BC hydro
FOR GENERATIONS

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August 11, 2009

Ms. Erica M. Hamilton
Commission Secretary
British Columbia Utilities Commission
Sixth Floor – 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Ms. Hamilton:

RE: Project No. 3698565
British Columbia Utilities Commission (BCUC)
British Columbia Hydro and Power Authority (BC Hydro)
Acquisition from Teck Metals Ltd. (Teck) of an Undivided On-third Interest in its Waneta Dam and Associated Assets (the Waneta Transaction)

BC Hydro encloses as Exhibit B-2 its response to BCUC information request (IR) No. 1.

The BCUC has indicated that it would be prepared to accept certain information in confidence in these responses For reasons that are set out in response to specific IRs, BC Hydro has not sought confidential treatment of any of its own information. However, where information has been provided to BC Hydro by a third party on a confidential basis BC Hydro is seeking confidential treatment to protect the commercial interests of the third party.

With the exception of the above noted confidential information all information supplied in the attached response is able to be made public.

For further information, please contact the undersigned.

Yours sincerely,

Joanna Sofield
Chief Regulatory Officer

Enclosure

c. BCUC Project No. 3698565 Registered Intervenor Distribution List.

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VIA E-MAIL
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July 23, 2009

BC HYDRO
WANETA TRANSACTION **EXHIBIT A-3**

Ms. Joanna Sofield
Chief Regulatory Officer
British Columbia Hydro and Power Authority
333 Dunsmuir Street
Vancouver, B.C. V6B 5R3

Dear Ms. Sofield:

Re: British Columbia Hydro and Power Authority
Project No. 3698565
Acquisition from Teck Metals Ltd. of an Undivided One-Third Interest
in the Waneta Dam and Associated Assets

Further to your July 6, 2009 filing of the acquisition of an undivided one-third interest in Waneta Dam and Associated Assets, enclosed please find Commission Information Request No. 1

Yours truly,

Original signed by:

Erica M. Hamilton

yl
Enclosure
cc: Registered Intervenors
(Via Email: *BCH-Waneta-RI*)

REQUESTOR NAME: BC Utilities Commission
INFORMATION REQUEST ROUND NO: 1
TO: BRITISH COLUMBIA HYDRO & POWER AUTHORITY
DATE: July 23, 2009
PROJECT NO: 3698565
APPLICATION NAME: British Columbia Hydro and Power Authority ("BC Hydro")
Acquisition from Teck Metals Ltd. ("Teck") of an Undivided One-third Interest in its Waneta Dam and Associated Assets (the "Waneta Transaction")

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

1.1 On page 6-1, BC Hydro states that the purchase of a one-third interest in the Waneta Assets is more analogous to a BC Hydro-built resource than an EPA acquisition. Please explain why the acquisition was better structured as an asset purchase rather than a long term power purchase or a power purchase with a transfer of assets to BC Hydro in 2036, including a discussion of relevant cost, risk and reliability factors under each option.

1.2 Please confirm that BC Hydro intends to purchase a one-third undivided interest in the Waneta Assets and to include the expenditure in its equivalent of rate base.

1.3 Please explain how the purchase will be funded, particularly identifying the portions that will be funded by debt and by equity, and the source of the equity investment. What will be the impact on BC Hydro's total equity for rate making purposes?

1.4 The draft order in Appendix B refers to an acquisition from Teck Metals Ltd., while the Master Term Sheet in Appendix A was executed by Teck Resources Limited and Teck Metals Ltd. Please clarify who currently owns each significant component of the Waneta Assets.

1.5 Relative to the proposed ownership structure for the Waneta Assets after the purchase by BC Hydro, please discuss the pros and cons of each of the following ownership structures:

1.5.1 Waneta Assets owned by a single purpose company, with BC Hydro holding one-third of the shares of the company;

1.5.2 The Waneta Assets held by a limited partnership that is jointly owned by Teck and BC Hydro;

1.5.3 The Waneta Assets held by an unincorporated joint venture between Teck and BC Hydro; and

1.5.4 The Waneta Assets owned by Teck and leased in part to BC Hydro, with the BC Hydro lease converting to ownership in 2036.

1.6 Please explain why the Application was filed for acceptance pursuant to section 44.2(3)(a) of the UCA.

1.7 Section 44.2(4) of the UCA provides that the Commission may accept of reject part of a schedule. Please confirm that the Commission could, for example, accept the expenditure of $825 million to Teck and reject the $25 million transaction costs. Could the Commission reject a part of the $825 million expenditure to Teck? Please provide reasons.

1.8 Please discuss why the Application was filed under section 44 of the UCA rather than under 45 and 46.

2.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Transaction Costs

2.1 Provide a detailed breakdown of the expenditures that make up the $25 million in transaction costs.

2.1.1 Provide the estimated regulatory costs by detailed category.

2.1.2 Provide the estimated First Nations consultation and accommodation costs.

2.2 Are there any cost items within the transaction costs for appraisals by independent third-party experts? If so, please provide an itemized description with the estimated cost for each.

2.3 Are there any costs items based on the value of the transaction rather than on billing hours, etc.? If so, please identify the cost items and the estimated expense.

2.4 Please provide the rational for the estimated transaction cost uncertainty of less than +/- $10 million.

3.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Benefits to BC Hydro

3.1 While there are benefits to BC Hydro, Figure 6-1 shows a 2 percent rate increase as a result of the Waneta Transaction. Does this rate impact include on-going capital, operating and maintenance, sustaining capital and other costs?

3.2 BC Hydro suggests that there would be a rate decrease of 1.3 percent by 2027. What level of certainty is the rate decrease based upon?

4.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Undivided Interest

4.1 Provide an explanation of the definition of an undivided <u>one-third</u> interest in the Waneta Assets.

4.2 If an undivided interest in real property is defined as real property held by two parties specifying the interests of each party by percentage, how does BC Hydro propose regulation be applied to the assets, capital works, sustaining capital, operation and maintenance requirements, etc.?

4.3 Please provide the percentage in related real property held by Teck, BC Hydro and Columbia Power as a result of the Waneta Expansion arrangement.

5.0 Reference: Exhibit B-1, Chapter 1, p. 1-2
Due Diligence

BC Hydro has just started its due diligence relative to the dam and equipment condition. Additional information will be developed through the due diligence process prior to signing the definitive agreements.

BC Hydro is not aware of any safety or environmental concerns that would be an impediment to the Waneta Transaction (Exhibit B-1, Chapter 2, p. 2-4).

5.1 In Chapter 6, Teck has indicated that there is a need for additional anchoring of the dam and BC Hydro has included Teck's estimate of cost of that anchoring in its assessment of ongoing sustaining capital costs.

5.1.1 Please provide Teck's estimate of cost of anchoring and BC Hydro's estimate of the same.

5.1.2 Please explain why this anchoring cost is included as a sustaining capital cost and is not being deducted from the acquisition costs.

5.2 BC Hydro is aware of cavitation problems on Unit 3 that limit its ability to operate in certain rough load zones. Teck continues to repair the cavitation damage on a yearly basis; this will be evaluated going forward with the potential of having to replace the runner in the future (Exhibit B-1, Chapter 2, p. 2-3).

5.2.1 Please provide an estimate of the cost of a runner replacement for Unit 3 and the approximate timing of the replacement.

5.2.2 Please explain if this runner replacement cost was included in the sustaining capital cost, or deducted from the acquisition costs and include the reasons for such treatment.

6.0 Reference: Exhibit B-1, Chapter 6, p. 6-23
Operating Costs

6.1 "BC Hydro is acquiring a portion of an existing asset, and with that the obligation to pay the acquisition costs and its share of the operating and sustaining capital costs."

6.1.1 Provide the amounts for the previous five years for sustaining capital costs.

6.1.2 Provide the amounts for the previous five years for operating costs (operations, maintenance and administration expenses) including asset management and maintenance fees, and service fees.

6.1.3 Provide any capital expenditures at Waneta for the next five years after the post-2035.

6.2 BC Hydro would dedicate its one-third interest in the Waneta Dam to joint operation by the parties and Teck would dedicate its two-third interest in the Waneta Dam and its rights under the CPA to joint operation by the parties. Value of initial contributions:

Teck's contribution:	$. [NTD: 2x purchase price]
BC Hydro's contribution:	$. [NTD: purchase price]

6.2.1 Please provide an estimate of the BC Hydro's initial contribution to joint operations.

7.0 Reference: Exhibit B-1, Chapter 3, p. 3-2
Price True Ups

7.1 However, due to entitlement scheduling flexibility allowed under the CPA, Teck's monthly and hourly reduction in entitlement usage may not correspond exactly on a month-to-month basis with its entitlement reduction.

7.1.1 Please provide an explanation for the true-up of sales for each of the super-peak, peak and off-peak hours by Teck to correspond exactly on a month to month basis with its entitlement reduction.

7.2 In Table 5-6, please explain why there is no super-peak column.

8.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Output of Turbines and BC Energy Plan, Electricity Policy 10

The Waneta facility has four Francis hydraulic turbines. The maximum output of the four turbines and generating units following recent unit upgrades is 493 MW at 63.2 m (207.5 feet (ft)) gross head or about 123 MW per unit. The hydraulic capacity of Waneta is about 932 meters cubed per second (m^3/s) (32,900 cubic feet per second (cfs)). Following the unit upgrades, which increased plant capacity from 375 MW to the current 493 MW, the average annual generating capability of Waneta is now estimated at 3,021 GWh, based on the 50-year stream flow record from 1938 to 1988. Average annual generation over the recent period from 1987 to 2009 was 2,447 GWh.

8.1 Is the average annual generating capability of Waneta that is now estimated at 3,021 GWh, based on the average 50-year stream flow record from 1938 to 1988, or "most adverse sequence of stream flows occurring within the historical record" as required by the BC Energy Plan, Electricity Policy 10?

8.1.1 If not, please provide the output based on the "most adverse sequence of stream flows occurring within the historical record".

8.1.2 Provide tables and graphs showing water entitlement and generator output for each of the average conditions and critical water conditions.

8.2 As part of the hydraulic capacity of 932 m^3/sec is assumed, provide the minimum, average, and maximum outputs without the assumed amounts as well as those under critical water conditions.

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7
WEP

9.1 The maximum hydraulic capacity from the present 1,050 MW capacity at Boundary Dam is approximately 1,472 m^3/s. Seattle City Light operates Boundary Dam as a peaking plant.

9.2 The Seven Mile power plant now has four units with a hydraulic capacity of about 52,000 cfs (1,472 m^3/s).

9.3 Essentially, once the WEP is in-service, Waneta will have priority rights to the first 25,000 cfs of flow, the WEP will have access to the next 21,400 cfs and Waneta will then have access to the next 7,910 cfs. Waneta's current entitlement assumes access to the first 32,910 cfs. (Exhibit B-1, Chapter 2, 2-15)

9.3.1 If 52,000 cfs is the maximum hydraulic capacity at Boundary Dam and Seven Mile is also 52,000 cfs (maximum), please provide the average hydraulic capacity and minimum hydraulic capacity.

9.3.2 Please confirm that BC Hydro assumes Waneta's current entitlement access to be the first 32,910 cfs at maximum hydraulic capacity.

9.3.3 As footnote 6 uses the word assumes, please explain if the access to the next 7,910 cfs is in question and why.

9.3.4 Please provide the head and discharge flows used in Table 3-1 Waneta Transaction Energy and Capacity Volumes to BC Hydro.

9.3.5 Please confirm that the water entitlement is instantaneous or explain how available water at any point in time is allocated.

9.4 Please provide the maximum amount of annual energy that the Waneta Dam can produce under critical water conditions and the hydraulic capacity in cfs under critical water conditions.

9.5 Please provide an economic analysis spreadsheet (excel working with formulae) for the critical water conditions as defined in SD 10.

9.6 Because of WEP's priority rights to water above the 25,000 cfs, the WEP would reduce the CPA energy entitlement by about 143 GWh/year. This reduction in energy and associated reduction in capacity has been reflected in the Operating Terms. To maintain Teck's ability to meet its Industrial Load, the Operating Terms contemplate that BC Hydro's Waneta Electricity would be reduced by the full amount of the anticipated reduction in energy and capacity associated with the WEP effective April 1, 2014 through December 31, 2035. (Exhibit B-1, Chapter 3, 3-6)

9.6.1 When BC Hydro's Waneta's electricity would be reduced below the one-third share, has the value of this amount of energy been taken into consideration when establishing the purchase price? If not, please provide an explanation.

9.6.2 Provide the hydraulic capacity used to generate Table 3-2.

10.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Water Licenses and Rights

10.1 As part of the Waneta Transaction does BC Hydro acquire a one-third interest in the water licenses listed in Table 2-2? If not, why not. If yes, list the water licenses acquired through the transaction.

10.2 BC Hydro would compensate Teck for any losses of power (either directly or through the CPA) from the Waneta Dam if the capacity or energy from the Waneta Dam is reduced by changes to the Waneta Dam water licences or by changes to the water flow regime at the Waneta Dam that result from a water use planning process, or analogous regulatory constraint, with respect to the Waneta Dam, where such changes are agreed to by BC Hydro, but not Teck, or are imposed on Teck or the Waneta Dam because BC Hydro (as opposed to any other person) is an owner of an interest in the Waneta Dam. For greater certainty, if reductions to Teck's capacity and/or energy or entitlement result from (i) a water use planning process or regulatory constraint with respect to BC Hydro's Seven Mile Dam or upstream facilities in the United States, (ii) a water use planning process or regulatory constraint that would have applied to Teck or the Waneta Dam if owned 100 percent by Teck, or jointly by Teck and a non-crown entity, or (iii) an Environmental Management Plan adopted by the Operating Committee or imposed on the parties pursuant to the Operating Agreement, then in each such case compensation under this paragraph would not apply. (Exhibit B-1, Appendix A, p. 27)

10.2.1 Why does BC Hydro compensate Teck for any losses of power from the Waneta Dam by changes to the Waneta Dam water licences or by changes to the water flow regime from either a planning process or a regulatory constraint with regard to the Seven Mile Dam or US facilities? Please explain.

10.2.2 Please explain Teck's exposure to similar or same losses before the acquisition.

10.3 If the price (net of applicable transmission costs) that Teck is able to obtain for any surplus energy would be below Teck's water licence fees payable in respect of generation of that energy, Teck would be entitled to spill that energy from the CPA exchange accounts, rather than offering it to BC Hydro. (Exhibit B-1, Appendix A, p. 35)

10.3.1 Please explain why BC Hydro does retain its rights for the surplus energy in this case regardless of the fees payable by Teck.

10.3.2 Please explain "spill that energy from the CPA exchange accounts, rather than offering it to BC Hydro".

11.0 Reference: Exhibit B-1, Chapter 2, p. 2-10
Transmission POD

11.1 A single circuit 230 kV line, referred to as Line 71, can be interconnected with either BC Hydro's Nelway Substation or BPA's Boundary Substation located at Boundary Dam approximately two km south of the Canada-U.S. border (but not both simultaneously). This transmission line provides Teck with its primary means to interconnect with the BC Hydro system and to export power to the U.S.

11.1.1 If the connection can not service both Nelway and Boundary substations simultaneously then who determines which path will be used?

11.2 Instead, Teck would agree to deliver capacity and energy that BC Hydro is entitled to, whether in the form of actual generation or entitlement, at the Kootenay Interconnection (KI), or the U.S. border using its Line 71 transmission rights (Exhibit B-1, Chapter 2, p. 2-14).

11.2.1 Identify the Kootenay Interconnection in Figure 2-3.

11.2.2 Have any upgrades to the KI been identified but not yet implemented?

11.2.3 As a result of any studies by BCTC or BC Hydro, have any upgrades to the KI been identified but not yet implemented?

11.2.4 Will the use of the KI affect FortisBC's ability to transfer power under the General Wheeling Agreement (GWA) which expires in 2045?

11.2.5 What are the costs of these upgrades?

11.3 The Operating Terms contemplate that Teck deliver BC Hydro's Waneta Electricity to the KI and oblige Teck, subject to its rights under the Line 71 Agreement, to schedule BC Hydro energy from the KI to the B.C.-U.S. border at BC Hydro's request (Exhibit B-1, Chapter 3, p. 3-10).

11.3.1 As the point of delivery appears to the B.C.-U.S., how much capacity/ energy might BC Hydro export and use to service its customers' loads?

11.3.2 Provide the dollar value of line losses for the various lines that could be used to deliver power to the points of delivery.

12.0 Reference: Exhibit B-1, Appendix A, p. 1-43
Certain Rights

"Teck American Limited may also be a party for purposes of transferring its interest in certain rights pertaining to the Waneta Dam."

12.1 Please describe the interests in certain rights referred to in the above quotation.

12.2 Are there other rights or interests held by Teck or others that will not be part of the acquisition?

13.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Operating Agreement

BC Hydro states "If it proceeds with the Waneta Transaction, BC Hydro would enter into a co-ownership and operating agreement with Teck (Operating Agreement) that obliges BC Hydro to pay its share of water rentals, insurance, maintenance, operating and sustaining capital costs and non-sustaining capital costs undertaken in accordance with the Operating Agreement".

13.1 Confirm that BC Hydro's share of water rentals, insurance, maintenance, operating and sustaining capital costs and non-sustaining capital costs will be one-third or less of the total amounts for such costs. If BC Hydro's share of the costs will be more than one-third, provide the percentage of BC Hydro's share of the total amount of such costs and an explanation for the percentage.

13.2 If Teck is to be reimbursed for certain expenses that it incurs on a unilateral basis as operator of the Waneta Assets and that reimbursement of other expenses would depend upon BC Hydro's consent to the expenditure, please provide a listing of these certain expenses and their amounts for the last five years and the forecast amounts for the next five years.

13.3 As an expenditure schedule does not exist for the Operating Agreement, please provide a detailed forecast of all expenditures under the Agreement for the next five years.

14.0 Reference: Exhibit B-1, Appendix A, p. 9-43
Appendix 2 Indicative Terms of the Co-ownership and Operating Agreement

14.1 Please provide an explanation of how the regulatory process for capital plans and operation and maintenance plans expenses in revenue requirements will be applied under the Operating Agreement.

14.2 As the Operator, Teck has the ability to hire an independent third party to resolve disagreements, does BC Hydro anticipate the Commission approving any dispute resolution? If not, why not?

14.3 Would the matters that require unanimous approval of the Operating Committee be filed with the Commission?

14.4 The Manager is appointed by the Operating Committee and the first Manager is FortisBC. Please explain how BC Hydro will file the billings for monthly billing for estimated ownership, operating, and maintenance costs and sustaining and non-sustaining capital costs expected to be incurred in the following month with the Commission to be included in its Revenue Requirements Application.

15.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Plant Physical Condition

BC Hydro understands from Teck that the Waneta facility is in good condition for the age of the plant. The facility has had a number of upgrades and life extensions in recent years, including:

- Units 1, 2, 3 and 4 had their turbine runners replaced in 2002, 2003, 1995 and 2007, respectively;
- Coincident with the turbine runner upgrade work, Units 1, 2 and 4 underwent major life extension work including: re-sleeving of wicket gates, new wicket gate bushings, refurbishment of bottom rings, head cover and operating rings, generator stator rewinds, new static excitation systems and new governor control systems; and Unit 3 had its generator stator rewound; and
- The generating plant substation was completely re-built in 2007.

15.1 As part of its due diligence, has BC Hydro engaged or will it engage an independent third party to perform the condition assessment evaluation and appraisal of assets? If not, why not. If so, please identify the third party and provide a copy of the report.

15.2 Is the cost of any additional experts already included in the transaction costs or are these costs in addition to the transaction costs.

15.3 What was the cost of replacing the turbine runner on Unit 3 in 1995?

15.4 Please provide a listing of the assets involved in the transaction, the condition of the asset, the remaining life and estimated replacement cost.

16.0 Reference: Exhibit B-1, Chapter 3, pp. 3-3, 3-4
Operating Agreement

"Commencing in 2036, BC Hydro and Teck would receive their proportionate share of the generation from the Waneta Assets with all risks and benefits of actual performance from the Waneta Assets being shared pro rata unless agreed otherwise."

16.1 Please provide an explanation of the differences in the terms of the Operating Agreement that could occur pre-December 2035 and post-December 2035.

17.0 Reference: Exhibit B-1, Appendix A, p. 23-43
Transmission after 2035, (f) Contribution to Operating Costs

Before 2036, Teck is to be responsible for all sustaining capital, operations and maintenance costs of Line 71, after which BC Hydro is pay Teck one-third of all sustaining capital, operations and maintenance expenditures incurred by Teck in connection with Line 71 from and after January 1, 2036.

17.1 Please provide estimates of forecasts/budgets for following 3 years of operations and maintenance costs and 5 years of sustaining capital costs for Line 71.

18.0 Reference: Exhibit B-1, Appendix A, p. 23-43
Acquisition of Remaining Interest and Line 71

If BC Hydro acquires Teck's two-thirds interest in Waneta Dam, BC Hydro would have a right to purchase Line 71 and other Teck transmission facilities related to Waneta Dam (but not the smelter), to the extent those other transmission facilities were not required by Teck, subject to assuming Teck's contractual commitments to third parties respecting access to and use of Line 71 and such other transmission facilities.

18.1 Please provide an estimate of the current cost, taking into account the age of the assets, to acquire the remaining two-thirds interest in the Waneta Dam at the present time and in 2036.

18.2 Please provide an estimate of the current cost, taking into account the age of the assets, to acquire the Line 71 and other Teck transmission facilities related to Waneta Dam at the present time and in 2036.

18.3 Please provide a listing of Teck's contractual commitments to third parties respecting access to and use of Line 71 and such other transmission facilities.

19.0 Reference: Exhibit B-1, pp. 1-3, 6-19
Acquisition of Assets from Teck

Page 1-3 of the Application states that the opportunities offered by the Waneta Transaction, particularly in regard to the acquisition of the assets, were sufficiently distinctive that a competitive tendering process would not have been useful. On page 6-19, the Application states that BC Hydro has a number of attributes that would suggest it would be the most logical party to acquire an interest in Waneta, including its existing arrangements under the CPA.

19.1 Please provide further details on the distinctive opportunities that, in BC Hydro's view, rendered a competitive tendering process not useful.

19.2 BC Hydro and Teck were in bilateral negotiations that preceded the signing of the Term Sheet in June 2009. Was this format, as opposed to competitive bidding, the format preferred by BC Hydro? Please explain.

19.3 FortisBC currently operates the Waneta Assets under the Canal Plant Agreement existing arrangements. FortisBC is also a purchaser of Teck's surplus power. To the best of BC Hydro's knowledge, has Teck approached FortisBC as an alternative purchaser of the Waneta Assets?

19.3.1 In section 6.5 of the Application, BC Hydro discusses whether it has paid a 'fair' price to acquire the Waneta Assets in light of their value to Teck. Is the definition of fair price substantially similar to the 'market value' described on line 26 at page 6-15? If not, please explain.

20.0 Reference: Exhibit B-1, p. 2-2
Plant Capacity and Generating Capability

20.1 Assuming that all units of the Waneta facility have been upgraded to the current 493 MW, what would have been the average annual generating capability for the 60-year stream flow record from 1948 to 2008?

20.1.1 Please explain if, and how, stream flows are affected by any large power developments or Treaty provisions over the years.

21.0 Reference: Exhibit B-1, pp. 2-10, 2-14
Waneta Expansion Project (WEP)

The Application states that CPC/CBT are currently planning an expansion to the Waneta project. If the WEP proceeds, it would allow energy generation from water that would otherwise be spilled and improve the overall efficiency of power generation at Waneta.

21.1 Would the improved efficiency of power generation at Waneta lead to improved average annual generating capability and in turn, more firm energy for BC Hydro from its acquisition of a one-third interest in the Waneta Assets? How would the improved capability be netted out by the WEP energy entitlement?

22.0 Reference: Exhibit B-1, p. 2-15

The Application states that the WEP would be included in the CPA and the project's operation would be coordinated by BC Hydro, and that the dispatch of generation at Waneta and WEP would be closely coordinated.

22.1 What is the relationship between BC Hydro and the WEP being proposed for development by CPC/CBT (e.g. EPA)? Would BC Hydro still consider acquiring power from the WEP after it acquires one-third of the Waneta Assets?

22.2 What is the status of formal amendments to the CPA to accommodate the WEP? Discuss if the terms of the amended CPA could report the value to BC Hydro of the Waneta purchase.

23.0 Reference: Exhibit B-1, pp. 3-1, 3-6, 6-16, 6-17
Surplus Power to Teck

23.1 Please provide the annual sale of power by Teck for the period 1999 to 2008, by volume and by value. Where the value includes environmental attributes, transmission wheeling costs, and other cost/revenue, please specify.

23.2 Please provide the monthly sale of power by Teck for the years 2008 and 2009, by volume and by value. Where the value includes environmental attributes, transmission wheeling costs, and other cost/revenue please specify.

23.3 Please provide a breakdown of power sales by major buyer (e.g. US wholesale power markets, FortisBC, Powerex, Alberta, etc.) for 2007 and 2008.

23.4 Please comment on the extent of Teck's sale which was a result of surplus entitlement and the proportion which was a result of market trading activities as a result of surplus capacity.

24.0 Reference: Exhibit B-1, p. 3-6
Entitlement Adjustments

The Application states that the Operating Terms would contemplate a series of entitlement adjustments until at least December 31, 2035 designed to ensure that Teck would have sufficient energy to serve the Industrial Load in all months.

24.1 Please provide the monthly requirements of Teck's industrial load, if available.

24.2 Does Teck's industrial load have priority over BC Hydro's peak load?

24.3 Please confirm that under the Waneta Transaction, the WEP has priority rights to water that would reduce the CPA energy entitlement and that furthermore, Teck has priority rights for its industrial load.

25.0 Reference: Exhibit B-1, p. 4-1
BC Hydro's 2008 Load Forecast Update

25.1 Please confirm that the Evidentiary Update in the 2008 LTAP (Exhibit B-10) was filed with the Commission on December 22, 2008 and that the underlying assumptions with respect to economic growth were updated by Exhibit B-18 of the same proceeding.

25.1.1 Please provide a current forecast to the values in Exhibit B-18 of the 2008 LTAP proceeding, if available. Please comment if the current forecasts of real GDP growth rates are different from those values shown in Exhibit B-18. If so, would it change the values in Table 4-1?

25.2 Is the 2008 Annual Load Forecast completed? Are the mid-forecasts for energy (GWh) and peak (MW) values identical to the Evidentiary Update referred to above? (X-reference: 2008 LTAP proceeding, Exhibit B-12 BCUC IR 3.237.1)

25.3 Please repeat Table 4-1 by showing all years between F2009 to F2028.

25.4 Please provide, for comparison purposes, the following:

	2008 Peak (MW)	2009 Peak (MW)	2008 Energy (GWh)	2009 Energy (GWh)
2007 Annual Load Forecast				
2008 Annual Load Forecast				
Actual Normalized (2008) Annualized (2009)				

25.5 Please repeat the above table for energy sales disaggregated by customer group: residential, commercial and industrial.

25.6 Please provide the basis of BC Hydro's assumption that the continued deterioration of domestic customer demand is a relatively short-term market condition.

26.0 Reference: Exhibit B-1, pp. 4-3, 4-4
Figures 4-1 and 4-2

26.1 Please provide the data used to create Figures 4-1 and 4-2 in tabular format. Please also supply the data in a workable electronic spreadsheet.

26.2 Please confirm if the attrition expectation is the only source of discrepancy between the load/resource balances presented in Figures 4-1 and 4-2 in this Application and the load/resource balances of the 2008 LTAP.

27.0 Reference: Exhibit B-1, pp. 4-5, 4-6
Load Resource Balances Prior to Adding Waneta Transaction

27.1 Please provide the data used to create Figures 4-3 and 4-4 in tabular format. Please also supply the data in a workable electronic spreadsheet.

27.2 Please explain in detail the differences (if any) between the load forecasts with DSM, the supply stack components and the load/resource gap between Figures 4-3 and 4-4 in this Application with the Base Resource Plan as presented in 2008 LTAP proceeding Exhibit B-10 Figures and Tables.

28.0 Reference: Exhibit B-1, pp. 4-7, 6-12
Waneta Transaction Effect on Load/Resource Gap & Demand Side Measures' Priority over Waneta Transaction

"*In the near term of the planning horizon, BC Hydro identified, in the 2008 LTAP, a planning firm energy deficit in F2013 and F2014 of 200 GWh and 500 GWh, respectively, based on its mid load forecast. As shown in Figure 4-5, BC Hydro's Waneta electricity, along with the increase in expected energy from Independent Power Producers (IPPs) described in section 4.1.2, would serve to eliminate that identified shortfall.*"

28.1 Please confirm that pursuant to B.C. Government's Special Direction No. 10 (SD 10), BC Hydro does not have to meet the self-sufficiency requirement until 2016. If confirmed, does this mean that the gap in F2013 and F2014 could be met by market transactions?

