Property D is an example of a location that was discarded because it was too similar to the Mazzocchi Location and FBC considered that placing the station at this location would be contrary to the feedback already provided.

The Grieve Location is privately owned land within the Regional District of Kootenay Boundary. It is not located next to public infrastructure such as a park, school, ball field or daycare and it does not require rezoning. The land zoning for this parcel, as determined by the Regional District, is currently zoned to allow for utilities. The Grieve Location is not used for public parking and, as a privately owned lot, it does not impact public land use. Safety, station aesthetics, siting, and noise impacts are common interests that FBC expects would be brought forward at any location chosen for the Project and can be mitigated.

15.4 Please explain how FBC intends to work with stakeholders to address their remaining interests raised during the engagement process.

Response:

FBC is working to address the remaining interests of stakeholders through direct engagement with the adjacent landowners, either by email, phone, or in-person, as well as responding to questions posed by stakeholders, including:

- **Safety:** Safety is a top priority at FortisBC. FBC is confident that any Project safety concerns brought forward can be addressed and will be actioned in a timely manner.
- **Station Aesthetics:** Please refer to the responses to BCUC IR1 14.2, 14.3 and 14.4.
- **Siting:** Please refer to the response to BCUC IR1 14.1.
- **Noise:** FBC has purchased low decibel rated transformers. FBC has conducted a noise measurement study for the Grieve Location to achieve baseline noise levels and to model the impact of the station. FBC will implement the recommendations of the study to mitigate noise, including a minimum 2.7 meter high concrete fence around the station.
- **Trees:** Please refer to the response to BCUC IR1 14.1.
- **Wildlife:** FBC conducted a desktop review and on-site assessment of the Grieve Location which concluded the risk of environmental impacts associated with the Project are Low at the Highway 3B Option. To ensure appropriate controls are in place to manage the environmental risks of the Project, a comprehensive Environmental Management Plan (EMP) will be prepared with site specific environmental mitigations.

16.0 Reference: CONSULTATION AND ENGAGEMENT

Exhibit B-1, Section 8.1, pp. 68-72; Appendix B

Properties Unavailable for Purchase

On pages 68 to 69 of the Application, FBC provides Table 8-1: Properties Pursued but Eliminated, part of which is reproduced below.

Period	Location	Primary Reason for Elimination
Consultation Period 1	Property B	Not available for purchase
	Property C	Not available for purchase
	Property D	Not available for purchase
	Property E	Not available for purchase
	Property F	Not available for purchase
Consultation Period 2	Property G	Not available for purchase
	Property H	Not available for purchase
	Property I	Not available for purchase

In Appendix B to the Application, FBC provides a land evaluation matrix, scoring potential sites against several criteria for the new Fruitvale substation.

16.1 For each property identified as "not available for purchase," please discuss the negotiations undertaken by FBC with the property owner and explain why the property was not available for purchase.

Response:

FBC has redacted a portion of this response for the public record and is requesting that it be filed on a confidential basis and held confidential by the BCUC in perpetuity, pursuant to Section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents, as set out in Order G-72-23. The response contains information which pertains to private land for which FBC does not have permission to disclose publicly and other information which is commercially sensitive and market competitive information which, if disclosed publicly, could prejudice or influence future negotiations of contracts between FBC and suppliers or counterparties, which could result in higher costs for customers. FBC is unable to foresee a time when the information may no longer be confidential and, therefore, requests that the information remains confidential in perpetuity. A confidential version has been provided to the BCUC and Interveners who have signed a Confidentiality Declaration and Undertaking

FBC made several attempts to negotiate with landowners, but each landowner ultimately has a right to decline to subdivide or sell their property. The table below provides a high-level summary of the negotiations with each property owner. As a property owners' reasons for not wanting to sell are private, FBC is unable to answer why the property was ultimately unavailable for purchase by FBC.

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

16.2 Please provide land evaluation matrix rows for each property identified as "not available for purchase."

Response:

Please refer to CONFIDENTIAL Attachment 16.2 for the requested Land Evaluation Matrix.

FBC is requesting that Attachment 16.2 be filed on a confidential basis and held confidential by the BCUC in perpetuity, pursuant to Section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents, as set out in Order G-72-23. The response contains information which pertains to private land for which FBC does not have permission to disclose publicly and other information which is commercially sensitive and market competitive information which, if disclosed publicly, could prejudice or influence future negotiations of contracts between FBC and suppliers or counterparties, which could result in higher costs for customers. FBC is unable to foresee a time when the information may no longer be confidential and, therefore, requests that the information remains confidential in perpetuity. A confidential version has been provided to the BCUC and Interveners who have signed a Confidentiality Declaration and Undertaking.

On page 72 of the Application, FBC states:

> Discussions with the landowner of Property D recommenced in April 2023. FBC anticipated the Project at this location would face similar opposition to that encountered at the Mazzocchi Location that would ultimately make it unavailable for purchase. Concurrent to this discussion, FBC became aware of the Grieve location and determined it to be a more suitable property.

16.3 Please elaborate on why FBC anticipated that Property D would face similar opposition to that encountered at the Mazzocchi Location and identify any stakeholders who provided feedback.

16.3.1 Please explain why, if faced with similar opposition, Property D would be made unavailable for purchase.

Response:

Please refer to the responses to BCUC IR1 15.3 and 16.1.

16.4 Please explain why FBC considers the Grieve location to be more suitable than Property D.

Response:

FBC has redacted a portion this response for the public record and is requesting that it be filed on a confidential basis and held confidential by the BCUC in perpetuity, pursuant to Section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents, as set out in Order G-72-23. The response contains information which pertains to private land for which FBC does not have permission to disclose publicly and other information which is commercially sensitive and market competitive information which, if disclosed publicly, could prejudice or influence future negotiations of contracts between FBC and suppliers or counterparties, which could result in higher costs for customers. FBC is unable to foresee a time when the information may no longer be confidential and, therefore, requests that the information remains confidential in perpetuity. A confidential version has been provided to the BCUC and Interveners who have signed a Confidentiality Declaration and Undertaking.

As shown in the Land Evaluation Matrix provided as Confidential Attachment 16.2, the following categories were scored higher (more negatively) for Property D as compared to the Grieve Location, demonstrating that the Grieve Location is more suitable for the New FRU Substation, even if the landowner for Property D was receptive to selling.

	[redacted]	Grieve Location
Landowner Receptive to Sell	[redacted]	Yes
Property Rezoning	[redacted]	Utilities permitted.
Transmission Extension Complexity	[redacted]	Medium – Property is adjacent to the transmission line; extension required within property to preferred site.
Distribution Reconfiguration Complexity	[redacted]	Low – Near to existing FRU substation, minimal offsite distribution line infrastructure required (i.e., new switches, etc.).
Visual and Noise Impact	[redacted]	Medium – Potential to visually impact several adjacent properties. Depending on the substation location within the property, the infrastructure could also potentially be visible from the nearby major roadways. Depending on the substation location, minimal noise disturbance as equipment noise would better blend into existing ambient noise because the site is adjacent to an industrial site.
Community Land Use Impact	[redacted].	Low – Property is not used for public parking and, as a privately owned lot, it does not impact public land use.
Relative Capital Cost	[redacted]	Low – Due primarily to shorter transmission extension and less distribution reconfiguration.

