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January 9, 2018

Mr. Patrick Wruck  
Commission Secretary and Manager  
Regulatory Support  
British Columbia Utilities Commission  
Suite 410, 900 Howe Street  
Vancouver, BC V6Z 2N3

Dear Mr. Wruck:

**RE: Project No. 1598933  
British Columbia Utilities Commission (BCUC or Commission)  
British Columbia Hydro and Power Authority (BC Hydro)  
Waneta 2017 Transaction**

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BC Hydro writes in response to the Commission's January 4, 2018 letter (Exhibit A-8) regarding, in part, BC Hydro's December 14, 2017 submissions in which we filed in confidence with the Commission (i) working Excel models (**spreadsheets**) of the financial and rate impact analyses relied on by BC Hydro in entering into the Waneta 2017 Transaction; and (ii) "overview" documents that explain how the spreadsheets work. Also on December 14, 2017, BC Hydro filed on the public record of this proceeding the cover letter to the confidential filing (Exhibit B-1-2). The purpose of the public filing of the cover letter was to ensure that participants in this proceeding, who unlike the Commission staff do not have access to the confidential filing, would have an opportunity to enquire into it and perhaps pursue access to it in accordance with the usual confidentiality processes. Except for one intervener, discussed below, no such person has made any enquiries or submissions regarding BC Hydro's December 14 confidential filing.

**Overview Documents**

The overview documents were created for the benefit of any new user of the spreadsheets, because the spreadsheets are working models developed by and used exclusively by the BC Hydro business team investigating the transaction. Because the spreadsheets are not self-explanatory and because they were not built for the purpose of review by those who are not already intimately familiar with the transaction, the overview documents were developed to inform any third-party review. In BC Hydro's view, they are at best of little to no value to a person who isn't reviewing the spreadsheets; at worst, they might be confusing and possibly misleading. Nevertheless,

BC Hydro has reviewed the overview documents again, in light of Exhibit A-8, and concludes that it is unlikely that any commercially sensitive, third-party or other confidential information that is in the spreadsheets can be inferred from "Attachment 1 – Overview of Waneta Valuation Model". Accordingly BC Hydro files this overview document, unredacted, on the public record under cover of this letter.

However, BC Hydro is not able to publicly file an unredacted copy of "Attachment 2 – Overview of Waneta Rate Impact Model". Page 5 of the document shows the amortization periods of Waneta asset classes, by asset type, that BC Hydro has assumed for the purpose of its rate impact analysis. These assumed amortization periods are commercially sensitive vis-à-vis Teck, because they inform the allocation of capital costs between Teck and BC Hydro. Revealing BC Hydro's current assumptions on these amortization periods will undermine BC Hydro's negotiating position with Teck when it comes time to discuss the specific allocations. All else being equal this will result in higher allocations to BC Hydro and higher rates to BC Hydro's ratepayers. Accordingly, the amortization period table has been redacted from the public version of "Attachment 2 – Overview of Waneta Rate Impact Model", also filed under cover of this letter.

## **Spreadsheets**

BC Hydro maintains its claim of confidentiality over the spreadsheets filed with the Commission on December 14, 2017, for the reasons provided, and subject to the following.

In regard to section 18.01(b) of the Rules of Practice and Procedure, BC Hydro submits that spreadsheets with confidential information cannot be redacted in a way that provides a reasonable basis to believe that confidential information will stay confidential. That's because of the inherent nature of a spreadsheet, which links input assumptions with functions and calculations between cells, and thereby allows confidential input assumptions to be calculated through a process of "reverse-engineering". Eliminating all possibility of such reverse-engineering results in either a non-working spreadsheet, or one that is so opaque that it cannot have any value.

BC Hydro has now had an opportunity to review intervenor information requests filed late last week. A number of intervenors have asked for further information regarding the redactions to the publicly-filed Waneta 2017 Business Case. (None of the intervenors have made the same submission regarding BC Hydro's confidentiality claims that FortisBC first made in its December 7, 2017 submission (Exhibit C1-2) and which FortisBC seems intent on pursuing). To address these information requests, we will be creating a document that provides a more fulsome explanation of each redaction from the Waneta 2017 Business Case and propose to undertake the same exercise with regard to the spreadsheets filed on December 14, 2017. Because of the time-consuming nature of those exercises, we do not expect them to be ready for filing prior to the date we file our responses to information request No. 1, currently scheduled for

January 26, 2018. With the possible exception of FortisBC, this commitment would seem to satisfy all interveners.

### **Usual Confidentiality Processes**

BC Hydro refers above to the “usual confidentiality processes” employed in Commission proceedings, and elaborates on them here, in the context of FortisBC’s submission regarding BC Hydro’s confidentiality claims, and a request it has had from one intervener to have access to the confidential information pursuant to the Commission’s Confidentiality Declaration and Undertaking Form.

The Rules of Practice and Procedure refer to parties “requesting” confidential treatment of documents and information, and to the fact that parties making such requests bear the onus of demonstrating why information should be kept in confidence. We submit that we satisfied those obligations in our filing of the Application, and the later filing on December 14, 2017, in the context within which the Commission normally and regularly deals with such requests. That is, it is very common for parties in Commission proceedings to offer generalized explanations of the need for confidential treatment, and for the Commission and interveners to either accept such requests or to seek access through use of the Commission’s Confidentiality Declaration and Undertaking Form. Conversely, it is not at all consistent with Commission practice for parties to provide a redaction-by-redaction explanation of its confidentiality requests as we have now committed to doing in regard to the Waneta 2017 Business Case and the spreadsheets as described above. Such a process would in most cases be unnecessarily burdensome and serve only to make Commission proceedings less efficient and more expensive for all parties.

From this perspective there was nothing extraordinary about either BC Hydro’s Application or the December 14, 2017 submission; only FortisBC’s December 7, 2017 response was extraordinary in light of FortisBC’s commercial, competitive interest in the transaction, its own usual generalized confidentiality claims, and its blanket challenge to BC Hydro’s confidentiality claims.<sup>1</sup>

As noted, only one participant in this proceeding has requested access to the confidential materials filed on December 14, 2017. That same party has also requested access to the confidential information filed with the Application. That participant is the Commercial Energy Consumers Association of BC (**CEC**). David Craig and Chris Weafer, representative and counsel to the CEC, submitted executed Confidentiality

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<sup>1</sup> Regarding the generalized manner in which FortisBC usually justifies confidential treatment, see for example FortisBC 2012 – 2013 Revenue Requirements and Review of 2012 Integrated System Plan Application ~ Project No. 3698620, Exhibit B-1, and FortisBC Application for Approval of the Residual Capacity Agreement Electric Tariff Supplement No. 10 and Rate Schedule 111 ~ Project No.3698792, Exhibit B-1, among others.