28.2 In BC Hydro's view, could the load forecast gap in the near term of the planning horizon (i.e. F2013 and F2014) be filled by: (a) ramping up DSM programs, (b) reliance on Burrard for the shortfall, and/or (c) imports?

29.0 Reference: Exhibit B-1, p. 4-10
Waneta Transaction Effect on High Load Forecast and Contingency Events

29.1 Given the global financial crisis in 2008 and subsequent economic recession, what is the probability of the high load forecast scenario?

29.2 Please explain if, and how, the completed Waneta Transaction would affect Site C as an option in the Contingency Plan.

30.0 Reference: Exhibit B-1, p.5-2
GHG Offset Cost Scenarios

In the 2008 LTAP, BC Hydro adopted a scenario approach to assess the impact of GHG regulation and GHG offset variability. It relied on an independent consultant, Natsource, to develop GHG scenarios and price forecasts. In this Application, BC Hydro continues to rely on its market assessments with respect to GHG offset costs, natural and electricity price forecasts that were set out in the 2008 LTAP.

30.1 Subsequent to the filing of the LTAP application with the Commission, have there been new legislative developments in the provincial and federal governments, and U.S. jurisdictions that could have (i) altered the risk profile of resource alternatives and/or (ii) affected the probabilities assigned to natural gas and electricity price forecasts?

31.0 Reference: Exhibit B-1, pp. 5-15 to 5-24
UEC and Attributes Comparison

31.1 Please compare the UECs and attributes of Waneta Transaction electricity with WEP power acquisition. If necessary, please provide the information on a confidential basis.

32.0 Reference: Exhibit B-1, p. 6-3
Optimum Sequence Portfolio Analysis

The Application states that the portfolio analysis in this section is consistent with, and uses the same modeling tools as, that presented in chapter 5 of the 2008 LTAP.

32.1 Please explain if the portfolio analysis in section 6.2.2 includes estimated incremental revenue that would result from the sale of the clean or renewable electricity from the Waneta Electricity or from the BC Hydro system. If yes, please provide the values and underlying assumptions used.

32.2 Has BC Hydro modeled both the carbon tax and the GHG offset requirements on natural gas-fired resources or either one without the other?

33.0 Reference: Exhibit B-1, pp. 6-3 and 6-5
Portfolio Analysis

33.1 Please provide the resources selected, the sequence, the capacity (installed and dependable), and energy (total and firm) for the two portfolios in the analysis – with and without Waneta Electricity.

33.2 Please provide the present values of the two portfolios, with and without Waneta Electricity.

34.0 Reference: Exhibit B-1, p. 6-6 to 6-8
Rate Impact

34.1 Please update the LTRIF as filed in the 2008 LTAP assuming the inclusion of the Waneta Transaction in the incremental revenue requirements analysis.

35.0 Reference: Exhibit B-1, pp. 5-11, 6-5
Discount and Exchange Rates

In section 5.2.5.2, BC Hydro states that the assumed 8 percent nominal discount rate aligns with its current definition of equity.

35.1 Please provide a summary of the calculation that resulted in this number, clarify whether the 8 percent is representative of its cost of capital or of equity, and discuss the impact that material changes in the Commission's generic ROE formula could have on the discount rate.

35.2 What exchange rate was used for the years 2010-2027 in Table 6-3?

35.2.1 Please reproduce Table 6-3 using a US dollar exchange rate of $0.93US to the Canadian dollar.

36.0 Reference: Exhibit B-1, pp. 3-6 to 3-9, Chapter 6

36.1 In Table 3-1, please explain why the capacity to BC Hydro drops from 249 MW to 162 MW for 2036 and beyond.

36.2 Use the energy and capacity volumes in Table 3-1 to generate a side-by-side comparison of Waneta costs and attribute values over the long term. The quantity and unit volume assigned for each attribute should be identified, and the source of each quantity and unit value number should be explained. Please provide a functioning spreadsheet that shows the information for each of at least 40 years, and discounts the total for each year at 8 and 10 percent nominal discount rates.

36.2.1 Please repeat Table 3-1 and the previous question assuming all years are high rate years.

36.2.2 Please repeat Table 3-1 and the previous question assuming all years are low rate years.

36.2.3 Please repeat Table 3-1 and the previous question assuming all years are critical water rate years.

36.3 In Table 3-2, please explain whether the "BC Hydro's Expectation of Teck's Reduction in Entitlement Usage" numbers have been reviewed with Teck, and whether Teck is in agreement with these numbers.

37.0 Reference: Exhibit B-1, Chapter 2, Physical, Historical and Commercial Context, sec. 2.1.1 Plant Physical Condition, pp. 2-2 to 2-3

37.1 BC Hydro refers to several recent upgrades and life extensions at the plant. For each of the replacements and upgrades referenced, please provide an approximate age of the asset at the time it was upgraded or replaced and an approximate cost of the upgrade or replacement. If this information is not available from Teck, please provide other reference points that would allow the Commission to understand the typical level and frequency of sustaining capital expenditures for the plant to date.

38.0 Reference: Exhibit B-1, Chapter 2, Physical, Historical and Commercial Context, sec. 2.4 pre-existing Surviving Contractual (Other) Arrangements, pp. 2-12 to 2-15

38.1 BC Hydro has developed water use plans for most of its hydroelectric facilities. Has Teck developed a water use plan for Waneta?

38.2 Does BC Hydro expect to undertake a water use plan for Waneta as a result of its acquisition of an interest in the plant?

38.3 Is there any likelihood a water use plan would be required by the Shareholder or expected by stakeholders / agencies as a result of the acquisition by BC Hydro? Could this affect future water allocation to the plant?

39.0 Reference: Exhibit B-1, Chapter 2, Physical, Historical and Commercial Context, sec. 2.2.2.3, Canal Plant Agreement, pp. 2-93 to 2-10

39.1 BC Hydro states that under the Canal Plant Agreement (CPA), the owners of non-BC Hydro projects receive monthly entitlements to energy and capacity that are derived from the estimated average annual generation capability of their projects, and that the difference between actual generation and contractual entitlement is received by (or the responsibility of) BC Hydro.

39.2 Does this mean that BC Hydro effectively already receives the benefits of intra-month dispatching capability of the projects? Explain.

39.3 In its evaluation of the value (cost-effectiveness) of the acquisition of its one-third ownership of the Waneta facility, please explain how BC Hydro has accounted for (and deducted) the value it currently receives from the plant, if any, under the CPA.

40.0 Reference: Exhibit B-1, Chapter 3 Commercial Arrangement, Sec. 3.3.3.5, Delivery of Capacity and Energy under the Waneta Transaction, pp. 3-6 to 3-9

40.1 Are the energy and capacity volumes in Table 3-1 average or firm volumes?

40.2 Please explain the calculation of firm energy and capacity volumes? Please demonstrate how the method used to calculate firm energy and capacity from Waneta is consistent with the method for firm energy and capacity from BC Hydro's heritage assets.

40.3 Please describe what BC Hydro's non-firm entitlement would be, if any.

41.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.1, BC Hydro's Waneta Electricity, p. 5-15

In the first paragraph of this section BC Hydro states the levelized unit cost of energy being incurred as a result of the Transaction, including future operating costs and the effects of time of delivery that would result from applying the Energy Weighting Factors presented in an earlier section is $63.1/MW.h based on an eight percent discount rate and $78.6 / MWh based on a ten percent discount rate.

41.1 Please explain the difference between the values quoted in the text above and EAPs highlighted in Table 5-7.

41.2 Please file a working excel spreadsheet with the detailed calculations of the EAP, clearly showing all components of this calculation, including assumptions for and treatment of the capital costs of the transaction, operating costs, annual capacity and energy supply assumptions over the 40-year amortization, the firm and non-firm components of energy and capacity, the application of the Energy and Capacity Weighting Factors to the output, the adjustment for losses and Cost of Incremental Firm Transmission (CIFT) to the Lower Mainland, and the economic value of environmental attributes.

41.3 BC Hydro has used a 40-year amortization period. What allowance was made for future capital costs on ongoing maintenance and refurbishment given the current age and state of the facilities.

42.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.2.1, BC Hydro's F2006 Call for Tenders, pp. 5-16 to5-17

42.1 Please explain the derivation of the CPI escalator in Table 5-6.

43.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.2.2, Alcan 2007 EPA, p. 5-18

43.1 Please explain the derivation of the EAP's for the Alcan 2007 EPA in Table 5-10. Are these for the firm component only?

44.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.2.4, Combined Cycle Gas Turbines, pp. 5-19 to 5-20

44.1 Please reconcile the EAP's for the CCGT scenarios in Table 5-12 with those filed in the 2008 LTAP. What changes were made in assumptions for these calculations compared with those filed in the 2007 LTAP.

45.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.2.2, Optimum Sequence Portfolio Analysis, pp. 6-3 to 6-6

45.1 Please provide a working excel spreadsheet that calculates the net benefits outlined in Tables 6-2 and 6-3. Please ensure the spreadsheet reflects the intra- and inter-year assumptions used in the calculations, the supply and cost assumptions used in the base portfolio analysis (i.e. portfolio without Waneta), and the supply, cost and other benefits assumptions used in the Waneta portfolio analysis. Include the market price assumptions used for surplus sales / purchases and any scenarios BC Hydro has evaluated.

45.2 Please provide a table summarizing the load / resource balance assumptions for the, with and without, Waneta portfolios by year, and the main differences in the sources of supply between the two portfolios by year.

45.3 Please describe and explain what level of sustaining capital for Waneta BC Hydro has assumed in its economic analysis.

45.4 Please describe and explain the value of capacity assumptions BC Hydro has used in its portfolio analysis.

45.5 Please confirm the operating, maintenance and sustaining capital cost assumptions used in the analysis. What method / data sources were used to estimate these expenditures? Was any real escalation in expenditures assumed? Given BC Hydro has conducted an analysis in nominal dollars, has BC Hydro assumed at a minimum nominal escalation in its share of operating, maintenance and sustaining capital costs over the period of analysis? If not, why not?

45.6 Please confirm whether BC Hydro has included any terminal value for Waneta or other projects in this analysis beyond the 18-year analysis period.

45.7 Has BC Hydro included any intra-month scheduling value for Waneta in its economic analysis? Please explain whether and how this value is an incremental value relative to the benefits BC Hydro derives under the current Canal Plant Agreement.

45.8 Has BC Hydro included in its economic analysis any costs or benefits associated with the proposed Surplus Power Rights Agreement?

46.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.3, Analysis of Estimated Rate Impacts, pp. 6-6 to 6-8

46.1 Please provide a working excel spreadsheet showing the underlying calculation of incremental rate increases / decreases in Figure 6-1.

46.2 Please provide a present value calculation of the incremental annual increases and decreases in the revenue requirement to F2027 under an 8 percent and 10 percent discount rate.

47.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.4.1 Schedule and Timing Availability, p. 6-9

47.1 BC Hydro states the Waneta resource is the only available within BC to fill a resource shortfall in F2013 and F2014. Please confirm the government's self-sufficiency requirement takes effect F2016. Does BC Hydro consider it should pay any premium to acquire a domestic resource prior to this requirement?

48.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.4.2, Term, p. 6-9

48.1 Does BC Hydro have any explicit evidence concerning the expected remaining useful life of the assets to be acquired?

49.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.4.3, Energy and Capacity Reliability, p. 6-9

49.1 BC Hydro suggests the energy and capacity portions of BC Hydro's Waneta Electricity are both physically and financially firm. Would there be situations where Teck could be making up shortfalls with market purchases from outside B.C.? If so, how is the full firm energy and capacity assumed by BC Hydro consistent with SD10?

49.2 Please provide an estimate of the firm energy and capacity associated with the resource post 2035 under current water allocations and historical flows (after the Waneta Upgrade Project) after Teck's obligation to assume both unit reliability risk and force majeure risk is removed.

50.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.4.9, Alignment with Government Policy Objectives, p. 6-12

50.1 BC Hydro cites government energy objectives and specifically refers to the government's objective to encourage public utilities to reduce GHG emissions. BC Hydro suggests that with this transaction BC Hydro would secure additional electricity that does not emit GHG's. Given this supply already exists and is presumably displacing supplies in other jurisdictions, does the acquisition result in any net reduction in GHG within the WECC? Is it BC Hydro's position that the government's energy objectives apply only to emissions within BC and that effects beyond BC are irrelevant such that the Commission should not weigh them in comparing the public interest impact of two alternatives with different global GHG impacts?

51.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.5, Teck's Opportunity Cost, pp. 6-13 to 6-20

51.1 Please file in confidence any analysis RBC Capital Markets conducted for BC Hydro regarding Teck's financial situation, the value of the assets to Teck or another purchaser (including cost of capital assumptions), and the optimal structure of the transaction.

51.2 Please file in confidence a working spreadsheet showing the calculation of values provided in Table 6-4 and included all input assumptions.

52.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.6, Risk Analysis, pp. 6-13 to 6-27

52.1 Please confirm what discount rate and term was used to derive the Present Values in Table 6-5.

52.2 BC Hydro indicates the Operating Agreement would contemplate thresholds on operating and sustaining costs that can be incurred at the plant above which BC Hydro would have to be in agreement for the costs to proceed. While this appears to give BC Hydro some control over decisions, please explain how it would reduce the risk to ratepayers arising from a real need to increase operating and sustaining capital requirements to maintain the physical asset.

52.3 Has BC Hydro included any explicit allowance, over and above normal operating and sustaining capital expenditures, to resolve the cavitation issues on Unit 3 in its economic analysis, or a sensitivity analysis?

52.4 Please explain why a 10 percent increase in sustaining capital, operating expenses, and water rentals over the life of the transaction is a realistic representation of risk to ratepayers.

52.5 Please compare the real levelized sustaining and operating expenditures (on a $/MWh of average energy basis) assumed by BC Hydro in its base case analysis of the economic value of the transaction to the current average sustaining and operating expenditures on BC Hydro's heritage assets (on a comparable $/MWh of average energy basis).

53.0 Reference: Exhibit B-1, Chapter 7 Aboriginal Consultation

In 2003, the British Columbia Environmental Assessment Office ("EAO") issued an environmental assessment certificate for the Waneta Hydroelectric Expansion Project. The Assessment Report prepared by the EAO describes the First Nations setting and discusses the potential effects of the project on asserted aboriginal rights and title.

53.1 Please provide a copy of the EA certificate decision and all documents related to the EA certificate decision.

53.2 Please confirm whether or not the documents related to the EA certificate decision were considered in assessing the strength of asserted aboriginal claims in the vicinity of the Waneta dam.

53.3 Based on the documents related to the EA decision and evidence filed, provide BC Hydro's preliminary assessment of the strength of the aboriginal claims in the vicinity of the Waneta dam. Based on this assessment, what is BC Hydro's opinion on the scope or content of the Crown's duty to consult?

53.4 Please outline the process and associated timelines for consulting First Nations about the proposed Waneta Transaction Application.

53.5 Has BC Hydro notified the affected First Nations of the current regulatory timetable and their right to intervene in this hearing process? If so, please advise as to the timing, nature and method of notification.

53.6 Have any of the affected First Nations advised that they are not able to work within the current regulatory schedule set by the Commission or the balance of the regulatory schedule proposed by BC Hydro in the application?

53.7 Does BC Hydro anticipate that further consultation or accommodation efforts to maintain the honour of the Crown may be required with affected First Nations after either the close of the evidentiary phase of the this hearing process or the release of the Commission's decision. Please explain. If so, what, if any, further regulatory or ministerial approval(s) will be required by BC Hydro after the release of the Commission's decision? For the purpose of this request, please assume the decision approves the application and is released in December 2009?

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

1.1.1 On page 6-1, BC Hydro states that the purchase of a one-third interest in the Waneta Assets is more analogous to a BC Hydro-built resource than an EPA acquisition. Please explain why the acquisition was better structured as an asset purchase rather than a long term power purchase or a power purchase with a transfer of assets to BC Hydro in 2036, including a discussion of relevant cost, risk and reliability factors under each option.

RESPONSE:

The Waneta Transaction was structured to meet two fundamental conditions of the parties: (1) to allow Teck to monetize the value of an asset; and (2) to provide BC Hydro with a new source of electricity while adequately managing counterparty risk.

As stated in section 6.5.1 of the Filing, Teck initially indicated a preference to pre-sell its generation for a defined period in return for an upfront payment, while retaining ownership of the Waneta Assets for the long term. BC Hydro was unwilling to proceed on that basis because it could not identify a means to obtain sufficient security to ensure that it would receive all the energy that it was entitled to in future years. Accordingly, BC Hydro insisted on acquiring an interest in the Waneta Assets themselves.

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

1.1.2 Please confirm that BC Hydro intends to purchase a one-third undivided interest in the Waneta Assets and to include the expenditure in its equivalent of rate base.

RESPONSE:

Confirmed.

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

1.1.3 Please explain how the purchase will be funded, particularly identifying the portions that will be funded by debt and by equity, and the source of the equity investment. What will be the impact on BC Hydro's total equity for rate making purposes?

RESPONSE:

It is anticipated that the $825 million purchase price and estimated $25 million transaction cost, for a total of $850 million, will be funded through some combination of incremental short and long-term debt. Based on current market conditions, BC Hydro expects this debt to have a blended cost of approximately 3.4 per cent with an annual cost in F2011 of approximately $29 million.

BC Hydro's deemed equity for rate making purposes would increase by approximately $255 million due to the Waneta Transaction. ($850 million x 30 per cent).

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

1.1.4 The draft order in Appendix B refers to an acquisition from Teck Metals Ltd., while the Master Term Sheet in Appendix A was executed by Teck Resources Limited and Teck Metals Ltd. Please clarify who currently owns each significant component of the Waneta Assets.

RESPONSE:

BC Hydro understands that Teck Metals Ltd. is the owner of all the Waneta Assets (with the exception of the Federal Energy Regulatory Commission license held by Teck American Limited). Teck Resources Limited (the parent company of Teck Metals Ltd.) is a signatory to the Master Term Sheet since it will guarantee certain obligations of Teck Metals Ltd. and Teck American Limited under the proposed Asset Purchase Agreement.

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

Relative to the proposed ownership structure for the Waneta Assets after the purchase by BC Hydro, please discuss the pros and cons of each of the following ownership structures:

1.1.5.1 Waneta Assets owned by a single purpose company, with BC Hydro holding one-third of the shares of the company;

RESPONSE:

Under this structure, since Teck would be a majority shareholder, there would be increased risk to BC Hydro's interest if Teck were to become insolvent over the life of the Waneta Dam. As well, there would be tax and other costs to Teck if it were to hold its interest in the Waneta Dam through a separate company. In the case of BC Hydro, it would lose tax and other benefits if it were to hold its interest through a separate single purpose company.

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

Relative to the proposed ownership structure for the Waneta Assets after the purchase by BC Hydro, please discuss the pros and cons of each of the following ownership structures:

1.1.5.2 The Waneta Assets held by a limited partnership that is jointly owned by Teck and BC Hydro.

RESPONSE:

Under a limited partnership structure, the limited partnership would be entitled to the Waneta output and would normally sell it to earn a profit that would be allocated to the partners. Since each of Teck and BC Hydro wish to receive their respective shares of Waneta output directly, to use as they see fit, this structure would not likely meet the parties' commercial objectives.

For tax reasons, it is likely a limited partnership would need to be structured with Teck as the general partner, holding title to the Waneta Assets. In this case, there could be an increased risk to BC Hydro's interest in the Waneta Assets if Teck were to become insolvent over the life of the Waneta Dam. There could also be significantly greater transfer taxes if a trust declaration was filed to protect BC Hydro's interests.

If BC Hydro was a limited partner, it would enjoy limited liability. However, it would not be able to participate in the management of the partnership business without risking loss of limited liability.

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

Relative to the proposed ownership structure for the Waneta Assets after the purchase by BC Hydro, please discuss the pros and cons of each of the following ownership structures:

1.1.5.3 The Waneta Assets held by an unincorporated joint venture between Teck and BC Hydro; and

RESPONSE:

The co-ownership arrangements contemplated by the transaction structure and Co-ownership Operating Agreement are, in effect, an unincorporated joint venture between Teck and BC Hydro. Key advantages of this structure include a direct BC Hydro ownership interest that would be protected if Teck were to become insolvent over the life of the Waneta Dam. In addition, each Co-Owner has a direct interest in the Waneta Dam and receives a direct share of Waneta output and therefore tax and other cost benefits available to each party should apply.

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

Relative to the proposed ownership structure for the Waneta Assets after the purchase by BC Hydro, please discuss the pros and cons of each of the following ownership structures:

1.1.5.4 The Waneta Assets owned by Teck and leased in part to BC Hydro, with the BC Hydro lease converting to ownership in 2036.

RESPONSE:

From Teck's perspective, a key term of any transaction with BC Hydro was an upfront payment. A lease, unless prepaid, would not meet this requirement. BC Hydro considered transaction structures that involved an upfront payment and concluded that, other than an outright purchase, there was a risk to BC Hydro's interest if Teck were to become insolvent over the life of the Waneta Dam.

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

1.1.6 Please explain why the Application was filed for acceptance pursuant to section 44.2(3)(a) of the UCA.

RESPONSE:

BC Hydro has sought acceptance of this expenditure schedule under section 44.2(3)(a) because the Waneta Transaction represents a significant capital commitment and BC Hydro wishes to ensure that it will be permitted to recover a return on and of that capital and prudently incurred operating costs associated with that commitment. The Term Sheet makes clear that BC Hydro's obligation to proceed with the transaction is conditional on the BCUC acceptance of the filing pursuant to section 44.2(3)(a).

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

1.1.7 Section 44.2(4) of the UCA provides that the Commission may accept of reject part of a schedule. Please confirm that the Commission could, for example, accept the expenditure of $825 million to Teck and reject the $25 million transaction costs. Could the Commission reject a part of the $825 million expenditure to Teck? Please provide reasons.

RESPONSE:

The BCUC may accept whatever portion of these expenditures it considers to be in the public interest. However, BC Hydro has no obligation to complete the Waneta Transaction unless all of the expenditures contemplated by it are accepted to be in the public interest by the BCUC. If they are not, BC Hydro would exercise its right to reconsider its options with respect to the transaction.

1.0 Reference: Exhibit B-1, pp. 1-1, 6-1
Nature of Filing

1.1.8 Please discuss why the Application was filed under section 44 of the UCA rather than under 45 and 46.

RESPONSE:

BC Hydro has sought acceptance of the expenditures contemplated by the Waneta Transaction under section 44.2 of the *UCA* for the reasons set out in the response to BCUC IR 1.1.6.

BC Hydro does not believe that sections 45 and 46 of the *UCA* are applicable to the Waneta Transaction.

Section 46 of the *UCA* applies only to persons who are required to have a Certificate of Public Convenience and Necessity (CPCN) as provided by section 45. Section 45 provides that after September 11, 1980, "a person must not begin the construction or operation of a public utility plant or system, or an extension of either" without obtaining a CPCN. BC Hydro does not believe that the Waneta Transaction would require BC Hydro to either construct or operate a public utility plant or system or extension of either.

The Waneta Dam was constructed by Teck or its predecessors and has been operated by it ever since. The Waneta Transaction will have no effect on the role Teck plays with respect to this plant or system. Teck will still have constructed and will continue to operate <u>all</u> of the Waneta Dam. The acquisition by BC Hydro of an undivided one-third interest in that facility does not change this underlying fact and thus does not bring the transaction within the ambit of section 45 of the *UCA*.

2.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Transaction Costs

1.2.1 Provide a detailed breakdown of the expenditures that make up the $25 million in transaction costs.

RESPONSE:

BC Hydro has estimated $25 million in transaction costs. This amount is broken down as follows:

	($ million)
Property Transfer Tax / Provincial Sales Tax:	**17.0**
Financial Advisory Fees:	**4.5**
Consultants, Legal and Regulatory:	**3.5**
Total:	**$25.0**

2.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Transaction Costs

1.2.1.1 Provide the estimated regulatory costs by detailed category.

RESPONSE:

Regulatory costs are estimated at a high level to be up to $1 million. Based on BC Hydro's experience, such a cost estimate is not unreasonable and would cover costs such as BCUC costs and intervenor funding. The actual regulatory cost will depend entirely upon the nature of the regulatory review process, which is yet to be determined. For this reason it is not possible to provide any further detail or itemization of estimated regulatory costs.

2.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Transaction Costs

1.2.1.2 Provide the estimated First Nations consultation and accommodation costs.

RESPONSE:

First Nations consultation costs and accommodation costs, if any, are not included in the estimated transaction costs.

2.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Transaction Costs

1.2.2 Are there any cost items within the transaction costs for appraisals by independent third-party experts? If so, please provide an itemized description with the estimated cost for each.

RESPONSE:

BC Hydro has retained external consultants to assess or appraise specific factors of the Waneta facilities. In particular, environmental and engineering assessments by independent experts are expected to cost as follows:

Environmental and Public Safety Assessment by Golder Associates: $35,000 plus taxes

- **Through a review of available literature, a site visit and discussion with Teck officials, identify current and potential future environmental risks (regarding water quality, fish, wildlife and vegetation effects, and waste management issues) associated with the footprint, operations and maintenance of the Waneta Generating Station.**
- **Where the literature or available knowledge indicates, identify social issues or concerns including archaeological and public safety issues associated with the footprint, operations and maintenance of the Waneta Generating Station.**

Engineering Assessment by Klohn Crippen Berger: $182,000 plus taxes

- **Assessment of the existing condition of the Waneta Assets through a review of available documentation, interviews with key Waneta personnel and "walk through" inspection of the facility to specifically:**
  - **provide an independent opinion on the quality of the assets; focus will be on existing facilities and will concentrate on major assets;**
  - **identify known deficiencies of a systemic or specific nature (greater than $1 million);**
  - **assess the adequacy of existing maintenance practices; the assessment will focus on major assets and determine overall if the asset has been properly maintained;**
  - **prepare a schedule of required capital investments and annual maintenance expenditures required to maintain existing availability and reliability; and**

- **assess the performance of the dam with respect to Canadian Dam Safety Guidelines. Specifically, comment on the need to upgrade the dam to meet seismic standards in the future.**

2.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Transaction Costs

1.2.3 Are there any costs items based on the value of the transaction rather than on billing hours, etc.? If so, please identify the cost items and the estimated expense.

RESPONSE:

RBC Capital Markets (RBC) will be paid aggregate fees and costs to August 31, 2009 of $1 million. Commencing September 1, 2009, RBC will be paid a work fee of $50,000 for each month in which it performs a meaningful amount of work. If the transaction completes, RBC will be paid a success fee of $3.5 million, less the aggregate amount of the work fee paid to the completion date.

2.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Transaction Costs

1.2.4 Please provide the rational for the estimated transaction cost uncertainty of less than +/- $10 million.

RESPONSE:

BC Hydro is analyzing how the purchase price allocation impacts the tax expenditure on the Waneta Assets. Real property and fixtures are generally subject to provincial property transfer tax at two per cent and tangible personal property is generally subject to the provincial sales tax at seven per cent unless an exemption is available. Depending on how items are classified, the tax expenditures will change accordingly.

Consulting, legal and regulatory costs are estimates only. Actual costs could vary from estimates, depending on a number of factors.

In BC Hydro's view, these uncertainties are unlikely to lead to a variance from the $25 million that is greater than $10 million.

3.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Benefits to BC Hydro

1.3.1 While there are benefits to BC Hydro, Figure 6-1 shows a 2 percent rate increase as a result of the Waneta Transaction. Does this rate impact include on-going capital, operating and maintenance, sustaining capital and other costs?

RESPONSE:

Yes, the rate impact calculation includes all of these costs, which are offset by the reduction in the domestic cost of energy.

3.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Benefits to BC Hydro

1.3.2 BC Hydro suggests that there would be a rate decrease of 1.3 percent by 2027. What level of certainty is the rate decrease based upon?

RESPONSE:

BC Hydro is confident that by 2027 (and in all likelihood much sooner than that), rates will be lower if BC Hydro proceeds with the Waneta Transaction than if it does not. Moreover, the economic analysis provided in Chapter 6 of the Filing identifies Waneta as an economic supply source compared to available alternatives.

Calculation of the precise extent of any decrease in rates requires considerable speculation and while BC Hydro is confident that directionally the anticipated decrease in 2027 is correct, it is not possible to predict rate levels 18 years from now with any level of certainty.

4.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Undivided Interest

1.4.1 Provide an explanation of the definition of an undivided one-third interest in the Waneta Assets.

RESPONSE:

An undivided one-third interest means that BC Hydro will have a one-third interest in all of the Waneta Assets rather than a partitioned or separate interest in one-third of the Waneta Assets. Land Registered titles in the Land Title Office will show Teck as to an "undivided two-thirds interest" and BC Hydro to an "undivided one-third interest".