1
2

Attachment 1.1a

CONDITION AND LIFE ASSESSMENT REPORT FRUITVALE T1 TRANSFORMER

Westinghouse Transformer Serial #A13S2748
Rev 1.0

By FortisBC Stations

Prepared by	Date	Checked by	Date	Rev #
Jonathan Reimer	29 May 2023	Paul Gheorghe	29 May 2023	0.0
Jonathan Reimer	7 May 2024	Shelby Ravestein	7 May 2024	1.0

9 May 2024

Table of Contents

1. INTRODUCTION

This report was prepared for FBC internal use. The report represents a comprehensive condition assessment of Westinghouse FRU T1 distribution power transformer.

The design parameters and identification numbers are shown below:

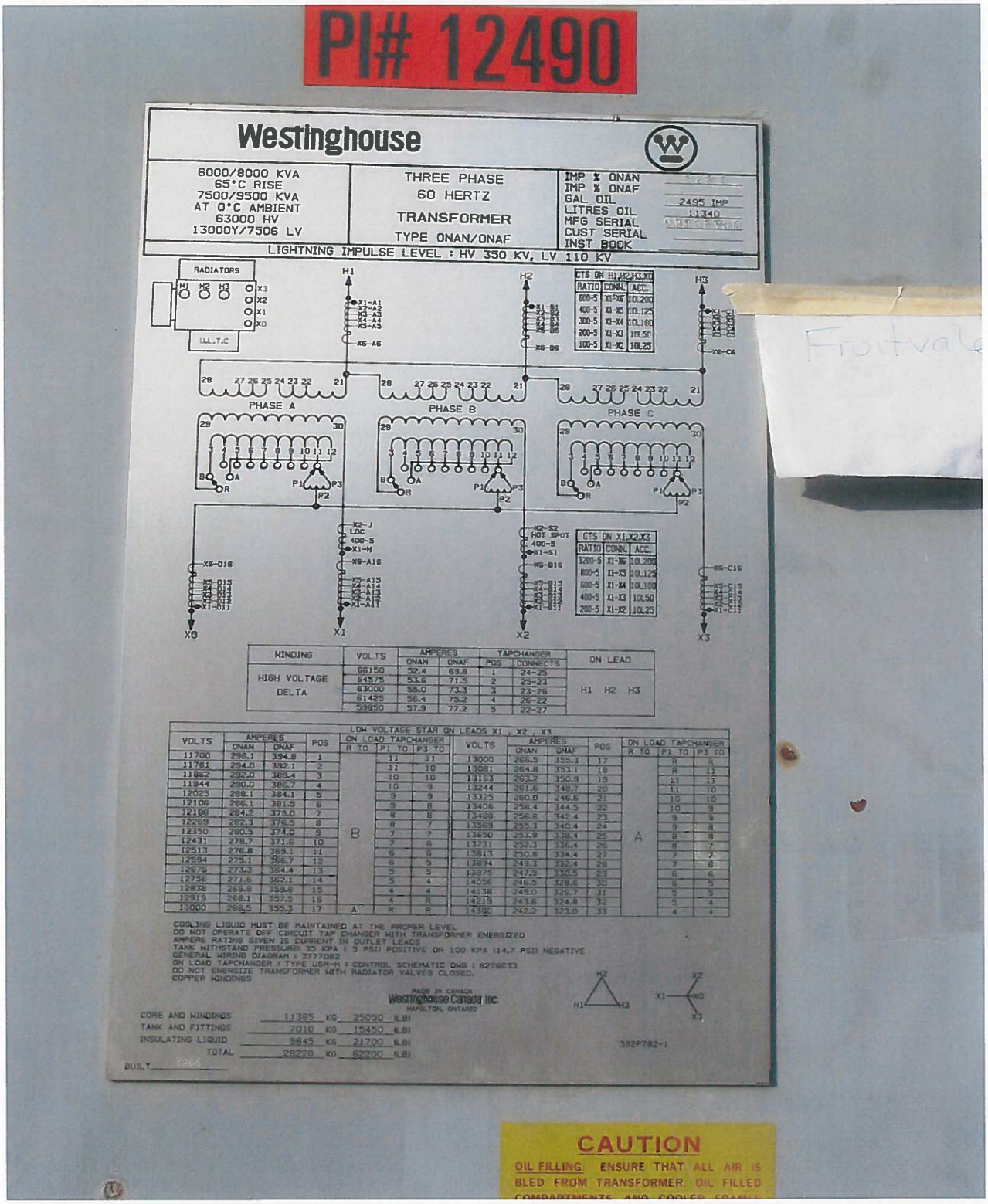
Unit ID	FRU T1
Manufacturer	Westinghouse
Rating	6/8 MVA ONAN/ONAF, 3ph, 60Hz
Voltage	63 kV Δ – 13 kV Y
HV Lightning Insulation Level	350 kV
LV Lightning Insulation Level	110 kV
Rated current (8 MVA)	HV 73.3 A, LV 355.3 A
Temperature rise	65°C
Serial number	A13S2748
Impedance (6 MVA)	6.28%
Manufacturing Date	1986

2. SITE INSPECTION REPORT

A formal inspection and report have not previously been completed on FRU T1. The last time a detailed assessment was performed was in August 2019 by the maintenance crew during routine maintenance, inspection, and testing.

- The de-energized tap changer was in position 3 at the time of inspection.
- The unit has three fans with only one fan rating.
- There is an oil temperature gauge and winding temperature gauge but no ETM/ITM.
- This is a conservator tank design with no air cell in the conservator and a silica gel breather.
- There are signs of leaking from the lower radiator flange and Buchholz relay.
- Paint on the transformer is down to the primer.
- There is cracked wood in the OLTC, and the contacts will need replacement during the next inspection.
- The OLTC motor current was 25.6A on one of the phases while the current was 13A on the other two phases.
- The oil temperature RTD is stuck in the dry well and could not be tested.
- The OLTC compartment does not have a pressure relief device.
- The main tank does not have a sudden pressure rise relay.

3. FRU T1 NAMEPLATE



4. FRU T1 LAYOUT

5. DISSOLVED GAS IN OIL IN MAIN TANK ANALYSIS REVIEW

The dissolved gas analysis (DGA) review has been done according to Table 1 of IEEE C57.104-2008 and Tables 1-4 of IEEE C57.104-2019. The limits for different gasses suggested in these Tables are to be used as a guide to assess the severity of the problem. A higher level indicates a worsening condition that requires increased monitoring and actions. Below are short descriptions of the four conditions referred to in the analysis from C57.104-2008 and the three statuses referred to in the analysis from C57.104-2019:

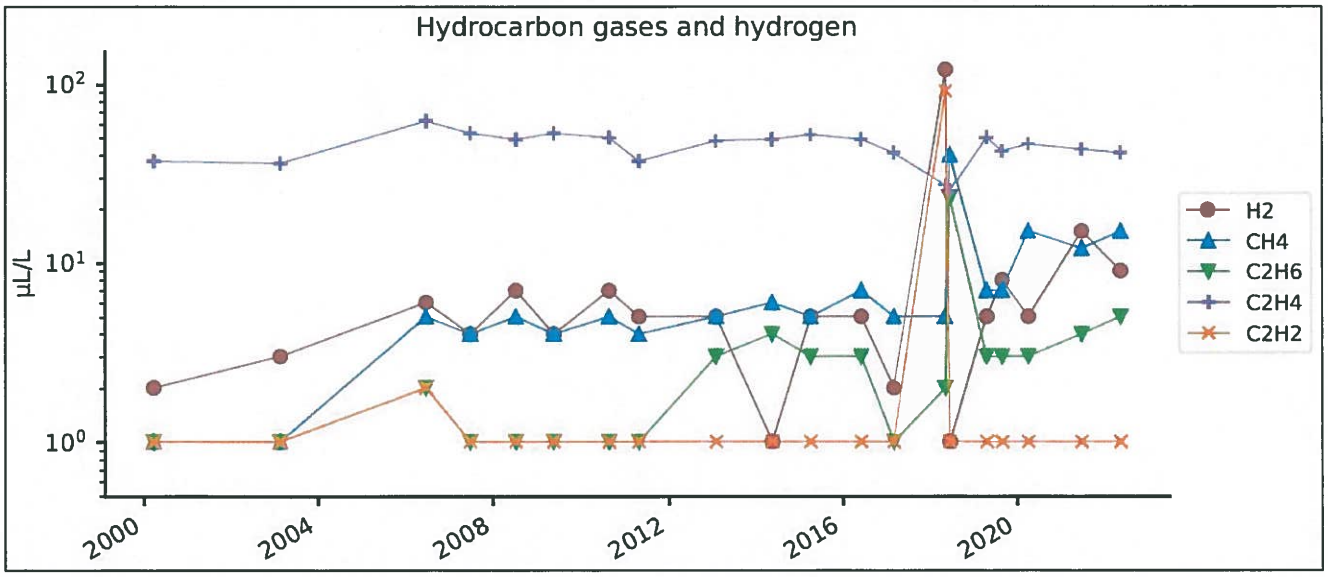
Condition 1: Transformer is operating satisfactorily.
Condition 2: A fault may be present. Take DGA samples at least often enough to calculate the amount of gas generation per day for each gas.
Condition 3: Indicates a high level of decomposition of cellulose insulation and/or oil. Take DGA samples at least often enough to calculate the amount of gas generation per day.
Condition 4: Indicates excessive decomposition of cellulose insulation and/or oil. Continued operation could result in failure of the transformer.

DGA Status 1: Low gas levels and no indication of gassing. (Unexceptional DGA)
DGA Status 2: Intermediate gas levels and/or possible gassing. (Possibly suspicious DGA)
DGA Status 3: High gas levels and/or probable active gassing. (Probably suspicious DGA)

The TOA4 report can be found in Cascade. DGA and Oil Quality data covers the period from 2000 up to today.

This is a summary review of the available data:

The concentration level of ethylene (C2H4) has been as high as condition level 2 and the levels of carbon monoxide (CO), and carbon dioxide (CO2) are currently at condition level 3, per IEEE C57.104-2008 guide. The oil has not been degassed or replaced during the recorded period from 2000 up to today so the gassing history has remained.



Based on C57.104-2019, the current CO level would trigger a DGA status 3 and the CO2 level in 2021 would trigger a DGA status 2 with the CO2 level in 2022 just below the level 2 threshold. Both statuses recommend an investigation and an increased sampling frequency with online monitoring suggested as a way to achieve this. Status 3 also recommends additional testing and consultation with the transformer manufacturer or a transformer expert.

The Carbon Dioxide vs. Carbon Monoxide (CO2/CO) ratio has been above 10 for most of the life of the unit, which points to an accelerated paper decay/depolymerization. Still, accelerated paper decay is expected, to a degree, due to the peak loading in winter close to the transformer rating (7462 kVA loading vs. 8000 kVA rating) with a poorly designed cooling system where the fans are positioned to blow through six radiators.

The normal CO2/CO ratios are typically in the range of 3 to 10. This is a conservator transformer but there is no air cell so there is an ample supply of oxygen, which means there are typically high levels of carbon oxides generated under normal loading conditions. It is also typical that some of the CO will be converted to CO2 in the presence of large quantities of oxygen. Oxygen acts as a catalyst to increase the generation rates of CO, CO2, and combustible gases.

The Oxygen (O2) level is always at the saturation point because the conservator does not have an air cell. The presence of large concentrations of Oxygen in oil can promote the formation of acids in the oil and cellulose, accelerate the aging rate of the insulation and aid in more gas generation.

6. GENERAL OIL QUALITY IN MAIN TANK

The following can be observed from the assessment of the oil quality using the Standard IEEE C57.106-2015, Tables 2 and 3 test limits for new and in-service mineral oil.

- The measured oil dielectric breakdown voltage in 2021 is below the suggested limit of 28kV minimum for an in-service transformer that is rated ≥69kV based on D1816-1mm method.
- The interfacial tension should have a minimum 30 mN/m. In this case, the measured interfacial tensions have been below this limit from 2017 to the present.
- The measured acid numbers are below the recommended maximum of 0.15 mg KOH/g by IEEE C57.106-2015 for transformers but there is an increasing trend.
- The recent measured power factor values at 25°C are all below the recommended limit of 0.5%. These measured values are all less than 0.1%.
- The last laboratory measured water content was 15 ppm, which is below the recommended maximum of 25 ppm by IEEE C57.106-2015 for ≥69kV transformers. The relative saturation was 18% and the dewpoint was -7°C, which are both marginal results. The water content has, at times during the life of the unit, been greater than 20 ppm. This indicates that moisture is getting into the main tank and is migrating into the insulation, leading to an accelerated deterioration of the insulation and lower dielectric withstand.
- The oxidation inhibitor level has never been measured during the recorded history of this transformer dating back to 2000. The conservator does not have an air cell so the Oxygen level has been at or near the saturation point for the life of the unit, so the inhibitor level needs to be measured and then added, if required. Since inhibitors are helpful to minimize the effects of oxidation of oil, the recommendation is to have inhibitor with a concentration that is between 0.08% and 0.30%. The first choice of attack by oxygen in the oil is the inhibitor molecules. This keeps the oil free from oxidation and its harmful by-products. As a transformer ages, the oxidation inhibitor is used up and needs to be replaced.

- As found oil colour is 4.0, which indicates that the oil is aged with the possible presence of sludge.
- Furan Analysis is a measure of the degradation of the cellulose paper. As paper ages, the degree of polymerization (DP) is reduced, and the mechanical strength also decreases. The DP can only be accurately measured by testing a sample of the paper in question, which is not practical for a transformer still in service. A 2019 Furan test showed an estimated level of polymerisation of 679, which indicates a midlife unit. However, it should be noted that this is a measure of the average DP of the paper and not at the location of the hot spot.

7. DGA AND GENERAL OIL QUALITY IN OLTC

The OLTC is a Westinghouse type URS model H. This is an obsolete switch and replacement parts are expensive and difficult to procure. The switching is done in oil so there are arcing by-products generated in the OLTC compartment. The arcing by-product ratios from the past several years are all within normal limits.

All of the oil quality results are within normal limits due to the OLTC oil being filtered during the last maintenance cycle in 2019.

8. POWER FACTOR AND CAPACITANCE MEASUREMENTS

The latest available Doble Power Factor and Capacitance tests were performed in August 2019.

The following is noted:

- The measured overall power factor and capacitance tests for windings are marginal but still acceptable for an in-service unit. A power factor between 0.5% to 1.0% is acceptable for older units but is an indication that moisture and possibly other contaminants are moving into the insulation.
- The C1 power factor and capacitance values for the HV and LV bushings were acceptable compared to bushing nameplate and previous values.
- The C2 power factor and capacitance values for the HV and LV bushings were acceptable compared to previous values.