Declaration and Undertaking Forms on January 2 and January 5, 2018 respectively (Exhibits C4-2 and C4-4). With respect to those requests:

- On January 8, 2018 BC Hydro delivered hard-copies of the non-electronic confidential information to each of Mr. Craig and Mr. Weafer;
- Mr. Craig and Mr. Weafer have agreed to additional undertakings that will address the issues associated with electronic confidential information (i.e. the spreadsheets), as follows:
  - ▶ receive the spreadsheets on a labelled, password-protected memory stick;
  - ▶ disconnect from the internet the PC (including other types of computer) while the memory stick is attached to the PC;
  - ▶ disable any automatic back-up function on the PC while the memory stick is attached to the PC;
  - ▶ no copies of the spreadsheets saved to the PC, or other device, except the labelled password-protected memory stick; and
  - ▶ return of the memory stick to BC Hydro upon conclusion of the proceeding.

The foregoing describes the usual confidentiality process, modified only to address specific concerns with electronic information. It is quick, reasonably secure, and procedurally fair. It readily allows for additional undertakings to deal with unique issues such as, in this case, electronic confidential information. Importantly, it allows an intervener to access the confidential information before making a case for its public disclosure (unlike the approach employed by FortisBC over a month ago, questioning the entirety of BC Hydro's confidentiality claim at the outset).

BC Hydro expects that it would be able to respond as quickly as it has with the CEC to any other intervener in this proceeding who does not raise the specific concerns for BC Hydro that FortisBC's intervention raises and who either is represented by counsel or has a robust understanding of the Commission's processes and the nature of the obligations regarding receipt of confidential information (as demonstrated, for example, by Mr. Craig through his long-standing participation in Commission proceedings).

With respect to FortisBC, BC Hydro notes again that Fortis Inc. can be assumed to have an on-going interest in a future transaction with Teck if the Waneta 2017 Transaction does not come to fruition; FortisBC has financial incentives to leverage any information it can glean in upcoming negotiations regarding, among other things, an amendment to the Canal Plant Agreement; and the reporting relationships between FortisBC and Fortis Inc. personnel are unclear at best.<sup>2</sup> FortisBC's participation in this proceeding as a ratepayer of BC Hydro is thus coloured by its non-ratepayer interests and allegiances.

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<sup>2</sup> Fortis Inc.'s interest in purchasing Waneta and the lack of distinction between FortisBC and Fortis Inc. were made clear by Fortis Inc. after the Fortis Transaction was announced: <https://www.bnn.ca/fortis-to-buy-teck-resources-stake-in-b-c-dam-for-1-2b-1.749884>.

Accordingly, a higher degree of concern regarding the release of confidential information to FortisBC is more than appropriate.

FortisBC's approach to the confidentiality issues has only served to cause BC Hydro more concern. To date FortisBC has challenged BC Hydro's confidentiality claim, has not availed itself of any of the usual confidentiality processes employed by the Commission and other interveners,<sup>3</sup> has not acknowledged the challenges its request for confidential information poses to BC Hydro interests and those parties whose information is being sought, and has offered nothing that would allow this issue to be resolved on anything other than an "all or nothing" basis. Conversely, BC Hydro has demonstrated through its exchange with Mr. Weafer and Mr. Craig that it is willing and able to work out confidentiality issues in a timely and balanced manner.

With regard to the non-counsel representatives of FortisBC, namely Ms. Martin, Mr. Egolf or Mr. King, BC Hydro has no information about their reporting relationships within the Fortis group of companies, or their roles and responsibilities in regard to this proceeding. Because of that lack of transparency, and because it is clear that FortisBC and its corporate parent Fortis Inc. have commercial competitive interests in this proceeding that are in addition to any legitimate interest FortisBC has as a ratepayer of BC Hydro, we maintain that they should not have access to the confidential information, at least on the basis of the information BC Hydro and the Commission currently have. To take one hypothetical example, if Mr. Egolf has a role in negotiating potential amendments to the Canal Plant Agreement, or has a reporting relationship directly or indirectly to Fortis Inc., then he is clearly in a conflict of interest position with respect to any confidential information he receives. It would be unfair to him, BC Hydro, our ratepayers, and the Commission processes to have him receive confidential information.

We believe our position as set out above does not preclude a hearing into the Application that is procedurally fair to FortisBC. BC Hydro accepts that counsel and one or more business representatives of FortisBC may need to have access to some of the confidential information, on the basis of more information on those representatives and appropriately tailored undertakings. The challenge, as always, is balancing the competing interests to ensure that both procedural fairness and confidentiality concerns are addressed. BC Hydro is more than willing to work with the Commission and FortisBC to find a balanced solution in this regard.

The Commission has specifically asked BC Hydro to address section 18.01(b) of its Rules of Practice and Procedure regarding the provision of redacted versions of confidential documents. We have addressed the substance of this request in our submissions above.

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<sup>3</sup> BC Hydro notes that neither Ms. Herbst nor Ms. Pratch, counsel for FortisBC, have executed and delivered a Confidentiality Declaration and Undertaking Form, despite BC Hydro agreeing that they could have access to the (hard-copy) confidential information on that basis (Exhibit B-4).

As requested, BC Hydro is also mindful of Rule 21.02 regarding Commission adjustments to proposed redactions, referred to on page 2 of Exhibit A-8. BC Hydro notes that pursuant to section 2 of the Rules, they are to be construed “consistent in all cases with the requirements of procedural fairness.” Consistent with section 2, we expects that before the Commission would put any particular piece of information on the public record that is currently held in confidence, that we would be given an opportunity to comment, as well as any third party that the information might be in regard to.

Finally, BC Hydro refers to the Commission’s concluding words in Exhibit A-8 regarding the Transmission Agreements. BC Hydro has said in the Application and repeats here that the Transmission Agreements must be filed in advance of information request No. 2, so they can be the subject of the information request process. BC Hydro notes FortisBC’s request that they be filed on or before January 22, 2018 (Exhibit C1-4). BC Hydro will endeavour to meet that proposed deadline, but in any event will file them no later than the date it files its responses to information request No. 1, bearing in mind that it has received nearly 1,000 Information Requests on this Application to date.

For further information, please contact Geoff Higgins at 604-623-4121 or by email at [bchydroregulatorygroup@bchydro.com](mailto:bchydroregulatorygroup@bchydro.com).

Yours sincerely,



Fred James  
Chief Regulatory Officer

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Enclosure

## **Waneta 2017 Transaction**

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### **Attachment 1**

### **Overview of Waneta Valuation Model**

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## Table of Contents

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1	Model Scope .....	1
2	Methodology .....	3
2.1	Input Data Sheets .....	5
2.2	Calculation Sheets .....	8
2.3	Output Sheets .....	12
3	Use of Output Data.....	13

## List of Figures

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Figure 2-1	Valuation Schematic – Waneta Two-Thirds Interest.....	4
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1 This document provides a guide to BC Hydro's excel-based model (the **Valuation**  
2 **Model**) developed to assess the value of the transaction for the purchase of  
3 two-thirds of the Waneta Facility from Teck (the **Transaction**).