4.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Undivided Interest

1.4.2 If an undivided interest in real property is defined as real property held by two parties specifying the interests of each party by percentage, how does BC Hydro propose regulation be applied to the assets, capital works, sustaining capital, operation and maintenance requirements, etc.?

RESPONSE:

BC Hydro does not propose that the BCUC regulate anything other than the financial aspects of its investment in the Waneta Assets. As discussed in section 3.3.3 of the Filing, BC Hydro will not control sustaining capital investment, operating or maintenance at the Waneta Dam. BC Hydro asks that the capital and future expenditures contemplated in the transaction be accepted because of the receipt of the Waneta electricity that results from the expenditure of the funds. It does not ask that the undivided interest it intends to acquire in the Waneta Dam become a regulated asset.

4.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Undivided Interest

1.4.3 Please provide the percentage in related real property held by Teck, BC Hydro and Columbia Power as a result of the Waneta Expansion arrangement.

RESPONSE:

The real property included within the Waneta Assets is currently subject to a pre-paid option to purchase in favour of Waneta Expansion Power Corporation (WEPC). WEPC is the party proposing to develop the Waneta Expansion Project. If the Waneta Expansion Project proceeds, WEPC will be entitled to exercise its option and acquire the property needed for the Waneta Expansion Project.

In that case, WEPC will own 100 per cent of the acquired property and Teck (two-thirds) and BC Hydro (one-third) will together continue to own 100 per cent of the remaining property. The option to purchase in favour of WEPC will be discharged against the remaining property owned by Teck and BC Hydro.

5.0 Reference: Exhibit B-1, Chapter 1, p. 1-2
Due Diligence

BC Hydro has just started its due diligence relative to the dam and equipment condition. Additional information will be developed through the due diligence process prior to signing the definitive agreements.

BC Hydro is not aware of any safety or environmental concerns that would be an impediment to the Waneta Transaction (Exhibit B-1, Chapter 2, p. 2-4).

1.5.1 In Chapter 6, Teck has indicated that there is a need for additional anchoring of the dam and BC Hydro has included Teck's estimate of cost of that anchoring in its assessment of ongoing sustaining capital costs.

1.5.1.1 Please provide Teck's estimate of cost of anchoring and BC Hydro's estimate of the same.

RESPONSE:

Teck has provided an estimate of $12 million in 2014 to anchor the dam. BC Hydro's consultants, Klohn Crippen Berger (KCB), have determined this estimate to be more than adequate to anchor the dam based on similar work done elsewhere recently.

BC Hydro has reviewed, and is satisfied with, the methodology used by KCB.

BC Hydro's share of this expenditure would be $4 million as shown in the response to BCUC IR 1.13.3.

5.0 Reference: Exhibit B-1, Chapter 1, p. 1-2
Due Diligence

BC Hydro has just started its due diligence relative to the dam and equipment condition. Additional information will be developed through the due diligence process prior to signing the definitive agreements.

BC Hydro is not aware of any safety or environmental concerns that would be an impediment to the Waneta Transaction (Exhibit B-1, Chapter 2, p. 2-4).

1.5.1 In Chapter 6, Teck has indicated that there is a need for additional anchoring of the dam and BC Hydro has included Teck's estimate of cost of that anchoring in its assessment of ongoing sustaining capital costs.

1.5.1.2 Please explain why this anchoring cost is included as a sustaining capital cost and is not being deducted from the acquisition costs.

RESPONSE:

Under the Co-ownership and Operating Agreement BC Hydro will assume its proportionate one-third share of all operating and capital costs on a going forward basis. Therefore BC Hydro has included its portion of the expected expenditure on anchoring costs as a future sustaining capital cost.

BC Hydro included this expenditure in its determination of the price it was willing to pay to acquire the one-third interest in the Waneta Assets. This determination reflected the forecast market value of the acquired electricity minus the costs BC Hydro would incur to acquire that electricity, including the upfront payment plus ongoing capital, operating and other costs.

5.0 Reference: Exhibit B-1, Chapter 1, p. 1-2
Due Diligence

BC Hydro has just started its due diligence relative to the dam and equipment condition. Additional information will be developed through the due diligence process prior to signing the definitive agreements.

BC Hydro is not aware of any safety or environmental concerns that would be an impediment to the Waneta Transaction (Exhibit B-1, Chapter 2, p. 2-4).

1.5.2 BC Hydro is aware of cavitation problems on Unit 3 that limit its ability to operate in certain rough load zones. Teck continues to repair the cavitation damage on a yearly basis; this will be evaluated going forward with the potential of having to replace the runner in the future (Exhibit B-1, Chapter 2, p. 2-3).

1.5.2.1 Please provide an estimate of the cost of a runner replacement for Unit 3 and the approximate timing of the replacement.

RESPONSE:

Teck has provided an estimate of $4 million to replace the runner. No timetable has been set since the replacement would have to be justified in a business case. An appropriate time to replace the runner would be during the Unit 3 life extension work planned in 2014, which is estimated to have a total cost, including the runner replacement, of $12 million. BC Hydro's share of these costs ($4 million) is shown in the response to BCUC IR 1.13.3.

5.0 Reference: Exhibit B-1, Chapter 1, p. 1-2
Due Diligence

BC Hydro has just started its due diligence relative to the dam and equipment condition. Additional information will be developed through the due diligence process prior to signing the definitive agreements.

BC Hydro is not aware of any safety or environmental concerns that would be an impediment to the Waneta Transaction (Exhibit B-1, Chapter 2, p. 2-4).

1.5.2 BC Hydro is aware of cavitation problems on Unit 3 that limit its ability to operate in certain rough load zones. Teck continues to repair the cavitation damage on a yearly basis; this will be evaluated going forward with the potential of having to replace the runner in the future (Exhibit B-1, Chapter 2, p. 2-3).

1.5.2.2 Please explain if this runner replacement cost was included in the sustaining capital cost, or deducted from the acquisition costs and include the reasons for such treatment.

RESPONSE:

Under the Co-ownership and Operating Agreement BC Hydro will assume its proportionate one-third share of all operating and capital costs on a going forward basis. Therefore BC Hydro has included its portion of the expected expenditure on Unit 3 runner replacement costs as a future sustaining capital cost.

BC Hydro considered this expenditure in its determination of the price it was willing to pay to acquire the one-third interest in the Waneta Assets. Please refer to the response to BCUC IR 1.5.1.2.

6.0 Reference: Exhibit B-1, Chapter 6, p. 6-23
Operating Costs

1.6.1 "BC Hydro is acquiring a portion of an existing asset, and with that the obligation to pay the acquisition costs and its share of the operating and sustaining capital costs."

1.6.1.1 Provide the amounts for the previous five years for sustaining capital costs.

RESPONSE:

Please refer to the response to BCUC IR 1.13.2.

6.0 Reference: Exhibit B-1, Chapter 6, p. 6-23
Operating Costs

1.6.1 "BC Hydro is acquiring a portion of an existing asset, and with that the obligation to pay the acquisition costs and its share of the operating and sustaining capital costs."

1.6.1.2 Provide the amounts for the previous five years for operating costs (operations, maintenance and administration expenses) including asset management and maintenance fees, and service fees.

RESPONSE:

Please refer to the response to BCUC IR 1.13.2.

6.0 Reference: Exhibit B-1, Chapter 6, p. 6-23
Operating Costs

1.6.1 "BC Hydro is acquiring a portion of an existing asset, and with that the obligation to pay the acquisition costs and its share of the operating and sustaining capital costs."

1.6.1.3 Provide any capital expenditures at Waneta for the next five years after the post-2035.

RESPONSE:

At this point in time, capital expenditures at Waneta post-2035 are unknown. BC Hydro has included an allowance for $100 million (2008$) of sustaining capital expenditures in 2036 in its evaluation of the Waneta Transaction.

Please also refer to the response to BCUC IR 1.41.3.

6.0 Reference: Exhibit B-1, Chapter 6, p. 6-23
Operating Costs

1.6.2 BC Hydro would dedicate its one-third interest in the Waneta Dam to joint operation by the parties and Teck would dedicate its two-third interest in the Waneta Dam and its rights under the CPA to joint operation by the parties. Value of initial contributions:

Teck's contribution: $. [NTD: 2x purchase price]
BC Hydro's contribution: $. [NTD: purchase price]

1.6.2.1 Please provide an estimate of the BC Hydro's initial contribution to joint operations.

RESPONSE:

The referenced provision in the Term Sheet was intended to reflect the fact that Teck would commit its two-thirds interest and BC Hydro its one-third interest to the joint operation of the Waneta facilities. The value of BC Hydro's contribution in this regard is best reflected by the purchase price of $825 million.

7.0 Reference: Exhibit B-1, Chapter 3, p. 3-2
Price True Ups

1.7.1 However, due to entitlement scheduling flexibility allowed under the CPA, Teck's monthly and hourly reduction in entitlement usage may not correspond exactly on a month-to-month basis with its entitlement reduction.

1.7.1.1 Please provide an explanation for the true-up of sales for each of the super-peak, peak and off-peak hours by Teck to correspond exactly on a month to month basis with its entitlement reduction.

RESPONSE:

As discussed in section 3.3.3.5 of the Filing, the net result of the Waneta Transaction is that Teck would receive a reduced entitlement to energy and capacity after closing. Additional information on this impact is provided in the response to BCUC IR 1.39.3.

This entitlement reduction would provide BC Hydro firm energy on an annual basis. However, to determine the timing of when the benefits of Teck's reduced entitlement would accrue to BC Hydro, it is necessary to estimate:

- **How Teck would use, or dispatch, the entitlement energy that it would receive absent the Waneta Transaction; and**
- **How Teck would use, or dispatch, the reduced entitlement energy it would receive after the Waneta Transaction.**

The difference between these two entitlement dispatches provides the estimated reduction in entitlement usage by Teck and therefore an estimate of the increased energy available to BC Hydro in each time period.

The Canal Plant Agreement provides flexibility in how the Entitlement Parties use their entitlement energy on a monthly and hourly basis. Currently, prior to the Waneta Transaction, Teck uses this flexibility to shape its entitlement energy to the smelter load and to shape any surplus entitlement energy into the highest value months and hours to maximize the revenue it would receive from surplus sales and to optimize trading opportunities (purchase for re-sale).

After the Waneta Transaction, from closing until December 2035, both the characteristics of Teck's residual entitlement and its smelter demand dictate that the entitlement be dispatched as essentially a flat monthly delivery. From and after January 2036, Teck would be motivated to shape its residual entitlement to its smelter load, to reduce any purchases required to serve the smelter and to maximize the value of any remaining surplus entitlement sales.

The Excel workbook provided in the response to BCUC IR 1.41.2 provides a detailed true-up of reduced entitlement usage for each of the super-peak, peak and off-peak hours by Teck showing how such reduced usage corresponds exactly on a month to month basis with its entitlement reduction. The workbook shows BC Hydro's estimate of how Teck is expected to use the flexibility under the Canal Plant Agreement to schedule its entitlement, both before and after the Waneta Transaction, for each of the following time periods:

- **The sheet titled "Dispatch 1" provides both dispatches for the period from Closing until July 2013;**
- **The sheet titled "Dispatch 2" provides both dispatches for the period from August 2013 until July 2014;**
- **The sheet titled "Dispatch 3" provides both dispatches for the period from August 2014 until December 2035; and**
- **The sheet titled "Dispatch 4" provides both dispatches for the period from January 2036 on.**

The values quoted in Table 3-2 of the Filing for the month of September from January 2036 onward are not correct. The reduction in entitlement capacity should be 162.0 MW, and the reduction in entitlement usage adjusted for line losses should be 12,395 MWh for super peak hours, 37,184 MWh for peak hours and 7,331 MWh for light hours. In addition, for clarity, it should be noted that the entitlement capacity reductions accruing to BC Hydro in September that are shown in Table 3-2 would be reduced by 123.3 MW on up to 22 days for planned maintenance prior to January 2036 and would be reduced by 41.1 MW for any planned maintenance from and after January 2036.

7.0 Reference: Exhibit B-1, Chapter 3, p. 3-2
Price True Ups

1.7.2 In Table 5-6, please explain why there is no super-peak column.

RESPONSE:

Table 5-6 sets out the Capacity Weighting Factor (CWF) table. That table is one of the individual resource production valuation tools and, thus, is a reference tool for comparing various supply alternatives. The CWF is not a "price true up" as may be inferred from the reference heading to this IR and is not part of the commercial arrangement described in Chapter 3 of the Filing or used in the Master Term Sheet set out in Appendix A to the Filing.

As described in footnote 35 of the Filing, the capacity weighting factors are the same as those set out in the BC Hydro response to IPPBC IR 1.15.1 (Exhibit B-3) of the 2008 LTAP. As stated in that IR response, those factors are the indicative values that were established for the Clean Power Call. The two state (on-peak/off-peak) distinction is the same distinction that was used in the 2008 LTAP.

8.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Output of Turbines and BC Energy Plan, Electricity Policy 10

The Waneta facility has four Francis hydraulic turbines. The maximum output of the four turbines and generating units following recent unit upgrades is 493 MW at 63.2 m (207.5 feet (ft)) gross head or about 123 MW per unit. The hydraulic capacity of Waneta is about 932 meters cubed per second (m3/s) (32,900 cubic feet per second (cfs)). Following the unit upgrades, which increased plant capacity from 375 MW to the current 493 MW, the average annual generating capability of Waneta is now estimated at 3,021 GWh, based on the 50-year stream flow record from 1938 to 1988. Average annual generation over the recent period from 1987 to 2009 was 2,447 GWh.

1.8.1 Is the average annual generating capability of Waneta that is now estimated at 3,021 GWh, based on the average 50-year stream flow record from 1938 to 1988, or "most adverse sequence of stream flows occurring within the historical record" as required by the BC Energy Plan, Electricity Policy 10?

RESPONSE:

As indicated on page 2-2 of the Filing, the 3,021 GWh/year value is the average annual generating capability of Waneta based on the 50-year stream flow record from 1938 to 1988.

This number was provided for information only and is not intended to reflect the energy capability that BC Hydro would ascribe to its purchased interest in Waneta.

The firm energy capability that BC Hydro does ascribe to its purchased interest in Waneta is more fully set out in the responses to BCUC IRs 1.7.1.1, 1.39.3 and 1.40.2.

8.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Output of Turbines and BC Energy Plan, Electricity Policy 10

The Waneta facility has four Francis hydraulic turbines. The maximum output of the four turbines and generating units following recent unit upgrades is 493 MW at 63.2 m (207.5 feet (ft)) gross head or about 123 MW per unit. The hydraulic capacity of Waneta is about 932 meters cubed per second (m3/s) (32,900 cubic feet per second (cfs)). Following the unit upgrades, which increased plant capacity from 375 MW to the current 493 MW, the average annual generating capability of Waneta is now estimated at 3,021 GWh, based on the 50-year stream flow record from 1938 to 1988. Average annual generation over the recent period from 1987 to 2009 was 2,447 GWh.

1.8.1.1 If not, please provide the output based on the "most adverse sequence of stream flows occurring within the historical record".

RESPONSE:

The firm energy capability that BC Hydro will receive from the Waneta Transaction is provided in Table 3-1 of the Filing. Note that, as further explained in the responses to BCUC IRs 1.39.3 and 1.40.2, these values are determined from the reduction in Waneta Plant entitlement that Teck would receive after the Waneta Transaction is implemented, and would apply under any streamflow conditions.

For convenience, Table 3-1 of the Filing is replicated below:

Waneta Transaction Energy and Capacity Volumes to BC Hydro

	Prior to August 2013	**August 2013 to July 2014**	**August 2014 to December 2035**	**2036 and Beyond**
Energy (annualized GWh/year)	1,008	902	865	884
Capacity (December MW)	256	256	249	162

8.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Output of Turbines and BC Energy Plan, Electricity Policy 10

The Waneta facility has four Francis hydraulic turbines. The maximum output of the four turbines and generating units following recent unit upgrades is 493 MW at 63.2 m (207.5 feet (ft)) gross head or about 123 MW per unit. The hydraulic capacity of Waneta is about 932 meters cubed per second (m3/s) (32,900 cubic feet per second (cfs)). Following the unit upgrades, which increased plant capacity from 375 MW to the current 493 MW, the average annual generating capability of Waneta is now estimated at 3,021 GWh, based on the 50-year stream flow record from 1938 to 1988. Average annual generation over the recent period from 1987 to 2009 was 2,447 GWh.

1.8.1.2 Provide tables and graphs showing water entitlement and generator output for each of the average conditions and critical water conditions.

RESPONSE:

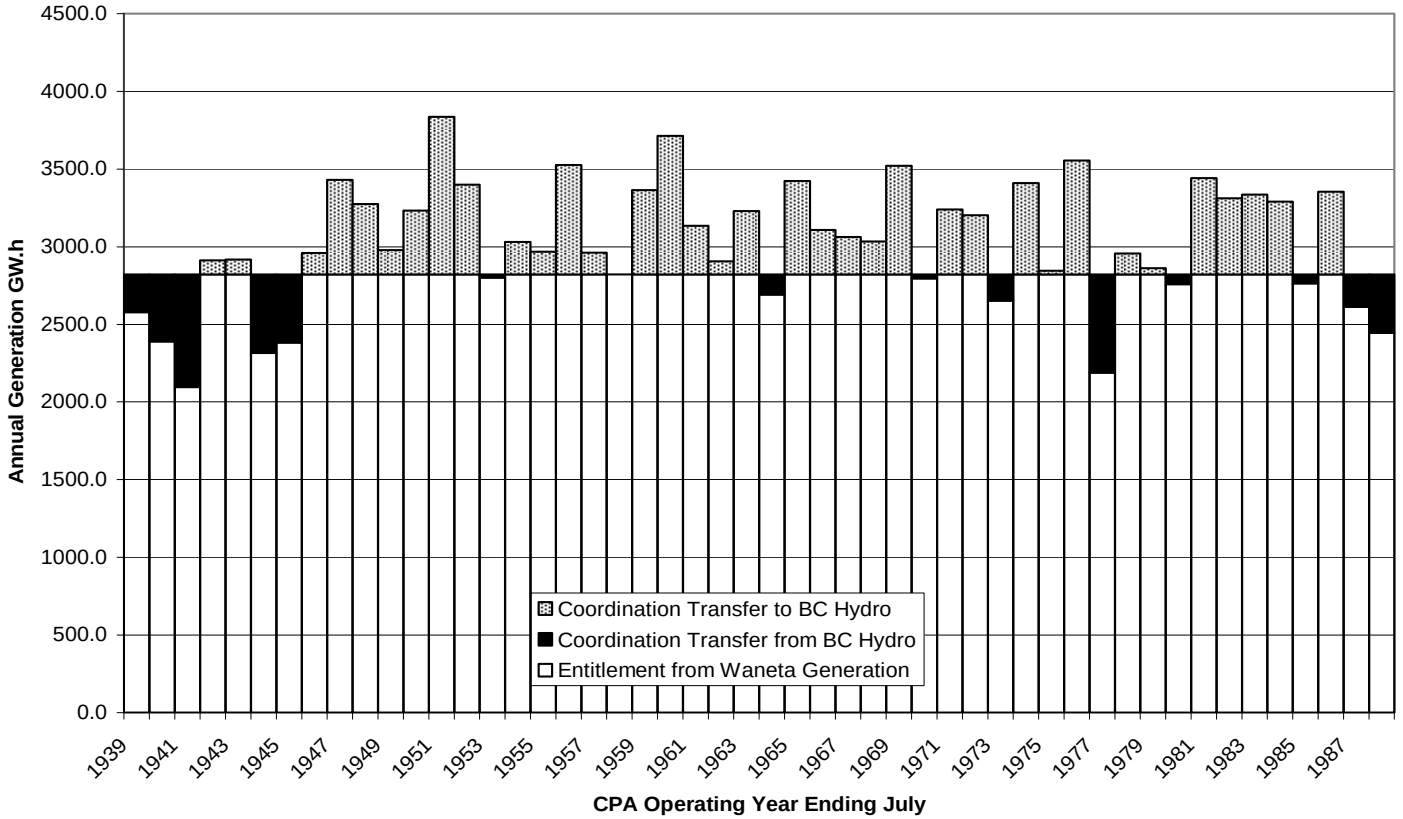
The water rights (entitlements) are based on the available flow at any instant in time and are as follows:

- **Teck has priority to the first 25,000 cfs of actual available flow for use at Waneta;**
- **WEPC has priority to the next 21,400 cfs of actual available flow to use in its Expansion, when that facility is operational; and**
- **Teck has priority to the next 7,910 cfs of actual available flow for use at Waneta.**

Comparing water rights to flows averaged over any period of time such as a critical period would be misleading because flow variations would be averaged out, leading one to erroneously conclude that more water could be utilized within the existing Waneta facility than actually would be possible.

The graph below shows the generator outputs for each water year in the available stream flow record and entitlements, for the existing Waneta facility. In addition, it shows whether Teck's entitlement is provided from Waneta or from a CPA coordination transfer from the BC Hydro system, and, when Waneta's generation is in excess of Teck's entitlement, the amount of the co-ordination transfer to the BC Hydro system.

Waneta Generation and Entitlements



8.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Output of Turbines and BC Energy Plan, Electricity Policy 10

The Waneta facility has four Francis hydraulic turbines. The maximum output of the four turbines and generating units following recent unit upgrades is 493 MW at 63.2 m (207.5 feet (ft)) gross head or about 123 MW per unit. The hydraulic capacity of Waneta is about 932 meters cubed per second (m3/s) (32,900 cubic feet per second (cfs)). Following the unit upgrades, which increased plant capacity from 375 MW to the current 493 MW, the average annual generating capability of Waneta is now estimated at 3,021 GWh, based on the 50-year stream flow record from 1938 to 1988. Average annual generation over the recent period from 1987 to 2009 was 2,447 GWh.

1.8.2 As part of the hydraulic capacity of 932 m3/sec is assumed, provide the minimum, average, and maximum outputs without the assumed amounts as well as those under critical water conditions.

RESPONSE:

It is important to distinguish between hydraulic capacity and water rights.

With respect to hydraulic capacity, none of the 932 m^3/s (32,910 cfs) hydraulic capacity is assumed. The hydraulic capacity is a function of the installed turbine capacity and the operating head (the difference between the actual reservoir elevation and the water level in the tailrace (water levels immediately downstream of dam)).

With respect to water rights, prior to the completion of Waneta Expansion, Teck can utilize the full amount of its licensed rights to water (32,910 cfs) in the Waneta facility at any time and under any water conditions. As expressed in footnote 6 on page 2-15 of the Filing, this is reflected in the calculation of Teck's current entitlement.

The range of generation for Waneta, for the existing situation prior to Waneta Expansion, is shown in the response to BCUC IR 1.8.1.2. Entitlements to WEPC and Teck for the situation following the completion of Waneta Expansion are not yet finalized.

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7 WEP

9.1 The maximum hydraulic capacity from the present 1,050 MW capacity at Boundary Dam is approximately 1,472 m3/s. Seattle City Light operates Boundary Dam as a peaking plant.

9.2 The Seven Mile power plant now has four units with a hydraulic capacity of about 52,000 cfs (1,472 m3/s).

9.3 Essentially, once the WEP is in-service, Waneta will have priority rights to the first 25,000 cfs of flow, the WEP will have access to the next 21,400 cfs and Waneta will then have access to the next 7,910 cfs. Waneta's current entitlement assumes access to the first 32,910 cfs. (Exhibit B-1, Chapter 2, 2-15)

1.9.3.1 If 52,000 cfs is the maximum hydraulic capacity at Boundary Dam and Seven Mile is also 52,000 cfs (maximum), please provide the average hydraulic capacity and minimum hydraulic capacity.

RESPONSE:

Both Boundary Dam and Seven Mile have limited amounts of reservoir storage and therefore reservoir elevations can be controlled on a daily basis as needed to optimize operation. As a result the average, minimum and maximum hydraulic capacities are independent of stream flow conditions.

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7 WEP

9.1 The maximum hydraulic capacity from the present 1,050 MW capacity at Boundary Dam is approximately 1,472 m3/s. Seattle City Light operates Boundary Dam as a peaking plant.

9.2 The Seven Mile power plant now has four units with a hydraulic capacity of about 52,000 cfs (1,472 m3/s).

9.3 Essentially, once the WEP is in-service, Waneta will have priority rights to the first 25,000 cfs of flow, the WEP will have access to the next 21,400 cfs and Waneta will then have access to the next 7,910 cfs. Waneta's current entitlement assumes access to the first 32,910 cfs. (Exhibit B-1, Chapter 2, 2-15)

1.9.3.2 Please confirm that BC Hydro assumes Waneta's current entitlement access to be the first 32,910 cfs at maximum hydraulic capacity.

RESPONSE:

Confirmed. Please refer to the response to BCUC IR 1.8.2.

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7 WEP

9.1 The maximum hydraulic capacity from the present 1,050 MW capacity at Boundary Dam is approximately 1,472 m3/s. Seattle City Light operates Boundary Dam as a peaking plant.

9.2 The Seven Mile power plant now has four units with a hydraulic capacity of about 52,000 cfs (1,472 m3/s).

9.3 Essentially, once the WEP is in-service, Waneta will have priority rights to the first 25,000 cfs of flow, the WEP will have access to the next 21,400 cfs and Waneta will then have access to the next 7,910 cfs. Waneta's current entitlement assumes access to the first 32,910 cfs. (Exhibit B-1, Chapter 2, 2-15)

1.9.3.3 As footnote 6 uses the word assumes, please explain if the access to the next 7,910 cfs is in question and why.

RESPONSE:

The access to the 7,910 cfs of available flow is not in question. Until Waneta Expansion is completed, Waneta has access to the first 32,910 cfs of flow in the Pend d'Oreille River. Please refer to the response to BCUC IR 1.8.2.

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7 WEP

9.1 The maximum hydraulic capacity from the present 1,050 MW capacity at Boundary Dam is approximately 1,472 m3/s. Seattle City Light operates Boundary Dam as a peaking plant.

9.2 The Seven Mile power plant now has four units with a hydraulic capacity of about 52,000 cfs (1,472 m3/s).

9.3 Essentially, once the WEP is in-service, Waneta will have priority rights to the first 25,000 cfs of flow, the WEP will have access to the next 21,400 cfs and Waneta will then have access to the next 7,910 cfs. Waneta's current entitlement assumes access to the first 32,910 cfs. (Exhibit B-1, Chapter 2, 2-15)

1.9.3.4 Please provide the head and discharge flows used in Table 3-1 Waneta Transaction Energy and Capacity Volumes to BC Hydro.

RESPONSE:

Table 3-1 was not derived from head and discharge flows, rather it was derived from the reduction in entitlement that would accrue to Teck as a result of the Waneta Transaction, as described more fully in the responses to BCUC IRs 1.39.3 and 1.40.2.

These entitlements are based on the Pend d'Oreille River flows shown in the table below, and on the Generation versus Flow characteristics for Waneta as provided below.

Certain of the values in Table 3-1 are based on Teck's estimate of the revised entitlements that would accrue to Waneta after the construction of Waneta Expansion. However, under the Waneta Transaction, Teck has agreed to accept the risk of actual negotiated entitlements deviating from its estimates for these values, with the result that, until January 1, 2036, the resulting benefit to BC Hydro as provided in Table 3-1 will be firm.