Winding resistance and ratio tests were conducted in October 2015 and the results were acceptable.

9. RECENT MAINTENANCE HISTORY

FRU T1 had the HV and LV bushings replaced in 2015 under the PCB Mitigation program.

10. LOSS OF LIFE CALCULATION

This section assesses the loss of transformer insulation life. Aging or deterioration of insulation is a time function of temperature, moisture content and oxygen content.

With a modern oil preservation system, the moisture and oxygen content contributions are minimized, leaving insulation temperature as the controlling parameter. When the conservator has an air cell, the moisture and oxygen levels are kept to a minimum. However, based on the levels of oxygen and

moisture present in the oil, this unit does not have an air cell and no testing has been done to check the level of oxidation inhibitor in the oil.

In aging studies, it is the norm to consider the aging effects produced by the highest/Hot Spot (HS) temperature. The HS temperature is dependent on the load, the top oil rise over ambient and the ambient temperature. Test results for winding temperature are not available for this unit and the winding temperature gauge values are not stored in the historian so aging markers, such as furans, and the loading history must be used.

The loading history shows that the peak winter load has been 7462 kVA compared to an 8000 kVA rating. This is when a furan analysis is especially useful for estimating the approximate age of the insulation. As stated earlier in this report, a furan test completed in 2019 estimated the DP to be 679. Furans are compounds that are present in paper (and wood), and they are released into the oil as the paper decays.

This evaluation does not take into account the high oxygen in the oil, nor does it account for the moisture content in the insulation or the deteriorated condition of the oil in the main tank, which are contributors to the insulation aging.

Based upon above listed facts, it is estimated the furan test will only give the average DP and considering the loading history since 2019 with a poorly designed cooling arrangement, it is concluded that FRU T1 has reached end of life and should be replaced within the next 2-3 years.

11.RISK OF FAILURE ASSESSMENT

The ABB research paper Fit at 50, which is based upon the CIGRE WG 12-05 (1983) transformer reliability survey, estimates a failure rate of 2% for industrial transformers that are more then 20 years old. Based upon the fact that FRU T1 is more then 35 years old and was designed and built with the quality of an industrial transformer, it has reached end of life based upon the remaining insulation life. Using ABB Fit at 50 graph, the failure rate is closer to 15% (one in seven will fail in a given year), where any system event has a reasonable chance of causing a failure.

12. RECOMMENDATIONS

The following is recommended within the next 2-3 years:

- Decommission FRU T1 and scrap it.
- Purchase and install a new transformer – FRU T2.
- Purchase and install a second new transformer – FRU T3.

Purchasing and installing two new transformers is recommended to provide system resiliency and to reduce the cost of equipment maintenance within the station. This would also allow the HER load to be transferred to FRU so that HER can be decommissioned based upon the HER T1 and overall station deteriorated condition.

Attachment 1.1b

CONDITION AND LIFE ASSESSMENT REPORT HEARNS T1 TRANSFORMER

Packard Electric Transformers Serial #137388,137392,137393 Rev 1.0

By FortisBC Stations

Prepared by	Date	Checked by	Date	Rev #
Jonathan Reimer	26 May 2023	Paul Gheorghe	26 May 2023	0.0
Jonathan Reimer	7 May 2024	Shelby Ravestein	7 May 2024	1.0

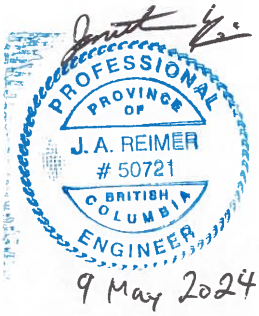


Table of Contents

1. INTRODUCTION

This report was prepared for FBC internal use. The report represents a comprehensive condition assessment of Packard Electric HER T1 single-phase transformers.

The design parameters and identification numbers are shown below:

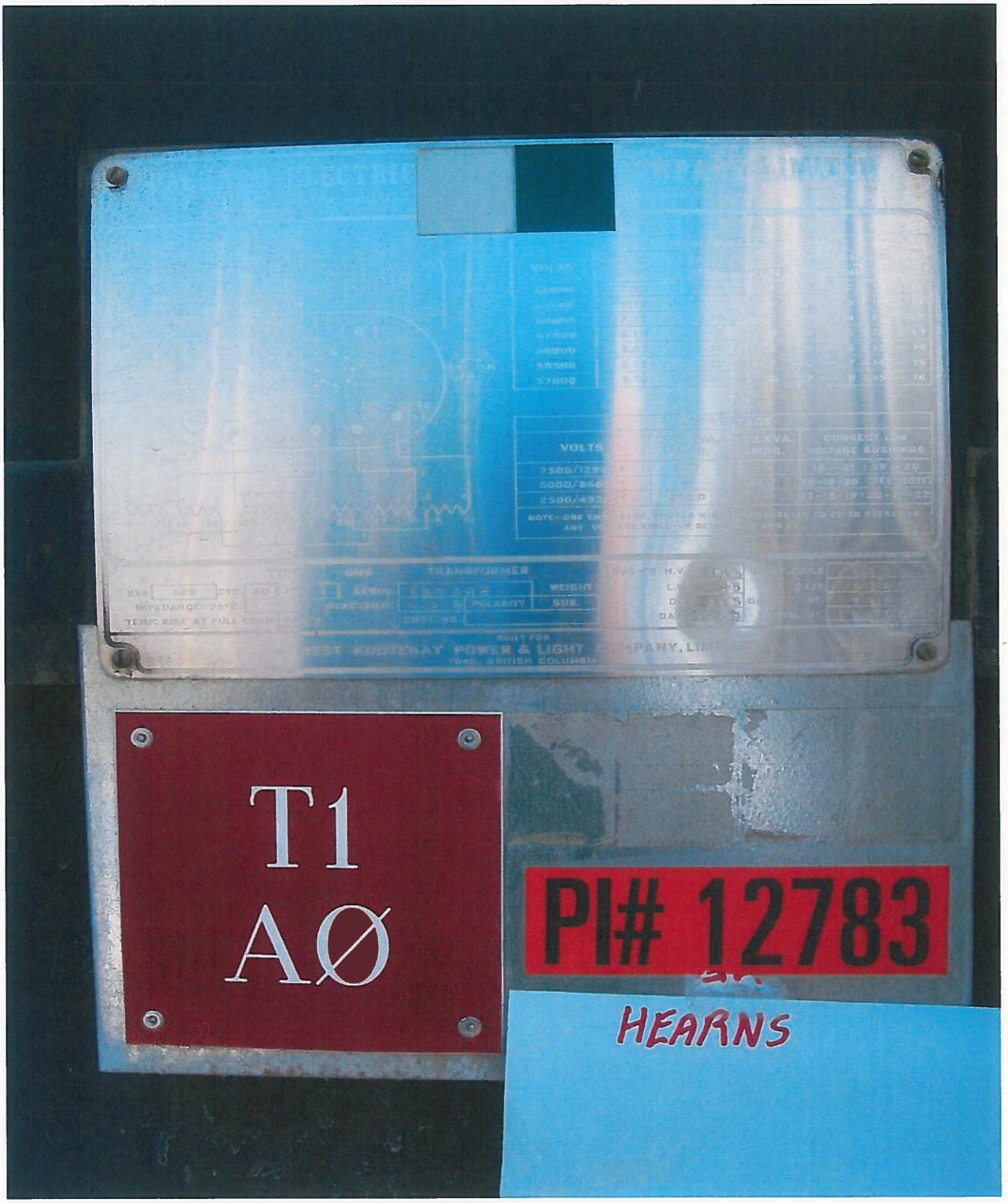
Unit ID	HER T1
Manufacture	Packard Electric
Rating	3 x 500 kVA ONAN (40°C), 3 x 1ph, 60Hz
Voltage	63 kV Δ – 12.99 kV Y
HV Lightning Insulation Level	350 kV
LV Lightning Insulation Level	110 kV
Rated current (1.5 MVA)	HV 7.95 A, LV 66.7 A
Temperature rise	40°C
Serial number	137388 (AΦ), 137392 (BΦ), 137393 (CΦ)
Impedance (1.5 MVA)	6.2%
Manufacturing Date	1950

