



Feasibility Study For XXXX

Bridge River 2 Unit 5/6 Rehabilitation Project

Report No: SPPA2008-96

February 2009

System Planning & Performance Assessment, BCTC

© British Columbia Transmission Corporation, 2008. All rights reserved.

DISCLAIMER

This report was prepared by the British Columbia Transmission Corporation (“**BCTC**”) or, as the case may be, on behalf of BCTC by persons or entities including, without limitation, persons or entities who are or were employees, agents, consultants, contractors, subcontractors, professional advisers or representatives of, or to, BCTC (individually and collectively, “**BCTC Personnel**”).

This report is to be read in the context of the methodology, procedures and techniques used, BCTC’s or BCTC’s Personnel’s assumptions, and the circumstances and constraints under which BCTC’s mandate to prepare this report was performed. This report is written solely for the purpose expressly stated in this report, and for the sole and exclusive benefit of the person or entity who directly engaged BCTC to prepare this report. Accordingly, this report is suitable only for such purpose, and is subject to any changes arising after the date of this report. This report is meant to be read as a whole, and accordingly no section or part of it should be read or relied upon out of context.

Unless otherwise expressly agreed by BCTC:

1. any assumption, data or information (whether embodied in tangible or electronic form) supplied by, or gathered from, any source (including, without limitation, any consultant, contractor or subcontractor, testing laboratory and equipment suppliers, etc.) upon which BCTC’s opinion or conclusion as set out in this report is based (individually and collectively, “**Information**”) has not been verified by BCTC or BCTC’s Personnel; BCTC makes no representation as to its accuracy or completeness and disclaims all liability with respect to the Information;
2. except as expressly set out in this report, all terms, conditions, warranties, representations and statements (whether express, implied, written, oral, collateral, statutory or otherwise) are excluded to the maximum extent permitted by law and, to the extent they cannot be excluded, BCTC disclaims all liability in relation to them to the maximum extent permitted by law;
3. BCTC does not represent or warrant the accuracy, completeness, merchantability, fitness for purpose or usefulness of this report, or any information contained in this report, for use or consideration by any person or entity. In addition BCTC does not accept any liability arising out of reliance by a person or entity on this report, or any information contained in this report, or for any errors or omissions in this report. Any use, reliance or publication by any person or entity of this report or any part of it is at their own risk; and
4. in no event will BCTC or BCTC’s Personnel be liable to any recipient of this report for any damage, loss, cost, expense, injury or other liability that arises out of or in connection with this report including, without limitation, any indirect, special, incidental, punitive or consequential loss, liability or damage of any kind.

COPYRIGHT NOTICE

Copyright and all other intellectual property rights in, and to, this report are the property of, and are expressly reserved to, BCTC. Without the prior written approval of BCTC, no part of this report may be reproduced, used or distributed in any manner or form whatsoever.

Revision Table

Revision Number	Date of Revision	Revised By

Table of Contents

DISCLAIMER.....	i
COPYRIGHT NOTICE.....	ii
Revision Table.....	iii
1.0 General.....	1
2.0 Study Purpose and Scope.....	1
3.0 Study Assumptions	2
4.0 Study Results and Required Upgrades.....	2
5.0 Cost Estimate and Project Schedule	3
6.0 Appendix A – Project Single Line Diagram and Locational Map.....	4
7.0 Appendix B – Other Study Assumptions.....	6

1.0 General

The project reviewed in this feasibility study report is as described in Table 1 below.

Table 1: Summary Project Information

Project Name	Bridge River 2 Unit 5/6 Rehabilitation	
Applicant Name	XXXX	
Point of Interconnection	BR2 360kV	
Applicant Proposed COD	June 1 st 2010	
Type of Interconnection Service	NRIS <input checked="" type="checkbox"/>	ERIS <input type="checkbox"/>
Maximum Power Injection (MW)	268 (Summer)	268 (Winter)
Number of Generator Units	4	
Plant Fuel	Hydro	

The current generating capacity of the Bridge River No.2 Generating Station (BR2) is 261 MVA or 248 MW at 0.95 leading/lagging power factor, provided by 4 identical units. BR2 is connected to the integrated system via transmission lines 3L13 and 3L14.