## 4 **1 Model Scope**

5 The primary purposes of the Valuation Model are as follows:

- 6 • To calculate the present value (**PV**) benefits or costs of the Transaction and  
7 determine if the benefits are larger than the purchase price;
- 8 • To provide quantitative analysis on key risks to Transaction value, specifically  
9 the risk of Counterparty default or extension of the Lease Agreement; and
- 10 • To further examine risks associated with the value of the Transaction under a  
11 variety of system and market conditions through scenario analysis.

12 The Valuation Model makes substantial reliance on data and analysis conducted for  
13 previous BC Hydro filings, including BC Hydro's Fiscal 2017 – Fiscal 2019 Revenue  
14 Requirements Application and the 2015 Rate Design Application. This includes:

- 15 • BC Hydro's load resource balance, which is used to determine when any  
16 incremental energy from Waneta would be required by domestic customers or  
17 exported to external markets;
- 18 • Market price forecasts, which are used to value any incremental energy from  
19 Waneta when it is exported to external markets; and
- 20 • The Long-Run Marginal Cost (**LRMC**), which provides the expected cost of new  
21 energy and capacity resources over time and is determined by portfolio  
22 analysis. The LRMC is used to value any incremental energy and capacity from  
23 Waneta when it is required by domestic customers.

1 BC Hydro's portfolio analysis remains our standard method for evaluation of  
2 long-term resource additions, which is why the above items are key inputs to the  
3 Waneta Valuation Model. The Valuation Model provides a simplified proxy for  
4 portfolio analysis with some additional capabilities which recognize the following key  
5 analytical requirements and features of the Transaction:

- 6 • **Valuation of the Transaction during the Lease Term.** The Lease Agreement  
7 is a purely commercial agreement rather than a conceptual resource addition.  
8 Valuation of the Lease Term also included quantitative analysis of the impact of  
9 counterparty default or extension through probabilistic option valuation, which is  
10 outside the scope and capabilities of BC Hydro's portfolio modelling.
- 11 • **Determination of the opportunity cost of other potential bidders for**  
12 **Waneta.** In order to develop an appropriate bid and negotiation strategy,  
13 BC Hydro developed a model of the potential value of the transaction from the  
14 perspective of other potential bidders. This required a valuation model that was  
15 not solely tied to BC Hydro's planning perspective.
- 16 • **Consideration of other transaction structures.** During the transaction  
17 process BC Hydro considered the potential for other potential transaction  
18 structures, which required a high degree of flexibility in the analytical frame  
19 work.

20 BC Hydro notes that the Valuation Model was restructured several times during the  
21 consideration of the Transaction due to changes in the potential transaction  
22 structure, the scope of the agreements associated with the transaction, and changes  
23 to input assumptions. We have removed functionality that was not ultimately relied  
24 on to proceed with the transaction to make the model simpler and avoid confusion  
25 regarding its function. However, some formulas may still retain functionality that was  
26 not used to value the Transaction as submitted in our application.

1 BC Hydro also notes that the model was developed for internal purposes by the  
2 Waneta valuation team. The model was not built with ease-of-use as an objective.  
3 While we have made attempts to simplify the model and explain its functions in this  
4 document, the model continues to include complex interrelations between  
5 calculations that may not be immediately apparent. As a result, we caution against  
6 making modifications to the model or attempting additional sensitivity analysis, and  
7 cannot commit to providing responsive answers to questions that are based on same.

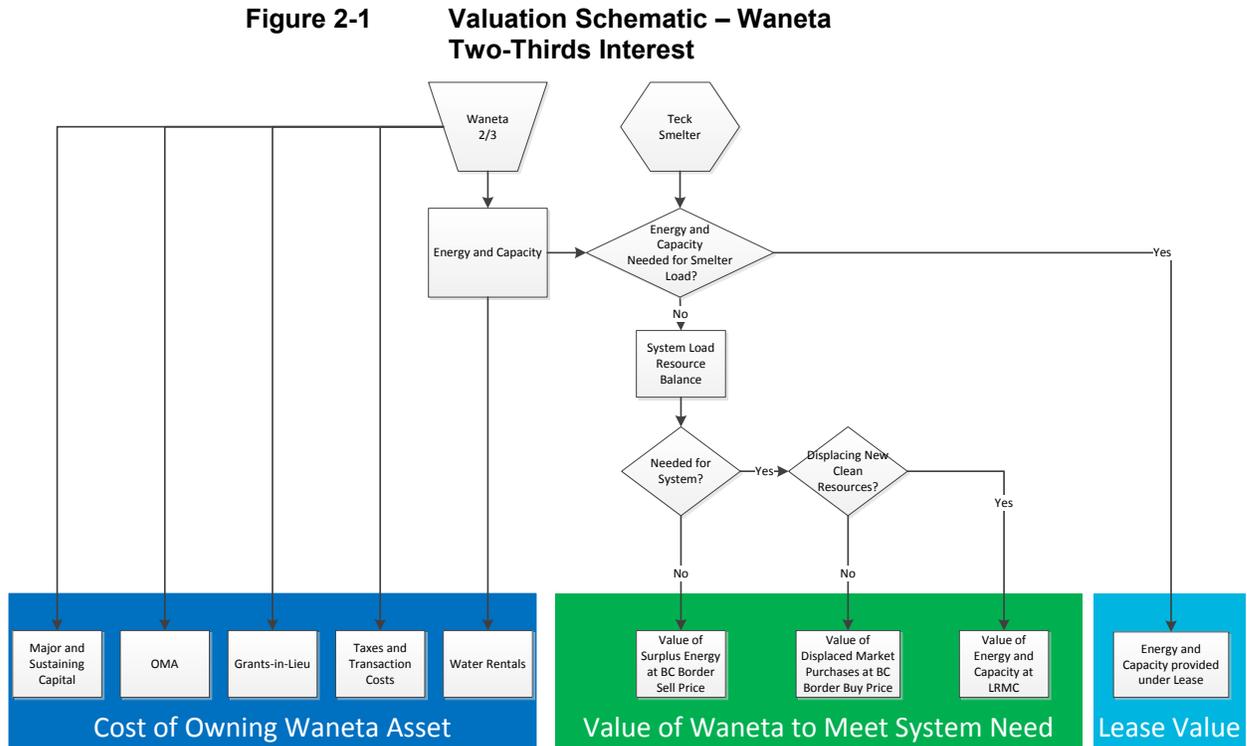
## 8 **2 Methodology**

9 The model is a discounted cash flow analysis and reflects the expected value of the  
10 Waneta energy and capacity as well as the expected costs of the asset. Overall the  
11 model does the following:

- 12 • Identifies the expected use of the Waneta Two-Third Interest generation  
13 depending on:
  - 14 ▶ Whether or not the Lease to Teck is in effect;
  - 15 ▶ Whether or not Teck is taking service under BC Hydro's industrial tariff; and
  - 16 ▶ Whether BC Hydro is in an LRB surplus or deficit position.
- 17 • Applies price indices to the Waneta Two-Third Interest generation depending  
18 on the expected use.
- 19 • Identifies the operating and capital costs associated with the Waneta  
20 Two-Third Interest.
- 21 • Identifies any incremental transmission use associated with the Waneta  
22 generation, and the associated costs or revenues.
- 23 • Consolidates the above factors and calculates the present value costs or  
24 benefits of the asset.

