bcuc
British Columbia
Utilities Commission

Marija Tresoglavic
Acting Commission Secretary

Commission.Secretary@bcuc.com
bcuc.com

Suite 410, 900 Howe Street
Vancouver, BC Canada V6Z 2N3
P: 604.660.4700
TF: 1.800.663.1385
F: 604.660.1102

June 18, 2020

Sent via email/eFile

FBC CPCN FOR THE KELOWNA BULK TRANSFORMER ADDITION PROJECT	**EXHIBIT A-3**

Mr. Doug Slater
Director, Regulatory Affairs
FortisBC Inc.
16705 Fraser Highway
Surrey, BC V4N 0E8
electricity.regulatory.affairs@fortisbc.com

Re: FortisBC Inc. – Application for a Certificate of Public Convenience and Necessity for the Kelowna Bulk Transformer Addition – Project 1599088 – Information Request No. 1

Dear Mr. Slater:

Further to your April 24, 2020 filing of the above noted application, enclosed please find British Columbia Utilities Commission Information Request No. 1. Please file your responses on or before **Thursday, July 9, 2020.**

Sincerely,

Original signed by:

Marija Tresoglavic
Acting Commission Secretary

/aci
Enclosure

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC Canada V6Z 2N3
bcuc.com
P: 604.660.4700
TF: 1.800.663.1385
F: 604.660.1102

FortisBC Inc.
Application for a Certificate of Public Convenience and Necessity for the
Kelowna Bulk Transformer Addition Project

INFORMATION REQUEST NO. 1 TO FORTISBC INC.

Table of Contents **Page no.**

A. APPLICANT

1.0 Reference: INTRODUCTION
Exhibit B-1, Section 1.1.3, p. 3
The Preferred Alternative

On page 3 of FortisBC Inc's (FBC) Application for a Certificate of Public Convenience and Necessity (CPCN) for the Kelowna Bulk Transformer Addition Project (KBTA Project) (Application), FBC states:

> The required substation modifications, including the reconfiguration of the 238 kV bus to a ring bus configuration, inside [the FA Lee Terminal Station];

1.1 Please confirm the reference to "238kV bus" is a typo.

B. PROJECT NEED AND JUSTIFICATION

2.0 Reference: PROJECT NEED AND JUSTIFICATION
Exhibit B-1, Section 3.2, p. 12
Kelowna Area System

On page 12 of the Application, FBC states:

> FBC has approximately 76,600 direct customers in the Kelowna area, shown by rate class in Table 3-1:

Table 3-1: FBC Kelowna Load Area Customers by Class

Rate Class	Customer Count
Small Commercial / Commercial	9,781
Large Commercial	22
Irrigation	212
Lighting	467
Residential	66,133
Total	76,615

2.1 Please update Table 3-1 to include the overall load composition broken down for each rate class (i.e. the percent of overall load attributed to each rate class shown).

On page 12, FBC states:

> Included in these customers in the Kelowna area are the following major customers:
>
> - Kelowna General Hospital;
> - University of British Columbia Okanagan;
> - Okanagan College;
> - Kelowna International Airport; and
> - Big White Ski Resort.

2.2 Please identify, to the best of FBC's knowledge, which of the major customers listed in the above preamble have on-site back-up generation to supply their load in the event of an FBC power outage.

Further on page 12, FBC states:

> In addition, FBC provides electricity to BC Hydro for service to its approximately 8,000 customers in the Duck Lake area[6], which can also be seen in Figure 3-1.
>
> [6] The Duck Lake Wheeling Agreement between FBC and BC Hydro was approved by Order G-19-10.

2.3 Please describe how FBC provides electricity to British Columbia Hydro and Power Authority (BC Hydro) for service to its Duck Lake Customers (i.e. from which substation, at what voltage, etc.).

2.3.1 If service to BC Hydro's Duck Lake service area is from FBC's 138 kV Kelowna system, please confirm if this load is included in FBC's peak load forecast provided in Table 3-5 of the Application.

2.3.1.1 Please also describe in detail how FBC determines the peak load forecast for this area. Please include any underlying calculations and assumptions.

3.0 Reference: PROJECT NEED AND JUSTIFICATION
Exhibit B-1, Section 3.3.1, pp. 11, 14
Population and Housing

On page 11, FBC provides a map of the Kelowna Load area in Figure 3-1.

On page 14 of the Application, FBC states:

> Kelowna has been one of the fastest growing cities in Canada during the last decade,[7] and has grown by an average annual rate of 1.6 percent during the 20-year period 1996-

2016. As shown in Table 3-2, the population is forecast to continue to grow at a similar rate in the subsequent 20 year period to 2036.

Table 3-2: Actual and Forecast Kelowna Area Population 1996-2041[8]

Year	Population	Annual Avg Growth Rate	20-Yr Avg Growth Rate
1996	102,021		
2001	110,995	1.7%	
2006	120,392	1.6%	
2011	131,835	1.8%	
2016	141,022	1.4%	1.6%
2021	149,705	1.2%	
2026	164,711	1.9%	
2031	177,072	1.5%	
2036	188,445	1.3%	1.5%
2041	199,031	1.1%	

[7] Statistics Canada, Table 17-10-0135-01, Population estimates, July 1, by census metropolitan area and census agglomeration, 2016 boundaries. July 1, 2018 data.

[8] Population projections prepared for FBC by BC Stats.

3.1 Please describe at what frequency BC Stats provides population projections to FBC.

3.2 Please confirm how recently the population projections shown in Table 3-2 were prepared by BC Stats for FBC.

3.3 Please confirm that the population projections provided in Table 3-2 refer to the same area that Figure 3-1 defines as the FBC Kelowna Load Area.

3.3.1 Please also confirm whether the BC Hydro Kelowna Load area (Duck Lake) is included in the population projections.

4.0 Reference: PROJECT NEED AND JUSTIFICATION
Exhibit B-1, Section 3.3.2, pp. 15-16
Kelowna Area Load Forecast

On page 15 of the Application, FBC states:

> Peak load forecasting for system planning purposes differs from forecasting energy and peak load for resource (energy) supply purposes in one important way. Unlike a resource planning forecast, which is a "weather-normalized" forecast used to determine FBC's resource requirements, the forecast for system planning purposes must account for possible weather extremes that directly impact winter and summer peak loads, in order to ensure sufficient capacity under adverse conditions.
>
> FBC accomplishes this through the use of a "1-in-20" year load forecast. This forecast is higher than the expected load forecast under normal conditions, meaning that there is only a 5 percent probability that loads will be higher than the "1-in-20" year forecast. This forecast is used as the basis for determining compliance with FBC's transmission planning standards and is also consistent with industry practice.[13]

[13] The success rate of the 1-in-20 forecast is expected to be 95 percent (a 5 percent chance that actual load will be higher). Industry practice requires that a quantitative risk factor, such as the 1-in-20 forecast, be incorporated into transmission planning studies such as the power flow models submitted by FBC to the Western Electricity Coordinating Council (WECC) for application in regional and system-wide transmission planning.

4.1 Please discuss how FBC determines that the use of a "1-in-20" load forecast for transmission planning studies to be consistent with industry practice. Please identify any relevant industry standards, if applicable.

4.2 Please discuss for how long FBC has been using a "1-in-20" year load forecast for system planning purposes.

4.3 Please identify other applications FBC has submitted to the British Columbia Utilities Commission (BCUC) that utilizes a "1-in 20" year load forecast.

4.4 Please discuss in detail FBC's process for preparing a "1-in-20" year peak load forecast. Please include all underlying calculations and assumptions.

4.4.1 Please compare this process to how FBC prepares a peak load forecast for resource supply purposes. Please explain, with rationale, where differences occur.

4.5 In the above preamble, FBC indicates "…the forecast for system planning purposes must account for possible weather extremes…". Please explain what FBC considers to be a weather extreme.

4.6 Please explain how a "1-in-20" peak load forecast accounts for possible weather extremes.

4.7 Please discuss FBC's process for weather normalizing a peak load forecast used for resource supply purposes.

4.8 Please explain why a weather normalized load forecast is not appropriate for use in this Application.

On page 16 of the Application, FBC provides the summer and winter peak actual loads from 2014 to 2019 in Table 3-4. Table 3-4 is reproduced below:

Table 3-4: FBC Kelowna Area Summer and Winter Peak Loads, 2014-2019

	2014	2015	2016	2017	2018	2019
Summer (MW)	276.4	283.7	281.4	288.1	301.0	300.5
Winter (MW)	277.0	268.3	306.9	283.6	298.6	324.9

4.9 Please update Table 3-4 to include the actual summer and winter peak load data at the FA Lee Terminal Station (LEE) and the DG Bell Terminal Station (DGB) for each year shown.

4.10 Please provide, in a fully functioning Excel spreadsheet, the historical load data for LEE Transformer 3 (T3), LEE Transformer 4 (T4) and DGB Transformer 2 (T2) for years 2015 to present (or as recent as possible). Please identify where the peak loads occurred.

4.11 Please discuss the performance of FBC's peak load forecasts as compared to actual peak loads experienced.

4.11.1 Please discuss how FBC evaluates its peak load forecasting performance.

4.11.2 Please provide any recent performance metrics related to FBC's peak load forecasting.

4.11.3 Please discuss if and how FBC utilizes past performance of peak load forecasts in the development of future peak load forecasts.