Waneta Inflows

BPA Data (Feb 98) - Best estimate of regulated flows

Regulated Inflows, CFS

Year	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Ann.
Ending	31	30	31	30	31	31	28	31	30	31	30	31	365
Minimum	7,681	10,570	15,327	12,856	13,264	11,653	8,782	11,887	15,308	20,389	12,614	7,604	15,499
Average	16,986	15,635	22,917	19,001	21,751	18,902	17,887	22,756	33,541	58,987	62,866	32,783	28,711
Maximum	28,512	24,656	37,508	31,390	35,799	34,173	30,895	43,346	54,196	98,812	125,724	66,451	40,698
1,939	13,421	12,834	19,101	14,734	16,253	15,188	9,795	17,656	33,727	60,771	33,970	16,869	22,108
1,940	10,300	11,808	18,097	14,216	16,685	11,875	12,690	22,489	30,289	40,278	21,367	11,371	18,492
1,941	8,331	11,444	18,104	14,750	15,252	12,985	12,477	16,863	19,607	26,422	16,618	12,860	15,499
1,942	7,998	13,979	19,275	16,765	34,072	17,695	13,650	16,776	27,457	41,748	49,572	35,752	24,625
1,943	14,271	14,487	19,614	17,849	19,412	18,623	13,756	18,751	54,196	70,204	77,001	55,725	32,892
1,944	22,792	15,423	21,712	16,327	16,333	12,183	11,526	11,887	15,792	24,663	21,742	14,442	17,111
1,945	7,851	11,057	15,327	12,856	13,264	14,580	10,721	16,968	16,752	42,975	48,874	30,163	20,168
1,946	12,916	13,207	20,725	18,383	21,656	20,361	12,610	20,288	39,073	69,730	58,662	28,650	28,101
1,947	14,116	15,464	24,548	21,498	30,437	24,847	23,426	28,644	42,203	75,749	66,253	30,820	33,212
1,948	17,031	17,067	34,601	24,155	24,362	22,299	15,537	19,330	36,080	88,860	125,724	39,014	38,729
1,949	28,512	17,014	22,076	17,704	15,307	11,653	15,320	21,575	38,667	78,853	52,295	23,237	28,594
1,950	15,052	13,420	20,631	20,219	23,376	20,382	21,454	30,108	38,623	60,648	92,764	66,451	35,308
1,951	28,200	18,426	30,546	25,799	35,490	26,505	28,095	30,071	48,646	77,584	71,506	42,702	38,690
1,952	24,006	21,150	34,012	23,022	25,114	22,503	16,557	19,330	43,531	78,266	47,893	26,857	31,957
1,953	14,730	12,461	18,033	15,119	16,108	19,183	18,765	19,041	23,493	53,114	81,516	39,323	27,585
1,954	20,836	12,545	20,832	16,534	19,679	18,164	17,580	22,305	29,816	73,771	87,521	59,484	33,348
1,955	23,803	20,318	23,794	20,039	20,815	13,464	12,718	13,197	22,374	40,941	76,886	52,480	28,460
1,956	21,107	14,794	29,211	21,534	32,742	26,380	20,981	25,682	51,157	98,812	88,283	31,617	38,610
1,957	20,886	15,530	22,687	17,554	21,044	14,871	15,459	21,702	28,740	78,641	64,712	22,754	28,792
1,958	13,482	12,396	21,130	16,305	18,175	16,475	18,471	22,259	30,341	71,086	50,929	20,206	25,982
1,959	13,489	13,383	22,538	22,256	29,554	24,998	24,685	26,095	40,808	64,396	95,074	42,648	34,992
1,960	21,026	24,513	37,508	31,390	34,964	25,393	18,428	24,900	48,670	55,944	62,066	31,096	34,715
1,961	18,393	15,358	21,158	20,058	18,465	18,087	24,626	24,632	32,968	69,759	84,263	26,712	31,184
1,962	12,283	13,187	24,040	16,829	18,399	19,820	16,773	19,990	42,196	65,614	58,569	25,211	27,778
1,963	16,004	14,470	25,204	21,529	26,284	18,807	23,262	22,362	29,929	44,446	44,773	26,416	26,130
1,964	13,571	14,600	19,128	17,501	16,275	15,259	11,269	16,412	24,117	58,092	97,833	44,355	29,076
1,965	21,377	19,863	23,642	19,407	27,230	22,089	20,948	26,550	46,069	77,680	86,198	36,648	35,683
1,966	20,256	21,835	25,291	19,213	19,450	15,006	12,075	21,277	36,506	50,994	48,908	27,012	26,547
1,967	12,885	13,060	19,449	18,152	23,026	24,671	23,375	23,048	23,566	56,875	94,396	36,169	30,711
1,968	17,178	12,154	22,332	20,022	19,450	18,579	21,105	27,348	24,289	41,892	52,752	24,521	25,145
1,969	19,698	24,656	32,060	24,599	26,225	22,662	20,243	21,667	51,563	81,947	54,489	30,607	34,265
1,970	12,672	14,792	22,662	17,238	17,000	17,786	16,324	19,342	21,628	57,991	75,639	27,712	26,756
1,971	14,725	13,924	22,672	17,756	18,676	20,193	30,895	27,682	41,884	82,045	90,816	38,894	34,981
1,972	20,774	15,156	21,392	17,145	17,524	18,394	21,691	43,346	48,943	72,965	108,082	40,930	37,212
1,973	23,139	16,118	22,272	17,263	18,761	15,417	11,886	19,183	16,883	28,831	29,809	14,769	19,585
1,974	9,651	11,573	17,995	22,861	30,206	34,173	30,834	31,185	51,232	72,478	113,234	63,170	40,698
1,975	22,148	16,082	19,988	17,046	17,525	16,702	13,333	17,966	20,591	51,621	94,425	58,464	30,560
1,976	24,133	20,764	26,879	23,133	35,799	21,230	23,014	22,705	41,946	79,433	64,624	38,222	35,230
1,977	25,203	20,916	21,231	15,799	14,886	12,536	12,446	13,528	15,308	20,389	12,614	7,604	16,067
1,978	7,681	11,927	19,686	16,635	24,994	20,245	13,505	24,657	41,964	58,893	58,711	39,781	28,299
1,979	21,568	20,314	21,284	16,921	15,072	14,726	16,609	21,561	23,543	58,601	45,976	19,644	24,695
1,980	12,262	13,227	18,433	15,079	16,336	15,459	12,399	19,345	30,945	64,491	52,562	30,120	25,127
1,981	14,609	16,680	22,696	19,346	33,786	28,907	27,282	25,367	27,310	59,883	66,583	37,323	31,674
1,982	19,559	13,364	21,168	17,708	19,180	20,645	29,122	34,444	33,026	63,407	85,556	54,222	34,292
1,983	22,054	16,235	24,339	18,369	19,814	21,108	21,271	31,894	27,500	44,798	47,031	41,988	28,097
1,984	22,637	16,328	22,649	24,192	19,642	20,923	20,496	23,266	28,399	41,354	58,672	33,467	27,681
1,985	17,640	16,996	22,398	19,766	16,585	14,986	12,734	16,743	30,937	53,687	45,019	14,965	23,576
1,986	13,210	20,482	29,920	23,893	23,364	18,490	21,644	36,045	41,879	40,710	41,349	21,772	27,734
1,987	11,162	14,412	23,488	20,353	19,499	14,877	11,714	24,735	31,763	42,883	15,627	12,879	20,350
1,988	8,689	10,570	18,272	13,210	14,010	12,725	8,782	15,600	30,099	34,119	23,562	31,060	18,460

Generation versus Flow Characteristics for Waneta.

Flow	Generation
cfs	MW
0	0.00
4,000	56.15
5,000	69.24
6,000	92.59
7,000	111.62
8,000	119.06
9,000	127.78
10,000	147.60
11,000	166.67
12,000	183.35
13,000	202.69
14,000	220.82
15,000	234.93
16,000	246.14
17,000	259.75
18,000	278.00
19,000	294.90
20,000	313.82
21,000	330.19
22,000	342.96
23,000	355.45
24,000	365.93
25,000	382.56
26,000	401.59
27,000	419.65
28,000	436.55
30,000	462.90
32,900	493.25
40,000	490.97
50,000	484.53
60,000	477.07
70,000	473.34
80,000	465.56
90,000	462.86
100,000	457.79
120,000	446.35
200,000	437.29

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7 WEP

9.1 The maximum hydraulic capacity from the present 1,050 MW capacity at Boundary Dam is approximately 1,472 m3/s. Seattle City Light operates Boundary Dam as a peaking plant.

9.2 The Seven Mile power plant now has four units with a hydraulic capacity of about 52,000 cfs (1,472 m3/s).

9.3 Essentially, once the WEP is in-service, Waneta will have priority rights to the first 25,000 cfs of flow, the WEP will have access to the next 21,400 cfs and Waneta will then have access to the next 7,910 cfs. Waneta's current entitlement assumes access to the first 32,910 cfs. (Exhibit B-1, Chapter 2, 2-15)

1.9.3.5 Please confirm that the water entitlement is instantaneous or explain how available water at any point in time is allocated.

RESPONSE:

Water rights are based on instantaneous flow.

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7 WEP

1.9.4 Please provide the maximum amount of annual energy that the Waneta Dam can produce under critical water conditions and the hydraulic capacity in cfs under critical water conditions.

RESPONSE:

The maximum amount of annual energy that the Waneta Dam can produce under the critical water conditions for the BC Hydro integrated system is 2,552 GWh/year. This amount, less the entitlement energy in respect of Waneta that accrues to Teck under the CPA (2,821 GWh for a net of -269), is included in the firm energy capability of BC Hydro's Heritage hydroelectric assets - i.e., it is already included in the 42,600 GWh per year heritage hydro asset capability.

The hydraulic capacity of the plant is the same under all water conditions at 932 m^3/s (32,910 cfs).

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7 WEP

1.9.5 Please provide an economic analysis spreadsheet (excel working with formulae) for the critical water conditions as defined in SD 10.

RESPONSE:

As illustrated in the response to BCUC IR 1.39.3, all of the products that BC Hydro has valued are firm, irrespective of water conditions. The details underlying the economic analysis set out in section 6.2.2 of the Filing are provided in the response to BCUC IR 1.33.1. As described in the response to BCUC IR 1.45.1, the economic analysis does not lend itself to being converted to a working spreadsheet.

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7 WEP

1.9.6 Because of WEP's priority rights to water above the 25,000 cfs, the WEP would reduce the CPA energy entitlement by about 143 GWh/year. This reduction in energy and associated reduction in capacity has been reflected in the Operating Terms. To maintain Teck's ability to meet its Industrial Load, the Operating Terms contemplate that BC Hydro's Waneta Electricity would be reduced by the full amount of the anticipated reduction in energy and capacity associated with the WEP effective April 1, 2014 through December 31, 2035. (Exhibit B-1, Chapter 3, 3-6)

1.9.6.1 When BC Hydro's Waneta's electricity would be reduced below the one-third share, has the value of this amount of energy been taken into consideration when establishing the purchase price? If not, please provide an explanation.

RESPONSE:

Yes. BC Hydro's evaluation of the appropriate purchase price was based on the actual suite of products it expects to receive as a result of the Waneta Transaction as identified in Table 3-1 and Table 3-2 of the Filing.

Please also refer to the responses to BCUC IRs 1.39.3 and 1.40.2.

9.0 Reference: Exhibit B-1, Chapter 2, pp. 2-6- 2-7 WEP

1.9.6 Because of WEP's priority rights to water above the 25,000 cfs, the WEP would reduce the CPA energy entitlement by about 143 GWh/year. This reduction in energy and associated reduction in capacity has been reflected in the Operating Terms. To maintain Teck's ability to meet its Industrial Load, the Operating Terms contemplate that BC Hydro's Waneta Electricity would be reduced by the full amount of the anticipated reduction in energy and capacity associated with the WEP effective April 1, 2014 through December 31, 2035. (Exhibit B-1, Chapter 3, 3-6)

1.9.6.2 Provide the hydraulic capacity used to generate Table 3-2.

RESPONSE:

Table 3-2 was developed from the reduction in entitlement that would accrue to Teck as a result of the Waneta Transaction, as described more fully in the response to BCUC IR 1.7.1.1.

While no hydraulic capacity values were used to develop Table 3-2 directly, the hydraulic capacity values used in the determination of the underlying entitlement calculation are as provided in the response to BCUC IR 1.9.3.4.

10.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Water Licenses and Rights

1.10.1 As part of the Waneta Transaction does BC Hydro acquire a one-third interest in the water licenses listed in Table 2-2? If not, why not. If yes, list the water licenses acquired through the transaction.

RESPONSE:

Under the terms of the Waneta Transaction, BC Hydro would acquire an undivided one-third interest in the Waneta Assets, which, as defined in Appendix D of the Filing, includes all licenses. Thus, BC Hydro would acquire an undivided one-third interest in the water licenses listed in Table 2-1 of the Filing.

10.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Water Licenses and Rights

1.10.2 BC Hydro would compensate Teck for any losses of power (either directly or through the CPA) from the Waneta Dam if the capacity or energy from the Waneta Dam is reduced by changes to the Waneta Dam water licences or by changes to the water flow regime at the Waneta Dam that result from a water use planning process, or analogous regulatory constraint, with respect to the Waneta Dam, where such changes are agreed to by BC Hydro, but not Teck, or are imposed on Teck or the Waneta Dam because BC Hydro (as opposed to any other person) is an owner of an interest in the Waneta Dam. For greater certainty, if reductions to Teck's capacity and/or energy or entitlement result from (i) a water use planning process or regulatory constraint with respect to BC Hydro's Seven Mile Dam or upstream facilities in the United States, (ii) a water use planning process or regulatory constraint that would have applied to Teck or the Waneta Dam if owned 100 percent by Teck, or jointly by Teck and a non-crown entity, or (iii) an Environmental Management Plan adopted by the Operating Committee or imposed on the parties pursuant to the Operating Agreement, then in each such case compensation under this paragraph would not apply. (Exhibit B-1, Appendix A, p. 27)

1.10.2.1 Why does BC Hydro compensate Teck for any losses of power from the Waneta Dam by changes to the Waneta Dam water licences or by changes to the water flow regime from either a planning process or a regulatory constraint with regard to the Seven Mile Dam or US facilities? Please explain.

RESPONSE:

As set out in the quoted preamble for this question, under the Waneta Transaction, BC Hydro would <u>not</u> compensate Teck for any losses of power from the Waneta Dam resulting from changes to the Waneta Dam water licences or from changes to the water flow regime from either a planning process or a regulatory constraint with regard to Seven Mile Dam or U.S. facilities.

10.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Water Licenses and Rights

1.10.2 BC Hydro would compensate Teck for any losses of power (either directly or through the CPA) from the Waneta Dam if the capacity or energy from the Waneta Dam is reduced by changes to the Waneta Dam water licences or by changes to the water flow regime at the Waneta Dam that result from a water use planning process, or analogous regulatory constraint, with respect to the Waneta Dam, where such changes are agreed to by BC Hydro, but not Teck, or are imposed on Teck or the Waneta Dam because BC Hydro (as opposed to any other person) is an owner of an interest in the Waneta Dam. For greater certainty, if reductions to Teck's capacity and/or energy or entitlement result from (i) a water use planning process or regulatory constraint with respect to BC Hydro's Seven Mile Dam or upstream facilities in the United States, (ii) a water use planning process or regulatory constraint that would have applied to Teck or the Waneta Dam if owned 100 percent by Teck, or jointly by Teck and a non-crown entity, or (iii) an Environmental Management Plan adopted by the Operating Committee or imposed on the parties pursuant to the Operating Agreement, then in each such case compensation under this paragraph would not apply. (Exhibit B-1, Appendix A, p. 27)

1.10.2.2 Please explain Teck's exposure to similar or same losses before the acquisition.

RESPONSE:

The Waneta Transaction would attempt to replicate Teck's exposure to similar losses before the acquisition – i.e., if it was exposed to these losses before the transaction, it would remain exposed after the transaction. Compensation would only be payable if BC Hydro, but not Teck, were to agree to the changes or if the changes were imposed on the Waneta Dam because BC Hydro (as opposed to any other person) would be an owner of Waneta Dam.

10.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Water Licenses and Rights

1.10.3 If the price (net of applicable transmission costs) that Teck is able to obtain for any surplus energy would be below Teck's water licence fees payable in respect of generation of that energy, Teck would be entitled to spill that energy from the CPA exchange accounts, rather than offering it to BC Hydro. (Exhibit B-1, Appendix A, p. 35)

1.10.3.1 Please explain why BC Hydro does retain its rights for the surplus energy in this case regardless of the fees payable by Teck.

RESPONSE:

The surplus in this case is surplus entitlement and not actual generation.

Under the CPA, Teck has two choices for the application of its entitlement energy: 1) use the energy and pay the associated water rental fees; or 2) not use the energy and make an accounting entry to remove the energy from its CPA energy exchange accounts. When the latter is selected the net effect is a transfer to BC Hydro of both the notionally-spilled entitlement energy, and the obligation to pay the water rental fees.

Under the Waneta Transaction, these choices would be preserved for Teck in their current form.

10.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Water Licenses and Rights

1.10.3 If the price (net of applicable transmission costs) that Teck is able to obtain for any surplus energy would be below Teck's water licence fees payable in respect of generation of that energy, Teck would be entitled to spill that energy from the CPA exchange accounts, rather than offering it to BC Hydro. (Exhibit B-1, Appendix A, p. 35)

1.10.3.2 Please explain "spill that energy from the CPA exchange accounts, rather than offering it to BC Hydro".

RESPONSE:

Please refer to the response to BCUC IR 1.10.3.1.

11.0 Reference: Exhibit B-1, Chapter 2, p. 2-10
Transmission POD

1.11.1 A single circuit 230 kV line, referred to as Line 71, can be interconnected with either BC Hydro's Nelway Substation or BPA's Boundary Substation located at Boundary Dam approximately two km south of the Canada-U.S. border (but not both simultaneously). This transmission line provides Teck with its primary means to interconnect with the BC Hydro system and to export power to the U.S.

1.11.1.1 If the connection can not service both Nelway and Boundary substations simultaneously then who determines which path will be used?

RESPONSE:

BCTC determines which path will be used irrespective of the Waneta Transaction.

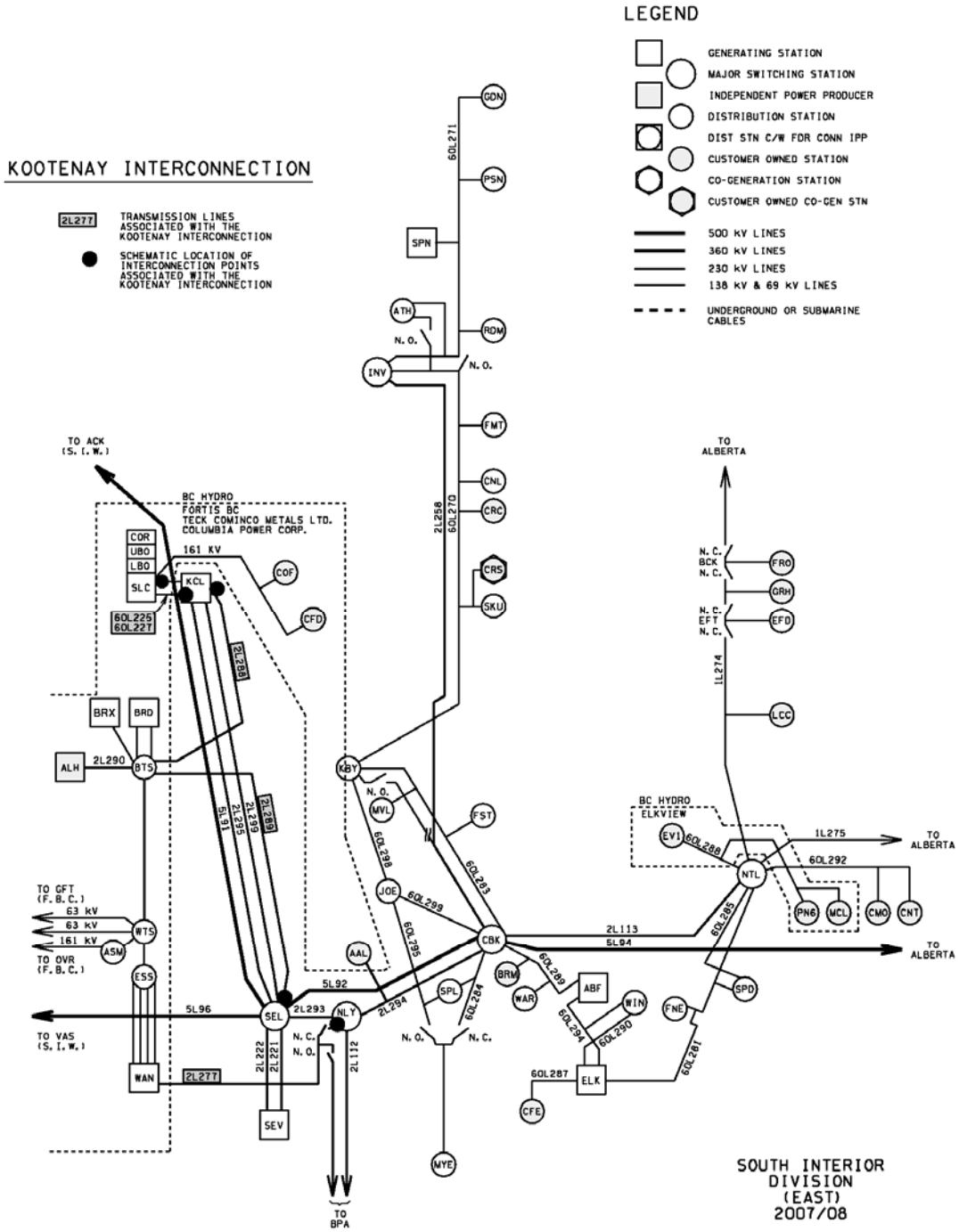
11.0 Reference: Exhibit B-1, Chapter 2, p. 2-10
Transmission POD

1.11.2 Instead, Teck would agree to deliver capacity and energy that BC Hydro is entitled to, whether in the form of actual generation or entitlement, at the Kootenay Interconnection (KI), or the U.S. border using its Line 71 transmission rights (Exhibit B-1, Chapter 2, p. 2-14).

1.11.2.1 Identify the Kootenay Interconnection in Figure 2-3.

RESPONSE:

Figure 2-3 in the Filing shows the general location of major electrical facilities but does not lend itself to identifying the Kootenay Interconnection (KI). The following schematic diagram identifies the transmission lines and the interconnection points associated with the KI. Note that transmission line 2L277 in the schematic diagram is Line 71.


KOOTENAY INTERCONNECTION
2L277
TRANSMISSION LINES ASSOCIATED WITH THE KOOTENAY INTERCONNECTION
SCHEMATIC LOCATION OF INTERCONNECTION POINTS ASSOCIATED WITH THE KOOTENAY INTERCONNECTION
LEGEND
GENERATING STATION
MAJOR SWITCHING STATION
INDEPENDENT POWER PRODUCER
DISTRIBUTION STATION
DIST STN C/W FDR CONN IPP
CUSTOMER OWNED STATION
CO-GENERATION STATION
CUSTOMER OWNED CO-GEN STN
500 kV LINES
360 kV LINES
230 kV LINES
138 kV & 69 kV LINES
UNDERGROUND OR SUBMARINE CABLES
GDN
PSN
SPN
ATH
RDM
INV
FMT
CNL
CRC
CRS
SKU
60L271
2L258
60L270
N. O.
TO ACK (S. I. W.)
BC HYDRO
FORTIS BC
TECK COMINCO METALS LTD.
COLUMBIA POWER CORP.
COR
UBO
LBO
SLC
161 kV
KCL
COF
CFD
60L225
60L227
2L288
BRX
BRD
ALH
2L290
BTS
2L295
5L91
2L289
KBY
MVL
FST
60L298
60L283
JOE
60L299
60L295
CBK
AAL
BRM
WAR
SPL
60L284
60L289
ABF
WIN
60L294
60L290
FNE
SPD
60L281
ELK
60L287
CFE
MYE
TO GFT (F. B. C.)
63 kV
63 kV
161 kV
WTS
ASM
TO OVR (F. B. C.)
ESS
5L96
SEL
2L293
NLY
2L294
5L92
2L113
5L94
TO ALBERTA
60L285
TO VAS (S. I. W.)
WAN
2L277
2L222
2L221
N. C.
N. O.
2L112
SEV
TO BPA
TO ALBERTA
N. C. BCK N. C.
FRO
GRH
N. C. EFT N. C.
EFD
1L274
LCC
BC HYDRO ELKVIEW
EVI
60L288
1L275
TO ALBERTA
60L292
NTL
PN6
MCL
CMO
CNT
SOUTH INTERIOR DIVISION (EAST) 2007/08

11.0 Reference: Exhibit B-1, Chapter 2, p. 2-10
Transmission POD

1.11.2 Instead, Teck would agree to deliver capacity and energy that BC Hydro is entitled to, whether in the form of actual generation or entitlement, at the Kootenay Interconnection (KI), or the U.S. border using its Line 71 transmission rights (Exhibit B-1, Chapter 2, p. 2-14).

1.11.2.2 Have any upgrades to the KI been identified but not yet implemented?

RESPONSE:

BC Hydro is not aware of any upgrades to the KI that have been identified but not yet implemented. BCTC's projection of potential future upgrades that could result from incremental Southern Interior generator projects are contained in its Transmission System Capital Plan F2010 and F2011.

11.0 Reference: Exhibit B-1, Chapter 2, p. 2-10
Transmission POD

1.11.2 Instead, Teck would agree to deliver capacity and energy that BC Hydro is entitled to, whether in the form of actual generation or entitlement, at the Kootenay Interconnection (KI), or the U.S. border using its Line 71 transmission rights (Exhibit B-1, Chapter 2, p. 2-14).

1.11.2.3 As a result of any studies by BCTC or BC Hydro, have any upgrades to the KI been identified but not yet implemented?

RESPONSE:

Please refer to the response to BCUC IR 1.11.2.2.

11.0 Reference: Exhibit B-1, Chapter 2, p. 2-10
Transmission POD

1.11.2 Instead, Teck would agree to deliver capacity and energy that BC Hydro is entitled to, whether in the form of actual generation or entitlement, at the Kootenay Interconnection (KI), or the U.S. border using its Line 71 transmission rights (Exhibit B-1, Chapter 2, p. 2-14).

1.11.2.4 Will the use of the KI affect FortisBC's ability to transfer power under the General Wheeling Agreement (GWA) which expires in 2045?

RESPONSE:

The Waneta Transaction is structured to purchase power from Teck that is surplus to its Industrial Load. This surplus power has historically been exported out of the Selkirk region, primarily to the U.S. While the contractual path for this power is typically Teck's Line 71, the physical power predominantly flows through the BCTC system to the Lower Mainland, where it is exported via the Ingledow - Custer 500 kV intertie with the U.S. Since the change in ownership would not change the dispatch of the Waneta generation and would not be expected to result in material physical changes in power flows, the Waneta Transaction is not expected to affect FortisBC's ability to transfer power under the General Wheeling Agreement.

11.0 Reference: Exhibit B-1, Chapter 2, p. 2-10
Transmission POD

1.11.2 Instead, Teck would agree to deliver capacity and energy that BC Hydro is entitled to, whether in the form of actual generation or entitlement, at the Kootenay Interconnection (KI), or the U.S. border using its Line 71 transmission rights (Exhibit B-1, Chapter 2, p. 2-14).

1.11.2.5 What are the costs of these upgrades?

RESPONSE:

Please refer to the response to BCUC IR 1.11.2.2.

11.0 Reference: Exhibit B-1, Chapter 2, p. 2-10
Transmission POD

1.11.3 The Operating Terms contemplate that Teck deliver BC Hydro's Waneta Electricity to the KI and oblige Teck, subject to its rights under the Line 71 Agreement, to schedule BC Hydro energy from the KI to the B.C.-U.S. border at BC Hydro's request (Exhibit B-1, Chapter 3, p. 3-10).

1.11.3.1 As the point of delivery appears to the B.C.-U.S., how much capacity/ energy might BC Hydro export and use to service its customers' loads?

RESPONSE:

The primary point of delivery is the KI, not the B.C.-U.S. border.

As with other supply sources BC Hydro acquires, BC Hydro is entering into the Waneta Transaction to serve its current and future firm load requirements of its domestic customer demand. While there may be some additional electricity exported by BC Hydro in the near term as a result of the Waneta Transaction, that is not BC Hydro's reason for entering into the Waneta Transaction. Any imports or exports by BC Hydro would be managed on a system basis as they are currently.

11.0 Reference: Exhibit B-1, Chapter 2, p. 2-10
Transmission POD

1.11.3 The Operating Terms contemplate that Teck deliver BC Hydro's Waneta Electricity to the KI and oblige Teck, subject to its rights under the Line 71 Agreement, to schedule BC Hydro energy from the KI to the B.C.-U.S. border at BC Hydro's request (Exhibit B-1, Chapter 3, p. 3-10).

1.11.3.2 Provide the dollar value of line losses for the various lines that could be used to deliver power to the points of delivery.

RESPONSE:

Under the Waneta Transaction, BC Hydro would purchase the electricity that is surplus to Teck's Industrial Load. Currently Teck markets this electricity, primarily to customers in the U.S. and schedules the export of this surplus under the Line 71 Agreement. In doing so, Teck incurs losses with respect to its power system, primarily Line 71, and BC Hydro incurs the losses with respect to any incremental power flows on the BCTC system. Most of these exports currently flow from the Southern Interior to the Lower Mainland and subsequently into the U.S. system, although a small portion is exported directly from Nelway.

Following the Waneta Transaction, BC Hydro would use the Waneta Electricity primarily to serve domestic requirements. As such, the predominant power flow from this surplus would be from the Southern Interior to the Lower Mainland.

As a result BC Hydro expects that transmission losses on the BCTC system after the Waneta Transaction would be similar to those already occurring, and which are already accruing to BC Hydro's account, before the Waneta Transaction. As such BC Hydro did not assign any dollar value to incremental line losses as a result of the Waneta Transaction.