XXXX plans to upgrade the generating units 5 and 6 at BR2 by retrofitting with new stators. After the upgrade, each unit will be rated at 80 MVA, which is capable of delivering 72 MW real power at the required power factor of 0.90 lagging\0.95 leading. The maximum MW output from the 4 units will be 268 MW, i.e. a 20 MW increase from the current of 248 MW. The Point of Interconnection (POI) is at BR2 360kV and the planned commercial operation date is June 1st 2010.

The project interconnection single-line diagram and the project location map can be found in Appendix A.

2.0 Study Purpose and Scope

This feasibility study is a preliminary evaluation of the system impact and cost of interconnecting the subject project to the British Columbia Transmission Corporation (BCTC) controlled transmission system based on power flow and short circuit analyses only and investigates potential system constraints associated with the interconnection of the project. This study is intended solely to assess the feasibility of integrating the generating unit or units of the interconnection customer, IC (or IPP), into the BCTC transmission system. It is also meant to provide the applicant with a non-binding good faith cost and schedule estimate to construct the interconnection facilities.

This is a “**limited scope**” study which is restricted to only power flow and short circuit analysis in accordance with the BCTC Open Access Transmission Tariff (OATT). This study does not include stability analysis, harmonic mitigation, electro-magnetic transient analysis, and other analytical studies or calculations which normally form part of a comprehensive system study. This study also does not include a consideration of First Nations or property acquisition issues,

nor the potential for such issues to affect the cost and scheduling estimates for the interconnection facilities in this report.

3.0 Study Assumptions

A number of assumptions have been made for purposes of conducting this feasibility study. First, BCTC relied upon the information provided by the project applicant in its Interconnection Request. Additional study assumptions are provided in Appendix B.

4.0 Study Results and Required Upgrades

The Project Single Line and the Project Location Map showing the subject project within the BCTC transmission system are included in Appendix A for reference purposes.

The power flow analysis indicates that the proposed generation upgrade in the subject project would cause the equipment or lines identified below to exceed design ratings.

The results of the Power Flow Analysis are summarized below:

Table 2: Equipment Requiring Upgrade

Elements Overloaded	Comments on Conditions
2L1 (BRT – FCN) 2L5 (FCN – CKY) 2L90 (BRT – KLY)	The circuits will be overloaded under a single contingency with the proposed power injection.

To address the identified system constraints listed above, 2L1 and 2L5 need to be upgraded to a 995 Ampere summer rating by increasing conductor operating temperature. 2L90 needs to be upgraded to an 850 Ampere summer rating by using the same measure.

The short circuit assessment indicates that the proposed generation upgrade in the subject project results in short circuit currents that do not generally exceed the interrupting capabilities of BCTC equipment.

Table 3 indicates the short circuit current at the POI.

Table 3: Short Circuit Fault Levels

Present Short Circuit Current without BR2 Unit 5/6 upgrade		
Three Phase Fault	3921	MVA
Single Line to Ground	7.36	kA RMS symmetrical
Ultimate Fault Level^[1]		
Three Phase Fault	15000	MVA
Single Line to Ground	28.16	kA RMS symmetrical

¹ No plans exist for increasing this ultimate fault level unless specified

5.0 Cost Estimate and Project Schedule

Table 4 lists the facilities required for system upgrades required for Bridge River 2 Unit 5&6 rehabilitation. It also provides a non-binding good faith cost estimate for these upgrades that would be the responsibility of the project applicant.

Table 4: Cost Estimate for the Required System Upgrades

Work Definition	Facilities	Estimated Cost
Station	Operation Update	
Transmission	2L1, 2L5 and 2L90 upgrades	
Estimated Interconnection Cost:		\$4.84m

The estimated time to implement the system upgrades required to interconnect the project to the BCTC transmission system is indicated by the check mark in Table 5 below.

