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

February 24, 2023

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC
V6Z 2N3

Attention: Sara Hardgrave, Acting Commission Secretary

Dear Sara Hardgrave:

Re: FortisBC Inc. (FBC)

Application for a Certificate of Public Convenience and Necessity (CPCN) for Approval of the A.S. Mawdsley Terminal Station Project (ASM Terminal Station Project or the Project) (Application)

Pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA), FBC applies to the British Columbia Utilities Commission (BCUC) for a CPCN for the ASM Terminal Station Project as described in the attached Application.

Request for Confidential Treatment of Certain Appendices

To support the Application, FBC has filed several appendices, with the following ones being filed confidentially pursuant to Section 19 of the BCUC's Rules of Practice and Procedure regarding confidential documents, as set out in Order G-178-22.

- Appendix A – ASM Line Diagrams – Current Configuration
- Appendix F – Line Diagrams – Proposed Configuration
- Appendix G-1 and G-2 – Station Cost Estimate Class 3
- Appendix H – Financial Schedules

FBC respectfully requests that the BCUC hold the above listed documents confidential, and that such information should remain confidential after the regulatory process for this Application is completed. Below FBC outlines the reasons for keeping the information confidential.

Appendices A and F

Appendices A and F are engineering documents and should be kept confidential on the basis that they contain operationally sensitive information pertaining to the Company's assets, which if disclosed, could impede FBC's ability to work safely and reliably operate its electricity system assets and could risk the safety of both its workers and the public.

Appendices G-1, G-2, and H

Appendices G-1, G-2, and H include cost estimates for the Project. They should be kept confidential on the basis that FBC may be going to the market to seek competitive bids for the materials and construction work for the Project. If the estimated costs for the material and construction work are disclosed, FBC reasonably expects that its negotiating position may be prejudiced. For instance, the bidding parties with knowledge about the estimated costs may use these estimates as a reference for their bidding.

Access to Confidential Information for Interveners

Should parties that choose to register in the review of this Application require access to some or all of the information filed confidentially, FBC has provided a proposed Undertaking of Confidentiality in Appendix J-3, to be executed before confidential information may be released to registered parties under the terms of the undertaking. FBC has no objection to providing confidential information to its customary and routine intervener groups representing customer interests. FBC requests that the BCUC provide it with the opportunity to file comments on any objections or concerns that it may have, should any other registered parties seek access to confidential information.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC INC.

Original signed:

Sarah Walsh

Attachments

cc (email only): Registered Interveners in the FBC Annual Review for 2023 Rates proceeding

FORTIS BC™

FORTISBC INC.

Application for Approval of a Certificate of Public Convenience and Necessity for the A.S. Mawdsley Terminal Station Project

February 24, 2023

Table of Contents

1. APPROVALS SOUGHT AND EXECUTIVE SUMMARY 1

1.1.1 System Overview and Description 1
1.1.2 Load Growth 2
1.1.3 Aging Infrastructure and Equipment Condition Issues 3
1.1.4 Two Feasible Alternatives Identified and Evaluated 3
1.1.5 Project Description 3
1.1.6 Project Costs and Rate Impact 4
1.1.7 Stakeholder Consultation and Indigenous Engagement 4
1.2 Approvals Sought 5
1.2.1 Confidential Filings Request 5
1.3 Proposed Regulatory Process 6
1.4 Organization of the application 6

2. APPLICANT 8

2.1 Name, Address, and Nature of Business 8
2.2 Financial and Technical Capacity 8
2.3 Company Contact 8
2.4 Legal Counsel 9

3. PROJECT NEED AND JUSTIFICATION 10

3.1 Introduction 10
3.2 System Overview and Description 10
3.3 Drivers of the Project Need 16
3.3.1 Inability to Maintain Reliability and Meet Load Growth 17
3.3.2 High Risk of Failure due to Condition of Transformers 21
3.4 Conclusion 22

4. DESCRIPTION AND EVALUATION OF ALTERNATIVES 23

4.1 Introduction 23
4.2 Alternatives Description 23
4.2.1 Alternative 1: Status Quo 24
4.2.2 Alternative 2: Like-for-Like Replacement of the ASM Transformers 24
4.2.3 Alternative 3: Rebuild the ASM Terminal Station and Expand the Existing Site Footprint 24

4.2.4 Alternative 4: Build a New Terminal Station at a Greenfield Location and Demolish the ASM Terminal Station 26
4.2.5 Alternative 5: Expand the WTS Site and Demolish the ASM Terminal Station 27
4.2.6 Alternative 6: Retain the Existing ASM Terminal Station and Add a New Transformer at WTS 29
4.3 Alternatives Evaluation 30
4.3.1 Introduction and Overview of Feasible Alternatives 30
4.3.2 Description of Evaluation Criteria 30
4.3.3 Assessment of Alternatives 3 and 5 based on Non-Financial Evaluation Criteria 32
4.3.4 Assessment of Alternatives 3 and 5 based on Financial Criterion 39
4.4 Alternative 5 is the Preferred Project Alternative 40
4.5 Conclusion 41

5. PROJECT DESCRIPTION 42
5.1 Project Overview 42
5.1.1 Land Modifications 42
5.1.2 Station Modifications 43
5.1.3 Transmission Modifications 45
5.1.4 Distribution (Underbuild) Modifications 46
5.1.5 Fibre Modifications 46
5.2 Project Engineering And Design 46
5.3 Project Management and Resources 47
5.3.1 Project Management Office 47
5.3.2 Engineering 47
5.3.3 Construction Services 48
5.4 Project Access and Staging Area 49
5.5 Project Schedule 50
5.5.1 Impact of Supply Chain Issues on Project Schedule 52
5.6 Risk Assessment 52
5.7 Conclusion 54

6. PROJECT COSTS, FINANCIAL ANALYSIS, ACCOUNTING TREATMENT AND RATE IMPACT 55
6.1 Introduction 55
6.2 Summary of Project Costs 55
6.3 Financial Evaluation 56

6.4 Accounting Treatment 58
6.4.1 CPCN Project Preliminary Engineering Costs 58
6.4.2 Treatment of Capital Costs 59
6.4.3 Retirement of Existing Assets 59
6.4.4 Cost of Removal 59
6.5 Rate Impact 59
6.6 Conclusion 60

7. ENVIRONMENTAL AND ARCHAEOLOGY 61
7.1 Environmental Impacts 61
7.2 Archaeological Impacts 62
7.2.1 Indigenous Community Participation 63
7.2.2 Further Plans 63

8. CONSULTATION AND ENGAGEMENT 65
8.1 Introduction 65
8.2 Consultation with the Local Community 65
8.2.1 FBC has Identified Stakeholders Potentially Affected 65
8.2.2 FBC's Approach to Community Engagement 66
8.2.3 Community and Municipality Feedback Received 66
8.3 Engagement with Indigenous Communities 67
8.3.1 FBC has Identified Indigenous Groups Potentially Affected 67
8.3.2 FBC's Approach to Indigenous Engagement 68
8.3.3 Indigenous Feedback Received 68
8.4 Conclusion 69

9. PROVINCIAL GOVERNMENT ENERGY OBJECTIVES 70
9.1 Introduction 70
9.2 British Columbia's Energy Objectives 70
9.3 Long Term Electric Resource Plan 72
9.4 Sections 6 and 19 of the Clean Energy Act 73

10. CONCLUSION 74

List of Appendices

Appendix A ASM Line Diagrams – Current Configuration – **CONFIDENTIAL**

A-1 ASM Operational Single Line Diagram – Current Configuration – **CONFIDENTIAL**

A-2 ASM General Arrangement – Current Configuration – **CONFIDENTIAL**

Appendix B ASM Transformers Condition Assessment Report

Appendix C Summary of Capital Costs

Appendix D Archaeological Overview Assessment Report

Appendix E Environmental Management Plans

E-1 WTS Environmental Management Plan

E-2 ASM Environmental Management Plan

Appendix F Line Diagrams – Proposed Configuration – **CONFIDENTIAL**

F-1 WTS General Arrangement – Current Configuration with Demolition Scope – **CONFIDENTIAL**

F-2 WTS General Arrangement – Proposed Configuration – **CONFIDENTIAL**

F-3 Operational Single Line Diagram – Proposed Configuration – **CONFIDENTIAL**

Appendix G Station Cost Estimate Class 3 – **CONFIDENTIAL**

G-1 Station Cost Estimate Class 3 – Preferred Alternative – **CONFIDENTIAL**

G-2 Lines Cost Estimate Class 3 – Preferred Alternative – **CONFIDENTIAL**

G-3 Wood Mackenzie Market Report

Appendix H Financial Schedules for Preferred Alternative – **CONFIDENTIAL**

Appendix I Consultation and Engagement

I-1 Stakeholder Consultation and Indigenous Engagement Logs

I-2 Project Notification Letter to Residents

I-3 FBC Statement of Indigenous Principles

I-4 WTS SOE Report

I-5 Project Notification Letter to Indigenous Groups

Appendix J Draft Orders and Undertaking of Confidentiality

J-1 Draft Procedural Order

J-2 Draft Final Order

J-3 Confidentiality Declaration and Undertaking Form

Appendix K List of Acronyms

Index of Tables and Figures

Table 1-1: Proposed Regulatory Timetable 6
Table 3-1: FBC Similkameen and Boundary Area Customers by Rate Class 13
Table 3-2: Boundary and Similkameen Areas' Historical Actual Peak Loads, 2017-2022 18
Table 3-3: Boundary and Similkameen Areas' Peak Load Forecast, 2023-2027 18
Table 4-1: Project Alternatives Evaluation Criteria (Non-Financial) 33
Table 4-2: Non-Financial Evaluation Scoring Definitions 33
Table 4-3: Scoring of Non-Financial Criteria between Alternatives 3 and 5 34
Table 4-4: Financial Evaluation Summary of Alternatives 3 and 5 40
Table 5-1: Risk Register 52
Table 6-1: Breakdown of the Project Cost Estimate ($ millions) 55
Table 6-2: Financial Analysis of the Project 57
Table 6-3: Summary of Project Annual Rate Impact 60
Table 8-1: Indigenous Communities Identified in CAD 68
Table 9-1: British Columbia's Energy Objectives 71

Figure 1-1: Aerial View of the ASM Terminal Station in Proximity to WTS 2
Figure 3-1: FBC Service Territory in the Boundary and Similkameen Areas of BC's Southern Interior 11
Figure 3-2: Boundary and Similkameen Power Supply Single Line Diagram 12
Figure 3-3: Map of the Boundary and Similkameen Power Supply Path from the Kootenay Region 13
Figure 3-4: Aerial View of the ASM Terminal Station in Relation to the Boundary and Similkameen Areas 14
Figure 3-5: Simplified Single Line Diagram of ASM Terminal Station Configuration 15
Figure 3-6: Aerial View of the ASM Terminal Station in Proximity to WTS 16
Figure 3-7: ASM Terminal Station's Contribution to the Boundary and Similkameen Areas' Total Load Compared to the N-1 Transformer Limits 19
Figure 3-8: Expected Life for Solid Insulation and its Dependence on Moisture and Temperature 20
Figure 4-1: Comparison of Current and Future Proposed Configuration of the ASM Terminal Station under Alternative 3 25
Figure 4-2: ASM Terminal Station Fence Line Changes under Alternative 3 26
Figure 4-3: Aerial Map of the ASM Terminal Station in Proximity to WTS 27
Figure 4-4: Single Line Diagram of the Proposed Reconfiguration of WTS under Alternative 5 28
Figure 4-5: Comparison of the Approximate Existing and Future WTS Boundaries to the Statutory Right-of-Way Boundary under Alternative 5 29
Figure 5-1: Proposed WTS Simplified Single Line Diagram 42
Figure 5-2: Aerial Image of Additional SRWs and their Associated Owners for the 34 Line and 11E Line Transmission Corridors 43
Figure 5-3: Organizational Chart 48
Figure 5-4: Existing Station Access 49
Figure 5-5: Project Schedule 51

1. APPROVALS SOUGHT AND EXECUTIVE SUMMARY

In this application (the Application) FortisBC Inc. (FBC or the Company) is seeking approval of the British Columbia Utilities Commission (BCUC) for a Certificate of Public Convenience and Necessity (CPCN) for the A.S. Mawdsley (ASM) Terminal Station project (the Project).

For the Project, FBC seeks approval from the BCUC to replace the ASM Terminal Station by expanding the Warfield Terminal Station (WTS). FBC's recommended alternative requires the installation of two new 150 MVA 63/161 kV transformers at WTS and the subsequent decommissioning of the existing ASM Terminal Station. Both the ASM Terminal Station and the WTS are located in Trail, BC.

The need for the Project is driven by:

- Load growth in the Boundary and Similkameen areas which has resulted in an inability to meet FBC's Transmission System Planning Criteria, triggering potential reliability issues; and
- Deteriorating condition of the ASM Terminal Station power transformers.

The estimated total cost of the Project in as-spent dollars is $35.179 million (AACE Class 3 Estimate), which includes Allowance for Funds Used During Construction (AFUDC) and the cost of equipment removal.

FBC plans to initiate the detailed design, procurement, and construction for the Project upon Application approval. The Project is expected to be complete by the end of 2026.

1.1.1 System Overview and Description

The Boundary and Similkameen areas are located within the Southern Interior of British Columbia. Customers in the Boundary and Similkameen areas are supplied with power generated in the Kootenay Region and with power from a transmission interconnection to BC Hydro at Vaseux Lake Terminal Station in the north.

Power generated in the Kootenay region flows into WTS at 230 kV and 63 kV. The WTS power transformers (WTS T1 and WTS T2) transform from 230 kV to 63 kV. At 63 kV, power travels from WTS to the ASM Terminal Station, which is 1 kilometre (km) away, as shown in Figure 1-1, where it is transformed from 63 kV to 161 kV by the ASM Terminal Station power transformers (ASM T1 and ASM T2).

The Similkameen and Boundary area customers and communities rely on the connection between WTS and the ASM Terminal Station via 34 Line and the 63 kV to 161 kV conversion that is performed by ASM T1 and ASM T2 at the ASM Terminal Station for safe and reliable power.

Figure 1-1: Aerial View of the ASM Terminal Station in Proximity to WTS

1.1.2 Load Growth

ASM T1 and ASM T2 currently have a combined capacity of 160 MVA (80 MVA per transformer). 11E Line supply (i.e., the ASM Terminal Station) is subject to meeting both normal operation (N-0) and single contingency (N-1) transmission planning criteria.

FBC has experienced (and anticipates future) high levels of customer load growth in the Boundary and Similkameen areas (which are served by the ASM Terminal Station). On average, the Boundary and Similkameen areas are supplied 67 percent of their load in the winter and 75 percent of their load in the summer by the ASM Terminal Station. With the current ASM Terminal Station power transformers, FBC has experienced consistent summer peak loads that exceed both normal and emergency ratings of an N-1 contingency event. FBC also experienced winter peaks which have exceeded both normal and emergency ratings of an N-1 contingency event. FBC has been able to manage this load through operational changes; however, these changes to system operation are not sustainable in the long-term.

FBC expects electricity demand will continue to exceed system planning reliability criteria; specifically, that FBC will not be able to meet the N-1 system reliability planning criterion to reliably maintain service.

1.1.3 Aging Infrastructure and Equipment Condition Issues

ASM T1 and ASM T2 are 57 and 51 years old, respectively. The risk of failure is increasing with each passing year. FBC contracted a qualified third-party consultant to assess the health of ASM T1 and ASM T2. The consultant's findings, provided in Appendix B, confirmed FBC's assessment of the units and categorized ASM T1 and ASM T2 as having an "Urgent" Total Risk of Failure, meaning that immediate attention is required. This is further discussed in Section 3.

1.1.4 Two Feasible Alternatives Identified and Evaluated

Based on FBC's early screening (described in Section 4.2), two alternatives were identified as feasible and meeting the Project objectives:

- Alternative 3: Rebuild the ASM Terminal Station and Expand the Existing Site Footprint; and
- Alternative 5: Expand the WTS Site and Demolish the ASM Terminal Station.

FBC considered both financial (levelized rate impact) and non-financial considerations, which include technical attributes. The non-financial evaluation criteria that were used to evaluate each alternative are as follows:

- Infrastructure;
- Safety;
- Environmental and archaeological;
- Community and stakeholder relations;
- Indigenous impact; and
- Technical.

Alternative 5 was identified as the preferred solution. Alternative 5 satisfies the need for the Project and provides several non-financial benefits. It meets FBC's transmission planning criteria, improves system reliability, has the potential for future expansion, and delivers the necessary safety performance. It also has limited environmental, archaeological, and community impact. Alternative 5 also carries less risk associated with construction and system operation during the construction and has less long-term maintenance requirements.

These evaluation criteria are discussed in more detail in Section 4.

1.1.5 Project Description

Under Alternative 5, FBC would expand WTS to incorporate a 63/161 kV conversion and convert 34 Line to 161 kV and interconnect it with 11E Line to extend 11E Line back to WTS, then decommission the ASM Terminal Station. Alternative 5 involves the following key components:

- Reconfiguring the 63 kV egress at WTS for 34 Line, 9 Line, and 10 Line;
- Expanding the WTS footprint;
- Installing two additional 63/161 kV transformers, reconfiguring the 63 kV ring bus, and adding a 161 kV radial bus;
- Converting 34 Line to 161 kV rating then connecting 11E Line from the ASM Terminal Station to WTS by repurposing 34 Line as an extension to 11E Line; and
- Demolishing the ASM Terminal Station above grade.

A detailed discussion of the Project is included in Section 5.

1.1.6 Project Costs and Rate Impact

The total Project cost estimate is $35.179 million (AACE Class 3 Estimate) in as-spent dollars, including AFUDC and removal costs. As described in Section 6, the Project will result in a levelized delivery rate impact of 0.63 percent over the 53-year analysis period. For an average FBC residential customer consuming 11,000 kWh per year, this is equivalent to an average bill impact of $7.80 in 2027.

1.1.7 Stakeholder Consultation and Indigenous Engagement

Consultation, engagement, and communication with the public, local government, Indigenous groups, and other stakeholders is an important component in FBC's development of the Project.

Prior to filing the Application, FBC sent Project notification letters to area residents and stakeholders who have the potential to be affected by the Project. As the Project is confined to existing industrialized land, FBC felt this approach was reasonable.

FBC considers that the public consultation activities to the time of filing the Application have been sufficient, appropriate, and reasonable to meet the requirements of the CPCN Guidelines. FBC will continue to consult with stakeholders regarding construction timelines, mitigation of traffic disruptions (where applicable) and public safety. Further consultation will continue prior to and throughout construction to help inform local government and residents about construction activities in their area in an effort to minimize impacts.

FBC has also engaged Indigenous communities with interests in the area of the Project site, to provide information, describe any potential impacts, understand their interests in the area, and to provide an opportunity for Indigenous communities to identify additional impacts and to provide input on the Project. Engagement was initiated by uploading Project information to the affected communities using the established engagement method between the community and FBC. The responses back requesting more time to review, more detailed Project information, or ongoing Project updates and engagement will be completed. At the time of filing, FBC has not received any concerns from Indigenous communities. FBC will continue to engage with Indigenous communities throughout the Project, including Project updates, potential job

opportunities and training, supply chain opportunities as well as any opportunities for cultural preservation and cultural training for the Project workforce.

1.2 *APPROVALS SOUGHT*

FBC hereby applies to the BCUC pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA), for a CPCN for the ASM Terminal Station Project.

A CPCN is required for this Project because it is a system extension that exceeds the materiality threshold of $20 million set for FBC by Order G-120-15.

A draft Order is attached as Appendix J-2.

1.2.1 Confidential Filings Request

FBC requests that certain Appendices to the Application (together, the Confidential Appendices) be filed on a confidential basis, pursuant to section 19 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-178-22. The confidential Appendices contain operationally sensitive information, including detailed information that, if disclosed, could impede FBC's ability to safely and reliably operate its electric system assets and could risk the safety of both its workers and the public. The Confidential Appendices also contain market sensitive information that the Company believes should be kept confidential so as not to influence or hamper negotiations for the construction contractor selection process for the Project. FBC has and will continue to mark all confidential information as such, where applicable. The Appendices for which FBC requests confidential treatment, and the specific reasons for the requested treatment, are as follows:

Appendices A-1, A-2, F-1, F-2, and F-3: Engineering Drawings including General Arrangement and Single Line Diagrams for ASM Terminal Station and WTS Expansion. Public disclosure of the technical and engineering information contained in these appendices elevates the risk of potential harm to FBC's assets by persons with malicious intent, which could result in damage to the assets and/or limit, restrict or impair their operation. Disclosure of this information could reasonably be expected to result in harm to the safety of the public, the Company's employees, and the assets themselves.

Appendices G-1, G-2, and H: Cost Estimates and Financial Schedules. The capital spending amounts in these Appendices describe the costs of the various and specific Project components. FBC intends to contract the majority of the construction for the Project: providing potential bidders with this information could reasonably be expected to prejudice FBC's negotiating position when procuring contracts and could result in higher costs for the Project.

FBC requests that the BCUC direct that the Confidential Appendices and any future filings which address confidential information be kept confidential. Interveners may access the confidential information upon execution of a Confidentiality Declaration and Undertaking in a form acceptable to the BCUC, a copy of which is provided in Appendix J-3. FBC will provide

electronic access to the confidential appendices to such interveners and will require confirmation at the conclusion of the proceeding that the information has been treated in accordance with section 24 of the BCUC Rules of Practice and Procedure.

1.3 *PROPOSED REGULATORY PROCESS*

FBC proposes a written public hearing process for the review of this Application. The information presented in this Application conforms to the BCUC's 2015 CPCN Guidelines (Order G-20-15), and the alternatives available to FBC are straightforward, with the selected alternative addressing all identified issues and with the lowest impact on customers' rates. FBC believes that a written hearing process with two rounds of information requests will provide for an appropriate and efficient review of the Application.

FBC proposes the regulatory timetable set out in Table 1-1 below. A draft procedural order is included as Appendix J-1. FBC plans to begin engineering, procurement and construction after approval by the BCUC, and expects to complete the Project by the end of 2026.

Table 1-1: Proposed Regulatory Timetable

ACTION	DATE (2023)
BCUC Issues Procedural Order by	Friday, March 17
FBC publishes Notice by	Friday, April 14
Intervener Registration Deadline	Friday, April 28
BCUC Information Request (IR) No. 1	Thursday, May 4
Intervener IR No. 1	Thursday, May 11
FBC Response to IR No. 1	Friday, June 2
BCUC and Intervener IR No. 2	Thursday, June 22
FBC Response to IR No. 2	Monday, July 17
FBC Final Argument	Tuesday, August 8
Intervener Final Arguments	Tuesday, August 22
FBC Reply Argument	Thursday, September 7

1.4 *ORGANIZATION OF THE APPLICATION*

The Application provides detailed information in support of the Project. The remainder of the Application is organized into the following sections:

- Section 2 provides an overview of the Applicant and provides information on FBC's financial and technical capabilities for the Project;
- Section 3 provides an overview of the need for the Project and describes the Boundary and Similkameen load areas, customers, and forecast load, FBC's transmission planning

criteria applicable to the Project, and the deteriorating condition of the infrastructure at the ASM Terminal Station;

- Section 4 describes the six alternatives that were identified and investigated in the early screening stage, the two feasible alternatives that were considered, and compares and evaluates each of these feasible alternatives against a list of non-financial and financial criteria;
- Section 5 provides a detailed description of the proposed Project, including construction, design, resource planning and management, and schedule. It includes a risk analysis and discussion of potential Project impacts;
- Section 6 provides the cost estimates, the assumptions upon which the financial analysis is based, and the rate impacts;
- Section 7 discusses and provides the environmental and archaeological impacts of the Project;
- Section 8 discusses FBC's public consultation, Indigenous engagement, and communication efforts regarding the Project;
- Section 9 provides an overview of the BC Provincial Government energy objectives and policy considerations relevant to the Project; and
- Section 10 provides a conclusion.

2. APPLICANT

2.1 NAME, ADDRESS, AND NATURE OF BUSINESS

FortisBC Inc.
Suite 100, 1975 Springfield Road
Kelowna, B.C. V1Y 7V7

FBC is an investor-owned utility engaged in the business of generation, transmission, distribution and bulk sale of electricity in the southern interior of British Columbia. It is an integrated utility serving approximately 188 thousand customers directly and indirectly. FBC was incorporated in 1897 and is regulated by the BCUC pursuant to the UCA.

2.2 FINANCIAL AND TECHNICAL CAPACITY

FBC is capable of financing the Project. FBC has credit ratings for senior unsecured debentures from DBRS and Moody's Investors Service of A (low) and Baa1, respectively.

The Company has a rate base of approximately $1.7 billion, including four hydroelectric generating plants with an aggregate capacity of 225 MW and approximately 7,200 km of transmission and distribution power lines for the delivery of electricity to major load centres and customers in its service area. FBC has approximately 550 full-time and part-time employees.

FBC will provide the necessary resources to manage and complete the Project. FBC has extensive experience in managing the design, construction, operation and maintenance of substations and transmission lines in British Columbia. For example, in recent years FBC has completed, or is in the process of completing, several major projects including the Corra Linn Dam Spillway Gate Replacement project (total value of approximately $80 million), the Upper Bonnington (UBO) Old Units Refurbishment project (total value of approximately $34 million), the Grand Forks Terminal (GFT) Station Reliability project (total value of approximately $9 million), the Playmor Substation Upgrade project (total value of approximately $8 million), and the Kelowna Bulk Transformer Addition (KBTA) project, in which it is overseeing the installation of a third transformer at the F.A. Lee Termination Station, with associated bus reconfiguration (with an estimated total value of approximately $23 million).

2.3 COMPANY CONTACT

Sarah Walsh
Director, Regulatory Affairs
FortisBC Inc.
16705 Fraser Highway
Surrey, B.C. V4N 0E8
Phone: (778) 578-3861

Fax: (604) 576-7074
Email: electricity.regulatory.affairs@fortisbc.com

2.4 LEGAL COUNSEL

Erica C. Miller
Farris LLP
2500 – 700 West Georgia Street
Vancouver, B.C. V7Y 1B3
Phone: (604) 684-9151
Fax: (604) 661-9349
E-mail: emiller@farris.com

3. PROJECT NEED AND JUSTIFICATION

3.1 *INTRODUCTION*

The ASM Terminal Station has two existing 63/161 kV transformers, which were manufactured in 1965 (ASM T1) and 1971 (ASM T2). As described in more detail in this section, FBC has experienced high levels of customer load growth in the Boundary and Similkameen areas (which are served by the ASM Terminal Station). FBC's electricity demand in the Boundary and Similkameen areas has exceeded FBC's Transmission System Planning Criteria (N-1 system reliability) with the current capacity of the ASM Terminal Station power transformers. In the event of an outage or failure of one of the two ASM Terminal Station transformers, FBC will not be able to reliably maintain service during peak periods. The likelihood of a power transformer failure (and the ability to restore customers in the area) is exacerbated by the age and condition of the existing ASM transformers. External consultation with transformer experts has indicated that ASM T1 and T2 have a high risk of failure, with the greatest contributor being the "risk of accessory failure due to their age."[1] The risk of failure is increasing with each passing year.

In the following sections, FBC explains the Project need and justification, as follows:

- Section 3.2 provides a system overview and description of the ASM Terminal Station, including the Station's interconnection to the FBC system, the customers and communities supplied by the ASM Terminal Station, and the Station's history and configuration.
- Section 3.3 describes the drivers of the Project need, including:
    - Load growth in the Boundary and Similkameen areas which will continue to exceed FBC's Transmission System Planning Criteria, triggering potential reliability issues; and
    - Deteriorating condition of the ASM transformers.

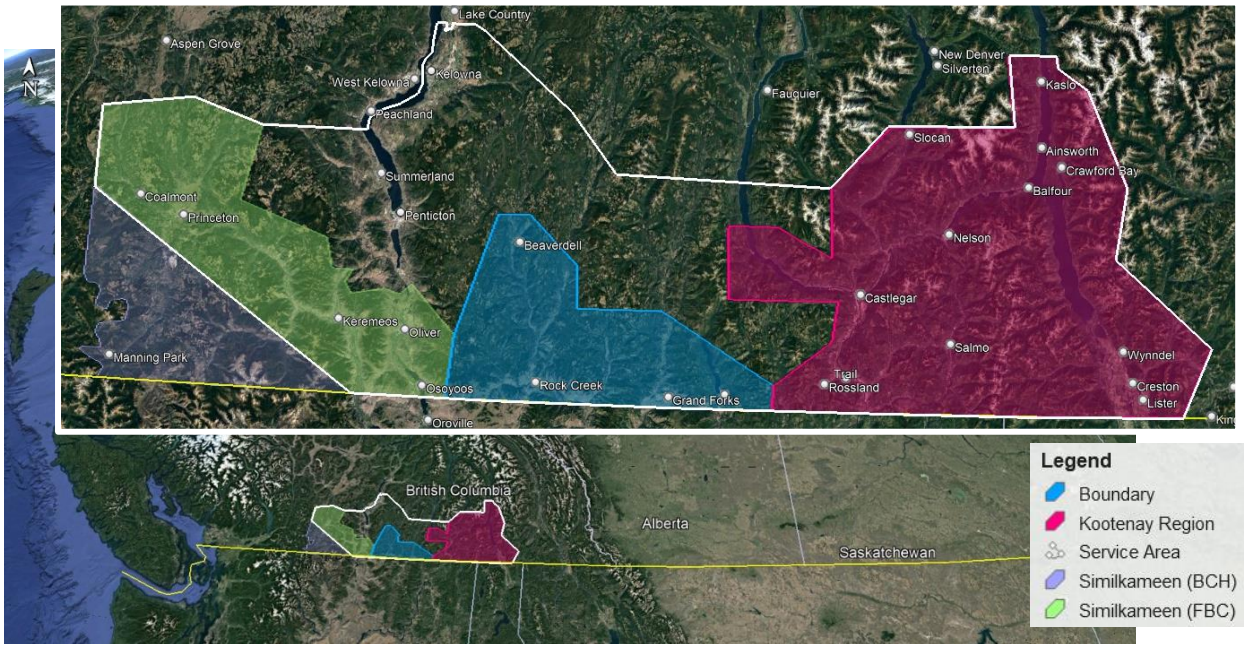
3.2 *SYSTEM OVERVIEW AND DESCRIPTION*

The Boundary and Similkameen areas are located within the Southern Interior of British Columbia. The Boundary area spans from the Canadian Border to the United States in the south to Beaverdell in the north, and from Christina Lake in the west to Osoyoos in the east. The Similkameen area spans from the Canadian Border to the United States in the south to Allison Lake in the north, and from Osoyoos in the west to Manning Provincial Park in the east. The Similkameen area straddles both the FBC and BC Hydro service territories. FBC's service territory covers the east and north of the Similkameen from Osoyoos in the southeast to Allison Lake. The southwest corner (Manning Park) of the Similkameen area is in BC Hydro's service territory. For the purpose of this document, the term "Similkameen area" will be used to refer to

[1] Appendix B, p. 18.

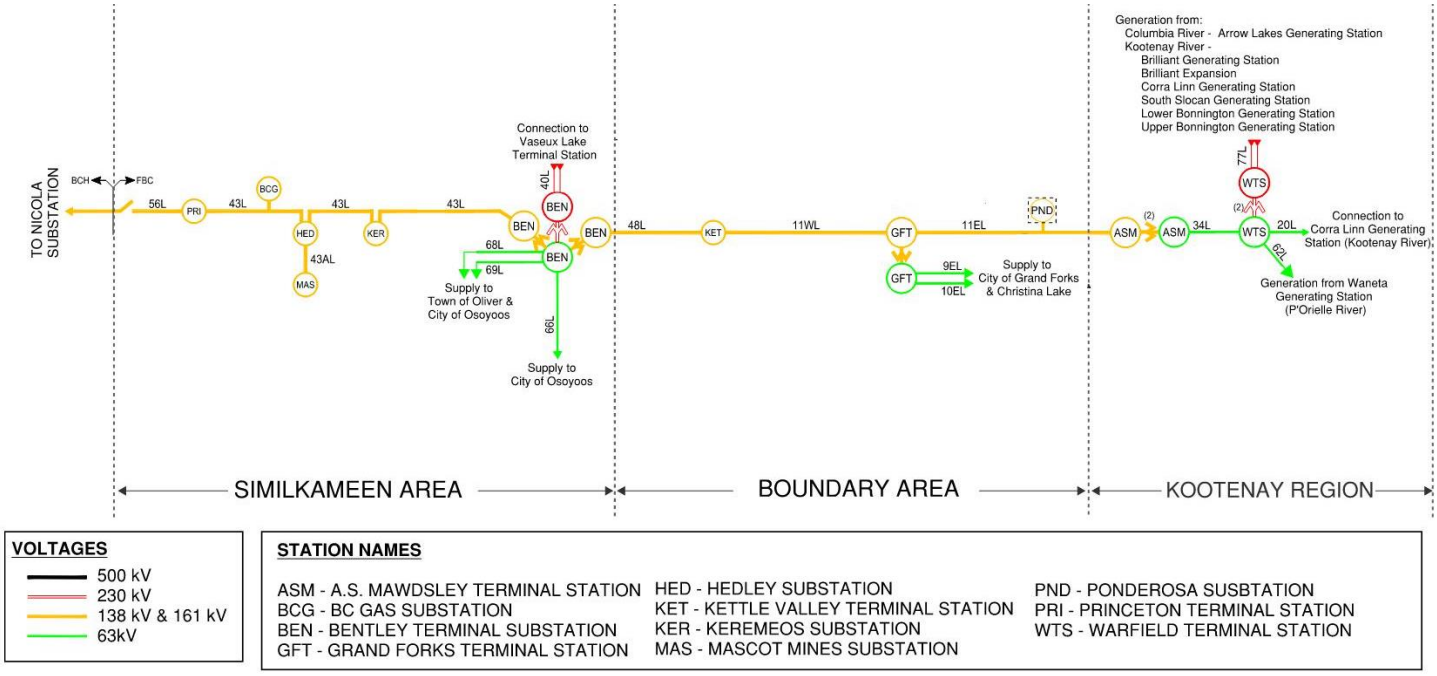
only the customers and the communities of the Similkameen area that are in FBC's service territory (i.e., excluding the southwest corner within BC Hydro's service territory). Figure 3-1 shows the portions of the Boundary and Similkameen areas that are within FBC's service territory.

Figure 3-1: FBC Service Territory in the Boundary and Similkameen Areas of BC's Southern Interior



Customers in the Boundary and Similkameen areas are supplied with power generated in the Kootenay region (shown in pink in Figure 3-1) and with power from a transmission interconnection to BC Hydro at Vaseux Lake Terminal Station in the north, as shown in the following single line diagram and further described below.

Figure 3-2: Boundary and Similkameen Power Supply Single Line Diagram[2]



As shown in Figure 3-2, the Boundary-Similkameen power supply path is composed of five main transmission lines:

- 11E Line (161 kV) – ASM Terminal Station to Grand Forks Terminal Station (GFT)
- 11W Line (161 kV) – GFT to Kettle Valley Terminal Station (KET)
- 48 Line (161 kV) – KET to Bentley Terminal Station (BEN)
- 40 Line (230 kV) – Vaseux Lake Terminal Station to BEN
- 43 Line (138 kV) – BEN to Princeton Terminal Station (PRI)

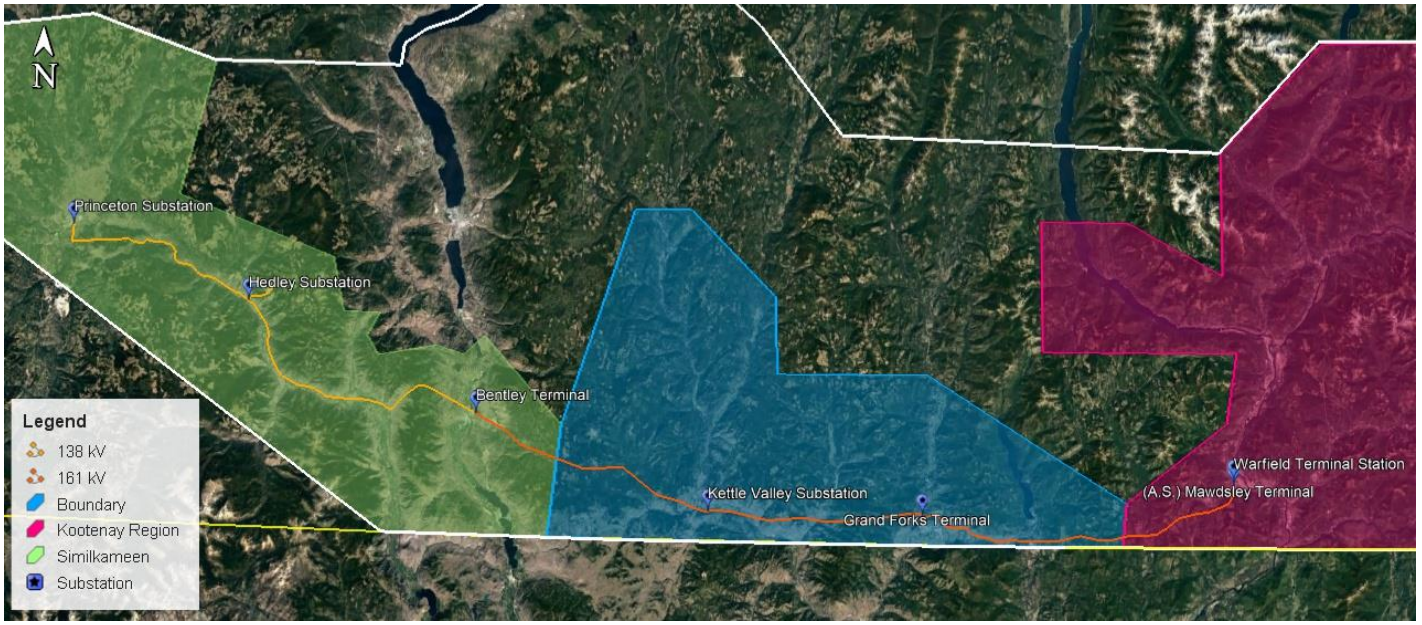
Power generated in the Kootenay region flows into the WTS at 230 kV and 63 kV. The WTS power transformers (WTS T1 and WTS T2) transform from 230 kV to 63 kV. At 63 kV, power travels from WTS to the ASM Terminal Station, which is 1 km away, where it is transformed from 63 kV to 161 kV by the ASM Terminal Station power transformers (ASM T1 and ASM T2).

At 161 kV, the ASM Terminal Station supplies power to 11E Line into the Boundary area. From 11E Line, power flows to 11W Line. Customers and communities in the Boundary area are supplied from substations connected directly to 11E Line and 11W Line. 11W Line connects to 48 Line, which carries power to BEN. At BEN, power is converted from 161 kV to 138 kV before flowing into 43 Line to supply customers and communities in the Similkameen area.

[2] Local transmission to the West Kootenays from WTS has been removed for simplicity.

Figure 3-3 illustrates the system connections from the Kootenay region through the Boundary and Similkameen areas.

Figure 3-3: Map of the Boundary and Similkameen Power Supply Path from the Kootenay Region



The Boundary and Similkameen areas cover a large geographical area. The areas account for approximately 19 percent of FBC's total summer and winter peak load.

The Boundary-Similkameen power supply path includes, among others, customers and communities in Grand Forks, Christina Lake, Kettle River, Rock Creek, Beaverdell, the Christian Valley, Oliver, Osoyoos, Keremeos, Hedley, and Princeton.

Based on 2022 customer data, FBC has approximately 26,000 direct customers in the Boundary and Similkameen areas, which are broken down by rate class in Table 3-1 below.

Table 3-1: FBC Similkameen and Boundary Area Customers by Rate Class

Rate Class	Customer Count
Residential	20,708
Small Commercial / Commercial	3,866
Large Commercial/Industrial	12
Irrigation	725
Lighting	869
Wholesale	3
Total	**26,183**

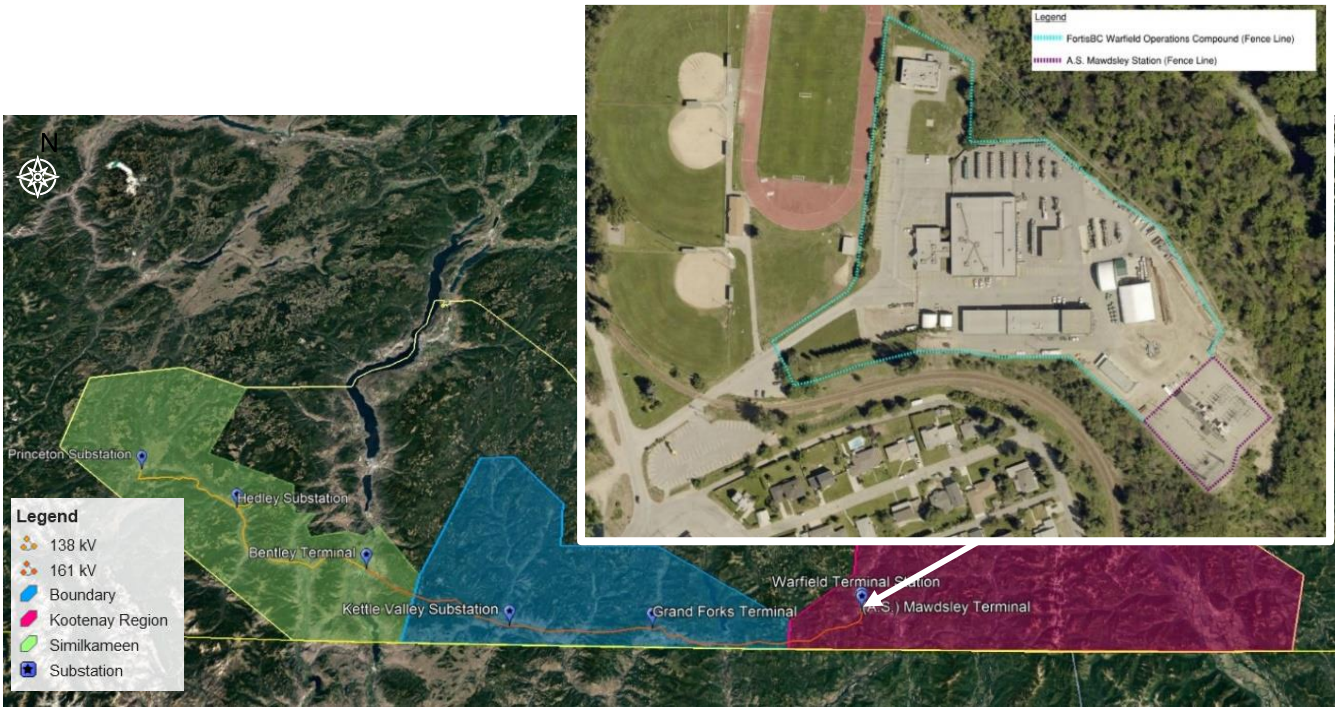
These customers include the following major customers:

- South Okanagan General Hospital;
- Boundary District Hospital;
- Princeton, Oliver, Osoyoos & Grand Forks Airports; and
- Okanagan College – Oliver.

The customers and communities in the Similkameen and Boundary areas rely on the connection between WTS and the ASM Terminal Station via 34 Line, as well as the 63 kV to 161 kV conversion that is performed by ASM T1 and T2 at the ASM Terminal Station, for safe and reliable power.

The ASM Terminal Station is located in Trail, BC (see Figure 3-4), at the Southeast end of the FBC Warfield Operations Compound.

Figure 3-4: Aerial View of the ASM Terminal Station in Relation to the Boundary and Similkameen Areas



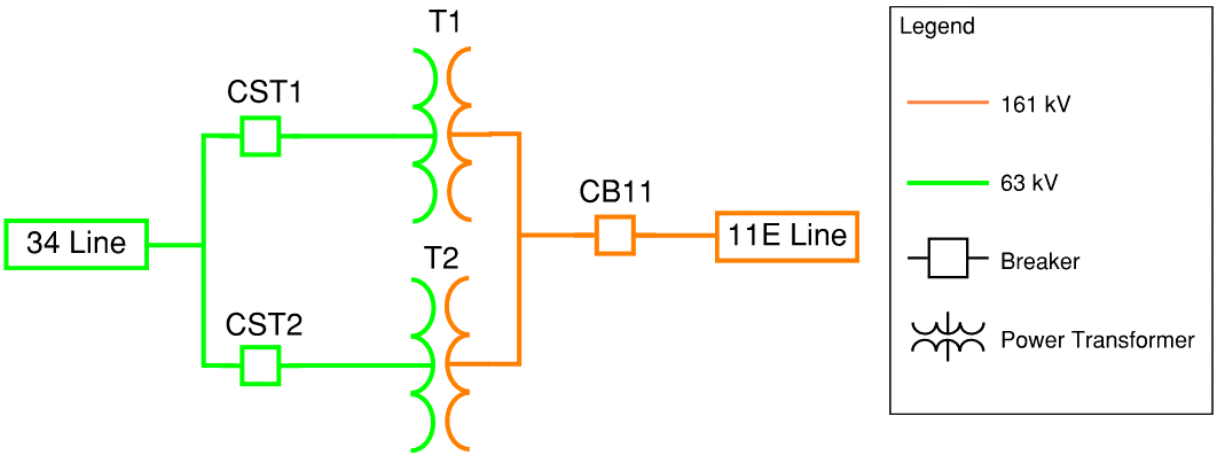
The ASM Terminal Station is comprised of two existing 63/161 kV 80 MVA step up transformers. These transformers, which were manufactured in 1965 (ASM T1) and 1971 (ASM T2), feed 11E Line and provide a combined capacity of 160 MVA.

ASM T1 and ASM T2 have been in service for 57 and 51 years, respectively. The ASM Terminal Station underwent an upgrade in 1971 and again in the early 2000s. The 1971 upgrades involved the addition of ASM T2 to the station configuration. The work performed in the early 2000s involved upgrading the 63 kV and 161 kV high voltage bus configuration and protection

system. The ASM Terminal Station still utilizes the transformers that were purchased in 1965 and 1971, i.e., ASM T1 and ASM T2.

Figure 3-5 provides a simplified single line diagram of the ASM Terminal Station configuration.

Figure 3-5: Simplified Single Line Diagram of ASM Terminal Station Configuration



As shown in Figure 3-5, the existing station uses a radial bus configuration on both sides of the transformers. ASM T1 and ASM T2 are each protected by a circuit switcher (ASM CST1 and ASM CST2) on the 63 kV side. Circuit switchers are a switching device that provide similar functionalities to circuit breakers; however, circuit switchers are more compact and have limited fault interrupting capabilities. On the 161 kV side, ASM T1 and ASM T2 supply into 11E Line through a single circuit breaker (ASM CB11).

The existing ASM Terminal Station Operating Single Line Diagram and General Arrangement are available in confidential Appendices A-1 and A-2, respectively.

The ASM Terminal Station is supplied by 34 Line at 63 kV, as illustrated in Figure 3-5 above. 34 Line connects the ASM Terminal Station to WTS, which is approximately 1 km north of the ASM Terminal Station, as presented in Figure 3-6 below. WTS was built in 2002 and receives power from numerous generating facilities in the Kootenay region. WTS is used to provide power to the local communities as well as to the ASM Terminal Station where it is converted from 63 kV to 161 kV for delivery to customers and communities in the Boundary and Similkameen areas.

Figure 3-6: Aerial View of the ASM Terminal Station in Proximity to WTS

3.3 *DRIVERS OF THE PROJECT NEED*

As further explained in the subsections below, the drivers of the Project need are as follows:

- The forecast load growth in the Boundary and Similkameen areas will continue to exceed FBC's N-1 system reliability planning criterion to reliably maintain service to the area load during peak periods in the event of an outage or failure of one of the ASM Terminal Station power transformers.
- In consideration of the condition of the transformers based on a recent condition assessment report performed by an independent third party, there is a high risk of failure at the ASM Terminal Station.

These drivers are explained in detail below.

3.3.1 Inability to Maintain Reliability and Meet Load Growth

3.3.1.1 FBC Planning Criteria and System Reliability Issues

Typical industry transmission planning standards require the system to be planned such that all projected customer loads are served during both normal (N-0)[3] operation, as well as during single contingency (N-1)[4] operation. Likewise, FBC's Transmission Planning Criteria also specify that customer load should be able to be supplied under both N-0 and N-1 conditions.

The normal operation (N-0) contingency planning criterion applies to all transmission facilities, while the single contingency (N-1) planning criterion applies to all transmission facilities that are part of the FBC interconnected system (which excludes radial transmission lines). Therefore, 11E Line supply (i.e., the ASM Terminal Station) is subject to meeting both normal operation and single contingency transmission planning criteria. FBC plans and constructs its interconnected transmission system to meet and maintain its N-1 planning contingency criterion. The system should be capable of meeting N-0 and N-1 performance at all times, including during minimum and maximum forecast load and generation conditions. The recently approved GFT Station Reliability Project CPCN[5] and the KBTA Project CPCN[6] proposed the addition of new terminal transformers in order to meet these planning criteria.

3.3.1.2 Forecast Peak Load Growth will Result in Inability to Reliably Maintain Service

3.3.1.2.1 BOUNDARY AND SIMILKAMEEN AREAS' HISTORICAL AND FORECAST PEAK LOAD

Peak load forecasting for system planning purposes (as is necessary for the current Application) 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, to ensure sufficient capacity is available under these 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 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

[3] 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).

[4] 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 (i.e., outage of 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.

[5] Approved by Order C-2-19.

[6] Approved by Order C-4-20.

with FBC's transmission planning standards and is also consistent with industry practice[7]. FBC has been using a "1-in-20" year load forecast for planning purposes since at least 2011. This method was examined in FBC's Application for Approval of 2012-2013 Revenue Requirements and Review of 2012 Integrated System Plan[8] and underpins FBC's capital plans, including those filed in the 2014-2019 Performance Based Rates Application and the 2020-2024 Multi-Year Rate Plan Application. The "1-in-20" year load forecast method was also used in FBC's KBTA Project CPCN application and was accepted by the BCUC Panel in its Decision and Order C-4-20[9].

Historical summer and winter peak loads for the Boundary and Similkameen areas from 2017 through 2022 are shown in Table 3-2 below.

Table 3-2: Boundary and Similkameen Areas' Historical Actual Peak Loads, 2017-2022

	2017	2018	2019	2020	2021	2022
Summer (MW)	122	121	133	135	148	173
Winter (MW)[10]	128	131	142	145	163	187

Looking forward, the load forecast for the Boundary and Similkameen areas for summer and winter 2023 through 2027 is shown in Table 3-3 below. Table 3-3 shows the forecasts of peak load based on historical data which are used in power flow simulations to determine compliance with FBC's Transmission Planning Criteria, and also includes forecast load growth related to electric vehicles (EVs)[11] and load from one known large capacity customer. Greater EV adoption and new government policy favouring electrification have the potential to result in increases beyond the "1-in-20" load forecast shown below.

Table 3-3: Boundary and Similkameen Areas' Peak Load Forecast, 2023-2027

	2023	2024	2025	2026	2027
Summer (MW)	163	163	165	165	168
Winter (MW)[12]	177	178	178	181	183

On average, the Boundary and Similkameen areas are supplied 67 percent of their load in the winter and 75 percent of their load in the summer by the ASM Terminal Station. Figure 3-7 compares the peak load flow through the ASM power transformers to available normal and

[7] The accuracy 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.

[8] Application for Approval of 2012-2013 Revenue Requirements and Review of 2012 Integrated System Plan, Volume 1, Tab 3, Appendix 3F.

[9] Page 12 of Decision and Order C-4-20.