12.0 Reference: Exhibit B-1, Appendix A, p. 1-43
Certain Rights

"Teck American Limited may also be a party for purposes of transferring its interest in certain rights pertaining to the Waneta Dam."

1.12.1 Please describe the interests in certain rights referred to in the above quotation.

RESPONSE:

Teck American Limited holds a license issued by the U.S. Federal Energy Regulatory Commission (FERC) that permits the flooding from time to time of approximately two acres in the area of Cedar Creek. Cedar Creek is a small tributary of the Pend d'Oreille River that originates on the U.S. side of the border. When the Waneta Dam is operated at full elevation this area of U.S. federal land is flooded. Since this license can only be held by a U.S. citizen or corporation, Teck American Limited would likely transfer a one-third interest in the license to a U.S. entity nominated by BC Hydro.

12.0 Reference: Exhibit B-1, Appendix A, p. 1-43
Certain Rights

"Teck American Limited may also be a party for purposes of transferring its interest in certain rights pertaining to the Waneta Dam."

1.12.2 Are there other rights or interests held by Teck or others that will not be part of the acquisition?

RESPONSE:

BC Hydro expects to acquire an interest in all rights or interests held by Teck pertaining to the Waneta Assets, as defined in Appendix D of the Filing. At this stage of the due diligence process, BC Hydro is not aware of interests held by others that will be part of the acquisition.

13.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Operating Agreement

BC Hydro states "If it proceeds with the Waneta Transaction, BC Hydro would enter into a co-ownership and operating agreement with Teck (Operating Agreement) that obliges BC Hydro to pay its share of water rentals, insurance, maintenance, operating and sustaining capital costs and non-sustaining capital costs undertaken in accordance with the Operating Agreement".

1.13.1 Confirm that BC Hydro's share of water rentals, insurance, maintenance, operating and sustaining capital costs and non-sustaining capital costs will be one-third or less of the total amounts for such costs. If BC Hydro's share of the costs will be more than one-third, provide the percentage of BC Hydro's share of the total amount of such costs and an explanation for the percentage.

RESPONSE:

BC Hydro's and Teck's share of insurance, maintenance, operating and sustaining capital costs would reflect their respective ownership interest in Waneta. As a result BC Hydro's share of these costs would be one-third (unless its ownership interest changes).

Under the Waneta Transaction, water rental fees would be payable by Teck and BC Hydro at the water rental fee rates that are applicable to them. Because BC Hydro's water rental fee rates are higher than the rate applicable to Teck's use of Waneta generation at the smelter, it is expected that BC Hydro's water rental fee payments would be higher than one-third. There would be an annual reconciliation between the parties of the amounts paid that reflect the actual amounts of energy and capacity that accrue to each party under the Transaction.

The allocation of costs related to property taxes are subject to ongoing discussion between BC Hydro and Teck and will be addressed in the definitive agreements.

13.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Operating Agreement

BC Hydro states "If it proceeds with the Waneta Transaction, BC Hydro would enter into a co-ownership and operating agreement with Teck (Operating Agreement) that obliges BC Hydro to pay its share of water rentals, insurance, maintenance, operating and sustaining capital costs and non-sustaining capital costs undertaken in accordance with the Operating Agreement".

1.13.2 If Teck is to be reimbursed for certain expenses that it incurs on a unilateral basis as operator of the Waneta Assets and that reimbursement of other expenses would depend upon BC Hydro's consent to the expenditure, please provide a listing of these certain expenses and their amounts for the last five years and the forecast amounts for the next five years.

RESPONSE:

As indicated on Page 3-4, lines 14 to 20 of the Filing, Teck, as majority owner and initial Operator, would be able to control routine matters including insurance coverage, operating and sustaining capital budgets determined using existing practices and non-sustaining capital expenditures under $10 million. BC Hydro would have significant input to decisions relating to safety plans, environmental management and Dam safety, environmental remediation and changes in the practices underlying sustaining capital or operating and maintenance budgets. These procedures are described in more detail in the terms of the Operating Agreement as provided in Appendix A, Sub-Appendix 2 of the Filing.

Teck would be reimbursed for one-third of Waneta expenditures, representing BC Hydro's one-third ownership interest, so long as procedures under the Operating Agreement are followed. The following table provides an estimate of actual and forecast operations and maintenance and capital expenditures, inclusive of management fees, from 2005 to 2014, representing the one-third portion for which Teck would be reimbursed subsequent to the Waneta Transaction.

Actual and Forecast Expenditures[1], Representing BC Hydro's Share ($ million, nominal)										
	Actual Expenditures				**Forecast Expenditures**					
Year (Calendar)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Operations & Maintenance	1.3	1.2	1.2	1.5	1.2	1.3	1.3	1.4	1.4	1.4
Sustaining and Major Capital	0.3	2.5	1.9	0.8	0.0	0.4	0.4	0.4	0.4	4.4
Total	1.6	3.7	3.1	2.3	1.2	1.7	1.7	1.8	1.8	5.8

[1] The pre-2005 financial information is not readily available since Teck's manager changed its financial reporting system at that time.

13.0 Reference: Exhibit B-1, Chapter 1, p. 1-1
Operating Agreement

BC Hydro states "If it proceeds with the Waneta Transaction, BC Hydro would enter into a co-ownership and operating agreement with Teck (Operating Agreement) that obliges BC Hydro to pay its share of water rentals, insurance, maintenance, operating and sustaining capital costs and non-sustaining capital costs undertaken in accordance with the Operating Agreement".

1.13.3 As an expenditure schedule does not exist for the Operating Agreement, please provide a detailed forecast of all expenditures under the Agreement for the next five years.

RESPONSE:

The following table provides a preliminary forecast of BC Hydro's share of expenditures under the Operating Agreement over the next six years (as was used in BC Hydro's evaluation). One additional year of expenditures is provided to capture the cost associated with the Unit 3 turbine runner replacement and life extension assumed in BC Hydro's economic evaluation of the transaction.

BC Hydro's due diligence appears to indicate that these numbers may increase somewhat. A final forecast will be provided with the definitive agreements.

Forecast of BC Hydro's Share of Expenditures ($ million, nominal)						
Year (Calendar)	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Operations & Maintenance	1.3	1.3	1.4	1.4	1.4	1.4
Property Taxes	0.7	0.7	0.7	0.7	0.8	0.8
Insurance & Administration	0.7	0.7	0.8	0.8	0.8	0.8
Sustaining Capital	0.4	0.4	0.4	0.4	0.4	0.4
Major Capital (dam anchoring)					4.0	
Major Capital (Unit 3 turbine runner replacement and life extension)						4.0
Water Rental Fees	8.0	8.8	9.3	9.8	9.3	9.7
Total	11.1	11.9	12.5	13.1	16.6	17.1

In addition, an annual allowance of $150,000 for BC Hydro administrative costs is included in the economic evaluation of the Waneta Transaction.

Please also refer to the response to BCUC IR 1.41.2.

14.0 Reference: Exhibit B-1, Appendix A, p. 9-43
Appendix 2 Indicative Terms of the Co-ownership and Operating Agreement

1.14.1 Please provide an explanation of how the regulatory process for capital plans and operation and maintenance plans expenses in revenue requirements will be applied under the Operating Agreement.

RESPONSE:

Teck will retain control of operations and associated expenditures of Waneta. BC Hydro has negotiated some controls on the expenses to which it will be required to contribute as described in section 3.3.3.1 of the Filing and more fully described in sections 5, 6 and 24(i) of the Operating Terms. However, Teck remains free to operate the facility subject to these commercial constraints. Because BC Hydro will be committing itself to ongoing contributions of a commercial nature pursuant to the Operating Agreement, BC Hydro is seeking BCUC acceptance of the expenditures contemplated by this agreement. Financial recovery of these costs will be sought based on forecast information provided in the appropriate revenue requirement application in the same way that recovery of other forecast expenditures is sought.

If the BCUC grants the relief sought in this Filing, BC Hydro would not anticipate including Waneta expenditures in its future capital plan filings.

14.0 Reference: Exhibit B-1, Appendix A, p. 9-43
Appendix 2 Indicative Terms of the Co-ownership and Operating Agreement

1.14.2 As the Operator, Teck has the ability to hire an independent third party to resolve disagreements, does BC Hydro anticipate the Commission approving any dispute resolution? If not, why not?

RESPONSE:

No, please refer to the response to BCUC IR 1.14.1.

14.0 Reference: Exhibit B-1, Appendix A, p. 9-43
Appendix 2 Indicative Terms of the Co-ownership and Operating Agreement

1.14.3 Would the matters that require unanimous approval of the Operating Committee be filed with the Commission?

RESPONSE:

No, please refer to the response to BCUC IR 1.14.1.

14.0 Reference: Exhibit B-1, Appendix A, p. 9-43
Appendix 2 Indicative Terms of the Co-ownership and Operating Agreement

1.14.4 The Manager is appointed by the Operating Committee and the first Manager is FortisBC. Please explain how BC Hydro will file the billings for monthly billing for estimated ownership, operating, and maintenance costs and sustaining and non-sustaining capital costs expected to be incurred in the following month with the Commission to be included in its Revenue Requirements Application.

RESPONSE:

BC Hydro does not intend to file the monthly billings with the BCUC. Please refer to the response to BCUC IR 1.14.1.

15.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Plant Physical Condition

BC Hydro understands from Teck that the Waneta facility is in good condition for the age of the plant. The facility has had a number of upgrades and life extensions in recent years, including:

- **Units 1, 2, 3 and 4 had their turbine runners replaced in 2002, 2003, 1995 and 2007, respectively;**

- **Coincident with the turbine runner upgrade work, Units 1, 2 and 4 underwent major life extension work including: re-sleeving of wicket gates, new wicket gate bushings, refurbishment of bottom rings, head cover and operating rings, generator stator rewinds, new static excitation systems and new governor control systems; and Unit 3 had its generator stator rewound; and**

- **The generating plant substation was completely re-built in 2007.**

1.15.1 As part of its due diligence, has BC Hydro engaged or will it engage an independent third party to perform the condition assessment evaluation and appraisal of assets? If not, why not. If so, please identify the third party and provide a copy of the report.

RESPONSE:

Please refer to the response to BCUC IR 1.2.2.

BC Hydro expects to file a copy of the KCB report with the definitive agreements.

15.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Plant Physical Condition

BC Hydro understands from Teck that the Waneta facility is in good condition for the age of the plant. The facility has had a number of upgrades and life extensions in recent years, including:

- **Units 1, 2, 3 and 4 had their turbine runners replaced in 2002, 2003, 1995 and 2007, respectively;**
- **Coincident with the turbine runner upgrade work, Units 1, 2 and 4 underwent major life extension work including: re-sleeving of wicket gates, new wicket gate bushings, refurbishment of bottom rings, head cover and operating rings, generator stator rewinds, new static excitation systems and new governor control systems; and Unit 3 had its generator stator rewound; and**
- **The generating plant substation was completely re-built in 2007.**

1.15.2 Is the cost of any additional experts already included in the transaction costs or are these costs in addition to the transaction costs.

RESPONSE:

These costs are included in the estimate of the transaction costs. Please refer to the response to BCUC IR 1.2.1.

15.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Plant Physical Condition

BC Hydro understands from Teck that the Waneta facility is in good condition for the age of the plant. The facility has had a number of upgrades and life extensions in recent years, including:

- **Units 1, 2, 3 and 4 had their turbine runners replaced in 2002, 2003, 1995 and 2007, respectively;**
- **Coincident with the turbine runner upgrade work, Units 1, 2 and 4 underwent major life extension work including: re-sleeving of wicket gates, new wicket gate bushings, refurbishment of bottom rings, head cover and operating rings, generator stator rewinds, new static excitation systems and new governor control systems; and Unit 3 had its generator stator rewound; and**
- **The generating plant substation was completely re-built in 2007.**

1.15.3 What was the cost of replacing the turbine runner on Unit 3 in 1995?

RESPONSE:

The following table sets out the information available to BC Hydro with respect to the unit upgrades including the cost of the turbine runners.

The total upgrade costs are shown, along with the runner supply costs, for all four units. As described on Page 2-3, lines 3 to 7 of the Filing, Unit 3 was a partial upgrade.

Unit	Year (in-service)	Total Upgrade Cost ($ million)	Runner Supply Cost ($ million)
1	2003	13.1	2.1
2	2003	13.6	1.6
3	1995	7.9	1.1
4	2007	14.1	3.4

15.0 Reference: Exhibit B-1, Chapter 2, p. 2-2
Plant Physical Condition

BC Hydro understands from Teck that the Waneta facility is in good condition for the age of the plant. The facility has had a number of upgrades and life extensions in recent years, including:

- **Units 1, 2, 3 and 4 had their turbine runners replaced in 2002, 2003, 1995 and 2007, respectively;**
- **Coincident with the turbine runner upgrade work, Units 1, 2 and 4 underwent major life extension work including: re-sleeving of wicket gates, new wicket gate bushings, refurbishment of bottom rings, head cover and operating rings, generator stator rewinds, new static excitation systems and new governor control systems; and Unit 3 had its generator stator rewound; and**
- **The generating plant substation was completely re-built in 2007.**

1.15.4 Please provide a listing of the assets involved in the transaction, the condition of the asset, the remaining life and estimated replacement cost.

RESPONSE:

Please refer to attached for a listing of major Waneta assets (Generating and Switchyard). BC Hydro has directed its consultants, KCB, to focus only on the major assets and identify material risks (greater than $1 million). The majority of the water-to-wires assets have been upgraded in the past seven years and Teck has plans to upgrade the balance of plant in future years. BC Hydro is in the process of estimating the remaining life of major Waneta assets and high-level estimates of the replacement cost for major assets nearing their end of life.

Waneta Dam Replacement Cost Estimate

Category	Asset Description	Waneta Assets			Asset Original In-service Date	Asset original/upgraded/refurbished date
		Quantity	Unit of Measure	Capacity/unit		
Generating Equipment	410 TURBINE, HYDRAULIC					
	Turbine #1	1	each	128 MW	1954-01-01	2003-02-28
	Turbine #2	1	each	128 MW	1954-01-01	2003-11-30
	Turbine #3	1	each	128 MW	1964-01-01	1997-05-01
	Turbine #4	1	each	128 MW	1966-01-01	2007-02-28
	420 GENERATOR, HYDRAULIC					
	Generator #1	1	each	141 MVA	1954-01-01	2003-02-28
	Generator #2	1	each	141 MVA	1954-01-01	2003-11-30
	Generator #3	1	each	141 MVA	1964-01-01	1964-01-01
	Generator #4	1	each	141 MVA	1966-01-01	2007-02-28
	421 EXCITATION SYSTEM					
	Exciter #1	1	each	original Rotary/new static	1954-01-01	2003-02-28
	Exciter #2	1	each	original Rotary/new static	1954-01-01	2003-11-30
	Exciter #3	1	each	original Rotary/new static	1964-01-01	2000-12-31
	Exciter #4	1	each	original Rotary/new static	1966-01-01	2000-08-31
	Governer #1	1	each		1954-01-01	2003-02-28
	Governer #2	1	each		1954-01-01	2003-11-30
	Governer #3	1	each		1964-01-01	1964-01-01
	Governer #4	1	each		1966-01-01	2007-02-28
	425 COOLING SYSTEM, WATER	4	each		1954-01-01	1992-07-01
	480 GENERATOR, DIESEL / GAS	1	each	400 kW, 500 KVA	2000-12-31	2000-12-31
	210 DAMS (Structures/concrete costs are with Spillway and Intake)					
	Diversion / Cofferdam	1	lot		1954-01-01	1954-01-01
	Foundation treatment	1	lot		1954-01-01	1954-01-01
	Drainage galeries	1	lot		1954-01-01	1954-01-01
	219 ROOFS	1700	m2		1954-01-01	1954-01-01
	220 BUILDINGS					
	Excavation, overburden, rock	300,000	m3		1954-01-01	1954-01-01
	Powerhouse foundation	40,000	m3		1954-01-01	1954-01-01
	Powerhouse / HVAC / Lighting - 4 story - Approximate gross area per floor: 17,215 FT2, 75m x 21 m (246 ft x 70 ft)	7,000	m2		1954-01-01	1954-01-01
	Switchgear building / Control Room	750	m2		2007-11-30	2007-11-30
	Grounding - Powerhouse and dam structures, equipment, raceway	4	lot		1954-01-01	1954-01-01
	230 SPILLWAYS	187,000	m3		1954-01-01	1954-01-01
	Gate superstructure - spillways	9	each		1954-01-01	1954-01-01
	231 INTAKE STRUCTURE, POWER	60,000	m3		1954-01-01	1954-01-01
	Gate superstructure - intake	4	each		1954-01-01	1954-01-01
	232 PENSTOCKS	260	m		1954-01-01	1954-01-01
	236 GATES AND STOPLOGS					
	Steel head gates, 30' x 30' on steel frame	4	each		1954-01-01	1954-01-01
	Main steel spillway gates, size 34' x 36' with steel frame superstructure and blower bubble air supply system	8	each		1954-01-01	2005-07-31
	Steel spillway regulating gate, size 34' x 20' on steel frame support and structure	1	each		1954-01-01	2009-07-31
	Installation including steel frame structure and consisting of: 1 - stop log monorail hoist, 20 ton with push button controls; 1 - set of stop logs including 10 concrete sectional slabs on steel frame support	1	lot		1954-01-01	1954-01-01
	237 TRASH RACKS	1	lot		1954-01-01	1954-01-01
	238 CRANES					
	Tailrace crane 38' span	1	each		1954-01-01	1954-01-01
	Overhead crane 70' span	1	each	400 ton / 2 hoists 200/25 ton	1954-01-01	1954-01-01
	Overhead crane 12' span	1	each	30 ton	1954-01-01	1954-01-01

Waneta Dam Replacement Cost Estimate

Category	Asset Description	Waneta Assets			Asset Original In-service Date	Asset original/upgraded/refurbished date
		Quantity	Unit of Measure	Capacity/unit		
Switchyard Equipment	521 TRANSFORMERS, POWER					
	Spare transformer	1	each	3 Phase 120 MVA 63 kV/14.4 kV	1966-01-01	1966-01-01
	Generator transformer #1	1	each	3 Phase 135 MVA 63 kV/14.4 kV	1954-01-01	2003-12-31
	Generator transformer #2	1	each	3 Phase 135 MVA 63 kV/14.4 kV	1954-01-01	2003-11-30
	Generator transformer #3	1	each	3 Phase 135 MVA 63 kV/14.4 kV	1964-01-01	1995-01-01
	Generator transformer #4	1	each	3 Phase 135 MVA 63 kV/14.4 kV	1966-01-01	2007-02-28
	Switchyard step-up transformer #1	1	each	3 Phase 200MVA, 63KV/230KV	2007-11-30	2007-11-30
	Switchyard step-up transformer #2	1	each	3 Phase 200MVA, 63KV/230KV	2007-11-30	2007-11-30
	541 CIRCUIT BREAKERS					
	63 kV breakers	11	each	2000 A 69kV 3500/5000 MVA	2003-10-31	2003-10-31
	542 SWITCHGEAR AND SWITCHES - Switchyard Gas Insulated Switchgear	4	each	69kV	2007-11-30	2007-11-30
	544 SWITCHGEAR, METALCLAD					
	600V Switchgear Unit #1 and miscellaneous P&C control panels allowance	1	lot		1954-01-01	2007-11-30
	600V Switchgear Unit #2 and miscellaneous P&C control panels allowance	1	lot		1954-01-01	2007-11-30
	600V Switchgear Unit #3 and miscellaneous P&C control panels allowance	1	lot		1964-01-01	2007-11-30
	600V Switchgear Unit #4 and miscellaneous P&C control panels allowance	1	lot		1966-01-01	2007-11-30
	554 BUSWORK AND STATION CONDUCTOR					
	63 KV cable bus from generator transformer to switchyard - including terminations (3 conductor per phase)	900	m		2007-11-30	2007-11-30
	63KV overhead line to switchyard (2 conductor per phase) - including towers and foundations	4500	m		2007-11-30	2007-11-30
	555 GROUNDING SYSTEMS - Switchyard structures, equipment	1	lot		2007-11-30	2007-11-30
	560 INSULATORS - Switchyard	1	lot		2007-11-30	2007-11-30
	570 ARRESTORS, SURGE - Switchyard	1	lot		2007-11-30	2007-11-30

16.0 Reference: Exhibit B-1, Chapter 3, pp. 3-3, 3-4
Operating Agreement

"Commencing in 2036, BC Hydro and Teck would receive their proportionate share of the generation from the Waneta Assets with all risks and benefits of actual performance from the Waneta Assets being shared pro rata unless agreed otherwise."

1.16.1 Please provide an explanation of the differences in the terms of the Operating Agreement that could occur pre-December 2035 and post-December 2035.

RESPONSE:

The following table provides a summary of the differences in the proposed terms for the Co-Ownership and Operating Agreement for the two periods:

Item	Prior to January 1, 2036	From and After January 1, 2036
Entitlement Amounts	**Negotiated amounts reflect the value of BC Hydro's one-third ownership interest.** **Specific annual and monthly quantities reflect Teck's expected surplus energy and capacity.**	**Directly reflects BC Hydro's one-third ownership interest.**
Unit Outages/Force Majeure	**Other than outages associated with agreed upgrades that are to be borne proportionately by the parties, Teck would bear the same risk under the CPA for unit outages that it currently has under 100 per cent ownership, and would bear the risk of other force majeure.**	**Teck's risk for unit outages under the CPA, and for force majeure, would be reduced to reflect its two-thirds ownership interest.**
Entitlement Re-determinations Under the Canal Plant Agreement	**Teck would bear the same risk under the CPA for entitlement re-determinations that it currently has under 100 per cent ownership.**	**Teck's risk for entitlement re-determinations under the CPA would be reduced to reflect its two-thirds ownership interest.**

Item	Prior to January 1, 2036	From and After January 1, 2036
Waneta Expansion Impacts	**Teck would bear the risk and receive the benefit of any Waneta Expansion advancement or deferral.** **Waneta Entitlement re-determinations related to the Waneta Expansion would accrue solely to Teck's account, as described above.**	**If Waneta Expansion is not built by January 1, 2036, BC Hydro would receive its one-third of the resulting benefit.** **Waneta Entitlement re-determinations related to the Waneta Expansion would be shared in proportion to ownership interest.**
Line 71 Costs and Losses	**All costs and losses would accrue to Teck's account.**	**Costs and losses on Line 71 would be shared in proportion to ownership interests in the Waneta Assets.**
Access to Kootenay Interconnection	**BC Hydro would have the right of priority access in amounts equal to the reduction in capacity entitlements shown in Table 3-2 of the Filing.**	**BC Hydro would have the right of priority access in amounts equal to its ownership interest in the Waneta Assets.**
Environmental Attributes	**BC Hydro would have the right to claim its share of Waneta output as Clean or Renewable Electricity.** **Teck would have a right to claim all other environmental attributes.**	**All environmental attributes would be shared in proportion to ownership interests in the Waneta Assets.**
CPA Scheduling Agreement	**Existing CPA Scheduling Agreement, which gives BC Hydro scheduling certainty in exchange for additional entitlement, would continue to be in effect.**	**CPA Scheduling Agreement may be terminated, although good faith negotiation to establish a new agreement is required.**

17.0 Reference: Exhibit B-1, Appendix A, p. 23-43
Transmission after 2035, (f) Contribution to Operating Costs

Before 2036, Teck is to be responsible for all sustaining capital, operations and maintenance costs of Line 71, after which BC Hydro is pay Teck one-third of all sustaining capital, operations and maintenance expenditures incurred by Teck in connection with Line 71 from and after January 1, 2036.

1.17.1 Please provide estimates of forecasts/budgets for following 3 years of operations and maintenance costs and 5 years of sustaining capital costs for Line 71.

RESPONSE:

At this point in time the costs associated with Line 71 for the period after 2035 are unknown. For reference, Teck has provided its current estimate of annual operating, maintenance and administration costs and sustaining capital costs for Line 71 of $230,000.

18.0 Reference: Exhibit B-1, Appendix A, p. 23-43
Acquisition of Remaining Interest and Line 71

If BC Hydro acquires Teck's two-thirds interest in Waneta Dam, BC Hydro would have a right to purchase Line 71 and other Teck transmission facilities related to Waneta Dam (but not the smelter), to the extent those other transmission facilities were not required by Teck, subject to assuming Teck's contractual commitments to third parties respecting access to and use of Line 71 and such other transmission facilities.

1.18.1 Please provide an estimate of the current cost, taking into account the age of the assets, to acquire the remaining two-thirds interest in the Waneta Dam at the present time and in 2036.

RESPONSE:

Teck has it made it clear to BC Hydro that the other two-thirds interest in Waneta is not currently for sale. The referenced provision would only apply in the event of a default by Teck or a decision by Teck to exercise the rights contemplated under section 20 of the Operating Terms. Since Teck is under no obligation to sell its remaining interest in the Waneta Dam, BC Hydro assumes that the value of its interest, if it ever does decide to sell, would be based on market conditions at that time. BC Hydro does not wish to speculate on what those conditions might be at this time.

18.0 Reference: Exhibit B-1, Appendix A, p. 23-43
Acquisition of Remaining Interest and Line 71

If BC Hydro acquires Teck's two-thirds interest in Waneta Dam, BC Hydro would have a right to purchase Line 71 and other Teck transmission facilities related to Waneta Dam (but not the smelter), to the extent those other transmission facilities were not required by Teck, subject to assuming Teck's contractual commitments to third parties respecting access to and use of Line 71 and such other transmission facilities.

1.18.2 Please provide an estimate of the current cost, taking into account the age of the assets, to acquire the Line 71 and other Teck transmission facilities related to Waneta Dam at the present time and in 2036.

RESPONSE:

Teck has not offered to sell and BC Hydro has not sought to purchase Line 71. Accordingly, BC Hydro has not estimated the cost of acquiring Line 71 or other Teck transmission facilities either now or in 2036.

18.0 Reference: Exhibit B-1, Appendix A, p. 23-43
Acquisition of Remaining Interest and Line 71

If BC Hydro acquires Teck's two-thirds interest in Waneta Dam, BC Hydro would have a right to purchase Line 71 and other Teck transmission facilities related to Waneta Dam (but not the smelter), to the extent those other transmission facilities were not required by Teck, subject to assuming Teck's contractual commitments to third parties respecting access to and use of Line 71 and such other transmission facilities.

1.18.3 Please provide a listing of Teck's contractual commitments to third parties respecting access to and use of Line 71 and such other transmission facilities.

RESPONSE:

BC Hydro has identified the following two commitments to third parties with respect to the access to and the use of Line 71:

- **Teck's obligation pursuant to section 5.9 of the PASDA to not unreasonably deny access to Line 71 for electricity generated at the Waneta Expansion or the Brilliant Expansion; and**

- **Teck's agreement to allow FortisBC use of Line 71 on an interruptible basis pursuant to the January 20, 1987 letter to West Kootenay Power (now FortisBC).**

19.0 Reference: Exhibit B-1, pp. 1-3, 6-19
Acquisition of Assets from Teck

Page 1-3 of the Application states that the opportunities offered by the Waneta Transaction, particularly in regard to the acquisition of the assets, were sufficiently distinctive that a competitive tendering process would not have been useful. On page 6-19, the Application states that BC Hydro has a number of attributes that would suggest it would be the most logical party to acquire an interest in Waneta, including its existing arrangements under the CPA.

1.19.1 Please provide further details on the distinctive opportunities that, in BC Hydro's view, rendered a competitive tendering process not useful.

RESPONSE:

The acquisition of an interest in the Waneta Dam provides BC Hydro with a resource that, at the price offered, has significant long-term value to BC Hydro, as set out in Chapter 6 of the Filing.

Teck approached BC Hydro in late 2008 and offered the opportunity for BC Hydro to enter into an EPA for an extended period provided that BC Hydro would prepay for the energy. Through bilateral negotiations, that opportunity evolved into the current proposal that would see BC Hydro acquire an undivided one-third interest in the Waneta Assets.

Teck made clear from the outset that its objective was to raise cash in the near term from non-core assets to improve its financial situation. Accordingly, BC Hydro knew that any transaction needed to involve a substantial upfront payment to Teck in a relatively short period of time. While the sense of urgency associated with the transaction abated as Teck's financial position improved, at all times BC Hydro understood that the opportunity would not remain available if a protracted process with an uncertain outcome from Teck's perspective was required.

Contemporaneously, BC Hydro had received proposals in response to its Clean Power Call in November 2008 and was commencing the evaluation process of the proposals. This call was a tendering process that did not contemplate upfront payments by BC Hydro but which did identify alternative resources that might be available from a competitive process. The information available from the Clean Power Call gave BC Hydro additional comfort that the deal it was negotiating with Teck would result in a cost-effective acquisition.