2. SITE INSPECTION REPORT

A formal inspection and report have not previously been completed on HER T1. The last time a detailed assessment was performed was in May 2022 by the maintenance crew during routine maintenance, inspection, and testing.

- The de-energized tap changers were in position C at the time of inspection.
- The units do not have fans.
- There is only an oil temperature gauge (no winding temperature gauge).
- This is a conservator tank design with silica gel breathers without an air cell in the conservator.
- Radiators are in acceptable condition.
- No signs of leaking or rust.
- Tank designs are rounded.
- The units do not have any control cabinets.
- Paint is faded.
- Pressure relief is accomplished with a pipe and diaphragm and no relay.
- There are no gas accumulation, sudden pressure rise, or main tank low oil relays.
- HV bushings were replaced in 2014 during the PCB Mitigation program.

3. HER T1 NAMEPLATES




COMPANY LIMITED
TYPE DNS TRANSFORMER
SERIAL
REACTANCE
CUST. NO.
WEST KOOTENAY POWER & LIGHT COMPANY
T1
BØ
PI# 12782
HEARNS


PACKARD ELECTRIC
COMPANY LIMITED
ONTARIO
VOLTS
66000
64500
65000
61500
60000
58500
57000
TRANSFORMER
500
CYC
IMPEDANCE: 75°C.
TEMP. RISE AT FULL LOAD
SERIAL
REACTANCE
POLARITY
SUB.
WEIGHT
255
45
225
1850
GALS.
TOTAL WT.
WEST KOOTENAY POWER & LIGHT
TRAIL, BRITISH COLUMBIA
T1
CØ
PI# 12781
HEARNS

4. HER T1 LAYOUT

5. DISSOLVED GAS IN OIL IN MAIN TANK ANALYSIS REVIEW

The dissolved gas analysis (DGA) review has been done according to Table 1 of IEEE C57.104-2008 and Tables 1-4 of IEEE C57.104-2019. The limits for different gasses suggested in these Tables are to be used as a guide to assess the severity of the problem. A higher level indicates a worsening condition that requires increased monitoring and actions. Below are short descriptions of the four conditions referred to in the analysis from C57.104-2008 and the three statuses referred to in the analysis from C57.104-2019:

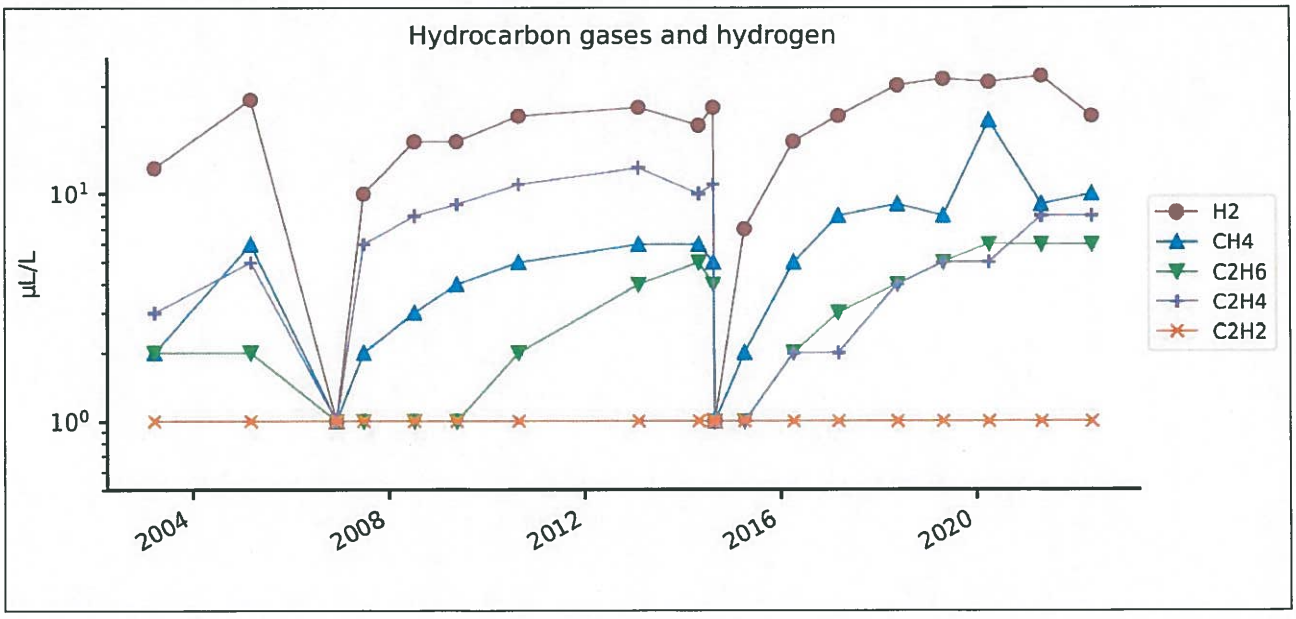
Condition 1: Transformer is operating satisfactorily.
Condition 2: A fault may be present. Take DGA samples at least often enough to calculate the amount of gas generation per day for each gas.
Condition 3: Indicates a high level of decomposition of cellulose insulation and/or oil. Take DGA samples at least often enough to calculate the amount of gas generation per day.
Condition 4: Indicates excessive decomposition of cellulose insulation and/or oil. Continued operation could result in failure of the transformer.