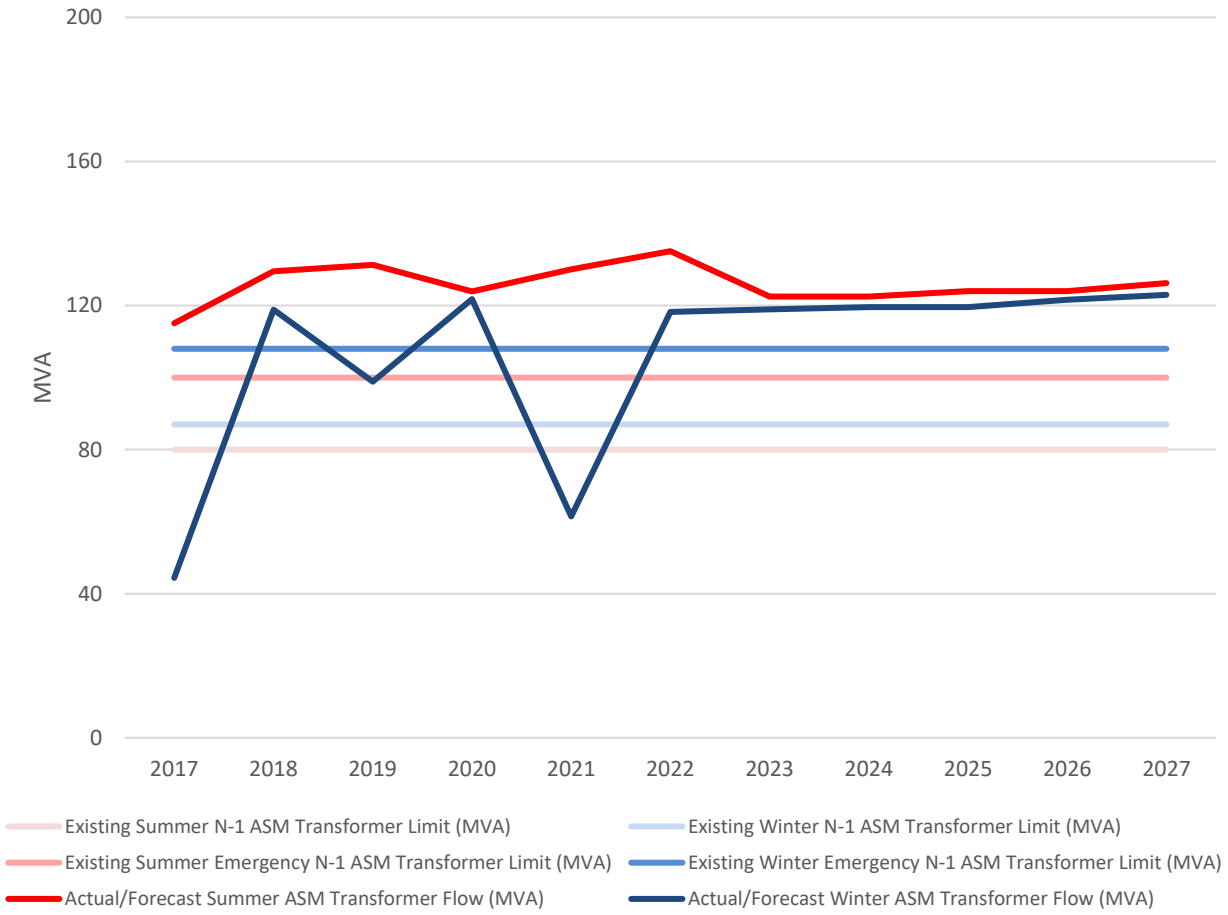
[10] The Winter Peak is based on the winter season of November to February.

[11] FBC included forecast EV load to the "1-in-20" load forecast by taking 50 percent of the total EV forecast load as filed in FBC's 2021 LTERP, Appendix F, pp. 17-18 and allocating the portion of forecast load attributable to the Boundary and Similkameen areas (approximately 20 percent).

[12] The Winter Peak is based on the winter season of November to February.

emergency capacity for winter and summer conditions in an N-1 contingency event. For clarity, Figure 3-7 displays the peak load flowing through the ASM Terminal Station compared to the capacity when only one power transformer is in-service.

Figure 3-7: ASM Terminal Station's Contribution to the Boundary and Similkameen Areas' Total Load Compared to the N-1 Transformer Limits[13]



As shown in Figure 3-7, the summer peak load has exceeded both normal and emergency ratings in an N-1 contingency event. FBC notes that winter peak has historically been more variable due to greater fluctuations in system conditions (i.e., configuration and generation) in the winter months. In recent years, certain new load and generation conditions have caused FBC to exceed N-1 system planning. FBC has been able to manage this load through operational changes; however, these changes to system operation are not sustainable in the long-term.

[13] ASM Terminal Station peak historical load (2017 – 2022 Summer) flows presented. Average percentage of load supplied from the ASM Terminal Station applied to total Boundary and Similkameen area load forecast (Table 3-3, 2022 Winter - 2027).

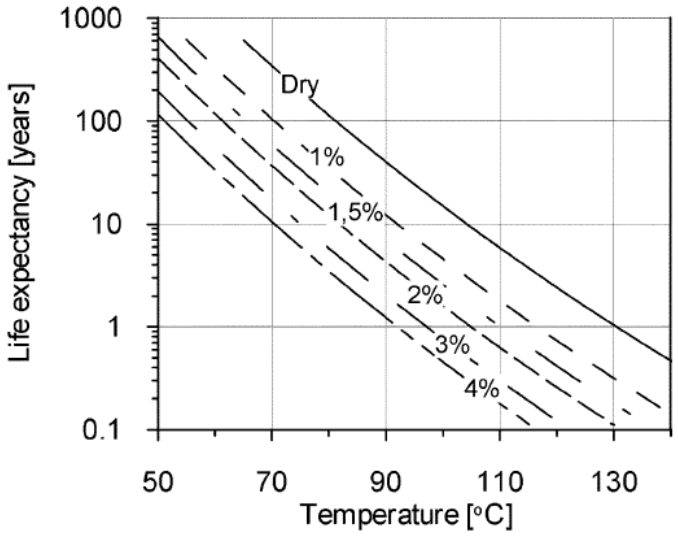
Based on the forecast peak values above in Table 3-3 and Figure 3-7, FBC expects electricity demand will continue to exceed FBC's Transmission Planning Criteria; specifically, that FBC will not be able to meet the N-1 system reliability planning criterion to reliably maintain service to the area load during peak periods in the event of an outage or failure of one of the ASM Terminal Station power transformers.

3.3.1.2.2 IMPACT OF LOAD GROWTH ON TRANSFORMER LIFESPANS

The loading of substation transformers above the normal nameplate rating has a significant impact on their remaining expected lifespan. As shown above in Figure 3-7, during an N-1 contingency event of an ASM transformer, the remaining transformer would be over its emergency limit.

Prolonged loading in the emergency range increases the winding hot spot temperature[14] and decreases the expected remaining life of the transformer. For transformers of the type installed at the ASM Terminal Station, this relationship between temperature and life expectancy is exponential, as can be seen in Figure 3-8 below. If a transformer is lightly loaded throughout its in-service life, the winding insulation can be expected to last longer; conversely, insulation life can be expected to be less than a year[15] if the transformer is overloaded on a consistent basis. Each hour that a transformer is loaded above its nameplate rating brings a corresponding increase in the winding hotspot temperature and has a substantial negative impact on the transformer's remaining expected lifespan.

Figure 3-8: Expected Life for Solid Insulation and its Dependence on Moisture and Temperature[16]



[14] The winding hot spot temperature is the temperature of the hottest area in the transformer.
[15] IEEE Power and Energy Society, IEEE Std. C57.12.00-2015 (Dec. 2015). "IEEE Standard for General Requirement for Liquid-Immersed Distribution, Power, and Regulating Transformers" by IEEE Transformer Committee.
[16] Figure 13 from IEEE Transactions on Power Delivery (Volume: 19, Issue: 1, Jan. 2004) "Aging of Oil-Impregnated Paper in Power Transformers" by L.E. Lundgaard; W. Hansen; D. Linhjell; T.J. Painter.

Given that the existing transformers at the ASM Terminal Station are extremely important system assets with replacement lead times in excess of a year, FBC submits that planned loading above their nameplate rating is not an acceptable practice.

3.3.2 High Risk of Failure due to Condition of Transformers

ASM T1 and ASM T2 are 57 and 51 years old, respectively. The condition of both transformers continues to deteriorate with age, with their risk of failure increasing with each passing year.

FBC commissioned Hitachi Energy, a third-party consultant and global leader in power transformers, to perform a comprehensive condition assessment for ASM T1 and T2 in 2022 (Condition Assessment Report). The Condition Assessment Report is provided in Appendix B of this Application. The Condition Assessment Report includes an analysis of the Total Risk of Failure of ASM T1 and ASM T2, which is defined to include the potential failure of the transformer main core/coil assembly, as well as any other condition that would require the transformer to be removed from service for a significant period. The Condition Assessment Report calculated the Total Risk of Failure[17] for ASM T1 and ASM T2 to be higher than FBC's accepted tolerances (2 percent), which is based on CEATI industry findings[18]. The calculated Total Risk of Failure in the Condition Assessment Report was based on the most recent dissolved gas analysis (DGA) and the available test/maintenance data. As a result, the Condition Assessment Report categorized both ASM T1 and ASM T2 as being in the "Urgent" (Code Red) category, meaning that immediate attention is needed.

The Condition Assessment Report lists the greatest contributors to risks of failure[19] for ASM T1 and ASM T2 as:

1. Risk of accessory failure due to their age (82.8%);
2. Risk of dielectric failure due to various causes (2.9%);
3. Risk from oil leaks or tank rust and their severity (8.4%);
4. Risk from hot spots or loose connections (0.0%); and
5. Risk of short circuit failure (5.9%).

Based on the above, ASM T1 and ASM T2 are most likely to fail due to the risk of accessory failure due to their ages.

Table 3[20] of the Condition Assessment Report provides the reasons for the risk of failure for each of the ASM transformers. For each transformer, this includes the fact that the operation count for the load tap changer (LTC) contacts has exceeded the maximum recommended by

[17] Appendix B, p. 12.
[18] CEATI, Stations Equipment Asset Management Program, REPORT No. T163700-30/113 (May 2018). "Translating the Health Index into Probability of Failure" by Doble Engineering.
[19] Appendix B, p. 18.
[20] Appendix B, p. 13.

the manufacturer. The LTC is the second most failed component for this type of transformer, and the early observation is that the failure rate per in-service transformer is higher for older units (i.e., those greater than 50 years old, like ASM T1 and ASM T2), than for the general population of power transformers.

ASM T1 and ASM T2 were manufactured with a CGE LR83 type LTC. This model of LTC is known for high amounts of arcing that occurs with each operation, which has the effect of degrading the insulating oil and the LTC contacts. While the original equipment manufacturer (OEM) recommended replacement of LTC contacts every 80,000 operations, this type of tap changer has not been supported by the original manufacturer since 2004. The ASM T1 and ASM T2 LTCs have been inspected and assessed multiple times to monitor their changes in condition. Currently, the ASM T1 LTC has recorded 98,000 operations, while the ASM T2 LTC has reached 394,000 operations. Both the ASM T1 and ASM T2 LTCs require a more detailed assessment in 2023 to determine possible actions to mitigate their risk of failure until a long-term solution (i.e., the proposed Project) is implemented.

3.4 *CONCLUSION*

As described above, FBC has experienced high levels of customer load growth in the Boundary and Similkameen areas (which are served by the ASM Terminal Station). FBC's electricity demand in the Boundary and Similkameen areas has exceeded FBC's Transmission System Planning Criteria (N-1 system reliability) with the current capacity of the ASM Terminal Station power transformers. The forecast for the Boundary and Similkameen areas indicates that load growth will continue to overload ASM T1 and ASM T2. Where overloading is projected over the peak period, it will violate FBC's Transmission Planning Criteria and accelerate a rise in the probability of failure of ASM T1 and ASM T2.

ASM T1 and ASM T2 are 57 and 51 years old, respectively, and their conditions are deteriorating. External consultation with transformer experts has indicated that ASM T1 and ASM T2 have a high risk of failure, with the greatest contributor being "risk of accessory failure due to their age". The risk of failure is increasing with each passing year.

Given the importance of the ASM T1 and T2 power transformers in supplying the Boundary and Similkameen areas, it is imperative that the capacity and condition issues be addressed.

4. DESCRIPTION AND EVALUATION OF ALTERNATIVES

4.1 *INTRODUCTION*

As outlined in Section 3, FBC has experienced high levels of customer load growth in the Boundary and Similkameen areas (which are served by the ASM Terminal Station) and FBC's electricity demand in the area has exceeded FBC's Transmission System Planning Criteria (N-1 system reliability) with the current capacity of the ASM Terminal Station power transformers. In the event of an outage or failure of one of the two ASM transformers, FBC will not be able to reliably maintain service during peak periods. The likelihood of a power transformer failure (and the ability to restore customers in the area) is exacerbated by the current age and condition of the existing transformers at the ASM Terminal Station. The Project therefore has the following objectives:

1. Increase the 161 kV capacity to the Boundary and Similkameen areas to maintain safe and reliable service to customers in these areas.

2. Address aging infrastructure which, based on the recently completed Condition Assessment Report, classifies the transformers as being at a high risk of failure.

In the following sections, FBC provides a description and evaluation of the alternatives considered for the Project, including FBC's preferred alternative, as follows:

- Section 4.2 describes the six alternatives that FBC investigated, including the alternatives that were rejected and the alternatives that were identified for further evaluation;
- Section 4.3 describes the evaluation framework used to assess the feasible alternatives identified, and applies this framework to evaluate the feasible alternatives based on non-financial and financial criteria; and
- Section 4.4 identifies and summarizes the preferred alternative.

4.2 *ALTERNATIVES DESCRIPTION*

Six alternatives were identified and considered for the Project:

- Alternative 1: Status Quo
- Alternative 2: Like-for-like Replacement of the ASM Terminal Station Transformers (ASM T1 and ASM T2)
- Alternative 3: Rebuild the ASM Terminal Station and Expand the Existing Site Footprint
- Alternative 4: Build a New Terminal Station at a Greenfield Site and Demolish the ASM Terminal Station

- Alternative 5: Expand the WTS Site and Demolish the ASM Terminal Station
- Alternative 6: Retain the Existing ASM Terminal Station and Add a New Transformer at WTS

Each of these alternatives is described in this section, including an explanation of the alternatives that were rejected at an early screening stage, as they were not feasible as they either did not meet the required objectives for the Project, or were clearly inferior to other alternatives due to cost and/or complexity.

4.2.1 Alternative 1: Status Quo

If the status quo were maintained, FBC would continue to operate and maintain the existing transformers (ASM T1 and ASM T2). The status quo is not a feasible alternative because it does not meet the Project objectives. The status quo does not address the high probability of failure due to the condition of the ASM transformers and does not increase the 161 kV supply capacity which, as explained in Section 3, is necessary for FBC to meet its N-1 transmission planning criterion in the event of a station outage.

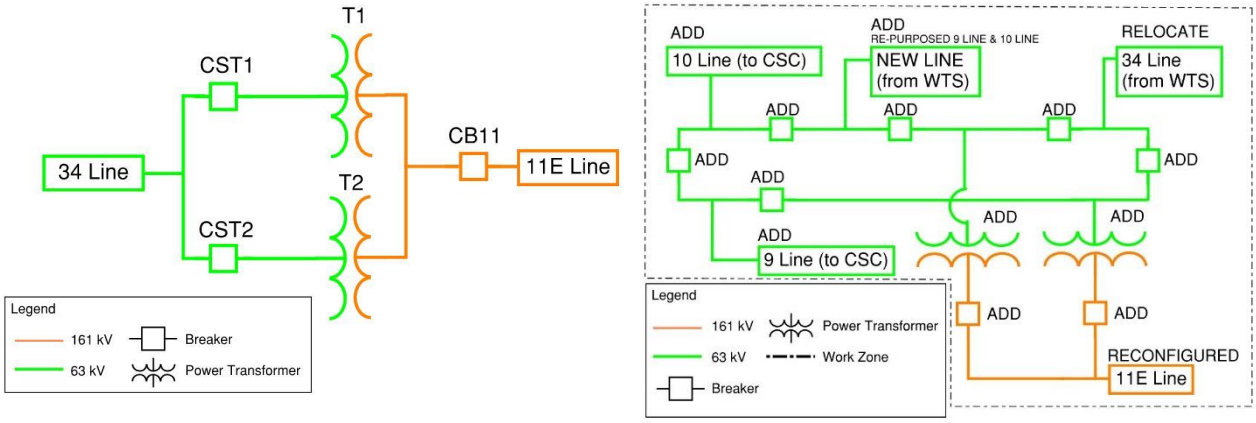
4.2.2 Alternative 2: Like-for-Like Replacement of the ASM Transformers

Replacing the ASM T1 and ASM T2 power transformers with in-kind models (i.e., 63/161 kV, 80 MVA) only addresses one of the Project objectives (i.e., replacing the aging transformers) and is therefore not feasible. This alternative would not increase the 161 kV supply which, as explained in Section 3, is necessary for FBC to meet its N-1 transmission planning criterion in the event of a station outage. FBC would not be able to continue to support load growth in the Boundary and Similkameen areas. Like the status quo, this alternative would lead to a shortage in transmission capacity, resulting in a level of customer service that is below established standards.

4.2.3 Alternative 3: Rebuild the ASM Terminal Station and Expand the Existing Site Footprint

Under Alternative 3, FBC would undertake a full rebuild of the ASM Terminal Station in order to increase the station capacity. This alternative involves replacing the existing two power transformers (ASM T1 and ASM T2) with two new 63/161 kV transformers with a rating of 90/120/150 MVA, as well as upgrading both the 63 kV bus and 161 kV bus. Figure 4-1 shows the existing and proposed reconfiguration of the ASM Terminal Station under this alternative. The ASM Terminal Station would be converted from a 63 kV bus with two transformers to a six node 63 kV ring bus, with four transmission nodes and two transformer nodes. For the 161 kV side of the ASM Terminal Station, the bus configuration would be upgraded to incorporate two circuit breakers, one for each transformer.

Figure 4-1: Comparison of Current and Future Proposed Configuration of the ASM Terminal Station under Alternative 3



(a) Current Configuration (b) Preliminary Proposed Re-configuration

Alternative 3 also includes the construction of a new control building as the additional relays and metering required would not fit in the existing station control building. The control building is also required for construction staging. FBC would also upgrade the station controls and protections.

The existing equipment would be salvaged, including both transformers (ASM T1 and ASM T2), both the 63 kV bus and the 161 kV bus, all superstructures, foundations, transformer secondary oil containment, protection and control equipment, the control building, and the fire suppression shed.

In order to accommodate the increased station capacity, the ASM Terminal Station footprint would need to be extended beyond the existing perimeter fence (although the expanded station would remain entirely on FBC property) as shown in Figure 4-2 below. This footprint expansion would be required to accommodate the additional equipment, construction staging, and to maintain system operation (i.e., the existing ASM transformers and 11E Line supply) for the duration of construction.

Figure 4-2: ASM Terminal Station Fence Line Changes under Alternative 3

Transmission work required as part of Alternative 3 includes the rebuilding of 9/10 Line (which runs from WTS to the ASM Terminal Station) into one high-capacity transmission line, as well as re-terminating 9 Line (to Cascade Substation (CSC)) and 10 Line (to CSC) at the ASM Terminal Station 63 kV bus.

This alternative would meet both Project objectives and is technically feasible. Accordingly, FBC evaluated this alternative further based on non-financial and financial criteria, as described in Section 4.3.

4.2.4 Alternative 4: Build a New Terminal Station at a Greenfield Location and Demolish the ASM Terminal Station

As explained in Alternative 3, in order to increase the capacity of the ASM Terminal Station to accommodate two larger transformers and the associated infrastructure, a larger site footprint is required. Accordingly, FBC investigated the possibility of building a new terminal station on a greenfield site and demolishing the existing ASM Terminal Station. The advantage of this option is that it would permit the continuous operation and supply of 161 kV capacity from the ASM Terminal Station during construction of the new station at the greenfield site.

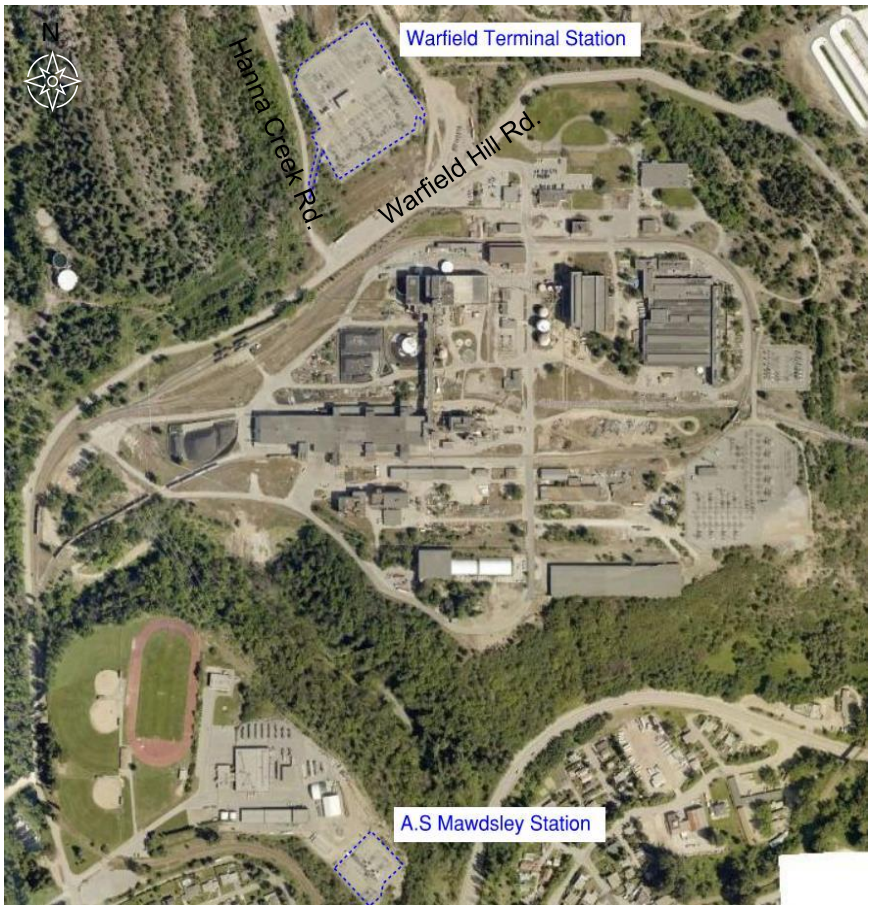
FBC investigated multiple potential greenfield sites during the early screening stage and determined that attempting to procure a greenfield location, as opposed to utilizing an existing site that is owned by FBC or subject to a statutory right-of-way (SRW) in favour of FBC, as further explained in Alternative 6, was not reasonable or practical. In particular, the potential issues related to using a greenfield site (assuming that FBC would be able to procure an appropriate site for a reasonable price) include logistical complexities and elevated costs, in

addition to the short and long-term risks associated with managing one or more of the following: topography, lack of road access, environmental protection covenants, green/park space designation, snow loading, land elevation, high potential community impact, land and right-of-way acquisitions for transmission lines and substation relocation, and interference/proximity to underground pipelines or other infrastructure. In consideration of these issues, FBC eliminated this alternative during the screening stage.

4.2.5 Alternative 5: Expand the WTS Site and Demolish the ASM Terminal Station

Alternative 5 includes expanding WTS to effectively replace the ASM Terminal Station. WTS is located approximately 1 km from the ASM Terminal Station as shown in Figure 4-3 below.

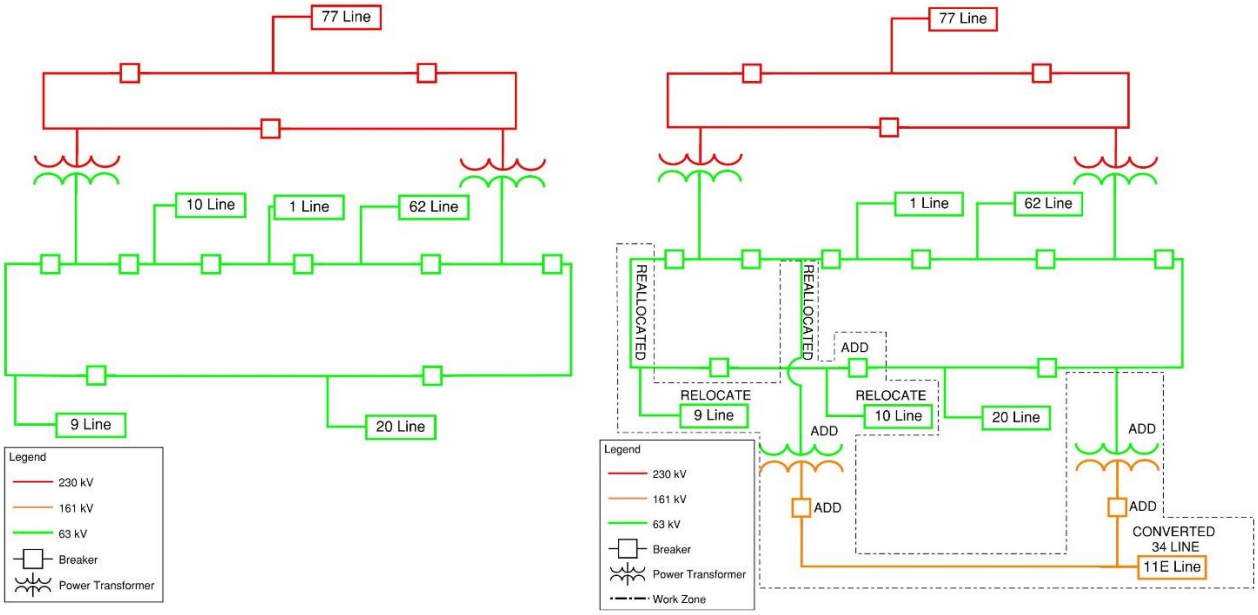
Figure 4-3: Aerial Map of the ASM Terminal Station in Proximity to WTS



This alternative involves the installation of two 63/161 kV transformers with a rating of 90/120/150 MVA at WTS, reconfiguring the 63 kV ring bus to provide one additional node connection, installing a 161 kV two breaker bus, and expanding the controls and protection scheme. Figure 4-4 below shows the existing and proposed reconfiguration of WTS under this alternative. As shown in Figure 4-4, one circuit breaker would be added to the WTS 63 kV ring

bus, 9 Line and 10 Line transmission terminations would be relocated, and 34 Line would be converted to 161 kV and connected to a new 161 kV bus at WTS. Reconfiguration of the 9 Line and 10 Line termination and repurposing of 34 Line frees up two existing bus nodes to connect the two new transformers.

Figure 4-4: Single Line Diagram of the Proposed Reconfiguration of WTS under Alternative 5



(a) Current Configuration (b) Preliminary Proposed Re-configuration

This alternative requires the expansion of the station footprint of WTS in order to accommodate the necessary 63 kV bus reconfiguration and additional equipment (although the expanded footprint would remain within the boundaries of FBC's SRW over a third-party owned parcel). Figure 4-5**Error! Reference source not found.** below depicts the new boundaries of WTS if Alternative 5 is undertaken, as compared to the existing boundaries and the SRW boundaries.

Figure 4-5: Comparison of the Approximate Existing and Future WTS Boundaries to the Statutory Right-of-Way Boundary under Alternative 5

Under this alternative, supply to the Boundary and Similkameen areas would come directly from WTS and the ASM Terminal Station would be decommissioned as it would no longer be necessary. Decommissioning would involve salvaging both transformers (ASM T1 and ASM T2), the 63 kV bus and the 161 kV bus, superstructures, and protection and control equipment.

This alternative would meet both Project objectives and is technically feasible. Accordingly, FBC evaluated this alternative further based on non-financial and financial criteria, as described in Section 4.3.

4.2.6 Alternative 6: Retain the Existing ASM Terminal Station and Add a New Transformer at WTS

This alternative includes installing a third transformer at WTS (WTS T3) while maintaining ASM T1 and ASM T2 at the existing ASM Terminal Station, resulting in the operation of three transformers in parallel. While this option would provide increases in capacity and some

redundancy to the system, FBC determined that this option is not feasible as it is not practical or cost-effective due to construction, operability/maintainability and safety limitations and constraints. This alternative would involve expanding WTS to incorporate a 63/161 kV transformer and a 161 kV transmission line connection and would require an extension of 11E Line from the ASM Terminal Station back to WTS. 11E Line would connect to both the ASM Terminal Station and WTS, and the ASM Terminal Station would remain operational with its existing equipment (i.e., the existing ASM T1 and ASM T2 transformers) inside the existing footprint. Several limitations and constraints were found with this alternative, including issues with the existing corridor between WTS and the ASM Terminal Station (circuit spacing, infrastructure congestion, topography, and access limitations), protection and control requirements, and an increase to system fault levels. For example, the transmission corridor between the ASM Terminal Station and WTS is not wide enough to comply with 161 kV circuit spacing while also continuing to be occupied by multiple 63 kV transmission lines. Installing an additional 161 kV connection between WTS and the ASM Terminal Station, while maintaining the existing 63 kV Line between WTS and the ASM Terminal Station, poses design, construction, and operational risks due to the limited corridor spacing, the terrain, and increasing congestion. Although additional land could be acquired, the availability of useable land is limited due to the terrain. Further, this alternative fails to meet the Project objective of replacing aging infrastructure. As such, FBC rejected this option in the screening stage.

4.3 *ALTERNATIVES EVALUATION*

4.3.1 Introduction and Overview of Feasible Alternatives

As explained in Section 4.2, FBC determined that Alternatives 3 and 5[21] met the Project objectives and should be evaluated further, as they address the risk of transformer failure, increase the 161 kV capacity to the Boundary and Similkameen areas, fulfil FBC's Transmission Planning Criteria, and maintain reliable service.

In each of Alternative 3 and Alternative 5, the transformers to be installed (at the ASM Terminal Station and WTS, respectively) are 63/161 kV transformers with a rating of ONAN/ONAF 90/120/150 MVA, which is the current industry standard size for transformers in applications of this type.

In the subsections below, FBC describes the evaluation criteria used to assess Alternatives 3 and 5 and, based on the results of the evaluation, identifies the preferred Project alternative.

4.3.2 Description of Evaluation Criteria

FBC evaluates alternatives based on a consideration of both financial and non-financial factors, including technical attributes. These factors are listed below.

[21] Alternative 3 is also referred to as Option 1 and Alternative 5 is also referred to as Option 2 in the appendices to the Application because these were the two alternatives that passed the screening stage.

1. Infrastructure

    1.1. System Reliability: Considers whether the alternative meets the Single Contingency (N-1) Transmission Planning Criterion, including the long-term ability to continue to serve all load during the outage of a single element (in this case, one of the 63/161 kV transformers). This criterion also considers the long-term amount of incremental capacity added by the alternative, as well as the reliability, availability and sustainability of electrical supply on the transmission and substation facilities in normal and emergency situations.

    1.2. Potential for Future Expansion: Considers the potential for future expansion of a terminal station, such as the ability to add more transmission lines or capacity as needed in the future.

2. Safety

    2.1. Personnel Safety: Considers risks to FBC personnel or its contractors during construction and/or long-term maintenance on the assets/system.

    2.2. Construction Safety: Considers risk to other entities working on private infrastructure adjacent or in proximity to FBC assets during construction.

    2.3. Ground Grid Integrity: Considers the requirements necessary for the alternative to construct a ground grid that is capable of mitigating the future system fault currents and voltages within acceptable tolerances.

3. Environmental & Archaeological

    3.1. Ecological: Considers the impact of an alternative during construction and during the life of the assets on the habitat in or around the project location, including specifically environmentally sensitive habitats and species at risk.

    3.2. Air-quality & GHG Reductions: Considers the impact of known air-corrosion on the long-term care of the assets and operation of the system. This criterion considers the impact of the alternative on GHG emissions (or options to limit GHG emissions).

    3.3. Archaeology: Considers the impact during construction, as well as the long-term impacts of the alternative, to archaeology at the project site, including considering the risks and options to preserve Indigenous heritage that may be disturbed by excavation.

4. Community & Stakeholder Relations

    4.1. Land Use & Adjacent Infrastructure: Considers the impact of the alternative, both in the short-term and the long-term, on the community members' existing use or access to the land, as well as any impacts to adjacent infrastructure.

4.2. Community Impact: Considers the impact of the alternative on the community, such as noise, local emissions, aesthetics, and other nuisance factors (both short and long-term).

4.3. Economic Growth: Considers the short-term and long-term impact of increasing system capacity on the local economy.

5. Indigenous Impact:

5.1. Indigenous Relations Considers the impact during construction, as well as long-term, of the alternative on the Indigenous community, including culturally sensitive areas at or in proximity to the project site.

6. Technical

6.1. Land Availability: Considers the complexity and risks associated with various land-related factors, such as the requirement for acquisition of temporary and/or permanent land rights/ownership, and site preparation requirements. This criterion also considers the necessity of relocation or disturbance of other FBC assets or services both in the short-term and long-term.

6.2. Constructability: Considers the existing above- and below-ground constraints on construction activities, including but not limited to system operation, regulatory compliance, requirements for non-routine construction techniques and procurement.

6.3. Operations Accessibility and Operability: Considers the accessibility and operability of the facilities by FBC employees and its contractors that are working on system repairs, performing routine maintenance, or transferring load during real-time outages, both during construction and long-term.

7. Financial

7.1. Rate Impact: Considers the levelized rate impact over the analysis period.

4.3.3 Assessment of Alternatives 3 and 5 based on Non-Financial Evaluation Criteria

4.3.3.1 Scoring and Weighting

Table 4-1 below shows the weighting applied for each of the non-financial evaluation criteria.

Table 4-1: Project Alternatives Evaluation Criteria (Non-Financial)

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%**

Table 4-2 below shows the scoring applied to each of the non-financial evaluation criteria.

Table 4-2: Non-Financial Evaluation Scoring Definitions

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

4.3.3.2 Non-Financial Evaluation Summary

Table 4-3 below provides a summary of the weighted scores and a rationale for this scoring against the non-financial evaluation criteria set out in Table 4-1 above. Each of the evaluation

[22] Provided values are rounded.

criteria was assessed based on the alternative's performance both during the short-term construction and during the long-term system operation.

Table 4-3: Scoring of Non-Financial Criteria between Alternatives 3 and 5

Criteria	Alternative 3 Rebuild ASM Terminal Station	Alternative 5 Expand WTS
Infrastructure		
	1	**2**
System Reliability (Weighting - 8.8 %)	• Reliability to the CSC will be impacted during construction. • Redundant lines between the ASM Terminal Station and WTS will share a corridor and could be subject to the same outage events (for example, a tree fall). Customers could continue to experience poor power performance as a result.	• Customers on the east end of 11E Line no longer experience poor power performance (low voltage) in a 34 Line outage event. • Less equipment installation required, limiting the additional number of failure points, providing optimal improvements in equipment reliability.
Potential for Future Expansion (Weighting - 7.2%)	**0**	**2**
	• Future site expansion is limited by topography to the south and west, proximity to third-party infrastructure to the east, and other FBC facilities/operations to the north.	• Provides adequate space for future additional 161 kV transmission infrastructure (i.e., secondary 161 kV transmission egress). • The land and topography in and around WTS could provide possibilities for other future station or transmission works (63 kV or 230 kV).
Safety		
Personnel Safety (Weighting – 4.9%)	**1**	**3**
	• Construction executed as brownfield. • Crews will be exposed to the hazards of working in close proximity to energized equipment for the full construction duration. • Site access is limited. Improvement opportunities are limited due to the terrain, topography, and bank stability. • Lack of long-term access to the station is expected to infringe safety, long-term maintenance (under normal and emergency operating conditions), and/or future projects. • Site and surrounding area will be highly congested due to the interference between construction and the neighbouring FBC operations. • Consistent and extensive hazard oversight and management throughout construction required.	• Can be executed as a greenfield project for most of construction. • Exposure to energized equipment can be limited through project staging. • Site has multiple points of access during construction and long term. • Site congestion and the potential safety implications can be managed through project staging.

Criteria	Alternative 3 Rebuild ASM Terminal Station	Alternative 5 Expand WTS
Construction Safety (Weighting – 4.9%)	**2**	**2**
	• Close proximity to a Canadian Pacific Railway (CPR) railroad; however, construction is not anticipated to interfere with CPR operations. • CPR operations could cause brief delays with construction and/or congestion. • Potential for high volume of traffic due to construction, which could impact the traffic flow of the greater Warfield Operations and by extension neighbouring public space and traffic intersections. • Multiple transmission line crossings that will need to be managed and coordinated during construction.	• Adjacent to various third-party underground infrastructure. • Some disturbance to neighbouring third-party operations is expected; disturbances can be limited to the construction window and managed through collaboration and coordination with these neighbouring entities. • Some third-party infrastructure may require relocation; however, this is a routine undertaking with known hazards and can be managed with existing mitigation plans. • Multiple transmission line crossings that will need to be managed and coordinated during construction.
Ground Grid Safety (Weighting – 5.2%)	**0**	**2**
	• Known ground grid limitations with the existing configuration. Additional upgrades to ground grid have already been exhausted. There is no additional space at this location (ASM Terminal Station) to expand the ground grid. • Site expansions/upgrades will only increase the fault levels and increase the operational risks and safety hazards.	• Known ground grid limitations with existing configuration. Limitations of the site (WTS) are only prevalent under very specific site conditions, which occur only a couple days in any given year (i.e., specific winter conditions). • Preliminary investigation identified that there are options available for managing and/or mitigating the ground grid limitation. • There is adjacent land available to support grounding improvements.

Criteria	Alternative 3 Rebuild ASM Terminal Station	Alternative 5 Expand WTS
Environmental & Archaeological		
Ecological (Weighting – 8.1%)	**1**	**2**
	• Land is already disturbed by station and transmission infrastructure. • Located within the City of Trail and has been subjected to historical deposition of aerial emission from local lead and zinc smelting facilities. • Potential high metal concentration in soils, triggering the Contaminated Sites Regulation. • As owner of the site, FBC would be responsible to undertake proper soil disposal for station and transmission ground disturbances.	• Land is already disturbed by station and transmission infrastructure. • Located within the City of Trail and has been subjected to historical deposition of aerial emission from local lead and zinc smelting facilities. • Potential high metal concentration in soils, triggering the Contaminated Sites Regulation. • WTS land is owned by Teck Metals Ltd. who is responsible for proper disposal of the contaminated soils; FBC would collaborate with Teck Metals Ltd. • Transmission work will include minimal ground disturbance. FBC would be responsible to undertake proper soil disposal.
Air Quality and GHG Reduction (Weighting – 6.8%)	**2**	**2**
	• Can use vacuum type circuit breaker technology at the 63 kV class. • Corrosion prevention plan is needed to preserve asset integrity.	
Archaeological (Weighting – 8.1%)	**1**	**2.5**
	• The ASM Terminal Station is identified as an area of archaeological potential by the Archaeological Overview Assessment (AOA).[23] • A more in-depth Archaeological Impact Assessment (AIA) would be required for station and transmission work. • AIA may determine additional archaeological actions are required during the excavation phase of construction.	• WTS identified as low potential for archaeological impact as per the AOA.[24] • AOA indicated that no additional archaeological actions were required at that time and that construction could proceed using existing Chance Find[25] for majority of area. • Transmission work is primarily overhead work with minimal ground disturbances. • AIA is required for the particular transmission scope involving ground disturbances.

[23] Appendix D, p. 1.
[24] Appendix D, p. 2.
[25] FBC's Chance Find Procedure requires the following actions in the event that an artifact is discovered during project activities: (1) If intact or disturbed archaeological deposits or potential human remains are encountered, immediately stop construction in the vicinity of the archaeological site; and (2) The Construction Manager (or designate) will contact the FortisBC Archaeologist for further guidance. See Appendix E-1 for further details.

Criteria	Alternative 3 Rebuild ASM Terminal Station	Alternative 5 Expand WTS
Community and Stakeholder Relations		
Land Use & Adjacent Infrastructure (Weighting – 5.4%)	2	3
	• The land is already used by station and transmission infrastructure. • The ASM Terminal Station is visible from neighbouring residential community. • Demolition and construction are expected to cause some disturbance to the neighbouring community.	• The land is already used by station and transmission infrastructure. • WTS is fully surrounded by industrial operations. No residential touch points are within proximity of the station.
Community Impact (Weighting – 7.2%)	**2**	**3**
	• FBC Warfield Facilities will need to accommodate increased deliveries, disruption to compound traffic flow, reduction to available space, and site congestion from increased personnel, equipment, project staging and parking, in addition to maintaining all existing Operations. Likelihood that congestion will cause backlog of traffic or parking outside FBC existing facilities.	• Small community impact both during construction and long term. • Minimal noise disturbance. Equipment noise will blend into existing ambient noise because the site is immersed in an industrial area. • WTS is located further away from residential communities than the ASM Terminal Station.
Economic Growth (Weighting – 5.4%)	**3**	**3**
	• Short-term economic growth opportunities during construction for the Kootenay region. • Long-term economic growth opportunities for the Boundary and Similkameen areas.	
Indigenous		
Indigenous Relations[26] (Weighting – 8%)	**2**	**2**
	• Same Indigenous Communities are engaged with each alternative. • Indigenous Communities were notified as part of the development phase and FBC received consistent responses and requests. • No immediate concerns were raised in response to the initial notification. • The Indigenous Communities engagement will continue as the project progresses, including identifying potential opportunities for Indigenous participation and ensuring local Indigenous individuals and groups are offered access to opportunities.	

[26] Based on the AOA, Alternative 3 does hold a higher potential for a large volume of Indigenous Engagement, Consultant, and Support regarding Heritage protection than Alternative 5. The impacts of the AOA are considered in the Environmental & Archaeological Evaluation criteria.

Criteria	Alternative 3 Rebuild ASM Terminal Station	Alternative 5 Expand WTS
Technical		
Land Availability (Weighting – 4%)	2.5	2
	• FBC already owns the ASM Terminal Station land. • The land has limited expansion options due to the steep terrain of the bank and proximity to CPR operations and other existing FBC operations. • Possible these land limitations could become cumbersome (logistically, technically, or financially) during construction or in the future. • Additional SRW would be required for changes to the transmission corridor.	• WTS land is owned by Teck Metals Ltd. FBC has an existing SRW at WTS that extends beyond the existing fence-line and can accommodate the station expansion. While the SRW language would require amendment for construction, FBC has secured an Agreement to Grant for the required amendment. • WTS is relatively flat and accessible. • Additional SRW required for the transmission work from Teck Metals Ltd. FBC has secured an Agreement to Grant for this additional SRW. • Additional SRWs are required for transmission work for land owned by the Ministry of Transportation and Infrastructure (MOTI).
Construction (Weighting – 8%)	1	3
	• Numerous outages required during construction. • High construction risk. • Complex project staging with multiple stages. • High site congestion. • Brownfield construction practices. • Land limitations pose significant risk. • Transmission work is more extensive resulting in a higher frequency of outages and greater total outage time.	• Less outages during construction, both in frequency of outages and total outage time. More outage flexibility and opportunity to schedule outages for points of lowest impact. • Lower construction risk. • Simpler project staging. • Site congestion can be easily managed. • Application of greenfield construction practice for majority of construction window.
Operations	2	2.5

Criteria	Alternative 3 Rebuild ASM Terminal Station	Alternative 5 Expand WTS
Accessibility & Operability (Weighting – 8%)	• Construction will infringe on the ASM Terminal Station, 11E Line, and 34 Line access, maintainability, and operability for the duration of construction and long term.	• Simpler system configuration with less equipment and less potential points of failure. • Less equipment to perform long-term maintenance on. • WTS has multiple points of access for maintenance during construction and long term. • The ASM Terminal Station will be accessible for maintenance during the construction window. • Transmission work will create congestion and constraint in the transmission corridor for maintenance on other lines. Long-term impacts are manageable.
Weighted Total[27]	**1.43**	**2.39**

As the table above demonstrates, based on the non-financial criteria, Alternative 5 is superior to Alternative 3.

4.3.4 Assessment of Alternatives 3 and 5 based on Financial Criterion

The financial evaluation considered the levelized rate impact resulting from each alternative over the 53-year analysis period. The 53-year analysis period is based on a 50-year post-project analysis period from 2027 (all assets estimated to enter FBC's rate base in 2027) plus three years for the estimated construction schedule from 2024 to 2026. The 50-year post-project analysis period is based on the Average Service Life (ASL) of the station equipment in the transmission plant category (i.e., asset class 353 Station Equipment)[28].

Table 4-4 below provides a summary of the financial analysis of Alternatives 3 and 5 over the 53-year analysis period at an AACE Class 4 estimate. As explained in Table 4-3 above (under the criterion of "Construction"), Alternative 5 has better constructability, lower construction risk, and less equipment procurement risk than Alternative 3. This is reflected in the lower estimated capital cost for Alternative 5 as compared to Alternative 3, as shown in Table 4-4 below. Please refer to Appendix C for a summary of the capital costs for both Alternatives 3 and 5 at an AACE Class 4 estimate level.

In addition to the difference in capital costs, Alternative 3 would have higher outage wheeling costs due to more outages during construction (as discussed in Table 4-3 above under the criterion of "Construction") and higher incremental operations and maintenance (O&M)

[27] Weighted total is calculated for each alternative by multiplying the score for each criterion with its associated weighting and then summing the scores. The maximum possible weighted total is 3.
[28] ASL of 50 years per FBC's 2017 Depreciation Study approved as part of the 2020-2024 MRP Decision and Order G-166-20.

expenses due to more equipment to maintain (as discussed in Table 4-3 above under the criterion of "Operations Accessibility & Operability") than Alternative 5, both of which are reflected in the present value (PV) of incremental revenue requirement and incremental O&M, respectively in Table 4-4 below. Overall, Alternative 3 has a higher PV of incremental revenue requirement and therefore a higher impact to customer rates over the 53-year analysis period compared to Alternative 5. As such, Alternative 5 is preferable to Alternative 3 based on the financial evaluation.

Table 4-4: Financial Evaluation Summary of Alternatives 3 and 5

	Alternative 3: Rebuild ASM	Alternative 5: Expand WTS
Capital Costs, including AFUDC[29], AACE Class 4, As-spent ($ millions)	43.517	28.378
Incremental O&M Expense in 2027, As-spent ($ millions)	0.014	0.002
Total PV of Incremental Revenue Requirement over 53 Years ($ millions)	57.736	37.372
Levelized Rate Impact over 53 Years (%)	0.82	0.53

4.4 *ALTERNATIVE 5 IS THE PREFERRED PROJECT ALTERNATIVE*

On the basis of FBC's financial and non-financial evaluation framework, the preferred solution is Alternative 5, under which FBC would expand WTS to incorporate a 63/161 kV conversion and convert 34 Line to 161 kV and interconnect it with 11E Line to extend 11E Line back to WTS, then decommission the ASM Terminal Station. Alternative 5 involves the following key components:

- Reconfiguring the 63 kV egress at WTS for 34 Line, 9 Line, and 10 Line;
- Expanding the WTS footprint;
- Installing two additional 63/161 kV transformers, reconfiguring the 63 kV ring bus, and adding a 161 kV two breaker bus;
- Converting 34 Line to 161 kV rating then connecting 11E Line from the ASM Terminal Station to WTS by repurposing 34 Line as an extension to 11E Line; and
- Demolishing the ASM Terminal Station above grade.

Alternative 5 satisfies the need for the Project and provides several non-financial benefits. It meets FBC's transmission planning criteria, improves system reliability, has the potential for future expansion, and delivers the necessary safety performance. It also has limited environmental, archaeological, and community impact. Alternative 5 also carries less risk associated with construction and system operation during the construction and it has less long-term maintenance needs.

[29] AFUDC is calculated based on the currently approved rate of 5.73 percent (approved as part of the FBC 2023 Annual Review Decision and Order G-282-22).

From a financial perspective, based on Class 4 estimates, Alternative 5 has a lower PV of incremental revenue requirement and levelized rate impact over a 53-year analysis period than Alternative 3.

Given Alternative 5 is superior from both a non-financial and financial perspective, FBC has selected it as the preferred solution for the Project.

4.5 *CONCLUSION*

FBC evaluated six alternatives in the screening stage to determine whether they would meet the Project objectives of (1) increasing capacity to the Boundary and Similkameen areas to maintain safe and reliable service to customers, and (2) addressing the high failure risk of the existing two transformers at the ASM Terminal Station which are aging and in poor condition.

Based on FBC's screening, two alternatives were identified as meeting the Project objectives and feasible: Rebuilding the ASM Terminal Station and Expanding the Existing Site Footprint (Alternative 3); and Expanding the WTS Site and Demolishing the ASM Terminal Station (Alternative 5). FBC evaluated Alternatives 3 and 5 based on non-financial and financial criteria and determined that Alternative 5 is superior from both a non-financial and financial perspective. Accordingly, FBC has selected Alternative 5 – Expanding the WTS Site and Demolishing the ASM Terminal Station – as the preferred solution for the Project, as further described in the remaining sections of the Application.

5. PROJECT DESCRIPTION

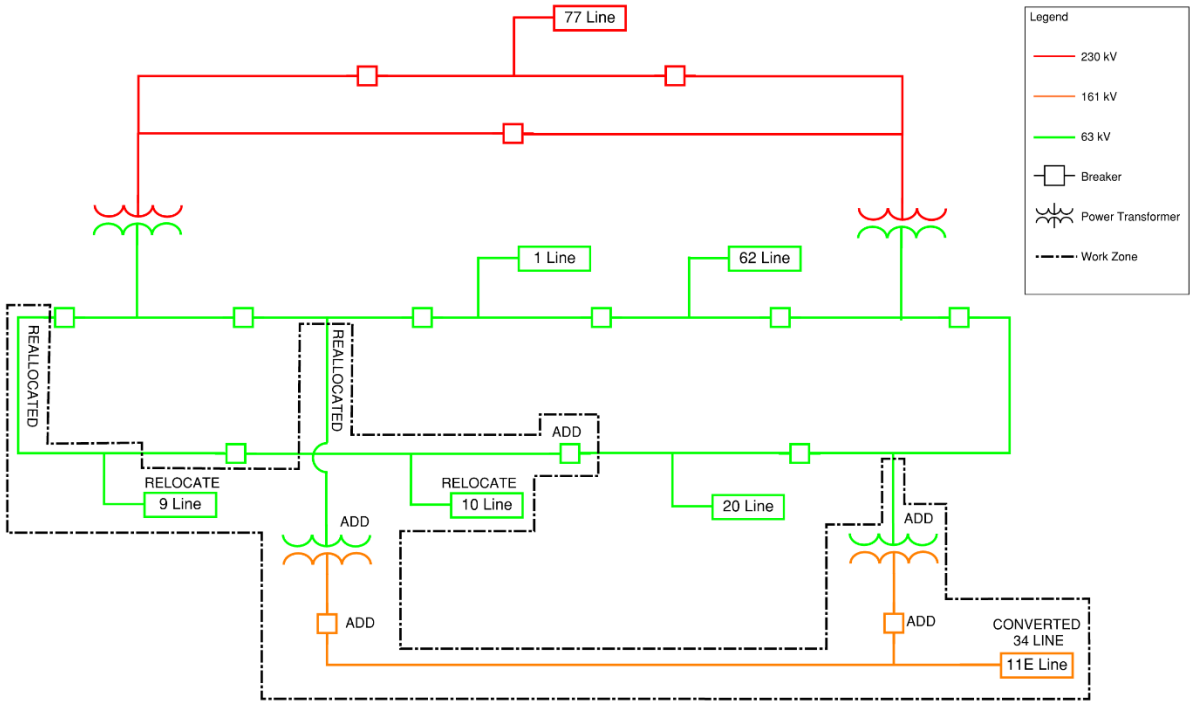
In this section, FBC describes the proposed Project in more detail, including information on the Project components, schedule, resource requirements, and risks and management.

5.1 *PROJECT OVERVIEW*

As discussed in Section 4, FBC's recommended alternative requires the installation of two new 150 MVA 63/161 kV transformers at WTS, located in Trail, BC, and the subsequent decommissioning of the existing ASM Terminal Station.