19.0 Reference: Exhibit B-1, pp. 1-3, 6-19
Acquisition of Assets from Teck

Page 1-3 of the Application states that the opportunities offered by the Waneta Transaction, particularly in regard to the acquisition of the assets, were sufficiently distinctive that a competitive tendering process would not have been useful. On page 6-19, the Application states that BC Hydro has a number of attributes that would suggest it would be the most logical party to acquire an interest in Waneta, including its existing arrangements under the CPA.

1.19.2 BC Hydro and Teck were in bilateral negotiations that preceded the signing of the Term Sheet in June 2009. Was this format, as opposed to competitive bidding, the format preferred by BC Hydro? Please explain.

RESPONSE:

Please refer to the response to BCUC IR 1.19.1.

19.0 Reference: Exhibit B-1, pp. 1-3, 6-19
Acquisition of Assets from Teck

Page 1-3 of the Application states that the opportunities offered by the Waneta Transaction, particularly in regard to the acquisition of the assets, were sufficiently distinctive that a competitive tendering process would not have been useful. On page 6-19, the Application states that BC Hydro has a number of attributes that would suggest it would be the most logical party to acquire an interest in Waneta, including its existing arrangements under the CPA.

1.19.3 FortisBC currently operates the Waneta Assets under the Canal Plant Agreement existing arrangements. FortisBC is also a purchaser of Teck's surplus power. To the best of BC Hydro's knowledge, has Teck approached FortisBC as an alternative purchaser of the Waneta Assets?

RESPONSE:

BC Hydro understands that Teck did approach a number of parties, including FortisBC, to explore options with respect to monetizing the value of Waneta. BC Hydro has no knowledge of the nature or extent of these discussions.

19.0 Reference: Exhibit B-1, pp. 1-3, 6-19
Acquisition of Assets from Teck

Page 1-3 of the Application states that the opportunities offered by the Waneta Transaction, particularly in regard to the acquisition of the assets, were sufficiently distinctive that a competitive tendering process would not have been useful. On page 6-19, the Application states that BC Hydro has a number of attributes that would suggest it would be the most logical party to acquire an interest in Waneta, including its existing arrangements under the CPA.

1.19.3.1 In section 6.5 of the Application, BC Hydro discusses whether it has paid a 'fair' price to acquire the Waneta Assets in light of their value to Teck. Is the definition of fair price substantially similar to the 'market value' described on line 26 at page 6-15? If not, please explain.

RESPONSE:

BC Hydro believes that the fair value of the Waneta Assets to BC Hydro is substantially similar to the market value described in section 6.5.3 of the Filing.

The market price serves as a floor for the fair price of the transaction of the seller. That is, if BC Hydro offered a price below the market price, Teck would be unlikely to accept it. The market price forms the basis for determining Teck's opportunity cost.

The fair price considers the market price, but also takes into account some aspects of the buyer's perspectives. Thus, if the asset in question has some unique value or cost to a buyer, the fair price for that particular buyer may be higher or lower than the market price.

20.0 Reference: Exhibit B-1, p. 2-2
Plant Capacity and Generating Capability

1.20.1 Assuming that all units of the Waneta facility have been upgraded to the current 493 MW, what would have been the average annual generating capability for the 60-year stream flow record from 1948 to 2008?

RESPONSE:

BC Hydro does not have access to regulated flow data beyond 1988, as explained in the response to BCUC IR 20.1.1. Year-by-year generation capability for the period from 1948 through 1988 is shown in the chart provided in response to BCUC IR 1.8.1.2.

20.0 Reference: Exhibit B-1, p. 2-2
Plant Capacity and Generating Capability

1.20.1.1 Please explain if, and how, stream flows are affected by any large power developments or Treaty provisions over the years.

RESPONSE:

The following describes how stream flows at Waneta are affected by any large upstream power developments over the years. However, none of these changes would affect BC Hydro's Waneta Electricity to 2036.

The seasonal run-off pattern of stream flows in the Pend d'Oreille River can be impacted by the reservoir storage operation of major upstream reservoirs including primarily Hungry Horse, Kerr and Albeni Falls reservoirs, and, to a lesser extent, Noxon Rapids and Priest Lake. The daily and hourly flow variation in Pend d'Oreille stream flows in the vicinity of Seven Mile and Waneta is impacted primarily by the Boundary project operations. The quantity and timing of flows can also be impacted by upstream irrigation requirements and other consumptive uses of water.

The Columbia River Treaty explicitly authorizes Canada and the U.S. to divert water from the Columbia River Basin for consumptive uses, while prohibiting, without consent of the other party, any other diversions of water from the basin.

The operation of the upstream reservoirs is coordinated to optimize power production within the constraints imposed for a number of purposes including flood control, fisheries, irrigation, recreation, etc. From time-to-time the various agencies and regulators may impose new or different operating constraints to the various projects.

In recent years, constraints related to fisheries requirements have increased the flow requirements during the May to July period, which can reduce the amount of reservoir storage available for release during the winter. These changes can impact the seasonal timing of downstream flows and the amount of water that is usable for generation.

To address these changes in reservoir operation over time, the CPA provides that entitlements may be re-determined in the event that there are "changes to the Available Flow at the Plant which would result in a change to the Aggregate Entitlement if re-determined…". Through its involvement on the Columbia River Treaty Operating Committee, BC Hydro is kept informed about changes in U.S. project operating criteria and plant constraints that could impact operations within Canada. From time-to-time BC Hydro receives, and on occasion will request, updated project simulation studies to determine if there has been sufficient change in U.S. project operation to warrant re-determination of CPA

entitlements. This was done as part of the re-negotiation of the CPA in 2005. Flow information for Waneta was as supplied in a February 1998 study from the Bonneville Power Administration incorporating all power and non-power constraints applicable at that time. This study encompassed the 1928 through 1988 period of stream flows.

Currently, U.S. studies are typically based on the 1928 through 1998 period of record. Every ten years, the U.S. agencies and other parties, including BC Hydro, thoroughly review, update and extend their stream flow information to include more recent years. Part of this process is to adjust the stream flow record for recent developments related to consumptive uses of water (irrigation is a much more significant factor within the U.S. portion of the Columbia Basin). Until this work is done, all U.S. studies, and BC Hydro studies that rely on this information, will typically not include more recent flow years.

21.0 Reference: Exhibit B-1, pp. 2-10, 2-14
Waneta Expansion Project (WEP)

The Application states that CPC/CBT are currently planning an expansion to the Waneta project. If the WEP proceeds, it would allow energy generation from water that would otherwise be spilled and improve the overall efficiency of power generation at Waneta.

1.21.1 Would the improved efficiency of power generation at Waneta lead to improved average annual generating capability and in turn, more firm energy for BC Hydro from its acquisition of a one-third interest in the Waneta Assets? How would the improved capability be netted out by the WEP energy entitlement?

RESPONSE:

No. The Waneta powerhouse can currently utilize 32,910 cfs of water flow, and does so on a first priority basis. Once the WEP is constructed, however, the priority for water utilization would change: Waneta would have priority for the first 25,000 cfs of flow in the river; WEP would have priority for the next 21,400 cfs; Waneta would have priority for the next 7,900 cfs. While some efficiency improvements are expected at Waneta due to the coordinated dispatch of the two projects, the net effect of WEP is to reduce the energy attributable to Waneta because the change in the priority of water rights (i.e., reduced water availability for Waneta) is a much more significant impact. The net impact of the addition of WEP is to reduce the Waneta entitlement by about 143 GWh/year.

22.0 Reference: Exhibit B-1, p. 2-15

The Application states that the WEP would be included in the CPA and the project's operation would be coordinated by BC Hydro, and that the dispatch of generation at Waneta and WEP would be closely coordinated.

1.22.1 What is the relationship between BC Hydro and the WEP being proposed for development by CPC/CBT (e.g. EPA)? Would BC Hydro still consider acquiring power from the WEP after it acquires one-third of the Waneta Assets?

RESPONSE:

An EPA-style engagement may be appropriate if WEP proceeds.

BC Hydro would consider acquiring power from the WEP if it appears to be a cost-effective source of supply.

22.0 Reference: Exhibit B-1, p. 2-15

The Application states that the WEP would be included in the CPA and the project's operation would be coordinated by BC Hydro, and that the dispatch of generation at Waneta and WEP would be closely coordinated.

1.22.2 What is the status of formal amendments to the CPA to accommodate the WEP? Discuss if the terms of the amended CPA could report the value to BC Hydro of the Waneta purchase.

RESPONSE:

BC Hydro and the Waneta Expansion Power Corporation are working to finalize the WEP CPA Amendment Agreement. The terms of the amended CPA are expected to document the new entitlement amounts for both Waneta and the Waneta Expansion. There is no impact on the financial value of the Waneta Transaction prior to January 2036.

23.0 Reference: Exhibit B-1, pp. 3-1, 3-6, 6-16, 6-17
Surplus Power to Teck

1.23.1 Please provide the annual sale of power by Teck for the period 1999 to 2008, by volume and by value. Where the value includes environmental attributes, transmission wheeling costs, and other cost/revenue, please specify.

RESPONSE:

BC Hydro asked Teck to provide it with the information requested in BCUC IRs 1.23.1 through 1.23.4. In response, Teck has provided information previously released by Teck or posted on the National Energy Board website as required by Teck's export permits.

Attachment 1 to this IR response identifies export sales and realized prices by quarter for each of the last ten years. Attachment 2 provides monthly volumes and revenue for 2008 and the first half of 2009. The information provided by Teck is not sufficiently disaggregated to provide the information sought in BCUC IRs 1.23.3 and 1.23.4.

Teck Metals Limited - Power Sales Data (1999-2008)

		Q1	Q2	Q3	Q4	Total
1999	Sales volume (GWh)	162	224	86	202	**674**
	Realized price (Cdn$/MWh)	34	29	37	42	**35**
2000	Sales volume (GWh)	99	225	157	217	**698**
	Realized price (Cdn$/MWh)	36	133	252	413	**236**
2001	Sales volume (GWh)	185	230	444	300	**1159**
	Realized price (Cdn$/MWh)	681	358	221	35	**269**
2002	Sales volume (GWh)	177	165	192	149	**683**
	Realized price (US$/MWh)	23	15	23	33	**23**
2003	Sales volume (GWh)	181	257	162	169	**769**
	Realized price (US$/MWh)	38	31	41	42	**36**
2004	Sales volume (GWh)	234	314	263	146	**957**
	Realized price (US$/MWh)	42	39	47	46	**44**
2005	Sales volume (GWh)	194	301	581	202	**1278**
	Realized price (US$/MWh)	53	46	62	88	**58**
2006	Sales volume (GWh)	249	291	245	106	**891**
	Realized price (US$/MWh)	50	28	53	59	**44**
2007	Sales volume (GWh)	248	374	300	208	**1130**
	Realized price (US$/MWh)	48	46	52	64	**51**
2008	Sales volume (GWh)	189	314	308	196	**1007**
	Realized price (US$/MWh)	75	62	62	57	**62**

Teck Exports (2008 – 2009)

	2008		2009	
	Energy (MWh)	**Revenue ($)**	**Energy (MWh)**	**Revenue ($)**
January	38,800	2,798,548	68,928	3,151,438
February	24,560	1,744,680	95,632	4,435,383
March	86,076	6,151,119	10,400	403,172
April	104,944	9,473,664	119,243	3,119,556
May	158,392	9,274,088	98,192	2,610,316
June	99,948	3,782,785	95,480	2,166,015
July	97,422	6,340,089		
August	102,170	7,648,974		
September	68,692	4,170,570		
October	106,048	6,794,593		
November	63,472	3,665,719		
December	97,385	6,636,849		
Total	**1,047,909**	**68,481,679**		

23.0 Reference: Exhibit B-1, pp. 3-1, 3-6, 6-16, 6-17
Surplus Power to Teck

1.23.2 Please provide the monthly sale of power by Teck for the years 2008 and 2009, by volume and by value. Where the value includes environmental attributes, transmission wheeling costs, and other cost/revenue please specify.

RESPONSE:

Please refer to the response to BCUC IR 1.23.1.

23.0 Reference: Exhibit B-1, pp. 3-1, 3-6, 6-16, 6-17
Surplus Power to Teck

1.23.3 Please provide a breakdown of power sales by major buyer (e.g. US wholesale power markets, FortisBC, Powerex, Alberta, etc.) for 2007 and 2008.

RESPONSE:

Please refer to the response to BCUC IR 1.23.1.

23.0 Reference: Exhibit B-1, pp. 3-1, 3-6, 6-16, 6-17
Surplus Power to Teck

1.23.4 Please comment on the extent of Teck's sale which was a result of surplus entitlement and the proportion which was a result of market trading activities as a result of surplus capacity.

RESPONSE:

Please refer to the response to BCUC IR 1.23.1.

24.0 Reference: Exhibit B-1, p. 3-6
Entitlement Adjustments

The Application states that the Operating Terms would contemplate a series of entitlement adjustments until at least December 31, 2035 designed to ensure that Teck would have sufficient energy to serve the Industrial Load in all months.

1.24.1 Please provide the monthly requirements of Teck's industrial load, if available.

RESPONSE:

Teck has estimated the typical maximum energy and capacity requirements of its Industrial Load at Trail (including the oxygen plant), including a capacity buffer to accommodate typical load fluctuations, as follows:

	Energy (MWh)	Capacity (MW)
January	157,700	236.8
February	141,900	236.0
March	155,500	233.7
April	149,000	231.6
May	152,300	229.2
June	146,400	227.8
July	150,100	226.1
August	150,300	226.4
September	147,200	229.0
October	154,200	231.9
November	151,200	234.8
December	157,700	236.6

24.0 Reference: Exhibit B-1, p. 3-6
Entitlement Adjustments

The Application states that the Operating Terms would contemplate a series of entitlement adjustments until at least December 31, 2035 designed to ensure that Teck would have sufficient energy to serve the Industrial Load in all months.

1.24.2 Does Teck's industrial load have priority over BC Hydro's peak load?

RESPONSE:

No. Neither party would have an obligation to serve the other's load.

With respect to BC Hydro's rights under the Waneta Transaction in the period prior to January 1, 2036, if a Waneta outage or entitlement decrease from a CPA re-determination occurs, then Teck's entitlement would be reduced by the entitlement adjustment calculated as if 100 per cent of Waneta remained in the CPA. In such circumstance Teck's entitlement for its Industrial Load would be reduced, with the result that in the period prior to January 1, 2036 BC Hydro's Waneta Electricity that becomes available to BC Hydro via the Waneta Transaction (through a decrease in Teck's entitlement under the CPA) has priority over Teck's Industrial Load.

However, while BC Hydro's Waneta Electricity has such priority: (i) as described in the preamble to this IR, the contemplated entitlement adjustments are intended to ensure that Teck would have sufficient energy to serve its Industrial Load in all months; and (ii) Teck has the ability to acquire power from the market to serve its Industrial Load.

24.0 Reference: Exhibit B-1, p. 3-6
Entitlement Adjustments

The Application states that the Operating Terms would contemplate a series of entitlement adjustments until at least December 31, 2035 designed to ensure that Teck would have sufficient energy to serve the Industrial Load in all months.

1.24.3 Please confirm that under the Waneta Transaction, the WEP has priority rights to water that would reduce the CPA energy entitlement and that furthermore, Teck has priority rights for its industrial load.

RESPONSE:

The priority rights to available flow are as discussed in the response to BCUC IR 1.8.2.

Under the CPA, Teck has a right to a specific amount of electricity (an entitlement) from generation at Waneta or through a coordination transfer from BC Hydro. Teck may use this entitlement in its absolute discretion, including service to its Industrial Load.

Absent the Waneta Transaction, if the WEP proceeds, it is expected that Teck's entitlement would be reduced by about 143 GWh/year and by about 8 MW of capacity.

With the Waneta Transaction, as discussed in the response to BCUC IR 1.36.1, Teck and BC Hydro would agree to a series of entitlement adjustments for the period prior to January 1, 2036. As a result of these adjustments, Teck's entitlement is forecast to remain essentially constant, in amounts equal to Teck's Industrial Load, throughout this period if WEP proceeds with an April 1, 2014 in-service date.

With respect to the priority rights between BC Hydro and Teck, please refer to the response to BCUC IR 1.24.2.

25.0 Reference: Exhibit B-1, p. 4-1
BC Hydro's 2008 Load Forecast Update

1.25.1 Please confirm that the Evidentiary Update in the 2008 LTAP (Exhibit B-10) was filed with the Commission on December 22, 2008 and that the underlying assumptions with respect to economic growth were updated by Exhibit B-18 of the same proceeding.

RESPONSE:

Confirmed with respect to both parts of the request.

25.0 Reference: Exhibit B-1, p. 4-1
BC Hydro's 2008 Load Forecast Update

1.25.1.1 Please provide a current forecast to the values in Exhibit B-18 of the 2008 LTAP proceeding, if available. Please comment if the current forecasts of real GDP growth rates are different from those values shown in Exhibit B-18. If so, would it change the values in Table 4-1?

RESPONSE:

Exhibit B-18 of the 2008 LTAP set out updates to various forecasts of the expected real growth rate of the B.C. Gross Domestic Product (GDP). Since the filing of that exhibit, the Conference Board of Canada (CBoC) forecast has been updated. The following table provides the sequence of forecasts by the CBoC as were provided in that exhibit with the addition of the CBoC July 2009 Quarterly Update.

Forecast of Real Growth in GDP (%)

Year	2008 LTAP Evidentiary Update	CBoC Update	CBoC Quarterly Forecast	CBoC Quarterly Forecast
	From 2008 LTAP Exhibit B-18			New
Date of Issuance	October 2008	January 2009	February 2009	July 2009
2009	1.8	0.	-0.1	-2
2010	3.3	3.	4.3	3
2011	2.8	-	3.4	3
2012	2.7	-	3.3	3
2013	2.2	-	2.6	3

As can be observed, since the filing of Exhibit B-18, the per cent change in GDP for 2009 has dropped significantly and the expectations for 2010 have declined to values nearer those that were expected in the earlier forecasts.

Beyond 2010, the forecast annual growth in GDP is somewhat higher than that previously forecast by the CBoC, generally confirming BC Hydro's view that for the mid- to long-term, the assumptions underlying the 2008 Load Forecast remain appropriate.

As described in section 4.1.1.1 of the Filing, BC Hydro anticipated this change in outlook by incorporating a reduced load forecast for calendar years 2010 and 2011

(the first two years of the Waneta Transaction) in developing its cost of energy set out in Table 6-2 of the Filing.

Accordingly, with the exception of F2010, the forecast values presented in Table 4-1 (that is the values for F2017, F2021 and F2028) would not change.

25.0 Reference: Exhibit B-1, p. 4-1
BC Hydro's 2008 Load Forecast Update

1.25.2 Is the 2008 Annual Load Forecast completed? Are the mid-forecasts for energy (GWh) and peak (MW) values identical to the Evidentiary Update referred to above? (X-reference: 2008 LTAP proceeding, Exhibit B-12 BCUC IR 3.237.1)

RESPONSE:

The 2008 Annual Load Forecast was completed in December 2008 and was filed in the 2008 LTAP Evidentiary Update (Exhibit B-10), and called the "2008 Load Forecast Update". Since that time, the full documentation associated with that forecast has been completed; a copy of the document is attached as Attachment 1.

The mid forecasts for energy and peak values are identical to those provided in the 2008 LTAP Evidentiary Update (Exhibit B-10) and referenced in BC Hydro's response to BCUC IR 3.237.1 (Exhibit B-12 of that proceeding). For example, the values set out in Tables 2-3 and 2-4 of the 2008 LTAP Evidentiary Update for the identified future years are identical to the peak and energy values provided for the BC Hydro Integrated System in Table A4.6 in the 2008 Load Forecast document.

Electric Load Forecast

2008/09 to 2028/29

Market Forecasting

Energy Planning

Customer Care and Conservation

BC Hydro

2008 Forecast
As Used in the 2008 BC Hydro Long Term Acquisition Plan Evidentiary Update as filed with the British Columbia Utilities Commission on December 22, 2008.

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Executive Summary

Background and Context

BC Hydro is the third largest utility in Canada and generates nearly 80% of the electricity produced in British Columbia. BC Hydro's total energy requirements including losses and sales to other utilities were 59,034 GWh in F2008[1]. Sales to BC Hydro's residential, commercial, industrial were over 51,639 GWh in F2008. The total integrated peak demand requirements including losses and peak demand from all other utilities was 9,861 MW.

Load forecasting is central to BC Hydro's long-term planning, medium-term investment and short-term and operational and forecasting activities. The BC Hydro Electric Load Forecast is published annually. The forecast is based on several comprehensive end-use and econometric models that use billed sales data up to March 31 of the relevant year as historical information, combined with a wide variety of economic forecasts and inputs from internal, government and third-party sources. The primary purpose of the Electric Load Forecast is to provide decision-making support on the questions of "where, when and how much" electricity is expected to be required on the BC Hydro system.

BC Hydro's load forecasting activities centre on the production of a number of term-specific and location-specific forecasts of energy sales and peak demand requirements to meet user needs for decision-support information. A variety of related products including monthly variance reports, inputs for revenue forecasts and load shape analysis are produced to supplement the forecasts presented in this report.

Sectors and Methodology

The main components of BC Hydro's Load Forecasts consist of: the residential sales forecast, the commercial sales forecast (distribution voltage and transmission voltage), the industrial sales forecast (distribution voltage and transmission voltage) and the peak forecast (distribution and transmission).

The sales forecasts are projections for billed sales and are produced using a variety of end-use and econometric models. The projections from these models result in a sales forecast before incremental Demand Side Management (DSM) and before the impacts from future changes in electricity rates.

Peak forecasts are developed for each of BC Hydro's distribution substations. These forecasts are aggregated on a coincident basis to develop a total distribution peak forecast. Historical trends, intelligence from Key Account mangers and information from sector studies are the basis for peak forecasts for BC Hydro's large transmission customers. These forecasts are aggregated on a coincident basis to develop a total peak forecast.

These specific forecast methods are based on their predictive value and their ability to most appropriately meet the needs of users, which includes simplicity and transparency.

The next section below briefly outlines key aspects of the sector sales and total peak demand requirements[2].

[1] BC Hydro's fiscal year runs from April to March. F2008 includes April 2007 to March 2008.

[2] Unless otherwise stated, forecast comparative statements in the entire document are benchmarked against the 2007 Load Forecast before DSM and Rate Impacts.

2008 Load Forecasts

The load forecasts referenced in this document were filed as part of the 2008 BC Hydro Long Term Acquisition Plan (LTAP) Evidentiary Update on December, 22, 2008. In this proceeding, this forecast was referenced as the "2008 Load Forecast Update".

The forecasts presented here are all before incremental DSM. At the time of preparing the 2008 Load Forecasts, DSM estimates for all 21 years were developed for the 2008 Long-Term Acquisition Plan (LTAP). These estimates and Load Forecasts with incremental DSM are contained in BC Hydro's 2008 LTAP.

The 2008 Reference Load Forecast before incremental DSM is provided both before and after rate impacts. Forecasts indicated as being: "Before DSM and Rate Impacts" assume the electricity rates increase with the rate of inflation (i.e., no real dollar rate increases). These are provided in Appendix table A4.5. Load Forecasts with estimates of future electricity rates are presented as the Reference Load Forecast before DSM and with Rate Impacts in table A4.6. These forecasts are based on assuming flat rate structures rather than inclining rate structures. The estimates of load reduction reflected in the forecast before DSM and rate impacts do not include any estimates for load reduction due to changes in rate structures.

Residential Forecast

Of the three customer classes, residential, commercial, and industrial, the residential sector is the most stable in terms of demand variability. Key features of the residential forecast include the following:

- Electricity Use - BC Hydro's residential sector currently consumes about 33% of BC Hydro's total annual billed sales. This electricity is used to provide a range of services (end uses) including space heating, water heating, refrigeration, and miscellaneous plug-in load which includes computer equipment and home entertainment systems.
- Drivers - The drivers of the residential forecast are number of accounts and average annual use per account. Growth in the total number of accounts is driven largely by estimates of growth in housing starts.
- Trends – Sales to the residential sector, before weather adjustment, grew by about 609 GWh or 3.6% from F2007 to F2008, and on a weather-normalized basis, grew by 171 GWh or 1.0%. Sales are expected to grow more slowly relative to the previous forecast over the forecasting period. This reflects a slower projection in use rate and housing starts. Refer to Table 1 for the sales forecast before DSM and rate impacts.

Commercial Forecast

BC Hydro's commercial sector encompasses a wide variety of commercial and publicly-provided services. It includes a diverse set of BC Hydro customers who operate a range of facilities such as office buildings, retail stores and institutions (i.e., hospitals and schools) provided at distribution voltages. It also includes transportation facilities provided at transmission voltages. Key features of the commercial forecast include the following:

- Electricity Use – BC Hydro's commercial sector currently consumes 30% of BC Hydro's total annual billed sales. This electricity is used to provide a range of services such as lighting, ventilation, heating, cooling, refrigeration and hot water. These needs vary considerably between different types of buildings.
- Drivers – At an aggregate level, the consumption in commercial sales is closely tied with economic activity in the province. Key drivers for the commercial sector include regional retail sales, regional employment and regional commercial output. As a

result, future economic trends are good indicators of future electricity consumption in the commercial sector.

- Trends – Electricity consumption in the commercial sector can vary considerably from year to year reflecting the level of activity in BC's service sector. Sales to BC Hydro's commercial sector grew by 334 GWh or 2.2% between F2007 and F2008. The current forecast is projected to be below the previous forecast due to lower economic drivers and a gain in efficiency in end-uses. Refer to Table 1 for the sales forecast before DSM and rate impacts.

Industrial Forecast

BC Hydro's industrial sector is concentrated in a limited number of industries, the most important of which are pulp and paper, wood products, chemicals, metal mining, coal mining and oil and gas sector loads. The remaining industrial load is made up of a large number of small and medium sized manufacturing establishments. Key features of the industrial forecast include the following:

- Electricity Use - BC Hydro's industrial sector currently consumes 37% of BC Hydro's total annual billed sales. This electricity is used in a variety of applications including fans, pumps, compression, conveyance, processes such as cutting, grinding, stamping and welding and electrolysis.
- Drivers - Industrial electricity consumption is tied closely with the level of economic activity in the province, market conditions and prices, and world and domestic events that impact sales.
- Trends - Electricity consumption in the industrial sector is quite volatile, driven substantially by economic conditions in the United States, China and Japan that affect commodity markets. Sales to BC Hydro's industrial sector declined by 731 GWh or 3.8% between F2007 and F2008. The industrial forecast is below last year's forecast in the near-term but higher after F2013. This year's forecast reflects global economic slowdown, lower industrial distribution sales forecast, and higher expectations for growth in mining and oil and gas customers. Further explanation can be found in Chapter 8. Refer to Table 1 for the sales forecast before DSM and rate impacts.

Peak Demand

Peak demand is composed of the demand for electricity at the distribution level, transmission level plus inter-utility transfers and transmission losses on the integrated system. Key features of the peak forecast include the following:

- Electricity Use – Peak demand is forecast as the maximum expected one-hour demand during the year. For BC Hydro's load, this event occurs in the winter with the peak driven particularly by space heating load. BC Hydro's peak forecast is based on normalized weather conditions which is the rolling average of the coldest daily average temperature over the most recent 30 years.
- Drivers – Key drivers of electricity peak include the level of economic activity, number of accounts, employment and the other discrete development such as new shopping malls, waste treatment plants or industrial facilities that drive substation peak demand.
- Trends – BC Hydro's peak total distribution peak demand grew by about 91 MW or 1.0% between F2007 and F2008. This modest change is attributed to a decrease in the transmission total peak which offset growth in the distribution peak over this time period. As for the forecast, transmission peak demand is expected to grow at a slower rate, reflecting decreased demand for industrial wood and pulp and paper products. While distribution peak demand is expected to continue to grow by an average of about 130 MW per annum over the longer term, transmission peak demand is

expected to grow an average of only 10 MW per annum. Total peak demand, including demands of other utilities served by BC Hydro, is forecast to grow by 160 MW on average over all 21 years. Please refer to Table 1 for the peak forecast before DSM and rate impacts.

Reference Energy and Peak Forecast Before DSM And Rate Impact

Table 1 provides a summary of historical and forecast of sector sales, total energy requirements and total peak demand requirements for selected years before DSM and before rate impacts.