1 [Figure 2-1](#) below shows the methodology structure as well as the key factors  
2 included in the valuation model.

3 **Figure 2-1**  
4



5 In the model there are four categories of sheets. The tabs have colours to identify  
6 the type of worksheet. These four categories are:

7 • Scenarios Sheet (**Green**):

- 8 ▶ This sheet is a master control worksheet for the Valuation Model;
- 9 ▶ It provides both input assumptions for sensitivity analysis and output data;  
10 and
- 11 ▶ It also contains a macro to update the scenario table with the full range of  
12 identified sensitivities.

13 • Input Data Sheets (**Blue**):

- 14 ▶ These sheets provide the core input assumptions to the model; and

1 ▶ Some Input Data Sheets also include interim calculations to translate raw  
2 input data into a form usable by the Calculation Sheets.

3 • Calculation Sheets (**Purple**):

4 ▶ These sheets perform the majority of the calculations in the model.

5 • Output Sheets (**Yellow**):

6 ▶ These sheets provide aggregation and summaries of the results calculated  
7 by the Calculation sheets; and

8 ▶ Some Output Sheets also include minor calculations for presentation  
9 purposes.

10 A description of the worksheets by category is provided below.

## 11 **2.1 Input Data Sheets**

12 The following make up the Input Data sheets in the Valuation Model

13 • **Scenarios** worksheet, which is both an input and an output sheet. The scenario  
14 sheet allows for the selection of sensitivity scenarios, with the following drivers:

15 ▶ Inclusion or exclusion of transmission costs.

16 ▶ Selection of which capital schedule to use (refer to Capital Expenditures  
17 worksheet).

18 ▶ Lease assumptions:

19 ▪ Initial term of the Lease;

20 ▪ Period that the Lease is extended, if any; and

21 ▪ Period that the Teck smelter load is expected to be served by BC Hydro  
22 under the Lease or other arrangements.

23 ▶ Delay in requirement for new domestic resources from the expected timing  
24 under BC Hydro's mid load forecast.

- 1       ▶ Market and LRMC assumptions:
  - 2           ▪ Toggle for whether generation is valued at the Long-Run Marginal Cost
  - 3           for periods where BC Hydro is in deficit, or whether to force the use of
  - 4           market prices for all generation not provided to Teck.
  - 5           ▪ Selection of market price scenario;
  - 6           ▪ Sensitivity adjustment for market capacity price used for valuation;
  - 7           ▪ Sensitivity adjustment for energy-based LRMC;
  - 8           ▪ Sensitivity adjustment for capacity-based LRMC; and
  - 9           ▪ Toggle for whether marginal capacity resource is pumped storage or
  - 10          natural gas.
- 11      ▶ No-Go Scenario Assumptions:
  - 12          ▪ Whether smelter is served by BC Hydro following expiry of the Lease;
  - 13          and
  - 14          ▪ Whether the 3808 PPA with Fortis BC is renewed following expiry of the
  - 15          Lease.
- 16      ▶ Discount Rate.
- 17      • **Inputs** worksheet, containing the majority of the commercial and financial input
- 18      values into the model. Key components are:
  - 19          ▶ Transaction purchase price details;
  - 20          ▶ Estimated project operating costs;
  - 21          ▶ Lease details;
  - 22          ▶ Time-value factors, including inflation and discount rates;
  - 23          ▶ Long-run marginal cost inputs;
  - 24          ▶ Market price inputs, including time of delivery factors;

- 
- 1       ▶ BC Hydro Tariff schedules;
- 2       ▶ Transmission data, including losses and wheeling factors;
- 3       ▶ Teck default probabilities;
- 4       ▶ Waneta generation and Teck smelter load; and
- 5       ▶ Scenario selectors for a wide range of sensitivity options.
- 6       • **Capital Expenditures worksheet**, containing the base capital expenditure
- 7       forecast for Waneta as well as variant capital forecasts used for sensitivity
- 8       analysis.
- 9       ▶ These capital forecasts are based on a project-level assessment of potential
- 10       capital requirements at Waneta, as well as a commercial review of how the
- 11       costs of these projects are likely to be shared between Teck and BC Hydro.
- 12       ▶ This worksheet contains main five capital scenarios:
- 13       ▪ Capital expenditures under a baseline standard (Good Utility Practice);
- 14       ▪ Capital expenditures under an enhanced standard (Leading Utility
- 15       Practice);
- 16       ▪ A sensitivity scenario using Leading Utility Practice with the addition of a
- 17       large one-time capital requirement upon expiry of the Lease;
- 18       ▪ A sensitivity scenario using Leading Utility Practice with the addition of
- 19       additional capital anticipated to be sufficient to extend the life of the
- 20       asset; and
- 21       ▪ A sensitivity scenario using Leading Utility Practice with the cost of all
- 22       major (>\$10 million) capital works increased by 50 per cent.
- 23       ▶ This worksheet also contains Teck's forecast of capital expenditures
- 24       (excluding transmission assets) for the Lease Term. This is utilized for the
- 25       valuation of default scenarios.

- 1 • **Load Resource Balance** worksheet, containing annual load resource balance  
2 data and the calculations of the associated **annual** energy and capacity surplus  
3 and supply requirements in response to the various forecast scenarios for the  
4 base, default and no-go scenarios.
- 5 • **Extension Option** worksheet, containing the results of a Monte Carlo  
6 assessment of the value of the Lease extension option as provided by  
7 Powerex.

## 8 **2.2 Calculation Sheets**

9 The **CoreValuation** worksheet is the primary calculation engine of the valuation  
10 model. This sheet consolidates energy, capacity and pricing values and calculates  
11 monthly costs and revenues during both the Lease and post-Lease period.