Figure 5-1 shows a simplified single line drawing of the proposed installation. Preliminary drawings showing the detailed single line diagram and general arrangement are included in Confidential Appendices F.

Figure 5-1: Proposed WTS Simplified Single Line Diagram



The Project's principal elements are modifications to the land, station, transmission line, distribution line, and fibre path, each of which is discussed in more detail below.

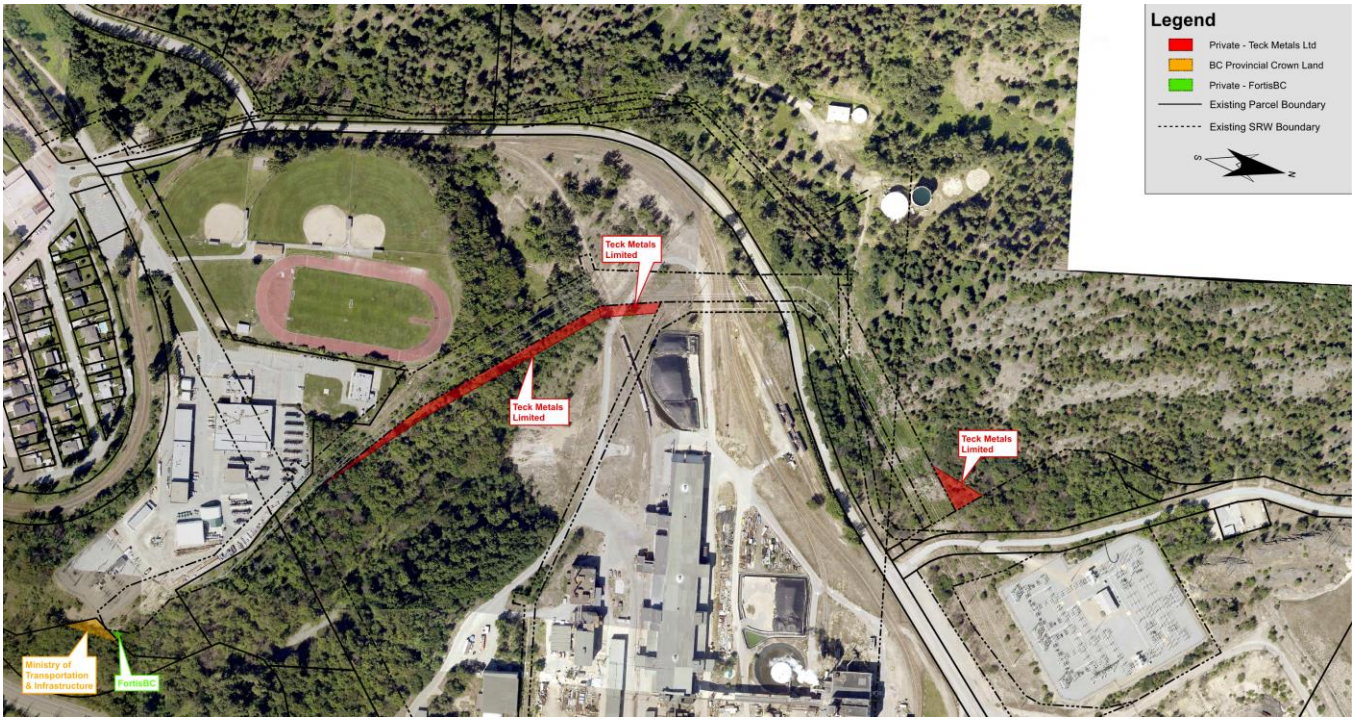
5.1.1 Land Modifications

WTS facilities are located within an FBC SRW, referred herein as SRW1, which allows for substation works of 63 kV and/or 230 kV infrastructure. The expansion of WTS will remain within the existing SRW1 boundary, as previously illustrated in Figure 4-5. In 2022, FBC entered into an Agreement to Grant with the Landowner (Teck Metals Ltd.) of the relevant land, to

modify the existing SRW1 legal agreement terms that would allow for substation works of 63 kV to 230 kV infrastructure.

The existing transmission connection (34 Line) between WTS and the ASM Terminal Station currently exists within a second SRW, referred herein as SRW2. SRW2 is also occupied by transmission lines 9 Line and 10 Line. Changes to the transmission corridor will require additional SRWs. Figure 5-2 below shows the locations of the additional transmission SRW areas, with a total additional area required of 3,511.2 m^2. This land is currently owned by three parties - FBC, the Ministry of Transportation and Infrastructure (MOTI), and Teck Metals Ltd. FBC has entered into an Agreement to Grant with Teck Metals Ltd. to acquire these additional SRWs after Project approval. Standard SRW processes will be followed during detailed design to acquire the new SRW from MOTI.

Figure 5-2: Aerial Image of Additional SRWs and their Associated Owners for the 34 Line and 11E Line Transmission Corridors



5.1.2 Station Modifications

Preliminary station engineering was completed to support Project definition work and evaluate the station configurations. The preliminary design provides the proposed station layout. The design will be further defined as part of the detailed design subsequent to BCUC CPCN approval.

WTS is able to accommodate two additional transformers with extension to the south and west, while remaining within SRW1. The existing 63 kV ring bus arrangement can be modified to add one additional node to relocate the 10 Line transmission egress. The existing nodes (9 Line, 10

Line, and 34 Line) will be reconfigured to change the 9 Line transmission egress and connect the two additional transformers. New 161 kV infrastructure will be installed in WTS to accommodate the 11E Line egress.

The existing ASM Terminal Station will be demolished at the end of the Project since that capacity will be supplied by WTS.

A summary of the station modifications to be completed for WTS as part of the Project is provided below:

- Expand existing station footprint to the south and west as indicated in Confidential Appendix F-2;
- Adjust existing main station access road, provide new access to the station extensions, and revise the station fence boundary and security;
- Upgrade station ground grid per grounding drawing, including one additional ground well, two additional lighting masts, and an asphalted perimeter exterior to the fence line;
- Reconfigure the 9 Line and 10 Line egress to clear the area for station works. This involves installing one new 63 kV 2,000 A vacuum type circuit breaker with access platforms, associated disconnect switches, buswork, connectors, supports, superstructures, foundations, and the addition of one 63 kV voltage transformer. Two 60 kV A-frame superstructures with foundations will also be provided, each with 72 kV 2,000 A motor operated disconnect switches (line switches), 48 kV Maximum Continuous Operating Voltage (MCOV) line arresters, conductors, and connectors;
- Demolish three of the existing 63 kV (existing 9 Line, 10 Line, 34 Line) A-frame structures on-site to provide space for new equipment;
- Reconfigure the 63 kV ring bus to provide additional connection points for two new transformers. This will involve the re-use of the existing 72 kV line switches for T3-2 and T4-2 (existing ID WTS 10-1 and WTS 34-1) and voltage transformers for T3-VT and T4-VT (existing ID WTS 10-VT and WTS 34-VT) to create new transformer nodes in the ring bus;
- Install two new 150 MVA, 161 kV / 63 kV / 25 kV auto transformers with On-load Tap Changer (OLTC) along with the necessary foundations, secondary oil containment with oil-water separation, and fire walls;
- Construct a 161 kV 2 breaker bus. This will involve the addition of two 230 kV, 2,000 A SF6 circuit breakers with aluminium access platforms, associated disconnect switches, buswork, connectors, three capacitive voltage transformers, and associated superstructures and foundations;
- Install one new 230 kV A-frame superstructure and foundation for 11E Line egress (formerly 34 Line egress), including 230 kV 2,000 A motor operated disconnect switch, 3-phase 111 kV MOCV line arresters, associated supports, connectors, and conductor;

- Provide new cable trench sections and covers which extend from the existing cable trench. This will include the installation of new conduits from the cable trench to new or re-positioned field devices; and
- Upgrade the protection system. This will involve adding two new line protection relays, replacing eight line relays, four new transformer protection relays (primary and secondary), three new meters, eight new lock-out relays, two new Input/Output Panels, additional Supervisory Control and Data Acquisition (SCADA), additional communication and annunciator modules, and all associated wiring (field and control building).

Following completion of the work at WTS, the demolition of the ASM Terminal Station will proceed, which includes:

- Salvage equipment as required;
- Demolish existing buswork, connectors and bus supports;
- Demolish existing superstructures;
- Remove all field cabling; and
- Abandon station foundations (after cutting off anchor bolts), conduits, secondary oil containment, fire suppression building, ground grid, and control building.

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

5.1.3 Transmission Modifications

Preliminary transmission line engineering was completed to support Project definition and to evaluate structure types and configuration. Transmission system modifications identified for the Project are associated with 9 Line, 10 Line, 34 Line, 11E Line, and 62 Line. FBC has existing SRWs with the landowners for these transmission lines. Modifications to 9 Line, 10 Line, 34 Line, and 11E Line require additional SRWs in specific locations adjacent to the existing SRWs, as discussed in Section 5.1.1 above, to permit aerial passes, structure placement with and without anchoring, and access for construction and long-term maintenance. Work on 62 Line is within the existing transmission right-of-way.

A summary of the transmission work required as part of the Project is set out below:

- Relocate 9 Line and 10 Line approach to the west of the station to provide the necessary clearance and space for the required station works;
- Relocate 34 Line approach to WTS to the west to provide the necessary clearance and space for the required station works;
- Upgrade 34 Line insulation from 63 kV to 161 kV and add arresters and additional grounding to selected structures for the higher operating voltage;

- Re-terminate 34 Line at the ASM Terminal Station into 11E Line and repurpose to extend 11E Line back to WTS; and
- Pole wrap 62 Line Structure ID 62L2 and bond ground rods into the expanded WTS ground grid.

Further details of the Project's transmission scope are included in Confidential Appendix G-2.

5.1.4 Distribution (Underbuild) Modifications

There are no distribution services supplied by WTS as a result of the Project. Stoney Creek Feeder 1 (STC1) is underbuilt on 9 Line, 10 Line, and 34 Line transmission structures, which will be re-routed to the new structures, once installed.

Further details of the Project's distribution scope are included in Confidential Appendix G-2.

5.1.5 Fibre Modifications

The existing fibre path circuits Webster Aerial FOSC to the ASM Terminal Station, ASM to the Secondary Control Centre (SCC) and then SCC to WTS.

A summary of the fibre work required as part of the Project is as follows:

- Install new 72 strand ADSS fibre cable from WTS and SCC routing along new 10 Line and 9 Line/10 Line structures to maintain communication services between WTS and SCC; and
- Salvage existing fibre between WTS and SCC.

Further details of the Project's fibre scope are included in Confidential Appendix G-2.

5.2 *PROJECT ENGINEERING AND DESIGN*

Engineering and detailed design is expected to start immediately upon CPCN approval by the BCUC. Activities will encompass all engineering calculations, validations, specifications, and drawings required to cover the Project need. Engineering activities will be organized in order of priority, in relation to the fabrication and procurement lead times and schedule date for each component to be on the work site.

The Engineering packages to be completed include, in no particular order:

- Transformer specification;
- Circuit breaker specification;
- 9 Line and 10 Line transmission re-alignment scope (and any associated distribution underbuild);
- WTS site preparation scope;

- WTS civil scope;
- WTS electrical scope;
- 34 Line conversion and re-alignment scope (and any associated distribution underbuild);
- Fibre modification scope; and
- ASM Terminal Station demolition scope.

Engineering will be completed either by FBC or by an FBC pre-qualified external engineering firm. Each engineering package completed by external resources will be reviewed and accepted by FBC Engineering. Engineering design will occur in stages, anticipated to begin in the first quarter of 2024. The design stage will be concluded by the final design review, prior to issuance of each Issued for Construction package.

The application processes for permits and approvals will be initiated and managed by Engineering in detailed design. This will include but is not limited to Environmental, Archaeological, MOTI, CPR, and any/all other permits, approvals, and authorizations.

5.3 *PROJECT MANAGEMENT AND RESOURCES*

5.3.1 Project Management Office

FBC will have a Project Manager/Owner's Representative who will manage all aspects of the Project including, but not limited to, permitting, engineering, procurement, and construction. The Project Manager is responsible for overseeing all Project activities.

Additionally, FBC will have a Construction Manager on site who will manage the construction activities and resources (both contracted resources and internal resources). The Construction Manager is responsible for all health and safety, quality, environment, schedule, outage staging and planning, and cost controls on site.

The Project Manager will be supported by other members of the FBC Project Management Office as required, such as Project Schedulers, Cost Analysts, and Administration. The Project will also be supported by other Company departments including Occupational Health and Safety, Operations/Network Services, Environment, and Lands. The Project Manager will be responsible for liaising with these other departments as required.

5.3.2 Engineering

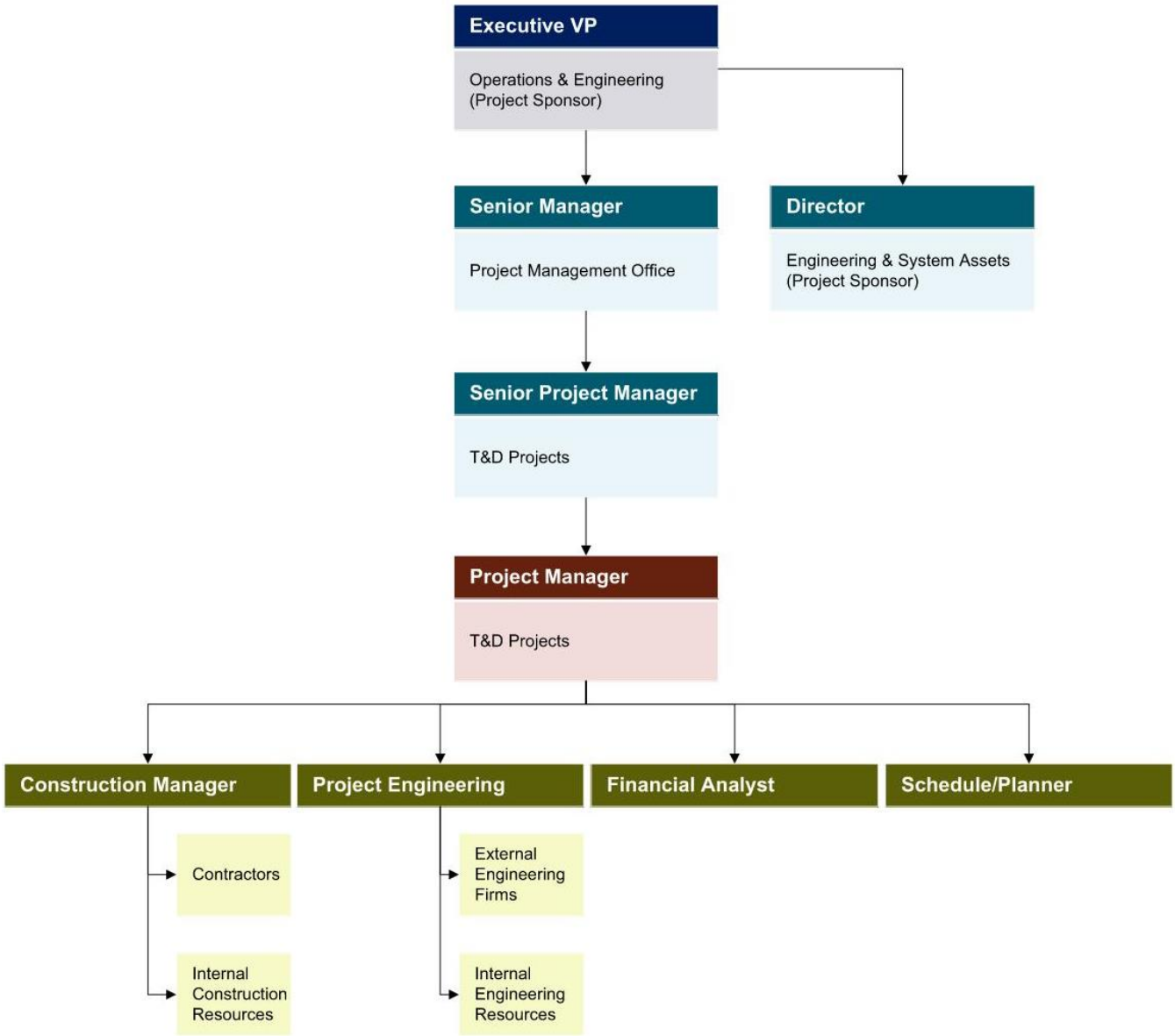
FBC will have a dedicated Project Engineer and supporting Design Technologists assigned to manage the engineering component of the Project. Supplemental external engineering support will be required to complete various engineering designs, such as geotechnical, site preparation and excavation, concrete foundations, and concrete containments.

5.3.3 Construction Services

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.

An organizational chart for the Project is provided in Figure 5-3 below.

Figure 5-3: Organizational Chart



5.4 *PROJECT ACCESS AND STAGING AREA*

WTS is located at the corner of Hanna Creek Road and Warfield Hill Road in Trail, BC. Both of these roads are paved and in good condition, as shown in Figure 5-4 below. The site is currently accessible from access roads on both the east and west perimeters.

Figure 5-4: Existing Station Access

The south/southeast perimeter of the station will be extended towards Warfield Hill Road. Two additional accesses to the station will be installed for this area, as reflected in Confidential Appendix F-2.

Existing access roads to 11E Line will be used to facilitate construction. Additional access roads may be found necessary during detailed design. Where possible, FBC plans to use its

warehouse in Warfield for material storage. Any field staging areas will be discussed with the Landowner (Teck Metals Ltd.).

5.5 *PROJECT SCHEDULE*

The Project schedule has been compiled to meet an in-service target of Q4 2026. The Project schedule considered engineering, procurement, construction, and project close-out.

Engineering and procurement for the Project will begin immediately upon BCUC approval. FBC has standard equipment specifications for equipment relevant to the Project scope, which reduces risk for ordering the long-lead time materials. The longest procurement lead time is for the power transformers, which will be competitively bid, and this process typically takes two to three months to select a supplier, and an expected further 18 to 24 months for manufacture.

Construction will require a high degree of coordination to complete. The construction phase of the Project will require important coordination on site and with the FBC System Control Centre (SCC) to complete the relocation, removal, and installation of various electrical components. FBC will make every effort in Project staging and scheduling to minimize outages and system impact. Outage windows to operating transmission lines will be scheduled at the start of the Project and updated on a bi-weekly basis. This is a standard practice between the SCC and the Project Management Office to provide definitive construction periods when outages are required. These outages will be scheduled during low load periods, where possible, to reduce the impact of the outage.

Initially, FBC will focus on relocation of the 9 Line and 10 Line transmission egress at WTS to maintain supply to CSC throughout construction. A brief outage may be required to CSC to perform transmission cutovers.

FBC will then focus on site preparation and construction of WTS station work. 34 Line, 11E Line, and the ASM Terminal Station will remain energized for the majority of this time. 34 Line conversion will require several outages (1 to 2 weeks in duration each) over the duration of construction. Multiple crews will be used to complete the work in this time to shorten outage duration, and outages will be scheduled for low load periods (i.e., shoulder seasons). Upon completion of installing WTS T3, a brief 34 Line outage will be taken to cut-over the converted 34 Line to the new WTS 11E Line transmission structure and 11E Line to new structures located back at the ASM Terminal Station. 34 Line will be redesignated as an extension 11E Line.

FBC will then proceed to focus on installing and energizing the two WTS transformers (WTS T3 with WTS T4) and 11E Line. The ASM Terminal Station will remain on standby until both WTS T3 and T4 are in service.

The basic sequence of construction is as follows:

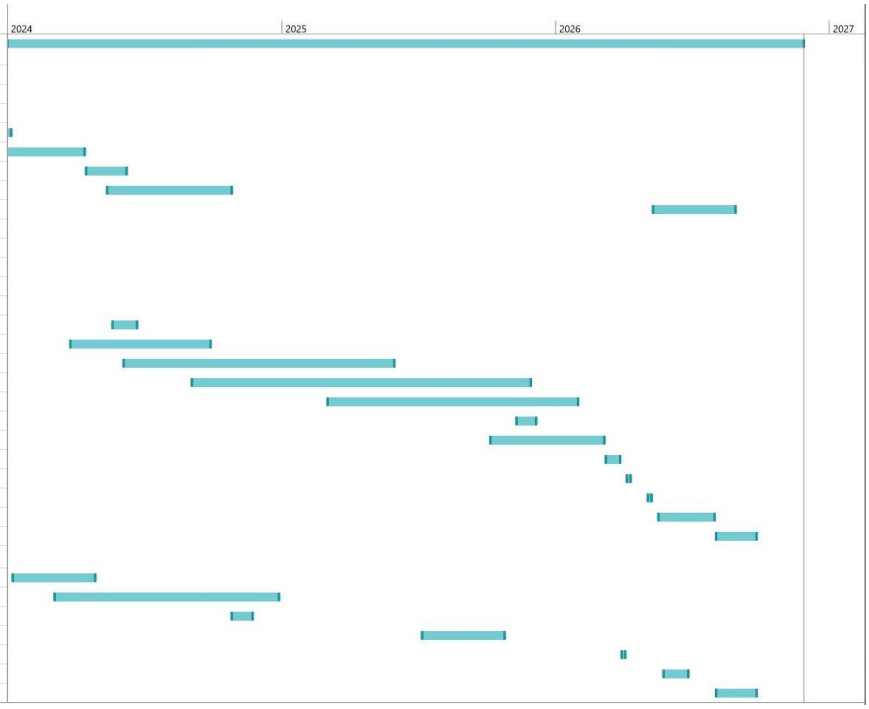
1. Relocation of 9 Line and 10 Line transmission egress at WTS;
2. WTS extension and site preparation;

3. Complete civil installations at WTS;
4. Re-configure the WTS 63 kV bus;
5. Install WTS T3, 161 kV bus work, protection and control, communication, and SCADA requirements;
6. Convert 34 Line from 63 kV to 161 kV rating (simultaneous with steps 2-5 above);
7. Cut-over 34 Line to 11E Line at the ASM Terminal Station. Re-route and re-terminate 34 Line egress at WTS to the new 11E Line transmission structure;
8. Energize WTS T3 and re-energize 11E Line from WTS;
9. Complete installation of WTS T4 and energize;
10. Re-route 48 fibre cable (simultaneous with above work); and
11. Demolish the ASM Terminal Station.

The following Project schedule (Figure 5-5) assumes that FBC receives CPCN approval from the BCUC by December 31, 2023, or approximately 90 days following the end of the estimated regulatory process.

Figure 5-5: Project Schedule

ID	Task Mode	Task Name	Duration	Start
1		**WTS Expansion Project**	760 days	Mon 1/1/24
2		**ENGINEERING/DESIGN**		
3		CPCN Approval	1 day	Mon 10/2/23
4		9/10L Reconfiguration (IFC)	39 days	Tue 10/3/23
5		Site Preparation (IFC)	69 days	Tue 10/3/23
6		Civil/Physical (IFC)	100 days	Mon 11/27/23
7		Module (IFC)	40 days	Mon 4/15/24
8		Electrical (IFC)	120 days	Mon 5/13/24
9		Engineering As-Builds	80 days	Mon 5/11/26
10		**STATIONS**		
11		Transformer procurement	70 days	Mon 7/10/23
12		Issue transformer PO	0 days	Mon 10/16/23
13		9/10L switch/PT procurement	5 days	Mon 10/23/23
14		High voltage Breaker procurement	10 days	Mon 7/10/23
15		Major material procurement	25 days	Mon 5/20/24
16		Site preparation construction	135 days	Mon 3/25/24
17		Civil/Site construction	259 days	Tue 6/4/24
18		Physical construction	324 days	Tue 9/3/24
19		Electrical construction	240 days	Mon 3/3/25
20		Transformer delivery and assembly	20 days	Mon 11/10/25
21		Commisioning	110 days	Mon 10/6/25
22		Deficiencies/handover documentation	15 days	Mon 3/9/26
23		WTS T3 Energization	5 days	Mon 4/6/26
24		WTS T4 Energization	5 days	Mon 5/4/26
25		ASM station salvage	55 days	Mon 5/18/26
26		Project closeouts	40 days	Mon 8/3/26
27		**Transmission/Distribution**		
28		Engineering (IFC)	80 days	Mon 1/8/24
29		Material procurement	215 days	Mon 3/4/24
30		Construction 9/10L reconfiguration	20 days	Fri 10/25/24
31		Construction 34L/11L rebuild	80 days	Mon 7/7/25
32		11L swing over to new infastructure	5 days	Mon 3/30/26
33		ASM structure salvage	25 days	Mon 5/25/26
34		Project closeouts	40 days	Mon 8/3/26



5.5.1 Impact of Supply Chain Issues on Project Schedule

The construction schedule in Figure 5-5 has taken into account prolonged lead-times based on the current labour and materials supply market. These lead-times assume no additional delays from what is currently being communicated from vendors. However, there are risk mitigations available should additional delays materialize. Mitigations include scheduling float for major equipment supply, construction methodology resequencing, resource levelling, overtime and shift rotations, and activity stacking.

5.6 *RISK ASSESSMENT*

FBC has assessed the risk to completing the Project by the in-service date in the fourth quarter of 2026. Circumstances that could delay the Project or increase costs are set out in Table 5-1 below.

Table 5-1: Risk Register

Type of Risk	Risk Description	Mitigating Actions	Likelihood of Occurrence (Low / Medium / High)
Scope	Scope creep due to existing conditions not reflecting that of existing as-built drawings on record.	FBC will validate existing conditions on site by surveying and reviewing substation drawings to reflect existing infrastructure.	Low
Safety	Contractors not familiar with FBC safe work practices resulting in injury or violation.	FBC will select a contractor with FBC substation experience or train the selected contractor prior to work commencing. FBC will provide a CAT 6 worker[30] to act as a site safety watch for construction work.	Low
Quality	Poor quality installations.	FBC will have dedicated resources monitoring construction activities as scheduled by the Construction Manager. An Inspection & Test plan will be implemented with the installation contractor.	Low
Cost	Raw material costs 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.	Medium
	Actual costs of construction are higher than estimated.	FBC will carefully monitor and control the budget.	Medium

[30] A Qualified worker authorized to perform the Person in Charge (PIC) duties (i.e., Control Release holder, Issue Permits and Protection Guarantees to Authorized workers).

Type of Risk	Risk Description	Mitigating Actions	Likelihood of Occurrence (Low / Medium / High)
Schedule	Availability of resources.	External contractors will be used with support from internal FBC crews. FBC anticipates availability of qualified external resources.	Low
	Availability of services and materials.	Schedule and order long lead-time materials in the early stages of the design to allow for ample time for delivery to site before required.	Medium
	Meeting construction windows for transmission outages.	In depth planning and scheduling of outages will be used to reduce this risk along with provisions of schedule buffers to mitigate impacts.	Low
	Scheduling conflicts with other system outages.	Early involvement and awareness from all internal groups well before construction to align outage requirements with system constraints.	Medium
	Access to FBC infrastructure inside Third Party Industrial zones.	Utilize qualified contractors that are familiar with Third Party safety requirements/orientation.	Low
	Project completion delayed.	Insert milestones in the contract with contractor and consider implementing liquidated damages or bonus structure to achieve schedule.	Medium
Environmental & Archaeological	Contaminated soils around existing station.	Early recognition by soil sampling to identify any contaminated areas. Collaboration with Teck Metals Ltd. and the Trail Area Health and Environment Program for contaminated soil will be used for testing and disposal.	Medium
	Wildfire risk during transmission work and site excavation.	In depth planning and scheduling this portion of work outside of wildfire season when possible. The work is confined to the substation property which has limited vegetation.	Low
	Unforeseen environmental or archaeological discoveries during construction.	FBC has procured specialists to evaluate environmental and archaeological potentials during preliminary planning to determine probability and associated costs. Specialist will be kept on reserve for quick response in event a finding does occur.	Low

FBC's analysis concludes that the overall risk to the Project schedule, quality, and cost, considering the planned mitigation activities, is Moderate to Low. Any cost impacts that may arise from these risk factors are expected to be manageable within the Project contingency, which is discussed in Section 6.2.

5.7 *CONCLUSION*

In this section, FBC has described the Project in detail, including information on Project components, schedule, resource requirements, and risks and management. The Project schedule incorporates required staging of station and transmission line work and considers seasonal windows for load transfers. Planned risk mitigation activities are in place to keep overall risk to the Project schedule low.

6. PROJECT COSTS, FINANCIAL ANALYSIS, ACCOUNTING TREATMENT AND RATE IMPACT

6.1 *INTRODUCTION*

The total Project cost estimate is $35.179 million in as-spent dollars, including cost of removal and AFUDC. This section provides a breakdown of the total Project cost estimate, summarizes the financial analysis performed, details the accounting treatment of the capital costs, and sets out the rate impact of the Project.

6.2 *SUMMARY OF PROJECT COSTS*

Table 6-1 below summarizes the total estimated Project capital costs in both 2022 and as-spent dollars.

Table 6-1: Breakdown of the Project Cost Estimate ($ millions)

Line	Particular	2022 $	As-Spent $	Reference
1	Station Construction Costs	20.453	22.270	Section 5.1.2
2	Transmission and Distribution Construction Costs	1.771	1.925	Section 5.1.3 and 5.1.4
3	Fibre Construction Costs	0.148	0.161	Sections 5.1.5
4	Removal Costs	0.984	1.092	Sections 5.1.2 to 5.1.5
5	Project Management and Owner's Costs	2.004	2.182	Sections 5.3
6	**Subtotal Project Capital Cost**	**25.361**	**27.631**	**Sum of Line 1 to 5**
7	Contingency	3.318	3.615	Section 6.2
8	**Subtotal Project Capital Cost w/Contingency**	**28.679**	**31.247**	**Sum of Line 6 to 7**
9	CPCN Preliminary Engineering Costs	0.751	0.760	Section 6.4.1
10	AFUDC	-	3.171	Conf. App. H, Sch 6, Ln 26 + 31 (2024-2026)
11	**Total Project Cost**	**29.430**	**35.179**	**Sum of Line 8 to 10**

The Project cost estimate, as provided in Table 6-1 above, is based on the following:

- A base capital cost estimate of $25.361 million (excluding contingency) in 2022 dollars developed by FBC in conjunction with PICA Engineering Ltd. (with respect to the station component of the Project) and DBS Energy Services Inc. (with respect to the transmission, distribution and fibre modification components of the Project) using the AACE Class 3 International Recommended Practices 18R-97 and 97R-18 as guides. The expected accuracy for a Class 3 cost estimate, as defined by the AACE, is low: -10 percent to -20 percent and High: +10 percent to +30 percent. Please refer to Section 5.1.2 for details related to the station component of the Project, and Confidential Appendix G-1 for the basis of estimate. With respect to the details of the Project related to transmission, distribution and fibre modifications, please refer to Sections 5.1.3, 5.1.4 and 5.1.5, respectively, as well as Confidential Appendix G-2 for the basis of estimates.
- A total contingency estimate of $3.318 million in 2022 dollars (approximately 13.1 percent of the base capital cost estimate of $25.361 million in 2022 dollars) was added to the base capital cost estimate. This contingency was estimated based on applying a

contingency of 15 percent for the station construction and removal costs before materials handling and provincial sales tax (as detailed in the basis of estimate for the station components in Confidential Appendix G-1), and a contingency of 10 percent for the transmission, distribution and fibre modification components (as detailed in Confidential Appendix G-2).

- To convert the base capital cost estimate and contingency from 2022 dollars to as-spent dollars over the period from 2023 to 2026,[31] a total escalation of $2.568 million was applied to the Project cost estimate. Of the total escalation of $2.568 million, $2.271 million corresponds to the escalation on the base capital cost estimate and $0.297 million corresponds to contingency. The escalation was derived based on a market report developed by Wood Mackenzie for FBC which provided a forecast of capital expenditure escalation for the period from Q2 2022 to Q4 2024 for electric transmission and distribution utilities across North America, with specific indices such as labour applied specific to British Columbia. For the escalation beyond Q4 of 2024 (i.e., 2025 and 2026), FBC assumed the same percentage increase as 2024. The Wood Mackenzie Market Report is included in Appendix G-3.
- A forecast of the CPCN Project Preliminary Engineering costs of $0.760 million (includes escalation of $0.009 million) was added, including $0.478 million of actual costs incurred from 2021 and 2022, and a forecast of $0.282 million for 2023. Consistent with the approved treatment[32] for CPCN project preliminary engineering costs, these costs, which are related to the development of the Project and include regulatory costs for the purpose of obtaining approval for the CPCN, are captured in the existing CPCN Project Preliminary Engineering non-rate base deferral account as discussed in Section 6.4.1 below.
- AFUDC, calculated using FBC's 2023 approved AFUDC rate of 5.73 percent[33], which is equal to FBC's after-tax weighted average cost of capital, and added to the total Project cost.

6.3 *FINANCIAL EVALUATION*

FBC has performed a financial evaluation of the Project based on the PV of the incremental revenue requirement and the levelized rate impact to its customers over a 53-year analysis period. As explained in Section 4.3.4, the 53-year analysis period is based on an estimated three-year construction period (from 2024 to 2026) plus a 50-year post-Project period commencing in 2027 (with all assets forecast to enter FBC's rate base in 2027). 50 years is the ASL of the station equipment in FBC's transmission plant[34] based on FBC's most recently

[31] No escalation applied on actual costs incurred by FBC prior to January 2023.
[32] Decision and Order G-139-14.
[33] Approved by Decision and Order G-382-22 (FBC Annual Review for 2023 Rates Decision). Actual AFUDC will be calculated based on the approved AFUDC rate at the time of construction.
[34] Asset class 353 Station Equipment.

approved depreciation study[35], and station equipment represents over 90 percent of the total capital costs entering FBC's rate base.

Table 6-2 below summarizes the financial analysis performed, based on the total Project costs of $35.179 million (as discussed in Section 6.2 above and reflected on Line 3 in Table 6-2 below) plus future incremental O&M, wheeling, property tax and sustainment capital costs over the 53-year analysis period, all of which are discussed further below and included in the financial analysis as part of the incremental revenue requirement due to the Project (as reflected on Line 8 in Table 6-2 below). Details of the financial evaluation of the Project can be found in the financial schedules included in Confidential Appendix H.

The PV of the incremental revenue requirement of the Project is approximately $44.138 million and the levelized rate impact is 0.63 percent over the 53-year analysis period.

Table 6-2: Financial Analysis of the Project

Line	Particular	Total	Reference
1	Total Capital Costs to Electric Plant in Service ($millions)	33.847	Schedule 6, Line 34
2	Total Removal Costs to Accumulated Depreciation ($millions)	1.332	Schedule 6, Sum of Line 35 - Line 34
3	**Total Project Cost ($ millions)**	**35.179**	**Line 1 + Line 2**
4	Incremental Sustainment Capital	6.252	Schedule 6, Sum of Line 27 (2027-2076)
5	**Total Incremental Capital Costs over 53 years ($millions)**	**41.431**	**Line 3 + Line 4**
6			
7	Incremental Rate Base in 2027 ($millions)	34.311	Schedule 5, Line 12 (2027)
8	Incremental Revenue Requirement in 2027 ($millions)	2.458	Schedule 1, Line 11 (2027)
9	**PV of Incremental Revenue Requirement 53 years ($ millions)**	**44.138**	**Schedule 9, Line 25**
10			
11	Rate Impact in 2027, compared to 2023 Approved (%)	0.58%	Schedule 9, Line 28 (2027)
12	**Levelized Rate Impact 53 years (%)**	**0.63%**	**Schedule 9, Line 32**
13	Levelized Rate Impact 53 years ($/MWh)	0.767	Schedule 9, Line 45

The financial evaluation of the Project includes the following assumptions:

- **Project Capital and Removal Costs:** Base capital cost estimate of $35.179 million in as-spent dollars as discussed in Section 6.2.
- **Future Incremental Sustainment Capital:** The financial evaluation over the 53-year period includes the future replacement cost of the poles, towers and fixtures, conductors and devices, and fibre components of the Project. The timing of these replacement costs is based on the ASL of 39 years for the poles, towers and fixtures, and conductors and devices, and an ASL of 14 years for the fibre lines, as detailed in FBC's most recently approved depreciation study (for example, the 50-year post-Project analysis period includes the one-time replacement of the poles, tower and fixtures, as well as the

[35] FBC's 2017 Depreciation Study, approved as part of the 2020-2024 MRP Decision and Order G-166-20.

conductors and devices in 2065, and the replacement of the fibre lines three times, in 2040, 2054, and 2068).

- **Incremental O&M:** FBC expects that ongoing maintenance spending will be optimized by incorporating the 63 kV/161 kV voltage conversion into WTS. Further, the retirement of the existing ASM Terminal Station will eliminate the O&M expenditures associated with the infrastructure at this site. The incremental O&M of the Project in 2027 (i.e., when all assets enter FBC's rate base) is minimal, estimated to be $2.180 thousand in as-spent dollars, relating to substation equipment, plus annual inflation as discussed below. Over an eight-year O&M window (based on a breaker replacement every eight years), the average incremental O&M is approximately $30.901 thousand per year. The incremental O&M can be found in Confidential Appendix H, Schedule 2.
- **Cost of Energy Outage Wheeling Cost:** As discussed in Section 5.5, the 34 Line conversion will require several outages over the duration of construction in 2025 and 2026, which will result in additional wheeling costs to cover the Okanagan transmission shortfall with the BC Hydro Open Access Transmission Tariff (OATT). The cost of the outages are estimated to be $0.290 million in 2025 and $0.357 million in 2026.
- **Property Tax:** Incremental property tax of $0.465 million, in as-spent dollars, is estimated to be incurred from 2027 onwards because of new infrastructure. This incremental amount will be partially offset by the removal of the ASM Terminal Station, as both WTS and the ASM Terminal Station are located in the City of Trail.
- **Inflation:** Two percent annually from 2027 onwards applied to the incremental O&M, property tax, and the future sustainment capital costs during the post-Project analysis period. FBC used the midpoint of the inflation-control target range of 1 to 3 percent, set by the Bank of Canada for long-term inflation forecasts for 2027 and beyond.

6.4 *ACCOUNTING TREATMENT*

In the subsections below, FBC describes the proposed treatment of the CPCN Preliminary Engineering costs, the Project capital costs, the retirement of the existing assets, and the cost of removal.

6.4.1 CPCN Project Preliminary Engineering Costs

As previously explained, preliminary and investigative engineering costs, including regulatory costs incurred for the purpose of receiving approval of the CPCN application, are captured in the CPCN Project Preliminary Engineering non-rate base deferral account, financed at FBC's weighted average cost of debt[36]. Upon BCUC approval of the CPCN, these costs will be transferred to FBC's construction work-in-progress and included in the total Project capital cost.

[36] Page 230 of Decision and Order G-139-14.

6.4.2 Treatment of Capital Costs

Consistent with FBC's treatment of Major Project capital costs, including CPCNs:

- As the capital costs of the Project (i.e., $33.847 million in as-spent dollars as set out in Line 1 of Table 6-2 above) are incurred, they will be recorded in construction work-in-progress, attracting AFUDC;
- Once the assets are placed into service (estimated to be in 2026), the associated capital cost will enter rate base as part of the opening balance in the appropriate plant asset accounts, for inclusion in FBC's rate base in the following year (estimated to be January 1, 2027). The amount and timing of transfer to FBC's rate base in 2027 is shown in the opening balance of FBC's Gross Plant in Service in Confidential Appendix H, Schedule 7; and
- Depreciation of the assets will begin on January 1 of the year that they enter FBC's rate base (i.e., January 1, 2027).

6.4.3 Retirement of Existing Assets

As discussed in Sections 5.1.2 and 5.1.5 of the Application, the Project includes the demolition of the three existing 63 kV A-frame structures, the demolition of the ASM Terminal Station, and the salvaging of existing fibre between WTS and SCC, with the total book value for the decommissioned assets estimated to be $4.470 million[37] by the end of 2026. These decommissioned assets will be retired from FBC's rate base by crediting the original value of $12.362 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 H, Schedule 7.

6.4.4 Cost of Removal

The total Project cost estimate includes approximately $1.332 million (including AFUDC) of removal costs in as-spent dollars. Consistent with FBC's existing regulatory treatment, removal costs will be charged to Accumulated Depreciation. Additionally, FBC's approved depreciation rates include a provision[38] for recovering the removal costs of assets in each asset class. These costs are identified in Confidential Appendix H, Schedule 8.

6.5 *RATE IMPACT*

The Project will have incremental rate impacts from 2025 to 2027. The drivers of the rate impact in each year are explained below:

[37] Based on the original acquisition value of $12.362 million and accumulated depreciation of $7.892 million estimated at the end of 2026.
[38] Page 12 of Decision and Order G-202-15.

- **2025 and 2026:** As discussed in Section 6.3 above, there will be additional wheeling costs in 2025 and 2026 for the outages to the 34 Line conversion. The outage wheeling costs are estimated to result in a rate impact of 0.07 percent and 0.08 percent in these years, respectively, when compared to the approved 2023 rates. FBC notes these costs are expected to occur in 2025 and 2026 only, thus having no rate impact in 2027 and beyond; and
- **2027:** All new assets related to the Project are expected to be in-service in 2026 and will be transferred to rate base on January 1, 2027, resulting in an incremental rate impact of approximately 0.58 percent in 2027, when compared to the approved 2023 rates.

Table 6-3 below provides an estimate of the annual incremental revenue requirement in millions and annual rate impact in percentage terms to FBC's customers due to the Project from 2025 to 2027 when compared to 2023 approved rates.

Table 6-3: Summary of Project Annual Rate Impact

Line	Particular	2025	2026	2027
1	Incremental Revenue Requirement compared to 2023 Approved ($ millions)	0.290	0.357	2.458
2	***Annual Rate Impact compared to 2023 Approved Rates (%)***	***0.07%***	***0.08%***	***0.58%***

The Project will result in a rate impact of 0.58 percent in 2027 over FBC's 2023 approved rates when all construction and salvage activities are complete, and all capital costs have entered FBC's rate base. This rate impact is equivalent to approximately $0.707 per MWh when compared to FBC's 2023 approved rates, and for an average FBC residential customer consuming 11,000 kWh per year, this would equate to a total bill impact of approximately $7.80 in 2027.

6.6 *CONCLUSION*

The total Project cost is $35.179 million in as-spent dollars and will result in an estimated rate impact of 0.58 percent in 2027 when all construction is complete and after all assets are placed in service. For an average FBC residential customer consuming 11,000 kWh per year, this would equate to a bill impact of approximately $7.80 in 2027.

7. ENVIRONMENTAL AND ARCHAEOLOGY

7.1 *ENVIRONMENTAL IMPACTS*

The WTS is an active FBC substation located within an SRW on a larger parcel owned by Teck Metals Ltd. The substation was developed in the early 2000s with no prior site developments and is located within the City of Trail, though not within the City's designated Development Permit Areas. The WTS is a Contaminated Sites Regulation (CSR) Schedule 2 Activity (electrical transmission or distribution substations) with bulk storage of transformer oil and various electrical infrastructure presenting a metals source.

Environmental investigations can be triggered under the CSR for sites that have a prescribed Schedule 2 Activity if they require a municipal permit, if the Schedule 2 Activity is decommissioned/ceased, or if more than 30 m^3 of soil will be relocated to an unlicensed facility. Municipal permits are not anticipated for the Project, nor will the Schedule 2 Activity be decommissioned/ceased, so only the latter trigger for environmental investigation would apply if more than 30 m^3 of soil was being relocated to an unlicensed facility.

A Stage 1 Preliminary Site Investigation (PSI) was completed by Bear Environmental Limited for the WTS site in November 2022. The goal of this Stage 1 PSI was to determine the potential for Contaminants of Potential Concern (COPCs) to be present in on-site environmental media or adjacent properties at concentrations of environmental concern, and to comment on the associated environmental risks and liabilities. The Stage 1 PSI identified three Areas of Potential Environmental Concern (APECs) with COPCs including the current substation, fertilizer truck staging area and Teck Wide Area surface soil impacts. The Stage 1 PSI confirmed that there are no records of substation incidents potentially resulting in a release of contaminants to the environment over and above typical operations and that further investigation within the substation is not recommended at this time.

As there is a likelihood of impacted surface soils within the footprint of the proposed expansion, a soil management plan is required. Initial discussions with Teck Metals Ltd. indicate that their licensed Teck Trail Operations Landfill can be used for soil disposal. Planning is being conducted with this approach, such that although there are no regulatory triggers for environmental investigations for soils relocated to a licensed facility, the licensed facility may still require some environmental data prior to acceptance. FBC will engage with a Qualified Environmental Professional (QEP) to ensure that all work will be completed in compliance with regulatory and disposal facility requirements.

Teck Metals Ltd. and the Trail Area Health and Environment Program are familiar with the environmental regulations pertaining to contaminated soil management for the Trail area, and FBC will work with them to ensure all regulatory requirements are met.

7.2 ARCHAEOLOGICAL IMPACTS

Nupqu Resource Limited Partnership[39] (Nupqu) was retained to complete an AOA of the Project (see Appendix D). The AOA was to assess the potential for archaeological and/or cultural heritage resources within the Project area and to determine the necessity and, if required, the scope of additional archaeological assessment (e.g., AIA) prior to the commencement of, or concurrent with, ground disturbing Project activities.

The AOA consisted of a desktop review that included examination of the existing archaeological potential model that overlaps the Project area, as well as a Preliminary Field Reconnaissance (PFR). The PFR was used to verify locations of archaeological potential within the Project area. The Project area includes an FBC SRW located within Teck Metals Ltd.'s Trail Operations Fertilizer Facility. A desktop review was completed on the SRW portion of the project due to Teck Metals Ltd.'s health, safety, and security requirements that allow access to qualified personnel and contractors only.

As part of the AOA, Nupqu reviewed a range of environmental, archaeological, cultural, and historical information. The Project was assessed for archaeological potential and overlap with known archaeological and historic heritage sites.

The AOA concluded that the Project footprint includes a mix of low to high archaeological potential. The AOA did not identify any archaeological sites or historic heritage sites overlapping the Project area. The preferred alternative (referred to here as Alternative 5 – WTS Expansion) crosses variable terrain, and areas of high archaeological potential were identified at and in the immediate vicinity of the ASM Terminal Station. However, based on the AOA, the preferred alternative for the Project has fewer areas with "high" archaeological potential than the other feasible alternative (referred to here as Alternative 3 – ASM Rebuild).

Nupqu has recommended that an AIA be completed for areas where Project-related ground disturbance activities are anticipated in areas identified as having high archaeological potential through the AOA process. It is expected that the AIA will begin in 2023 and continue, as necessary, throughout construction.

A permit will be required under Section 12.2 of the *Heritage Conservation Act* (HCA) 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. Currently the Indigenous communities with traditional territory overlapping the Project area that have cultural heritage investigation permitting processes are the Okanagan Indian Band and Upper Nicola Indian Band. AIA work will be completed where Project works with the potential for ground disturbance occur in areas identified as high archaeological potential. The extent of AIA works will be dependent on final engineering design.

[39] Nupqu Resource Limited Partnership is a natural resource management consulting and contracting services company associated with Ktunaxa Enterprises Ltd. and is owned by all communities of the Ktunaxa Nation.

The detailed results of the work completed by Nupqu are outlined in the AOA (Appendix D).

7.2.1 Indigenous Community Participation

A notification of the intended AOA work, which included an invitation to participate in the PFR, was sent to Indigenous communities. On completion of the draft AOA, the notified Indigenous communities were provided with an opportunity to provide information or comments.

The following Indigenous communities or organizations were contacted as a part of the AOA:

- Adams Lake Indian Band
- Colville Confederated Tribes
- Ktunaxa Nation Council
- Lower Similkameen Indian Band
- Okanagan Indian Band
- Okanagan Nation Alliance
- Osoyoos Indian Band
- Penticton Indian Band
- Shuswap Band
- Splats'in First Nation
- Upper Nicola Band

Osoyoos Indian Band was the only Indigenous community that chose to participate in the PFR. Prior to the AIA, Indigenous communities will be notified of the work and provided the opportunity to participate in the AIA.

7.2.2 Further Plans

Potential impacts to archaeological and historic heritage sites will be further assessed during the AIA. The objective of the AIA will be to identify archaeological and historic heritage resources within the Project footprint and, if present, to evaluate the impacts to those resources as a result of the Project and to provide recommendations to effectively manage these impacts. It is anticipated that the majority of the AIA will be completed prior to construction, though the AIA of portions of the Project area may have to be conducted concurrent with construction (e.g., areas with access constraints, where ground conditions are not suitable for manual testing). A subsurface testing program will be undertaken, where required. The AIA will provide a detailed assessment to allow for development of site-specific mitigation strategies to offset any potential impacts to archaeological and historic heritage sites associated with the Project.

A project Environmental Management Plan (EMP), which will include archaeological specifications, will be prepared and included in the contractor RFP documents. Environmental

Protection Plan(s) specific to the Project, including, if necessary, protection of archaeological, historic heritage, and cultural resources, will be developed by successful contractor(s) prior to commencement of the Project.

If required, archaeological monitoring will be undertaken during all archaeologically sensitive aspects of the Project construction program and the designated archaeological monitor will have "stop work authority" in the event that works underway have the potential to result in unauthorized impacts to archaeological, historic heritage or cultural resources. If archaeological monitoring is not required, the Project will utilize an archaeological chance find procedure to manage the possibility of encountering unanticipated archaeological, historic heritage or cultural resources during Project-related activities.

8. CONSULTATION AND ENGAGEMENT

8.1 *INTRODUCTION*

Consultation and engagement are integral to FBC's project development process. Indigenous communities and stakeholders, including local governments, municipalities, local residents and Teck Metals Ltd., have been notified of the proposed Project, in order to be provided with the opportunity to engage on the Project.

The Project is expected to have minimal impacts on the community. The Project involves only modest excavation, which will be conducted primarily within existing SRWs and within FBC facilities. As a result, FBC's consultation and engagement activities have been (and will continue to be) largely targeted towards the Indigenous communities that have been identified as having asserted interests in the territory, as well as local governments and other stakeholders who live or work near the location of the Project.

FBC initiated consultation and engagement for the Project in November 2022 with the distribution of Project information letters to nine Indigenous communities, four local governments, and residents located in proximity to the Project work sites. In Sections 8.2 and 8.3 below, FBC describes its consultation with the local community and its engagement with Indigenous communities, respectively, and the feedback received to date. FBC's activities and the response are also recorded in more detail in FBC's Stakeholder Consultation Log and Indigenous Engagement Log, included in Appendix I-1.

Moving forward, FBC will continue working with Indigenous communities and stakeholders to address any concerns raised that are related to the Project.

8.2 *CONSULTATION WITH THE LOCAL COMMUNITY*

Consultation and engagement with local communities is important to FBC. Both WTS and the ASM Terminal Station are located within the City of Trail and adjacent to the Village of Warfield. While WTS is located within an industrial area, many residents of the City of Rossland pass by WTS while commuting along Warfield Hill Road. Maintaining clear and open communication channels throughout the duration of the Project to these municipalities and the Regional District of Kootenay Boundary is a priority.

8.2.1 FBC has Identified Stakeholders Potentially Affected

FBC has identified the following stakeholders as being potentially affected by the Project:

- City of Trail
- City of Rossland
- Village of Warfield

- Regional District Kootenay Boundary, Area B
- Teck Metals Ltd.
- Webster School
- Residents in the subdivision neighbouring the ASM Terminal Station

As noted above, WTS is situated in an industrial area off Warfield Hill Road within the City of Trail. WTS is on a brownfield site, privately owned by Teck Metals Ltd. The adjacent parcels of land, owned by Teck Metals Ltd., MOTI, and FBC, are undeveloped. Directly across the highway from WTS is a large fertilizer plant also owned by Teck Metals Ltd. Construction will take place within FBC's SRW.

The ASM Terminal Station is located to the rear of an existing warehouse in Warfield owned by FBC. The ASM Terminal Station sits on a narrow projection of land with downhill sloping terrain on either side. Due to the age of the Station's infrastructure, a consistent buzz or hum from the Station can be heard in the neighbouring subdivision, as noted in the Stakeholder Consultation Log included as Appendix I-1. This hum would stop after the completion of the Project, when the new transformers are installed at WTS and the existing ASM Terminal Station transformers are decommissioned.