Table 1. Reference Energy and Peak Forecast Before DSM and Rate Impacts for Selected Years

Fiscal Year	BC Hydro Residential (GWh)	BC Hydro Commercial (GWh)	BC Hydro Industrial (GWh)	Total Domestic Sales (GWh)***	Total Gross Require-ments (GWh)	Total Integrated System Peak (MW)
F2008	17,462 (16,872)*	15,439	18,737	53,002	59,034	9,861 (10,597)*
F2009	17,394	15,812	18,260	52,755	58,350	10,793
F2013	19,057	17,368	19,763	57,742	63,826	11,571
F2019	20,962	19,518	21,282	63,450	70,100	12,197
F2029	24,490	23,988	20,856	71,172	78,702	13,899
Growth Rates[3]						
5 years: F2008 to F2013	1.8% (2.5%)*	2.4%	1.1%	1.7%	1.6%	1.8%
11 years: F2008 to F2019	1.7% (2.0%)*	2.2%	1.2%	1.6%	1.6%	1.3%
21 years: F2008 to F2029	1.6% (1.8%)*	2.1%	0.5%	1.4%	1.4%	1.3%

Note: * Values shown in brackets are weather normalized actuals. Unless otherwise noted, the growth rates for the peak demand are provided on a weather-normalized basis.

** In F2008 the actual Domestic system peak was 9,548 MW on January 28, 2008. The average temperature in the Lower Mainland during this day was -1 degree Celsius. The Domestic Peak demand excludes the peak demand requirements of the other utilities served by BC Hydro.

*** Includes sales to other utilities.

Sensitivity Analysis

BC Hydro's Load Forecast is sensitive to a number of factors, including economic conditions, weather, DSM, electricity rate structures, electricity rates and elasticities. A composite sensitivity analysis using a Monte Carlo model is included in this forecast, the results of which are represented a probability distribution and reflected as the High (P90) and Low (P10) Forecasts. Further details on the sensitivity analysis are included in Section 5 and further details on the Monte Carlo model are included in Appendix 2. Uncertainty in BC Hydro's 20 Year DSM forecast and its impact on the Load Forecast is not reflected in any of the High and Low Forecasts as published in this document.

[3] Unless otherwise noted, all growth rates are calculated as annual compound growth rates.

1 Introduction

BC Hydro's Load Forecast is typically published annually. The Load Forecast consists of a 21-year forecast (remainder of the current year plus a 20-year projection) for future energy and peak demand requirements. These forecasts include the annual Reference Load Forecast or the mid–level projections that are used for planning future energy and peak supply requirements.

In addition to integrated resource planning, the Load Forecast is used to provide decision-making support for several aspects of BC Hydro's business including: revenue requirements and rate design, system planning and operations and BC Hydro's service plan.

Ranges in the Load Forecasts, referred to as uncertainty bands, are developed using simulation methods. These bands represent the expected ranges around the annual Reference forecasts at certainty level of statistical confidence. These forecasts are produced because there is uncertainty in the variables that predict future loads and in the predictive powers of the forecasting models.

The Reference energy forecast consists of a sales forecast for three main customer sectors (residential, commercial and industrial) and a sales forecast for other utilities supplied by BC Hydro. The Reference Total Gross energy requirements forecast consists of the sector sales forecast, other utility sales forecast plus total line losses.

The sales forecast is developed by analyzing and modeling the relationships between energy sales and the predictors of future sales, which are referred as forecast drivers. Drivers consist of both economic variables and non-economic variables. Economic variables include GDP, housing starts, retail sales, employment and electricity prices (rates). Non-economic variables include weather. The rate impact consists of the effect on load due to potential electricity rate changes under current rate structures. Savings or reductions in the load due to changes in rate structures are considered to be part of BC Hydro's 20 Year DSM plan. These savings are not included in the Load Forecasts contained in this document. DSM savings forecasts and Load Forecasts with DSM were included in BC Hydro's 2008 LTAP filing in June 2008 and the 2008 LTAP Evidentiary Update of December 2008.

The total Reference peak forecast consists of coincident distribution substation peak demands, peak demands of BC Hydro large transmission connected customers, peak demand supplied by BC Hydro to other utilities, and total transmission losses. The distribution peak demand forecast is developed by analyzing and modelling the relationship between substation peak demand and economic variables. Distribution peak forecasts are prepared under average cold weather conditions or a design temperature. The transmission peak demand involves estimating the future demands of larger customers which are driven by future market conditions and company specific productions plans.

BC Hydro continuously attempts to improve the accuracy of its forecasting process monitoring trends on forecasting approaches, and tracking developments that may affect the forecast. Forecasts are continually monitored and compared to sales. Forecasts are adjusted for variances or if new information on the drivers becomes available.

2 Regulatory Background and Current Initiatives

The British Columbia Utilities Commission (BCUC), various intervenors and other stakeholders have reviewed BC Hydro's electric Load Forecasts over the past three years in the following processes:

- Vancouver Island Gas Plant Certificate of Public Convenience and Necessities (CPCN) Application
- F2005 and F2006 Revenue Requirements Application (RRA)
- 2004 Integrated Electricity Plan
- Vancouver Island Call for Tenders
- F2007 and F2008 RRA
- 2006 Integrated Electricity Plan (IEP) and Long-term Acquisition Plan (LTAP).
- F2009 and F2010 Revenue Requirements Application (RRA)
- 2008 Long-term Acquisition Plan (LTAP) and 2008 LTAP Evidentiary Update.

In the BCUC's decision on the 2006 IEP/LTAP, the BCUC listed several directives and comments on the Load Forecast. Actions taken in response to these issues and directives are summarized in Table 2.1 in context of the 2008 Load Forecast. At the time this document was being compiled, the oral evidentiary phase of the 2008 LTAP proceeding had been completed and the BCUC had released its Decision on the 2009 and 2010 RRA. In its Decision, the BCUC accepted the updated load projections and issued no directives with respect to future load forecasts.

Table 2.1. BC Utilities Commission Directives and Actions

Directives from the 2006 IEP & LTAP	Action
# 3. The Commission Panel directs BC Hydro to include with its next load forecast a report assessing if there are statistically quantifiable trends associated with the temperature metrics used to forecast peak and energy demands, and an analysis of whether these trends should be extrapolated or otherwise incorporated for use in predicting peak and energy usage in the future. Whether BC Hydro determines it should continue to use temperatures based on historical averages or a statistical trend for forecasting peak and energy demand, the Commission Panel expects BC Hydro to provide a clear and consistent rationale for the historical period it uses for calculating averages, estimating trends, or evaluating variability.	BC Hydro indicated in its 2007 Load Forecast document that a 10-year rolling average of degree days is the best representation of weather for forecasting energy sales. In addition, a rolling 30-year period of the coldest daily average temperature is an appropriate method for forecasting peak demand. For the 2008 Load Forecast there is no changes to these methods.
# 4. The Commission Panel accepts BC Hydro's undertaking to provide adjustments to a load forecast within the updated forecast, and in a manner that provides an explanation of the adjustments and reconciliation to the load forecast.	Appendix 1.3 discusses adjustments to regression based forecasts.

# 5. Subject to the issues noted above and in Sections 3.2.4 and 6.1.2, the Commission Panel finds that BC Hydro's Load Forecast has generally been prepared in accordance with the Commission's Guidelines and further accepts that the results of the 20-year forecast are reasonable for the purposes of the 2006 IEP/LTAP. At the time of filing its next annual load forecast, the Commission Panel directs BC Hydro to provide a review of its prospective forecast range as produced by the Monte Carlo simulation, relative to its historical experience.	The 2007 Load Forecast provided analysis that lead BC Hydro to conclude that that the forecast ranges as produced by the Monte Carlo model are a reasonable representation of the range of expected variability around the forecast. No changes to the Monte Carlo model were introduced for 2008 Load Forecast.

In addition to the above directives, other issues were raised in the BCUC 2006 IEP/LTAP decision. The table below address these other topics.

Other Issues from the 2006 IEP & LTAP Decision	**Action**
Commission's determination in section 6.2 of the Decision directed BC Hydro to file financial forecast of BC Hydro's rates in both real and nominal terms, for a minimum of ten years, but preferably 20 years. The Commission Panel further directs BC Hydro to rely on the report for assumptions regarding retail prices in each of the CPR, the Load Forecast, and DSM evaluation methodologies.	The 2008 Reference Load Forecast that includes potential long-term rate impacts from a financial forecast has been prepared. These forecasts also include the impact of the rates as filed by BC Hydro F2009/F2010 RRA proceeding[4]. These load forecasts are contained in Table A4.6 in Appendix 4.

[4] The real rate increases used to develop the 2008 Reference Load Forecast before DSM and with Rate Increases is provided in BC Hydro's response to BCUC IR 3.252.1 filed on February 10, 2009 in the 2008 LTAP proceeding.

In the Commission Panel's view BC Hydro should improve the presentation of its transmission level industrial forecast by providing an explanation of the value that is added to the forecast by the consideration of consultant reports in the three industrial sectors discussed when they apparently do not change the "envelope" forecast resulting from the econometric analysis. The Commission Panel expects BC Hydro to justify the expense of the exercise of attributing load to individual customers, when its next load forecast is filed.	Modifications to the industrial forecast methodology have been undertaken. These are the result of incorporation of a consultant's report on BC's forestry, mining and oil and gas sectors. See Section 8 for a description of the industrial sector forecast, and Appendix A1.3 for a description of the industrial sector forecasting methodology. BC Hydro believes that a bottom-up forecast (i.e. attributing load to individual customers) enhances the forecasting process. See Appendix 1A for a description of the Industrial sector forecast methodology.
The Commission Panel is concerned about making a customer-specific adjustment to the forecast if there is no evidence as to whether or not the forecast of GDP is already reflective of the adjustment. If BC Hydro finds that an adjustment to the forecast similar to the current adjustment for Highland Valley Copper is required, the Commission Panel requests that BC Hydro also confirm that any such adjustment is not already reflected in the projection of GDP used in forecasting transmission voltage industrial sales.	Appendix A1.3 discusses adjustments to the forecast. BC Hydro incorporates forecast adjustments for specific large industrial loads (such as Highland Valley Copper) as the contribution to demand is disproportionably larger than their contribution to forecast drivers such as GDP.
The Commission Panel does not believe that there is added value to including a forecast of billed sales in load forecasts. While the Commission Panel agrees that the enhanced accuracy may be small, it believes that providing a forecast that includes the accrual will enhance transparency and provide information on a consistent basis for both future IEP/LTAP and RRA Applications.	BC Hydro continues to publish an annual forecast based on billed sales because: (i) the difference between billed and accrued sales is relatively small, (ii) billed sales are readily available by all rate classes, and as such forecasting models can easily be updated using billed sales; and (iii) modifications to existing forecasting process to include accrued sales would involve extensive computations to develop revised history.

3 Forecast Drivers, Data Sources and Assumptions

3.1. Forecast Drivers

Table 3.1 provides an overview of the key drivers for the Reference forecast. Each forecast component is described as activity variables; use rate variables and data requirements for these variables. Within the forecast, the activity variable drives the scale of forecast electricity use. The Use Rate variables represent the intensity of electricity use. The Data column provides a general description of the data requirements to produce the activity and the use rate variable.

Table 3.1. Key Forecast Drivers

Forecast Component	Activity	Use Rate	Data
1. Residential Forecast	• Number of residential accounts by housing type, heating type and region	• Consumption per account	• Historical Number of accounts • Housing starts • Appliance saturation rates from Residential End Use Survey (REUS) • End use efficiency data from the Energy Information Agency (EIA)
2. Commercial (Distribution) Forecast	• Growth Rate of Employment, Commercial Output, Retail Sales • Households (Number of Residential Accounts) • Heating and Cooling Degree Days (HDD/CDD)	• Consumption per unit of each predictor variable in SAE regression model	• Billing data • Commercial Output • Employment • Retail Sales • HDD/CDD • End use saturation rates from Commercial End Use Survey and efficiency data from the EIA.
3. Industrial Distribution Forecast	• GDP	• Consumption per unit of GDP (Based on regression model)	• Billing data • GDP
4. Industrial and Commercial Transmission Forecast	• Customer-specific production information for short-term forecasts	• Customer-specific energy intensity information for short-term forecasts	• Forecasts from industry studies and Key Account Managers • Billing data • GDP
5. Non-Integrated Area (NIA) Forecast	• Number of accounts	• Consumption per account	• Historical number of accounts • Local conditions in the short-term • Population forecast for longer term • Appliance saturation rates from REUS

Forecast Component	Activity	Use Rate	Data
6. Peak Forecast	• Number of accounts by housing and heating type • Sales to General Rate Class • Industrial activity and trends	• Residential – kW/Account • General – kW/kWh • Transmission – peak demand (kVA)	• Employment forecast and housing starts • Weather data and load research data on load shape • Transmission customer hourly data • Regional economic forecasts and industry reports

3.2. Growth Assumptions

Growth assumptions for key drivers used in the Reference forecast are displayed in Table 3.2 below.

Table 3.2. Growth Assumptions (Annual rate of growth)

Fiscal Year	Residential Accounts (%)	Calendar Year	Employment (%)	Real GDP (%)	Retail Sales (%)
Actual					
F2008	1.8	2007	3.2	3.0	6.7
Forecast					
F2009	1.7	2008	2.4	1.2	2.3
F2010	1.5	2009	0.6	1.8	4.0
F2011	1.4	2010	1.3	3.3	5.0
F2012	1.4	2011	1.5	2.8	5.3
F2013	1.4	2012	1.1	2.7	5.2
F2014	1.3	2013	1.0	2.2	4.9
F2015	1.3	2014	0.7	2.0	4.1
F2016	1.3	2015	0.8	1.9	4.0
F2017	1.3	2016	0.8	1.9	4.0
F2018	1.2	2017	0.7	1.9	3.9
F2019	1.2	2018	0.6	1.9	3.9
F2020	1.2	2019	0.5	1.8	4.1
F2021	1.2	2020	0.6	1.8	4.1
F2022	1.2	2021	0.6	1.8	4.1
F2023	1.2	2022	0.6	1.8	4.1
F2024	1.1	2023	0.5	1.8	4.0
F2025	1.1	2024	0.6	1.7	3.8
F2026	1.1	2025	0.5	1.7	3.8
F2027	1.1	2026	0.4	1.7	3.9
F2028	1.0	2027	0.4	1.6	3.8
F2029	1.0	2028	0.4	1.6	3.7

Information on the sources and the uses of the growth assumptions is shown in Table 3.3.

3.3. Data Sources

Table 3.3. Data Sources and Uses for Growth Assumptions

Variable	Application	Forecast Period	Source
Population	• Used for NIA forecast and as a check on total residential account growth	• 2008-2028	• BC Statistics, BC Population Forecast, February 2008
GDP	• Industrial distribution energy forecast	• 2008-2013 • 2014-2028	• Conference Board of Canada, Provincial Data, October 2008 • Conference Board of Canada, Provincial Data, May 2008
GDP	• Industrial and Commercial transmission energy forecast	• 2008-2013 • 2014-2028	• Conference Board of Canada, Provincial Data, October 2008 • Conference Board of Canada, Provincial Data, May 2008
Housing Starts	• Residential accounts forecast	• 2008-2028	• Conference Board of Canada, Provincial Data, May 2008
Employment, Retail Sales, & Commercial Output	• Commercial distribution sales • Distribution peak forecast	• 2008-2013 • 2014-2028	• Conference Board of Canada, Provincial Data, October 2008 • Conference Board of Canada, Provincial Data, May 2008

4 Comparison Between 2007 and 2008 Forecasts

The following tables show the difference between this year's energy forecast and peak demand requirements before DSM and rate impacts.

4.1. Integrated Gross Requirements before DSM and Rate Impact

Table 4.1 compares this year's total integrated gross requirements reference forecast with the 2007 Forecast. Both the 2007 and 2008 Forecast are before DSM, with no rate impacts.

Table 4.1. Comparison of Integrated Gross System Requirements Before DSM and Rate Impacts (GWh)

Fiscal Year	2008 Forecast	2007 Forecast	2008 Forecast minus 2007 Forecast	Change over 2007 Forecast (%)
F2003	53,010*	53,010*	-	-
F2004	54,756*	54,756*	-	-
F2005	55,437*	55,437*	-	-
F2006	57,296*	57,296*	-	-
F2007	57,982*	57,982*	-	-
F2008	58,735*	58,366	369	0.6%
F2009	57,991	59,944	-1,953	-3.3%
F2010	59,671	61,171	-1,500	-2.5%
F2011	60,917	62,186	-1,268	-2.0%
F2012	61,900	62,847	-947	-1.5%
F2013	63,187	63,911	-724	-1.1%
F2014	65,306	65,561	-255	-0.4%
F2015	66,301	67,093	-793	-1.2%
F2016	66,403	68,033	-1,630	-2.4%
F2017	67,441	69,184	-1,743	-2.5%
F2018	68,331	70,152	-1,821	-2.6%
F2019	69,063	71,133	-2,070	-2.9%
F2020	69,671	70,998	-1,326	-1.9%
F2021	69,950	72,004	-2,054	-2.9%
F2022	70,805	72,924	-2,119	-2.9%
F2023	71,671	73,912	-2,240	-3.0%
F2024	72,643	74,903	-2,260	-3.0%
F2025	73,625	75,909	-2,284	-3.0%
F2026	74,484	76,846	-2,361	-3.1%
F2027	75,430	77,813	-2,383	-3.1%
F2028	76,445	78,820	-2,374	-3.0%
F2029	77,564			

Note. * = actuals

4.2. Total Integrated System Peak Before DSM and Rate Impacts

Table 4.2 compares this year's total integrated peak requirements forecast with the 2007 Forecast. Both the 2007 and 2008 Forecast are before DSM, with no rate impacts. An explanation of the changes in the forecast is contained in Section 10.3.3 on the Peak Forecast.

Table 4.2. Comparison of Peak Forecasts Before DSM and Rate Impact (Integrated System) (MW)

Fiscal Year	2008 Forecast	2007 Forecast	2008 Forecast minus 2007 Forecast	Change over 2007 Forecast (%)
F2003	8,824*	8,824*	-	-
F2004	9,911*	9,911*	-	-
F2005	9,761*	9,761*	-	-
F2006	9,617*	9,617*	-	-
F2007	10,371*	10,371*	-	-
F2008	9,861 (10,597)**	10,784	-187	-1.7
F2009	10,793	10,949	(156)	-1.4%
F2010	11,091	11,195	(104)	-0.9%
F2011	11,224	11,305	(81)	-0.7%
F2012	11,379	11,383	(4)	0.0%
F2013	11,571	11,487	84	0.7%
F2014	11,749	11,693	56	0.5%
F2015	11,871	11,859	12	0.1%
F2016	11,923	11,984	(61)	-0.5%
F2017	11,989	12,073	(84)	-0.7%
F2018	12,114	12,175	(61)	-0.5%
F2019	12,197	12,321	(124)	-1.0%
F2020	12,349	12,471	(122)	-1.0%
F2021	12,506	12,624	(118)	-0.9%
F2022	12,666	12,781	(115)	-0.9%
F2023	12,830	12,941	(111)	-0.9%
F2024	12,998	13,105	(107)	-0.8%
F2025	13,170	13,272	(102)	-0.8%
F2026	13,346	13,443	(97)	-0.7%
F2027	13,526	13,618	(92)	-0.7%
F2028	13,711	13,797	(86)	-0.6%
F2029	13,899			

Note. * = actuals

**= Weather normalized peak in brackets and variance for F2008 is computed on a weather normalized basis.

5 Sensitivity Analysis

5.1. Background

Forecasting the future is fundamentally uncertain. Electricity consumption depends on many variables: economic activity, weather, electricity rates and DSM. The future behavior of all these variables is characterized by significant uncertainty. Moreover load is affected by extraordinary events such as strikes, trade disputes, pine beetle infestations and volatility in commodity markets. World events like the current economic crisis, wars and revolutions may impact electricity demand.

BC Hydro tries to reduce the uncertainty in its Load Forecast as much as possible by developing accurate, reliable and stable models that specify the relationship between load and its key drivers, and by using reliable and credible sources for forecasts of the key drivers of load.

BC Hydro uses a Monte Carlo model to estimate the uncertainty of BC Hydro's Load Forecast. This model produces forecast uncertainty bands around the Reference forecast by examining the impact on load from the uncertainty in a set of key drivers.

The major causal factors used by the model are: economic growth rate (measured by GDP), the electricity rates charged by BC Hydro to its customers, the effective energy reduction achieved by DSM programs, the sales response to electricity rate changes (price elasticity) and weather (reflected by heating degree-days). Probability distributions are assigned to each of these causal factors, and a distribution is assigned to a residual uncertainty variable.

The Monte Carlo model uses simulation methods to quantify and combine the probability distributions, reflecting the relationships between the five causal factors and electricity consumption. A probability distribution for the load forecast is thus obtained which shows the likelihood of various load levels resulting from the combined effect of the input variables. This distribution implies the following bands:

- A low band: There is a 10 per cent chance the outcome will be below this value in a particular year.
- A high band: There is a 10 per cent chance that the outcome will exceed this value in a particular year.

The low and high bands for each major customer category of the Reference Load Forecast are generated using the Monte Carlo model. A detailed description of the Monte Carlo Model can be found in Appendix 2.

High and low Load Forecasts before DSM and rate impacts are presented in tables A4.7 to A4.8 in Appendix 4. The high and low total peak forecasts contained in these tables are based on the ratios of the Reference total energy requirements forecast to the high and low uncertainty bands.

The High and Low Load Forecasts before DSM with rate impacts are also generated using the Monte Carlo model. These forecasts are contained in tables A4.9 to A4.10 in Appendix 4. The high and low peak forecasts contained in these tables are also based on ratios of the Reference total energy requirements to the high and low uncertainty bands.

All of these uncertainty bands exclude the impacts of incremental DSM.

Figure 5.1 illustrates the high and low bands for Total Integrated Gross Requirements before DSM and rate impacts. Figure 5.2 provides the projected loads from previous vintages of BC Hydro Load Forecasts.

Figure 5.1 High and Low bands for Total Integrated Gross Requirements Before DSM and Rate Impacts

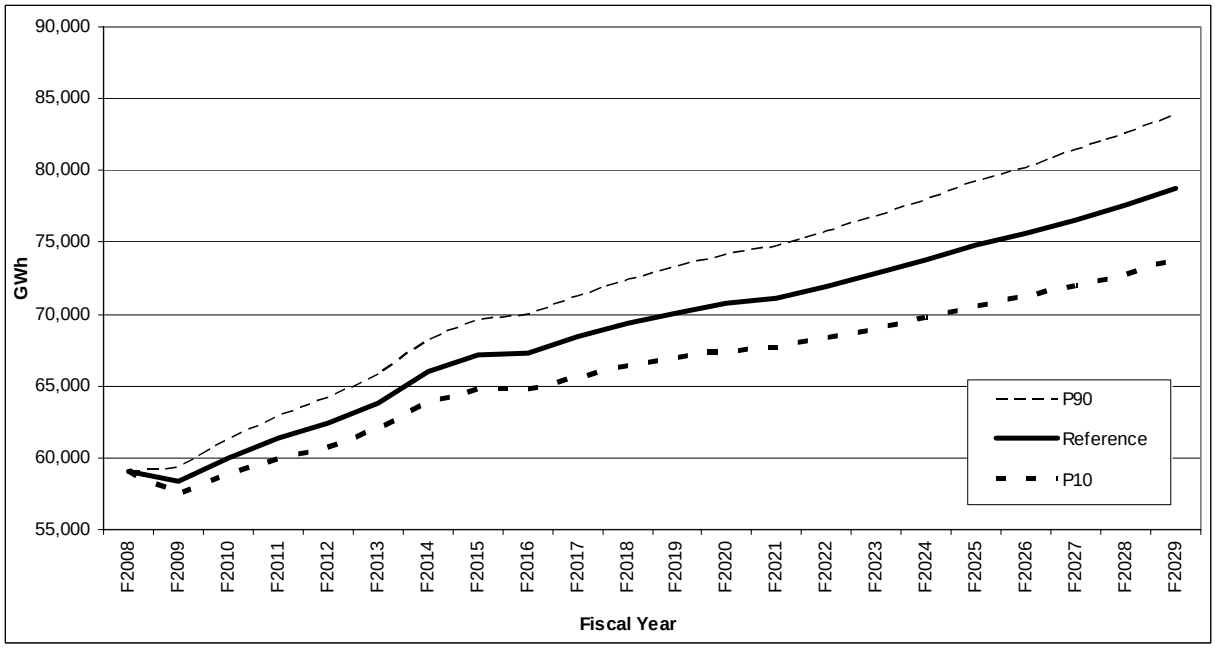
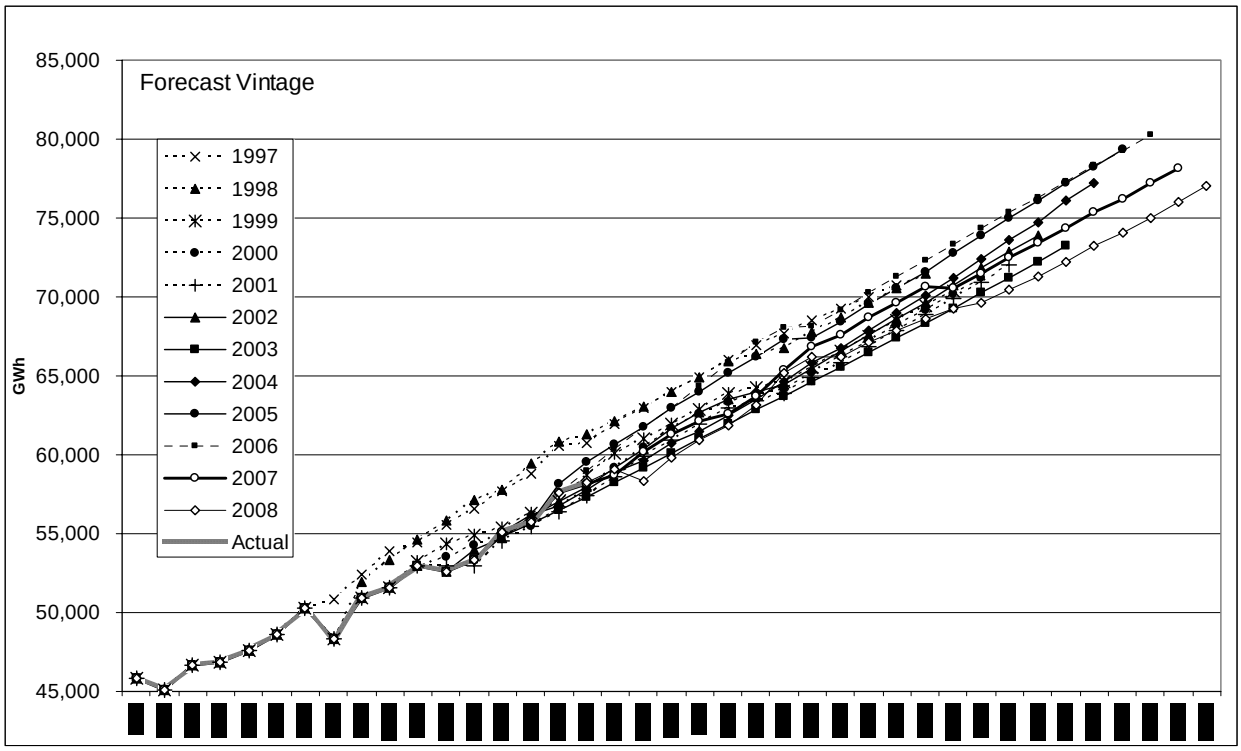


Figure 5.2 Historical Actual and Forecasts of Total Integrated Gross Requirements Before DSM and Rate Impacts



6. Residential Forecast

6.1. Sector Description

BC Hydro's residential sector currently consumes about 33% of BC Hydro's total annual billed sales. This electricity is used to provide a range of services (referred to as end-uses). The largest end-uses are space heating, water heating, refrigeration, and miscellaneous plug-in load which include computer equipment and home entertainment devices such as plasma TVs. Since space and water heating loads are dependent on the outside temperature, monthly residential sales can be strongly affected by the weather, but sales variations due to the weather tend to cancel out over the long-term.

Of the three customer classes, (residential, commercial, and industrial), the residential sector is the most stable in terms of demand variability. Average growth in the number of residential accounts has been 1.4% over the last 10 years. After many years of growth in use per account, growth in use per account is forecast to almost level out, growing at an average rate of 0.5% per year over the entire forecast period.

Of the 1.57 million residential accounts served by BC Hydro at the end of F2008, 58% were single/duplex, 8% were row houses, 26% were apartments, and 8% were mobile and miscellaneous. Geographically, 58% of the residential accounts are in the Lower Mainland, 9% are in the North Region, 12% are in the South Interior, and 21% are on Vancouver Island. Vancouver Island has the highest percentage of electrically heated accounts because of the relatively recent availability of natural gas. On a sales basis, 52% of residential sales were made in the Lower Mainland, 9% in the North Region, 12% in the South Interior, and 27% in Vancouver Island.