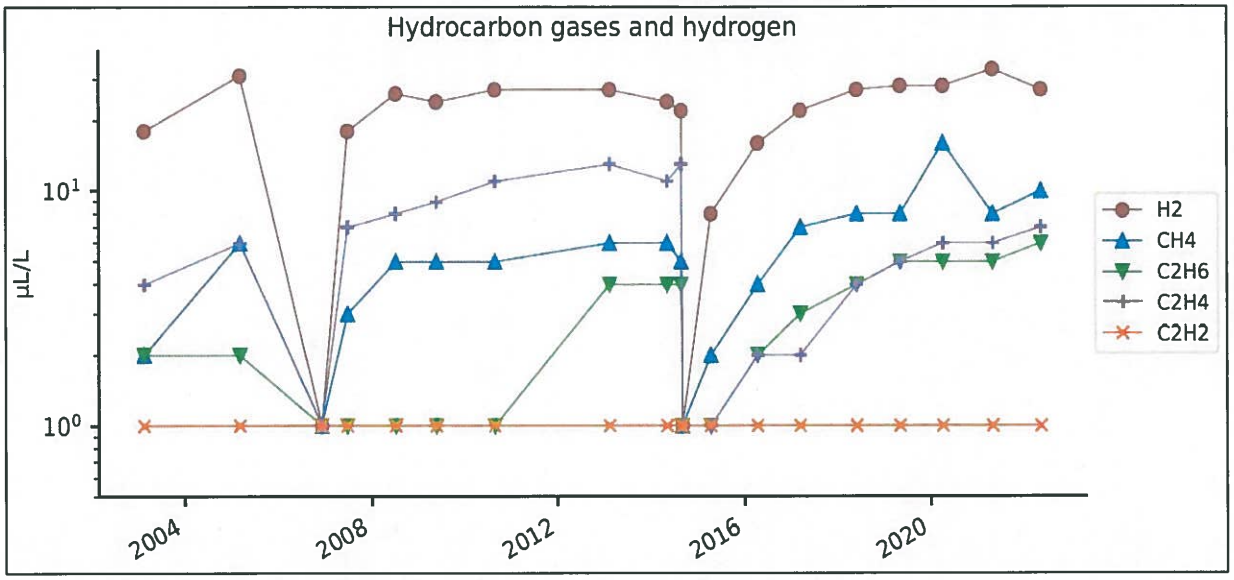
DGA Status 1: Low gas levels and no indication of gassing. (Unexceptional DGA)
DGA Status 2: Intermediate gas levels and/or possible gassing. (Possibly suspicious DGA)
DGA Status 3: High gas levels and/or probable active gassing. (Probably suspicious DGA)

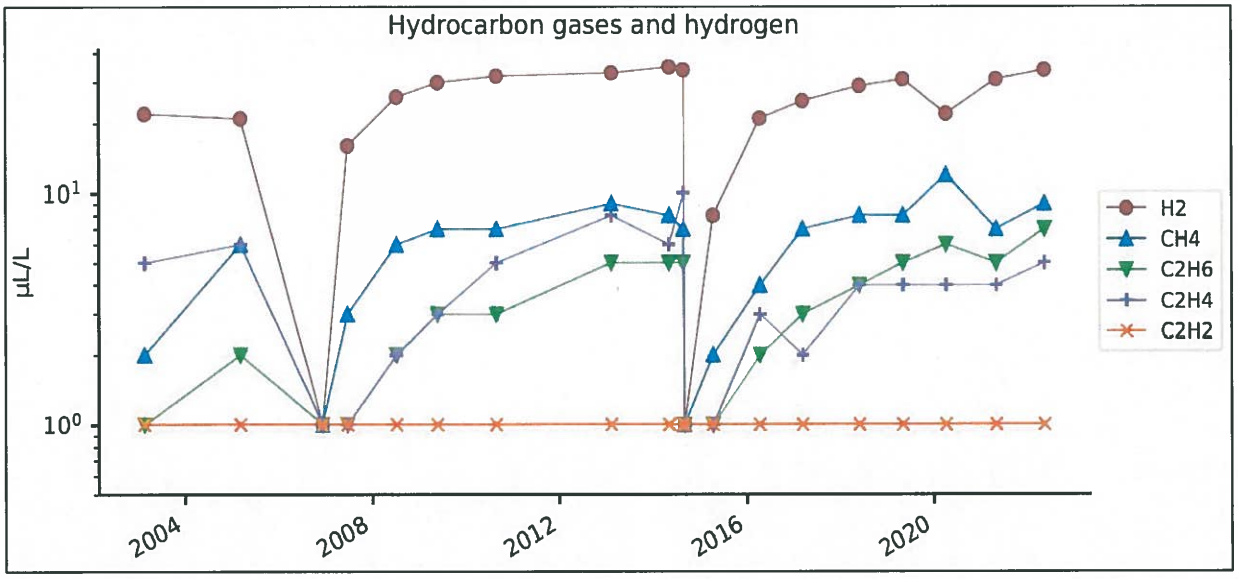
The TOA4 report can be found in Cascade. DGA and Oil Quality data covers the period from 2003 up to today.

This is a summary review of the available data:

The concentration levels of carbon monoxide (CO) for all three units are currently at condition level 2 and the concentration levels of carbon dioxide (CO2) for all three units are around the transition between condition level 2 and level 3, per IEEE C57.104-2008 guide. The oil was last replaced in 2014 so the gassing history has been reset. The hydrocarbon and hydrogen gas levels for all three units are shown below, starting with AΦ, followed by BΦ, and then CΦ.







The Carbon Dioxide vs. Carbon Monoxide (CO2/CO) ratio has been around 10 for most of the recorded life of all three units, which points to an accelerated paper decay/depolymerization. Still, accelerated paper decay is expected, to a degree, due to the transformers not having conductors with thermally upgraded paper and with the peak loading in summer close to the transformer rating (1487 kVA loading vs. 1500 kVA rating).

The normal CO2/CO ratios are typically in the range of 3 to 10. This is a conservator transformer but there is no air cell so there is an ample supply of oxygen, which means there are typically high levels of carbon oxides generated under normal loading conditions. It is also typical that some of the CO will be converted to CO2 in the presence of large quantities of oxygen. Oxygen acts as a catalyst to increase the generation rates of CO, CO2, and combustible gases.

The Oxygen (O2) level is always at the saturation point because the conservators do not have air cells. The presence of large concentrations of Oxygen in oil can promote the formation of

acids in the oil and cellulose, accelerate the aging rate of the insulation and aid in more gas generation.

6. GENERAL OIL QUALITY IN MAIN TANK

The following can be observed from the assessment of the oil quality using the Standard IEEE C57.106-2015, Tables 2 and 3 test limits for new and in-service mineral oil.

- The measured oil dielectric breakdown voltages in 2021 are above the suggested limit of 28kV minimum for an in-service transformer that is rated ≥69kV based on D1816-1mm method.
- The interfacial tension should have a minimum 30 mN/m. In this case, the measured interfacial tensions are all borderline (28.6-30.2 mN/m).
- The measured acid numbers are below the recommended maximum of 0.15 mg KOH/g by IEEE C57.106-2015 for transformers but there is an increasing trend for all three units.
- The recent measured power factor values at 25°C are all below the recommended limit of 0.5%. These measured values are all less than 0.01%.
- The last laboratory measured water contents were 13-20 ppm for the three units, which are below the recommended maximum of 25 ppm by IEEE C57.106-2015 for ≥69kV transformers. The relative saturations were 20-28% and the dewpoints were -10 to -1°C, which are all marginal results. The water content has, during most of the life of the units, been around 20 ppm with relative saturations greater than 20%. This indicates that moisture is getting into the main tank and is migrating into the insulation, leading to an accelerated deterioration of the insulation and lower dielectric withstand.
- As found oil colour is 0.5-1.0, which is due to the oil having been replaced in 2014.
- Furan Analysis is a measure of the degradation of the cellulose paper. As paper ages, the degree of polymerization (DP) is reduced, and the mechanical strength also decreases. The DP can only be accurately measured by testing a sample of the paper in question, which is not practical for a transformer still in service. A 2019 Furan test showed estimated levels of polymerisation of 610-650, which indicates a midlife unit. However, it should be noted that this is a measure of the average DP of the paper and not at the location of the hot spot. It should also be noted that the oil was replaced in 2014, which erases some of the aging markers. Another note is that these transformers do not have thermally upgraded paper insulation so the standard analysis might not be valid without modification to the analysis.