Potential customer impacts during construction will be limited to those living in the subdivisions near the ASM Terminal Station site. As such, the primary focus of FBC's communication materials is to provide notice of the proposed Project and gather and respond to any feedback or concerns raised.

8.2.2 FBC's Approach to Community Engagement

FBC recognizes the importance of meaningful consultation and of developing, maintaining, and enhancing strong stakeholder relationships. To support the successful completion of the Project, FBC's interactions with stakeholders will be open, transparent and continue until completion of the Project.

In November 2022, FBC initiated engagement activities by sending Project notification letters (Appendix I-2) to the affected local governments, as well as residents within 250 metres of both the ASM Terminal Station and WTS sites. The notification letter included a map of the Trail area with WTS and the ASM Terminal Station work sites identified. In the subdivision neighbouring the ASM Terminal station, the Project notification letters were hand delivered in order to discuss and answer questions directly with the community.

8.2.3 Community and Municipality Feedback Received

After the Project notification letters were issued in November 2022, FBC received a small number of inquiries and responses from the community. Each of these contacts has been noted in the Stakeholder Consultation Log (Appendix I-1).

- The City of Trail raised a concern about potential negative impacts to the use of Hailey Park during construction. FBC has responded to the City of Trail to advise that it anticipates little to no disruption to the use of Hailey Park. FBC will continue to collaborate with the City of Trail as construction schedules are established.
- A resident in the subdivision neighbouring the ASM Terminal Station commented that she could hear the buzz of the existing transformers and would look forward to the decommissioning of that site in the future if it would result in the elimination of the noise.
- During discussions, Teck Metals Ltd. requested that FBC send notification of the Project to the residents of Hanna Creek Rd., which is located more than 250 metres from WTS. On November 28, 2022, FBC mailed Project notification letters to these residents.

FBC will continue to follow up on and address any concerns that are identified through ongoing engagement efforts, and to track these details in its Stakeholder Consultation Log.

8.3 *ENGAGEMENT WITH INDIGENOUS COMMUNITIES*

FBC is guided by its Statement of Indigenous Principles (Appendix I-3) and seeks to build and maintain relationships with Indigenous communities across the Province. This approach to engagement ensures that the potential impacts of the Project on the title, rights and interests of affected Indigenous communities are documented and considered. In keeping with these principles, the Project team has, and will continue to:

- Practice thorough, timely and meaningful engagement with potentially affected Indigenous communities, throughout the Project lifecycle; and
- Identify potential opportunities for Indigenous participation, ensuring local Indigenous individuals and groups are offered access to opportunities through the development of the Project.

As set out in Section 8.3.1 below, FBC identified nine Indigenous communities as having asserted interests in the Project area. In November 2022, FBC initiated Project notification and began consultation with these Indigenous communities. The notification letter is included in Appendix I-5. Transparency and open channels of communication will be maintained with these groups throughout the Project.

8.3.1 FBC has Identified Indigenous Groups Potentially Affected

FBC used the BC Government's Consultative Areas Database (CAD) to generate a list of nine Indigenous Communities with asserted interests in the Project area, as per the Spatial Overview Engine (SOE) Reports queried on October 11, 2022 (Appendix I-4). A list of the Indigenous communities identified through the CAD search are summarized in Table 8-1 below.

Table 8-1: Indigenous Communities Identified in CAD

Indigenous Communities	
Ktunaxa Nation Council	Penticton Indian Band
Lower Similkameen Indian Band	Shuswap Indian Band
Okanagan Indian Band	Splats'in First Nation
Okanagan Nation Alliance	Upper Nicola Indian Band
Osoyoos Indian Band	

8.3.2 FBC's Approach to Indigenous Engagement

In November 2022, FBC initiated engagement activities with each of the Indigenous communities identified in Table 8-1 above. The notification package included a map of the Trail area with the WTS and ASM Terminal Station work sites identified as well as the transmission lines. FBC will keep working with these Indigenous communities discussing progress and opportunities as the Project advances.

Indigenous engagement has also occurred during the Project's archaeological work that has been conducted to date, as further discussed in Section 7.2. Notification of the intended AOA work, which included an invitation to participate in the PFR, was sent to the Indigenous communities listed in Section 7.2.1. Nupqu was retained to complete the AOA and the Osoyoos Indian Band participated in the PFR. On completion of the draft AOA, the notified Indigenous communities were provided with an opportunity to submit information or comments.

Further, FBC will continue to discuss procurement opportunities for Indigenous contractors as the Project advances. FBC has been engaging with local Indigenous communities regarding procurement opportunities. FBC will continue to actively seek Indigenous business opportunities during this Project.

8.3.3 Indigenous Feedback Received

After Project notification letters were issued, FBC received replies from five Indigenous communities. Each of these responses has been recorded in FBC's Indigenous Engagement Log (Appendix I-1), as is summarized below.

- The Penticton Indian Band requested any further consultation and engagement be deferred to the Osoyoos Indian Band.
- The Okanagan Indian Band requested any further consultation and engagement be deferred to the Osoyoos Indian Band and Lower Similkameen Indian Band. They also asked to be informed of any major changes to the Project in the event it changes their initial assessment and view on the need for further consultation.
- The Osoyoos Indian Band requested a 60-day period in order to review FBC's notification letter before they respond. FBC approved this request, and the review period

passed without comment. FBC will continue to engage with the Osoyoos Indian Band throughout the life of the Project.

- Both the Ktunaxa Nation Council and the Splats'in requested they receive copies of the AOA report and environmental assessment reports once complete. In addition, the Splats'in requested updates as the Project progresses.

In addition to fulfilling the individual requests which are noted above, FBC will continue providing Project information to all Indigenous communities identified in Table 8-1 above, for their consideration and comment. This will include:

- Notifying Indigenous communities once the Application is filed with the BCUC; and
- Engaging with Indigenous communities during the procurement process to identify employment and contract opportunities.

As the Project progresses, FBC will continue to address any concerns that are raised through ongoing engagement efforts, and to track and respond to any new inquiries received during the life of the Project.

8.4 *CONCLUSION*

In FBC's view, its consultation and engagement process summarized above has been sufficient, appropriate and reasonable, in the context of the approval being sought from the BCUC, to meet the requirements of the CPCN Guidelines.

FBC initiated consultation with Project stakeholders and Indigenous communities prior to the submission of this CPCN Application. The Project is anticipated to have minimal impact on area residents and FBC is committed to meaningful engagement with stakeholders and Indigenous communities as the Project progresses. FBC will continue to maintain open lines of communication and collaborate with stakeholders and Indigenous communities on any outstanding interests or concerns brought forward throughout the duration of the Project, including planning, construction and restoration.

9. PROVINCIAL GOVERNMENT ENERGY OBJECTIVES

9.1 *INTRODUCTION*

Section 46 (3.1) of the UCA states that, in deciding whether to issue a CPCN, the BCUC must consider:

(a) the applicable of British Columbia's energy objectives,

(b) the most recent long-term resource plan filed by the public utility under section 44.1, if any, and

(c) the extent to which the application for the certificate is consistent with the applicable requirements under sections 6 and 19 of the *Clean Energy Act* (CEA).

FBC addresses these requirements below.

9.2 *BRITISH COLUMBIA'S ENERGY OBJECTIVES*

The Project is consistent with British Columbia's energy objectives. These objectives are set out in section 2 of the CEA, which itemizes 16 specific energy objectives for the Province. They include the Province's objectives of generating electricity from clean or renewable resources and reducing greenhouse gas (GHG) emissions. The objectives also include several social and economic goals for the Province, including encouraging economic development and the creation and retention of jobs. Table 9-1 below discusses how the Project is consistent with (or, alternatively, does not hamper) each of the Province's energy objectives.

The Project has the following objectives:

1. Increase the 161 kV capacity to the Boundary and Similkameen areas to maintain safe and reliable service to customers in these areas; and

2. Address aging infrastructure which, based on the recently completed Condition Assessment Report, classifies the transformers as being at a high risk of failure.

The Project is directly aligned with the objectives set out in subsections 2 (c), (h), (k), and (m) of the CEA. Further, while the Project does not directly affect the remaining objectives, it indirectly advances certain of them, and does not hamper the advancement of the balance of the energy objectives by the applicant or other proponents, through other projects or initiatives.

Table 9-1: British Columbia's Energy Objectives[40]

Item	Objective	Comments
(a)	To achieve electricity self-sufficiency;	The Project does not affect the generation or acquisition of electricity, and does not hamper the advancement of this objective.
(b)	To take demand-side measures and to conserve energy, including the objective of the authority reducing its expected increase in demand for electricity by the year 2020 by at least 66%;	The load served by the Project is net of demand side management savings (and the 66% reduction in demand applies to BC Hydro and is not applicable to FBC). The Project does not hamper the advancement of this objective.
(c)	To generate at least 93% of the electricity in British Columbia from clean or renewable resources and to build the infrastructure necessary to transmit that electricity;	The Project is aligned with this energy objective, as the infrastructure involved is for the purpose of transmitting electricity within the Province.
(d)	To use and foster the development in British Columbia of innovative technologies that support energy conservation and efficiency and the use of clean or renewable resources;	The load served by the Project is net of demand side management savings. The Project does not affect the generation or acquisition of electricity, and does not hamper the advancement of this objective.
(e)	To ensure the authority's ratepayers receive the benefits of the heritage assets and to ensure the benefits of the heritage contract under the *BC Hydro Public Power Legacy and Heritage Contract Act* continue to accrue to the authority's ratepayers;	This objective applies to BC Hydro and is not applicable to FBC.
(f)	To ensure the authority's rates remain among the most competitive of rates charged by public utilities in North America;	This objective applies to BC Hydro and is not applicable to FBC.
(g)	To reduce BC greenhouse gas emissions: (i) by 2012 and for each subsequent calendar year to at least 6% less than the level of those emissions in 2007, (ii) by 2016 and for each subsequent calendar year to at least 18% less than the level of those emissions in 2007, (iii) by 2020 and for each subsequent calendar year to at least 33% less than the level of those emissions in 2007, (iv) by 2050 and for each subsequent calendar year to at least 80% less than the level of those emissions in 2007, and (v) by such other amounts as determined under the *Climate Change Accountability Act*;	While the Project does not directly affect GHG emissions, it advances this objective as it increases the available transmission capacity necessary to accommodate incremental load switching from higher emitting sources of energy to electricity.
(h)	To encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia;	The Project increases capacity in the Boundary and Similkameen areas, which is necessary to accommodate incremental load switching from higher emitting sources of energy to electricity. The Project is consistent with this energy objective.

[40] As set out in section 2 of the CEA.

Item	Objective	Comments
(i)	To encourage communities to reduce greenhouse gas emissions and use energy efficiently;	The Project does not directly affect communities' energy use or GHG emissions, and does not hamper the advancement of this objective.
(j)	To reduce waste by encouraging the use of waste heat, biogas, and biomass;	The Project does not affect the generation of electricity and does not hamper the advancement of this objective.
(k)	To encourage economic development and the creation and retention of jobs;	The Project will benefit the local economy during the construction phase and will ensure adequate transmission capacity is available to support future economic growth The Project is consistent with this energy objective.
(l)	To foster the development of first nation and rural communities through the use and development of clean or renewable resources;	The Project does not affect the generation of electricity and does not hamper the advancement of this objective.
(m)	To maximize the value, including the incremental value of the resources being clean or renewable resources, of British Columbia's generation and transmission assets for the benefit of British Columbia;	The Project increases available transmission capacity for the benefit of FBC's customers, which are located within the Province, and is consistent with this energy objective.
(n)	To be a net exporter of electricity from clean or renewable resources with the intention of benefiting all British Columbians and reducing greenhouse gas emissions in regions in which British Columbia trades electricity while protecting the interests of persons who receive or may receive service in British Columbia;	The Project does not affect the generation or export of electricity, and does not hamper the advancement of this objective.
(o)	To achieve British Columbia's energy objectives without the use of nuclear power;	The Project does not affect the generation of electricity and does not hamper the advancement of this objective.

9.3 *LONG TERM ELECTRIC RESOURCE PLAN*

FBC's most recent Long Term Electric Resource Plan (2021 LTERP) was filed pursuant to section 44.1 of the UCA on August 4, 2021 and was accepted by the BCUC in Order G-380-22 on December 21, 2022. The Project was identified in Section 6.4 of the 2021 LTERP as two separate projects required for system reinforcement within the 2024-2029 timeframe. Table 6-3 of the 2021 LTERP set out the replacement of ASM T1 in the 2024-2025 timeframe and ASM T2 in the 2028-2029 timeframe. The 2021 LTERP explained that its system reinforcement projects were identified based on load forecasting, transmission planning criteria and power flow and other transmission planning studies, and also noted that project timing is reassessed frequently based on updated load forecasts; consequently, the timing of projects may be either advanced or delayed.

Since the filing of the 2021 LTERP, FBC has identified that the ASM Terminal Station requires an upgrade to higher MVA transformers (both ASM T1 and T2) within a three-year window, as opposed to the timeframes initially identified in the 2021 LTERP. This is due to load growth that has occurred and is anticipated in the Boundary and Similkameen areas, in order to allow FBC to reliably meet its transmission system planning criteria, as is explained in Section 3.3 of the

Application. Further, based on the recently completed Condition Assessment Report, the conditions of the ASM T1 and T2 transformers are such that they have been assessed as having a high risk of failure due to their respective ages. This Project addresses the objectives of (1) increasing capacity to the Boundary and Similkameen areas to maintain safe and reliable service to customers and (2) addressing the high failure risk of the existing two transformers at the ASM Terminal Station which are aging and in poor condition.

9.4 *SECTIONS 6 AND 19 OF THE CLEAN ENERGY ACT*

Sections 6 and 19 of the CEA concern, respectively, electricity self-sufficiency and clean or renewable resources. While sections 6 and 19 apply largely to BC Hydro, the following portions have relevance to FBC:

> 6(4) A public utility, in planning in accordance with section 44.1 of the *Utilities Commission Act* for
>
> (a) the construction or extension of generation facilities, and
>
> (b) energy purchases,
>
> must consider British Columbia's energy objective to achieve electricity self-sufficiency.
>
> …
>
> 19(1) To facilitate the achievement of British Columbia's energy objective set out in section 2 (c), a person to whom this subsection applies
>
> (a) must pursue actions to meet the prescribed targets in relation to clean or renewable resources, and
>
> (b) must use the prescribed guidelines in planning for
>
> (i) the construction or extension of generation facilities, and
>
> (ii) energy purchases.
>
> (2) Subsection (1) applies to
>
> (a) the authority, and
>
> (b) a prescribed public utility, if any, and a public utility in a class of prescribed public utilities, if any.

The Project does not involve either the construction or extension of generation facilities, nor is FBC a prescribed public utility for the purpose of section 19 of the CEA. Accordingly, sections 6 and 19 of the CEA are not applicable to the Project.

10. CONCLUSION

The Company respectfully submits that the Project is necessary to address system load growth, meet FBC's Transmission System Planning criteria, and maintain reliable service to the Boundary and Similkameen areas. FBC has experienced high levels of customer load growth in the Boundary and Similkameen areas (which are served by the ASM Terminal Station). FBC's electricity demand in the Boundary and Similkameen areas has exceeded its Transmission System Planning Criteria (N-1 system reliability) with the current capacity of the ASM Terminal Station power transformers. In the event of an outage or failure of one of the two ASM Terminal Station transformers (i.e., ASM T1 and ASM T2), FBC will not be able to reliably maintain service during peak periods. The likelihood of a power transformer failure (and the ability to restore customers in the area) is exacerbated by the age and condition of the existing ASM transformers. External consultation with transformer experts has indicated that ASM T1 and ASM T2 have a high risk of failure, and the risk of failure is increasing with each passing year.

FBC's preferred alternative, to expand the WTS and demolish the ASM Terminal Station, provides the best technical and financial solution (the Project). The Project involves adding two new transformers to WTS, constructing a 161 kV radial bus at WTS, and extending 11E Line to WTS by converting 34 Line to 161 kV and interconnecting 11E Line to 34 Line. The Project meets FBC's transmission planning criteria, improves system reliability, has the potential for future expansion, and delivers the necessary safety performance. It also has limited environmental, archaeological, and community impacts.

FBC requests that the BCUC approve the Project as set out in the Application. FBC plans to initiate the detailed design, procurement, and construction for the Project upon Application approval. The Project is expected to be completed by the end of 2026.

Appendix A
ASM LINE DIAGRAMS – CURRENT CONFIGURATION

FILED CONFIDENTIALLY

Appendix A-1

ASM OPERATIONAL SINGLE LINE DIAGRAM – CURRENT CONFIGURATION

FILED CONFIDENTIALLY

Appendix A-2

ASM GENERAL ARRANGEMENT – CURRENT CONFIGURATION

FILED CONFIDENTIALLY

Appendix B
ASM TRANSFORMERS CONDITION ASSESSMENT REPORT

CUSTOMER DOCUMENTATION

Transformer Condition Assessment

Customer: Fortis BC

Purchase order ref.: 4800005630

Transformers Location: ASM Substation

HEPG Project Number: 3767685

	PREPARED BY	CHECKED BY	APPROVED BY
NAME:	Tom Wang and Mickel Saad	Mustafa Lahloub	Ed G. TeNyenhuis
DATE:	April 09, 2022	April 09, 2022	April 10, 2022
OWNING ORGANIZATION:	HITACHI Energy Transformer Service		
ADDRESS:	180 Constellation Drive, Stoney Creek, ON, Canada, L8E 6B2		

DOCUMENT ID.	STATUS	REV.	LANG.	PAGE
ASM Substation Transformer Assessment	Approved	1	English	1/21

Table of Contents

1. Introduction 3

2. Transformer Input Data 3

3. Transformer Population Data 3

4. Hitachi Energy's (HE) Method of Risk Assessment 4

5. Evaluation of Transformer Failure Rates 5

   5.1 Risk of Short-Circuit Failure 5

   5.2 Thermal Winding Aging Risk 6

   5.3 Risk of Dielectric Failure 7

   5.4 Accessory Failure Risk 8

   5.5 Miscellaneous Failure Risk Factor 9

6. Total Risk of Failure Assessment 10

7. Reasons for Risk 12

8. Insulation Loss of Life 13

   8.1 Insulation Loss of Life During years 1999 to 2013 14

   8.2 Insulation Loss of Life in years 2020 and 2021 14

   8.3 Insulation Loss of Life as of 2021 16

   8.4 Insulation Loss of Life for Future Years of 2022 to 2031 16

9. Conclusion and Recommendation 18

10. Revisions 21

11. Disclaimer of warranties and limitations of liability 21

1. Introduction

Fortis BC decided to perform an assessment study on 2 transformers in their ASM Substation in Warfield, BC. These units are critical for the operation of the station. The purpose of the study was to determine the risk of failure of each of the transformers and to prioritize them for follow-up corrective actions such as inspection, maintenance, repair, or replacement.

2. Transformer Input Data

The input data for the study was collected by Fortis BC personnel. The pertinent data includes separate information to address specific areas of data for the transformer including:

I. ID and General Information: Nameplate information, general information about the transformer, the accessories, the application, loading history, and failure history, etc.
II. Main unit power factor test results, and power factor test on bushings.
III. Maintenance record.
IV. Oil DGA & quality history for main tank and LTC.
V. Loading information.
VI. Criticality, spare & redundancy status.

3. Transformer Population Data

The transformer population in the study consists of 2 transformers as listed in **Table 1** below. Included is the relative importance for each transformer that was provided by the customer.

ID No.	Location	Position	Importance	Manufacturer	MVA	Serial Number	YoM
1	ASM	T1	100	CGE	60/80	285738	1965
2	ASM	T2	100	CGE	60/80	287735	1971

Table 1 – Transformers Considered in Fortis BC Transformers Assessment

4. Hitachi Energy's (HE) Method of Risk Assessment

Estimating the risk of failure of a transformer involves analysis of historical failure data, knowledge of design issues and interpretation of diagnostic test results. The HE's approach relies heavily on HE's transformer design experience and transformer manufacturing knowledge. The following are the key aspects of the risk of failure algorithm:

A. Risk of short-circuit failure – An assessment of the likely short-circuit strength of the windings and clamping structure based on HE's knowledge of design practices for transformers of that type and voltage, the incidence & magnitude of short-circuit through fault events, historical information, and condition of the windings.
B. Winding thermal condition – This is based on the expected condition of the paper insulation as determined from HE's knowledge of the typical design practices of the time, DGA data and loading history. Aged, brittle insulation is more susceptible to fail under mechanical and electrical stress conditions.
C. Risk of dielectric failure – This is an assessment of the dielectric withstand capability of the transformer insulation system (oil, paper, etc.) and the electrical stress imposed by the power system and naturally occurring events.
D. Accessory failures – Failure of transformer accessories such as bushings, pumps, or tap changers may cause a failure or loss of service of the transformer.
E. Random Failure risk – This is due to causes not associated with the design of the transformer or its condition.

The Hitachi Energy approach to fleet risk screening involves a combination of the risk of failure assessment and the relative importance of a transformer to the utility system. **Figure 1** shows an analysis tool used in this approach. This represents the analysis for an example fleet of transformers that have a diverse risk of failure characteristics as well as a diverse relative importance. Using **Figure 1**, each transformer in the fleet is assigned a risk of failure and a relative importance and displayed on the risk management plot. Those that fall in the Red Zone are transformers with a combination of high risk of failure and/or higher importance for the system. These are classified as Urgent, or those requiring immediate action. The next transformers are those in the Yellow or Priority zone. Action would normally be taken on these transformers as soon as the Urgent transformers have been taken care of. The transformers in the Normal category would typically not require anything other than normal basic maintenance unless circumstances move either the risk of failure or importance to a higher value (into the Yellow or Red Zone).

The intent of risk management is to move the identified transformers to areas of lower risk. For example, a transformer in **Figure 1** below can be moved from the Urgent zone to the normal zone by reducing the expected risk of failure. The process of reducing the expected risk may begin with a detailed life assessment study to identify ways of reducing the risk of failure. In the process, some of the original assumptions regarding the risk of failure may also be modified to obtain a more accurate view of the risk of failure. Actual methods for reducing

the risk of failure may include refurbishment of the transformer or accessories, moving the transformer to an area with a lower incident of faults on the feeder lines, or it could involve system changes such as modifying reclosing practices or trimming trees in a right of way.

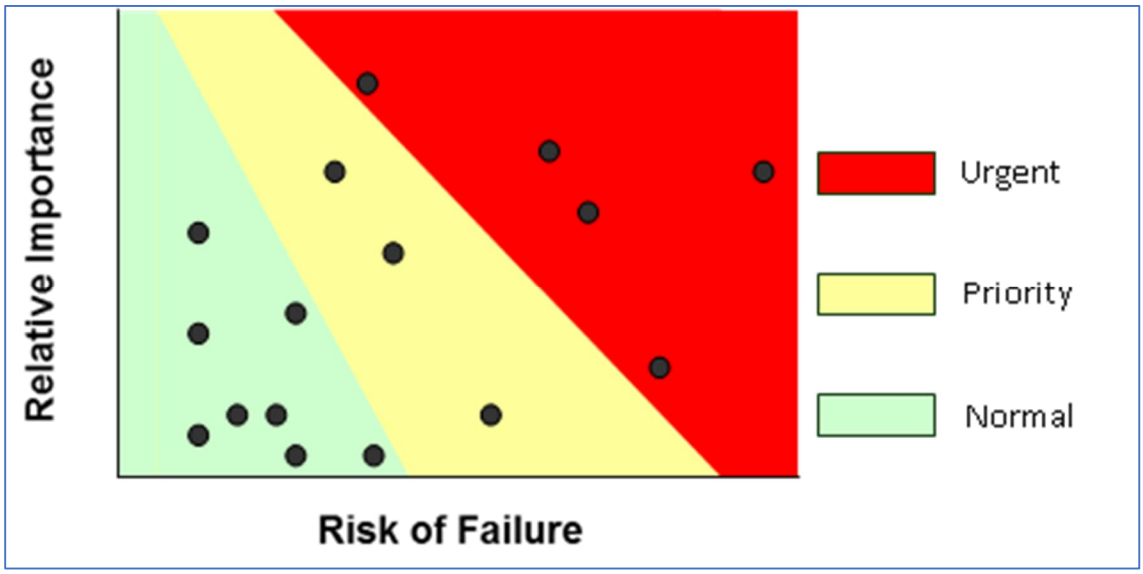


Figure 1 – Risk management approach to identify

5. Evaluation of Transformer Failure Rates

This risk assessment analysis was performed on the 2 transformers identified in **Table 1**. The analysis of this data was used as part of a risk-of-failure algorithm developed by HE to determine the relative risk of failure for each of the categories shown in section 4.

The risk of failure algorithm, as discussed in Section 4, is based upon a combination of individual sub-categories. To aid in the understanding of the risks for the transformers, the relative risks for each of these categories will be presented.

5.1 Risk of Short-Circuit Failure

One of the more common types of failures in power transformers is a winding failure caused by the forces associated with a through-fault. The transformer test results did not show any signs of past short circuit events. **Figure 2** shows a histogram of the transformers as a function of the relative risk of short circuit.

The main factors contributing to short circuit risk of failure are the following: degree of polymerization, MVA, historical loading, manufacturer, and age. T1 short circuit risk is slightly higher than the T2 due to historical loading and low CO2/CO ratio. **However, both units are showing low short circuit risk.**

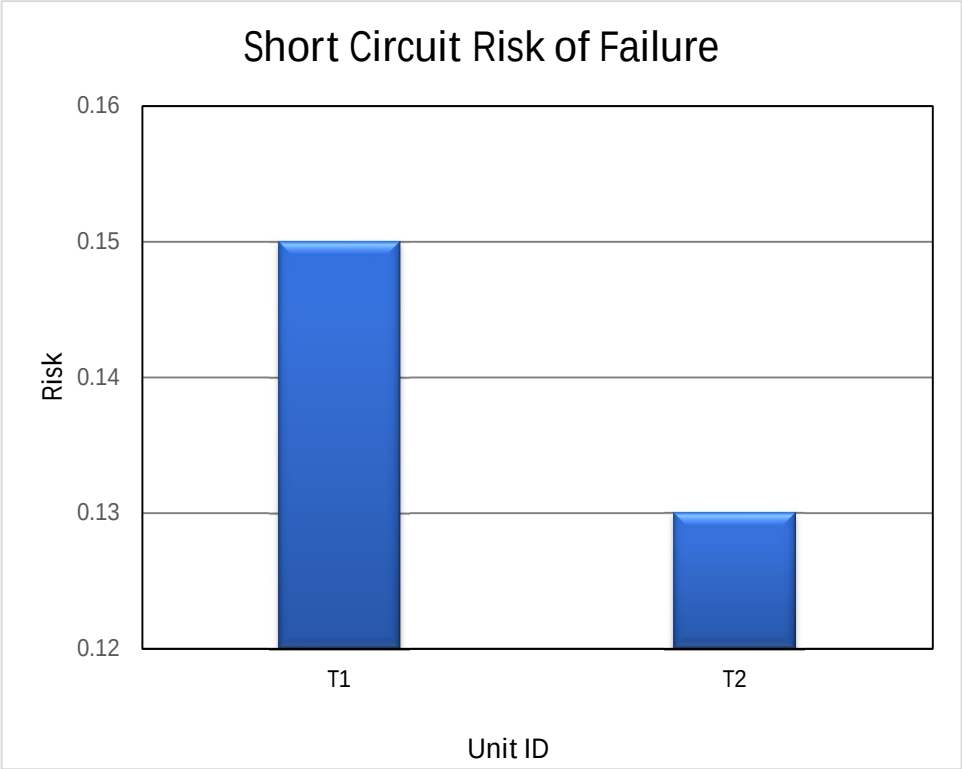


Figure 2 – Relative risk of short circuit failure for the transformers

5.2 Thermal Winding Aging Risk

An important factor in the risk of failure is the condition of the paper insulation. Aged transformers with brittle insulation and/or loose windings are more likely to experience a failure under the same through fault conditions than compared to other transformers of the same design that do not have brittle insulation or loose windings. This principle was incorporated into the risk of failure analysis by the thermal winding risk factor. As with the short circuit risk factor, this factor is only one component of the risk of failure equation, and so only the relative comparisons of the factor for the different transformers are meaningful.

The main factors contributing to thermal risk of failure are specific gasses from DGA, and oil preservation type. **Figure 3** shows there is no associated thermal risk to the transformers.

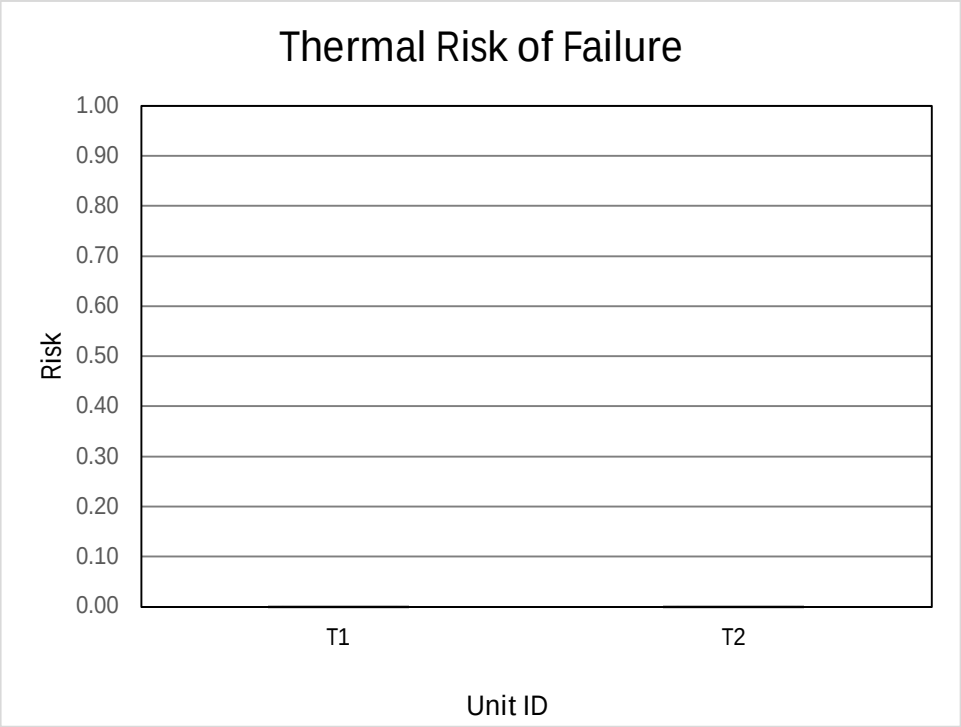


Figure 3 – Relative risk of thermal failure for the transformers

5.3 Risk of Dielectric Failure

The risk of dielectric failure involves both design and condition issues. Both design knowledge and the historical information were used in this evaluation, as well as the diagnostic test data. Variation of historical diagnostic test results also affects the dielectric risk. **Figure 4** shows the distribution of the relative risk of dielectric failure for the population of transformers. The units with the highest risk of dielectric failures are identified in the histogram. **For T1 transformer, the risk of dielectric failure came from variation in winding power factor.**

The main factors contributing to dielectric risk of failure are the following: acetylene levels, oil quality, and insulation power factor values. T1 is showing changes in the insulation power factor values for LV to TV (0.20 – 0.035 – negative) and TV to ground (0.449 – 0.505 – 0.736) which contributes to the higher dielectric risk.

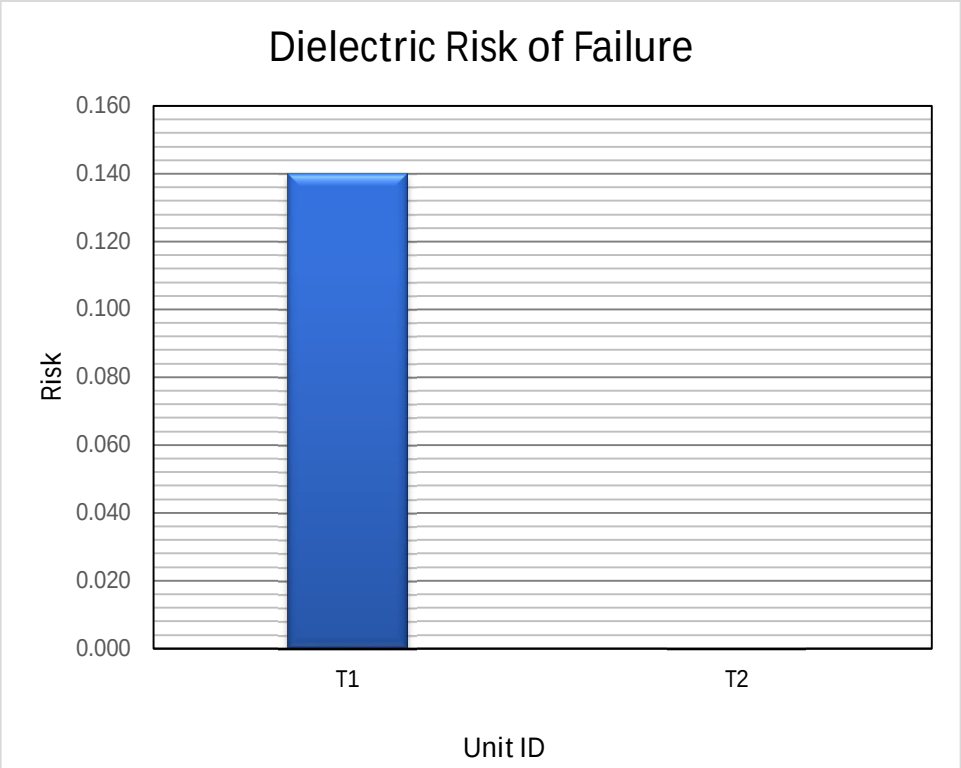


Figure 4 – Relative risk of dielectric failure for the transformers

5.4 Accessory Failure Risk

Accessory failure refers to the loss of service of the transformer due to either the failure or operational breakdown of an accessory. **Figure 5** shows the histogram of accessory failure risk. The greatest accessories sub-risk is from bushings and lack of diagnostic data. The risk of accessory failure is based on the type of equipment, the age, and the site assessments.

The main factors contributing to accessories risk of failure are the following: bushing condition, bushing power factor results, bushing service age, tap changers condition and age (on-load and off-load) if present in the transformers. **T2 is higher than T1 due to > 50% increase in PF's of the LV bushings.**

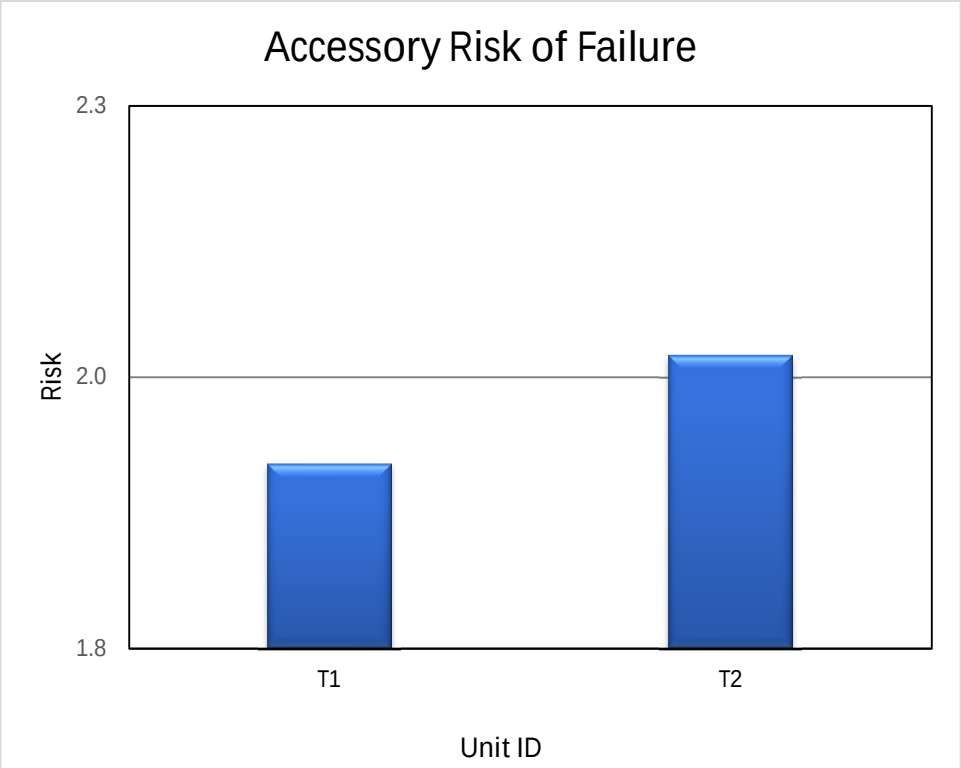


Figure 5 – Relative risk of accessories failure for the transformers

5.5 Miscellaneous Failure Risk Factor

One of the environmental risks associated with transformers involves the loss of transformer dielectric & cooling fluid in the tank through tank leaks or around gasket joints in the auxiliary equipment. Small leaks pose little risk to the failure of a transformer, however if the transformer enters a vacuum condition, moisture may enter the tank and can over time increase the risk of dielectric failure. In addition, oil leaking into the ground of the substation could pose an environmental hazard. In severe leak cases, a fire in the substation can spread to other equipment or control buildings because of saturated oil in the soil. Rust could develop into a leak if left unchecked. Leaks can also develop in radiators, tanks, or other components due to vibration, rust, or transportation. In many cases these leaks can be repaired by welding or other methods.

The number of leaks or rust spots and their severity are calculated under miscellaneous failure risk and shown in **Figure 6** below.

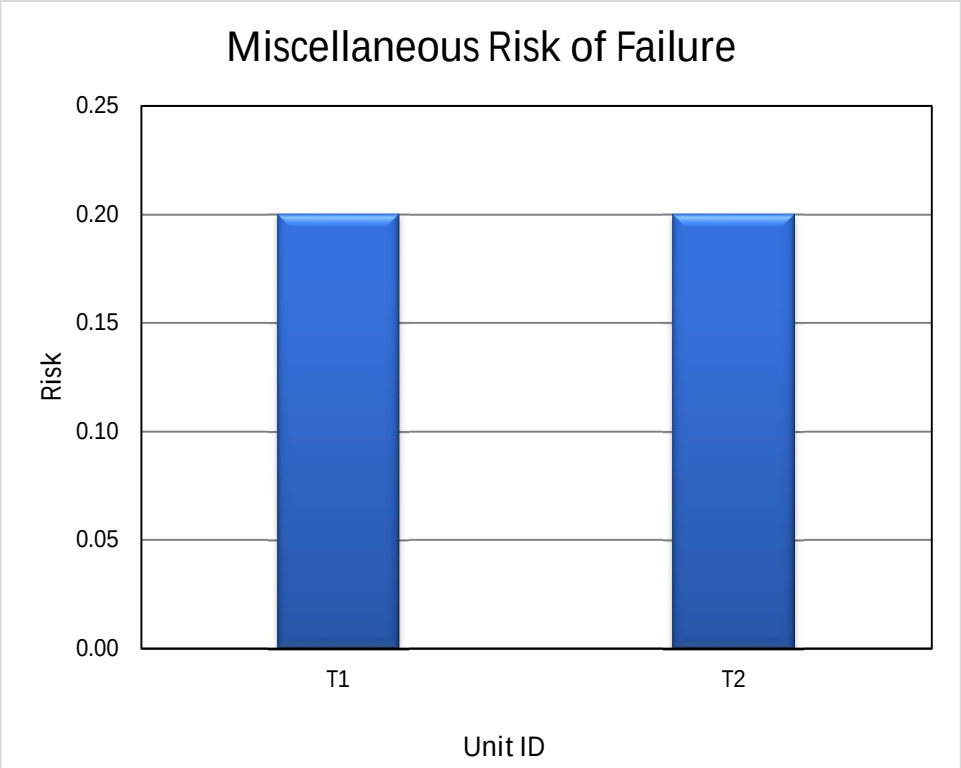


Figure 6 – Relative risk of miscellaneous failure for the transformers

6. Total Risk of Failure Assessment

In this report, the term “risk of failure” is defined to include not only potential failures of the transformer main core/coil assembly, but also any condition that would require removal from service for a significant period.

For each transformer, a risk of failure was calculated, and a relative importance was indicated. The results were plotted, grouped, and separated into four distinct categories. Those with the highest risk of failure that would warrant removing from service are categorized into the critical category. Those with high risk of failure, but not so high as to warrant removal from service, and those with higher importance and moderate risk of failure or above were categorized into the “Urgent” (Code Red) category, meaning that immediate attention is needed. Those with a significant, but somewhat lower risk of failure or importance were categorized into a middle or “Priority” (Code Yellow) level, meaning that action is needed within about one year. The remaining units, with lower risk of failure and importance were in the “Normal” (code green) category.

Figure 7 shows a plot of the risk of failure vs. importance for unit. The Urgent, Priority, and Normal boundaries were also shown on this plot, so that the transformer could be categorized. From **Figure 7** we see that both transformers are in the Urgent (Red) category.

Figure 8 shows a histogram of the failure rate of the transformer, which is a combination of the information from each of the individual risk categories.

Table 2 presents the transformer shaded according to the category. The result and analysis are based on the input data provided by Fortis BC personnel.

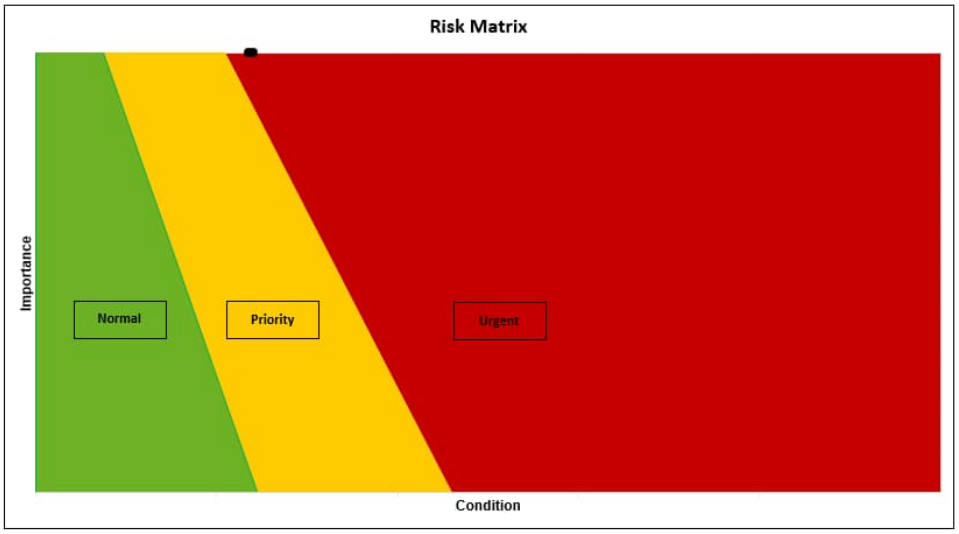


Figure 7 – Risk of Failure vs. Importance

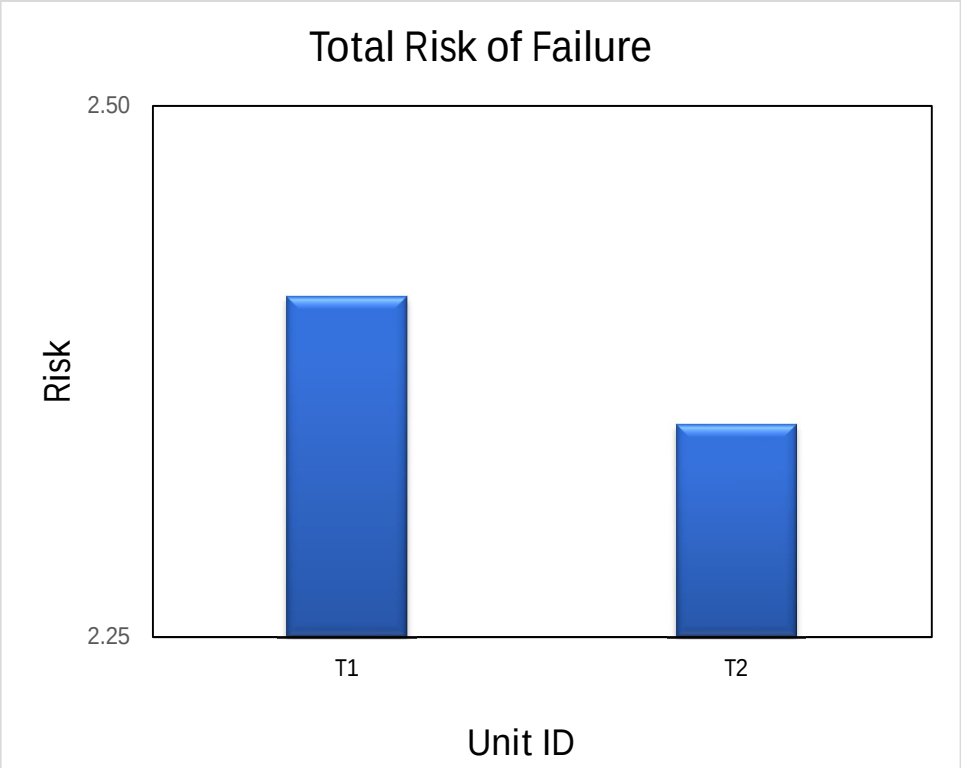


Figure 8 – Total Risk of Failure Histogram

ID No.	Position	Total Risk of Failure	Relative Importance	Location	Serial Number	Manufacturer	YoM
1	T1	2.41	100	ASM	285738	CGE	1965
2	T2	2.35	100	ASM	287735	CGE	1971

Table 2 – Transformers Color Coded by Risk

7. Reasons for Risk

Table 3 below lists the transformers primary reasons for the risk. These reasons provide the basis for planning corrective actions to reduce the risk of failure and the costs associated with transformer failures.

ID No.	1		Position	T1		Total Risk of Failure	2.41
There is a DGA-related issue with the on-load tap changer. This can be caused by overheating, arcing, or coking.							
The operation count for the load tap changer contacts has exceeded the maximum recommended by the manufacturer.							
The low CO2/CO ratio is an indicator of probable paper carbonization.							
The latest PF test result of LV winding to TV winding is abnormal. Also, the PF test results of TV winding to ground is increasing.							
ID No.	**2**		**Position**	**T2**		**Total Risk of Failure**	**2.35**
There is a DGA-related issue with the on-load tap changer. This can be caused by overheating, arcing, or coking.							
The operation count for the load tap changer contacts has exceeded the maximum recommended by the manufacturer.							
The LV bushings have more than 50% increase in the power factor.							

Table 3 – Reasons for Risk of Failure

8. Insulation Loss of Life

The ANSI overload and loss of life (IEEE Standard C57.91-2015) method was used with the following:

- The transformer specifics such as the weights and volume of oil were taken from the Outline Drawing.
- The transformer losses, winding hot spot temperature, and top oil temperature rise were taken from the factory final tests as a performance basis.
- The average monthly ambient temperatures were retrieved from the Environment Canada website for the Warfield BC weather station which is 2 km away from the site.
- Based on the standard insulation life and ambient temperatures, and assuming continues load, the remaining insulation life can be approximated per C57.91.
- The calculation assumes that the cooling was working as efficiently as when the equipment was new.
- The loss of life can be greatly influenced by moisture in the insulation and exposure to oxygen. This is included in the above estimation.

8.1 Insulation Loss of Life During years 1999 to 2013

- The average temperatures used were the “1999 Canadian Climate Warfield Station Data” and is shown in **Table 4** below.

Month	1999 Average Daily Temperature (°C)	Month	1999 Average Daily Temperature (°C)
Jan	-1.2	Jul	22.1
Feb	0	Aug	21.8
Mar	3.5	Sep	17.2
Apr	8.5	Oct	7.8
May	13.4	Nov	2.1
Jun	16.7	Dec	-0.7

Table 4 – Average Monthly Ambient Temperatures in 1999

- The T1 unit has been loaded 36.2 MVA on average over the years 1999 to 2013 and overloaded at 87.5 MVA on average for 29.5 hours.
- The T2 unit has been loaded 36.0 MVA on average over the years 1999 to 2013 and overloaded at 86.9 MVA on average for 28.3 hours.
- The calculation results of loss of insulation life are shown below.

Unit	Insulation Loss of Life During 1999 to 2013[1]
T1	10.13%
T2	13.73%

Note 1: Values are approximate and based on the above assumptions.

8.2 Insulation Loss of Life in years 2020 and 2021

- The average temperatures used were the “2020 and 2021 Canadian Climate Warfield Station Data” and is shown in **Table 5** below.

Month	2020 Average Daily Temperature (°C)	2021 Average Daily Temperature (°C)
Jan	-1.2	-0.7
Feb	0	-2.5
Mar	3.5	5
Apr	8.5	9.5
May	13.4	13.7
Jun	16.7	21.5
Jul	22.1	25.7
Aug	21.8	20.4
Sep	17.2	15.5
Oct	7.8	8.2
Nov	2.1	2.5
Dec	-0.7	-4.3

Table 5 – Average Monthly Ambient Temperatures

- The T1 unit has been loaded 28.4 MVA on average over the years of 2020 and 2021, and as such has little loss of insulation life.
- The T2 unit has been loaded 28.6 MVA on average over the years of 2020 and 2021, and as such has little loss of insulation life.
- The calculation results of loss of insulation life are shown below.

Unit	Insulation Loss of Life in 2020[1]	Insulation Loss of Life in 2021[1]
T1	0.11%	0.10%
T2	0.18%	0.15%

Note 1: Values are approximate and based on the above assumptions.

8.3 Insulation Loss of Life as of 2021

- The calculation of loss of insulation life for T1 is based on the similar MVA load during the years of 1965 to 1998 to the years of 1999 to 2013, and the similar MVA load during the years of 2014 to 2019 to the years of 2020 and 2021.
- The calculation of loss of insulation life for T2 is based on the similar MVA load during the years of 1971 to 1998 to the years of 1999 to 2013, and the similar MVA load during the years of 2014 to 2019 to the years of 2020 and 2021.
- The calculation results of loss of insulation life are shown below.

Unit	Insulation Loss of Life as of 2021	Remaining Insulation Life (years)[2]
T1	23.80%	15.6
T2	26.95%	15.0

Note 2: Values are based on insulation life of a transformer per C57.91-2015.

8.4 Insulation Loss of Life for Future Years of 2022 to 2031

- For future years of 2022 to 2031, the calculations of loss of life are based on 29.2 MVA on average without DMG load and 38.8 MVA on average with DMG load for T1, and 30.9 MVA on average without DMG load and 41.6 MVA on average with DMG load for T2.
- The mean average temperatures of 2020 and 2021 in **Table 6** are used for the ambient temperatures of each month.

Month	2020 and 2021 Mean Average Daily Temperature (°C)	Month	2020 and 2021 Mean Average Daily Temperature (°C)
Jan	-0.95	Jul	23.9
Feb	-1.25	Aug	21.1
Mar	4.25	Sep	16.4
Apr	9	Oct	8.0
May	13.55	Nov	2.3
Jun	19.1	Dec	-2.5

Table 6 – Average Monthly Ambient Temperatures

	Without DMG Load		With DMG Load	
Unit	**Insulation Loss of Life [1] to 2031**	**Remaining Insulation Life (years)[2]**	**Insulation Loss of Life[1] to 2031**	**Remaining Insulation Life (years)[2]**
T1	25.08%	15.4	26.78%	15.0
T2	29.48%	14.5	32.68%	13.8

Note 1: Values are approximate and based on the above assumptions.
Note 2: Values are based on insulation life of a transformer per C57.91-2015.