Further on page 16, FBC provides the summer and winter peak load forecast from 2020 to 2028 in Table 3-5. Table 3-5 is reproduced below:

Table 3-5: Kelowna Load Area Summer and Winter Peak Load Forecast, 2020-2028

	2020	2021	2022	2023	2024	2025	2026	2027	2028
Summer (MW)	309.5	314.6	319.8	325.5	331.5	336.5	343.3	349.4	355.5
Winter (MW)	340.4	343.9	348.3	352.9	357.0	361.3	365.8	370.3	374.5

4.12 Please describe in detail how FBC prepares the summer and winter peak load forecast as shown in Table 3-5. Please include all underlying assumptions and calculations.

4.13 Please provide substation level summer and winter peak load forecast, if possible, for LEE and DGB for each year shown.

On page 16, FBC states:

> After forecasting peak load from historical data, FBC includes the impact of known or highly probable load developments, such as community developments that have an expected connection date and defined loads. It is reasonable to expect that other incremental loads may materialize in the near to medium term. For example, FBC has received transmission service interconnection inquiries related to cannabis, cryptocurrency and data processing facilities. Additionally, electric vehicle (EV) adoption and electrification of transit fleets and new government policy all have the potential to result in further increases to the Kelowna area load forecast.

4.14 Please describe how FBC determines that a load development is sufficiently probable to include in its peak load forecast.

4.15 Please provide a breakdown of load (in MW) included in the peak load forecast that is not yet connected to FBC's system.

5.0 Reference: PROJECT NEED AND JUSTIFICATION
Exhibit B-1, Section 3.3.2.1, pp. 17-18
Impact of COVID-19 on Load Forecast

On page 17, FBC states:

> FBC's peak demand forecast was prepared in 2019, before the onset of the COVID-19 pandemic. FBC acknowledges that the immediate and near-term impacts of the pandemic may be significant for some rate classes and economic sectors. However, the Company is optimistic about the timeline for recovery from these impacts in its service territory and believes that the execution of this critical transmission project should not be deferred as a result of the COVID-19 situation, particularly as the Project is not expected to be in service until the end of 2022. As of the date of filing, there is insufficient data to quantify the COVID-19 impact during 2020, or to forecast future impacts on energy consumption or, more importantly for system planning, on peak loads.

5.1 Please provide any updates to the peak load forecast as a result of expected impacts due to the COVID-19 pandemic.

5.2 Please explain, with rationale, if FBC expects there to be differences in how the COVID-19 pandemic may impact FBC's energy consumption forecast versus how the COVID-19 pandemic may impact FBC's peak load forecast.

6.0 Reference: PROJECT NEED AND JUSTIFICATION

Exhibit B-1, Section 3.2, p. 13; Section 3.4, p. 18; FortisBC Energy Inc. and FortisBC Inc. (collectively FortisBC) Application for Approval of a Multi-Year Rate Plan for 2020 through 2024; Exhibit B-10, Attachment 60.3

FBC Planning Criteria

In FortisBC Energy Inc. and FortisBC Inc. Application for Approval of a Multi-Year Rate Plan for 2020 through 2024, FortisBC includes Attachment 60.3 in Exhibit B-10, which is FortisBC's responses to BCUC IR1.[1] Attachment 60.3 states the following regarding the Kelowna Bulk Transformer Addition:

> The project is also required to ensure continued compliance with BC Mandatory Reliability Standard TPL-001-4, which requires that applicable thermal ratings are not exceeded following the loss of a single element.

In footnote 14 on page 18 of the Application, FBC states:

> The Kelowna area 138 kV system is not subject to provincial Mandatory Reliability Standards (MRS). Although greater than 100 kV (the threshold definition for the Bulk Electric System (BES) to which MRS apply, subject to exclusions), this area is a Local Network and meets the BES definition of Exclusion E3 for Local Networks as described in BCUC letter L-56-14 dated October 29, 2014.

6.1 Please confirm if FBC's 138 kV Kelowna system is subject to Mandatory Reliability Standards (MRS).

6.2 Please confirm if FBC is required to submit any power flow models to the Western Electricity Coordinating Council (WECC) for the Kelowna 138 kV system.

6.2.1 If yes, please discuss the requirements for these submissions.

On Page 18 of the Application, FBC states:

> Typical industry transmission planning standards require the system to be planned such that all projected customer loads are served during both normal (N-0)[15] operation and single contingency (N-1)[16] operation.
>
> [15] Normal operation, also referred to as N-0 reliability, means that with all major elements of the power system in service, the network can be operated to meet projected customer demand in order to avoid a load loss (customer outage).
>
> [16] Single contingency, also referred to as N-1 reliability, means that an outage of a single element with all other elements of the power system in service (a single transmission line, transformer, generating unit, power conditioning unit like a shunt capacitor bank, a shunt reactor bank, a series capacitor, a series reactor, etc.) results in no load loss.

6.3 Please provide specific references for the typical industry standards FBC refers to in the above preamble.

6.4 Footnote 16 above provides a partial list of power system elements that N-1 planning criteria is applied to. Please provide a complete list of power system elements that FBC applies N-1 planning criteria to.

On Page 18 on the Application, FBC states:

> The normal operation (N-0) contingency planning criteria applies to all transmission facilities. The single contingency (N-1) planning criteria apply to all transmission facilities

[1] https://www.bcuc.com/Documents/Proceedings/2019/DOC_54278_B-10-FortisBC-Responses-to-BCUC-IR1.pdf

that are part of the FBC interconnected system, which excludes radial transmission lines. FBC plans and constructs its interconnected transmission system to meet and maintain its N-1 planning contingency criteria.

6.5 Please describe what FBC considers to be the defining characteristics of an interconnected system.

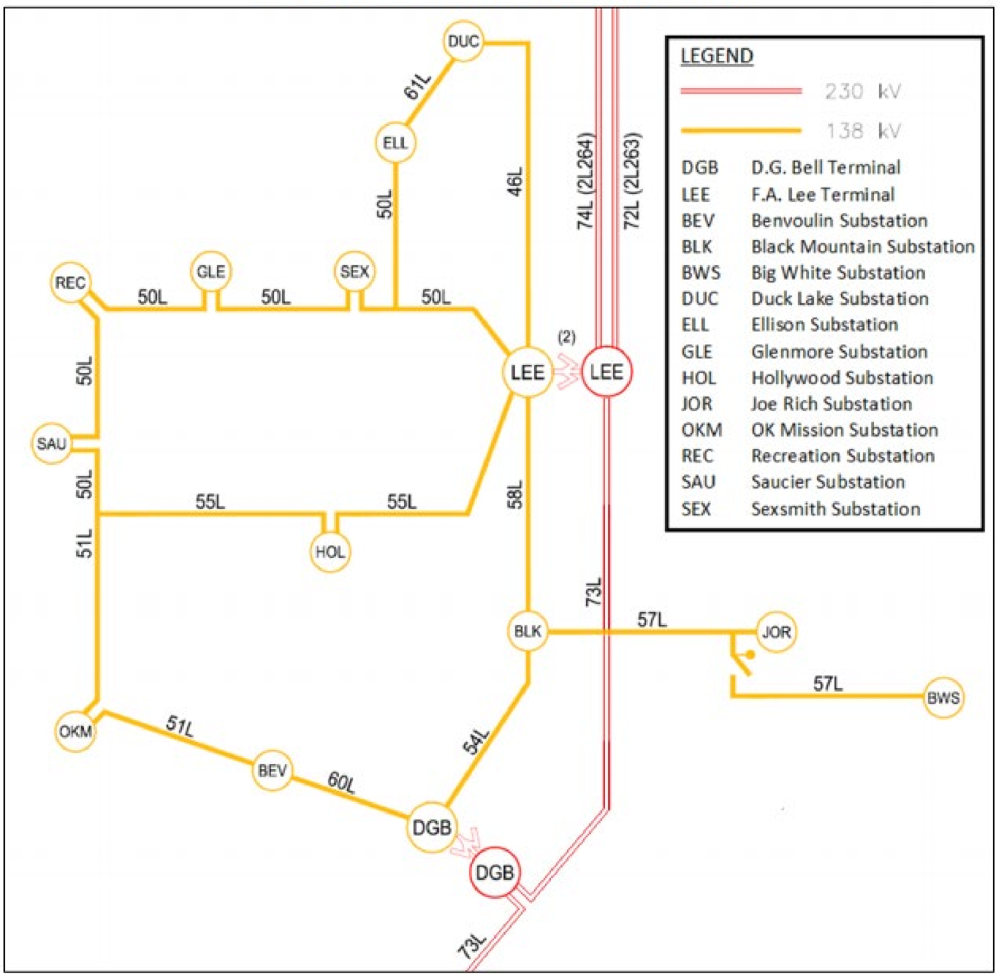
6.6 Please discuss whether all transmission facilities which FBC considers to be part of FBC's interconnected system achieve N-1 planning criteria.

6.6.1 For those facilities that do not, please discuss why not.

6.7 Please provide a map of FBC's Transmission System labelled to identify which parts of the system FBC's considers to be part of the interconnected system where N-1 planning criteria applies, and which parts of the system are not considered part of the interconnected system where N-1 planning criteria does not apply.

On page 13 of the Application, Figure 3-2 describes the Kelowna Area Transmission System. Figure 3-2 is reproduced below.

Figure 3-2: Kelowna Area Transmission System



On Page 18 on the Application, FBC states:

> The Kelowna load area is part of the interconnected system (that is, it is supplied from more than one 230 kV source, in this case 73 Line and 72/74 Lines as shown in Figure 3-2 above); therefore, the N-1 planning criteria applies.