7. POWER FACTOR AND CAPACITANCE MEASUREMENTS

The latest available Doble Power Factor and Capacitance tests were performed in May 2022.

The following is noted:

- The measured overall power factor and capacitance tests for windings are poor with results as high as 2.37% for T1-A, 3.56% for T1-B, and 2.48% for T1-C. A power factor between 0.5% to 1.0% is acceptable for older units but is an indication that moisture and possibly other contaminants are moving into the insulation. The reason that these units were kept in-service with this power factor result is that the subject matter expert at Doble advised that it was normal for units from this manufacturer of this vintage to have a high power factor result but the condition still needs to be carefully monitored.

- The C1 power factor and capacitance values for the HV bushings were acceptable compared to bushing nameplate and previous values.
- The C2 power factor and capacitance values for the HV bushings were acceptable compared to previous values expect for the T1-B H1 bushing where the power factor has gone from 0.943% in 2014 to 1.431% in 2022.
- The LV bushings have no capacitive tap; accordingly, a hot-collar test was performed to assess the condition. The test results were acceptable compared to previous values.

Winding resistance and ratio tests were conducted in August 2014 and the results were acceptable.

8. RECENT MAINTENANCE HISTORY

HER T1 had the HV bushings replaced in 2014 under the PCB Mitigation program.

9. LOSS OF LIFE CALCULATION

This section assesses the loss of transformer insulation life. Aging or deterioration of insulation is a time function of temperature, moisture content and oxygen content.

With a modern oil preservation system, the moisture and oxygen content contributions are minimized, leaving insulation temperature as the controlling parameter. When the conservator has an air cell, the moisture and oxygen levels are kept to a minimum. However, based on the levels of oxygen and moisture present in the oil, these units do not have air cells.

In aging studies, it is the norm to consider the aging effects produced by the highest/Hot Spot (HS) temperature. The HS temperature is dependent on the load, the top oil rise over ambient and the ambient temperature. Test results for winding temperature are not available for these units and there are no winding temperature gauges so aging markers, such as furans, and the loading history must be used.

The loading history shows that the peak summer load has been 1487 kVA compared to a 1500 kVA rating. This is when a furan analysis is especially useful for estimating the approximate age of the insulation. As stated earlier in this report, a furan test completed in 2019 estimated the DP to be 610-650. Furans are compounds that are present in paper (and wood), and they are released into the oil as the paper decays.

This evaluation does not take into account the high oxygen in the oil, nor does it account for the moisture content in the insulation, which are contributors to the insulation aging.

Based upon above listed facts, it is estimated the furan test will only give the average DP, part of the furan history was erased when the oil was replaced, and considering the loading history, it is concluded that HER T1 has reached end of life and should be scrapped within the next 2-3 years.

10. RISK OF FAILURE ASSESSMENT

The ABB research paper Fit at 50, which is based upon the CIGRE WG 12-05 (1983) transformer reliability survey, estimates a failure rate of 2% for industrial transformers that are more then 20 years old. Based upon the fact that HER T1 is more then 70 years old and was designed and built with the quality of an industrial transformer, it has reached end of life based upon the remaining insulation life. The ABB Fit at 50 graph does not include data for industrial transformers that are older then 55-years, in which the graph reflects a failure rate of 50% for industrial transformers of that age. As HER T1 is

over 70 years old, it is estimated that HER T1 failure rate is likely close to 100%, considering the exponential rise. Any system event has a reasonable chance of causing a failure of HER T1.

11. RECOMMENDATIONS

The following is recommended within the next 2-3 years:

- Decommission HER T1 and scrap it.
- Transfer HER load to FRU.

Transferring the HER load to FRU is contingent upon a new FRU station being constructed.

Attachment 5.5

New Fruitvale Substation Land Evaluation Criteria and Scoring

Impact Evaluation
- Low and/or meets criteria
- Medium
- High
- Highest

Site	Location Name	Landownership & Use					Environmental, Archeological, and Hazards				Technical					Community & Stakeholder Relations				Relative Capital Cost[14]
		Landowner Receptive to Sell	Land Vacant[1]	Property Rezoning[2]	Indigenous Reserve Lands[3]	Agricultural Land Reserve[3]	Floodplain[3,4]	Critical Habit for Species at Risk[3]	Archaeological Site within 250m[3,5]	EMF Impact[6]	Parcel Size (m^2)[7]	Transmission Extension Complexity	Distribution Reconfiguration Complexity	Constructability Complexity[8]	Operations Accessibility[9]	Visual & Noise Impact[10]	Community Land Use Impact[11]	Indigenous Consultation Requirements[12]	Customer Reliability Impact[13]	
1	Atco Wood Products – Property A	Yes	Yes	Utilities permitted	No	Partially	Partially	No	No	Low	679,720	Low	Highest	Highest	Low	High	Low	Low	High	Highest
2	Former Atco Wood Products Property	Landowner not approached	Yes	Utilities permitted	No	Partially	No	No	No	Low	198,164	Low	Highest	Highest	Low	High	Low	Low	High	Highest
3	Hepburn Road	Landowner not approached	Yes	Utilities permitted	No	No	Entirely within floodplain	No	No	Low	5,934	Medium	Medium	Medium	Low	Medium	Low	Low	Low	Medium
4	Atco Wood Products – Property B	Yes	Yes	Utilities permitted	No	No	Vacant land within floodplain	No	No	Low	121,083	Medium	Medium	Medium	Low	Low	Low	Low	Low	Medium
5	Old Salmo Road	Yes	Partially	Utilities permitted	No	No	Partially	No	No	Low	29,075 (portion of property offered by landowner too small given ravine)	Medium	Medium	Highest	Medium	Low	Low	Low	Low	Not scored due to unresolvable land constraint
6	Highway 3B – Property A	Landowner not approached	Yes	Utilities permitted	No	No	No	No	No	Low	89,904	High	High	Highest	High	Medium	Low	High	Medium	High
7	Atco Wood Products – Property C	Yes	Yes	Utilities permitted	No	No	No	No	No	Low	72,600	High	High	Highest	High	Medium	Low	Low	Medium	High
8	Highway 3B – Property B	Yes	Partially	Utilities permitted	No	No	Partially within floodplain and impacted by spring runoff	No	No	Low	72,600	Low	High	Medium	Low	Medium	Low	Low	Medium	Medium
9	2064 Grieve Rd	Yes	Partially	Utilities permitted	No	No	No	No	No	Low	40,510	Medium	Low	Medium	Low	Medium	Low	Low	Low	Low
10	HER Substation	Yes	Partially Existing HER substation is on the property	Utilities permitted	No	Partially	No	No	No	Low	4,519	Low	Highest	Highest	Low	High	Low	Low	High	Highest

NOTES

1 - Land that is not vacant may require structure(s) to be demolished potentially adding liability to the project.
2 - Considers potential impact related to rezoning parcel to allow for utility use.
3 - Considers impact to new station, transmission, and/or distribution infrastructure.
4 - Identifies whether a property is entirely within the floodplain, partially within the floodplain, or entirely outside of the floodplain. It also considers whether property is within areas where overland flooding is a known issue.
5 - A distance of 250m from an archaeological site based on review conducted 2 February 2024. The distance of 250m was used to identify at a screening level if there were known resources that could require management if the site was chosen.
6 - Considers the impact of electric and magnetic fields from substation and transmission lines.
7 - The standard station footprint for a two transformer station is typically 4736 m^2 (61.5m x 77m), the minimum size is typically 2500 m^2 (50m x 50m).
8 - Considers aggregate challenges of terrain, subsurface conditions, available construction footprint, requirement of specialized crews and equipment, construction related outages, underground facilities, etc.
9 - Considers the accessibility of the facilities during construction and afterwards by FBC employees and contractors.
10 - Considers the visual and noise impact on the community from the new station, transmission, and/or distribution infrastructure.
11 - Considers the impact of the proposed facilities on the current land use by the community (i.e. community activities, parking lot, etc.).
12 - Indigenous consultation requirements as per internal and external guidelines.
13 - Options located further from the load centre are considered to have a lower reliability benefit.
14 - Relative to the other alternative locations, and considers the Transmission Extension Complexity, Distribution Reconfiguration Complexity and Constructability Complexity. No estimating completed.