9. Conclusion and Recommendation

1. For each transformer, a risk of failure was calculated at the relative importance indicated. The results were plotted, grouped, and separated into three distinct categories. Those with high risk of failure, but not so high as to warrant removal from service and those with higher importance and moderate risk of failure or above were categorized into the “Urgent” (Code Red) category, meaning that immediate attention is needed. Those with a significant, but somewhat lower risk of failure or importance were categorized into a middle or “Priority” (Code Yellow) level, meaning that action is needed within about one year. The remaining units, with lower risk of failure and importance were in the “Normal” (code green) category. Both T1 and T2 units were identified in the “Urgent” (Code Red) category.
2. The greatest risks of failure are:
    - [1] Risk of accessory failure due to their age (82.8%),
    - [2] Risk of dielectric failure due to various causes (2.9%),
    - [3] Risk from oil leaks or tank rust and their severity (8.4%),
    - [4] Risk from hot spots or loose connections (0.0%),
    - [5] Risk of short circuit failure (5.9%).
3. A breakdown of all the units’ risk of failure with respect to the subcategories is shown below. This helps visualize the major contributor of risk for each unit.

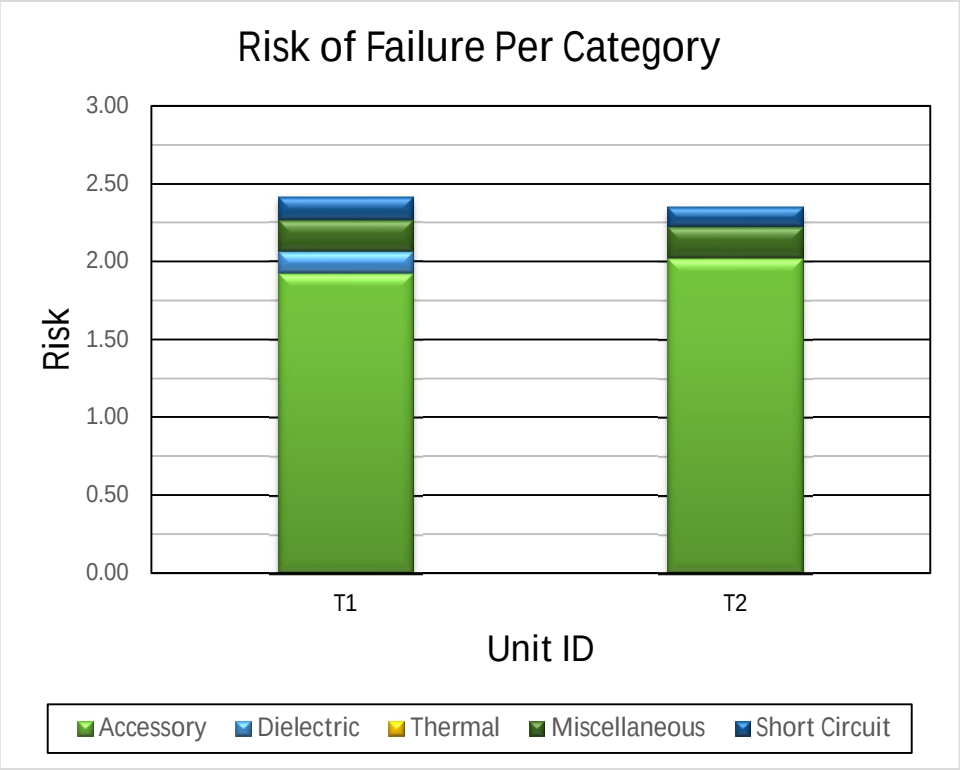


Figure 9 – Risk of Failure Per Category

4. As a long-term plan, the risk assessment process used in this study should be the process for prioritizing maintenance actions in the future for the two transformers to ensure that the resources used are optimized. The completion of the short-term recommended maintenance actions from this group of transformers will also provide additional diagnostic information, which in turn can be used to refine the estimates from this investigation.
5. The below specific actions are recommended for **both** transformers:
    - Overhaul the LTC's ASAP to lower the risk of failure. The LTC's on both units have signs of arcing, overheating, and copper pitting.
    - Plan for oil quality samples and DGA on the units on a yearly basis.
    - Include oil analysis power factor testing at 100°C in future oil samples. This can distinguish oil contamination vs oil aging if the power factor is high.
    - Oil leaks need to be repaired. Besides the environmental concerns, oil leaks cause oxygen to enter the unit which accelerates insulation aging. Oil leaks can also cause dielectric failure if the leak is big enough and the oil drops below the active part.

- Ensure the cooling equipment is in good working condition and well maintained.
- Plan for a bushing power factor testing every 3-5 years.

6. The latest DGA for **T1** main tank shows an increase for H2, C2H4, and CO. Even though the increase does not seem serious at these levels, it should be monitored.
7. The LV bushings of **T2** should be tested for power factor. A bushing DFR test is recommended to be performed if the increased PFs are confirmed.
8. A short-term action plan should be developed to address the risks to the transformers identified in this study and to implement appropriate risk mitigation measures. A recommended short-term action plan is as follows.

Position	ID#	Possible Risk Mitigation Actions							
		[L1] = 6 months, [L2] = 1 - 2 Yrs., [L3] = 2 - 3 Yrs., [L4] = 3 – 5 Yrs							
		DGA & Oil Test	PF and Cap. test	Bushing PF Tests	Bushing DFR Test	Fix Oil Leaks	Clean Rads	LTC Overhaul	Oil Reclaim / Drying
1	T1	[L1]	[L1]	[L1]		[L2]	[L2]	[L1]	
2	T2	[L1]		[L1]	[L2]	[L2]	[L2]	[L1]	

Table 5 – Recommended short term action plan

9. For the life of the transformers to date, the total accumulated loss of life amounted to less than 23.80% for T1 and 26.95% for T2.
10. Based on the standard insulation life and ambient temperatures, and assuming load as described by the customer, the remaining insulation life can be approximated per C57.91. The remaining insulation life is approximately 15.6 years and 15 for the T1 and T2 units respectively. This calculation is approximate, based on the data provided which is not complete, and might not represent the actual loss of life. Also, this only reflects the insulation life **not** transformer life.
11. The CIGRE Technical Brochure 642 on Transformer Failure Statistics shows a low failure rate on units greater than 50 years old for the data compiled. CIGRE Working Group A2.62 is presently performing an update on Transformer Failure Statistics with the goal of receiving wider data (from more countries and applications) and receiving the in-service transformer distribution (by age and application). Early new data shows that the failure rate is flat by age however there is a lower distribution of old in-service units (note - although North America has high distribution of old units, much of the rest of the world has a younger transformer age distribution). The early observation is that the failure rate per in service transformer is higher for older units (> 50 years). Thus, for the 2 transformers in this report which are older than 50 years, they statistically have a higher expected general failure rate.

10. Revisions

Rev.	Section	Description	Date Dept./Initial
0		Initial Release	April 9, 2022, ENG / TW
1		8.1 added, Insulation loss of life recalculated. Items 10 & 11 in the conclusion revised/added.	May 6, 2022, ENG / TW

11. Disclaimer of warranties and limitations of liability

THERE ARE NO UNDERSTANDINGS, AGREEMENTS, REPRESENTATIONS, OR WARRANTIES, EXPRESSLY OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OTHER THAN THOSE SPECIFICALLY SET OUT BY AN EXISTING CONTRACT BETWEEN THE PARTIES. ANY SUCH CONTRACT STATES THE ENTIRE OBLIGATION OF ABB. THE CONTENTS OF THIS DOCUMENT SHALL NOT BECOME PART OF ANY EXISTING AGREEMENT, COMMITMENT OR RELATIONSHIP.

The information, recommendations, descriptions, and safety notations in this document are based on our experience and judgment with respect to transformers. IT SHOULD NOT BE CONSIDERED TO BE CONCLUSIVE OR TO COVER ALL CONTINGENCIES. If further information is required, ABB should be consulted.

NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OR WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE, ARE MADE REGARDING THE INFORMATION, RECOMMENDATIONS, DESCRIPTIONS, AND SAFETY NOTATIONS CONTAINED HEREIN. In no event will ABB be responsible to the user, under any legal ground, for any special, indirect, incidental, or consequential damage or loss whatsoever including, but not limited to, damage to, or loss of use of, equipment, plant or power system, cost of capital, loss of profits or revenues, loss of data, cost of replacement power, additional expenses in the use of existing power facilities, or claims against the user by its customers resulting from the use of the information, recommendations, description, and safety notations contained herein.

Appendix C
SUMMARY OF CAPITAL COSTS

Breakdown of the Project Cost Estimate for Alternatives 3 and 5 at AACE Class 4 estimate level ($millions)

		Alternative 3: Rebuild ASM (Class 4)		Alternative 5: Expand WTS (Class 4)	
Line	Particular	2022 $	As-Spent $	2022 $	As-Spent $
1	Station Construction Costs	25.704	27.832	15.608	17.015
2	Transmission and Distribution Construction Costs	1.888	2.049	1.525	1.663
3	Fibre Construction Costs	1.260	1.370	0.238	0.260
4	Removal Costs	1.176	1.309	1.381	1.540
5	Project Management and Owner's Costs	1.999	2.176	1.542	1.681
6	**Subtotal Project Capital Cost**	**32.027**	**34.737**	**20.293**	**22.158**
7	Contingency	3.482	3.794	2.746	2.999
8	**Subtotal Project Capital Cost w/Contingency**	**35.508**	**38.531**	**23.039**	**25.157**
9	CPCN Preliminary Engineering Costs	0.751	0.760	0.751	0.760
10	AFUDC	-	4.226	-	2.460
11	**Total Project Cost**	**36.260**	**43.517**	**23.791**	**28.378**

Appendix D
ARCHAEOLOGICAL OVERVIEW ASSESSMENT REPORT

Nupqu LIMITED PARTNERSHIP

7443 Mission Road
Cranbrook, BC
V1C 7E5
p: 250 489 5762
www.nupqu.com

Archaeological Overview Assessment

FortisBC Inc.

Date: December 6th, 2022
Attention: Christopher Wylie, *RPCA*, Archaeologist: FortisBC Inc.
D'Arcy Caron, Project Manager: FortisBC Inc.
Shelby Ravestein, P. Eng, Electrical Engineer: FortisBC Inc.

RE: **Archaeological Overview Assessment of Proposed Development Options at WTS and ASM Substations and Associated Infrastructure**

Management Summary:

Nupqu Resource Limited Partnership's Archaeology Division (Nupqu) was contracted by FortisBC Inc. (FortisBC) to conduct an Archaeological Overview Assessment (AOA) of proposed development options at Warfield Terminal Station (WTS) and A.S. Mawdsley (ASM) Terminal Station, as well as the transmission line which extends between the two substations (the Project). To support the desktop review component of the AOA, a Preliminary Field Reconnaissance (PFR) was also conducted. In total, one area of potential (AOP) was identified on an elevated terrace which holds ASM substation.

Proposed Development:

The Project is located within the City of Trail in southeastern British Columbia, and partially overlaps with Teck Resources Ltd. (Teck)-owned property. The Project can be located on map sheets 082F.002 and 082F.012 (BC TRIM), and 082F/04 (NTS [*Appendix A: Figures 1-2*]).

FortisBC has presented two options for the proposed upgrades, each include varied levels of ground disturbance, removal and replacement of electrical poles and other infrastructure, and expansion of the substations. Option A is the expansion of the ASM substation footprint to the southwest, the removal of several structures in ASM, installation of several temporary structures, as well as an underground alignment, the re-establishment of a former access road and pole installations (with associated anchors) to facilitate the rebuild and re-purpose of the 9 Line and 10 Line segment adjacent to the 34 Line transmission line extending to WTS (*Appendix A: Figures 3-4*). Option B is an expansion of WTS to the south and west of its current footprint, removal of existing structures within the expansion area, the addition of poles and anchors to the west of WTS,

the removal of existing structures and addition of new poles at ASM, and the re-establishment of a former access road (*Appendix A: Figures 5-6*).

Methods:

Work completed on this AOA consisted of two components: a PFR to assess the terrain at ASM, WTS and the transmission line and an in-office desktop review to evaluate field results, as well as other information relevant to the Project. The PFR was completed on October 24th, 2022, where Nupqu was accompanied by an Osoyoos Indian Band representative (Courtney Louie) and two FortisBC representatives (D'Arcy Caron and Shelby Ravestein). For the desktop review, Nupqu reviewed readily available background information related to previous archaeological assessments, palaeoecology, current environment, cultural history and postcontact history applicable to the Project location. Determining the potential of precontact archaeological resources (*i.e.* pre-dating AD 1846) within the Project area consisted of the analysis of applicable archaeological predictive models (APMs), the Remote Access to Archaeological Data application (RAAD [maintained by the BC Archaeology Branch]), the Provincial Archaeology Report Library (PARL [maintained by the BC Archaeology Branch]) for previously completed assessments in proximity to the Project's location, satellite imagery performed on Google Earth, and a review of historical documents and aerial photos of the Project location.

Results:

In total, one AOP was identified which overlaps with FortisBC's proposed work within and in the vicinity of ASM substation (within Option A or B) and a section of the transmission line footprint situated on the southwestern facing terrace which overlooks Schofield Highway and the residential community of Annabel (*Appendix A: Figures 4 and 6*). Regarding WTS substation and the transmission line footprint on the northeast side of the drainage (*i.e.* adjacent to Bingay Road and within Teck property), low archaeological potential was identified.

Background Research:

Sections of high potential APM polygons overlap with sections of the Project (*Appendix A: Figures 3-6*). These APMs were completed on portions of the Arrow Forest District, which includes the Project location (Handly *et al.* 1998; Handly and Lackowicz 2000). The determination of archaeological potential within the APMs is based on a review of regional geomorphology and geological information, environmental features, ethnographic information, and locations of previously recorded cultural sites and archaeological sites (*ibid.*). This information is applied to selected landscapes and identifies archaeologically-favourable attributes that result in the

delineation of polygons which encompass areas likely to contain precontact archaeological deposits and/or features (*ibid.*). Archaeological potential polygons within the AOA are defined as high, moderate-high and moderate (*ibid.*).

A review of RAAD indicated the presence of 15 previously recorded archaeological sites within a 10 km radius of the Project's location (see Table 1). The majority of sites in proximity to the Project are situated downslope and along the Columbia River drainage (*Appendix A: Figures 1-2*). Common precontact site types that have been identified within this radius consist of (but are not limited to) surface lithic scatters and cultural depression features for habitation and subsistence.

Table 1. Precontact Archaeological Sites within a 10 km Radius of the Project

Borden Number	Location/Distance	Site Type	*HCA* Permit Number
DgQk-2	382 m NE	Historic, Building, Industrial/General, *Project 9 Heavy Water Project Building*	1979-0010
DgQk-20	2.5 km SW	Historic, Transportation, Trail: Dewdney Trail	1974-0001
DgQk-21	2.5 km SW	Historic, Transportation, Trail: Dewdney Trail	1974-0001
DgQk-3	2.9 km N	Precontact, Cultural Materials, Surface Lithics	1980-NP
DgQk-1	3.05 km N	Precontact, Other Feature, Cultural Depression, Function Unassigned	1973-0028 1980-NP 1981-NP 1982-NP 1982-0020
DgQk-5	4.3 km N	Precontact, Cultural Material, Surface Faunal	1982-NP
DgQk-4	5.4 km NNE	Precontact, Subsistence Feature, Cultural Depression, Cache Pit; Habitation Feature, Cultural Depression, Housepit Historic, Transportation, Trail	1980-NP 1982-0020
DgQk-25	5.5 km NE	Precontact, Other Feature, Petroform, Cairn	2014-0155
DhQk-9	7.7 km NNE	Precontact, Cultural Material, Surface Lithics	2012-0071
DgQj-21	8.5 km ESE	Precontact, Cultural Material, Surface Lithics	2010-NP
DgQl-1	8.7 km SE	Precontact, Cultural Material, Subsurface Lithics; Subsistence Feature, Cultural Depression, Cache Pit	1982-0020
DhQk-2	8.8 km NNE	Precontact, Subsistence Feature, Cultural Depression, Cache Pit; Habitation Feature, Cultural Depression, Housepit	1980-NP 1982-0020
DhQk-7	9 km NNE	Precontact, Cultural Material, Surface Lithics	2000-0270
DgQj-12	9.4 km SE	Precontact, Cultural Material, Surface Lithics	1974-0001
DgQj-1	9.9 km SE	Precontact, Cultural Material, Surface & Subsurface Lithics; Surface & Subsurface Faunal; Surface & Subsurface Fire-	1969-0015 1971-0030 1974-0001 1974-0030 1997-0209

Borden Number	Location/Distance	Site Type	*HCA* Permit Number
		altered Rock (FAR); Precontact, Other Feature, Petroform, Cairn; Postcontact, Cultural Material, Surface Glass	1999-0129 1999-0178 1999-0291 2017-0369 2018-0141 2022-0156 2022-0205
Comments: • NP = non-permit recording/site visit			

Previous Archaeological Assessments:

Multiple archaeological assessments have taken place in proximity to the Project location. The most recent is an AOA and non-permit PFR completed by Ursus Heritage Consulting Ltd. at Violin Lake and Cambridge Creek (*ca.* 2020), situated approximately 3.5 km to 7 km south-southeast of the Project, as part of a dam decommissioning for the City of Trail and resulted in the identification of three areas of potential (AOPs [Bonner 2020]).

Tipi Mountain Eco-Cultural Services Ltd. (TMECS) completed an AIA for ATCO Wood Products Ltd. (ATCO), under permit #2018-0192, within a proposed timber harvest area along Moris Creek, approximately 11 km to the southeast, which yielded negative results for archaeological sites but one AOP was identified (Neill and Hanna 2019). TMECS completed another AIA on ATCO's proposed timber harvest area in 2014 (permit #2014-0155) along Randall Creek, where site DgQk-25 was recorded (Precontact, Other Feature, Petroform, Cairn) approximately 5.5 km to the northwest (Liddy 2015).

An archaeological impact assessment (AIA) was completed by Kutenai West Heritage Consulting Ltd., under permit #2000-0270, of a proposed 230kV Transmission Development System near the City of Castlegar (Handly and Lackowicz 2001), wherein a portion of that study area overlapped with WTS (prior to its construction). Based on the #2000-0270 final report, it appears the location of WTS was not subject to a pedestrian traverse during the AIA, as field observations for this location were not discussed within the report. However, Lackowicz and Handly determined that terrain assessed within then-Cominco property had been "severely impacted by previous land alterations resulting in large areas being stripped by heavy machinery or used as fill" (*ibid.*).

An intensive AIA was completed by Points West Heritage Consulting Ltd. (Points West) under permits #1998-0067 and #1998-0283 for the BC Gas Utility Ltd. pipeline. Jane Bussey (Points West) along with Wayne Choquette from the Ktunaxa-Kinbasket Tribal Council, Martin Handly and Robert Lackowicz from Kutenai Heritage West Consulting Ltd. and Stan Copp from Itkus Heritage Consulting, conducted the field assessments along the Southern Crossing Pipeline, which extends

from Oliver, BC, through the Boundary and West Kootenay regions to Yahk, BC (Bussey *et al.* 1998). No precontact archaeological sites were identified in proximity to the Project location.

Between 1980 and 1982, James Baker conducted several archaeological assessments along the Columbia River between Castlegar and Trail as part of the Murphy Creek Project for BC Hydro. Reporting for Baker's PFR, completed in 1981, is on file within the BC Hydro archives and is not accessible for this AOA. However, based on available site forms from RAAD, Baker recorded almost 40 precontact archaeological sites during this 1981 assessment. Under permit #1982-0020, Baker completed a detailed evaluation (*i.e.* subsurface testing) at 15 precontact sites that were considered to be in conflict with the Murphy Creek project, four of which were perceived to have an increased significance level where recommendations of excavation were put forth prior to the construction activities for the project (Baker 1982). Of the sites recorded/revisited by Baker between 1980 and 1982, those in proximity to the Project are DhQk-2, DgQk-1, 3, 4 and 5, and DgQl-1, all measuring within an 8.8 km radius.

In 1974, a Heritage Impact Assessment was completed by Wayne Choquette on the proposed inland natural gas East Kootenay transmission line link between the Village of Salmo and the City of Rossland, wherein 11 precontact and 22 historic sites were recorded, including DgQk-20 and 21 (2.5 km southwest of the Project), which consist of sections of the historic Dewdney Trail (Choquette 1974). After the project was completed, the assessment and report were assigned under permit #1974-0001$_G$ by the government sector equivalent to the BC Archaeology Branch at that time.

Palaeoecology:

The Project location is situated within the southern Selkirk Trench, bound by the Selkirk Mountains to the east and the Monashee Range to the west. This area was subject to repeated glaciations during the Pleistocene Epoch, with the final deglaciation beginning approximately 15,000 years ago. Following deglaciation, Glacial Lake Columbia, which predates 10,000 before present (BP), extended up the Columbia River from present-day Washington to north of Revelstoke. Following the draining of Glacial Lake Columbia, the Columbia River and its tributaries eroded and reworked the thick fill of stratified drift which had been deposited by the glacial lake throughout the region (Choquette 1993: 13). This fill material was subsequently reworked into a series of fluvial terraces in the upper portions of the valley. In the inner valley, fluvial flood bars, alluvial floodplain terraces and fans were formed in response to climatic variations over time.

Within the approximate time span of 12,000 BP to 10,500 BP, a pioneer community of grass, sage and scattered conifers colonized a “cold desert” habitat which persisted until a warming climate trend occurred at the end of that period. Between about 10,500 BP and 7,000 BP, the climate in the Columbia River valley region was primarily continental (*i.e.* with significant annual variation in temperature). After 7,000 BP, maritime westerlies (prevailing winds from the west) brought significant climatic change throughout the region, with forests becoming denser on west-facing slopes and vegetation communities becoming strongly influenced by precipitation and winds (Choquette 1987 and Choquette 1996).

A more diverse vegetation population began to evolve after 5,000 BP, when a global cooling trend brought about the regrowth of cirque glaciers at higher elevations. Between 4,000 BP and 1,500 BP, the present-day moist maritime forest associations characterized by cedar, hemlock and Douglas-fir developed in the region (Mack *et al.* 1978, Hebda 1982, Choquette in Bussey 2003: 13).

Changes in animal population distributions in response to the varied palaeoenvironmental conditions are currently not well documented for the Columbia River valley. However, it has been proposed that ungulate habitat of the southern Monashee and Selkirk mountains was likely greater during the period prior to 7,000 BP (Choquette 1993). The period between 4,500 BP and 2,500 BP has been identified as a time when aquatic resources were likely at their maximum extent; this would also hold true of the salmon carrying capacity of the Columbia River within the general study area (Choquette 1985).

Current Environment:

The Project is located in the Dry Warm Interior Cedar – Hemlock (ICHdw) biogeoclimatic zone, as described in A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (Braumandl and Curran 2002). The ICHdw subzone is characterized by very hot, moist summers and very mild winters with light snowfall. Fluvial soils with silty sandy, and/or loamy textures are found on lower and level slopes (*ibid*.). Common rock types include monzonite, diorite, gneiss, schist, argillite and quartzite (*ibid*.). Forest cover within the study area consists of Douglas-fir, lodgepole pine, ponderosa pine, and cottonwood. Shrubs include falsebox, Douglas maple, black huckleberry, and baldhip rose; herbs include pinegrass, twinflower, prince’s pine, queen’s cup and wild sarsaparilla. The ICHdw subzone is important winter habitat for ungulates, including elk and white-tailed deer (*ibid*.). The Columbia River has remaining native fish populations of rainbow trout, bull trout, cutthroat trout, mountain white fish, white sturgeon, suckers and ling or burbot (Choquette 1993: 8-10). The anadromous fish migrations, which previously moved up the Columbia River,

Lower Kootenay River and the Slocan River, were halted with the construction of the Grand Coulee Dam (*ca.* 1934) on the Columbia River in Washington State, USA, and the Brilliant Dam on the lower Kootenay River (*ibid*.).

Cultural History:

Detailed culture history sequences have been developed for the study area and the greater Columbia Region and can be reviewed in the original reports. These works include those of David and Jennifer Chance at Kettle Falls to the south (Chance and Chance 1977, 1979, 1982 and 1985; Chance et al 1977), Chris Turnbull and Morley Eldridge in the Arrow Lakes to the north (Turnbull 1977; Eldridge 1984), and Wayne Choquette in the upper and lower Columbia River valley and in the East and West Kootenay regions (1984, 1985, 1987_A, 1987_B, 1993, 1996, 2001_A and 2001_B).

Postcontact History:

Gold was discovered in the now-Rossland area by a French-Canadian prospector, Joe Moris, and his partner, Joe Bourgeois, in 1890 (Rossland Museum website accessed: November 25, 2022). As news spread of their discovery, more people settled in the area for gold and mineral exploration, which led to the establishment of a tent town, now the City of Rossland (*ibid.*). Within two years of the discovery, the rich deposits of gold-copper ore were actively mined and transported to American smelters to be treated for market until 1896, when a local gold-copper smelter was constructed by an American miner, F.A. Heinze (Teck Trail Operations 2020). In 1898, the smelter was bought by Canadian Pacific Rail (CPR) and in 1906, the smelter, several mines in Rossland and a lead-silver mine in the East Kootenays were joined together to form the Consolidated Mining and Smelting Company of Canada (CM&S), Limited, later renamed Cominco Limited (*ca.* 1966 [Cominco]). The CM&S smelter is situated on an elevated terrace on the west side of the Columbia River, within the City of Trail, and eventually expanded to also process lead, zinc, and silver (Teck Trail Operations 2020).

In 1930, CM&S opened a fertilizer plant on an elevated terrace, approximately 155 m above and to the west of the existing smelter adjacent to (northeast of) the Village of Warfield. The community of Warfield was built by the CM&S to house the influx of employees hired to work at the fertilizer plant. In 1938, 150 houses were constructed in Upper Warfield, also affectionately called “Mickey Mouse Town” for the cartoon-like styles of homes, and 10 houses were built in Lower Warfield (Nelson 1976; Trail and District Chamber of Commerce website, accessed November 25, 2022). Warfield was originally considered a residential neighbourhood of the City of Trail, but eventually became established as an incorporated village in 1953 (Trail and District Chamber of Commerce

website, accessed November 25, 2022). In 2001, Cominco merged with Teck Corporation, forming Teck Cominco Limited, and then Teck Resources Ltd. in 2009 (Teck Trail Operations 2020 [Teck]).

ASM substation was built in the early 1960s by West Kootenay Power, a subsidiary of CM&S, and has since been subject to several upgrades (FortisBC, pers. comm. November 21 & 25, 2022). The property was formerly owned by CM&S, purchased from the Columbia and Western Railway Company in 1919, and in 1979, West Kootenay Power purchased the property from Cominco (*ibid.*). WTS substation was built in 2001-2002 and is situated on a Statutory Right-Of-Way within Teck's property (*ibid.*). In 2003-2004, West Kootenay Power was purchased by Fortis Inc., a Newfoundland and Labrador based company, and the subsidiary was then renamed FortisBC (FortisBC Inc. website, accessed: November 28, 2022).

Preliminary Field Reconnaissance:

The in-field assessment consisted of a pedestrian traverse beginning at WTS substation and on the terrain between Bingay Road (southeast) and the existing substation (northwest). This terrain has been heavily impacted by the adjacent infrastructure and was subject to leveling (*e.g.* mechanical excavation and/or imported fill) in the past, likely associated with the active fertilizer plant to the south of the Project and/or historical mining-related activity (*Appendix A: Figures 3 and 5; Appendix B: Photos 1-2*). Low archaeological potential was identified within the footprint of proposed work at WTS.

The transmission line extends from WTS to the southwest, atop existing bedrock and sloped terrain (15-30° descending south and southeast [*Appendix B: Photo 3*), and corners to the southeast, crossing Bingay Road then extends through Teck's property and terminates at ASM on a terrace on the southwest side of a steep ravine and drainage (*Appendix A: Figures 3-6; Appendix B: Photo 4*). In-field assessment of the transmission line did not take place through Teck's property, as intensive safety requirements and approvals were required to enter the property. The re-establishment of an existing access road (approx. 70 m in length) was present in both proposed development options (*i.e.* A and B), situated between the transmission line and Bingay Road – approximately 115 m southwest of Hanna Creek Road (*Appendix A: Figures 3 and 5*). This section of terrain holds previously mechanically leveled ground surface extending across moderately sloped terrain (southwest descending 15-20°) to the transmission line. Vegetation surrounding WTS and the transmission line on the northside of Bingay Road consisted of elderberry shrub, black locust trees and various grasses. No AOPs were identified within the sections of the transmission line and the proposed access road on the north side of Bingay Road and therefore the areas were identified as containing low archaeological potential.

ASM is located on an elevated terrace with a southwest aspect, overlooking the Warfield neighbourhood of Annabel and Schofield Highway (trending east-west) approximately 75 m below. The northeastern margin of the terrace contains the southern portion of the transmission line, as it connects to ASM, and overlooks a steep (40°+) ravine situated between (southwest of) the Teck-owned property and (northeast of) FortisBC's property. The ravine was formed by a northwest-southeast trending drainage that fed into Trail Creek to the southwest. Terrain surrounding the ASM substation footprint is level and consists of a sandy silt matrix containing evidence of past ground disturbance related to electrical infrastructure, such as (but not limited to) previously installed electrical poles and push piles adjacent to the substation fence. The terrain was subject to surface surveys to identify exposed precontact artifacts and/or features, as much of the area was devoid of vegetation, but yielded negative results. The terrain to the south, southwest and northeast of ASM was identified as an AOP, as precontact materials may be present within the substratum of the landform (*Appendix A: Figures 4 and 6; Appendix B: Photos 5-7*).

Desktop Review:

According to aerial and historical photos, the northern portion of the assessment area, where WTS is currently situated, had been subject to extensive ground disturbing impacts associated with the fertilizer plant and it appears sections of bedrock had been extracted, possibly during the construction of Bingay Road and/or Hanna Creek Road, or as a result of the ongoing operation (*e.g.* expansion, maintenance, etc.) of the fertilizer plant. The analysis of Teck property, where the FortisBC transmission line extends through, indicated that the area has been subject to severe ground-disturbing impacts as a result of ongoing maintenance and upgrades within the property throughout the 20th and early 21st centuries. The presence of intact substratum is unlikely, therefore low archaeological potential has been identified along the FortisBC Right-Of-Way within Teck property.

Recommendations:

Of the two options proposed by FortisBC, Nupqu considers Option B as the preferable choice based on the decreased level of ground disturbing developments proposed in comparison to Option A.

With regard to the proposed developments for WTS and the connecting transmission line, low archaeological potential was identified, therefore proposed work can take place with no additional archaeological assessments at this time.

Nupqu LIMITED PARTNERSHIP

With regard to the area of potential (AOP) identified on terrain surrounding ASM, an Archaeological Impact Assessment (AIA) completed under a *Heritage Conservation Act* Section 12(2) Heritage Inspection Permit is recommended prior to commencing proposed ground disturbing work.

It is further recommended that the proponent inform all staff and contractors that archaeological remains predating AD 1846, located on both public and private lands, or sites containing rock art or human burials, are automatically protected within the Province of British Columbia from intentional and inadvertent disturbance by the *Heritage Conservation Act* (RSBC 1996, Chapter 187).

To properly address any unanticipated discoveries of archaeological materials as a result of this development please ensure staff and contractors are aware of the following:

- All ground disturbance in the immediate vicinity of the suspected find(s) must be suspended at once;
- The Ministry of Forests Archaeology Branch (250-953-3334) be informed, as soon as possible, of the location of the archaeological remains and the nature of the disturbance, and;
- Any relevant First Nation communities are promptly informed about particulars of the unanticipated discoveries

Lindsey Neill, BA
Archaeologist/Project Manager
lindsey.neill@nupqu.com

Cc:
Adams Lake Indian Band
Colville Confederated Tribes (Sinixt Nation)
Ktunaxa Nation Council
Lower Similkameen Indian Band
Okanagan Indian Band
Okanagan Nation Alliance
Osoyoos Indian Band
Penticton Indian Band
Shuswap Band
Splatsin First Nation
Upper Nicola Band

Nupqu LIMITED PARTNERSHIP

References Cited:

BC Law
1996 *Heritage Conservation Act,* Revised Statutes of British Columbia 187, Kings Printer, Victoria, BC.

Bonner, Fraser (Ursus Heritage Consulting Ltd.)
2020 Archaeological Overview Assessment and Preliminary Field Reconnaissance of the proposed City of Trail Cambridge Creek Reservoir and Violin Lake Dam Decommissioning. Prepared for Wetland Restoration Consulting. Website: https://www.trail.ca/en/inside-city-hall/resources/ViolinLake/2020.11.30---Cambridge-Reservoir-Violin-Lake-Dam-Decomissioning-AOA-PFR-Report_DRAFT.pdf. Accessed: November 25, 2022.

Burmandl, T.F and M.P Curran
2002 A Field Guide for Site Identification and Interpretation for the Nelson Forest Region. Land Management Book Number 20, Part 1. Ministry of Forests, Forest Science Program.

Bussey, Jean, Wayne Choquette, Martin Handly, Robert Lackowicz and Gabriella Prager
1998 Supplemental and Additional Archaeological Investigations for the Southern Crossing Pipeline. Prepared for BC Gas Utility Ltd, final report for Heritage Inspection Permits 1998-0067 and 1998-0283. On file with the BC Archaeology Branch and Nupqu.

Chance, D.H and J.V Chance
1985 Kettle Falls: 1978, Further Archaeological Excavations in Lake Roosevelt. University of Idaho Anthropological Research Manuscript Series, no. 84.

1982 Kettle Falls: 1971 and 1974, Salvage Archaeology in Lake Roosevelt. University of Idaho Anthropological Research Manuscript Series, no. 69.

1979 Kettle Falls: 1977, Salvage Archaeology in Lake Roosevelt. University of Idaho Anthropological Research Manuscript Series, no. 53.

1977 Kettle Falls: 1976, Salvage Archaeology in Lake Roosevelt. University of Idaho Anthropological Research Manuscript Series, no. 39.

Chance, D.H, J.V Chance and J. Fagan
1977 Kettle Falls: 1972, Salvage Archaeology in Lake Roosevelt. University of Idaho Anthropological Research Manuscript Series, no. 31.

Choquette, Wayne
2001A Results of Archaeological Monitoring at Sites DgQa 4, DgQc 4 and DgQd 8, BC Gas Southern Crossing Pipeline Project, Southeastern B.C. Report submitted to Westland Resource Group, Victoria.

2001B Results of Archaeological Monitoring at Sites DgQj-20, DgQa-3, DgQb-1, DgQb-2, DgQb-4, DgQc-1 and DgQc-5, BC Gas Southern Crossing Pipeline Project, Southeastern B.C. Report submitted to Westland Resource Group, Victoria.

1996 Early Remains in the Kootenay Region. In Carlson, R. ed. Proceedings of a symposium on Early Cultures in BC. Vancouver: University of British Columbia Press.

1993 Archaeological Resource Overview for the Nelson Forest Region. On file with the BC Archaeology Branch.

1987A A Palaeoclimatic Model for the Upper Columbia River Drainage Basin. In McKinnon, Neil, and Glenn Stuart, eds. Man and the Mid-Holocene Climatic Optimum. Calgary: The Students' Press, pp. 311-344.

1987B Archaeological Investigations in the Middle Kootenai Region and Vicinity. Chapter 3 in Thorns, Alston and Greg Burtchard, eds. Prehistoric Land Use in the Northern Rocky Mountains: a perspective from the Middle Kootenai Valley. Washington State University, Center for Northwest Anthropology, Project Report no. 4: 57-119.

1985 Excavations at DiQj-18, South Slocan: A Test of a Model of Upper Columbia Basin Human Settlement Dynamics. Report on file with the BC Archaeology Branch.

1974 Heritage Impact Assessment of Proposed Inland Natural Gas East Kootenay Transmission Line Link, Salmo to Rossland Section. On file at Nupqu.

Eldridge, M.
1984 Vallican Archaeological Site (DjQj-1): A Synthesis and Management Report. On file with the Archaeology Branch, Ministry Responsible for Culture, Victoria.

Fortis Inc.
2022 About Us. Website: https://www.fortisinc.com/about-us/fortis-history. Accessed: November 28, 2022.

Handly, Martin and Robert Lackowicz (Kutenai West Heritage Consulting Ltd.)
2001 Archaeological Impact Assessment Results for West Kootenay Power Ltd.'s Proposed 230kV Transmission System Development Near Castlegar, BC. Prepared for West Kootenay Power Ltd., final report for Heritage Inspection Permit 2000-0270. On file with Nupqu and the BC Archaeology Branch.

2000 An Archaeological Predictive Model for ATCO Lumber Ltd., Kalesnikoff Lumber Co. Ltd. and Arrow Forest District SBFEP Operating Areas, Arrow and Kootenay Lake Forest Districts, Southeastern BC. Prepared for ATCO Lumber Ltd., Kalesnikoff Lumber Co., Ministry of Forests – Arrow Forest District Small Business Forest Enterprise Program. Prepared by Kutenai West Heritage Consulting Ltd.

Handly, Martin, Robert Lackowicz and Dorothy Zibauer
1998 Arrow Forest District – Archaeological Overview Assessment (1995-1999). Prepared for the Arrow Forest District.

Hedba, RJ.
1982 Postglacial history of Grasslands of Southern British Columbia and Adjacent Regions. In Nicholson, A.C., A. McLean, and T> Baker, eds. Grassland Ecology and Classification, Symposium Proceedings, pg 157-191. Victoria: British Columbia Ministry of Forests.

Liddy, Jacob (Tipi Mountain Eco-Cultural Services Ltd.)
2015 Box Canyon F.L. A20193 Area I. Prepared for ATCO Wood Products Ltd. Interim report completed under Heritage Inspection Permit 2014-0155. On file with the BC Archaeology Branch and Nupqu.

Mack, R.N., N.W. Rutter, V. Bryant Jr. and S. Valastro
1978 Late Quarternary Pollen Record from Big Meadow, Pend d'Oreille County, Washington. Ecology 59(5): pg. 956-965.

Neill, Lindsey and Justin Hanna (Tipi Mountain Eco-Cultural Services Ltd.)
2019 Archaeological Impact Assessment of ATCO Wood Products Proposed Timber Harvest Areas: Shields Face, Neptune, Bear, West Beavervale and Morris Creek. Prepared for ATCO Wood Products Ltd. Interim report completed under Heritage Inspection Permit 2018-0192. On file with the BC Archaeology Branch and Nupqu.

Nelson, Patti
1976 Mickey Mouse Houses in Warfield. Term paper for Anthropology 101, Selkirk College. On file at Selkirk College and Nupqu.

Personal Communication
2022 Communication with FortisBC Energy Inc. on November 21st and 25th, 2022.

Rossland Museum and Discovery Centre
2022 Centre Star Mine and War Eagle Mine. Website: https://www.rosslandmuseum.ca/cominco. Accessed: November 25, 2022.

Teck Trail Operations
2020 A Brief History, Teck Trail Operations, January 2020. Teck Resources Ltd. Website: https://static1.squarespace.com/static/5b11caa631d4df0138d9dfdb/t/5f498843f15d38134af56d7f/1598654534176/Teck+-+A+Brief+History+-+January+2020.pdf. Accessed November 25th, 2022

Turnbull, C.J
1977 Archaeology and Ethnohistory in the Arrow Lakes, Southeastern British Columbia. National Museum of Man, Mercury Series 65.

Appendix A

Maps

FortisBC Inc.

ASM and WTS Substations

AOA

Nupqu LIMITED PARTNERSHIP

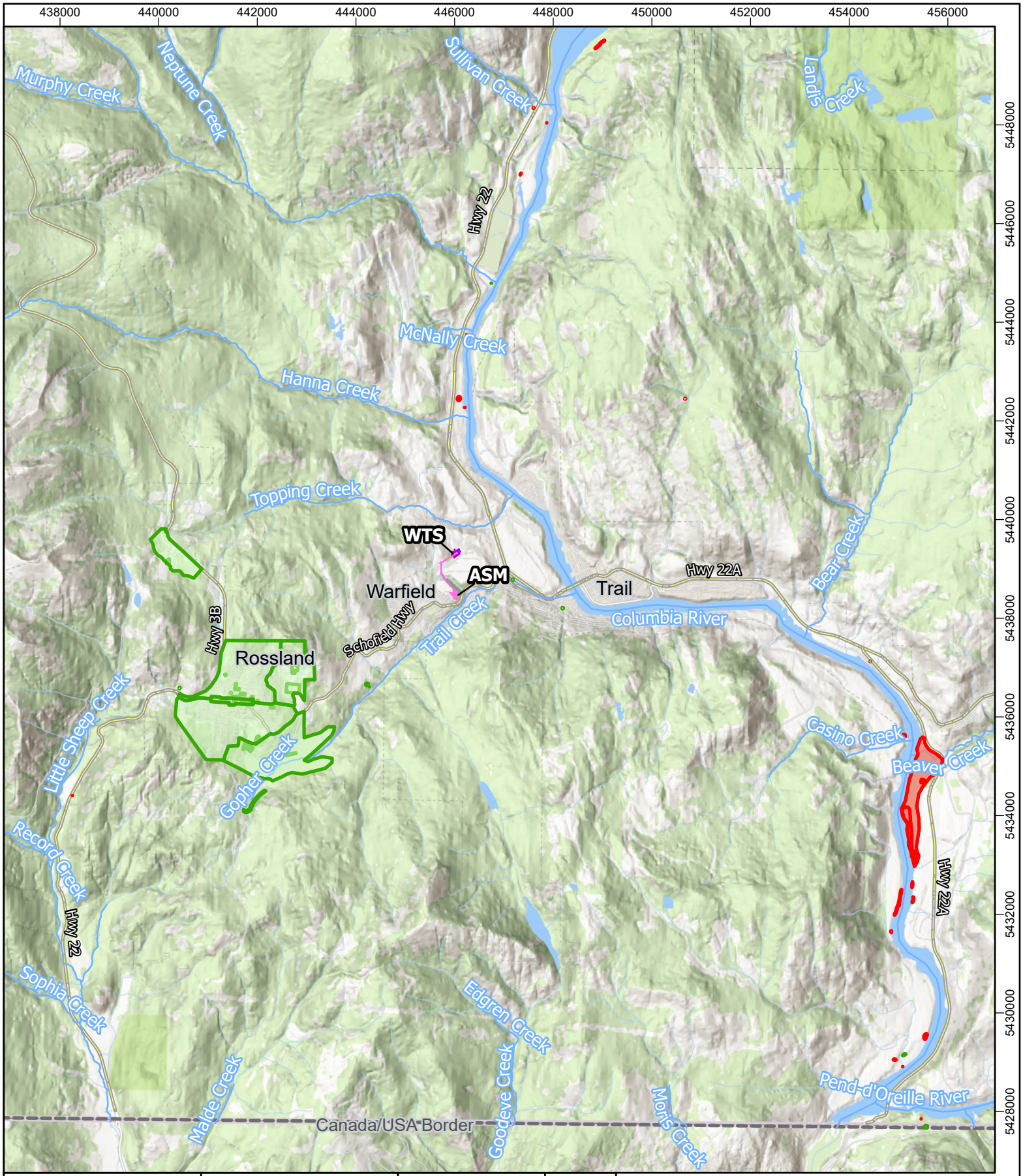


Figure: 1	Client: FortisBC Inc.	UTM11 - NAD83 - NTS 82F	N	Legend
Permit: Non-Permit		BC AB 1:40,000,000	Mapping by: Nupqu	Precontact Arch Site Boundary (RAAD 2022); Historic Arch Site Boundary (RAAD 2022); WTS/ASM Expansion Option A; WTS/ASM Expansion Option B; Watercourse; Highway; Canada/USA Border
Title: Overview Map	Survey Date: 24/10/2022			
	Mapping Date: 02/12/2022			
Project: ASM and WTS AOA	0 0.5 1 2 km 1:100,000			

Base Data: DataBC; Base Map: ESRI; Arch Site: Arch Branch; Project: Client; Field: Nupqu

Disclaimer: Information relating to the location and nature of archaeological sites is considered sensitive cultural heritage information. Archaeological Overview Assessments, polygons, and other site-specific information provided to the Proponent's name is confidential and must not be shared with the public, individuals or other entities without written permission from Nupqu Resource LP.

Figure: 2	Client: FortisBC Inc.	UTM11 - NAD83 - NTS 82F04	N	Legend
Permit: Non-Permit		BC AB 1:40,000,000	Mapping by: Nupqu	Historical Arch Site Boundary (RAAD 2022); AOA - Kutenai West - High Arch Potential; AOA - Kutenai West - Moderate Arch Potential; Area of Potential; WTS/ASM Expansion Option A; WTS/ASM Expansion Option B; Watercourse; Paved Road; Contour (40m)
Title: Midrange Map	Survey Date: 24/10/2022			
Project: ASM and WTS AOA	Mapping Date: 02/12/2022			
	0 125 250 500 m 1:20,000			

Base Data: DataBC; Base Map: ESRI; Arch Site: Arch Branch; Project: Client; Field: Nupqu

Figure: 3	Client: FortisBC Inc.	UTM11 - NAD83 - NTS 82F04	N	Legend
Permit: Non-Permit		BC AB 1:40,000,000	Mapping by: Nupqu	AOA - Kutenai West - High Arch Potential; Disturbance Area; Proposed Structure; Structure Removal; New Anchor; Salvage Anchor; Traverse; Paved Road; Watercourse; Cadastral Boundary; Contour (40m)
Title: Option A North Detailed Map	Survey Date: 24/10/2022			
	Mapping Date: 02/12/2022			
Project: ASM and WTS AOA	0 20 40 80 m 1:3,000			

Base Data: DataBC; Base Map: ESRI; Arch Site: Arch Branch; Project: Client; Field: Nupqu

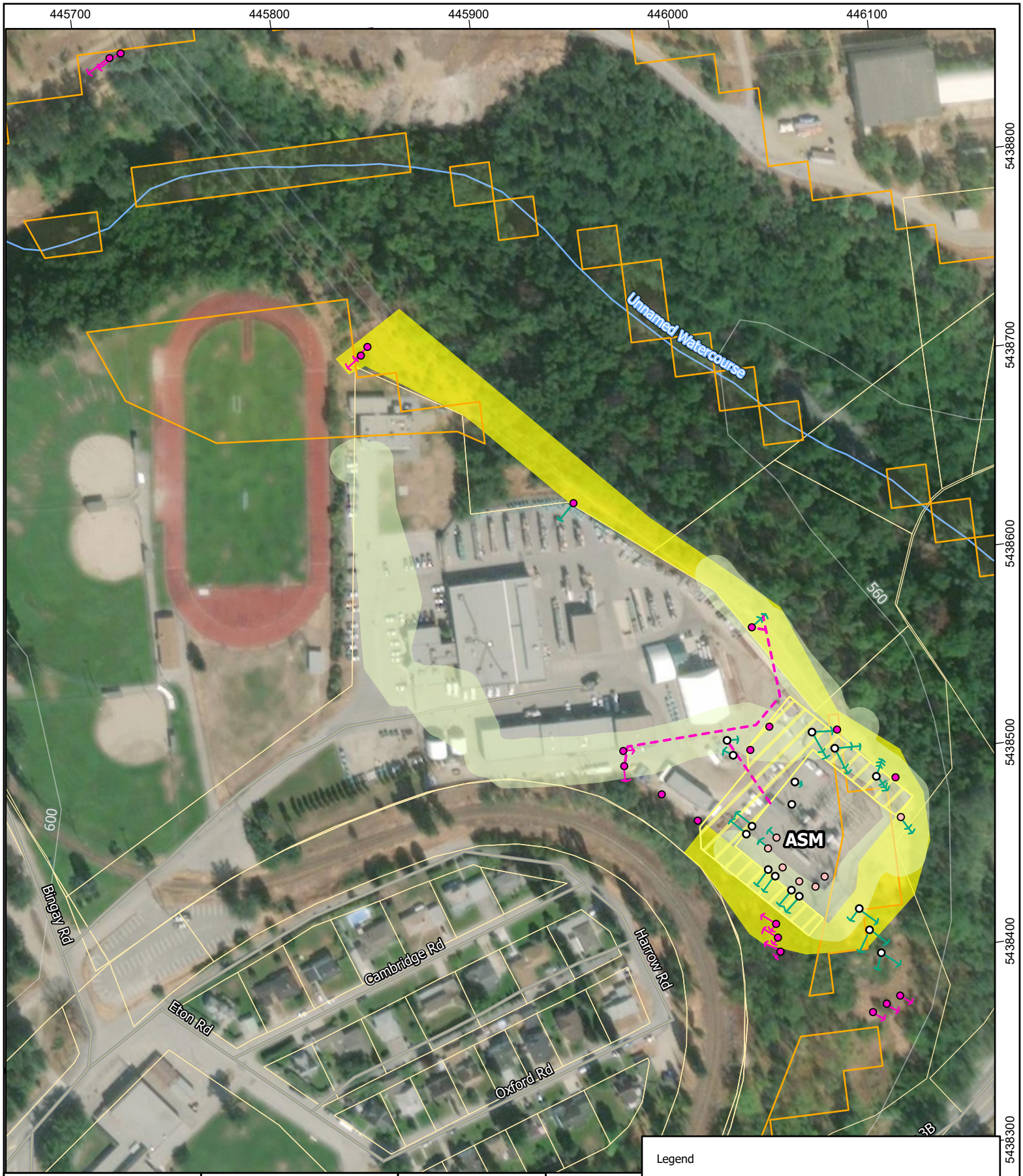


Figure: 4	Client: FortisBC Inc.	UTM11 - NAD83 - NTS 82F04	N	Legend
Permit: Non-Permit		BC AB 1:40,000,000	Mapping by: Nupqu	AOA - Kutenai West - High Arch Potential; Area of Potential; Traverse; Disturbance Area; Proposed Structure; Temporary Structure; Structure Removal; Proposed Underground Alignment; New Anchor; Salvage Anchor; Paved Road; Watercourse; Cadastral Boundary; Contour (40m)
Title: Option A South Detailed Map	Survey Date: 24/10/2022			
	Mapping Date: 02/12/2022			
Project: ASM and WTS AOA	0 15 30 60 m 1:2,500			

Base Data: DataBC; Base Map: ESRI; Arch Site: Arch Branch; Project: Client; Field: Nupqu

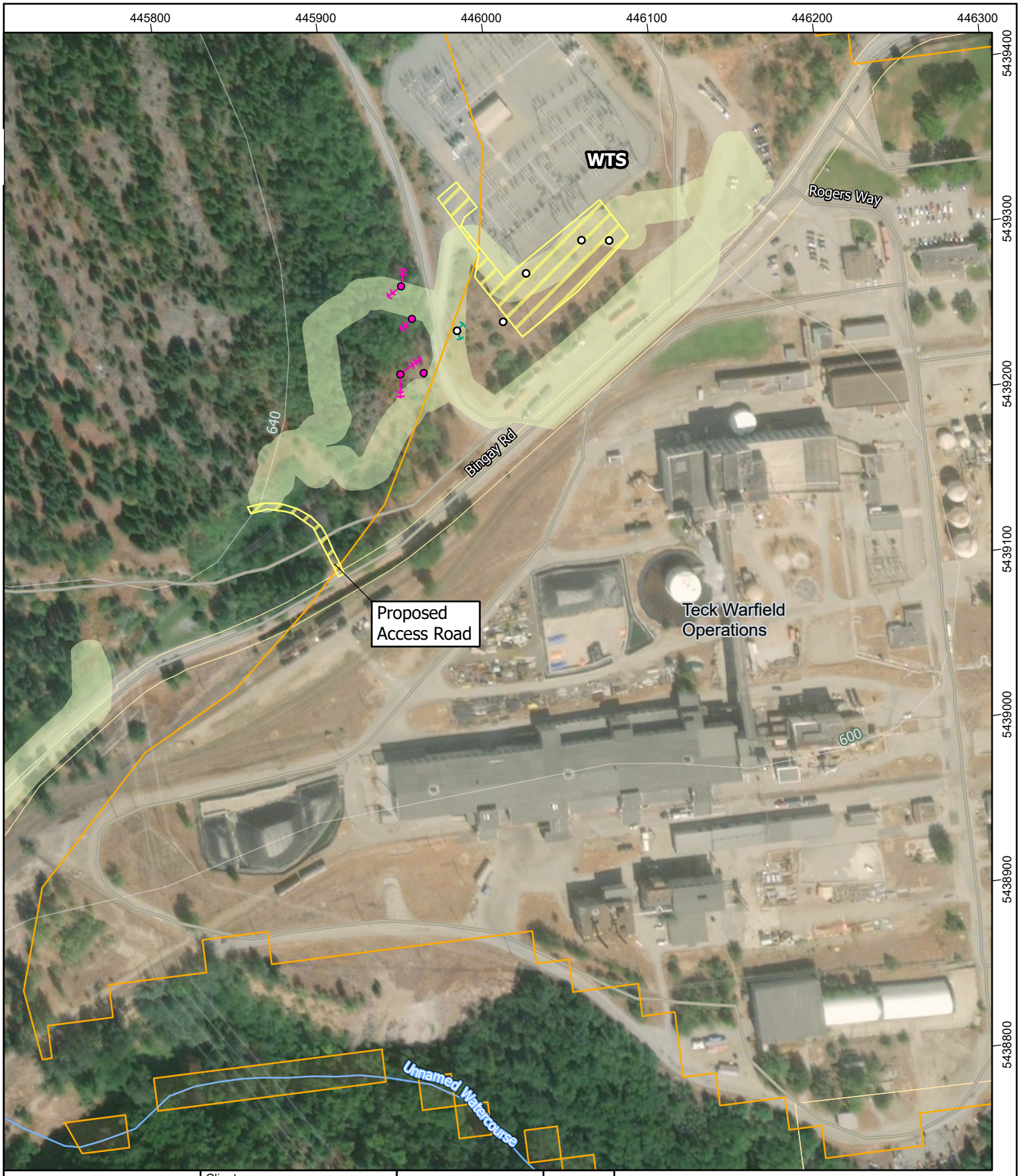


Figure: 5	Client: FortisBC Inc.	UTM11 - NAD83 - NTS 82F04	N	Legend
Permit: Non-Permit		BC AB 1:40,000,000	Mapping by: Nupqu	AOA - Kutenai West - High Arch Potential; Disturbance Area; Traverse; Proposed Structure; Structure Removal; New Anchor; Salvage Anchor; Watercourse; Paved Road; Cadastral Boundary; Contour (40m)
Title: Option B North Detailed Map	Survey Date: 24/10/2022			
	Mapping Date: 02/12/2022			
Project: ASM and WTS AOA	0 15 30 60 m 1:3,000			

Base Data: DataBC; Base Map: ESRI; Arch Site: Arch Branch; Project: Client; Field: Nupqu

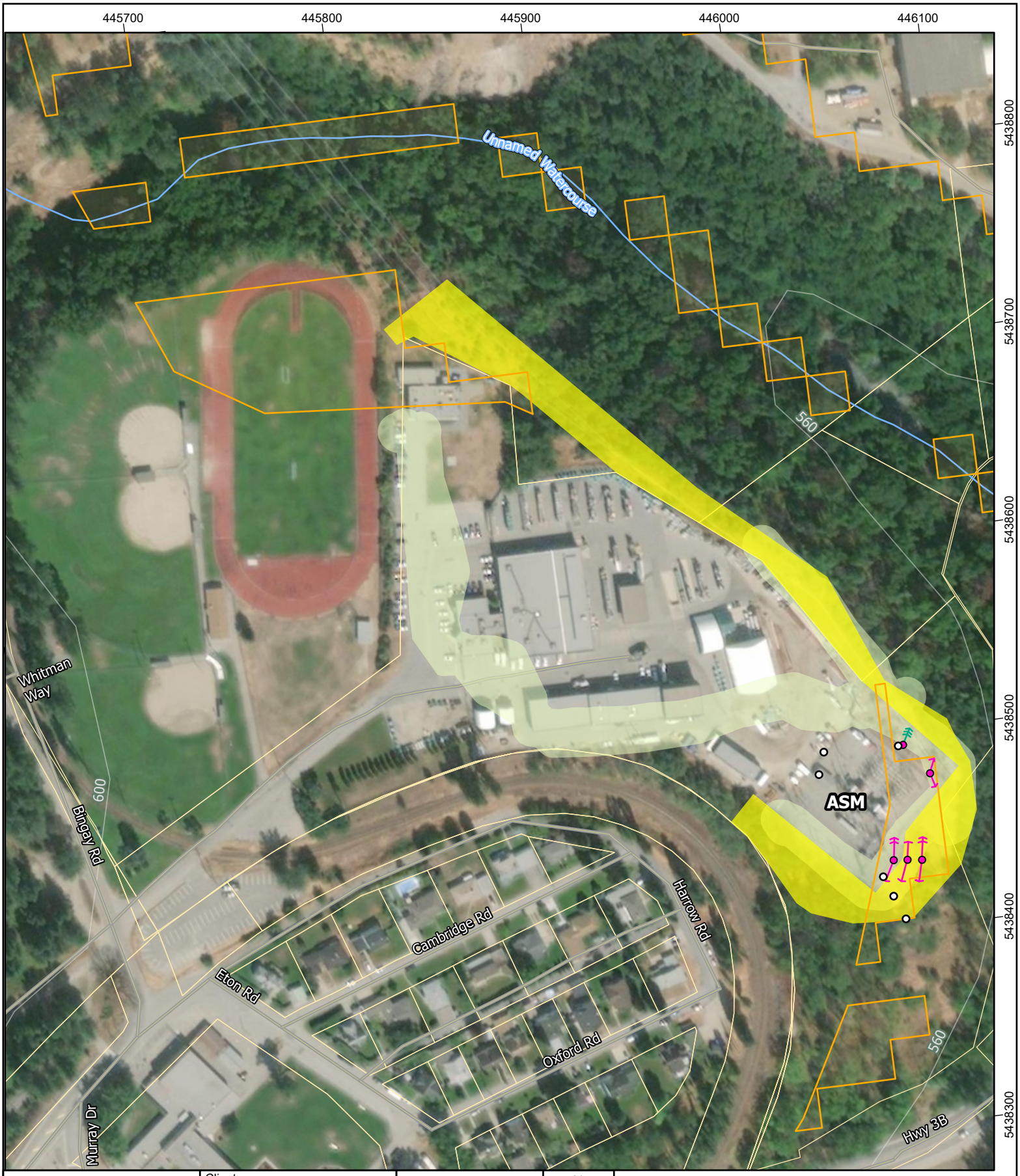


Figure: 6	Client: FortisBC Inc.	UTM11 - NAD83 - NTS 82F04	N	Legend
Permit: Non-Permit		BC AB 1:40,000,000	Mapping by: Nupqu	AOA - Kutenai West - High Arch Potential; Area of Potential; Proposed Structure; Structure Removal; New Anchor; Salvage Anchor; Traverse; Paved Road; Watercourse; Cadastral Boundary; Contour (40m)
Title: Option B South Detailed Map	Survey Date: 24/10/2022			
Project: ASM and WTS AOA	Mapping Date: 02/12/2022	0 15 30 60 m 1:2,500		

Base Data: DataBC; Base Map: ESRI; Arch Site: Arch Branch; Project: Client; Field: Nupqu

Disclaimer: Information relating to the location and nature of archaeological sites is considered sensitive cultural heritage information. Archaeological Overview Assessments, polygons, and other site-specific information provided to the Proponent's name is confidential and must not be shared with the public, individuals or other entities without written permission from Nupqu Resource LP.