6.8 Please discuss if FBC considers transmission line 57L, as shown in Figure 3-2, to be a radial transmission line.

6.8.1 Please confirm the 2019 summer and winter peak load data for all load connected to 57L.

6.9 Other than the transformer capacity being considered in this Application, please identify if there are any other power system elements in the Kelowna area (where FBC considers N-1 planning criteria to apply) that are at risk of not maintaining the N-1 planning criteria for the 2020-2030 time period. Please include in the response FBC's plans to address these items.

6.10 Please discuss the contingency scenarios for FBC's 230 kV system in Kelowna in the 2020-2028 time period. Specifically, please confirm that any one of transmission lines 74L, 72L or 73L can be taken out of service while still maintaining service to Kelowna area load.

7.0 Reference: PROJECT NEED AND JUSTIFICATION
Exhibit B-1, Section 3.3.2, pp. 16-17; Section 3.4.1, p. 19
Seasonal Peaks Forecast to Reach Emergency Limits in N-1 Conditions

On pages 16-17 of the Application, FBC states:

> The summer peak load is forecast to reach the transformer limit of 315 MW in 2021 and to exceed the limit in 2022 as set out in Table 3-5, and the forecast winter peak load will exceed the winter transformer limit of 370 MVA in 2027.

7.1 Please provide the summer transformer limit in MVA.

7.2 Please describe how FBC determined the existing N-1 Summer and Winter Transformer Limits for the Kelowna Area. Please include all underlying calculations and assumptions.

On page 19 of the Application, FBC states:

> For the 138 kV transmission system in the Kelowna area, seasonal peaks will reach system emergency limits during the summer season before the seasonal peaks will reach system emergency limits in the winter season. This is because higher ambient temperatures reduce the summer emergency limits below the winter emergency limits. For example, summer emergency limits for LEE T3 and T4 are both much lower in summer at 159 MW, as compared to their respective winter emergency limits of 189 MW and 195 MW.

7.3 Generally speaking, please describe the ratings and limits associated with FBC's transformers (i.e. normal ratings, emergency limits). Please also describe which ratings and limits are impacted by seasonal temperatures.

7.3.1 Please confirm all of the ratings and limits described above for LEE T3, LEE T4 and DGB T2.

7.3.2 Please explain how FBC determines each rating and limit described. Please include all underlying calculations and assumptions.

On page 19 of the Application, FBC states:

> Power flow simulation studies were used to analyse single contingency scenarios. When either of the two existing LEE terminal transformers[18] is out of service, the loading on the remaining transformer is 191 MVA (91 percent of its emergency limit) when the total Kelowna area load reaches 315 MW, which is just marginally higher than the forecast summer peak load forecast in 2021[19], as provided in Table 3-5. The loading on the remaining LEE transformer can be lowered by adjusting the load supply

configuration in the Kelowna 138 kV system to transfer additional load to DGB. After system reconfiguration, the flow on the remaining LEE transformer is 168 MVA, which is 80 percent of the emergency limit and 100 percent of normal rating.

[18] The loss of one of the two transformers at LEE is the critical outage for planning purposes. If DGB transformer were to fail, the system could continue to supply all load within normal limits from LEE transformers and 138 kV lines.

[19] It is industry convention to refer to system load in MW, while equipment ratings are expressed in MVA. They are related according to the following formula: Real Power (MW) = Power Factor x Apparent Power (MVA). For the Kelowna area, the average Power Factor = 0.98, which is close to unity. For accuracy, when modelling load flows, FBC applies substation-specific power factors.

7.4 Please provide the substation specific power factors for LEE and DGB.

7.5 Please describe the details of the system reconfiguration noted in the preamble.

7.5.1 Please provide an update to Figure 3-2 to show the 138 kV system before and after the noted system reconfiguration.

7.6 Please discuss the limiting factors of the noted system reconfiguration.

7.6.1 Please confirm whether more load could be transferred from LEE to DGB, and if not, why not.

7.7 Please provide additional power flow study data in the following 2 tables. Please use the same system reconfigurations as indicated in the above preamble.

Kelowna Summer Peak Load (MW) (Data from Table 3-4 & 3-5)	Year	Condition	Power Flow Analysis (Before System Reconfiguration)					
			LEE T3		LEE T4		DGB T2	
			MVA	% of normal rating	MVA	% of normal rating	MVA	% of normal rating
300.5	2019	All elements in service						
		LEE T3 out						
		LEE T4 out						
		DGB T2 out						
309.5	2020	All elements in service						
		LEE T3 out						
		LEE T4 out						
		DGB T2 out						
314.6	2021	All elements in service						
		LEE T3 out						
		LEE T4 out						
		DGB T2 out						
319.8	2022	All elements in service						
		LEE T3 out						
		LEE T4 out						
		DGB T2 out						

Kelowna Summer Peak Load (MW) (Data from Table 3-4 & 3-5)	Year	Condition	Power Flow Analysis (After System Reconfiguration)					
			LEE T3		LEE T4		DGB T2	
			MVA	% of normal rating	MVA	% of normal rating	MVA	% of normal rating
300.5	2019	All elements in service						
		LEE T3 out						
		LEE T4 out						
		DGB T2 out						
309.5	2020	All elements in service						
		LEE T3 out						
		LEE T4 out						
		DGB T2 out						
314.6	2021	All elements in service						
		LEE T3 out						
		LEE T4 out						
		DGB T2 out						
319.8	2022	All elements in service						
		LEE T3 out						
		LEE T4 out						
		DGB T2 out						

On page 19 of the Application, FBC states:

> As Kelowna area load increases, an N-1 event in 2022 and beyond would result in loading above 168 MVA on the remaining LEE transformer, even after the reconfiguration described above. FBC's operating procedures allow operation above the normal rating for only six hours[20], and plans to reduce the loading must be implemented within this time frame. If loading above the normal rating of 168 MVA is expected to persist for longer than six hours, the facility loading must be reduced below 168 MVA as soon as practicable by shedding customer load during peak load periods. Initially, the requirement for such load shedding would be confined to only part of the peak load period on summer peak days. However, as Kelowna area load increases, the duration and frequency of required load shedding events would increase.
>
> [20] The six hour requirement has been verified by FBC operational performance history, engineering analysis, and is based on the recommendations of many IEEE standards.

7.8 Please describe in detail how FBC has verified the six-hour requirement by FBC operational history.

7.9 Please describe in detail how FBC has verified the six-hour requirement by engineering analysis.

7.10 Please identify which Institute of Electrical and Electronics Engineers (IEEE) standards recommend the six-hour requirement.

7.11 Please describe how FBC defines the transformer "normal rating", as referred to in the above preamble. Please reconcile this with the ratings and limits FBC describes in response to IR 7.3.

7.12 Please identify whether LEE T3, LEE T4 or DGB T2 have ever been operated above their respective normal rating.

7.12.1 If yes, please identify the size, timing and duration.

On page 19 of the Application, FBC states:

> …in the event of a LEE terminal transformer failure, it would likely take more than a year to procure and install a replacement transformer. Since FBC does not own a mobile transformer of suitable size and voltage, such a failure would require customer outages for the Kelowna area under peak load conditions to prevent excessive operation of the transformers within emergency limits.

7.13 Please discuss why FBC does not own a mobile transformer of suitable size and voltage.

8.0 Reference: PROJECT NEED AND JUSTIFICATION
Exhibit B-1, Section 1.1, p. 1; Section 3.6, p. 21
Additional 138 kV Capacity is Needed

On page 21 of the Application, FBC states:

> Beginning in summer 2022, the outage of a LEE transformer under peak load conditions would result in overloading of the remaining LEE transformer even after Kelowna network reconfiguration. Where overloading is projected to persist for more than six hours over the peak period, it would violate FBC's planning criteria requiring customer load shedding, creating considerable impacts.

On page 1 of the Application, FBC states:

> The new transformer is scheduled to be in service by the end of 2022, with Project completion and close-out during the second quarter of 2023.

8.1 Please discuss the risks to Kelowna area customers during summer 2022 when FBC's planning criteria may be violated.

8.1.1 Please discuss why FBC considers these risks acceptable for the summer 2022 time period.

8.1.2 Please discuss how FBC is planning for and mitigating these risks.

9.0 Reference: PROJECT NEED AND JUSTIFICATION
Exhibit B-1, Section 3.2, p. 13; Section 3.5, p. 20
Kelowna Area Planning

On page 13 of the Application, FBC states:

> The transformers were manufactured in 1978 (LEE T4), 1985 (LEE T3), and 2004 (DGB T2).

On page 20 on the Application, FBC states:

> While transformers have an average life of 40 years, if a transformer is lightly loaded throughout its in-service life, the winding insulation can be expected to last longer; conversely, insulation life would be expected to be less than a year if the transformer is overloaded on a consistent basis.

9.1 Please discuss when FBC anticipates a need to replace LEE T3 and LEE T4.

BC Hydro's West Kelowna Transmission Project Website[2] indicates BC Hydro is considering an alternative (alternative 3d) where BC Hydro would connect to FBC's system in Kelowna.

9.2 In FBC's view, please discuss at a high level how BC Hydro's West Kelowna Transmission Project may impact FBC's 138kV system. Please describe any and all potential interdependencies with the work planned for the KBTA Project.

C. DESCRIPTION AND EVALUATION OF ALTERNATIVES

10.0 Reference: OVERVIEW
Exhibit B-1, Section 3.2, pp. 13-14; Section 4.1 p. 22; Section 3.5, p. 20
Other possible alternatives

On page 22 of the Application, FBC states:

> FBC considered a number of alternatives to increase the 138kV capacity in the Kelowna load area to continue meeting the transmission planning criteria and to maintain reliable service to Kelowna's growing customer base. Among the alternatives considered were demand reduction measures, local generation, and adding 230 kV to 138 kV transformation capacity. Ultimately FBC determined that the only feasible means of adding the necessary capacity is the addition of an additional transformer at one of the two terminal stations in Kelowna.