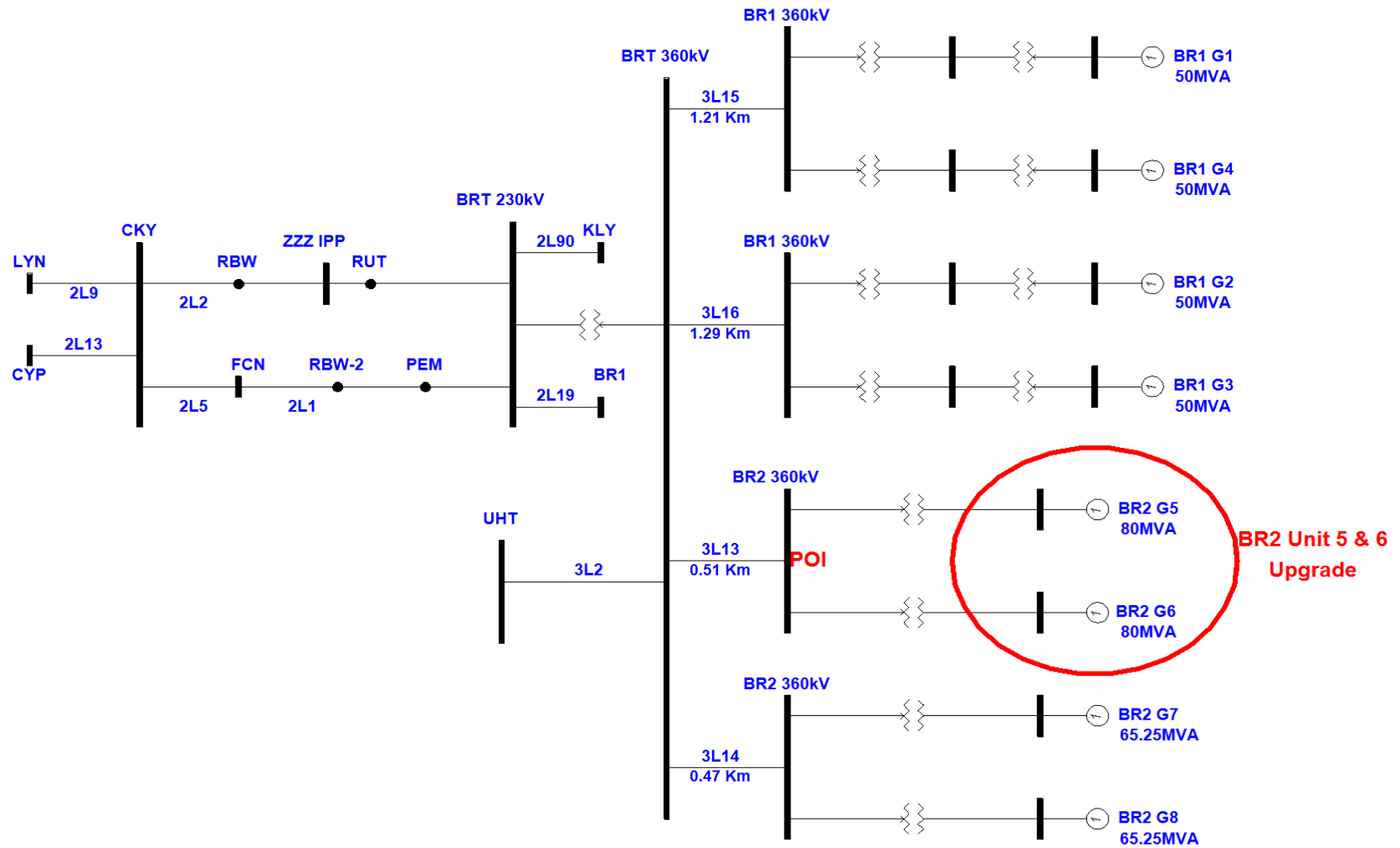
Table 5: Estimated Project Schedule

0 - 6 months	<input type="checkbox"/>	36 - 42 months	<input type="checkbox"/>
6 -12 months	<input type="checkbox"/>	42 -48 months	<input type="checkbox"/>
12- 18 months	<input type="checkbox"/>	48- 54 months	<input type="checkbox"/>
18 - 24 months	<input type="checkbox"/>	54 - 60 months	<input type="checkbox"/>
24 – 30 months	<input checked="" type="checkbox"/>	60 – 66 months	<input type="checkbox"/>
30 - 36 months	<input type="checkbox"/>	66 - 72months	<input type="checkbox"/>