Appendix B

Photo Log

FortisBC Inc.

ASM and WTS Substations

AOA

Nupqu LIMITED PARTNERSHIP

Photo 1. Overview of proposed development area at WTS substation (view: northeast).

Photo 2. Representative of terrain between current WTS substation and Schofield Highway (view: southwest).

Photo 3. Representative photo of terrain along section of transmission line north of Schofield Hwy (view: southwest).

Photo 4. Continuation of transmission line into Teck property (view: south).

Photo 5. ASM substation AOP along southwest facing terrace (view: northwest).

Photo 6. ASM substation AOP along southwest facing terrace (view: southeast).

Photo 7. Northwestern margin of AOP adjacent to ASM and Fortis office (view: northwest).

Appendix E
ENVIRONMENTAL MANAGEMENT PLANS

Appendix E-1
WTS ENVIRONMENTAL MANAGEMENT PLAN

Warfield Terminal Substation
Environmental Management Plan

November 2022

FortisBC acknowledges and respects

INDIGENOUS PEOPLES

In this place we call Canada and

On whose territories we all live, work and play.

FortisBC is committed to

Reconciliation with INDIGENOUS PEOPLES

Using our Statement of Indigenous Principles to guide our words and actions.

Warfield Terminal Station: EMP Quick Reference iv
1.0 Introduction 1
FortisBC Risk Assessment - Stations 3
Risk Assessment Scoring Criteria 4
1.1 Reporting 5
1.2 Permitting and Notifications 5
2.0 Warfield Terminal Overview 6
3.0 Regulatory Compliance 7
3.1 FortisBC EMS RISK AREA: Terrestrial Resource Management 7
3.1.1 Heritage Conservation Act 7
3.1.2 Species at Risk and Critical Habitat 8
3.1.3 Avian Protection 9
3.1.4 Ground Disturbance and Soil Disposal 10
3.1.5 Noxious Weeds and Invasive Plants 10
3.2 FortisBC EMS RISK AREA: Environmental Incidents (Spills) 12
3.2.1 Spill Prevention 12
3.2.2 Spill Kits 12
3.2.3 Environmental Spill Response and Cleanup 13
3.2.4 Spill Reporting 13
3.3 FortisBC EMS RISK AREA: Waste Management 14
3.3.1 Hazardous Waste Management: Handling and Disposal 14
3.3.2 Transportation of Dangerous Goods (TDG) 14
3.3.3 TDG Environmental Management Controls 14
Appendix I: Heritage Resource Management (Chance Finds) 15

Warfield Terminal Station: EMP Quick Reference

PERMIT REQUIREMENTS

No Environmental Permits Required for this project.

SECTION 3.1 TERRESTRIAL RESOURCE MANAGEMENT

Species at Risk	**Occurrences**	**Cat.**	**Mammals**	**Plants**	**Birds**	**Invertebrates**	**Reptiles & Amphibians**
		No.	No Known Occurrences of Species at Risk in the WTS Substation area				
	Critical Habitat		**Mammals**				
			Critical Habitat for Mountain Caribou within the Trail area				

Migratory Birds Reporting	**Nesting Window: March 25 – August 15** Report all nests on, in or near assets to FBC Environment	
Invasive Plants within the Project Area	• Field Bindweed • Goutweed • Hoary Alyssum • Mullein • Oxeye Daisy	• Himalayan Blackberry • Policeman's Helmet • St Johns Wort • Spotted Knapweed

SECTION 3.2 ENVIRONMENTAL INCIDENTS

Report **all spills** and other environmental incidents to FBC Environment.

SECTION 3.3 WASTE MANAGEMENT

Only routine Waste is anticipated to be generated during construction. Best Management Practices for routine hazardous and non-hazardous waste disposal will be followed by all crews and contractors. Contact FortisBC Environment if additional support is required.

Project Contacts

Contact Name	Position	Contact Number
Amy Duncan	FBC Terrestrial Biologist	250 608 5147
Serina Swanson	FBC Environmental Lead	250 809 7148
Chris Wylie	FortisBC Archaeologist	250 215 0942
System Control	T&D	1- 844-544-0722 Option2

1.0 Introduction

FortisBC's ISO 14001 compliant Environmental Management System (EMS) provides the framework for identifying, managing and mitigating environmental risks associated with operations and project work.

The Company is committed to protecting the environment by utilizing established Best Practices and Management Controls to ensure work is performed in an environmentally responsible and sustainable manner.

Best Practices include, but are not limited to, the following:

- Environmental awareness training for employees and contractors;
- Integration of environmental protection measures into all elements of business;
- Open communication with stakeholders;
- Working with industry associations, governments and other stakeholders to establish standards for the environment appropriate for our business, and;
- Efficient and effective use of resources.

Environmental Risk Minimization requires maintaining seamless communication between all members of the Project Team. Crews will communicate any previously unidentified aspects of the project that they are concerned could potentially pose a risk to the environment. The Project Manager (or designate) will maintain regular communication with FortisBC Environment in order to ensure any potential risks are appropriately addressed.

Contractors will follow Best Practices identified in this EMP and outlined in contract documents. If unforeseen changes in environmental conditions occur on the project site, the Contractor will contact the FBC Project Manager or Construction Manager, who will in turn contact FBC Environment.

This EMP aligns with all regulatory requirements and includes preventative measures to protect against harm to the environment. There are several regulations that govern FBC activities; a brief description of the regulatory requirements associated with the Project are identified in each of the Environmental Risk Areas identified in Sections 3.1 – 3.4. **All work associated with the Project and conducted by FBC crews and/or contractors will done so in accordance with this EMP.**

If any mitigation measure does not meet the regulatory requirements during Project execution

WORK SHALL STOP.

FortisBC Environment will work with the Project Manager (or designate) and Crew to identify and implement Corrective Action AS SOON AS POSSIBLE.

All FBC crews and/or contractors involved in the Project are responsible for adhering to the guidelines and controls specified in this EMP. Specified controls meet relevant Provincial, Federal and Local regulatory requirements. The primary risks and the protective measures and management controls associated with each risk are summarized in Section 3 of this EMP.

The purpose of this Environmental Management Plan (EMP) is to identify all potential environmental impacts associated with proposed project activities at the Warfield Terminal substation and to provide appropriate controls to mitigate and/or manage these impacts.

The FortisBC Environmental Management System Risk Registry process combines Occurrence Criteria with Regulatory, Environmental Risk, Mitigation Cost and Public Perception to come up with a Significance Score as shown in Table 1 on the following page. The Risk Assessment Scoring Criteria is shown in Table 2 on Page 4.

NOTE: This EMP DOES NOT address health and safety issues. Those issues are addressed under a project-specific health and safety plan. All work must be conducted in accordance with WorkSafeBC standards.

FortisBC Risk Assessment - Stations

FortisBC Environmental Management System Environmental Risk Assessment for Stations																Record Updated: February 09, 2023
Ref. #	RISK AREA	ACTIVITY, OPERATION	ENVIRONMENTAL ASPECT(S)	ENVIRONMENTAL IMPACT(S)	f	rg	er	mc	pp	SIG SCORE	SIGNIFICANT RISK (before controls)	MANAGEMENT CONTROLS	EMC	RESIDUAL SCORE	RESIDUAL RISK (after controls)	REGULATIONS
1	Aquatic Resource Management Terrestrial Resource Managment	Maintenance of sub-stations near sensitive areas	Equipment or personnel working in sensitive habitat including listed species such as nesting and riparian areas.	Destruction of shrub or ground nests or species, removal of wildlife trees, destruction of riparian habitat, regulatory impacts including SARA and Fisheries Act.	3	3	2	2	2	27	medium	Vegetation Management Plan; Tailboard meetings; Secondary containment at sentive stations. Site sentivitiy assessments completed.	2	13.5	medium	Wildlife Act, Species at Risk Act, Migratory Birds Convention Act.
2	Emissions Management, Materials Management	Operation of HVAC equipment.	Improper handling of ozone depleteing substances.	Release of regulated ozone depleting substances.	1	2	2	2	1	7	low	Facilities management of R22 containing equipment; Regular equipment maintenance.	2	3.5	low	Ozone-depleting Substances Regulations
3	Emmissions Management GHG Emissions.	Management of SF6 filled equipment.	Release of SF6, a regulated greenhouse gas through topping up, installation of new equipment or incidences.	Impact to atmosphere, contribution to greenhouse gas emmisions, regulatory implications.	3	2	3	1	0	18	low	SF6 Handling Procedures; DISTOPER SF6 Equipment; CEA SF6 reporting protocol	3	6	low	Greenhouse Gas Industrial Reporting and Control Act, Greenhouse Gas Reduction Targets Act, SF6 reporting Protocol between CEA and EC.
4	Emmissions Management GHG Emissions.	Fleet Operation	Release of greenhouse gases to the environment during use.	Cumulative contribution to climate change through rlease of green house gasses. Reduction in air quality.	4	1	2	1	0	16	low	Anti-idling best practises, Regular vehiclular maintenance, AVL installation to track idling.	3	5.3	low	Greenhouse Gas Industrial Reporting and Control Act, Greenhouse Gas Reduction Targets Act,
5	Environmental Incidents	Management of oil-filled substation equipment including transformers and breakers.	Release of hydrocarbon and possible PCB contamination (regulated substance) during maintenance or construction	Soil and/or water contamination; non-compliance with CEPA regulations.	2	3	3	3	3	24	medium	PCB disposal program complete; Secondary containment for transformers at substations with detectable PCBs with >1g PCBs in the transformers; Spill Respose Standard; Spill kits on site at sensitive sites.	2	12	medium	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC)
6	Environmental Incidents	Operation of sub-stations.	Failure of equipment resulting in fire or explosion	Potential fire risk leading to wildfire and release of deleterious substances.	2	3	4	3	3	26	medium	Vegetation Management Plan, Wood Pole Management Plan, Osprey Nest Standard, Fireplans; Regular maintenance and inspections.	3	8.7	low	Wildfire Act
7	Contaminated Sites	Property acquisitions and dispositions	Acquisition or disposition of contaminated lands.	Financial impacts associated with remediation of contiminated lands	2	2	2	4	2	20	medium	address on a site-by-site basis	3	7	low	Environmental Management Act.
8	Contaminated Sites	Management of pre-existing / legacy site contamination.	Contaminated site discovered or regulatory requirements change for existing sites.	Contamination of air, water, and soil.	1	2	2	4	1	9	Low	Environmental Management Environmental Due Diligence for Property Transactions Guideline (1491) Hazardous and Non-Hazardous Waste Management (1163) Addressed on a site by site basis Contaminated soil guidance is provided by Environment team as required Known contaminated sites may be documented in GIS.	2	4.5	Low	~Environmental Management Act, Contaminated Sites Regulation Hazardous Waste Regulation ~Water Sustainability Act and Groundwater Protection Regulation ~Drinking Water Protection Act
9	Terrestrial Resource Managment	Operation of Sub-stations	Exposed high voltage equipment	Impact to migratory bird, protected or listed species due to electruction or collision.	3	2	2	1	2	21	medium	Incidences are tracked and if they are more frequent at specific locations, then protection will be installed.	2	10.5	medium	Wildlife Act, Species at Risk Act, Migratory Birds Convention Act.
10	Terrestrial Resource Managment	Excavation or grading construction activities	Disruption of heritage, archeological or cultural resources	Discovery of heritage archeological or cultural finds. Destruction of artifacts, Loss of ability to study undistrubed location of historic significance.	2	2	1	3	1	14	low	Chance Find procedure; GIS mapping; Training	3	5.3	low	Heritage Conservation Act
11	Vegetation Mangment	Vegetation control on company land	Herbicide use	soil or water contamination impacts to adjacent vegetation.	3	3	2	1	3	27	medium	FBC Pest Management Plans for Facilities; Use of specialized contractors.	3	9.0	low	Pesticide Control Act, Weed Control Act, Vegetation control requird in sub-stations because the roots act as a conductor for electricity.
12	Waste Management,	Pumping manholes, underground distribution vaults, sumps and containment pits	Release of deleterious substances to the ground with the disposal of water.	Soil and/or water contamination	3	2	2	3	2	27	medium	Spill Respose Standard; Spill ERP; Waste Water Disposal Standard	2	13.5	medium	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC) There is an opportunity to review water disposal practises and analyse water quality to confirm discharge options.
13	Waste Management, Materials Management	Management of hazardous waste including asbestos, lead, mercury, batteries and waste oil.	Release of hazardous substances to the environment through improper handling and/or storage.	Air, soil and/or water contamination.	3	2	3	2	1	24	medium	Disposal at authorized facility Waste Management Manual - industry best practices;	3	8	low	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC).
14	Waste Management, Materials Management	Handling and disposal of non-hazardous waste materials	Improper handling and disposal of used wood, insulators, etc resulting in subsequent impact	Air, soil and water contamination	4	0	1	1	1	12	low	Waste Management Manual	4	3	low	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC)
15	Waste Management, Materials Management	Maintenance of structures, Sandblasting	Release of particulate material into the environment	Air, soil and water contamination	2	3	2	2	2	18	low	Waste Management Manual; Standard for Lead Management	2	9	low	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC)
16	AI Risk Areas	Maintenance of sub-stations - Use of Contractors.	Use of contractors to augment workforce or perform specialty work in substations. Potential for contractors to not follow FortisBC standards.	Impacts to environment.	2	2	3	2	2	18	low	Pre-qualification of contractors; CAT Training with some environmental components; Contract;	2	9	low	Contractors hired by the PMO group on a project-by-project basis and managed according to project environmental risk.

Risk Assessment Scoring Criteria

Frequency or Probability of Occurrence Criteria (f)

Probability	Definition	Score
Improbable	Very unlikely to occur; may occur every 10 years or more	1
Occasional	Has occurred a few times; may occur every 3-10 years	2
Moderate	Has occurred with moderate frequency, every few months to 2 years	3
Frequent	Continually occurs, or will occur frequently under normal conditions, possibly several times / month	4

Consequence Criteria

Regulated (rg)

Concern Level	Definition	Score
None	Not regulated, no internal policies or industry standards	0
Low	Not regulated, but is covered by internal policy or industry standard	1
Moderate	Regulated, low probability of fines	2
High	Regulated, violation would probably lead to legal action	3
Critical	Regulated, violation may cause shut-down or restriction of operation	4

Environmental Risk (er)

Concern Level	Definition	Score
Low	Has minimal effect on the natural environment	1
Medium	Impacts are limited to company boundary/right-of way	2
Moderate	Impacts occur beyond company boundary/right-of-way, but can be overcome in the short term	3
High	Impacts occur beyond company boundary/right-of-way, but can not be overcome in the short term	4

Mitigation Cost (mc)

Concern Level	Definition	Score
Low	Less than $5K	1
Medium	$5K - $20K	2
Moderate	$20K - $100K	3
High	More than $100K	4

Public Perception (pp)

Concern Level	Definition	Score
None	No public or agency concern	0
Low	Individual stakeholder, low level agency concern	1
Medium	Local or community, medium agency concern	2
Moderate	Multi-stakeholder, and/or moderate agency concern	3
High	Shareholder concern, extensive media coverage	4

Effectiveness of Management Controls (EMC)

Definition	Score
Unacceptable. No management controls are in place	1
Poor. Controls in place, but subject to human error. New or poorly implemented	2
Adequate. Controls are consistently implemented and/or Aspect is permitted by	3
Good. Controls are consistently implemented and permanent engineered controls	4

f x (rg + er + mc + pp) = Significance Score

Low (L) = less than 20

Medium (M) = 21 to 30

High (H) = more than 30

Significant risk rating/EMC = Residual Risk score

Low (L) = <10

Medium (M) = 10 to 24

High (H) = >24

1.1 Reporting

All environmental incidents must be reported to FBC Environment who will file the incident under the internal reporting system (URM) and will complete external reporting to any regulatory agencies if required.

Examples of environmental incidents can include, but are not limited to:

- Destruction of active bird nest;
- Snake mortality on the road;
- Spills to water or ground of any amount;
- Identification of an osprey nest being built atop a pole.

If you are unsure if an incident requires reporting, contact FBC Environment for assistance.

1.2 Permitting and Notifications

No Environmental Permits are anticipated for this project. However, in the event that unanticipated work activity reveals the requirement for environmental permitting or a notification, such documents will be obtained by FortisBC prior to commencement of work and will be kept onsite.

Activites that require permits can include, but are not limited to:

- Removal of vegetation in areas of Critical Habitat for a Species at Risk;
- Working in and around Water, including streams, ephemeral ponds and wetlands;
- Relocation of a birds nest.

Contact FBC Environment for assistance.

2.0 Warfield Terminal Overview

The Warfield Terminal substation is located in Warfield, BC adjacent to the FortisBC Warfield Operations compound. (Figure 1).

Figure 1: Warfield Terminal Substation .

Warfield terminal substation was constructed in the early 2000's and has two power transformers with a combined oil capacity of 180,000 liters, and eleven sulfur hexafluoride (SF6) circuit breakers with a combined SF6 capacity of 454.48 kilograms. A swimming pool style secondary oil containment with Imbiber Bead system extends beneath both power transformers to provide secondary containment in the event of a catastrophic transformer failure.

3.0 Regulatory Compliance

Regulatory compliance is a key component of FortisBC's Environmental Policy commitment and is a duty that the Company takes seriously. Within that commitment, FortisBC employees shall ensure that all work completed for the Project will **meet or exceed all identified environmental regulatory requirements.**

The regulatory requirements applicable to the Risk Areas associated with the Project are identified in the following sections of the EMP. Prior to commencement of work, the Project Manager will meet with FBC Environment and the project team to make sure that all components of this EMP are clear and fully understood.

Any questions or concerns regarding the Risk Areas and the controls applied in the project will be addressed then. Should the discussion result in updates being required to the EMP, FortisBC Environment will make the appropriate changes and communicate those changes prior to commencement of work.

If concerns or questions of compliance arise at any time during the project, FBC Environment is to be notified and the matter dealt with accordingly. This action may or may not result in a stop in activities. The Project Manager (or designate) and the project crew in consultation with FBC Environment, will apply corrective action as soon as possible.

3.1 FortisBC EMS RISK AREA: Terrestrial Resource Management

By the very nature of its business, FortisBC Electric operations involve interactions with terrestrial environments: poles and wire placement and maintenance, right-of-way construction and maintenance, substation construction and maintenance. As part of it's Environmental Commitments, the Company **identifies** and **manages** operational hazards associated with Terrestrial Resources, and implements appropriate **controls** to minimize risks that have the potential for adverse consequences. Terrestrial Resource Management controls to be implemented for the identified risks of this project are decribed in the sections below.

A project specific summary of the Environmental Risks at each structure can be requested by FBC Environment.

3.1.1 Heritage Conservation Act

The purpose of the *Heritage Conservation Act* is to protect and conserve heritage property in BC. The Act applies to artifacts and sites of heritage value to BC, a community or an aboriginal people and prohibits the destruction, excavation or alteration of archaeological sites without a permit.

British Columbia's archaeological and heritage sites are protected under the provincial *Heritage Conservation Act* (HCA). The provisions of the HCA apply whether sites are located on public or private land. Known sites are mapped and documented by the Archaeology Branch. Chance finds are also protected under the HCA. Heritage sites and artifacts that are protected under by the HCA include:

- Burial places;
- Aboriginal rock paintings or carvings;
- Sites that contain artifacts, features, materials or other physical evidence of human habitation or use before 1846 such as cultural depressions and culturally modified trees.

3.1.1.1 FortisBC Chance Find Procedure

Prior to commencement of a project, a review must be conducted by the FortisBC Archeologist who will identify where known archaeological or heritage sites are within the AS Mawdsley. Unless an Archaeology Permit is required, all other work work will follow the FortisBC Chance Find Procedure summarized below.

See Appendix I: Heritage Resource Management(Chance Finds) for the full Procedure.

FortisBC's Chance Find Procedure

FBC crew and contractors have been trained in **FortisBC's Chance Find Procedure (Archaeological Resource Management) CRL Document #1136** which requires the following actions in the event that an artifact is discovered during project activities.

1. If intact or disturbed archaeological deposits or potential human remains are encountered, immediately stop construction in the vicinity of the archaeological site
2. The Construction Manager (or designate) will contact FortisBC Archaeologist Chris Wylie (250) 215 0942 for further guidance.

3.1.2 Species at Risk and Critical Habitat

Species at Risk include plant and wildlife species whose populations are considered to be of special concern, threatened, endangered, extirpated or extinct under the *Species at Risk Act* (SARA), Red or Blue-listed by the BC Conservation Data Centre (BC CDC), or are Identified Wildlife under *the Forest and Ranges Practices Act* (BC FRPA). SARA prohibits the killing, harming or harassing of listed species and the damaging or destroying the residence of an individual of a listed species.

The only Species at Risk with Critical Habitat extending across the Trail, BC area is the Mountain Caribou. There ae no known occurrances within the Warfield Terminal Substation area; however, should there be a sighting, FBC Environment is to be contacted immediately.

FortisBC Species At Risk Guidance Document

Guidance Documents for each of the Species at Risk have been prepared and can be found on the FortisBC Connector site for Environment. The **Mountain Caribou Guidance Documents** can be used in conjunction with this EMP to ensure that all measures to avoid potential interaction with the species are properly implemented and monitored. https://connector.fortisbc.com/DepartmentsandServices/Environment/Pages/SpeciesAtRiskResources.aspx

Mountain Caribou

3.1.3 Avian Protection

Migratory birds are common throughout the FortisBC Service Territory and as such all precautions must be taken to mitigate against conflict between the migratory birds and project work.

3.1.3.1 Migratory Birds

Migratory birds are common throughout the FortisBC Service Territory and as such all precautions must be taken to mitigate against conflict between the migratory birds and project work.

<table>
<tr><td>Legislation</td><td colspan="3">Migratory Birds Convention Act</td></tr>
<tr><td>Purpose</td><td colspan="3">To protect migratory birds, their nests and eggs from harm including prohibiting the dumping of substances harmful to birds in waters or areas frequented by them.</td></tr>
<tr><td>Definitions</td><td colspan="3">Migratory Bird: a bird that regularly crosses national borders
Incidental Take: inadvertent destruction of nests, eggs or birds</td></tr>
<tr><td>Potential Risk for Operations</td><td colspan="3">Migratory Birds can be impacted from:
vegetation management along right-of-ways and access roads
pole replacements that have active woodpecker nests
some birds nest on the ground – these nests can be crushed or damaged</td></tr>
<tr><td>Bird Nesting Window</td><td colspan="3">March 25 – August 15 (for Zones A1 & A2 from Environment Canada’s nesting calendar)</td></tr>
<tr><td rowspan="2">Migitating Impact to Migratory Birds</td><td colspan="2">Environment Canada’s Recommendations for Avoiding Incidental Take</td><td>FortisBC’s Mitigation Measures</td></tr>
<tr><td colspan="2">understand your projects’ potential impacts to migratory birds
take reasonable care to avoid impacts when planning your work
avoid potentially destructive activities
implement appropriate preventative measures to minimize the risk of incidental take</td><td>provide project information to Environment for preparation of an EMP
mitigate impacts by educating crew on the ID and habitats used by Migratory Birds within the project area
when possible schedule work outside of the Migratory Birds window
if work must take place during the bird nesting window, schedule nest sweeps prior to construction to identify nests and avoid potential impacts</td></tr>
<tr><td>Migratory Birds (examples of Family groups)</td><td>Woodpeckers
Swifts
Wrens</td><td>Flycatchers
Larks
Bobolinks</td><td>Sparrows
Thrashers
Sapsuckers</td></tr>
</table>

3.1.4 Soil Disposal

The Teck landfill can accept metal contaminated soil from Teck Metals Ltd. properties in the Trail area provided it does not exceed leachable hazardous waste criteria (as determined by a TCLP test). If soil tests exceed Teck landfill requirements, FortisBC will dispose of contaminated soils at a facility authorized to accept soils with the specified contaminant levels

3.1.5 Noxious Weeds and Invasive Plants

Noxious weeds (invasive plants) must be controlled according to the Weed Control Regulation B.C Reg. 66/85 or as per Section 15 of the Environmental Protection and Management Regulation B.C. Reg. 200/2010 (ALC & BC.OGC, 2013). FortisBC Guideline 1496 Invasive Plant Management provides measures to help minimize the spread of noxious weeds and invasive plants. Invasive plants are known to be present along rights-of-way and along all existing access roads, therefore ensure your crew follows the measures outlined in the **FBC Noxious Weed and Invasive Plant Spread Prevention Measures** below.

FortisBC Noxious Weed and Invasive Plant Spread Prevention Measures:

- Pressure wash all equipment and trucks immediately prior to mobilizing to site;
- Check vehicles and clothing prior to entering the ROW. Inspect the undercarriage and tires of all vehicles and remove and bag any plant material or large clumps of soil found.
- Access to the Project area via designated/marked accesses. Vehicles will only use designated pull outs and parking areas;
- Minimize construction footprint;
- Pressure wash and/or sweep all equipment and trucks prior to leaving the ROW;
- Revegetate all disturbed areas with a regionally appropriate seed mix approved by FBC Environment immediately following project completion.

Invasive plants found in the vicinity of Warfield Terminal can be found in Table 3 on the following page.

Table 1: Invasive plant species found in the AS Mawdsley.

		
Field Bindweed	**Goutweed**	**Hoary Alyssum**
		
Himalayan Blackberry	**Policeman's Helmet**	**Mullein**
		
Oxeye Daisy	**St Johns Wort**	**Spotted Knapweed**

3.2 FortisBC EMS RISK AREA: Environmental Incidents (Spills)

An Environmental Incident is an event that has caused or has the potential to cause harm to the environment. This includes but is not limited to the unintentional release of hazardous or deleterious substances to land or water. FortisBC has Environmental Management Controls in place to address the risks associated with spill incidents. The Controls pertinent to this EMP include the following:

- Spill Prevention
- CRL #1127 Spill Reporting, Response and Cleanup; and
- Spill Response Training

3.2.1 Spill Prevention

Personnel will identify potential hazards (*i.e.,* operating equipment over a waterway), determine the level of risk for activities that could result in a spill, and take measures to reduce the potential of a spill. All efforts will be taken to minimize the risk of spills, including:

Equipment Inspections and Maintenance

- maintain equipment to minimize losses of hydraulic fluids, lubricants or fuels; this includes regular inspections of fuel and hydraulic lines;
- before operation of equipment, operators will check for leaks and hydraulic hose connections for excess lubricants;
- equipment working **in and around water** or a temporarily dewatered area must be thoroughly examined for fluid leaks and steam cleaned prior to commencing work;
- maintenance of equipment on the project site will occur in a manner that prevents spills to the environment, for example, ensuring proper containment;
- **no refuelling equipment within 30 m of a watercourse;**
- ensure equipment left overnight is secure and any fluid (i.e., oil, engine coolant) containers are locked within the equipment or facility compound.

Ensure Proper Containment

- all portable oil-filled equipment or equipment containing hazardous materials must be kept within secondary containment capable of holding 110% of the equipment's tank capacity
- ensure **spill containment** is set up in a manner that prevents spills to water;
- ensure mobile equipment is in appropriate secondary containment (*i.e.,* duck ponds, spill trays);
- place **absorbant pads** underneath areas of the equipment or vehicles that require maintenance;
- store all fuels and lubricants brought onto the project site in properly labelled containers and ensure they are used in a manner that avoids spills.

3.2.2 Spill Kits

Spill-kits and equipment, including sorbent pads, booms, drip pans, and leak proof waste containers, shall be provided by the Contractor and be readily available on site and on each piece of mobile equipment (e.g. light trucks, excavators, backhoes, Bobcats, etc) in the quantities required for the equipment being used and the quantities of fluids onboard. Sufficient quantities of sorbent pads suitable for coolant shall also be included in each spill kit.

3.2.3 Environmental Spill Response and Cleanup

In the event that an environmental incident or spill occurs, follow the response procedures outlined in Table 4. For complete information on detailed spill reporting, response and cleanup procedures see the FortisBC Spill Reporting Response and Clean-up Protocol #1127.

Table 2: Response procedure for environmental incidents and spills.

	Procedure	Oil/Petroleum-Based Fluid Considerations
1	**Ensure personal and worker safety.**	Make sure to don all appropriate PPE. Consult the SDS for the spilled product and remove ignition sources if safe to do so.
2	**Notify and get help.**	When possible, contact your Manager and/or Spill Support number.
3	**Control and contain the spill.**	Utilize petroleum specific spill absorbent materials (i.e., socks, booms, pads, etc.) to contain the spill. Use water repelling absorbent booms/pads to contain spills to water.
4	**Clean-up the spill and site.**	Absorb small spills with petroleum specific absorbent pads and booms. Place contaminated absorbents in plastic bags, seal and store in a sealed container in an indoor area away from ignition sources.

3.2.4 Spill Reporting

The ***Spill Reporting Regulation*** specifies external reporting thresholds for spills of specified substances. As per this regulation a spill of a listed substance is externally reportable regardless of quantity, if it enters or is likely to enter a waterway. FortisBC Spill Response protocol requires **internal reporting of spills over 1 litre to ground and spills of any amount to water**. Contact FBC Environment for support. Externally reportable volumes are regulated under the *Spill Reporting Regulation*.

SPILLS OF ANY AMOUNT TO WATER ARE INTERNALLY AND EXTERNALLY REPORTABLE

3.3 FortisBC EMS RISK AREA: Waste Management

All waste, debris, and construction related materials (wood forms, hardware, plastics, etc.) will be removed from the site and disposed of in an appropriate manner. The Contractor shall separate and store recyclable and waste materials in appropriately labelled, covered, waterproof containers prior to transport to approved recycling and disposal facilities. Solid wastes generated by the Contractor shall be contained and removed on a regular basis to maintain a clean and tidy environment and prevent the attraction of bears and other wildlife. The Contractor shall be responsible for a thorough clean-up of the work area as per the requirements below.

Non-Hazardous Waste - Solid wastes generated during this project and requiring disposal off site will need approval from the local landfill operator prior to disposal. Local landfills may have specific restrictions on waste items accepted. The Contractor is required to comply with these requirements. Prior to removal from site, surplus excavated soil shall first be tested for contaminants and only be disposed of at a permitted landfill pre-approved by Fortis BC.

3.3.1 Hazardous Waste Management: Handling and Disposal

The ***Hazardous Waste Regulation (HWR)*** addresses the proper handling and disposal of hazardous wastes, under the *Environmental Management Act*. Hazardous Waste generated as a result of the Project must follow the requirements outlined in the *HWR*.
Hazardous Waste is not anticipated for this project; however, it should be noted that absorbent materials or soils saturated with hydrocarbons are classified as hazardous waste under the B.C. Environmental Management Act. Should spill response materials, soils, or other materials become contaminated, the Contractor shall dispose of all materials and hazardous wastes in accordance with the B.C. Environmental Management Act and its regulations. Contact FortisBC Environment for guidance on management of Hazardous Wastes.
Please consult with FortisBC controls:

- CRL #1163 Hazardous and Non-Hazardous Waste Management
- CRL #1320 Hazardous Waste Transport

3.3.2 Transportation of Dangerous Goods (TDG)

The *Transportation of Dangerous Goods Act (TDG Act)* and *Transportation of Dangerous Goods Regulations* pursuant to the *TDG Act* outline requirements for transporting dangerous goods including but not limited to containment, labelling, documentation and training. Dangerous goods pertaining to the Project must be transported in accordance with the *TDG Regulations*.

3.3.3 TDG Environmental Management Controls

FortisBC has Controls in place to ensure dangerous goods are transported in accordance with the *TDG Act* and *Regulations*. The Controls pertinent to this EMP include the following:

- CRL #1163 Hazardous and Non-Hazardous Waste Management
- CRL #1320 Hazardous Waste Transport

All personnel transporting hazardous materials must have the appropriate training and will ensure the use of appropriate equipment, containment and signage and follow the federal *Transportation of Dangerous Goods Regulations* and provincial *Hazardous Waste Regulations*. Contact FortisBC Environment for guidance on management of Hazardous Waste.

Appendix I: Heritage Resource Management(Chance Finds)

DOCUMENT NUMBER: 1136
DOCUMENT TYPE: PROCEDURE
Owner: Kristoff, Leslie
SML: Wylie, Christopher
Utility: Electric, Gas
Approved Date: June 05, 2020
Effective Date: June 05, 2020
Next Review Date: June 05, 2024 CATEGORY: ENVIRONMENT, HEALTH & SAFETY - ENVIRONMENTAL MANAGEMENT - TERRESTRIALRESOURCE MANAGEMENT

Document History: This document replaces 1136 Archaeological Resource Management (Chance Finds) dated 17 August 2015.

Summary of Changes

In June 2020, this document was updated with significant changes to the following sections - Definitions,Scope, Procedure, and Legislation and Indigenous Policies. The title was also updated.

Overview

This document specifies the procedures that FortisBC will follow upon discovering unanticipated potentialheritage resources or human remains (i.e., Chance Finds) to remain compliant with applicable municipal,provincial, and federal legislation as well as applicable Indigenous policies.

Audience

This procedure applies to all employees and contractors of FortisBC who discover a potential heritageresource or human remains.

Definitions

- **Archaeological Site –** A location that contains physical evidence of past human activity and that can bestudied by archaeological methods of investigation, including site survey, excavation, and data analysis.
- **Heritage Conservation Act –** The *Heritage Conservation Act* (HCA) is provincial legislation that providesfor the protection and conservation of heritage sites (e.g. archaeological sites and historic places) and objects within BC and once regulations have been developed, will require that all discoveries of sites or objects that may have heritage value be reported to the minister.
- All archaeological sites, whether on Provincial Crown or private land, including land that is underwater, that predate AD 1846 are automatically protected under the HCA. Certain sites, including human burialsand rock art sites with heritage value, are automatically protected, regardless of their antiquity.
- Shipwrecks and plane wrecks greater than two years of age are also protected under the HCA. The HCAdoes not distinguish between those archaeological sites which are “intact” (i.e., those sites which are in apristine, or undisturbed state) and those which are “disturbed” (i.e., those sites which have been subject to alteration, permitted or otherwise). All archaeological sites, regardless of condition, are protected by the HCA, as described above.

- HCA-protected sites or objects cannot be disturbed or altered without a permit issued under Section 12.2 or Section 12.4 of the HCA and a person may be liable to obtain and pay for an archaeological impact assessment as a condition of a permit.
- **Heritage Resource –** A collective term for heritage sites and objects.
- **Heritage Site –** As defined in the BC *HCA*, whether designated or not, land, including land covered by water, that has heritage value to British Columbia, a community or an aboriginal people. This may include archaeological sites and historic places.
- **Heritage Object –** As defined in the BC HCA, whether designated or not, personal property that has heritage value to British Columbia, a community or an aboriginal people.
- **Historic Place (Formally Recognized) –** Defined by the eligibility requirements for inclusion in theBritish Columbia and Canadian Registers of Historic Places. Comprised of places that have been formally recognized for their heritage value by some form of legislative enactment (order-in-council,bylaw, or council resolution) by the province, a local government or a regional district. Federally designated National Historic Sites are also included in this site category.
- **Historic Place (Not Recognized) –** Not protected and not formally recognized by government. Many ofthese places are non-designated historic sites such as heritage buildings identified through various thematic studies. This also includes records for historic places that have been un-designated, de- registered and/or destroyed.

Scope

Construction activities such as, though not limited to, clearing, grading and excavation have the potentialto disturb heritage resources. Therefore, Environment and/or a professional archaeologist may be involved in the planning and construction phases of a project to minimize the risk of unexpected impacts to heritage sites and objects as a result of FortisBC activities. This document specifies the procedures that FortisBC will follow upon discovering unanticipated potential heritage resources or human remains(i.e., Chance Finds).

Heritage Resource Management (Chance Find) Procedure

Initial Response

If the activities of FortisBC or one of our contractors inadvertently uncover a potential heritage site,object, or human remains:

1. **STOP** construction in the immediate vicinity of the potential heritage resource or human remains.
2. Contact Environment
   a. FortisBC Archaeologist:
      Christopher Wylie

      Office: 250-868-4577 / Cell: 250-215-0942

   b. FortisBC Environmental Program ManagerLeslie Kristoff

      Office: 604-592-7680 / Cell: 604-842-7188
3. For a Heritage Site or Object **OR** unidentifiable bone:
   a. FortisBC Environment will contact a professional archaeologist for further guidance.

b. If the Chance Find occurs on an Indian Reserve, FortisBC Environment will contact the Indigenous Community.

4. For obvious Human Remains:
   a. FortisBC Environment will contact the FortisBC Project Manager, the local policing authority, a professional archaeologist, appropriate Indigenous communities, and the Archaeology Branch.
   b. The Office of the Coroner may also be notified, following discussions with the local policing authority.
5. Depending on the type of resource, the professional archaeologist, possibly in consultation with the Archaeology Branch and/or local Indigenous communities, will advise on further action.
6. Complete the required reporting in Utility Risk Management (URM). Contact Environment for assistance with URM if required.

Initial Action

Depending on the nature of the situation, one of the following is likely:

1. Heritage Site or Object OR unidentifiable bone:
   a. Based on a description of the incident, it may be decided that there are no further concerns, allowing construction to continue as planned.

   OR

   b. A field visit by a professional archaeologist may be recommended to better assess the nature of the situation and to identify an appropriate course of action.

2. Obvious Human Remains:
   a. A professional archaeologist with appropriate experience and training, or a physical anthropologist (a specialist in the study of human remains) will visit the site as soon as possible with invited Indigenous representatives.
   b. The professional archaeologist, local policing authority and/or the Office of the Coroner will determine if the human remains are forensic or archaeological in nature.
   c. If it is determined that the human remains are archaeological in nature, FortisBC has HCA permits that may be applicable and contain methods for the respectful treatment of human remains. The Archaeology Branch will be consulted to determine applicability of the FortisBC HCA Permit. The appropriate Indigenous community(s) will be consulted regarding protocols, if necessary, for the respectful recovery, handling, and/or disposition of the human remains.
   d. If it is determined that the human remains are not clearly archaeological, the local policing authority and/or coroner will take control of the site area and dictate appropriate protocols.

Management Options

In the event that heritage resources are in fact present, FortisBC, the professional archaeologist, the Archaeology Branch, and the land owners, should consider Management Options 1, 2, and 3 described below for deciding how to proceed.

In the event that archaeological human remains are identified, they will be assumed to be Indigenous and the appropriate Indigenous community(s) will be consulted regarding protocol for the respectful treatment of the ancestor. Should it be determined that the archaeological human remains are not Indigenous, the appropriate ethnic community will if possible, be identified and consulted regarding protocol for the respectful treatment of the individual.

Management Options 1 and 3, described below, will be considered when deciding how toproceed.

Option 1

Avoidance through partial project redesign or relocation. This option results in minimal impact tothe heritage site and/or human remains, and is the most preferable from a cultural resource management perspective. It can also be the least expensive option from a construction perspective. An archaeological impact assessment (AIA) under a HCA permit may be required todefine the extent of the heritage site/human remains. FortisBC has applicable permits to conductan AIA. If AIA is required to define site boundaries in order to avoid the site, construction may be delayed approximately one month to comply with a condition to notify Indigenouscommunity(s) of work being completed under permit.

Option 2

Where avoidance is not possible, archaeological monitoring may be undertaken to mitigate project impacts to a site by ensuring that adverse project impacts on the resource that could notbe predicted or evaluated prior to construction are addressed. Monitoring may also assess the effectiveness of mitigation measures, as well as the magnitude, severity or duration of an impact. Monitoring is conducted under an HCA permit and may result in the need to complete archaeological excavation if archaeological features are encountered. FortisBC has applicable permits for archaeological monitoring though construction may be delayed approximately one month to comply with a condition to notify Indigenous community(s) of work being completed under permit.

Option 3

For an archaeological site, salvage excavation may be necessary. If located on provincial Crown or private land this option would require appropriate permitting from the Archaeology Branch before mitigation (e.g., excavation) could commence. This "data recovery" option can beexpensive and destructive and can delay construction by up to several months unless a HCA permit is already in hand. Consequently, salvage excavation is not a preferred option.

For human remains, salvage or emergency excavation to respectfully remove the remains for reburial in a location chosen by the appropriate community(s) should be completed in consultation with the relevant government authorities. Field operations should be aware that removal of human remains and subsequent reburial might involve the conduct of ceremonies orcertain procedures that could incur costs and delay construction.

Option 4

Application of protection measures. Protection measures may include temporary and/or long term strategies. Temporary strategies could include erecting fencing or barricades to protect thesite, while longer term solutions could include capping the site area with fill.

Appropriate archaeological site protection measures should be identified on a site-specific basisin consultation with local Indigenous communities for approval by the Archaeology Branch.

Additional permitting and further archaeological studies may be required.

Legislation and Indigenous Policies

Changes to legislation and Indigenous policies can occur at any time. FortisBC staff must ensurethey remain aware of current legislation and Indigenous policies. Legislation that may apply to heritage resources is listed below.

For more information regarding environmental legislation and its applicability to FortisBC, please refer to the Environmental Compliance Directory.

Summary of Applicable Legislation & Indigenous Policies

Municipal

- *Local Government Act*
- *Vancouver Charter*

Provincial

- *Heritage Conservation Act*
- *Oil and Gas Activities Act*

Federal

- *Canadian Environmental Assessment Act*, 2012
- *Historic Sites and Monuments Act*
- *Parks Canada Agency Act*

Indigenous

- Various policies, subject to change (professional archaeologist to advise FortisBC)

Communication and Enforcement

As outlined in the procedure above.

Related Information

Other References:

- EMR 03-16 Approval record
- Gas Distribution Archaeological or Heritage Site Procedures OPS-00170

Appendix E-2
ASM ENVIRONMENTAL MANAGEMENT PLAN

AS Mawdsley Substation
Environmental Management Plan

November 2022

FortisBC acknowledges and respects

INDIGENOUS PEOPLES

In this place we call Canada and

On whose territories we all live, work and play.

FortisBC is committed to

Reconciliation with INDIGENOUS PEOPLES

Using our Statement of Indigenous Principles to guide our words and actions.

AS Mawdsley: EMP Quick Reference iv
1.0 Introduction 1
FortisBC Risk Assessment - Stations 3
Risk Assessment Scoring Criteria 4
1.1 Reporting 5
1.2 Permitting and Notifications 5
2.0 AS Mawdsley Overview 6
3.0 Regulatory Compliance 7
3.1 FortisBC EMS RISK AREA: Terrestrial Resource Management 7
3.1.1 Heritage Conservation Act 7
3.1.2 Species at Risk and Critical Habitat 8
3.1.3 Avian Protection 9
3.1.4 Soils and Ground Disturbance 10
3.1.5 Noxious Weeds and Invasive Plants 10
3.2 FortisBC EMS RISK AREA: Environmental Incidents (Spills) 12
3.2.1 Spill Prevention 12
3.2.2 Spill Kits 12
3.2.3 Environmental Spill Response and Cleanup 13
3.2.4 Spill Reporting 13
3.3 FortisBC EMS RISK AREA: Waste Management 14
3.3.1 Hazardous Waste Management: Handling and Disposal 14
3.3.2 Transportation of Dangerous Goods (TDG) 14
3.3.3 TDG Environmental Management Controls 14
Appendix I: Heritage Resource Management (Chance Finds) 15

AS Mawdsley: EMP Quick Reference

PERMIT REQUIREMENTS

No Environmental Permits Required for this project.

SECTION 3.1 TERRESTRIAL RESOURCE MANAGEMENT

Species at Risk			Mammals	Plants	Birds	Invertebrates	Reptiles & Amphibians
	Occurrences	Cat.					
		No.	No Known Occurrences of Species at Risk in the ASM Substation area				
	Critical Habitat		**Mammals**				
			Critical Habitat for Mountain Caribou within the Trail area				

Migratory Birds Reporting	**Nesting Window: March 25 – August 15** Report all nests on, in or near assets to FBC Environment	
Invasive Plants within the Project Area	• Field Bindweed • Goutweed • Hoary Alyssum • Mullein • Oxeye Daisy	• Himalayan Blackberry • Policeman's Helmet • St Johns Wort • Spotted Knapweed

SECTION 3.2 ENVIRONMENTAL INCIDENTS

Report **all spills** and other environmental incidents to FBC Environment.

SECTION 3.3 WASTE MANAGEMENT

Only routine Waste is anticipated to be generated during construction. Best Management Practices for routine hazardous and non-hazardous waste disposal will be followed by all crews and contractors. Contact FortisBC Environment if additional support is required.

Project Contacts

Contact Name	Position	Contact Number
Amy Duncan	FBC Terrestrial Biologist	250 608 5147
Serina Swanson	FBC Environmental Lead	250 809 7148
Chris Wylie	FortisBC Archaeologist	250 215 0942
System Control	T&D	1- 844-544-0722 Option2

1.0 Introduction

FortisBC's ISO 14001 compliant Environmental Management System (EMS) provides the framework for identifying, managing and mitigating environmental risks associated with operations and project work.