10.1 Please discuss all other alternatives considered in addition to those noted in the preamble above and explain why these alternatives were determined not to be feasible.

10.2 Please explain whether FBC considered the use of a 230/138 kV portable spare to mitigate for N–1 contingency in the event of a loss of a transformer.

10.2.1 If FBC did consider a portable spare, please discuss the reasons why a portable spare is not a feasible alternative.

10.2.2 If FBC did not consider a portable spare, please explain why not.

On page 13 of the Application, FBC provides the age of the existing transformers at LEE and DGB substations: "The transformers were manufactured in 1978 (LEE T4), 1985 (LEE T3), and 2004 (DGB T2). While there are no significant condition issues known for these transformers at present, FBC discusses the impact of operating the transformers above the normal operating limits in Section 3.5."

On page 20 on the Application, FBC states:

> While transformers have an average life of 40 years, if a transformer is lightly loaded throughout its in-service life, the winding insulation can be expected to last longer; conversely, insulation life would be expected to be less than a year if the transformer is overloaded on a consistent basis.

10.3 Please discuss what FBC considers to be the likelihood of failure of LEE T3, LEE T4, or DGB T2, and when failure is anticipated to occur. Please include in the discussion how the age of each transformer impacts their likelihood of failure.

10.3.1 Please explain how this variance in likelihood affected the project alternatives analysis.

10.3.2 Considering the age of the 230/138 kV transformers at LEE, please explain whether FBC

[2] https://www.bchydro.com/energy-in-bc/projects/wktp.html

considered a project alternative consisting of replacing the two existing transformers with larger transformers.

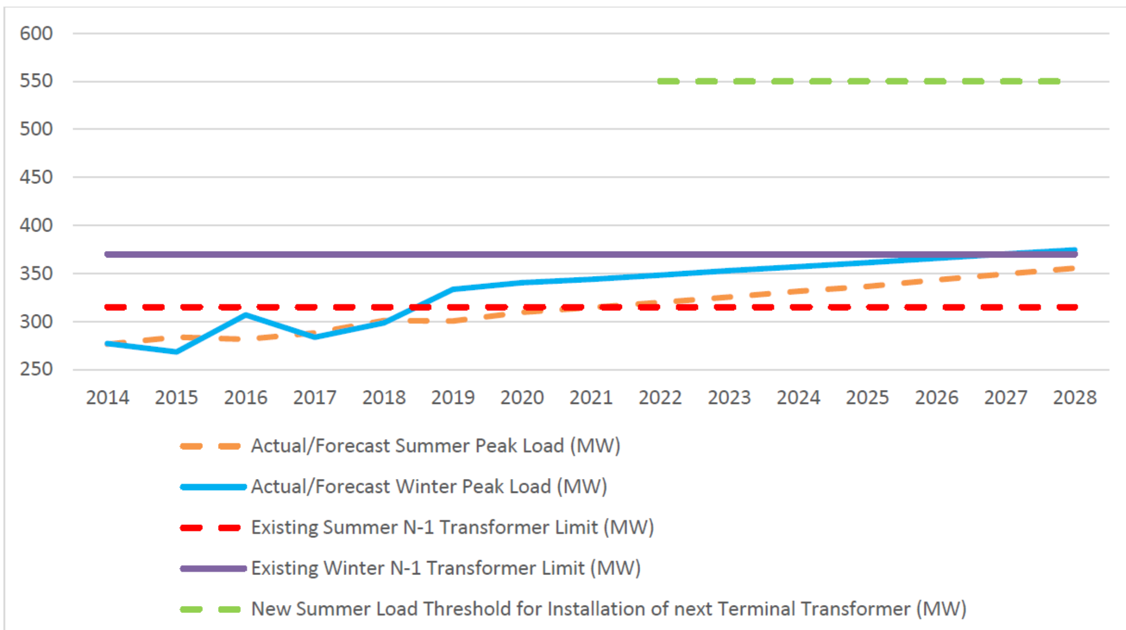
10.3.2.1 If not, please explain why.

10.3.2.2 If FBC did consider this option, please explain why it was not considered a feasible alternative

11.0 Reference: ALTERNATIVES FOR FURTHER REVIEW
Exhibit B-1, Section 4.3, pp. 24, 25
Alternatives for further review

On page 24 of the Application, FBC provides Figure 4-1, showing the Kelowna Area peak load and N-1 transformer limits under the LEE substation Alternatives. FBC states, "After installation of an additional transformer at LEE, the next terminal transformer addition would not be required for the Kelowna area until the summer peak load reaches 550 MW, which provides for an incremental emergency capacity of 235 MW."

Figure 4-1: Kelowna Area Peak Loads and N-1 Transformer Limits (LEE Alternatives)



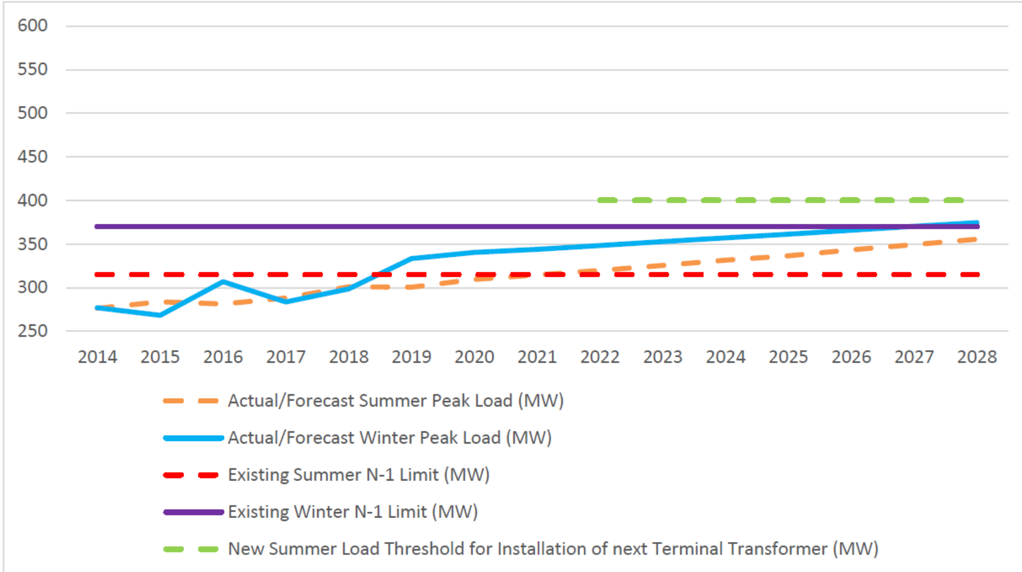
11.1 Please update Figure 4-1, with the time axis extending to 2042, 20 years beyond the in-service date of the project.

11.2 Please confirm when (i.e. what year) FBC expects Kelowna area peak summer load to reach 550MW.

11.3 Please provide the data set for Figure 4-1 in a fully functioning Excel spreadsheet.

On page 25 of the Application, FBC provides Figure 4-2, showing the Kelowna area peak load and N-1 transformer limits for Alternative C. FBC states, "[t]he capacity gain from the DGB alternative would be lower than the LEE alternative, and a second terminal transformer addition would be required for the Kelowna area when summer peak load reaches 400MW, which provides for incremental emergency capacity of 85 MW."

Figure 4-2: Kelowna Area Peak Loads and N-1 Transformer Limits (DGB Alternative with 60L and 51L Reconductoring)



11.4 Please update Figure 4-2, with the time axis extending to 2042, 20 years beyond the in-service date of the project.

On page 25 of the Application, FBC further describes Alternative C:

> As a result of the load distribution and Kelowna network configuration, undertaking the capacity addition at DGB would also require increasing the capacity of certain 138 kV transmission lines in the Kelowna area. Referring to Figure 3-2, the Sexsmith (SEX), Glenmore (GLE), Duck Lake (DUC), Hollywood (HOL) and Recreation (REC) distribution stations are the more heavily loaded stations in the Kelowna area. DGB has two 138 kV transmission lines compared to four at LEE, and is more distant from the high-load area. Consequently, 60 Line and 51 Line would require reconductoring in order to transmit the incremental capacity installed at DGB.

11.5 Please explain whether there are any advantages or benefits to FBC, its customers and/or potential customers from reconductoring the required 138 kV lines under Alternative C.

12.0 Reference: ALTERNATIVES FOR FURTHER REVIEW
Exhibit B-1, Section 4.3.1, p. 26
Ring Bus vs. Split Bus Configuration

On page 26 of the Application, FBC lists several advantages of the ring bus configuration over the split bus configuration:

> Research on substation reliability shows that a ring bus configuration results in a more than 50 percent reduction in outage minutes per year as compared to a split bus configuration.
>
> Further, a breaker failure on a split bus causes a larger outage than on a ring bus. This is due to the redundant path for power to flow created by the ring configuration.
>
> The ring bus configuration is easier to maintain and operate than split bus because any single breaker can be taken out of service without the need for bus reconfiguration.
>
> The ring bus configuration reduces safety risk as compared to split bus because it

provides a clear zone of isolation when working on equipment that is free from complex transfer buses and switches.

The ring bus configuration has less complicated protection and switching schemes than split bus because each transformer and transmission line has its own discrete node in the bus between two breakers.

The ring bus configuration is less prone to human error when operating, resulting in fewer instances of mis-operation than a split bus.