12 A detailed description of the Core Valuation worksheet is provided below.

Col	Title	Description
A	Index Month	Counter for number of monthly periods from Transaction close
B	Fiscal Month	Month within fiscal year, where Apr = 1, Dec = 9, Jan = 10, Mar = 12
C	Fiscal Year	Fiscal year within with monthly period occurs
D	Lease Energy	The amount of energy provided to Teck under the Lease or subsequent agreements
E	Lease Capacity	The effective capacity provided to Teck under the Lease or subsequent agreements
F	Add'l Surplus Energy	Amount of Energy held by BC Hydro that is exported as surplus
G	Av'd Market Purchases	Amount of Energy held by BC Hydro that is used by domestic customers to offset expected market purchases
H	Av'd Domestic Energy	Amount of Energy held by BC Hydro that is used by domestic customers to avoid new domestic resources
I	BCH Use of FBC use of Line 71	Amount of energy wheeled by Fortis BC over Line 71 to bulk BC Hydro system
J	Domestic Capacity	Amount of capacity held by BC Hydro that is used by domestic customers to avoid new domestic resources
K	Lease or Tariff Rate – Capacity	Rate (\$/MW-mo) paid by Teck for capacity under the Lease Agreement (during lease) or Tariff (\$/MW-mo) paid by Teck for capacity (post-lease) with smelter load.

Col	Title	Description
L	Lease or Tariff Rate – Energy	Rate (\$/MWh) paid by Teck for energy under the Lease Agreement (during lease) or Tariff (\$/MWh) paid by Teck for capacity (post-lease) with smelter load.
M	1987 Agreement Cost	Amount paid by FBC for use of L71 under 1987 Letter Agreement with Teck
N	Capacity Water Rental	Water rental rate for capacity (\$/kW-year)
O	Energy Water Rental	Water rental rate for energy (\$/MWh)
P	BC Border Sell Price	The forecasted price (in \$/MWh) that exports to external markets will be valued at. This value is calculated by escalating a real dollar market price by forecast inflation.
Q	BC Border Buy Price	The forecasted price (in \$/MWh) that imports from external markets will be valued at. This value is calculated by escalating a real dollar market price by forecast inflation.
R	Reference Price – Energy (LRMC)	The expected value of energy (in \$/MWh) provided by Waneta when it is not provided to Teck under the Lease or subsequent agreements. For the purposes of the Waneta Business Case we have termed this our Long Run Marginal Cost (LRMC) of energy. This represents the market price for where BC Hydro is in operational surplus, and the cost of new-build resources when BC Hydro is in planning deficit. This latter value is derived from the prices in BC Hydro's resource options inventory and adjusted for time of delivery factors and escalation.
S	Reference Price – Capacity(LRMC)	The expected value of the capacity (in \$/kW-yr) provided by Waneta when it is not provided to Teck under the Lease or subsequent agreements. For the purposes of the Waneta Business Case we have termed this our Long Run Marginal Cost (LRMC) of energy. This represents the market price for where BC Hydro is in operational surplus, and the cost of new-build resources when BC Hydro is in deficit. This latter value is derived from the prices in BC Hydro's resource options inventory and adjusted for time of delivery factors and escalation.
T	Capacity Revenue	Revenue from sale of Capacity to Teck under the Lease or subsequent agreements. Calculated as product of [Lease Capacity] and [Lease or Tariff Capacity Rate].
U	Energy Revenue	Revenue from sale of energy to Teck under the Lease or subsequent agreements Calculated as product of [Lease Energy] and [Lease or Tariff Energy Rate].
V	Line 71 Revenue	Revenue to BC Hydro from Fortis BC use of Line 71 (only applies to periods where BC Hydro is owner of Line 71). Calculated as the product of the payment rate under the 1987 agreement [col M] and the total FortisBC use of Line 71 [col I].
W	Grants-in-lieu	Expected grants-in-lieu paid by BC Hydro.
X	Operations and Maintenance	Expected operations and maintenance costs paid by BC Hydro.
Y	Administration	Expected administration costs paid by BC Hydro.

Col	Title	Description
Z	Capacity Water Rentals	Expected capacity water rental costs paid by BC Hydro.
AA	Energy Water Rentals	Expected energy water rental costs paid by BC Hydro.
AB	Capital Costs	Expected sustaining and major capital costs paid by BC Hydro.
AC	Surplus Revenue	Revenue from sale of energy into external markets. Calculated as product of [BC Border Sell Price] and [Add'l Surplus Energy], adjusted for transmission losses to the bulk system.
AD	Displaced Imports Value	Avoided cost resulting from avoided market purchases. Calculated as product of [Av'd Market Purchases] and [BC Border Buy Price], adjusted for transmission losses to the bulk system.
AE	Energy Value	Avoided cost resulting from avoided new-build <u>energy</u> resources. Calculated as product of [Av'd Domestic Energy] and [LRMC], adjusted for transmission losses to the bulk system.
AF	Capacity Value	Avoided cost resulting from avoided new-build <u>capacity</u> resources. Calculated as product of [Domestic Capacity] and [Capacity Value], adjusted for transmission losses to the bulk system.
AG	Transaction Cost	Expected transaction costs (including property transfer tax).
AH	Net Total Annual \$	Total annual cashflow resulting from the transaction (excluding purchase price and resulting impacts). Calculated as sum of columns [T] through [AG].
AI	Present Value	Present value of monthly cashflow. Calculated by multiplying [Net Total Annual \$] by nominal monthly present value factor.
AJ	Cumulative Present Value	Total present value cost or benefit from start of analysis period to relevant month.

1 Two of the other calculation worksheets (**Default Valuation** and **No Go Scenario**)  
 2 are modified versions of the CoreValuation worksheet and contain many of the same  
 3 components as listed above. The key differences with the Default Valuation and No  
 4 Go Scenario worksheets are as follows:

- 5 • **Default Valuation:**
  - 6 ▶ This sheet calculates the monthly cashflows during the Lease Term
  - 7 assuming the lease is terminated and the smelter no longer operates – so
  - 8 there are no lease values or tariff revenue. This monthly cashflow is then
  - 9 used in the **Default Valuation (yr)** worksheet to determine the

- 1 probability-weighted impact of potential counterparty default (described  
2 further below).
- 3 ► The main modifications to the functionality in the CoreValuation sheet are to:
- 4 ■ remove all potential for lease payments and tariff revenue;
  - 5 ■ include operations costs (OMA, grants-in-lieu, administration, water  
6 rentals); and
  - 7 ■ include all expected capital costs, rather than just the portion of capital  
8 costs that BC Hydro would be responsible for under the Lease  
9 Agreement.
- 10 • **No Go Scenario:**
- 11 ► This sheet calculates the monthly cashflows that would result from one or  
12 both of the following changes:
- 13 ■ the Teck smelter load being served by BC Hydro despite not purchasing  
14 the Waneta facility; and
  - 15 ■ the 3808 Power Purchase Agreement (**PPA**) with Fortis BC not being  
16 renewed.
- 17 ► The main modifications to the functionality in the CoreValuation sheet are:
- 18 ■ Include energy and capacity reductions to load related to the 3808  
19 Agreement with FortisBC;
  - 20 ■ Include energy and capacity amounts related to the Teck smelter; and
  - 21 ■ Remove functionality for operating and capital costs.