The Company is committed to protecting the environment by utilizing established Best Practices and Management Controls to ensure work is performed in an environmentally responsible and sustainable manner.

Best Practices include, but are not limited to, the following:

- Environmental awareness training for employees and contractors;
- Integration of environmental protection measures into all elements of business;
- Open communication with stakeholders;
- Working with industry associations, governments and other stakeholders to establish standards for the environment appropriate for our business, and;
- Efficient and effective use of resources.

Environmental Risk Minimization requires maintaining seamless communication between all members of the Project Team. Crews will communicate any previously unidentified aspects of the project that they are concerned could potentially pose a risk to the environment. The Project Manager (or designate) will maintain regular communication with FortisBC Environment in order to ensure any potential risks are appropriately addressed.

Contractors will follow Best Practices identified in this EMP and outlined in contract documents. If unforeseen changes in environmental conditions occur on the project site, the Contractor will contact the FBC Project Manager or Construction Manager, who will in turn contact FBC Environment.

This EMP aligns with all regulatory requirements and includes preventative measures to protect against harm to the environment. There are several regulations that govern FBC activities; a brief description of the regulatory requirements associated with the Project are identified in each of the Environmental Risk Areas identified in Sections 3.1 – 3.4. **All work associated with the Project and conducted by FBC crews and/or contractors will done so in accordance with this EMP.**

If any mitigation measure does not meet the regulatory requirements during Project execution

WORK SHALL STOP.

FortisBC Environment will work with the Project Manager (or designate) and Crew to identify and implement Corrective Action AS SOON AS POSSIBLE.

All FBC crews and/or contractors involved in the Project are responsible for adhering to the guidelines and controls specified in this EMP. Specified controls meet relevant Provincial, Federal and Local regulatory requirements. The primary risks and the protective measures and management controls associated with each risk are summarized in Section 3 of this EMP.

The purpose of this Environmental Management Plan (EMP) is to identify all potential environmental impacts associated with proposed project activities at the AS Mawdsley substation and to provide appropriate controls to mitigate and/or manage these impacts.

The FortisBC Environmental Management System Risk Registry process combines Occurrence Criteria with Regulatory, Environmental Risk, Mitigation Cost and Public Perception to come up with a Significance Score as shown in Table 1 on the following page. The Risk Assessment Scoring Criteria is shown in Table 2 on Page 4.

NOTE: This EMP DOES NOT address health and safety issues. Those issues are addressed under a project-specific health and safety plan. All work must be conducted in accordance with WorkSafeBC standards.

FortisBC Risk Assessment - Stations

FortisBC Environmental Management System Environmental Risk Assessment for Stations																Record Updated: February 09, 2023
Ref. #	RISK AREA	ACTIVITY, OPERATION	ENVIRONMENTAL ASPECT(S)	ENVIRONMENTAL IMPACT(S)	f	rg	er	mc	pp	SIG SCORE	SIGNIFICANT RISK (before controls)	MANAGEMENT CONTROLS	EMC	RESIDUAL SCORE	RESIDUAL RISK (after controls)	REGULATIONS
1	Aquatic Resource Management Terrestrial Resource Managment	Maintenance of sub-stations near sensitive areas	Equipment or personnel working in sensitive habitat including listed species such as nesting and riparian areas.	Destruction of shrub or ground nests or species, removal of wildlife trees, destruction of riparian habitat, regulatory impacts including SARA and Fisheries Act.	3	3	2	2	2	27	medium	Vegetation Management Plan; Tailboard meetings; Secondary containment at sentive stations. Site sentivitiy assessments completed.	2	13.5	medium	Wildlife Act, Species at Risk Act, Migratory Birds Convention Act.
2	Emissions Management, Materials Management	Operation of HVAC equipment.	Improper handling of ozone depleteing substances.	Release of regulated ozone depleting substances.	1	2	2	2	1	7	low	Facilities management of R22 containing equipment; Regular equipment maintenance.	2	3.5	low	Ozone-depleting Substances Regulations
3	Emmissions Management GHG Emissions.	Management of SF6 filled equipment.	Release of SF6, a regulated greenhouse gas through topping up, installation of new equipment or incidences.	Impact to atmosphere, contribution to greenhouse gas emmisions, regulatory implications.	3	2	3	1	0	18	low	SF6 Handling Procedures; DISTOPER SF6 Equipment; CEA SF6 reporting protocol	3	6	low	Greenhouse Gas Industrial Reporting and Control Act, Greenhouse Gas Reduction Targets Act, SF6 reporting Protocol between CEA and EC.
4	Emmissions Management GHG Emissions.	Fleet Operation	Release of greenhouse gases to the environment during use.	Cumulative contribution to climate change through rlease of green house gasses. Reduction in air quality.	4	1	2	1	0	16	low	Anti-idling best practises, Regular vehiclular maintenance, AVL installation to track idling.	3	5.3	low	Greenhouse Gas Industrial Reporting and Control Act, Greenhouse Gas Reduction Targets Act,
5	Environmental Incidents	Management of oil-filled substation equipment including transformers and breakers.	Release of hydrocarbon and possible PCB contamination (regulated substance) during maintenance or construction	Soil and/or water contamination; non-compliance with CEPA regulations.	2	3	3	3	3	24	medium	PCB disposal program complete; Secondary containment for transformers at substations with detectable PCBs with >1g PCBs in the transformers; Spill Respose Standard; Spill kits on site at sensitive sites.	2	12	medium	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC)
6	Environmental Incidents	Operation of sub-stations.	Failure of equipment resulting in fire or explosion	Potential fire risk leading to wildfire and release of deleterious substances.	2	3	4	3	3	26	medium	Vegetation Management Plan, Wood Pole Management Plan, Osprey Nest Standard, Fireplans; Regular maintenance and inspections.	3	8.7	low	Wildfire Act
7	Contaminated Sites	Property acquisitions and dispositions	Acquisition or disposition of contaminated lands.	Financial impacts associated with remediation of contiminated lands	2	2	2	4	2	20	medium	address on a site-by-site basis	3	7	low	Environmental Management Act.
8	Contaminated Sites	Management of pre-existing / legacy site contamination.	Contaminated site discovered or regulatory requirements change for existing sites.	Contamination of air, water, and soil.	1	2	2	4	1	9	Low	Environmental Management Environmental Due Diligence for Property Transactions Guideline (1491) Hazardous and Non-Hazardous Waste Management (1163) Addressed on a site by site basis Contaminated soil guidance is provided by Environment team as required Known contaminated sites may be documented in GIS.	2	4.5	Low	~Environmental Management Act, Contaminated Sites Regulation Hazardous Waste Regulation ~Water Sustainability Act and Groundwater Protection Regulation ~Drinking Water Protection Act
9	Terrestrial Resource Managment	Operation of Sub-stations	Exposed high voltage equipment	Impact to migratory bird, protected or listed species due to electruction or collision.	3	2	2	1	2	21	medium	Incidences are tracked and if they are more frequent at specific locations, then protection will be installed.	2	10.5	medium	Wildlife Act, Species at Risk Act, Migratory Birds Convention Act.
10	Terrestrial Resource Managment	Excavation or grading construction activities	Disruption of heritage, archeological or cultural resources	Discovery of heritage archeological or cultural finds. Destruction of artifacts, Loss of ability to study undistrubed location of historic significance.	2	2	1	3	1	14	low	Chance Find procedure; GIS mapping; Training	3	5.3	low	Heritage Conservation Act
11	Vegetation Mangment	Vegetation control on company land	Herbicide use	soil or water contamination impacts to adjacent vegetation.	3	3	2	1	3	27	medium	FBC Pest Management Plans for Facilities; Use of specialized contractors.	3	9.0	low	Pesticide Control Act, Weed Control Act, Vegetation control requird in sub-stations because the roots act as a conductor for electricity.
12	Waste Management,	Pumping manholes, underground distribution vaults, sumps and containment pits	Release of deleterious substances to the ground with the disposal of water.	Soil and/or water contamination	3	2	2	3	2	27	medium	Spill Respose Standard; Spill ERP; Waste Water Disposal Standard	2	13.5	medium	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC) There is an opportunity to review water disposal practises and analyse water quality to confirm discharge options.
13	Waste Management, Materials Management	Management of hazardous waste including asbestos, lead, mercury, batteries and waste oil.	Release of hazardous substances to the environment through improper handling and/or storage.	Air, soil and/or water contamination.	3	2	3	2	1	24	medium	Disposal at authorized facility Waste Management Manual - industry best practices;	3	8	low	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC).
14	Waste Management, Materials Management	Handling and disposal of non-hazardous waste materials	Improper handling and disposal of used wood, insulators, etc resulting in subsequent impact	Air, soil and water contamination	4	0	1	1	1	12	low	Waste Management Manual	4	3	low	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC)
15	Waste Management, Materials Management	Maintenance of structures, Sandblasting	Release of particulate material into the environment	Air, soil and water contamination	2	3	2	2	2	18	low	Waste Management Manual; Standard for Lead Management	2	9	low	Canadian Environmental Protection Act, Fisheries Act, Environmental Management Act (BC), Spill reporting Regulation (BC)
16	AI Risk Areas	Maintenance of sub-stations - Use of Contractors.	Use of contractors to augment workforce or perform specialty work in substations. Potential for contractors to not follow FortisBC standards.	Impacts to environment.	2	2	3	2	2	18	low	Pre-qualification of contractors; CAT Training with some environmental components; Contract;	2	9	low	Contractors hired by the PMO group on a project-by-project basis and managed according to project environmental risk.

Risk Assessment Scoring Criteria

Frequency or Probability of Occurrence Criteria (f)

Probability	Definition	Score
Improbable	Very unlikely to occur; may occur every 10 years or more	1
Occasional	Has occurred a few times; may occur every 3-10 years	2
Moderate	Has occurred with moderate frequency, every few months to 2 years	3
Frequent	Continually occurs, or will occur frequently under normal conditions, possibly several times / month	4

Consequence Criteria

Regulated (rg)

Concern Level	Definition	Score
None	Not regulated, no internal policies or industry standards	0
Low	Not regulated, but is covered by internal policy or industry standard	1
Moderate	Regulated, low probability of fines	2
High	Regulated, violation would probably lead to legal action	3
Critical	Regulated, violation may cause shut-down or restriction of operation	4

Environmental Risk (er)

Concern Level	Definition	Score
Low	Has minimal effect on the natural environment	1
Medium	Impacts are limited to company boundary/right-of way	2
Moderate	Impacts occur beyond company boundary/right-of-way, but can be overcome in the short term	3
High	Impacts occur beyond company boundary/right-of-way, but can not be overcome in the short term	4

Mitigation Cost (mc)

Concern Level	Definition	Score
Low	Less than $5K	1
Medium	$5K - $20K	2
Moderate	$20K - $100K	3
High	More than $100K	4

Public Perception (pp)

Concern Level	Definition	Score
None	No public or agency concern	0
Low	Individual stakeholder, low level agency concern	1
Medium	Local or community, medium agency concern	2
Moderate	Multi-stakeholder, and/or moderate agency concern	3
High	Shareholder concern, extensive media coverage	4

Effectiveness of Management Controls (EMC)

Definition	Score
Unacceptable. No management controls are in place	1
Poor. Controls in place, but subject to human error. New or poorly implemented	2
Adequate. Controls are consistently implemented and/or Aspect is permitted by	3
Good. Controls are consistently implemented and permanent engineered controls	4

f x (rg + er + mc + pp) = Significance Score

Low (L) = less than 20

Medium (M) = 21 to 30

High (H) = more than 30

Significant risk rating/EMC = Residual Risk score

Low (L) = <10

Medium (M) = 10 to 24

High (H) = >24

1.1 Reporting

All environmental incidents must be reported to FBC Environment who will file the incident under the internal reporting system (URM) and will complete external reporting to any regulatory agencies if required.

Examples of environmental incidents can include, but are not limited to:

- Destruction of active bird nest;
- Snake mortality on the road;
- Spills to water or ground of any amount;
- Identification of an osprey nest being built atop a pole.

If you are unsure if an incident requires reporting, contact FBC Environment for assistance.

1.2 Permitting and Notifications

No Environmental Permits are anticipated for this project. However, in the event that unanticipated work activity reveals the requirement for environmental permitting or a notification, such documents will be obtained by FortisBC prior to commencement of work and will be kept onsite.

Activites that require permits can include, but are not limited to:

- Removal of vegetation in areas of Critical Habitat for a Species at Risk;
- Working in and around Water, including streams, ephemeral ponds and wetlands;
- Relocation of a birds nest.

Contact FBC Environment for assistance.

2.0 AS Mawdsley Overview

The AS Mawdsley substation is located in Warfield, BC adjacent to the FortisBC Warfield Operations compound. (Figure 1).

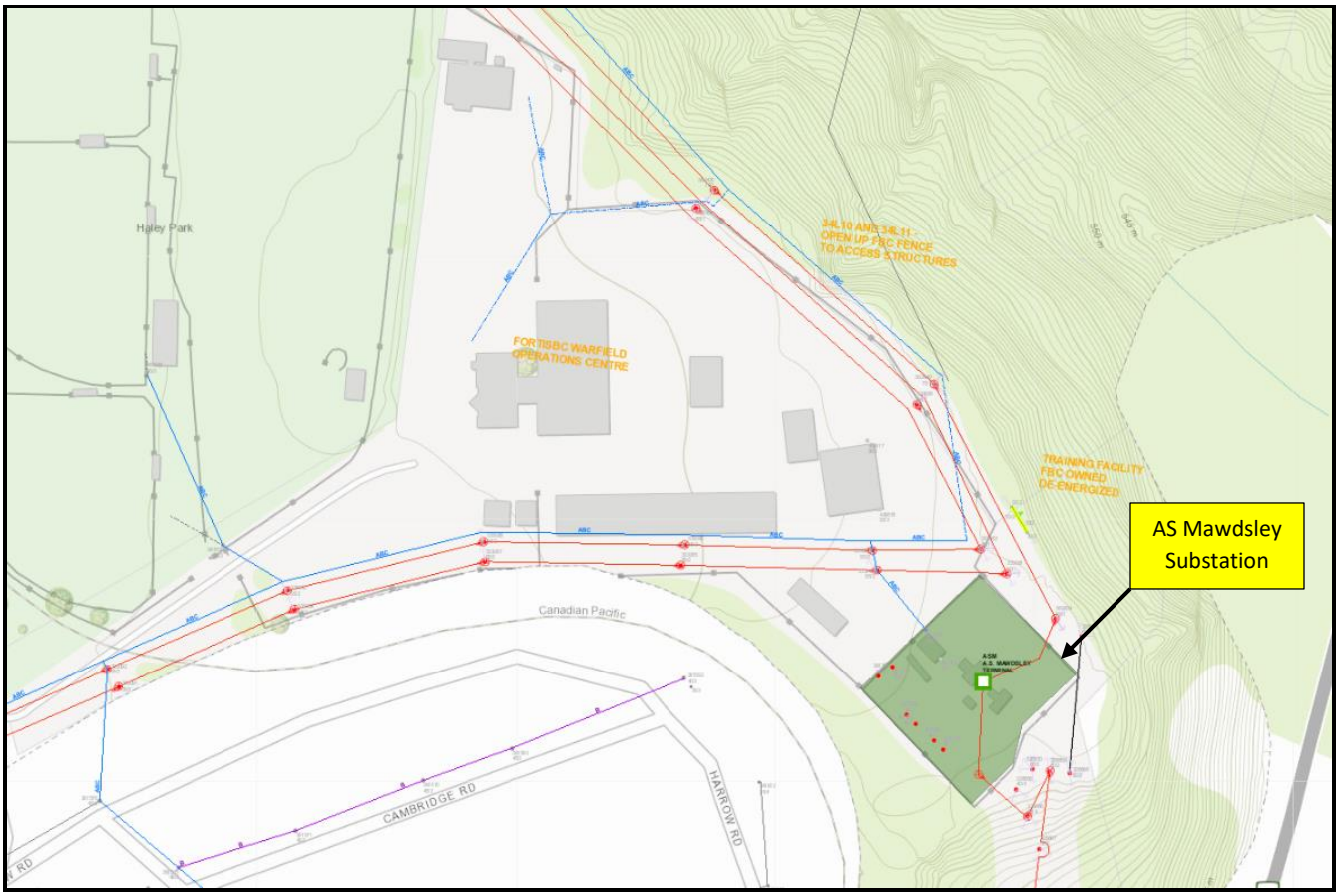


Figure 1: AS Mawdsley Substation .

A.S. Mawdsley (ASM) terminal substation was constructed in the 1960s and services the Boundary and South Okanagan regions. The station has two power transformers with a combined oil capacity of 99,739 liters, and three sulfur hexafluoride (SF6) circuit breakers with a combined SF6 capacity of 93.6 kilograms. A swimming pool style with SorbWeb Plus secondary oil containment system extends beneath both power transformers to provide secondary containment in the event of a catastrophic transformer failure.

3.0 Regulatory Compliance

Regulatory compliance is a key component of FortisBC's Environmental Policy commitment and is a duty that the Company takes seriously. Within that commitment, FortisBC employees shall ensure that all work completed for the Project will **meet or exceed all identified environmental regulatory requirements.**

The regulatory requirements applicable to the Risk Areas associated with the Project are identified in the following sections of the EMP. Prior to commencement of work, the Project Manager will meet with FBC Environment and the project team to make sure that all components of this EMP are clear and fully understood.

Any questions or concerns regarding the Risk Areas and the controls applied in the project will be addressed then. Should the discussion result in updates being required to the EMP, FortisBC Environment will make the appropriate changes and communicate those changes prior to commencement of work.

If concerns or questions of compliance arise at any time during the project, FBC Environment is to be notified and the matter dealt with accordingly. This action may or may not result in a stop in activities. The Project Manager (or designate) and the project crew in consultation with FBC Environment, will apply corrective action as soon as possible.

3.1 FortisBC EMS RISK AREA: Terrestrial Resource Management

By the very nature of its business, FortisBC Electric operations involve interactions with terrestrial environments: poles and wire placement and maintenance, right-of-way construction and maintenance, substation construction and maintenance. As part of it's Environmental Commitments, the Company **identifies** and **manages** operational hazards associated with Terrestrial Resources, and implements appropriate **controls** to minimize risks that have the potential for adverse consequences. Terrestrial Resource Management controls to be implemented for the identified risks of this project are decribed in the sections below.

A project specific summary of the Environmental Risks at each structure can be requested by FBC Environment.

3.1.1 Heritage Conservation Act

The purpose of the *Heritage Conservation Act* is to protect and conserve heritage property in BC. The Act applies to artifacts and sites of heritage value to BC, a community or an aboriginal people and prohibits the destruction, excavation or alteration of archaeological sites without a permit.

British Columbia's archaeological and heritage sites are protected under the provincial *Heritage Conservation Act* (HCA). The provisions of the HCA apply whether sites are located on public or private land. Known sites are mapped and documented by the Archaeology Branch. Chance finds are also protected under the HCA. Heritage sites and artifacts that are protected under by the HCA include:

- Burial places;
- Aboriginal rock paintings or carvings;
- Sites that contain artifacts, features, materials or other physical evidence of human habitation or use before 1846 such as cultural depressions and culturally modified trees.

3.1.1.1 FortisBC Chance Find Procedure

Prior to commencement of a project, a review must be conducted by the FortisBC Archeologist who will identify where known archaeological or heritage sites are within the AS Mawdsley. Unless an Archaeology Permit is required, all other work work will follow the FortisBC Chance Find Procedure summarized below.

See Appendix I: Heritage Resource Management(Chance Finds) for the full Procedure.

FortisBC's Chance Find Procedure

FBC crew and contractors have been trained in **FortisBC's Chance Find Procedure (Archaeological Resource Management) CRL Document #1136** which requires the following actions in the event that an artifact is discovered during project activities.

1. If intact or disturbed archaeological deposits or potential human remains are encountered, immediately stop construction in the vicinity of the archaeological site
2. The Construction Manager (or designate) will contact FortisBC Archaeologist Chris Wylie (250) 215 0942 for further guidance.

3.1.2 Species at Risk and Critical Habitat

Species at Risk include plant and wildlife species whose populations are considered to be of special concern, threatened, endangered, extirpated or extinct under the *Species at Risk Act* (SARA), Red or Blue-listed by the BC Conservation Data Centre (BC CDC), or are Identified Wildlife under *the Forest and Ranges Practices Act* (BC FRPA). SARA prohibits the killing, harming or harassing of listed species and the damaging or destroying the residence of an individual of a listed species.

The only Species at Risk with Critical Habitat extending across the Trail, BC area is the Mountain Caribou. There ae no known occurrances within the AS Mawdsley Substation area; however, should there be a sighting, FBC Environment is to be contacted immediately.

FortisBC Species At Risk Guidance Document

Guidance Documents for each of the Species at Risk have been prepared and can be found on the FortisBC Connector site for Environment. The **Mountain Caribou Guidance Documents** can be used in conjunction with this EMP to ensure that all measures to avoid potential interaction with the species are properly implemented and monitored. https://connector.fortisbc.com/DepartmentsandServices/Environment/Pages/SpeciesAtRiskResources.aspx

Mountain Caribou

3.1.3 Avian Protection

Migratory birds are common throughout the FortisBC Service Territory and as such all precautions must be taken to mitigate against conflict between the migratory birds and project work.

3.1.3.1 Migratory Birds

Migratory birds are common throughout the FortisBC Service Territory and as such all precautions must be taken to mitigate against conflict between the migratory birds and project work.

<table>
<tr><td>Legislation</td><td colspan="3">Migratory Birds Convention Act</td></tr>
<tr><td>Purpose</td><td colspan="3">To protect migratory birds, their nests and eggs from harm including prohibiting the dumping of substances harmful to birds in waters or areas frequented by them.</td></tr>
<tr><td>Definitions</td><td colspan="3">Migratory Bird: a bird that regularly crosses national borders
Incidental Take: inadvertent destruction of nests, eggs or birds</td></tr>
<tr><td>Potential Risk for Operations</td><td colspan="3">Migratory Birds can be impacted from:
vegetation management along right-of-ways and access roads
pole replacements that have active woodpecker nests
some birds nest on the ground – these nests can be crushed or damaged</td></tr>
<tr><td>Bird Nesting Window</td><td colspan="3">March 25 – August 15 (for Zones A1 & A2 from Environment Canada’s nesting calendar)</td></tr>
<tr><td rowspan="2">Migitating Impact to Migratory Birds</td><td colspan="2">Environment Canada’s Recommendations for Avoiding Incidental Take</td><td>FortisBC’s Mitigation Measures</td></tr>
<tr><td colspan="2">understand your projects’ potential impacts to migratory birds
take reasonable care to avoid impacts when planning your work
avoid potentially destructive activities
implement appropriate preventative measures to minimize the risk of incidental take</td><td>provide project information to Environment for preparation of an EMP
mitigate impacts by educating crew on the ID and habitats used by Migratory Birds within the project area
when possible schedule work outside of the Migratory Birds window
if work must take place during the bird nesting window, schedule nest sweeps prior to construction to identify nests and avoid potential impacts</td></tr>
<tr><td>Migratory Birds (examples of Family groups)</td><td>Woodpeckers
Swifts
Wrens</td><td>Flycatchers
Larks
Bobolinks</td><td>Sparrows
Thrashers
Sapsuckers</td></tr>
</table>

3.1.4 Soils and Ground Disturbance

Upon completion of work FortisBC will ensure that the sites are stable and not subject to erosion or other instability. A native seed mix acceptable by FBC Environment will be applied where required.

3.1.5 Noxious Weeds and Invasive Plants

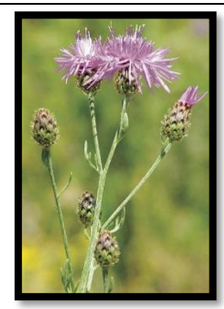
Noxious weeds (invasive plants) must be controlled according to the Weed Control Regulation B.C Reg. 66/85 or as per Section 15 of the Environmental Protection and Management Regulation B.C. Reg. 200/2010 (ALC & BC.OGC, 2013). FortisBC Guideline 1496 Invasive Plant Management provides measures to help minimize the spread of noxious weeds and invasive plants. Invasive plants are known to be present along rights-of-way and along all existing access roads, therefore ensure your crew follows the measures outlined in the **FBC Noxious Weed and Invasive Plant Spread Prevention Measures** below.

FortisBC Noxious Weed and Invasive Plant Spread Prevention Measures:

- Pressure wash all equipment and trucks immediately prior to mobilizing to site;
- Check vehicles and clothing prior to entering the ROW. Inspect the undercarriage and tires of all vehicles and remove and bag any plant material or large clumps of soil found.
- Access to the Project area via designated/marked accesses. Vehicles will only use designated pull outs and parking areas;
- Minimize construction footprint;
- Pressure wash and/or sweep all equipment and trucks prior to leaving the ROW;
- Revegetate all disturbed areas with a regionally appropriate seed mix approved by FBC Environment immediately following project completion.

Invasive plants found in the vicinity of AS Mawdsley can be found in Table 3 on the following page.

Table 1: Invasive plant species found in the AS Mawdsley.

		
Field Bindweed	**Goutweed**	**Hoary Alyssum**
		
Himalayan Blackberry	**Policeman's Helmet**	**Mullein**
		
Oxeye Daisy	**St Johns Wort**	**Spotted Knapweed**

3.2 FortisBC EMS RISK AREA: Environmental Incidents (Spills)

An Environmental Incident is an event that has caused or has the potential to cause harm to the environment. This includes but is not limited to the unintentional release of hazardous or deleterious substances to land or water. FortisBC has Environmental Management Controls in place to address the risks associated with spill incidents. The Controls pertinent to this EMP include the following:

- Spill Prevention
- CRL #1127 Spill Reporting, Response and Cleanup; and
- Spill Response Training

3.2.1 Spill Prevention

Personnel will identify potential hazards (*i.e.,* operating equipment over a waterway), determine the level of risk for activities that could result in a spill, and take measures to reduce the potential of a spill. All efforts will be taken to minimize the risk of spills, including:

Equipment Inspections and Maintenance

- maintain equipment to minimize losses of hydraulic fluids, lubricants or fuels; this includes regular inspections of fuel and hydraulic lines;
- before operation of equipment, operators will check for leaks and hydraulic hose connections for excess lubricants;
- equipment working **in and around water** or a temporarily dewatered area must be thoroughly examined for fluid leaks and steam cleaned prior to commencing work;
- maintenance of equipment on the project site will occur in a manner that prevents spills to the environment, for example, ensuring proper containment;
- **no refuelling equipment within 30 m of a watercourse;**
- ensure equipment left overnight is secure and any fluid (i.e., oil, engine coolant) containers are locked within the equipment or facility compound.

Ensure Proper Containment

- all portable oil-filled equipment or equipment containing hazardous materials must be kept within secondary containment capable of holding 110% of the equipment's tank capacity
- ensure **spill containment** is set up in a manner that prevents spills to water;
- ensure mobile equipment is in appropriate secondary containment (*i.e.,* duck ponds, spill trays);
- place **absorbant pads** underneath areas of the equipment or vehicles that require maintenance;
- store all fuels and lubricants brought onto the project site in properly labelled containers and ensure they are used in a manner that avoids spills.

3.2.2 Spill Kits

Spill-kits and equipment, including sorbent pads, booms, drip pans, and leak proof waste containers, shall be provided by the Contractor and be readily available on site and on each piece of mobile equipment (e.g. light trucks, excavators, backhoes, Bobcats, etc) in the quantities required for the equipment being used and the quantities of fluids onboard. Sufficient quantities of sorbent pads suitable for coolant shall also be included in each spill kit.

3.2.3 Environmental Spill Response and Cleanup

In the event that an environmental incident or spill occurs, follow the response procedures outlined in Table 4. For complete information on detailed spill reporting, response and cleanup procedures see the FortisBC Spill Reporting Response and Clean-up Protocol #1127.

Table 2: Response procedure for environmental incidents and spills.

	Procedure	Oil/Petroleum-Based Fluid Considerations
1	**Ensure personal and worker safety.**	Make sure to don all appropriate PPE. Consult the SDS for the spilled product and remove ignition sources if safe to do so.
2	**Notify and get help.**	When possible, contact your Manager and/or Spill Support number.
3	**Control and contain the spill.**	Utilize petroleum specific spill absorbent materials (i.e., socks, booms, pads, etc.) to contain the spill. Use water repelling absorbent booms/pads to contain spills to water.
4	**Clean-up the spill and site.**	Absorb small spills with petroleum specific absorbent pads and booms. Place contaminated absorbents in plastic bags, seal and store in a sealed container in an indoor area away from ignition sources.

3.2.4 Spill Reporting

The ***Spill Reporting Regulation*** specifies external reporting thresholds for spills of specified substances. As per this regulation a spill of a listed substance is externally reportable regardless of quantity, if it enters or is likely to enter a waterway. FortisBC Spill Response protocol requires **internal reporting of spills over 1 litre to ground and spills of any amount to water**. Contact FBC Environment for support. Externally reportable volumes are regulated under the *Spill Reporting Regulation*.

SPILLS OF ANY AMOUNT TO WATER ARE INTERNALLY AND EXTERNALLY REPORTABLE

3.3 FortisBC EMS RISK AREA: Waste Management

All waste, debris, and construction related materials (wood forms, hardware, plastics, etc.) will be removed from the site and disposed of in an appropriate manner. The Contractor shall separate and store recyclable and waste materials in appropriately labelled, covered, waterproof containers prior to transport to approved recycling and disposal facilities. Solid wastes generated by the Contractor shall be contained and removed on a regular basis to maintain a clean and tidy environment and prevent the attraction of bears and other wildlife. The Contractor shall be responsible for a thorough clean-up of the work area as per the requirements below.

Non-Hazardous Waste - Solid wastes generated during this project and requiring disposal off site will need approval from the local landfill operator prior to disposal. Local landfills may have specific restrictions on waste items accepted. The Contractor is required to comply with these requirements. Prior to removal from site, surplus excavated soil shall first be tested for contaminants and only be disposed of at a permitted landfill pre-approved by Fortis BC.

3.3.1 Hazardous Waste Management: Handling and Disposal

The ***Hazardous Waste Regulation (HWR)*** addresses the proper handling and disposal of hazardous wastes, under the *Environmental Management Act*. Hazardous Waste generated as a result of the Project must follow the requirements outlined in the *HWR*.
Hazardous Waste is not anticipated for this project; however, it should be noted that absorbent materials or soils saturated with hydrocarbons are classified as hazardous waste under the B.C. Environmental Management Act. Should spill response materials, soils, or other materials become contaminated, the Contractor shall dispose of all materials and hazardous wastes in accordance with the B.C. Environmental Management Act and its regulations. Contact FortisBC Environment for guidance on management of Hazardous Wastes.
Please consult with FortisBC controls:

- CRL #1163 Hazardous and Non-Hazardous Waste Management
- CRL #1320 Hazardous Waste Transport

3.3.2 Transportation of Dangerous Goods (TDG)

The *Transportation of Dangerous Goods Act (TDG Act)* and *Transportation of Dangerous Goods Regulations* pursuant to the *TDG Act* outline requirements for transporting dangerous goods including but not limited to containment, labelling, documentation and training. Dangerous goods pertaining to the Project must be transported in accordance with the *TDG Regulations*.

3.3.3 TDG Environmental Management Controls

FortisBC has Controls in place to ensure dangerous goods are transported in accordance with the *TDG Act* and *Regulations*. The Controls pertinent to this EMP include the following:

- CRL #1163 Hazardous and Non-Hazardous Waste Management
- CRL #1320 Hazardous Waste Transport

All personnel transporting hazardous materials must have the appropriate training and will ensure the use of appropriate equipment, containment and signage and follow the federal *Transportation of Dangerous Goods Regulations* and provincial *Hazardous Waste Regulations*. Contact FortisBC Environment for guidance on management of Hazardous Waste.

Appendix I: Heritage Resource Management(Chance Finds)

DOCUMENT NUMBER: 1136
DOCUMENT TYPE: PROCEDURE
Owner: Kristoff, Leslie
SML: Wylie, Christopher
Utility: Electric, Gas
Approved Date: June 05, 2020
Effective Date: June 05, 2020
Next Review Date: June 05, 2024 CATEGORY: ENVIRONMENT, HEALTH & SAFETY - ENVIRONMENTAL MANAGEMENT - TERRESTRIALRESOURCE MANAGEMENT

Document History: This document replaces 1136 Archaeological Resource Management (Chance Finds) dated 17 August 2015.

Summary of Changes

In June 2020, this document was updated with significant changes to the following sections - Definitions,Scope, Procedure, and Legislation and Indigenous Policies. The title was also updated.

Overview

This document specifies the procedures that FortisBC will follow upon discovering unanticipated potentialheritage resources or human remains (i.e., Chance Finds) to remain compliant with applicable municipal,provincial, and federal legislation as well as applicable Indigenous policies.

Audience

This procedure applies to all employees and contractors of FortisBC who discover a potential heritageresource or human remains.

Definitions

- **Archaeological Site –** A location that contains physical evidence of past human activity and that can bestudied by archaeological methods of investigation, including site survey, excavation, and data analysis.
- **Heritage Conservation Act –** The *Heritage Conservation Act* (HCA) is provincial legislation that providesfor the protection and conservation of heritage sites (e.g. archaeological sites and historic places) and objects within BC and once regulations have been developed, will require that all discoveries of sites or objects that may have heritage value be reported to the minister.
- All archaeological sites, whether on Provincial Crown or private land, including land that is underwater, that predate AD 1846 are automatically protected under the HCA. Certain sites, including human burialsand rock art sites with heritage value, are automatically protected, regardless of their antiquity.
- Shipwrecks and plane wrecks greater than two years of age are also protected under the HCA. The HCAdoes not distinguish between those archaeological sites which are “intact” (i.e., those sites which are in apristine, or undisturbed state) and those which are “disturbed” (i.e., those sites which have been subject to alteration, permitted or otherwise). All archaeological sites, regardless of condition, are protected by the HCA, as described above.

- HCA-protected sites or objects cannot be disturbed or altered without a permit issued under Section 12.2 or Section 12.4 of the HCA and a person may be liable to obtain and pay for an archaeological impact assessment as a condition of a permit.
- **Heritage Resource –** A collective term for heritage sites and objects.
- **Heritage Site –** As defined in the BC *HCA*, whether designated or not, land, including land covered by water, that has heritage value to British Columbia, a community or an aboriginal people. This may include archaeological sites and historic places.
- **Heritage Object –** As defined in the BC HCA, whether designated or not, personal property that has heritage value to British Columbia, a community or an aboriginal people.
- **Historic Place (Formally Recognized) –** Defined by the eligibility requirements for inclusion in theBritish Columbia and Canadian Registers of Historic Places. Comprised of places that have been formally recognized for their heritage value by some form of legislative enactment (order-in-council,bylaw, or council resolution) by the province, a local government or a regional district. Federally designated National Historic Sites are also included in this site category.
- **Historic Place (Not Recognized) –** Not protected and not formally recognized by government. Many ofthese places are non-designated historic sites such as heritage buildings identified through various thematic studies. This also includes records for historic places that have been un-designated, de- registered and/or destroyed.

Scope

Construction activities such as, though not limited to, clearing, grading and excavation have the potentialto disturb heritage resources. Therefore, Environment and/or a professional archaeologist may be involved in the planning and construction phases of a project to minimize the risk of unexpected impacts to heritage sites and objects as a result of FortisBC activities. This document specifies the procedures that FortisBC will follow upon discovering unanticipated potential heritage resources or human remains(i.e., Chance Finds).

Heritage Resource Management (Chance Find) Procedure

Initial Response

If the activities of FortisBC or one of our contractors inadvertently uncover a potential heritage site,object, or human remains:

1. **STOP** construction in the immediate vicinity of the potential heritage resource or human remains.
2. Contact Environment
   a. FortisBC Archaeologist:
      Christopher Wylie

      Office: 250-868-4577 / Cell: 250-215-0942

   b. FortisBC Environmental Program ManagerLeslie Kristoff

      Office: 604-592-7680 / Cell: 604-842-7188
3. For a Heritage Site or Object **OR** unidentifiable bone:
   a. FortisBC Environment will contact a professional archaeologist for further guidance.

b. If the Chance Find occurs on an Indian Reserve, FortisBC Environment will contact the Indigenous Community.

4. For obvious Human Remains:
   a. FortisBC Environment will contact the FortisBC Project Manager, the local policing authority, a professional archaeologist, appropriate Indigenous communities, and the Archaeology Branch.
   b. The Office of the Coroner may also be notified, following discussions with the local policing authority.
5. Depending on the type of resource, the professional archaeologist, possibly in consultation with the Archaeology Branch and/or local Indigenous communities, will advise on further action.
6. Complete the required reporting in Utility Risk Management (URM). Contact Environment for assistance with URM if required.

Initial Action

Depending on the nature of the situation, one of the following is likely:

1. Heritage Site or Object OR unidentifiable bone:
   a. Based on a description of the incident, it may be decided that there are no further concerns, allowing construction to continue as planned.

   OR

   b. A field visit by a professional archaeologist may be recommended to better assess the nature of the situation and to identify an appropriate course of action.

2. Obvious Human Remains:
   a. A professional archaeologist with appropriate experience and training, or a physical anthropologist (a specialist in the study of human remains) will visit the site as soon as possible with invited Indigenous representatives.
   b. The professional archaeologist, local policing authority and/or the Office of the Coroner will determine if the human remains are forensic or archaeological in nature.
   c. If it is determined that the human remains are archaeological in nature, FortisBC has HCA permits that may be applicable and contain methods for the respectful treatment of human remains. The Archaeology Branch will be consulted to determine applicability of the FortisBC HCA Permit. The appropriate Indigenous community(s) will be consulted regarding protocols, if necessary, for the respectful recovery, handling, and/or disposition of the human remains.
   d. If it is determined that the human remains are not clearly archaeological, the local policing authority and/or coroner will take control of the site area and dictate appropriate protocols.

Management Options

In the event that heritage resources are in fact present, FortisBC, the professional archaeologist, the Archaeology Branch, and the land owners, should consider Management Options 1, 2, and 3 described below for deciding how to proceed.

In the event that archaeological human remains are identified, they will be assumed to be Indigenous and the appropriate Indigenous community(s) will be consulted regarding protocol for the respectful treatment of the ancestor. Should it be determined that the archaeological human remains are not Indigenous, the appropriate ethnic community will if possible, be identified and consulted regarding protocol for the respectful treatment of the individual.

Management Options 1 and 3, described below, will be considered when deciding how toproceed.

Option 1

Avoidance through partial project redesign or relocation. This option results in minimal impact tothe heritage site and/or human remains, and is the most preferable from a cultural resource management perspective. It can also be the least expensive option from a construction perspective. An archaeological impact assessment (AIA) under a HCA permit may be required todefine the extent of the heritage site/human remains. FortisBC has applicable permits to conductan AIA. If AIA is required to define site boundaries in order to avoid the site, construction may be delayed approximately one month to comply with a condition to notify Indigenouscommunity(s) of work being completed under permit.

Option 2

Where avoidance is not possible, archaeological monitoring may be undertaken to mitigate project impacts to a site by ensuring that adverse project impacts on the resource that could notbe predicted or evaluated prior to construction are addressed. Monitoring may also assess the effectiveness of mitigation measures, as well as the magnitude, severity or duration of an impact. Monitoring is conducted under an HCA permit and may result in the need to complete archaeological excavation if archaeological features are encountered. FortisBC has applicable permits for archaeological monitoring though construction may be delayed approximately one month to comply with a condition to notify Indigenous community(s) of work being completed under permit.

Option 3

For an archaeological site, salvage excavation may be necessary. If located on provincial Crown or private land this option would require appropriate permitting from the Archaeology Branch before mitigation (e.g., excavation) could commence. This "data recovery" option can beexpensive and destructive and can delay construction by up to several months unless a HCA permit is already in hand. Consequently, salvage excavation is not a preferred option.

For human remains, salvage or emergency excavation to respectfully remove the remains for reburial in a location chosen by the appropriate community(s) should be completed in consultation with the relevant government authorities. Field operations should be aware that removal of human remains and subsequent reburial might involve the conduct of ceremonies orcertain procedures that could incur costs and delay construction.

Option 4

Application of protection measures. Protection measures may include temporary and/or long term strategies. Temporary strategies could include erecting fencing or barricades to protect thesite, while longer term solutions could include capping the site area with fill.

Appropriate archaeological site protection measures should be identified on a site-specific basisin consultation with local Indigenous communities for approval by the Archaeology Branch.

Additional permitting and further archaeological studies may be required.

Legislation and Indigenous Policies

Changes to legislation and Indigenous policies can occur at any time. FortisBC staff must ensurethey remain aware of current legislation and Indigenous policies. Legislation that may apply to heritage resources is listed below.

For more information regarding environmental legislation and its applicability to FortisBC, please refer to the Environmental Compliance Directory.

Summary of Applicable Legislation & Indigenous Policies

Municipal

- *Local Government Act*
- *Vancouver Charter*

Provincial

- *Heritage Conservation Act*
- *Oil and Gas Activities Act*

Federal

- *Canadian Environmental Assessment Act*, 2012
- *Historic Sites and Monuments Act*
- *Parks Canada Agency Act*

Indigenous

- Various policies, subject to change (professional archaeologist to advise FortisBC)

Communication and Enforcement

As outlined in the procedure above.

Related Information

Other References:

- EMR 03-16 Approval record
- Gas Distribution Archaeological or Heritage Site Procedures OPS-00170

Appendix F
LINE DIAGRAMS – PROPOSED CONFIGURATION

FILED CONFIDENTIALLY

Appendix F-1

WTS GENERAL ARRANGEMENT – CURRENT CONFIGURATION WITH DEMOLITION SCOPE

FILED CONFIDENTIALLY

Appendix F-2

WTS GENERAL ARRANGEMENT – PROPOSED CONFIGURATION

FILED CONFIDENTIALLY

Appendix F-3

OPERATIONAL SINGLE LINE DIAGRAM – PROPOSED CONFIGURATION

FILED CONFIDENTIALLY

Appendix G

STATION COST ESTIMATE CLASS 3

FILED CONFIDENTIALLY:

- **G-1 – STATION COST ESTIMATE CLASS 3 – PREFERRED ALTERNATIVE**
- **G-2 – LINES COST ESTIMATE CLASS 3 – PREFERRED ALTERNATIVE**

Appendix G-1

STATION COST ESTIMATE CLASS 3 – PREFERRED ALTERNATIVE

FILED CONFIDENTIALLY

Appendix G-2

LINES COST ESTIMATE CLASS 3 – PREFERRED ALTERNATIVE

FILED CONFIDENTIALLY

Appendix G-3
WOOD MACKENZIE MARKET REPORT

Market Report: Gas and Electric Transmission and Distribution Cost Impacts 2020-2024

May 2022

The Engagement

FortisBC has engaged Wood Mackenzie Supply Chain Consulting to provide a market report detailing how market factors have impacted and are anticipated to impact North American utility spend between 2020 and 2024. Wood Mackenzie is a global research and consulting firm that provides energy clients with data, analytics, and insights that they rely on for their decision making. Wood Mackenzie Supply Chain Consulting (SCC), formerly PowerAdvocate, utilizes proprietary cloud-based software solutions and bespoke consulting services to enable our clients to leverage data analysis and assist them in navigating an ever-changing marketplace.

Market dynamics over the last two years have created significant inflationary pressures across both materials and services. This market report is specific to two portfolios: electric transmission and distribution (T&D) and gas T&D capital expenditures at Canadian utilities, with labour specific to British Columbia, Canada. In both portfolios, market escalation has been observed since FortisBC's initial Multi-Year Rate Plan (MRP) filing (Quarter 1, 2020 through Quarter 1, 2022). This report also includes a forecast of potential impacts from Quarter 2, 2022 through Quarter 4, 2024.

Qualifications

Wood Mackenzie Supply Chain Intelligence is a suite of cloud-based software solutions that includes a product, Cost Intelligence, which enables our clients to identify market-based risks and opportunities. Cost Intelligence includes thousands of cost models and indices that enable users to understand what a project or item should cost in a dynamic market. Wood Mackenzie Cost Intelligence models were developed to support the energy market. The Wood Mackenzie team starts with industry specifications, technical drawings, supplier 10ks, and other industry information to develop detailed items that tie cost inputs to dynamic market indices. Those indices are then weighted and loaded on the cloud-based platform. The items are combined into categories and sub-categories that reflect clients spend profiles, or specific capital project expenditures.

Methodology

North American Gas and Electric Utility Cost Models

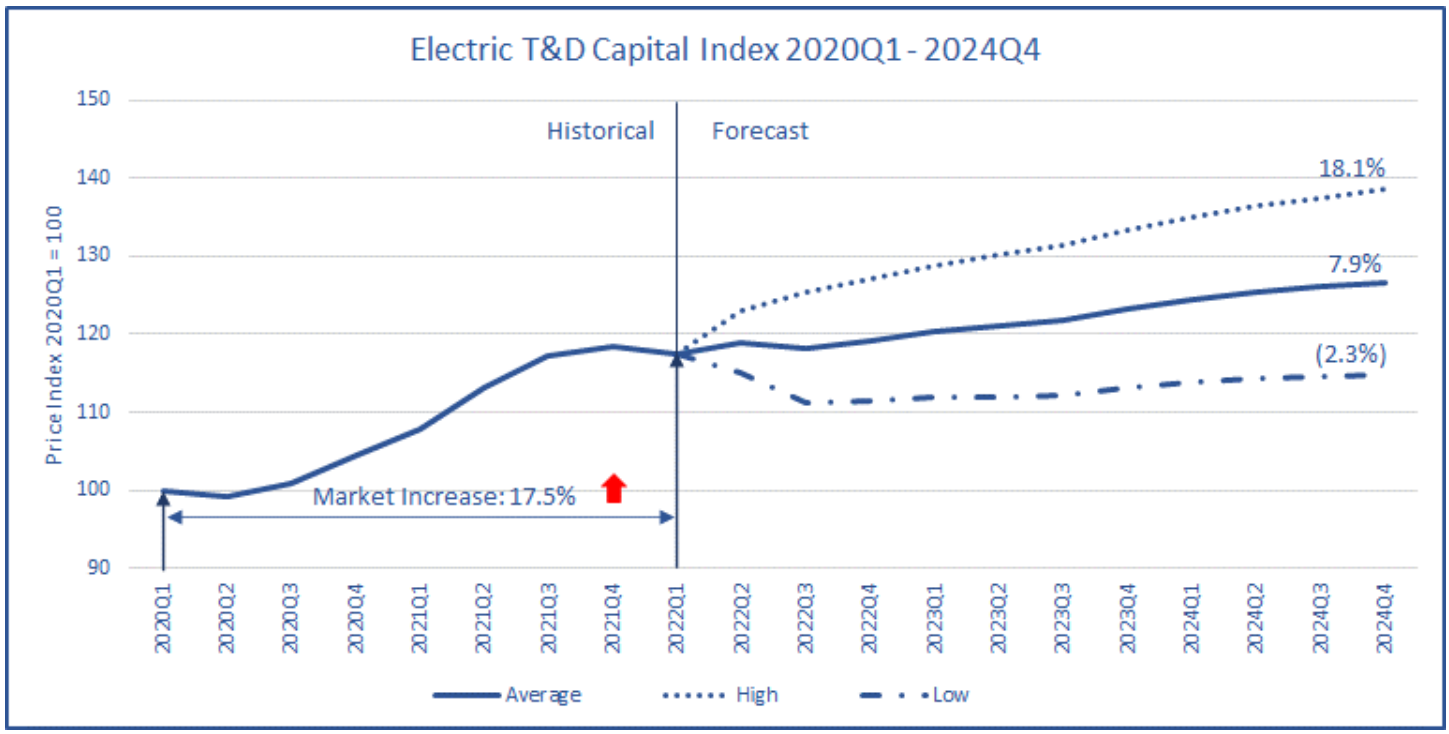
Wood Mackenzie built two customized cost models – Electric Transmission and Distribution and Gas Transmission and Distribution. Each cost model is built from aggregated spend from utilities across North America and over $550M (CAD) in total spend. The models apply indices to spend at an item level and roll up to sub-category, category, and facility level. Each model incorporates over 150 indices tracked monthly by Wood Mackenzie.

Customization for British Columbia Specific Labour Pool

British Columbia (BC) has a unique labour pool and, where appropriate, the models incorporate indices specific to BC, particularly around trade labour and any other labour activities specific to the BC province.