12.1 Please discuss if and when a failure of LEE T3, LEE T4, and DGB T2 has occurred in their respective lifespans.

12.2 Please provide the annual outage minutes for the LEE substation for the past 5 years.

12.3 Please explain how frequently, on an annual basis, any single breaker must be taken out of service at LEE, for maintenance or other reasons.

12.4 Please explain the safety risk reduction characterized in the preamble.

12.4.1 Please explain how frequently crews working within the LEE substation would be exposed to the hazards from a split bus isolation zone.

12.4.2 Please explain how exposure to the hazards from a split bus isolation zone impacts day to day operations at LEE or impacts the project costs.

12.5 Please explain what benefits to outage statistics FBC expects as a result of a ring bus configuration versus the current split-bus configuration.

13.0 Reference: ALTERNATIVES FOR FURTHER REVIEW
Exhibit B-1, Section 4.3.2, p. 27
Current Bus Configuration

On page 27 of the Application, FBC discusses its standard substation bus configuration for high voltage switching substations:

LEE was constructed prior to FBC's adoption of ring bus as a standard configuration, meaning that it differs from the ring configurations in service at DGB, Vaseux Lake Terminal, Bentley Terminal, Warfield Terminal, Black Mountain and Duck Lake. Ring bus configurations are also in service at Brilliant Terminal Station and Brilliant Switching Station, which are operated by FBC.

13.1 Please list how many 230 kV/138 kV switching stations owned by FBC have a ring bus or a split-bus configuration.

14.0 Reference: DISCUSSION OF ALTERNATIVES
Exhibit B-1, Section 4.4.1.1, p. 28
Alternative A – Description and Scope

On page 28 of the Application, FBC discusses the future potential for expansion of Alternative A, "[t]hough not part of this Project, the seven breaker ring bus could be converted in future to a nine breaker ring without expanding the bus, creating two additional nodes for connection of new transmission line(s) and/or a 138 kV/13 kV distribution transformer."

14.1 Please explain when FBC expects to require another node, either for connection of a new transmission line, a 230/138 kV transformer, or a 138/13 kV transformer.

15.0 Reference: DISCUSSION OF ALTERNATIVES
Exhibit B-1, Section 4.3, p. 23; Section 4.4.3, pp. 28- 31;
Alternative C – Description and Scope

On page 24, FBC briefly describes Alternative C: "**Alternative C:** Purchase and install a second terminal transformer at DGB and extend the existing 138 kV industry standard ring bus configuration."

15.1 Please explain the risks to having a single 230/138 kV transformer at DGB substation, including the consequences of a long-term transformer outage in the event of a failure.

On page 31 of the Application, FBC explains the future needs of the Kelowna area due to future load growth over the 40-year evaluation period:

> Even after the addition of a second transformer at DGB and the reconductoring of 51L and 60L, Kelowna area load is forecast to exceed the 138kV capacity no later than 2036. The addition of a fifth terminal transformer in the Kelowna area would be required at that time. Since this additional transformer falls within the 40-year period of financial analysis, FBC included the additional transformer cost in its evaluation of this alternative. The capital cost of the new transformer at DGB and the transmission line reconductoring in this alternative is $33.332 million including removal costs and AFUDC. Excluded from the $33.332 million is the capital cost of the next capacity addition in 2036. FBC assumes the cost of that addition to be the same as Alternative A, subject to inflation. These 2036 costs have been included in the 40-year financial analysis of this project for comparability to Alternatives A and B.

15.2 Please explain how FBC compares the long-term performance of the alternatives against each other.

15.3 Please explain, under a long-term analysis, how Alternative C compares to the other alternatives, in terms of reliability, number of outages, load management within Kelowna, or other applicable criteria.

16.0 Reference: EVALUATION OF ALTERNATIVES
Exhibit B-1, Section 4.5.1, p.33
Evaluation Criteria

On page 33 of the Application, FBC provides Table 4-1:

Table 4-1: KBTA Project Alternatives Comparison

Evaluation Criteria (Section 4.5.1)	PARAMETERS FOR RATING	WEIGHT	OPTION A RATING	OPTION B RATING	OPTION C RATING	GENERAL COMMENTS / RATIONALE FOR RATING
	Technical Criteria					
1	N-1 Criteria Considerations	10%	3	3	1	All alternatives allow FBC to serve load growth in the Kelowna area while continuing to meet N-1 planning criteria. Alternatives A & B provide 235 MW of incremental capacity in the event of a LEE transformer failure, while Alternative C provides only 85 MW of incremental capacity.
2.1	Safety	10%	3	1	3	As described in Section 4.3.1, the ring bus configuration in Alternatives A and C reduces safety risk as compared to split bus.
2.2	Operability	20%	3	2	3	As described in Section 4.3.1, the ring bus configuration in Alternatives A and C is easier to operate and maintain than split bus.
2.3	Complexity of protection and switching schemes	5%	3	1	3	As described in Section 4.3.1, the ring bus configuration in Alternatives A and C reduces the risk of misoperation incidents due to simpler protection and switching schemes.
2.4	Removal of legacy infrastructure	5%	3	2	1	Alternatives A & B address end-of-life 13 kV distribution equipment at LEE. Alternative A also addresses obsolete 138 kV breakers at LEE, as four end-of-life breakers are salvaged.
3	Potential for future expansion	20%	3	1	2	**Alternative A:** The seven breaker 138 kV ring bus could be converted in future to a nine breaker ring without expanding the bus. A nine breaker ring bus would create two additional nodes for connection of new transmission line(s) and/or a 138 kV/13 kV distribution transformer. **Alternative B**: 138 kV split bus would not provide the ability to add future nodes for the installation of a distribution transformer and/or transmission line(s). **Alternative C:** The construction of the new 230 kV yard leaves ample space for future equipment installation. The removal of 230 kV equipment from the existing station creates space for the installation of future 138 kV equipment.
4	Reliability	20%	3	2	3	As described in Section 4.3.1, the ring bus configuration in Alternatives A and C is more reliable than split bus.
	Subtotal Technical Criteria Score	**90%**	**2.70**	**1.55**	**2.2**	
	Project Risks					
5.1	Schedule Risk	2.5%	2	3	2	Transformer for all alternatives has a lead-time in excess of a year and will need to be ordered in early design stage. Construction activities for Alternative B are the less complex than Alternatives A and C, so schedule risk is lowest.
5.2	Lands Risk	2.5%	3	3	3	Agricultural Land Commission approval is required for station expansion in all alternatives.
5.3	Environmental Risk	2.5%	3	3	3	None of the alternatives require environmental permitting.
5.4	Archaeological Risk	2.5%	3	3	3	There are no known archaeological sites near LEE or DGB.
	Subtotal Risk Criteria	10.0%	0.275	0.3	0.275	
	Total Technical and Risk Criteria Score (Max 3.0)	**100%**	**2.98**	**1.85**	**2.48**	

16.1 Please explain how the weight given to each criterion was determined.

16.2 Please explain why the weighting for "Potential for future expansion" is 20 percent, whereas "N-1 Criteria Considerations" is 10 percent.

16.3 Please explain how the attribution of ratings 1, 2 and 3 are determined.

16.4 Please explain why under "N-1 Criteria Consideration", Option C is given a score of "1", given that it also meets N-1 criteria.

16.5 Please explain why under "Safety", Option B was provided a score a "1", given that the substation can be operated safely, similar to today.

16.6 Please explain the scoring of Option B as a "1" under "Complexity of protection and switching schemes."

16.7 For "Potential for future expansion," please explain the difference between Option C and Option A.

17.0 Reference: PREFERRED ALTERNATIVE AND JUSTIFICATION
Exhibit B-1, Section 1.1.1, pp. 1, 3, 34
Technical Evaluation

On page 1 of the Application, FBC summarizes the need for the project in the Executive Summary:

> FBC has experienced high levels of customer load growth in the Kelowna area and it expects that electricity demand will exceed system planning reliability criteria by the summer of 2022. Specifically, FBC will not be able to meet the N-1 system reliability planning criteria in order to reliably maintain service to the area load during peak periods in the event of an outage or failure of one of the two existing 230/138 kV transformers at LEE. Therefore, without expanding FBC's current capacity resources,

> load will need to be shed in 2022 in the event of an outage or failure of one of the two existing transformers at LEE, as explained in Section 3.4 below. The likelihood and duration of the required load shedding under these contingency conditions will increase as load grows in the Kelowna area.

On page 3 of the Application, FBC states it has selected Alternative A as the preferred Alternative because "[a]lternative A best addresses the reliability concerns and growth opportunities for the Kelowna load area."

17.1 Please confirm, or explain otherwise, that each of the three project Alternatives meets the N-1 reliability criteria mentioned in the preamble.

17.2 Please confirm, or explain otherwise, that the lowest cost alternative, Alternative B, meets the growth opportunities for the Kelowna area load.

On page 34 of the Application, FBC provides justification of the technical superiority of Alternative A. FBC states:

> Although the reliability associated with Alternative C is expected to exceed that of Alternative B, and would simplify outage planning and facilitate network reconfiguration due to the ring bus configuration, Alternatives A and B both have significant advantages over Alternative C as they do not require any associated transmission line reconductoring.

17.3 With reference to Table 4-1: KBTA Project Alternatives Comparison, please discuss whether assessing Alternatives A, B, and C over a 20-year and a 40-year lifespan would impact the results of the comparison.

17.3.1 If so, please provide details.

17.3.2 If not, please explain why not.

Further on page 34, in support of Alternative A, FBC states: "a breaker failure on a split bus causes a larger outage than on a ring bus; substation reliability research shows that a ring bus configuration provides 50 percent fewer outage minutes per year than a split bus configuration."