Attachment 6.5

2064 Grieve Rd Land Evaluation Criteria and Scoring

Impact Evaluation

- Low
- Medium
- High
- Highest

2064 Grieve Rd Option	Landownership & Use					Environmental, Archeological, and Hazards				Technical					Community & Stakeholder Relations				Relative Capital Cost[14]
	Landowner Receptive to Sell	Land Vacant[1]	Property Rezoning[2]	Indigenous Reserve Lands[3]	Agricultural Land Reserve[3]	Floodplain[3,4]	Critical Habit for Species at Risk[3]	Archaeological Site within 250m[3,5]	EMF Impact[6]	Parcel Size (m^2)[7]	Transmission Extension Complexity	Distribution Reconfiguration Complexity	Constructability Complexity[8]	Operations Accessibility[9]	Visual & Noise Impact[10]	Community Land Use Impact[11]	Indigenous Consultation Requirements[12]	Customer Reliability Impact[13]	
Hwy 3B Option	Yes	Partially	Utilities permitted	No	No	No	No	No	Low	40,510	Medium	Low	Low	Low	Low	Low	Low	Low	Low
Old Salmo Rd Option	Yes	Yes	Utilities permitted	No	No	No	No	No	Low	40,510	Low	Low	Medium	Medium	Medium	Low	Low	Low	Medium

NOTES

1 - Land that is not vacant may require structure(s) to be demolished potentially adding liability to the project.
2 - Considers potential impact related to rezoning parcel to allow for utility use.
3 - Considers impact to new station, transmission, and/or distribution infrastructure.
4 - Identifies whether a property is entirely within the floodplain, partially within the floodplain, or entirely outside of the floodplain. It also considers whether property is within areas where overland flooding is a known issue.
5 - A distance of 250m from an archaeological site based on review conducted 2 February 2024. The distance of 250m was used to identify at a screening level if there were known resources that could require management if the site was chosen.
6 - Considers the impact of electric and magnetic fields from substation and transmission lines.
7 - The standard station footprint for a two transformer station is typically 4736 m^2 (61.5m x 77m), the minimum size is typically 2500 m^2 (50m x 50m).
8 - Considers aggregate challenges of terrain, subsurface conditions, available construction footprint, requirement of specialized crews and equipment, construction related outages, underground facilities, etc.
9 - Considers the accessibility of the facilities during construction and afterwards by FBC employees and contractors.
10 - Considers the visual and noise impact on the community from the new station, transmission, and/or distribution infrastructure.
11 - Considers the impact of the proposed facilities on the current land use by the community (i.e. community activities, parking lot, etc.).
12 - Indigenous consultation requirements as per internal and external guidelines.
13 - Options located further from the load centre are considered to have a lower reliability benefit.
14 - Relative to the other alternative locations, and considers the Transmission Extension Complexity, Distribution Reconfiguration Complexity and Constructability Complexity. No estimating completed.

Attachment 14.3

Substation Fencing Options

Revision History

Date	Rev	Description	Author	Checked
Apr 3, 2023	0	New document	LR	MWK

April 2023

Contents

1- Introduction

There are a variety of different fencing options available for FortisBC (FBC) substations. These options include concrete, wood, and chain link fencing. The following sections provides some examples of fencing styles that are available for new substations. Some of these examples have been used at other FBC substations. This is not an exhaustive list of available options, and we could explore others if required. Depending on fence height, barbed wire along the top may be required.

1.1 Concrete Panel Fencing

Concrete fencing offers a significant amount of noise reduction and can be made aesthetically pleasing. The concrete panels can be finished with different types of patterns or murals. The panels can also be stained and coated with graffiti resistant paint. Each of these options are available in a range of type, shape and colours and can be used in combination for an attractive architectural appearance. Some of the concrete options available are provided below.

1.1.1 Granular Wood Painted

The concrete panels can have a painted granular wood pattern as shown in the figure below.

Figure 1-1 : Concrete fencing with painted granular wood pattern

1.1.2 Granular Wood Painted with Border

The concrete panels can have a painted granular wood pattern with borders as shown in the figure.

Figure 1-2 : Concrete fencing with painted granular wood pattern with borders

1.1.3 Granular Wood Unpainted

The concrete panels can have an unpainted granular wood pattern as shown in the figure below.below.

Figure 1-3: Concrete fencing with unpainted granular wood pattern

1.1.4 Ashlar Stone

The concrete panels can have an Ashlar stone pattern as shown in the figure below.

Figure 1-4: Concrete fencing with Ashlar stone pattern

1.1.5 Block Wall Pattern

The concrete panels can have a painted block wall pattern as shown in the figure below.

Figure 1-5 : Concrete fencing with painted block wall pattern

1.1.6 Concrete Panels with Murals

The concrete panels can have murals embedded or painted on them as shown in the figures below. FBC embedded murals in the concrete panels at the Nk'Mip substation in Osoyoos, where the local Indian Band designed the murals. At the Salmo substation in Salmo, a local artist painted murals on the concrete panels.

Figure 1-6 : Concrete panels with embedded murals

Figure 1-7 : Concrete panels with embedded murals

Figure 1-8: Concrete panels with painted mural

Figure 1-9: Concrete panels with painted mural

1.1.7 Concrete Brick Fencing

The concrete fence can be built using concrete bricks as shown in the figures below. FBC uses this fencing style at Westminster substation in Penticton.

Figure 1-10: Concrete brick fencing

Figure 1-11: Concrete brick fencing

1.2 Wooden Fencing

The only wooden fencing option FBC has used is a pressure treated lumber fence as shown in the figure below. The wooden fence would not offer the same level of noise reduction as the concrete fence. FBC uses this fencing style at the Castlegar substation in Castlegar.

Figure 1-12: Wooden fencing

1.3 Chain Link Fencing

The only chain link fencing option FBC has used is a chain link fence as shown in the figures below. This is a very typical substation fence style used by many utilities as a standard. It also prevents graffiti. Chain link fences can be galvanized or painted in dark colours to minimize their visibility or they can be obtained with vinyl cladding. This fencing style offers the least amount of noise reduction. FBC uses this fencing style at the Ootischenia substation in Castlegar as shown in the figures below.

Figure 1-13: Chain link fencing

Figure 1-14: Chain link fencing

Attachment 16.2

FILED CONFIDENTIALLY