Market Insights

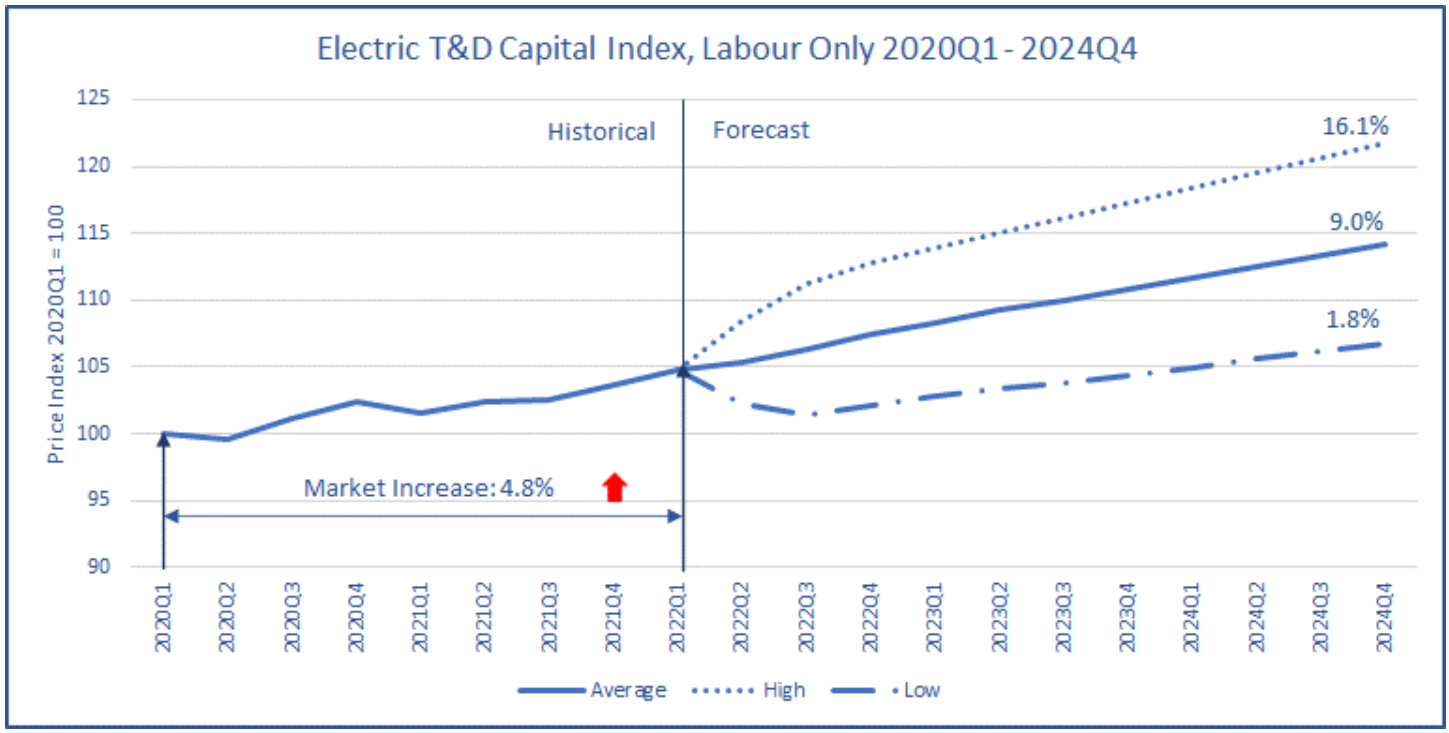
Electric Transmission and Distribution 2020Q1-2024Q4



*This graph includes an aggregate of multiple indices, including both labour and material cost components.
**Forecasted percentage increases or decreases are based on index 2022Q1 = 100

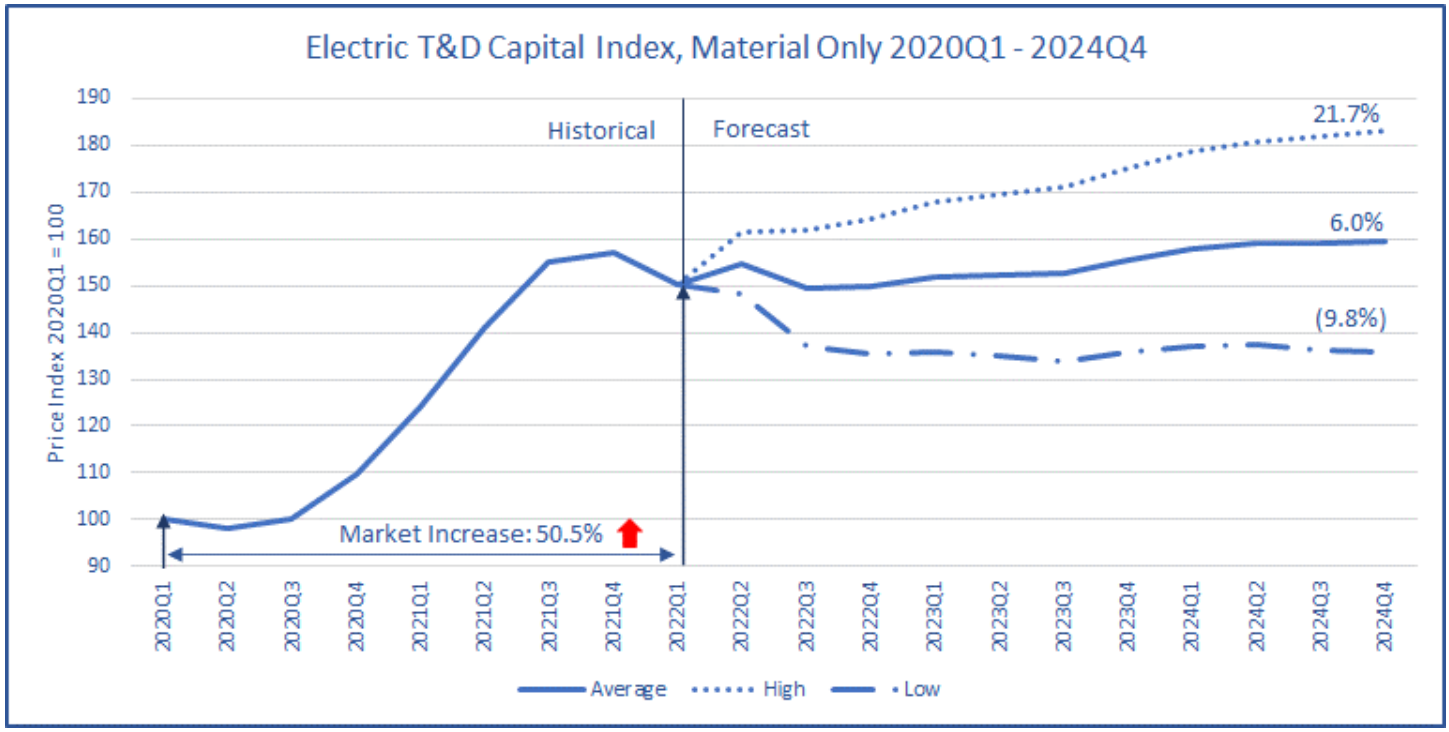
Since execution of FortisBC's MRP (Q1 2020 – Q1 2022), market factors have caused an escalation in capital costs for electric T&D of 17.5%. Forward-looking forecasts for Q1 2022 – Q4 2024 average 7.9%. Table 1 shows the ten most impactful commodities and services in the electric T&D model, and their individual escalations since the beginning of the MRP. Sharp increases in steel and aluminum prices starting in Q3 2020 drove escalations through Q3 2021. Prices of steel and aluminum have leveled off since Q4 2022 which is reflected in the forecast through 2024. The total market split for Electric T&D between labour and materials is 65% and 35% respectively. Labour costs are expected to continue to rise, while material costs level out.

Electric Transmission and Distribution - Labour 2020Q1-2024Q4



**Forecasted percentage increases or decreases are based on index 2022Q1 = 100

Electric Transmission and Distribution - Material 2020Q1-2024Q4



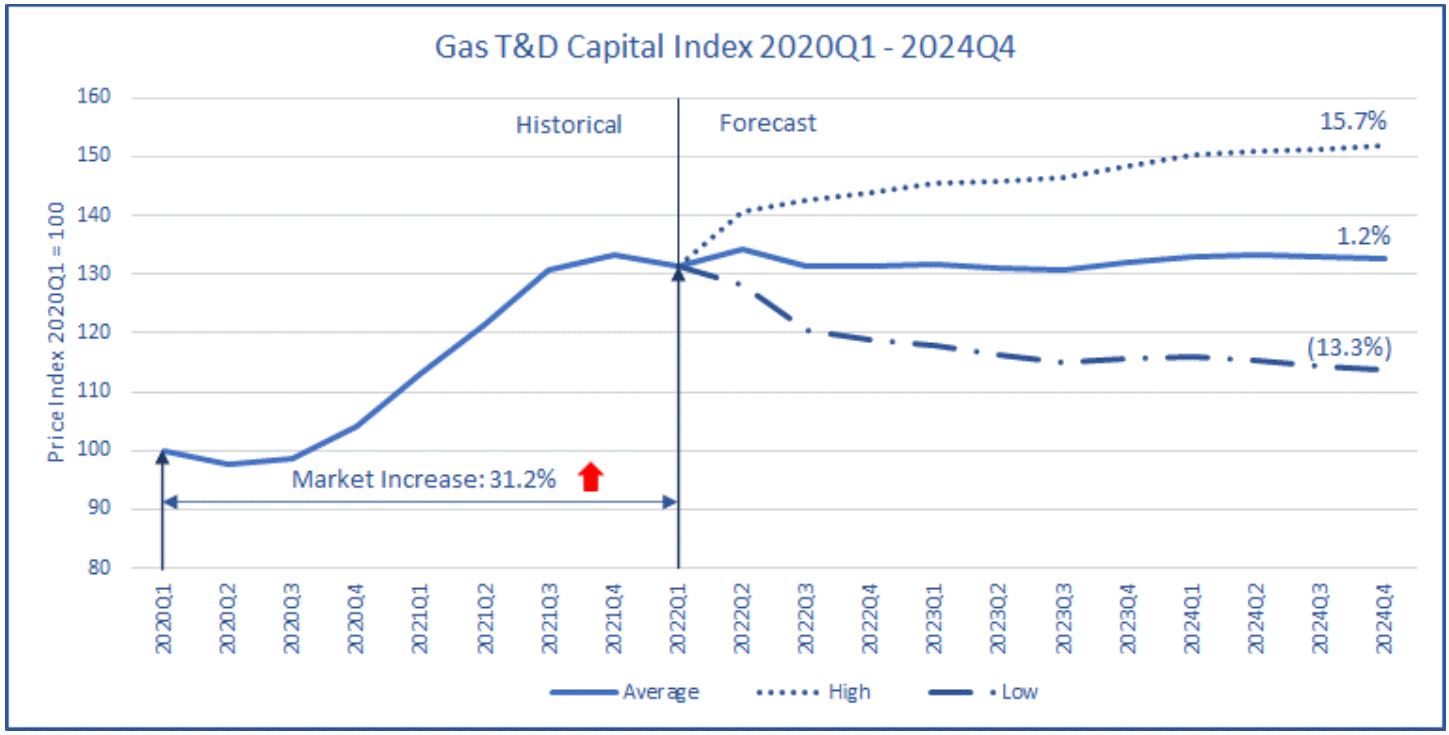
**Forecasted percentage increases or decreases are based on index 2022Q1 = 100

Table 1. Electric T&D High-impact Commodities and Services

Electric T&D High Impact Commodities and Services	Q1 2020 – Q2 2022 (%)
AHE: Mechanical and Electrical Trades, Basic Construction Union Wages, BC	1.5
AHE: Construction, Private Compensation, BC	10.8
ECEC: Benefits, Private Construction	3.3
SPM: Steel, Hot-Rolled Coil	117.3
PPI: Cement, Canada	(3.4)
AHE: Heavy Equipment Operator, Basic Construction Union Wages, BC	2.6
AWE: Repair and Maintenance, BC	4.3
SPM: Aluminum, High Grade	83.2
PPI: Springs and Wire Products, Canada	42.2
IM: Transmission Conductor	160.4

AHE: Average Hourly Earnings, Employer Costs for Employee Compensation, SPM: Spot Price Metal, IPPI: Producer Price Index, AWE: Average Weekly Earnings, IM: Industry Margin

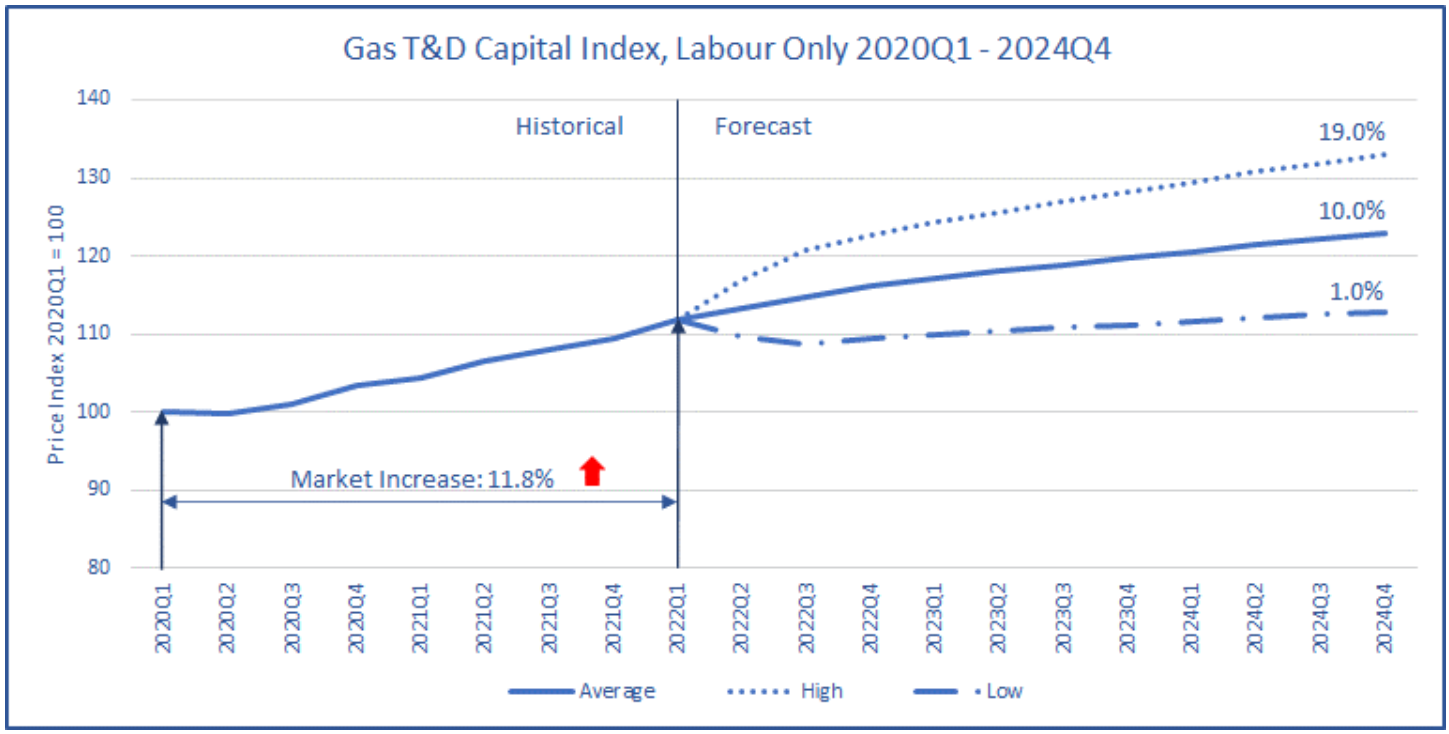
Gas Transmission and Distribution 2020Q1 – 2024Q4



*This graph includes an aggregate of multiple indices, including both labour and material cost components.
**Forecasted percentage increases or decreases are based on index 2022Q1 = 100

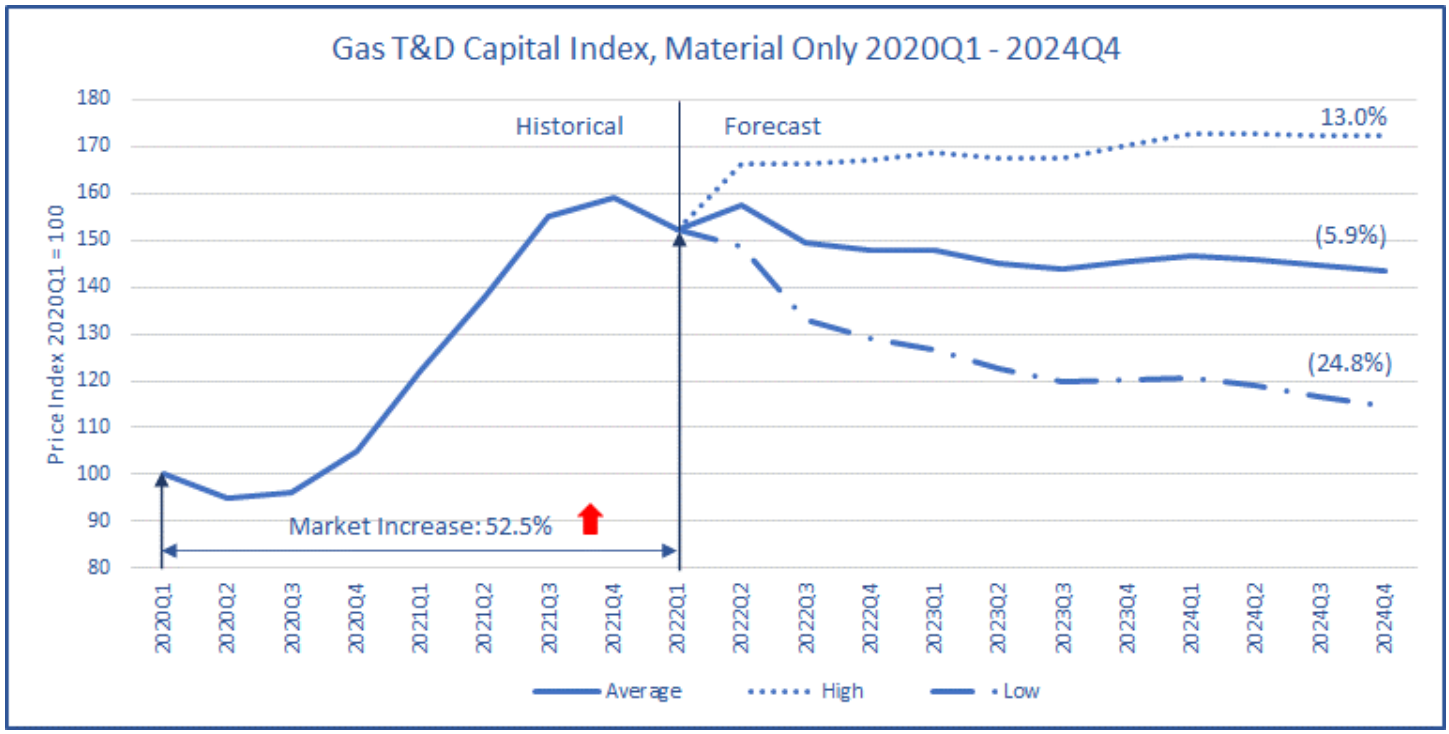
Since execution of FortisBC's MRP (Q1 2020 – Q1 2022), market factors have caused an escalation in capital costs for gas T&D of 31.2%. Forward-looking forecasts for Q1 2022 – Q4 2024 average 1.2%. Table 2 shows the ten most impactful commodities and services in the gas T&D model, and their individual escalations since the beginning of the MRP. Sharp increases in steel and aluminum prices starting in Q3 2020 drove escalations through Q3 2021. Prices of steel and aluminum have leveled off since Q4 2022 which is reflected in the forecast through 2024. The total market split for Gas T&D Construction between labour and materials is 44% and 56% respectively. Labour costs are expected to continue to rise, while material costs are expected to drop slightly, driven by declining steel prices.

Gas Transmission and Distribution - Labour 2020Q1 – 2024Q4



**Forecasted percentage increases or decreases are based on index 2022Q1 = 100

Gas Transmission and Distribution - Material 2020Q1 – 2024Q4



**Forecasted percentage increases or decreases are based on index 2022Q1 = 100

Table 2. Gas T&D High-impact Commodities and Services

Gas T&D High Impact Commodities and Services	Q1 2020 – Q2 2022 Escalation (%)
AHE: Construction, Private, Compensation, BC	10.8
SPM: Steel Plate, Cut-to-Length	173.7
SPM: Steel, Hot-Rolled Coil	117.3
PPI: Hand and Edge Tools	2.7
PPI: Commercial and Industrial Machinery and Equipment Rental	(2.2)
AHE: Professional, Scientific and Technical Services, BC	11.6
SPM: Steel Plate, Coiled	117.3
AHE: Architectural and Finishing Trades, Basic Construction, BC	1.4
AHE Manufacturing, BC	9.8
PPI: Metal Building and Construction Materials, Canada	51.1

AHE: Average Hourly Earnings, SPM: Spot Price Metal, PPI: Producer Price Index

Pre-MRP Market Escalations

The market conditions for both electric and gas T&D vary significantly from the five years prior to the execution of the MRP. Table 3 uses the same models as above to observe the market between Q1 2015 through Q4 2019. Two years (2015 and 2019) experienced a decrease in market price, and the total escalations over this period were 7.6% and 7.5% for electric T&D and gas T&D, respectively.

Table 3. Annual Market Adjustments for Electric and Gas T&D

Year Q1 – Q4	Electric T&D Market Change (%)	Gas T&D Market Change (%)
2019	(0.2)	(3.6)
2018	1.0	4.5
2017	1.8	1.2
2016	4.1	3.6
2015	(1.7)	(3.5)

Disclaimer

Strictly Private & Confidential

Verisk™

Wood Mackenzie™, a Verisk business, is a trusted intelligence provider, empowering decision-makers with unique insight on the world's natural resources. We are a leading research and consultancy business for the global energy, power and renewables, subsurface, chemicals, and metals and mining industries. For more information visit: **woodmac.com**

Europe +44 131 243 4400
Americas +1 713 470 1600
Asia Pacific +65 6518 0800
Email contactus@woodmac.com
Website www.woodmac.com

Appendix H
FINANCIAL SCHEDULES FOR PREFERRED ALTERNATIVE

FILED CONFIDENTIALLY

Appendix I
CONSULTATION AND ENGAGEMENT

Appendix I-1
STAKEHOLDER CONSULTATION AND INDIGENOUS ENGAGEMENT LOGS

ASM - Indigenous Consultation Log

Date	Engagement Type	External Representatives	External Contact Name	FBC Representatives	Indigenous Community	Summary	Column3
1-Oct-22	In-Person Meeting			Blair	Ktunaxa Nation	Procurement opportunities with ASM.	
4-Nov-22	E-Mail			Jen	Penticton Indian Band	Project notification letter sent via Nations Connect. Includes project area map and FBC CIR contact person.	
4-Nov-22	E-Mail			Jen	Okanagan Indian Band	Project notification letter sent via Nations Connect. Includes project area map and FBC CIR contact person.	
4-Nov-22	E-Mail			Jen	Lower Similkameen Indian Band	Project notification letter sent via email to referrals@lisb.net. Includes project area map and FBC CIR contact person.	
4-Nov-22	E-Mail			Jen	Okanagan Nation Alliance	Project notification letter sent via email to onareception@sylix.org. Includes project area map and FBC CIR contact person.	
4-Nov-22	E-Mail			Blair	Ktunaxa Nation	Project notification letter sent via Ktunaxa Connect portal. Includes project area map and FBC CIR contact person.	
4-Nov-22	E-Mail			Jen	Upper Nicola Indian Band	Project notification letter sent via Nations Connect. Includes project area map and FBC CIR contact person.	
4-Nov-22	E-Mail			Jen	Osoyoos Indian Band	Project notification letter sent via email to lands@oib.ca. Includes project area map and FBC CIR contact person.	
4-Nov-22	E-Mail			Jen	Shuswap Indian Band	Project notification letter sent via Nations Connect. Includes project area map and FBC CIR contact person.	
4-Nov-22	E-Mail			Jen	Splatsin First Nations	Project notification letter sent via Nations Connect. Includes project area map and FBC CIR contact person.	
7-Nov-22	E-Mail	Referrals Coordinator, Natural Resources Department PIB	Maryssa Bonneau	Blair	Penticton Indian Band	Confirmed receipt of the referral and deferred consultation to OIB.	
10-Nov-22	E-Mail	Guardianship Referrals Administrator - Lands & Resources	Michelle Dunn	Blair	Ktunaxa Nation	Request a copy of the preliminary Archeological Overview Assessment and the environmental assessment when completed.	
21-Nov-22	E-Mail	Referrals, Territorial Stewardship Division	Julie Richard	Blair	Okanagan Indian Band	Confirmed receipt of referral and asked to defer to OIB and LSIB for a more in-depth review. Please keep us informed of major changes to project.	
22-Nov-22	E-Mail	Splatsin Referrals	Kayla Gunner Patricia Muskrat	Blair Jen	Splatsin First Nations	Confirmed receipt of referral. Request a copy of the Archeological Overview Assessment and the Environmental Assessment and to be kept up to date as the project progresses.	
1-Dec-22	E-Mail	Referrals Coordinator	Teresa Anderson	Blair Jen	Osoyoos Indian Band	Confirmed receipt of the referral. Request a 60 day period to review the application.	
7-Dec-22	E-Mail			Blair	Ktunaxa Nation	AOA report uploaded to the Ktunaxa Connect portal.	
7-Dec-22	E-Mail			Jen	Upper Nicola Indian Band	AOA report sent via Nations Connect.	
7-Dec-22	E-Mail			Jen	Splatsin First Nations	AOA report sent via Nations Connect.	
7-Dec-22	E-Mail			Jen	Shuswap Indian Band	AOA report sent via Nations Connect.	
7-Dec-22	E-Mail			Jen	Penticton Indian Band	AOA report sent via Nations Connect.	
7-Dec-22	E-Mail			Jen	Okanagan Indian Band	AOA report sent via Nations Connect.	
12-Dec-22	E-Mail		Teresa Anderson	Jen	Osoyoos Indian Band	Sent notification that the request for a 60 day application review period can be accommodated.	
17-Jan-22	E-Mail			Jen	Upper Nicola Indian Band	Environmental Management reports for ASM and WTS sent via Nations Connect.	
17-Jan-22	E-Mail			Jen	Penticton Indian Band	Environmental Management reports for ASM and WTS sent via Nations Connect.	
17-Jan-22	E-Mail			Jen	Shuswap Indian Band	Environmental Management reports for ASM and WTS sent via Nations Connect.	
17-Jan-22	E-Mail			Jen	Splatsin First Nations	Environmental Management reports for ASM and WTS sent via Nations Connect.	
17-Jan-22	E-Mail			Jen	Upper Nicola Indian Band	Environmental Management reports for ASM and WTS sent via Nations Connect.	
17-Jan-22	E-Mail			Jen	Ktunaxa Nation	Environmental Management reports for ASM and WTRS sent via Ktunaxa Connect.	
17-Jan-22	E-Mail			Jen	Osoyoos Indian Band	AOA report and Environmental Management reports for ASM and WTRS sent via sent via email to lands@oib.ca.	

ASM - Stakeholder Consultation Log

Date	Consultation Type	External Representatives	FBC Representatives	Municipality/Stakeholder	Summary
3-Nov-22	E-Mail		Jen/Aimee	City of Trail	Project notification letter sent via email. Includes project area map and FBC CIR contact person.
3-Nov-22	E-Mail		Jen/Aimee	Village of Warfield	Project notification letter sent via email. Includes project area map and FBC CIR contact person.
3-Nov-22	E-Mail		Jen/Aimee	City of Rossland	Project notification letter sent via email. Includes project area map and FBC CIR contact person.
3-Nov-22	E-Mail		Jen/Aimee	RDKB	Project notification letter sent via email. Includes project area map and FBC CIR contact person.
3-Nov-22	E-Mail		Jen/Aimee	Webster School	Project notification letter sent via email. Includes project area map and FBC CIR contact person.
3-Nov-22	Letter		Jen/Aimee	Area Residents	Project notification letters hand delivered door to door for Eton, Cambridge, and Oxford Road. Includes project area map and FBC CIR contact person.
3-Nov-22	Letter		Jen/Aimee	Area Residents	Project notification letters sent via mail for remaining residential customers within 250 meters of each site (Annabell area).
4-Nov-22	E-Mail		Blair	City of Trail	Concern raised about impact to Hailey Park during line restringing.
4-Nov-22	E-Mail		Blair	City of Trail	Email sent confirming FBC will work with our crews and the City of Trail on scheduling in order to minimize that impact to the park and its availability. The City of Trail responded positively.
28-Nov-22	Letter		Jen/Aimee	Area Residents	Project notification letters sent via mail for residential customers on Hanna Creek Rd.

ASM - Public Inquires Log						
Date	Channel	Inquirer	Contact Details	Concern/Interest	Summary/Response	Additional Comments
31-Oct	In Person	Customer	120 Cambridge Rd, Warfield	Noise	The existing ASM transformers make noise. There is a consistent and continual buzzing sounds that can be heard in the neighboring subdivision.	
31-Oct	In Person	Customer	120 Cambridge Rd, Warfield	Noise	ASM snow plow back up beeping on truck is loud. Plowing is done in the early hours of the morning and can disturb sleep of residents.	Sent notification of complaint details to FBC Facilities on Nov 2 for their review.
3-Nov-22	In Person	Customer	1235 Oxford Rd, Warfield	Supportive	Customer commented they were in support of the projects and appreciated receiving our notification letter.	

Method	Date	Recipient(s)	Content
Email	3-Nov-22	Municipalities and RD	Project notification letter
In Person	3-Nov-22	Area residents	Project notification letter
Mail	3-Nov-22	Area residents	Project notification letter
Email	4-Nov-22	Indigenous groups	Project notification letter
Mail	28-Nov-22	Area residents - Hanna Creek	Project notification letter

Appendix I-2
PROJECT NOTIFICATION LETTER TO RESIDENTS

Jennifer Datchkoff
Community and Indigenous
Relations Liaison
FortisBC

FortisBC Inc.
1290 Esplanade
PO Box 130
Trail, BC V1R 4L4
250-368-0674
Jennifer.datchkoff@fortisbc.com
www.fortisbc.com

November 2, 2022

We are planning work in your neighborhood

FortisBC is in the planning stages of filing a Certificate of Public Convenience and Necessity (CPCN) with the British Columbia Utilities Commission (BCUC) to increase system reliability and meet load growth. This project will replace aging infrastructure and equipment near end-of-life to improve FortisBC's system reliability. In addition, it will increase Boundary and Similkameen area capacity supporting the region's growth and development.

The project includes removing FortisBC's transformers at the AS Mawdsley substation, expanding capacity at its existing facility Warfield Terminal Station, and restringing transmission lines. Site area map is included.

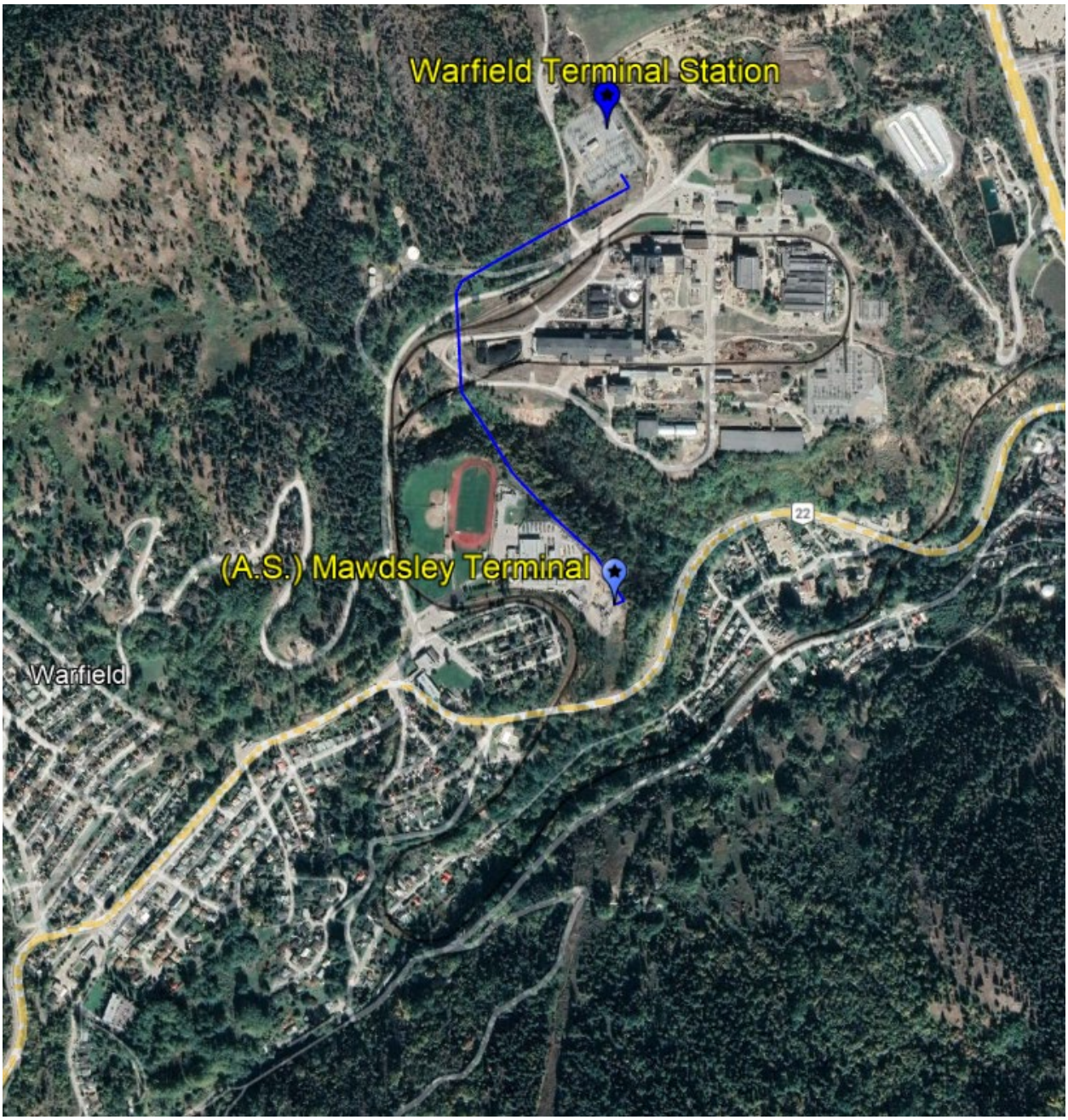
FortisBC will submit an application in early winter 2023. If approved construction is expected to take place in the spring of 2024 with the new transformers anticipated to be in service by the end of 2026.

For any questions regarding this project, please contact Aimee Montpellier at 1-250-231-5602. If you would like to contact the BCUC directly they can be reached at https://www.bcuc.com.

Respectfully;

Jennifer Datchkoff
Community and Indigenous Relations Liaison
FortisBC

FortisBC AS Mawdsley Project Map



Appendix I-3
FBC STATEMENT OF INDIGENOUS PRINCIPLES

Statement of Indigenous Principles

FortisBC is committed to building effective Indigenous relationships and to ensuring we have the structure, resources and skills necessary to maintain these relationships.

To meet this commitment, the actions of the company and its employees will be guided by the following principles:

- FortisBC companies acknowledge, respect and understand that Indigenous Peoples have unique histories, cultures, protocols, values, beliefs and governments.
- FortisBC supports fair and equal access to employment and business opportunities within FortisBC companies for Indigenous Peoples.
- FortisBC will develop fair, accessible employment practices and plans that ensure Indigenous Peoples are considered fairly for employment opportunities within FortisBC.
- FortisBC will strive to attract Indigenous employees, consultants and contractors and business partnerships.
- FortisBC is committed to dialogue through clear and open communication with Indigenous communities on an ongoing and timely basis for the mutual interest and benefit of both parties.
- FortisBC encourages awareness and understanding of Indigenous issues within its work force, industry and communities where it operates.
- To achieve better understanding and appreciation of Indigenous culture, values and beliefs, FortisBC is committed to educating its employees regarding Indigenous issues, interests and goals.
- FortisBC will ensure that when interacting with Indigenous Peoples, its employees, consultants and contractors demonstrate respect, and understanding of Indigenous Peoples' culture, values and beliefs.
- To give effect to these principles, each of FortisBC's business units will develop, in dialogue with Indigenous communities, plans specific to their circumstances.

Appendix I-4
WTS SOE REPORT

SOE Report

Report Name: Report

Report Date: Tue Oct 11 14:24:23 PDT 2022

Shape Name: unnamed

Adjacency Buffer: This feature was not buffered.

Contacts for First Nation Consultation Areas contact information for the area that was queried is displayed below. Note that a single First Nation consultation area may have multiple contacts. As a result it is possible for a contact to show up in the list more than once.

Conflicting Features:

Contact Name	Okanagan Nation Alliance
Contact Title	Tribal Council
Contact Organization	Okanagan Nation Alliance (ONA)
Contact Address	#101, 3535 Old Okanagan Hwy
Contact City	Westbank
Contact Province	BC
Contact Postal Code	V4T 3L7
Contact Phone	2507070095
Contact Fax	2507070166
Contact Email	onareception@syilx.org
Public Contact Comment	

Contact Name	Penticton Indian Band
Contact Title	Referrals Coordinator
Contact Organization	Penticton Indian Band
Contact Address	RR 2 Site 80 Comp 19
Contact City	Penticton
Contact Province	BC
Contact Postal Code	V2A 6J7
Contact Phone	2504930048
Contact Fax	2504932882
Contact Email	referrals@pib.ca
Public Contact Comment	

Contact Name	Lower Similkameen Indian Band
Contact Title	Chief and Council
Contact Organization	Lower Similkameen Indian Band
Contact Address	1420 Hwy 3
Contact City	Cawston
Contact Province	BC
Contact Postal Code	V0X 1C3
Contact Phone	2504995528
Contact Fax	2504995538
Contact Email	referrals@lsib.net

Public Contact Comment	

Contact Name	Upper Nicola Band
Contact Title	Chief and Council
Contact Organization	Upper Nicola Band (UNB)
Contact Address	P.O. Box 3700
Contact City	MERRITT
Contact Province	BC
Contact Postal Code	V1K 1B8
Contact Phone	2503503342
Contact Fax	2503503311
Contact Email	https://nationsconnect.ca/
Public Contact Comment	

Contact Name	Okanagan Indian Band
Contact Title	Chief and Council
Contact Organization	Okanagan Indian Band
Contact Address	12420 Westside Road
Contact City	Vernon
Contact Province	BC
Contact Postal Code	V1H 2A4
Contact Phone	2505424328
Contact Fax	2505424990
Contact Email	okibreferrals@okanagan.org
Public Contact Comment	

Contact Name	Osoyoos Indian Band
Contact Title	OIB Referrals
Contact Organization	Osoyoos Indian Band
Contact Address	1155 Sen Pok Chin Blvd
Contact City	Oliver
Contact Province	BC
Contact Postal Code	V0H 1T8
Contact Phone	2504983444
Contact Fax	2504986577
Contact Email	lands@oib.ca
Public Contact Comment	

Contact Name	x
Contact Title	x
Contact Organization	x
Contact Address	x
Contact City	x
Contact Province	x
Contact Postal Code	V0G 2J0
Contact Phone	
Contact Fax	

Contact Email	test
Public Contact Comment	

Contact Name	Splats'in First Nation
Contact Title	Chief and Council
Contact Organization	Splatsin First Nation
Contact Address	PO Box 460, 5775 Old Vernon Road
Contact City	Enderby
Contact Province	BC
Contact Postal Code	V0E 1V0
Contact Phone	2508386496
Contact Fax	2508382131
Contact Email	referrals@splatsin.ca
Public Contact Comment	

Contact Name	Shuswap Band
Contact Title	Referrals
Contact Organization	Shuswap Band
Contact Address	RR#2 3A - 492 Arrow Rd
Contact City	Invermere
Contact Province	BC
Contact Postal Code	V0A 1K2
Contact Phone	
Contact Fax	
Contact Email	https://nationsconnect.ca
Public Contact Comment	

Contact Name	Dwayne Spence
Contact Title	Referrals Coordinator
Contact Organization	Shuswap Band
Contact Address	RR2 3A-492 Arrow Road
Contact City	Invermere
Contact Province	BC
Contact Postal Code	V0A 1K2
Contact Phone	2503413678
Contact Fax	5879999500
Contact Email	dspence@shuswapband.ca
Public Contact Comment	

Contact Name	Ktunaxa Nation Council
Contact Title	Ktunaxa Nation Lands & Resources
Contact Organization	Ktunaxa Nation Council
Contact Address	7468 Mission Rd
Contact City	Cranbrook
Contact Province	BC
Contact Postal Code	V1C 7E5

Contact Phone	2504892464
Contact Fax	2504895760
Contact Email	referrals@ktunaxa.org
Public Contact Comment	Contact information for Ktunaxa Nation Council at the main office in Cranbrook, BC. The office is located at 220 Cranbrook Street North (2nd Street North).

Layers Queried Successfully:

Contacts for First Nation Consultation Areas contact information for the area that was queried is displayed below. Note that a single First Nation consultation area may have multiple contacts. As a result it is possible for a contact to show up in the list more than once.

Disclaimer:

The Contacts for First Nation Consultation Areas Public Map Service Report provides preliminary contact information for First Nations who may have with aboriginal interests identified within the area queried.

These contacts are based on knowledge currently available to the Province. Those choosing to provide information and involve First Nations early in a proposed project have the opportunity to develop mutual understanding of the interests around the project. This can be important to successful business planning and project development. The Contacts for First Nation Consultation Area Public Map Service users are encouraged to explore making this contact prior to submitting an application for government authorization. This approach gives support to the Provincial consultation process and the goals of the New Relationship.

The information provided is not intended to create, recognize, limit or deny any aboriginal or treaty rights, including aboriginal title, that First Nations may have, or impose any obligations on the Province or alter the legal status of resources within the Province or the existing legal authority of British Columbia. The Province makes no warranties or representations regarding the accuracy, timeliness, completeness or fitness for use of any or all data provided in the reports.

Appendix I-5
PROJECT NOTIFICATION LETTER TO INDIGENOUS GROUPS

Blair Weston
Community and Indigenous
Relations Manager
FortisBC

FortisBC Inc.
5643 Taghum Frontage Road,
Taghum BC, V0G 6Y2
250-231-0176
blair.weston@fortisbc.com
www.fortisbc.com

November 2, 2022

XXX
XXX
XXX
XXX

RE: FortisBC planned CPCN substation upgrade project AS Mawdsley Trail, BC

FortisBC is in the planning stages of filing a Certificate of Public Convenience and Necessity (CPCN) with the British Columbia Utilities Commission (BCUC) to increase system reliability and meet area load growth. This project will replace aging infrastructure and equipment near end-of-life to improve FortisBC's system reliability. In addition, it will increase Boundary and Similkameen area capacity supporting the region's growth and development.

FBC has completed a preliminary Archeological Overview Assessment and is in the process of completing its environmental assessment. A copy of both reports will be available by mid-December. If you would like a copy I will send it upon request.

FortisBC will submit an application in early 2023. If approved construction is expected to take place in the spring of 2024 with the new transformers expected to be in service by the end of 2026.

If you have any questions regarding this project, please contact Blair at 1-250-231-0176. If you would like to contact the BCUC directly they can be reached at https://www.bcuc.com.

Respectfully;

Blair Weston
Community and Indigenous Relations Manager
FortisBC

Appendix J

DRAFT ORDERS AND CONFIDENTIALITY DECLARATION AND UNDERTAKING FORM

Appendix J-1
DRAFT PROCEDURAL ORDER

bcuc
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

ORDER NUMBER
G-xx-23

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

and

FortisBC Inc.
Application for a Certificate of Public Convenience and Necessity for the A.S. Mawdsley Terminal Station Project

BEFORE:
[Panel Chair]
Commissioner
Commissioner

on Date

ORDER

WHEREAS:

A. On February 24, 2023, FortisBC Inc. (FBC) filed an application (Application) with the British Columbia Utilities Commission (BCUC) for a Certificate of Public Convenience and Necessity (CPCN), pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA), for the A.S. Mawdsley (ASM) Terminal Station project (Project);

B. The Project consists of the following:

    1. Required alterations at the Warfield Terminal Station (WTS), including the installation of two new 63/161 kV transformers, reconfiguration of the 63 kV ring bus, installation of a new 161 kV radial bus, and extension of 11E Line from the ASM Terminal Station to WTS by converting 34 Line to 161 kV; and

    2. Demolition of the ASM Terminal Station.

C. FBC estimates capital costs for the Project in as-spent dollars to be $35.179 million, which includes Allowance for Funds Used During Construction and the cost of equipment removal;

D. The Project's expected in-service date is by the end of 2026;

E. FBC requests that certain appendices to the Application that contain detailed information relating to Project engineering and cost estimates be treated as confidential due to their commercially sensitive nature, to maintain the safety of FBC's workers and the public, and to maintain the safety and security of FBC assets; and

F. The BCUC has commenced review of the Application and considers that the establishment of a written public hearing process is warranted.

NOW THEREFORE the BCUC orders as follows:

1. A written hearing process is established for the review of the Application in accordance with the regulatory timetable as set out in Appendix A to this order.

2. Pursuant to sections 19 and 20 of the BCUC's Rules of Practice and Procedure, established by Order G-178-22, Appendices A, F, G-1, G-2, and H attached to the Application will be held confidential, due to their commercially sensitive nature, to maintain the safety of FBC's workers and the public, and to maintain the safety and security of FBC's assets. Interveners may obtain access to this information by executing standard form undertakings of confidentiality.

3. FBC must publish the Public Notice, attached as Appendix B to this order, in print/display-ad format in appropriate news publications, such as but not limited to, local and community newspapers to provide adequate notice to those parties who may have an interest in or be affected by the Application, as soon as reasonably possible, but no later than [Day/DATE].

4. As soon as practicable, FBC must publish notice of this Application on its website and social media platforms, but not later than Day/DATE. FBC must also publish weekly reminder notices on each platform until the conclusion of the intervener registration period on [Day/DATE].

5. FBC must provide an electronic copy of the Application and this order to all affected and potentially affected parties by no later than Day/DATE. The affected and potentially affected parties include the following:

    a. All interveners registered in the FBC Annual Review for 2023 Rates proceeding;

    b. All municipalities and regional districts identified in Appendix I of the Application; and

    c. All Indigenous groups identified in Appendix I of the Application.

6. FBC must provide confirmation to the BCUC when the Public Notice has been published or posted, including a list of the relevant publications (paper and digital), by Day/DATE.

7. FBC must submit to the BCUC a list of all affected and potentially affected parties to whom FBC has provided a copy of the Application and this order, including the method and date of notification, by Day/DATE.

8. Parties who wish to actively participate in the proceeding must complete a Request to Intervene Form, available on the BCUC's website at https://www.bcuc.com/get-involved/get-involved-proceeding.html, by Day/DATE as established in the regulatory timetable, and in accordance with the BCUC's Rules of Practice and Procedure attached to Order G-178-22. Parties who wish to stay informed about the proceeding may register as an interested party by completing an Interested Party Form, available on the BCUC's website under Get Involved. Parties may also submit letters of comment by completing a Letter of Comment Form, available on the BCUC's website.

DATED at the City of Vancouver, in the Province of British Columbia, this (XX) day of (Month Year).

BY ORDER

(X. X. last name)
Commissioner

Attachment

FortisBC Inc.
Application for a Certificate of Public Convenience and Necessity for the A.S. Mawdsley Terminal Station Project

REGULATORY TIMETABLE

Action	Date (2023)
FBC publishes Notice of Application on its social media platforms and in print/display ad format by	Friday, April 14
FBC provides list of published notices and notified parties	Tuesday, April 18
Intervener registration deadline	Friday, April 28
BCUC Information Request (IR) No. 1 to FBC	Thursday, May 4
Intervener IR No. 1 to FBC	Thursday, May 11
FBC Response to IR No. 1	Friday, June 2
BCUC and Intervener IR No. 2	Thursday, June 22
FBC Response to IR No. 2	Monday, July 17
FBC Final Argument	Tuesday, August 8
Intervener Final Arguments	Tuesday, August 22
FBC Reply Argument	Thursday, September 7

bcuc
British Columbia Utilities Commission

We want to hear from you

FBC APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE A.S. MAWDSLEY TERMINAL STATION PROJECT

On February 24, 2023, FortisBC Inc. (FBC) filed an application (Application) for a Certificate of Public Convenience and Necessity for the A.S. Mawdsley (ASM) Terminal Station Project with the British Columbia Utilities Commission (BCUC). The purpose of the project is to replace the ASM Terminal Station by expanding the Warfield Terminal Station in order to meet load growth in the Boundary and Similkameen areas, mitigate potential reliability issues, and address the deteriorating condition of the ASM Terminal Station power transformers. The estimated total cost of the project is $35.179 million.

HOW TO PARTICIPATE

- **Submit a letter of comment**
- **Register as an interested party**
- **Request intervener status**

IMPORTANT DATES

1. **[Day/DATE** – Deadline to register as an intervener with the BCUC

For more information about the Application, please visit the Proceeding Webpage on bcuc.com under "Our Work – Proceedings." To learn more about getting involved, please visit our website (www.bcuc.com/get-involved) or contact us at the information below.

GET MORE INFORMATION

FortisBC Energy Inc. Regulatory Affairs

16705 Fraser Highway
Surrey, BC Canada V4N 0E8

E: gas.regulatory.affairs@fortisbc.com

P: 604.592.7664

British Columbia Utilities Commission

Suite 410, 900 Howe Street
Vancouver, BC Canada V6Z 2N3

E: Commission.Secretary@bcuc.com

P: 604.660.4700

Appendix J-2
DRAFT FINAL ORDER

bcuc
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

ORDER NUMBER
C-xx-23

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

and

FortisBC Inc.
Application for a Certificate of Public Convenience and Necessity for the A.S. Mawdsley Terminal Station Project

BEFORE:
[Panel Chair]
Commissioner
Commissioner

on Date

ORDER

WHEREAS:

A. On February 24, 2023, FortisBC Inc. (FBC) filed an application (Application) with the British Columbia Utilities Commission (BCUC) for a Certificate of Public Convenience and Necessity (CPCN), pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA), for the A.S. Mawdsley (ASM) Terminal Station project (the Project);

B. The Project includes the following:

    1. Required alterations at the Warfield Terminal Station (WTS), including the installation of two new 63/161 kV transformers, reconfiguration of the 63 kV ring bus, installation of a new 161 kV radial bus, and extension of 11E Line from the ASM Terminal Station to WTS by converting 34 Line to 161 kV; and

    2. Demolition of the ASM Terminal Station;

C. By Order G-##-23 dated [Date], the BCUC established a regulatory timetable for the review of the Application; and

D. The BCUC has reviewed the Application, the evidence and submissions in this proceeding and determines that the requested approvals are warranted.

NOW THEREFORE the BCUC orders as follows:

1. Pursuant to sections 45 and 46 of the *Utilities Commission Act*, FBC is granted a CPCN to construct and operate the Project.

2. FBC is directed to file with the BCUC the following reports:

    - Quarterly Progress Reports, within 30 days of the end of each quarterly reporting period, and ending upon the filing of the Final Report; and

    - A Final Report, within six months of substantial completion or the in-service date of the Project, whichever is earlier.

3. The BCUC will continue to hold confidential Appendices A, F, G-1, G-2, and H and associated materials filed in this proceeding.

DATED at the City of Vancouver, in the Province of British Columbia, this (XX) day of (Month Year).

BY ORDER

(X. X. last name)
Commissioner

Attachment

Appendix J-3

CONFIDENTIALITY DECLARATION AND UNDERTAKING FORM

Confidentiality Declaration and Undertaking Form

In accordance with the Commission's Rules of Practice and Procedure, please provide a completed form to the party who filed the confidential document and copy Commission Secretary at commission.secretary@bcuc.com. If email is unavailable, please mail the form to the address above.

Undertaking

I, _____, am representing the party _____ in the matter of

_____FBC A.S. Mawdsley Terminal Station Project CPCN Application_____

In this capacity, I request access to the confidential information in the record of this proceeding. I understand that the execution of this undertaking is a condition of an Order of the Commission, and the Commission may enforce this Undertaking pursuant to the provisions of the *Administrative Tribunal Act*.

Description of document:	

I hereby undertake:

(a) to use the information disclosed under the conditions of the Undertaking exclusively for duties performed in respect of this proceeding;

(b) not to divulge information disclosed under the conditions of this Undertaking except to a person granted access to such information or to staff of the Commission;

(c) not to reproduce, in any manner, information disclosed under the conditions of this Undertaking except for purposes of the proceeding;

(d) to keep confidential and to protect the information disclosed under the conditions of this Undertaking;

(e) to return to the applicant, _____,all documents and materials containing information disclosed under the conditions of this Undertaking, including notes and memoranda based on such information, or to destroy such documents and materials within fourteen (14) days of the Commission's final decision in the proceeding; and

(f) to report promptly to the Commission any violation of this Undertaking.

Signed at _____ this _____.

Signature: _____

Name (please print): _____

Email address: _____

Representing (if applicable): _____

Appendix K
LIST OF ACRONYMS

Acronym	Definition
AFUDC	Allowance for Funds Used During Construction
AIA	Archaeological Impact Assessment
AOA	Archaeological Overview Assessment
APEC	Areas of Potential Environmental Concern
ASL	Average Service Life
ASM	A.S. Mawdsley Terminal Station
BCUC	British Columbia Utilities Commission
BEN	Bentley Terminal Station
CAD	Consultative Areas Database
CB	Circuit Breaker
CEA	*Clean Energy Act*
CGE	Canadian General Electric
CPCN	Certificate of Public Convenience and Necessity
CSC	Cascade Substation
CST	Circuit Switcher
EMP	Environmental Management Plan
FBC	FortisBC Inc.
GFT	Grand Forks Terminal Station
GHG	Greenhouse Gas
HCA	*Heritage Conservation Act*

Acronym	Definition
KBTA	Kelowna Bulk Transformer Addition Project CPCN
KET	Kettle Valley Terminal Station
kV	Kilovolt
LTC	Load Tap Changer
LTERP	Long Term Electric Resource Plan
MCOV	Maximum Continuous Operating Voltage
MOTI	Ministry of Transportation and Infrastructure
MRP	FBC's Multi-Year Rate Plan for 2020 to 2024
MVA	Megavolt Amperes
N-0	Normal Operation
N-1	Single Contingency Operation
Nupqu	Nupqu Resource Limited Partnership
O&M	Operations and Maintenance
OATT	Open Access Transmission Tariff
OLTC	On-load Tap Changer
PFR	Preliminary Field Reconnaissance
PRI	Princeton Terminal Station
PV	Present Value
SCADA	Supervisory Control and Data Acquisition
SCC	Secondary Control Centre
SOE Reports	Spatial Overview Engine Reports

Acronym	Definition
SRW	Statutory Rights-of-Way
STC1	Stoney Creek Feeder 1
UBO	Upper Bonnington Old Units Refurbishment Project
UCA	*Utilities Commission Act*
WECC	Western Electricity Coordinating Council
WTS	Warfield Terminal Station