22 The final calculation worksheet (**Default Valuation –Total**) calculates the  
23 probability-weighted risk of counterparty default on an annual time-step. The  
24 calculations in this worksheet are as follows:

Col	Title	Description
D	Default Cost During Lease	Annual sum of cashflows for identified year, assuming the Lease <u>is not</u> in effect (i.e., default has occurred). Sum taken from values calculated in Default Valuation worksheet.
E	Lease Value	Annual sum of cashflows for identified year, assuming the Lease <u>continues to be</u> in effect (i.e., no default). Sum taken from values calculated in CoreValuation worksheet.
F	Remainder Continue	Sum of Lease Value cashflows for the current year and all years remaining in the Lease Term.
G	Previous Value	Sum of Lease Value cashflows from the start of the Lease up to the previous year.
H	Remainder Default	Sum of Default Value cashflows for the current year and all years remaining in the Lease Term.
I	Total Default	Total value during the Lease Term assuming default occurs during the identified year. Calculated as sum of [Previous Value] and [Remainder Default] for the identified year.
J	Default Probability	Probability of default occurring during the identified year.
K	Probability Weighted	Probability-weighted value of Lease assuming default occurs during the identified year. Calculated as product of [Total Default] and [Default Probability].
L	Net cost adjustment for counterparty default	Net value adjustment required due to potential for counterparty default. Calculated as sum of [Probability Weighted] less sum of [Lease Value] (i.e., assuming no default).

## 2.3 Output Sheets

The following make up the Input Data sheets in the Valuation Model:

- **CoreValuation (Yr)** worksheet, providing an annual summary of the results in the **CoreValuation** worksheet.
- **NoGo Scenario (Yr)** worksheet, providing an annual summary of the results in the **NoGo Scenario** worksheet.
- Note that the **Scenarios** worksheet is both an input and an output sheet, and is the location of the PV summary results provided in the Business Case.
  - ▶ There is a macro button available in cell A17. This macro repopulates the output tables using the assumptions provided in rows 20 to 40; and

- 1       ▶ References to tables in the Business Case are provided in row 16, where  
2       available.

### 3           **Use of Output Data**

4       The Waneta Business Case primarily makes use of the Transaction PV. This is:

- 5       • the sum of PV of the costs and benefits for both the Lease and post-lease  
6       period (as calculated by the CoreValuation worksheet);
- 7       • adjusted for:
- 8           ▶ the value impact of potential counterparty default (as calculated by the  
9           **Default Valuation** worksheet); and
- 10          ▶ the value impact of potential counterparty extension of the Lease Term (as  
11          provided by Powerex).

12       The Waneta Business Case sourced the PV results directly from the Valuation  
13       Model.

14       In addition to the PV results, the model outputs were used as an input to BC Hydro's  
15       Rate Impact Model (**RRIM**). This model calculates the annual differential cumulative  
16       rate impact of the Transaction as compared to the No-Go scenario. Refer to the  
17       Overview of the Watena Rate Impact Model for a description of the RRIM.

## **Waneta 2017 Transaction**

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### **Attachment 2**

### **Overview of Waneta Rate Impact Model**

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## Table of Contents

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1	Model Scope .....	1
2	Methodology .....	3
2.1	Input Data Sheet (5.0 Input Data) .....	4
2.2	Calculation Sheets (2.0 Finance Charges, 3.0 Capital, 4.0 Energy & Revenue) .....	6
2.3	Summary Sheet (1.0 Summary).....	8
2.4	Line Graph Sheet (Line Graph).....	9
3	Results .....	9
4	Other Assumptions.....	11

## List of Tables

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Table 1-1	Rate Impact Models Scenarios .....	2
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This document provides a description of BC Hydro's excel-based model (the **Rate Impact Model**) used to estimate the impact on ratepayers of the purchase of two-thirds of the Waneta Facility from Teck (the **Transaction**) under various scenarios.

## 1 Model Scope

The primary purpose of the Rate Impact Model is as follows:

- To calculate the estimated impact on BC Hydro's revenue requirements as a result of the Transaction; and
- To calculate the estimated incremental impact on BC Hydro customer rate increases as a result of the Transaction.

The Rate Impact Model estimate ratepayer impacts under different scenarios, and has been submitted in previous Commission applications. This is a model with which the Commission is familiar, and which allows for BC Hydro to compare projects and scenarios under different assumptions.

The Rate Impact Model assumes a Base Case, which includes an estimate of BC Hydro's total revenue requirement over the F2018 to F2058 period. The year F2058 represents the end of the 40-year analysis period following the planned date of the Transaction.

For multiple scenarios, BC Hydro has used the Rate Impact Model to estimate the incremental impact on the main components of BC Hydro's total revenue requirement (amortization, finance charges, operating costs and energy costs), compared with the Base Case. This is described in further detail below.

The table below identifies the different scenarios for which BC Hydro is providing Rate Impact Models, as well as their respective filing attachment names:

**Table 1-1 Rate Impact Models Scenarios**

Scenarios	Description	Filing Attachment Reference
1) LRMC Clean	The Transaction at a purchase price of \$1.2 billion, with no Teck default or Lease Extension, and post-lease valuation at LRMC – Clean	1) LRMC Clean.xls
2) LRBC Clean + Gas	The Transaction at a purchase price of \$1.2 billion, with no Teck default or Lease Extension, and post-lease valuation at LRMC – Clean + Gas	2) LRBC Clean+Gas.xls
3) Market ABB	The Transaction at a purchase price of \$1.2 billion, with no Teck default or Lease Extension, and post-lease valuation at ABB market prices	3) Market ABB.xls
4) Market Extrapolated	The Transaction at a purchase price of \$1.2 billion, with no Teck default or Lease Extension, and post-lease valuation at Extrapolated market prices	4) Market Extrapolated.xls
5) Tariff	The Transaction at a purchase price of \$1.2 billion, with no Teck default or Lease Extension, and post-lease valuation at BC Hydro Industrial Tariff	5) Tariff.xls
6) 10 Year Default, then LRMC Clean	The Transaction at a purchase price of \$1.2 billion, with Teck default in year 10 of the Lease, under LRMC-Clean scenario	6) 10yr default + LRMC Clean.xls
7) 10 Year Default, then ABB	The Transaction at a purchase price of \$1.2 billion, with Teck default in year 10 of the Lease, under ABB market price scenario	7) 10yr default + ABB.xls
8) Lease extension, then LRMC Clean	The Transaction at a purchase price of \$1.2 billion, with no Teck default and the 10-year Lease Extension, under LRMC-Clean scenario	8) Lease extension + LRMC Clean.xls
9) Lease extension, then ABB	The Transaction at a purchase price of \$1.2 billion, with no Teck default and the 10-year Lease Extension, under ABB market price scenario	9) Lease extension + ABB.xls

For each scenario, the Rate Impact Model makes substantial reliance on outputs provided by the Waneta Valuation Model, which is described in **Overview of Waneta Valuation Model**.