17.4 Please provide the source of the substation reliability research quoted in the preamble.

Further on page 34, FBC states:

> …the ring bus configuration simplifies outage planning and maintenance activities, and reduces time required for network reconfiguration, also because of the redundant path. The ring bus reduces safety risks because it provides clear zones of isolation to work on station equipment. The risk of instances of mis-operation is also lower with a ring bus since it does not require complex transfers, and new employees will more quickly become familiar with this simple and standardized bus configuration.

17.5 Please explain how FBC currently manages outage planning and maintenance activities at LEE substation, with the current split bus configuration.

17.6 Please explain how FBC employees and contractors can safely work at LEE substation today, with the current split bus configuration. Please elaborate on any special safety measures taken to mitigate the safety risks associated with working on or near a split bus configuration.

17.7 Please confirm how many mis-operations FBC has experienced at LEE substation annually, over the past five years, that can be attributed to the split bus configuration.

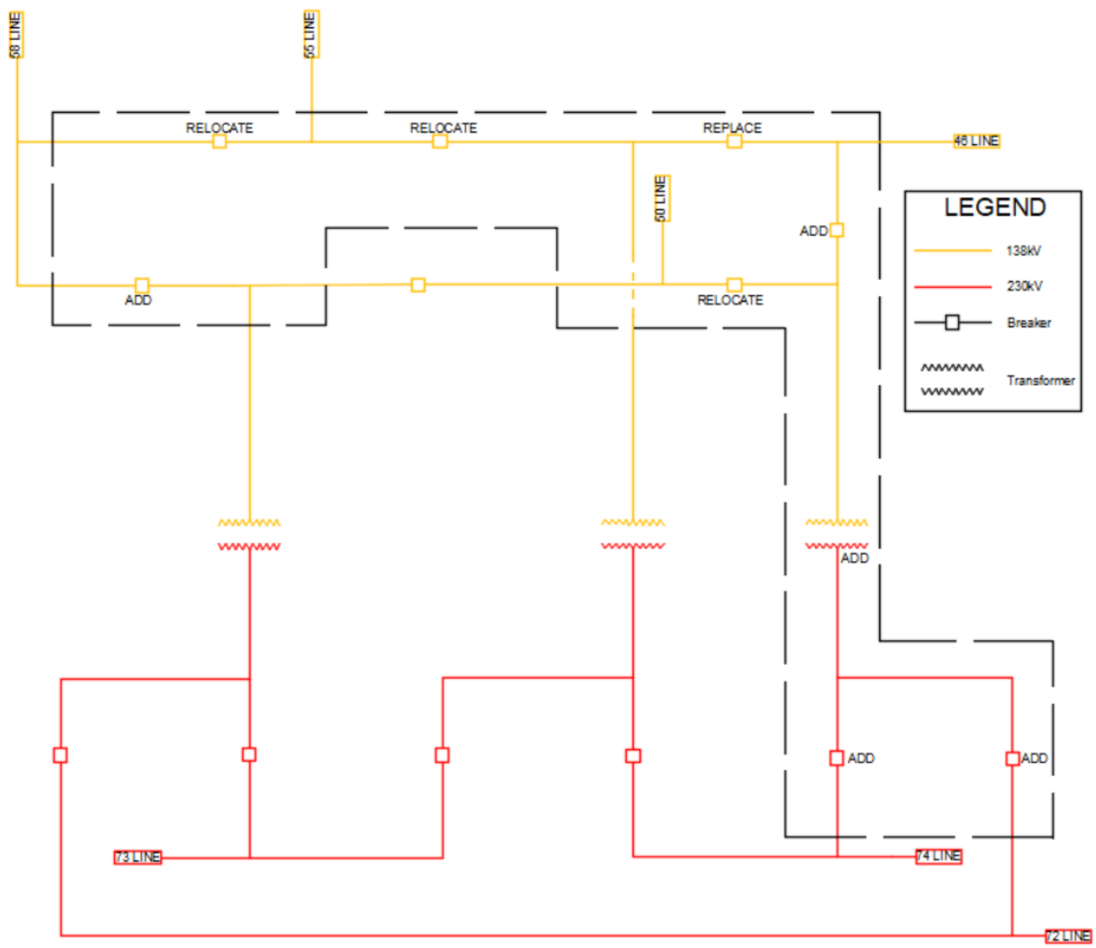
17.7.1 Please state how many customers were negatively affected by these mis-operations.

D. PROJECT DESCRIPTION

18.0 Reference: OVERVIEW
Exhibit B-1, Section 5.1, p. 38
Substation one-line diagram

On page 38 of the Application, FBC provides Figure 5-1, "LEE Terminal Ring Bus Simplified Single Line Drawing" under Alternative A.

Figure 5-1: LEE Terminal Ring Bus Simplified Single Line Drawing



18.1 Please provide an updated Figure 5-1, with the transformers and circuit breakers labelled.

18.2 Please provide a similar Simplified Single Line Drawing for LEE substation today.

18.3 Please provide a similar Simplified Single Line Drawing for DGB substation today.

18.4 Please provide a similar Simplified Single Line Drawing for LEE substation under Alternative B.

18.5 Please provide a similar Simplified Single Line Drawing for DGB substation under Alternative C.

19.0 Reference: OVERVIEW
Exhibit B-1, Section 5.1.2, p. 39
Distribution Line Modifications

On page 39 of the Application, FBC discusses the distribution line modifications portion of the project:

> With the transfer of distribution load from LEE to Sexsmith Feeder 6 in 2020, the 13 kV feeders LEE 1 and 2 will no longer be utilized. Distribution lines will be re-aligned as they will be underbuilt on 55L and 50L just inside the station's south and west property lines. The distribution lines will bypass LEE and will run between Sexsmith substation and Black Mountain with a normal open point just west of LEE.

19.1 Please explain the benefits of re-aligning the distribution lines to be underbuilt on 55L and 50L.

20.0 Reference: OVERVIEW
Exhibit B-1, Section 5.1.3, p. 39; Section 5.4, p. 44
Equipment demolished and salvaged

On page 39 of the Application, FBC discusses the demolition of distribution equipment as part of the project: "[e]xisting 13 kV equipment in the station will be demolished since this distribution load will be supplied from Sexsmith station upon completion of the Sexsmith Second Distribution Transformer project in 2020."

On page 44 of the Application, FBC provides the following components of the project schedule:

> Salvage existing 13 kV distribution structures and equipment;
> - Salvage existing T3 and T4 tertiary equipment, except station service transformers;
> - Salvage existing T3 and T4 grounding transformers;
> - Salvage existing Feeder (FDR)1 and FDR2 egress structures and lines

20.1 Please discuss what FBC intends to do with the salvaged or demolished equipment. For example, will the equipment be repurposed for use in other projects, used as spares or scrapped? Please include a discussion on the 13 kV equipment removed from LEE during this project.

On page 28 of the Application, FBC states:

> Though not part of this Project, the seven breaker ring bus could be converted in future to a nine breaker ring without expanding the bus, creating two additional nodes for connection of new transmission line(s) and/or a 138 kV/13 kV distribution transformer.

20.2 Please discuss what impact, if any, removal of the 13 kV equipment from LEE would have on FBC's future plans to add a 138 kV /13 kV distribution transformer.

21.0 Reference: PROJECT ENGINEERING AND DESIGN
Exhibit B-1, Section 5.2, p. 40; Section 5.3.3, p. 41
Project Engineering and Construction

On page 40 of the Application, FBC states: "[e]ngineering will be completed either by FBC or by an FBC pre-qualified external engineering firm."

On page 41 of the Application, FBC describes construction services for the project:

> All Project activities will be managed directly on site by FBC. Construction work will be tendered and contracted to pre-qualified vendors, with the exception of technical support, outage coordination, and security-sensitive work such as communications,

protection, and controls, which will be performed by internal FBC resources. All laydown/storage will be at site and use FBC's standard project security measures such as locked storage containers and security guard patrol.

21.1 Please explain the rationale for the use of vendors or FBC resources for the engineering and construction work. Please discuss the advantages and disadvantages for each.

21.1.1 When selecting between vendors, please explain how FBC selects the successful vendors, detailing any criteria applied.

21.1.2 When using vendors, please discuss how FBC ensures it retains control over project costs and design.

22.0 Reference: PROJECT ENGINEERING AND DESIGN
Exhibit B-1, Section 5.2, p. 41; Appendix E, pp. 1, 14; Appendix G to Appendix E, p. 5
Noise mitigation

On page 41 of the Application, FBC writes of its Noise Impact Assessment:

> When the transformer specification is issued to potential vendors during procurement, it will include proactive noise mitigation measures based on the recommendations of the Noise Impact Assessment that is further described in Section 5.5. In order to minimize noise impact for nearby customers, it will include a requirement for the transformer cooling fans to meet an acoustic specification of a maximum of 82 decibels (dBA) at a distance of one meter. Installation of a variable frequency drive (VFD) system on the fans will also be considered in order to reduce overall acoustic impact.

In Appendix E, FBC submits its Noise Impact Assessment, prepared by Patching Associates Acoustical Engineering Ltd. (Patching Associates) dated April 3, 2020.

In the Executive Summary of Appendix E, Patching Associates states: "the requirements of the Alberta Utilities Commission (AUC) Rule 012: Noise Control (the Rule) were used as a guideline for this analysis and to establish a target sound level for the Lee Substation facility design."

On page 14 of Appendix E, in its section titled Noise Control Recommendations, Patching Associates states its recommendations as: "[i]nstall 6m high barrier walls around the proposed T2 and the existing T3 and T4 Transformers. The suggested layout is depicted below in figure 6."