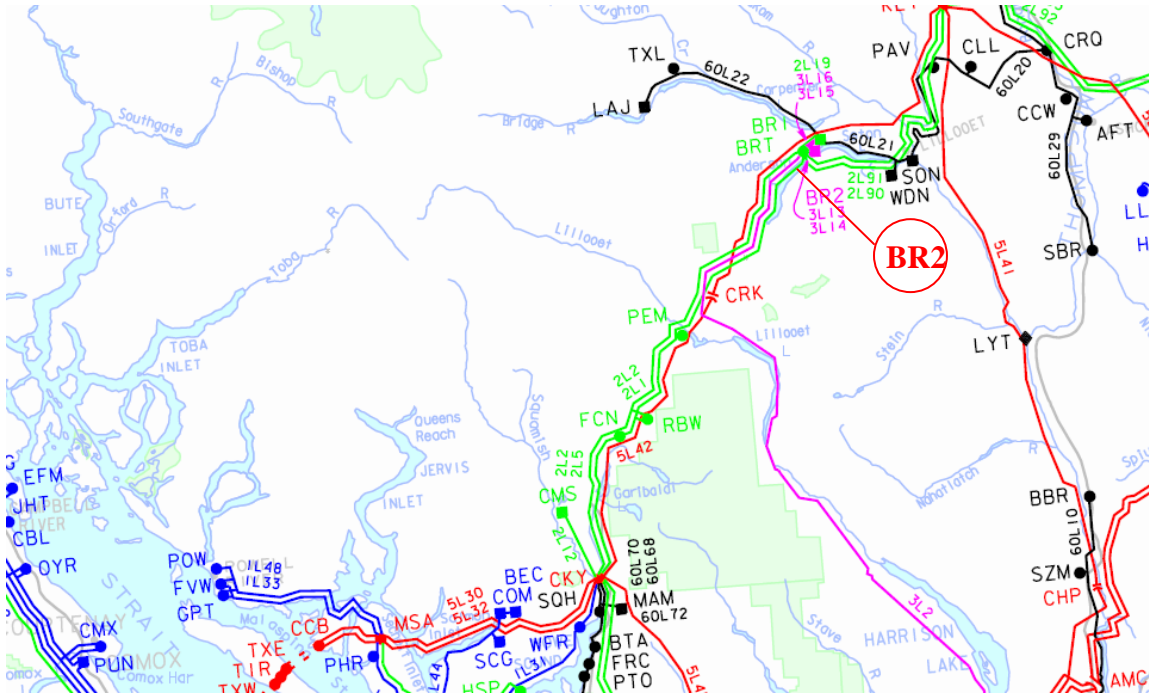
This study does not include stability analysis, harmonic mitigation, electro-magnetic transient analysis, and other analytical studies or calculations which normally form part of a comprehensive system study. Equipment that may be determined during more comprehensive studies is not included in the cost estimate or considered in the estimated schedule provided herein.

6.0 Appendix A

Bridge River 2 Unit 5/6 Rehabilitation Project Single Line Diagram



Project Location Map



7.0 Appendix B – Other Study Assumptions

Assumptions related to the BCTC transmission system:

Power Flow

Power flow is based upon the base case that includes generation, transmission facilities, and load forecast representing the queue position of the project applicable to the study of this project. Applicable seasonal conditions and the appropriate number of study years for the study horizon have also been incorporated.

Short Circuit

Short circuit study is based upon the base case data that includes generation, transmission facilities, and load forecast representing the queue position of the project applicable to the study of this project. Applicable seasonal conditions and the appropriate number of study years for the study horizon have also been incorporated.

Financial and Estimating Assumptions

Cost estimates are based on an order of magnitude assumption and are non-binding and provided in good faith. The cost estimate included in this report does not and cannot account for a variety of issues not under the control of BCTC including, but not limited to:

- The impact of additional equipment required as the result of more detailed comprehensive studies;
- Actual equipment specified during engineering design;
- Fluctuations in costs over time;
- First Nation considerations;
- Property-related costs and issues;
- Any Certificate of Public Convenience and Necessity (CPCN) required from the British Columbia Utilities Commission (BCUC);
- Physical space constraints in network facilities.