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## 2 Methodology

BC Hydro has used the Rate Impact Model to estimate the incremental impact on the main components of BC Hydro's total revenue requirement (amortization, finance charges, operating costs and energy costs), compared with the Base Case, under various scenarios.

The impact of the Transaction on BC Hydro's total revenue requirement under these various scenarios, compared to the Base Case, is estimated on an annual basis over the F2018 to F2058 period. This **Estimated Total Change in Revenue Requirement** is shown (in \$ millions) on Line 10 of the Summary Sheet in each attached Rate Impact Model files.

The incremental changes to BC Hydro's revenue requirement are also used to estimate the incremental cumulative impact on future rates. This is shown as **Estimated Incremental Impact on Future Rates** on Line 15 of the Summary Sheet in each attached files. The percentage amounts shown in this line represent the magnitude (in %), in a given year, which rates are higher or lower in the scenario than they would have otherwise been in the Base Case, in that same year.

Additionally, the incremental changes to BC Hydro's revenue requirement are also used to estimate the incremental cumulative rate increases for each scenario. This is shown as **Estimated Incremental Cumulative Rate Impact** on Line 20 of the **Summary** pages in the attached files. The estimated incremental cumulative rate increases represents the magnitude (in %), in a given future year, that cumulative rate increases (compared with F2017 rates) would be higher or lower in the scenario than they would have otherwise been in the Base Case, in that same year.

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In the model there are four categories of sheets. These are shown below, along with the associated names of their respective tabs in the attached Rate Impact Models:

- Input Sheet (**5.0 Input data** tab)
- Calculation Sheets (**2.0 Finance Charges** tab, **3.0 Capital** tab, **4.0 Energy & Revenue** tab)
- Summary Sheet (**1.0 Summary** tab)
- Line Graph Sheet (**Line Graph** tab)

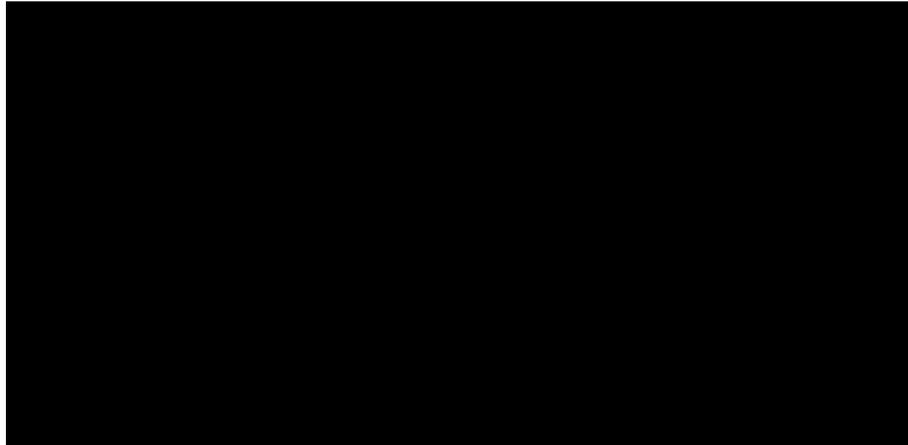
A description of the worksheets by category is provided below.

## **2.1 Input Data Sheet (5.0 Input Data)**

This sheet provides the core input assumptions to the model. The majority of the inputs are provided by the Waneta Valuation Model, which is described in **Overview of Waneta Valuation Model**. The Input Data sheet also includes interim summation calculations, as applicable, to translate input data into totals used by the Calculation Sheets. The key inputs, and their sources, are listed below.

### **Capital Expenditures**

- Annual incremental capital expenditures related to the Transaction, including the initial capital investment, ongoing sustaining capital expenditures, and forecast capital upgrades, are included in Lines 1 through 10;
- Source – Waneta Valuation Model;
- Capital expenditures are assumed to be placed into service halfway through the fiscal year; and
- Amortization – amortization periods depend on the type of asset, and are shown in the table below.



**Increase (Decrease) in Cost of Energy**

- Annual incremental energy costs in each scenario, compared with the Base Case, are shown in Lines 22 to 28; and
- Source – Waneta Valuation Model.

**Increase (Decrease) in Operating Costs**

- Annual incremental operating costs in each scenario, compared with the Base Case, are shown in Lines 18 to 19; and
- Source – Waneta Valuation Model.

**Lease or Other Revenue**

- Annual incremental Lease or Other revenue, compared with the Base Case is shown on Line 29. This is comprised of incremental lease revenue from Teck, incremental transmission revenue, and incremental tariff revenue, as applicable
- Source – Waneta Valuation Model.

**Forecast Interest Rates**

Annual short-term and long-term interest rates are shown on Lines 30 and 31. These are based on Province of BC interest rate assumption from May 2017.

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## Annual Forecast Rate Increases

Annual forecast rate increases are shown on Line 32, and represent BC Hydro's forecast base case rate increases. These are based on BC Hydro's forecast of annual rate increases at the time of analysis, and are consistent with the 10 Year Rates Plan rate increases for the F2017 to F2024 period. Annual rate increases after F2024 are assumed to be 2.0 per cent.

## 2.2 Calculation Sheets (2.0 Finance Charges, 3.0 Capital, 4.0 Energy & Revenue)

These sheets perform the majority of the calculations in the model, and are described below.

### 2.0 Finance Charges

- This sheet calculates the annual incremental finance charges due to the higher debt related to the Transaction, under each scenario. Incremental finance charges are calculated by applying assumed interest rates to the incremental debt incurred to finance capital expenditures, under each scenario. Incremental finance charges are shown on Line 13.
- As amortization is collected from ratepayers, the annual incremental debt balance, shown in Line 12, due to the transaction, will decrease over time.
- Province of B.C. interest rates, provided to BC Hydro at the time of preparing the Waneta Business Case, have been used in the calculation of incremental finance charges under each scenario. For the purposes of this analysis, BC Hydro has assumed three different interest rates:
  - ▶ Long-Term Interest Rate – 10 Year: this is equal to the Province of BC long-term interest rate for ten-year debt, provided to BC Hydro at the time of preparing the Waneta Business Case. This is found on Line 16.