22.1 Please explain whether the AUC Noise Control rule is an industry-accepted guideline for establishing a target sound level for substation design in BC.

22.2 Please confirm that the proactive noise mitigation measures FBC intends to implement are "install 6m high barrier walls around the proposed T2 and the existing T3 and T4 transformers," as recommended by Patching Associates.

22.3 Please explain whether FBC has received any customer complaints or questions regarding noise levels with respect to either the existing LEE substation and/or the proposed KBTA Project.

Appendix G of the Patching Associates Noise Impact Assessment is titled, "Technical Details and Best Practices Approach." Page 5 details several best practices to minimize impacts of construction noise.

22.4 Please confirm, or explain otherwise, that FBC intends to follow these best practices to minimize construction noise during the project.

23.0 Reference: PROJECT SCHEDULE
Exhibit B-1, Section 5.4, pp.43,. 45

COVID-19 impacts to project schedule and construction costs

On page 43 of the Application, FBC provides the proposed project schedule as Figure 5-3.

On page 45 of the Application, FBC discusses the impacts of COVID-19 on its project schedule:

> The construction schedule in Figure 5-3 assumes no critical path delays, including those as a result of pandemic-related impacts on supply chain or resources. However, there are risk mitigations available should delays materialize. Mitigations include scheduling float for major equipment supply, construction methodology resequencing, resource levelling and blitzing, overtime and shift rotations, and activity stacking.
>
> During the 2020 COVID-19 pandemic, FBC initiated measures to combat the spread of the virus and ensure health and safety of our workers and contractors. The Company's work is deemed essential, which includes the KBTA Project. Should the COVID-19 pandemic remain a concern during the construction phase, at minimum the approach would be to continue with the measures adopted in 2020, evaluate the risks in accordance with standard health and safety practices, and institute mitigation measures as required.

23.1 Please confirm that any measures FBC is taking to mitigate COVID-19 risks for workers and contractors on its project construction sites and in its offices are in alignment with Work Safe BC requirements.

23.2 Since the Application was filed on April 24, 2020, the COVID-19 pandemic in B.C. has progressed. Please discuss whether any measures implemented in B.C. to control the COVID-19 pandemic will impact the proposed project schedule.

23.2.1 If applicable, please provide update the project schedule provided in Figure 5-3.

23.3 Please explain whether any additional allowances directly related to the COVID-19 pandemic, including but not limited to material cost increases and labour shortages, have been included in the project cost estimates.

23.4 If delays mentioned in the preamble above do materialize, please discuss the affect they may have on the project cost. Please also discuss FBC's cost risk mitigation measures for potential delays.

24.0 Reference: PROJECT SCHEDULE
Exhibit B-1, Section 5.4, p.43; Section 7.4.3, p. 60; Appendix D-4, p. 11
Work scheduling

On page 43 of the Application, FBC states: "[d]uring times when outages have constraints such as loading or other conflicting outage plans, FBC will plan work to occur during low load periods such as nights and weekends."

On page 60 of the Application, FBC states as part of their community consultation: "[l]ighting: will be improved for safety purposes and will only be in use when night work is required in the station. FBC confirmed that lighting will not be on 24 hours per day;"

Appendix D-4 of the Application contains FBC's Virtual Town Hall Presentation. Page 11 of the presentation is reproduced below:

> **Project Impacts**
>
> Construction
>
> - Normal work hours
>
> Environmental
>
> Visual
>
> - Addition of solid fence
> - Removal of white storage tent and adjacent buildings
>
> No expected outages or interruptions

24.1 Please clarify and explain during what hours of the day construction will take place. In your response please identify what portions of the project are anticipated to include night and/or weekend work.

24.2 IF FBC expects to undertake work during nights and weekend, please confirm if construction working hours will be included in the construction notification letters, as discussed in Section 7.6 of the Application.

E. PROJECT COST AND FINANCIAL EVALUATION

25.0 Reference: PROJECT COST AND FINANCIAL EVALUATION
Exhibit B-1, Section 5.7, p. 48; Section 6.2, p. 52
Project Capital Cost Estimate

Page 52 of the Application states, "[t]he expected accuracy of the cost estimate is, as defined in AACE: Low: -10 percent to -20 percent and High: +10 percent to +30 percent." [*Emphasis added*]

On page 48 of the Application, FBC states that "[d]etailed class three estimate [have been] completed for construction."

25.1 Please discuss the level of project definition for each alternative with reference to the AACE classes of estimates.

25.2 Please confirm, or otherwise explain, whether the accuracy of the cost estimate for each alternative is within the expected accuracy range for a Class 3 estimate.

25.2.1 Please provide the accuracy range for each cost estimate.

25.3 Please complete the table below to illustrate the range of the Project Costs for Alternatives A, B and C.

Alternative	Project Cost	Low Estimate		High Estimate		
		Cost Decline 20%	Cost Decline 10%	Cost Increase 10%	Cost Increase 20%	Cost Increase 30%
A	$23.288M					
B	$17.008M					
C	$32.332M					

25.4 Please discuss the probabilities of these alternatives being at either the low or high end of their estimates.

26.0 Reference: PROJECT COST AND FINANCIAL EVALUATION
Exhibit B-1, Section 6.4.1, p. 54; Appendix B-3, p. 1
Construction Costs

Page 54 of the Applications states, "construction of the Project is scheduled to be completed in multiple phases."

Page 1 of Appendix B-3 reflects the costs of the line work by phase.

26.1 Please provide the costs of the station work by phase, on a confidential basis if required.

26.2 Please confirm, or explain otherwise, whether incurring estimated station costs by their phase of construction affects the indicative rates displayed in Schedule 9 in Appendix C.

26.2.1 If not confirmed, please provide updated Schedule 9 for Alternatives A, B and C, on a confidential basis if required, highlighting any changes.

27.0 Reference: PROJECT COST AND FINANCIAL EVALUATION
Exhibit B-1, Section 5.7, pp. 48, 51; Section 6.2.4, p. 53; FBC Certificate of Public Convenience and Necessity (CPCN) Application for the Grand Forks Terminal Station Reliability Project (Grand Forks CPCN Application) Decision and Order C-2-19 dated July 25, 2019, Section 6.1.3, p. 42
Project Contingency

Page 53 of the Application states, "FBC has applied a contingency amount to the estimates (before materials handling and provincial sales tax) of 15 percent for all construction and removal, other than for transmission and distribution line construction at 20 percent, and line removal costs at 7 percent. Contingency amounts that have been applied are based on FBC experience."

27.1 Please explain which past construction projects and experience were used to determine the contingency amounts for this Application. Please also explain why this past experience is relevant for the KBTA Project.

27.2 Please explain why line removal requires half the contingency compared to the other construction removals.

Page 42 of Exhibit B-1 of FBC's Grand Forks CPCN Application states, "[a] contingency of 17.7 percent (including Project loadings) was used for the stations component and a contingency of 20 percent was used for the transmission and distribution component."

27.3 Please provide the reasoning for the construction and removal contingencies being set at 15 percent in this Application compared to the contingency for the station component of the Grand Forks CPCN Application.

Table 5-1, Risk Register, on page 48 of the Application shows:

Cost	Raw materials cost increase due to inflation/market value	Purchase all equipment from established suppliers and, where possible, with agreed purchase prices. Competitive tendering will be used to ensure lowest cost at best value products. Contingency may be used in the case of higher than anticipated foreign exchange or raw material escalation	Low
	Actual costs of construction higher than estimated	Detailed class three estimate completed for construction	Low

Page 51 of the Application states, "[a]ny cost impacts that may arise from these risk factors are expected to be manageable within the Project contingency."

27.4 Please confirm, or explain otherwise, that anticipated foreign exchange and raw material escalation are included in the 15 percent and 20 percent contingencies mentioned above.

27.5 Please confirm, or explain otherwise, whether the 15 percent and 20 percent contingencies mentioned above include any allowances for increased labour costs.

28.0 Reference: PROJECT COST AND FINANCIAL EVALUATION
Exhibit B-1, Section 3.3.2.1, pp. 17-18; Section 4.5.1, p. 33; Section 6.2, p. 52; Section 6.4.2, p. 55
Incremental Revenue Requirements and Rate Impact

Table 4-2 on page 33 of the Application states the PV of 40 years of Incremental Revenue Requirement for each of Alternative A, B and C is equal to $23.0M, $17.1M and $44.0M, respectively.

Page 52 of the Application states, "[t]he expected accuracy of the cost estimate is, as defined in AACE: Low: -10 percent to -20 percent and High: +10 percent to +30 percent."

Page 55 of the Application states:

> The Project construction period is between 2021 and 2022 with the majority of assets entering rate base in 2023. A 40-year cost of service model, equivalent to the life of the assets, was used to evaluate the rate impact. The rate impact in 2024, the year when all assets have been transferred into plant asset accounts is estimated at 0.54 percent. This equates to an annual bill increase of $6.87 for an average residential customer using 11,000 kWh. The levelized 40-year rate impact is 0.39 percent or approximately $0.45 per MWh. The annual bill impact for an average residential customer using 11,000 kWh at the 40 year levelized rate would be approximately $4.96.

28.1 For Alternatives B and C, please provide the annual bill increase for an average residential customer using 11,000 kWh at: (i) the Cost of Service; and (ii) 40 year levelized rate.

28.2 Please complete the table below to illustrate the variability in the PV of the 40-year Incremental Revenue Requirement for Alternatives A, B and C.