- 
- ▶ Long Term Interest Rate – 30 Year: this is equal to the Province of B.C. long-term interest rate for ten-year debt, provided to BC Hydro at the time of preparing the Waneta Business Case, plus an adder of 60 basis points (0.6 per cent) to approximate the cost of borrowing for a 30-year debt issuance. This is shown on Line 18.
  - ▶ Short Term Interest Rate: this is equal to the Province of B.C. short-term interest rate, provided to BC Hydro at the time of preparing the Waneta Business Case. This is shown on Line 19.
  - BC Hydro has not calculated a weighted cost of debt to estimate finance charges. For the purposes of this analysis, BC Hydro has assumed that the incremental debt related to the Transaction, under each scenario, will be issued with separate terms and therefore different interest rates. These initial terms and amounts are assumed based on discussion with BC Hydro's treasury group.
    - ▶ \$550 million is assumed to be issued as long-term debt over 30 years (representing 50 per cent of the total incremental long-term debt);
    - ▶ \$550 million is assumed to be issued as long-term debt over ten years (representing 50 per cent of the total incremental long-term debt);
    - ▶ Approximately \$140 million (equal to the remaining incremental debt of approximately) is assumed to be issued as short-term debt (i.e., commercial paper).
  - When each long-term debt issuance reaches maturity, the amount of long-term debt and short-term debt to be re-issued is recalculated such that the ratio between long-term and short-term debt is 85:15, consistent with BC Hydro's current debt management approach. This can be seen in Lines 20 to 35.

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### 3.0 Capital

- This sheet calculates the annual incremental amortization from incremental annual capital expenditures under each scenario.
- These calculations are based on the annual incremental capital expenditure amounts, and the related useful lives from the Input Data sheet.
- Capital expenditures are assumed to include interest-during-construction (**IDC**)
- For the purpose of this analysis, sustaining capital expenditures are assumed to be amortized in the year of expenditure. Although these sustaining capital expenditures will have useful lives of greater than one year, BC Hydro has made this simplifying assumption due to the limitation of the Rate Impact Model, which cannot accommodate the large number of annual sustaining capital projects.

### 4.0 Energy & Revenue

- This sheet estimates BC Hydro's annual revenue requirement by escalating current customer average rates (by customer class) by assumed future rate increases, and then applying these rates to forecast sales (by customer class) volumes subject to rate increases. The result is an estimate of the total revenue requirements subject to rate increases over time.
- This sheet also includes the annual incremental customer revenue, due to the Transaction, under each scenario. This includes revenue from Teck, and other tariff revenue, as applicable for each respective scenario.

### 2.3 Summary Sheet (1.0 Summary)

This sheet provides an aggregation and summary of the results calculated by the calculation sheets. Additionally, this sheet also includes the final calculations required to estimate the rate impact for presentation purposes. A reference column

is provided on the Summary Sheet to either identify the source of the data on each line, or describe the calculation.

## 2.4 Line Graph Sheet (Line Graph)

The line graph sheet is a simple graphical output, in chart format, of the incremental cumulative rate impact of the given scenario, compared with the Base Case. This sheet includes a line graph showing the **Estimated Incremental Impact on Future Rates**, which corresponds to Line 15 of the **Summary** pages in the respective file. This is a graphical representation of the magnitude (in %), over the F2018 to F2058 period, which rates are higher or lower in the scenario than they would have otherwise been in the Base Case, over that same period of time.

## 3 Results

The graphical output of the results of the core scenarios were included in Figure 6 on page 44 of Appendix N (Waneta Business Case). The core scenarios include:

- LRMC – Clean
- LRMC – Clean + Gas
- Market ABB
- Market Extrapolated
- Tariff

Each line on the chart in Figure 6 corresponds to the Line Graph Sheet for the respective Rate Impact Model, and shows the cumulative incremental rate impact for the respective scenarios.

In all scenarios, there is a beneficial impact on rates for the full evaluation period. In the initial 20-year period the Lease revenues from Teck more than offset the costs of

purchasing the two-thirds Interest (which are primarily amortization and finance charges).

For the period beyond the first 20 years the beneficial rate impact depends on the value of the energy.

BC Hydro further considered additional scenarios. The graphical output of the results of these additional scenarios were included in Figure 7 on page 45 of Appendix N (Waneta Business Case). The additional scenarios include:

- 10 Year Default, then LRMC Clean
- 10 Year Default, then ABB
- Lease extension, then LRMC Clean
- Lease extension, then ABB

Each line on the chart in Figure 7 corresponds to the Line Graph Sheet for the respective Rate Impact Model, and shows the cumulative incremental rate impact for the respective scenarios.

In all scenarios, there is a beneficial impact on rates for the full evaluation period. As shown, under both default and Lease extension scenarios, the transaction results in lower cumulative rates.

Under the default scenarios, there is a rate change upon default due to a shift from lease revenues to either market prices or LRMC (depending on BC Hydro's Load Resource Balance position at the time).

Under the Lease extension scenarios there is a step-change decrease in rates due to the change from a \$40/MWh lease payment to a \$53/MWh lease payment. The extension also defers the benefits of the LRMC-clean scenario by ten years.

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## 4 Other Assumptions

**Base Case** – In the Base Case, BC Hydro’s total projected revenue requirement over the F2018 to F2058 period is estimated by escalating current customer average rates (by customer class) by assumed future rate increases, and then applying these rates to forecast sales (by customer class) volumes subject to rate increases. The result is an estimate of the total revenue requirements subject to rate increases over time.

In the Base Case, rate increases are assumed to increase by 4.0 per cent in F2017, 3.5 per cent in F2018, 3.0 per cent in F2019, and by 2.6 per cent each year from F2020 to F2024, consistent with the 10 Year Rates Plan. For years after F2024, BC Hydro assumes annual rate increases equal to inflation of 2.0 per cent.

BC Hydro’s estimated annual revenue requirement over the F2018 to F2058 period is not based on a long-term forecast of specific annual costs (i.e., it is not a ‘bottom-up’ forecast of individual costs). Rather, it represents an estimate from the revenue side, making the assumption that customer rates over time will be increasing only in order to recover its total costs (total revenue requirement). And therefore total revenue received from customers in a future year will equal the total costs to be recovered from ratepayer in that same year.

BC Hydro’s assumed annual rate increases and revenue requirement over the F2025 to F2058 period does not represent BC Hydro’s view as to future Revenue Requirement Applications (**RRAs**), and any rate increases requested in future RRAs will be based on BC Hydro’s assessment of its expected revenues and costs at the time of filing. Similarly, the incremental rate impact assessment of various scenarios related to the Transaction are not determinative of BC Hydro’s view of its future annual rate increases and revenue requirement but gives an indication of the incremental impact to ratepayers under these various scenarios.

Rate Smoothing - the analysis does not consider any potential smoothing of the rate impacts of the Transaction.