Alternative	Base NPV	NPV Value If:		Difference to Base NPV if:	
		Cost Decline 20%	Cost Increase 30%	Cost Decline 20%	Cost Increase 30%
A	$23.0M				
B	$17.1M				
C	$44.0M				

28.3 Please complete the table below to illustrate the percentage rate impact and change in annual bill based on the calculations applied in IR 28.2.

Alternative	Base NPV	% Rate Impact if:		Change in Annual Bill if:	
		Project Cost Decline 20%	Project Cost Increase 30%	Project Cost Decline 20%	Project Cost Increase 30%
A	$23.0M				
B	$17.1M				
C	$44.0M				

F. CONSULTATION

29.0 Reference: CONSULTATION
Exhibit B-1, Section 7.1, p. 57
General

The BCUC's CPCN Guidelines[3] (CPCN Guidelines) outline the minimum requirement for an application submitted under sections 45 and 46 of the *Utilities Commission Act* (UCA). Page 6 of the CPCN Guidelines incudes items specific to Public Consultation. Item (i) of that section is as follows:

> (i) Overview of the community, social and environmental setting in which the project and its feasible alternatives will be constructed and operated, and of the public who may be directly impacted by the project and its feasible alternatives.

29.1 Please provide an overview of the community, social and environmental setting in which the KBTA Project will be constructed and operated.

29.2 Please provide an overview of the community, social and environmental setting in which Alternative C would be constructed and operated, and of the public who would be directly impacted.

30.0 Reference: CONSULTATION
Exhibit B-1, Section 7.2, p. 57
Key Stakeholders

On page 57 of the Application, FBC states:

> The Key Stakeholders for the KBTA Project have been identified as:
>
> - City of Kelowna elected officials and staff;
> - Residents and businesses at the Tower Ranch subdivision and Tower Ranch Golf & Country Club, and other residents adjacent to or in close proximity to LEE; and
> - Indigenous Communities as identified through the Provincial Consultative Areas Database.

30.1 Please identify how many other residents are adjacent to or in close proximity to LEE that are not part of the Tower Ranch subdivision that FBC identifies as key stakeholders to the KBTA Project.

30.1.1 Please confirm, or otherwise explain, that notification letters were sent to these residents who do not live within the Tower Ranch subdivision.

31.0 Reference: CONSULTATION
Exhibit B-1, Section 7.3, p. 57
Consultation with Local Government

Page 57 of the Application states:

> FBC contacted City of Kelowna staff and, at their request, provided a brief overview of the Project by email on March 16, 2020. The overview included information about the Project, the purpose for the upgrade, application timelines and how FBC is consulting

[3] Order G-20-15, dated February 12, 2015, https://www.bcuc.com/Documents/Guidelines/2015/DOC_25326_G-20-15_BCUC-2015-CPCN-Guidelines.pdf

with local community members and area residents. FBC sent a follow-up letter on March 31, 2020 that included the visual renderings and noise study summary, and offered to provide additional information if needed, or to set up a meeting or Council presentation if required. A response received on March 31, 2020 29 advised that the City Manager had briefed Council and would be in contact if further information was requested. As of the date of filing, no further information has been requested.

31.1 Please discuss if there has been any further communication with the City of Kelowna staff regarding the KBTA Project since the date of filing of the Application. If so, please provide details of any communications.

32.0 Reference: CONSULTATION
Exhibit B-1, Section 7.3, p. 58-61; Appendix D-2, Appendix D-4, p. 11
Consultation with Local Residents

On page 58 of the Application, FBC states:

> The Project has a dedicated webpage containing information on the Project and includes an opportunity to provide feedback via an online survey.

Appendix D-2 of the Application provides KBTA Survey Results as of April 22, 2020.

32.1 Please provide a summary of any additional surveys or any additional feedback received from local residents since the date of filing of the Application.

On page 59 of the Application, FBC states:

> On April 22, 2020 from 5:00 p.m. to 7:30 p.m., FBC hosted a virtual Town Hall/Information Session with the TRCA President and area residents to provide an additional opportunity for stakeholders to engage directly with Project technical staff, Communications and Regulatory Affairs representatives of FBC. This session was hosted virtually, as a opposed to being an in-person public open house, due to the recent COVID-19 events and the related limitations on public meetings and requirements for social distancing.

Further on page 59 of the Application, FBC states:

> Approximately 12 residents called into the virtual Town Hall event…

32.2 Please confirm approximately how many residents and other key stakeholders were invited to the April 22, 2020 virtual town hall.

32.3 Please discuss, based on FBC's experience hosting town hall meetings for other projects, whether FBC considers the attendance at the April 22, 2020 virtual town hall to be average, above average, or below average.

On pages 60-61 of the Application, FBC states:

> The primary topics of discussion focused on:
>
> - Aesthetic improvement options FBC is considering including concrete wall height and colour, as well as vegetative screening;
> - Clarification on results of noise study summary and whether noise levels will increase substantially;
> - Lighting concerns about the number of lights and times of use;
> - The extent to which work would be done within current station footprint or

beyond;
- Impacts during construction such as road closures and/or planned outages; and
- Levels of electromagnetic fields post construction.

FBC provided the following information to address each concern raised:

- Aesthetic improvement: FBC is open to feedback on options for concrete wall height and colour that would be acceptable to area residents and complimentary to them neighbourhood aesthetics, as well as consideration of input on vegetative screening;
- Noise: not expected to substantially increase given the change in operation of the station with the load spread across a higher number of transformers;
- Lighting: will be improved for safety purposes and will only be in use when night work is required in the station. FBC confirmed that lighting will not be on 24 hours per day;
- Station work will not require any expansion outside of existing station property. Confirmed a small fence modification will be required on the southwest corner, away from the residential area;
- Construction impacts are expected to be minimal and will be communicated to the residents as outlined in section 7.6; and
- FBC has committed to assess any change in EMF levels that may result from the Project.

The information provided was well received by participants, with FBC either sufficiently addressing the concerns raised and answered questions asked, or agreeing to work collaboratively with the TRCA Board of Directors by creating a focus group to continue discussions as the Project progresses. Not all decisions related to station aesthetics need to be finalized prior to commencing station planning and construction, and FBC will work in partnership with the TRCA Board to incorporate customer input into design plans for appropriate aesthetic improvements to the extent possible.

32.4 For each concern listed in the above preamble, please identify which concerns FBC considers to be sufficiently addressed and resolved, and which concerns FBC will be continuing to address through the noted focus group.

32.4.1 For those items to be continued to be addressed, please discuss how FBC may consider resolving issues where consensus can not be achieved.

33.0 Reference: CONSULTATION
Exhibit B-1, Section 1.1.5, p. 4; Section 7.5, pp. 61-62
Engagement with Indigenous Communities

On pages 61-62 of the Application, FBC states the following in regard to notification of Indigenous communities:

> The Project notification letter was emailed on December 19, 2019. A sample letter can be found at Appendix D-5. FBC did not receive any requests for meetings as a result of the notification letter and received only one response deferring further engagement to Okanagan Indian Band and Westbank First Nation as these communities are in closer proximity to the station site.
>
> FBC followed up on April 2, 2020 by sending an update email with a link to the Project webpage, summary of the noise study and visual renderings of the Project. FBC offered to host a virtual Town Hall with the Indigenous communities. Two responses were

> received, one deferring further engagement to Westbank First Nation; and one requesting additional information on the Project location, which was provided.
>
> Following the filing of this Application, FBC will send a follow up letter to the Indigenous communities advising of the filing and extending another offer to discuss the Project, if requested. FBC will continue to update and engage with Indigenous communities as the Project progresses.

33.1 Please discuss if FBC has considered any means of communication other then letter and email to notify Indigenous communities of the KBTA Project.

33.1.1 If not, please discuss why not.

33.2 Please provide a copy of the follow up letter, as noted above, which FBC indicates would be sent to Indigenous communities following the filing of the Application.

33.3 Please discuss if there has been any additional communication with Indigenous communities regarding the KBTA Project since the date of filing of the Application.

On page 61 of the Application, FBC states:

> A list of potentially affected Indigenous communities was developed using the Province of British Columbia's Consultative Areas Database (CAD) to create a comprehensive list of those Indigenous communities whose area of interest is located in the area of the F.A. Lee Terminal Station. The list includes:
>
> - Okanagan Indian Band;
> - Penticton Indian Band;
> - Okanagan Nation Alliance;
> - Lower Similkameen Indian Band;
> - Westbank First Nation; and
> - Upper Nicola Indian Band

Page 4 of the CPCN Guidelines incudes items specific to First Nations Consultation. Items (i), (ix), and (x) of that section are as follows:

> (i) Identification of the First Nations potentially affected by the application or filing, <u>including the feasible project alternatives</u>; and the information considered to identify these First Nations. [*Emphasis added*]
>
> (ix) The applicant's overall view as to the sufficiency of the consultation process with the First Nation to date, in the context of the decision which is being sought from the Commission.
>
> (x) A statement of what future consultation with First Nations is contemplated subsequent to the preparation of the CPCN application.

33.4 Please provided a list of potentially affected First Nations for Alternative C.

33.5 Please provide a statement as to FBC's overall view as to the sufficiency of the consultation process with Indigenous communities to date, in the context of the decision that is being sought from the BCUC.

33.6 Please provide a statement of what future consultation is contemplated.

On Page 4 of the Application, FBC states:

FBC will continue to engage with Indigenous communities throughout the Project, including with respect to potential jobs, training and supply chain opportunities as well as any opportunities for cultural preservation.

33.7 Please discuss how FBC will engage with Indigenous communities with respect to potential jobs, training and supply chain opportunities as well as any opportunities for cultural preservation.