6.2. Forecast Summary

Sales to the residential sector grew by 3.6% before weather normalization and 1.0% after weather normalization between F2007 and F2008. This growth was mainly due to a 1.8% increase in number of accounts, and a 0.8% decrease in use per account. Based on the current forecast for housing starts, the new forecast for number of accounts at the end of F2013 is 1,688,000, which is 12,500 or 0.73% lower than the 2007 Forecast. However, this is partially offset by a 0.14% increase in the forecast for use per account in F2013. Overall, the new sales forecast for F2013 is down by 0.49% compared to the 2007 Forecast.

6.3. Residential Forecast Comparison

The 2008 Forecast is lower than the 2007 Forecast over the entire forecast period. The differences in the residential sales forecast compared to the previous forecast are: down 100 GWh (-0.6%) in F2009, down 94 GWh (-0.5%) in F2013, down 620 GWh (-2.9%) in F2019 and down 1,036 GWh (-4.1%) in F2028.

The main reasons for the difference between the 2007 Forecast and the 2008 Forecast are: a lower anchor point (i.e. a lower starting point for the new forecast; a lower forecast for account growth; and a lower forecast for Use Rate.

a) Anchor Point: In 2007, the forecast called for F2008 billed sales to be 17,087 GWh. Actual weather normalized billed sales for F2008 were 16,872 GWh, 215 GWh or 1.3% lower than forecast. Lower weather normalized sales for F2008 put downward pressure on the 2008 Forecast.

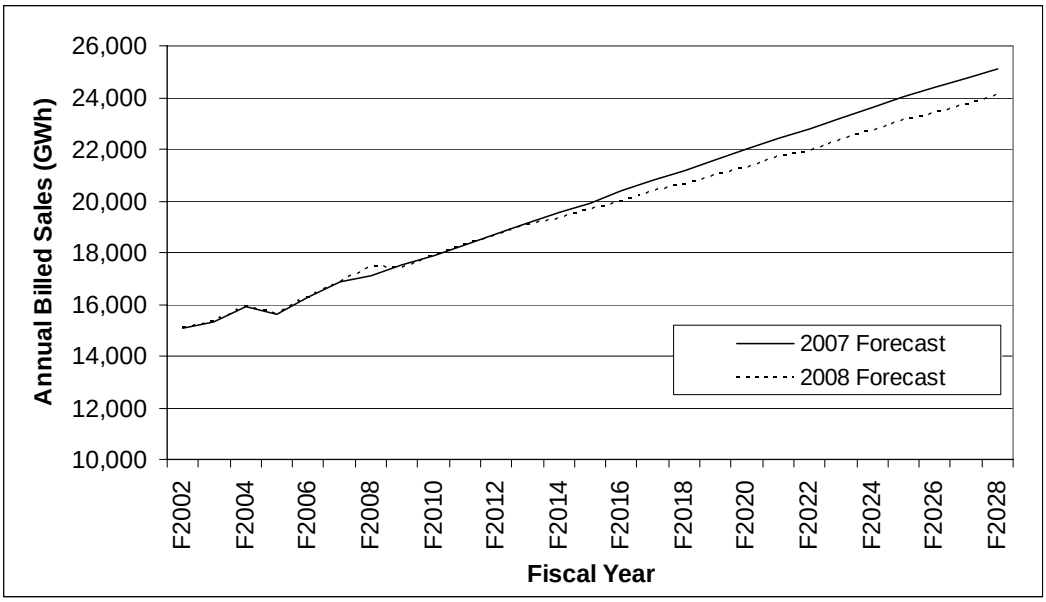
(b) Number of Accounts: The ending number of accounts for F2008 was 1,568,508. This was 1,332 accounts or 0.08% above the forecast value of 1,567,176.

However, the 2008 Forecast for growth in number of accounts is lower than the 2007 Forecast. So although the 2008 Forecast for number of accounts starts off higher than the 2007 Forecast, by F2010, the 2008 forecast for number of accounts is lower than the 2007 Forecast. In the 2007 Forecast, 5, 11, and 21 year growth rates for number of accounts were 1.65%, 1.58%, and 1.46% respectively. In the current forecast, the 5, 11, and 21 year growth rates for number of accounts are 1.48%, 1.37%, and 1.25% respectively.

(c) Use Rate: The 2007 Forecast called for the 2008 average annual Use Rate to be 10,998 kWh per account. However, the weather normalized 2008 average annual Use Rate was 10,855 KWh/account, which was 143 KWh/account or 1.30% below forecast. This gave a lower starting point for Use Rate for the current forecast. Compared to the 2007 Forecast, the 2008 Forecast calls for slightly stronger growth in Use Rate over the entire forecast period. In the 2007 Forecast, the 5, 11, and 21 year growth rates for Use Rate were 0.63%, 0.54%, and 0.48% respectively. In the current forecast, the 5, 11, and 21 year growth rates for Use Rate are 0.93%, 0.59%, and 0.52% respectively.

For F2009, the first year of the 2008 Forecast, the lower anchor point, and the new lower forecast for Use Rate combined to produce a sales forecast that was 100 GWh or 0.6% lower than the 2007 Forecast. The new lower forecast for number of accounts kept the new sales forecast below the 2007 Forecast for the entire forecast period.

Figure 6.1. Comparison of Forecasts for Residential Sales before DSM and Rate Impacts



6.4. Key Issues

Table 6.1 shows the forecast for total residential sales and regional residential sales before the impact of potential rate increases and DSM.

The use rate forecast is based on projections of factors such as housing mix (single family, row house, apartment, etc.), heating fuel choices (electric versus non-electric), appliance penetration rates, appliance life span and changes in electricity demands. According to the BC Hydro billing system, 20 per cent of BC Hydro's residential accounts are currently heated electrically, and on average they require about 14,300 kWh per year. The average overall usage may not change much for reasons stated below.

Ten years ago, the average annual residential weather-normalized use rate was 10,650 kWh per year. Currently, the average annual residential weather-normalized use rate is 10,855 kWh per year. Improvements in building insulation and appliance efficiency have offset the increased use of electronics in terms of moderating the growth in the residential use rate. Over the last ten years, the average annual use rate grew by about 20 kWh per year, corresponding to an average annual compound growth rate of 0.09%.

Over the longer term, the use rate trend is not expected to change significantly because of the offsetting effects of the following residential trends:

- First, increased electric space heating market share is expected to be offset by smaller housing units. Due to limited availability of land for residential development, the trend in major metropolitan centres is expected to be towards denser housing. Since row houses and apartments are more likely to be built with electric heat than single family homes, the market share for electrically heated housing is expected to increase. Although new row houses and apartments tend to be larger than existing similar dwellings, they generally have a smaller floor area than detached single family homes, and therefore have lower space heating load requirements. The increase in market share of electric space heating is also offset to some extent by improvements in building standards, and by the construction of the Vancouver Island gas pipeline, which has made gas space heat available to Island residents. However, natural gas prices are projected to be higher for Vancouver Island compared to the Mainland over the entire forecast period. As a result, the growth in the penetration rate of gas heating is anticipated to be slower for Vancouver Island than it was for the Mainland.
- Second, there is the issue of more efficient appliances versus increasing penetration of home appliances. Manufacturers throughout Canada and the United States are expected to continue to improve the energy efficiency of major electrical appliances. As older models wear out and are replaced by newer ones, electricity consumption for major appliances such as refrigerators, freezers, ovens and ranges is forecast to decrease. However, new models of these major appliances tend to be larger and include more features than models currently in use. Therefore, some of the reduction in electricity use resulting from improvements in electricity efficiency will be offset by an increase in appliance size and features.
- Third, a projected decrease in the number of people per household would tend to reduce electricity use per account. However, this reduction is expected to be offset by an increase in the penetration level of small appliances. An increase in electricity use is also projected from lifestyle changes and technological improvements, which is expected to cause an increase in demand for electronic, entertainment and telecommunication devices in the home. A trend towards home offices is also expected to produce a long-term increase in residential electricity consumption. In the long-term, the expected overall impact of these various trends is that the factors working to increase the use rate will be offset by the factors working

to decrease it, leading to average growth in use rate being about 0.5% per year over the entire forecast period before the impact of rate increases and DSM.

6.5. Forecast Methodology

The forecast for residential sales is calculated as forecast number of accounts times forecast use per account. These two main drivers are discussed below.

For the first year of the forecast, the growth in number of accounts is forecast based on recent trends. For all subsequent years, percentage growth in number of accounts is set equal to percentage growth in forecast housing starts, which are provided by a third party.

To develop the residential sales forecast for the entire BC Hydro service area, the total service area was divided into four customer service regions, and a forecast was prepared for each region. These regions were Lower Mainland, Northern Region, South Interior and Vancouver Island. For each region, a third party housing stock forecast was prepared based on the housing starts forecast in the region, and on other regional factors such as trends in housing mix and gas availability.

A use rate forecast was also developed for each region based on projections of penetration rates and individual consumption levels by end use (space heating, water heating, major appliances and small lifestyle appliances).

The residential sales forecast for a region is the sum of the requirements for each end use. The requirements for each end use are the product of the number of accounts having that end use and the energy used by an average account having that end use.

The 2008 residential forecast was prepared using both the recently implemented Statistically Adjusted End Use (SAE) model and the Residential End-Use Energy Planning System model (REEPS). The forecast results produced by these models were consistent with each other.

Refer to Appendix 1.1.4 for the residential sales forecast methodology for further details on the sales methodology.

Drivers – The drivers of the residential forecast are number of accounts and average annual use per account. The growth in the number of accounts is driven by housing starts. Since household size is gradually decreasing, account growth is expected to be somewhat higher than population growth. Account growth can vary considerably from year to year in response to BC's economy. In F1994, over 38,000 accounts were added, but in F2002, only about 13,000 accounts were added. With the forecast of a weaker BC economy, account growth for F2009 is forecast to be about 26,000, down from the account growth of 28,332 experienced in 2008. Over the entire forecast period, number of accounts is forecast to grow at 1.25%, Use Rate is forecast to grow at 0.52% and sales are forecast to grow at 1.79%.

Figure 6.2. Comparison of Forecasts of Number of Residential Accounts

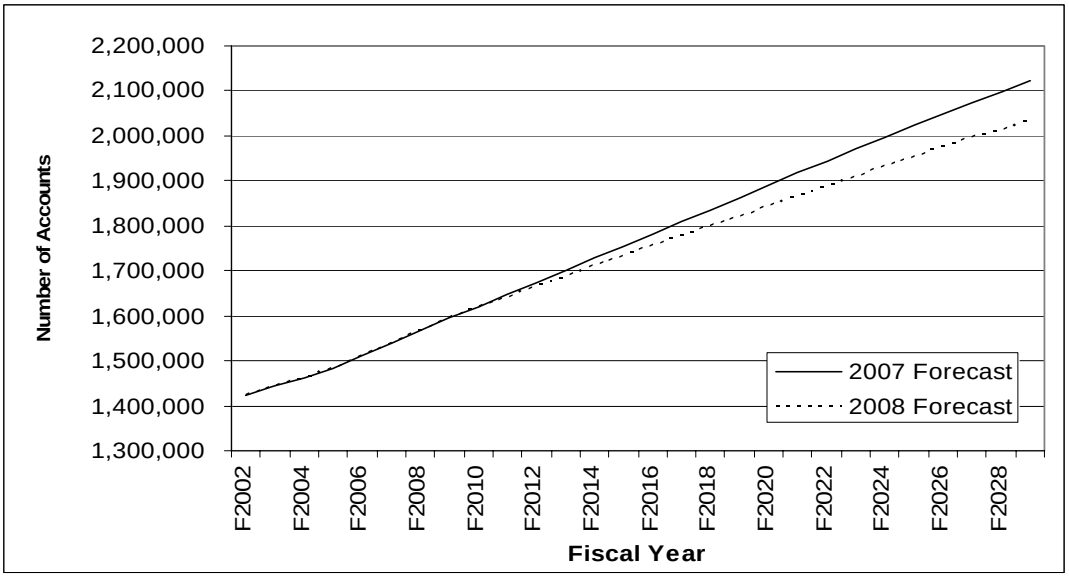
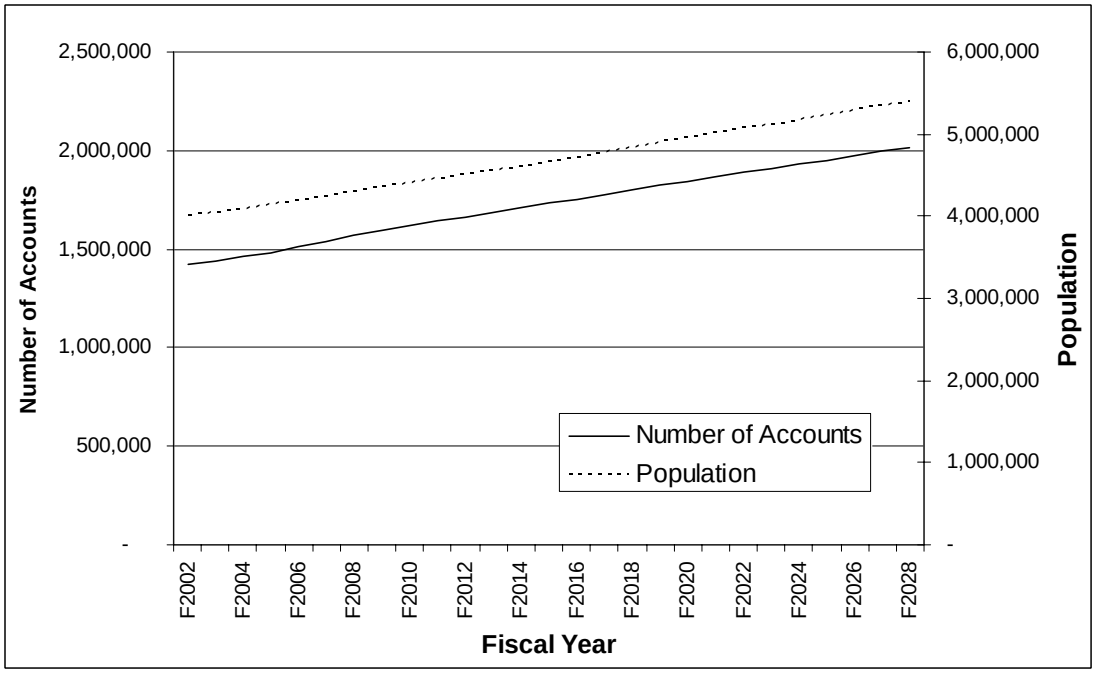


Figure 6.3. Comparison of Number of Accounts versus Population



6.6. Risks and Uncertainties

Uncertainty in the residential sales forecast is due to uncertainty in three factors: forecast for number of accounts, forecast for use per account, and weather.

(a) Number of Accounts: In the short-term, an error in the forecast for account growth would not result in a significant error in the forecast for total number of accounts. This is because account growth is currently running at about 1.5% per annum, so in the first year, an error of 1% in the forecast for account growth would contribute an error of about 0.015% to the forecast for total number of

accounts. However, in the long-term, there is a risk from the cumulative effect of errors in the forecast for account growth.

(b) Use per Account: Most of the risk in the residential forecast is due to the forecast for use per account. This is due to two reasons:

I. Unlike the forecast for account growth, an error of 1% in the forecast for use per account in any year would contribute to an error of 1% to the forecast for residential sales for that year.

II. The forecast for use per account is the net result of many conflicting forces. Some of the forces working to increase use rate are:

- increases in home sizes
- natural gas prices increasing faster than electricity prices
- increases in electric space heating share
- increases in real disposable income
- increases in saturation levels of appliances

Some of the forces working to decrease use rate are:

- increases in heating system efficiencies
- new dwellings being built with higher insulation standards
- heat from additional appliances reduces electric heating load
- increased use of programmable thermostats
- decreases in household sizes

Although all these positive and negative forces were recognized when the forecast for use rate was developed, there is uncertainty inherent in the forecasts for all these forces.

(c) Weather: In the short-term, weather is highly variable. Therefore, in any one year, there is a risk that weather may have a significant impact on residential sales. For example, the El Nino event of F1998 is estimated to have reduced residential sales by about 4%. Since average weather is expected to be close to the rolling 10-year normal values used in the forecast, weather is not viewed as being a high risk to the long-term forecast for residential sales.

Potential forecast risks/issues that have not been included in this forecast, but monitored on which has been initiated, include:

- Effects of provincial and regional carbon taxes
- Electric-powered vehicles
- Cross-fuel elasticities
- A potential shift to electricity for residential heating
- Changes in transmission loss factors due to new transmission infrastructures

Table 6.1. Residential Sales Before DSM and Rate Impacts (GWh)

Fiscal Year	**Lower Mainland** Sales	**Vancouver Island** Sales	**South Interior** Sales	**Northern Region** Sales	**BC Hydro Total** Sales
Actual (values shown in brackets are weather-normalized)					
F2003	8,120 (8,201)	3,981 (4,049)	1,729 (1,749)	1,457 (1,465)	15,287 (15,464)
F2004	8,447 (8,476)	4,123 (4,149)	1,803 (1,780)	1,526 (1,527)	15,899 (15,932)
F2005	8,316 (8,487)	4,021 (4,151)	1,805 (1,819)	1,478 (1,518)	15,620 (15,976)
F2006	8,637 (8,785)	4,251 (4,329)	1,856 (1,866)	1,498 (1,558)	16,241 (16,538)
F2007	8,879 (8,804)	4,426 (4,377)	1,975 (1,936)	1,574 (1,585)	16,853 (16,702)
F2008	9,122 (8,871)	4,631 (4,397)	2,057 (2,000)	1,652 (1,605)	17,462 (16,872)
Forecast (Residential sales forecast based on “normalized weather”)					
F2009	9,138	4,539	2,073	1,645	17,394
F2010	9,406	4,678	2,136	1,681	17,900
F2011	9,622	4,766	2,194	1,713	18,295
F2012	9,821	4,841	2,243	1,741	18,646
F2013	10,048	4,937	2,293	1,778	19,057
F2014	10,192	4,989	2,335	1,806	19,322
F2015	10,379	5,062	2,380	1,832	19,653
F2016	10,573	5,130	2,424	1,857	19,983
F2017	10,808	5,213	2,471	1,885	20,378
F2018	10,961	5,260	2,511	1,906	20,638
F2019	11,151	5,325	2,554	1,932	20,962
F2020	11,347	5,391	2,596	1,957	21,292
F2021	11,584	5,472	2,640	1,987	21,683
F2022	11,755	5,524	2,681	2,010	21,970
F2023	11,976	5,595	2,726	2,037	22,335
F2024	12,192	5,666	2,770	2,064	22,692
F2025	12,451	5,751	2,816	2,094	23,113
F2026	12,621	5,798	2,855	2,118	23,393
F2027	12,833	5,863	2,897	2,146	23,739
F2028	13,049	5,926	2,939	2,173	24,088
F2029	13,297	6,005	2,984	2,204	24,490
Growth Rates (values shown in brackets are weather-normalized)					
5 years: F2003 to F2008	2.4% (1.6%)	3.1% (1.7%)	3.5% (2.7%)	2.5% (1.8%)	2.7% (1.8%)
5 years: F2008 to F2013	2.0% (2.5%)	1.3% (2.3%)	2.2% (2.8%)	1.5% (2.1%)	1.8% (2.5%)
11 years: F2008 to F2019	1.8% (2.1%)	1.3% (1.8%)	2.0% (2.2%)	1.4% (1.7%)	1.7% (2.0%)
21 years: F2008 to F2029	1.8% (1.9%)	1.2% (1.5%)	1.8% (1.9%)	1.4% (1.5%)	1.6% (1.8%)

7 Commercial Forecast

7.1. Sector Description

BC Hydro's commercial sector currently consumes about 29% of BC Hydro's total sales. This electricity is used to provide a range of services such as lighting, ventilation, heating, cooling, refrigeration and hot water. These vary considerably between the different types of buildings.

The commercial sector consists of distribution voltage (< 60kV) sales (93% of the total) and transmission (> 60kV) sales (7% of the total). Within the distribution sales, there are currently two major demand levels (kW): General Under 35kW, which includes small offices, small retails/grocery stores, restaurants, motels and common areas of apartment buildings and General Over 35kW, which includes large offices, large retails/grocery stores, universities, hospitals and hotels. Also included as part of the total commercial sales are street lighting, irrigation and BC Hydro Own Use, which is electricity that BC Hydro's buildings and facilities use. Commercial transmission customers, which includes universities, major ports and transportation facilities, use electricity at higher voltages (>60 kV).

7.2. Forecast Summary

Electricity consumption of the commercial sector can vary considerably from year to year reflecting the level of activity in BC's service sector. Between F2007 and F2008, total sales grew by 334 GWh or 2.2 per cent. Total commercial sales are expected to grow by 373 GWh or 2.4 per cent before DSM and rate impacts between F2008 and F2009. Five, eleven and twenty-one years into the forecast, the commercial sales growth is expected to be 2.4 per cent, 2.2 per cent and 2.1 per cent respectively. Commercial distribution sales growth is forecast to be relatively stable over the entire forecast period, with slightly stronger growth in the short term, while commercial transmission sales are forecast to experience slower growth throughout the entire forecast period.

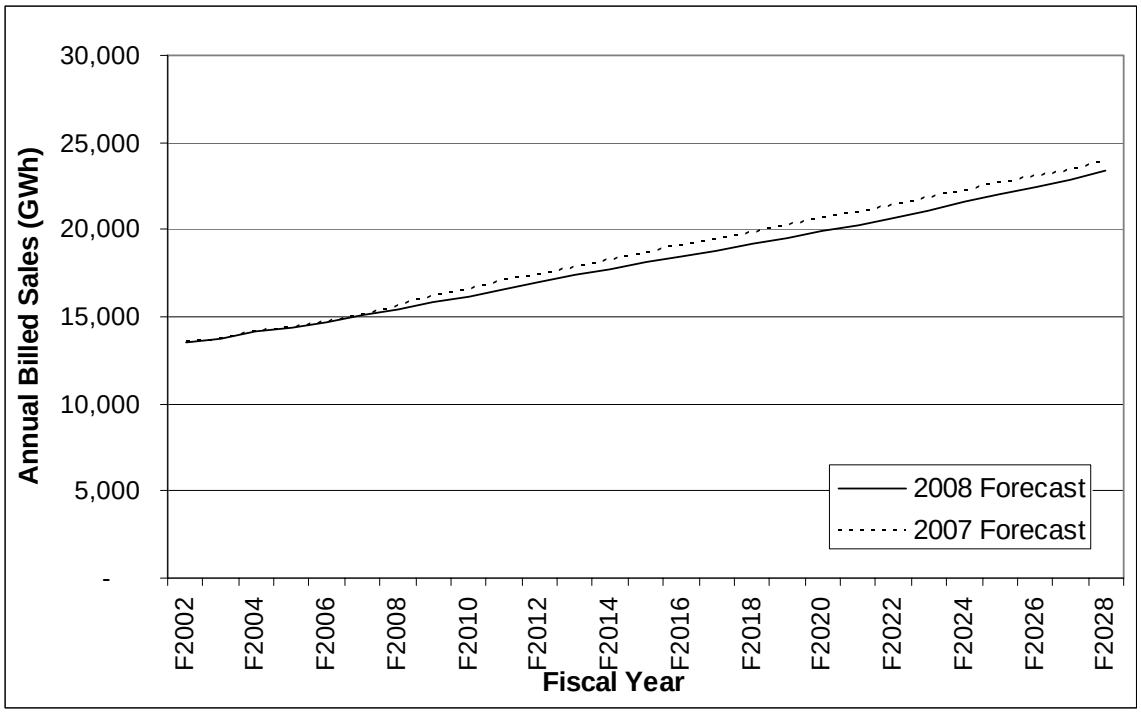
7.3. Commercial Forecast Comparison

When compared with the 2007 Forecast, the 2008 commercial sales forecast before DSM and rate impacts is 370 GWh lower (-2.3%) for F2009, 460 GWh lower (-2.6%) for F2013, 724 GWh lower (-3.6%) for F2019 and 464 GWh lower (-1.9%) for F2028.

The 2008 commercial forecast is lower than the 2007 Forecast for the entire forecast period. Commercial distribution sales are below last year's forecast because: 1) revised assumptions reflecting a gain in efficiency of end-uses have been incorporated into the current forecasting model, 2) economic drivers that drive the forecast, such as employment, retails sales and commercial output, have lower growth compare to the previous forecast and 3) the results of a reclassification of customers from commercial rate class into the residential rate class. The commercial transmission forecast is lower due to lowered revised expectations in the transportation, communication and utilities sector.

Table 7.1 provides a summary of historical and forecast sales by the four regions before DSM and rate impacts.

Figure 7.1. Comparison of Forecasts for Commercial Billed Sales before DSM and Rate Impacts



7.4. Key Issues

The following paragraphs discuss the regional commercial sales growth projection for each of BC Hydro main service regions: Lower Mainland, Vancouver Island, South Interior and Northern Region.

Lower Mainland:

Approximately 65 per cent of the sales in the commercial sector are located in the Lower Mainland. Relative to the 2007 Forecast, the 2008 commercial sales are lower throughout the forecast period.

In the Lower Mainland, the commercial sales growth is expected to be 2.5 per cent, 2.4 per cent and 2.5 per cent, over the next five, eleven and twenty-one years of the forecast respectively.

Commercial output has traditionally been the growth driver of the region and will remain so despite all the large, ongoing construction projects. Although gains in industrial and commercial output will both slow, commercial output will remain somewhat more resilient over the medium term, posting growth over 3 per cent until after the 2010 Olympics.

While all subsets of commercial output is forecast to slow over the long term, there will be no major contraction of the region taken as a whole. The largest subset in the commercial output category is finance, which will continue to increase by over 2 per cent over the next six years before gradually declining to around 1.7 per cent growth per year in the outer years of the forecast. Community and business commercial services will grow strongly leading up to the Olympics, driven by increased tourism in the Lower Mainland. Community and business commercial services will grow by 3 per cent, following gains of 3.9 per cent in 2009 and 4.8 per cent in 2008. Finally

retail trade will expand by 2.5 per cent this year after increasing by 7.2 per cent last year and 7.7 per cent in 2006. Growth in retail trade will continue to decelerate over the forecast period as real disposable incomes decline because of the aging population.

Employment gains will be modest over the forecast period, following several years of robust growth for this region. This is reflective of the aging population. Following increases of 3.6 per cent and 3.8 per cent growth in 2006 and 2007, employment will expand by 2.4 per cent in 2008. Over the long term, employment growth is forecast to slow, to below 1 per cent per year. Because the region will increasingly take up a larger share of the provincial population, it will continue to have the strongest employment growth out of all the regions and be a driving force for the province's economy.

Vancouver Island:

Of the total BC Hydro commercial sales, Vancouver Island makes up 16 per cent. Compared to the 2007 Forecast, commercial sales in Vancouver Island is lower throughout the forecast years.

Vancouver Island's commercial sales growth is expected to be 1.5 per cent, 1.3 per cent and 1.3 per cent, over the next five, eleven and twenty-one years of the forecast respectively.

Vancouver Island's population will grow very slowly over the forecast period. As a result, employment growth will be moderate over the medium term and experience further decrease in the long run. Employment grew by 2.3 per cent in 2007 but will expand by an average of 1.2 per cent in the next two years. The employment rate (the percentage of people who care currently employed) will remain the lowest in the province over the forecast period.

Services have always been a main drive of economic activity in the region. Over the next three years, commercial output will grow at a faster pace than industrial output. Non-commercial services such as medical care will be strong over the forecast period, driven largely by the aging Island population. The 2006 census listed Victoria's median age as 43.1 and the proportion of people aged 65+ as 17.8 per cent, compared with provincial numbers of 40.8 years and 14.6 per cent respectively.

South Interior:

10 per cent of BC Hydro's total commercial sales can be attributed to the South Interior. Compared to the 2007 Forecast, the South Interior has a lower sales forecast for most years.

Overall, commercial sales growth is expected to be 3.5 per cent, 2.3 per cent and 1.9 per cent, over the next five, eleven and twenty-one years of the forecast respectively.

Commercial output posted steady gains and will continue to do so over the next few years before settling down to about 1.1 per cent growth after 2015. With the pine beetle infestation, decreased sawmill activity is expected to dampen the forestry sector over the long run. Employment will expand minimally over the medium term and will even start contracting after 2018 as the population continues to age. Retail sales, indirectly affected by the low employment figures, will face slow growth in the long term.

Northern Region:

The Northern Region makes up the final 9 per cent of the BC Hydro's total commercial sales. Relative to the 2007 Forecast, the Northern Region has a lower forecast throughout the forecasting periods.

Overall, the commercial sales growth before DSM is expected to be 1.8 per cent, 1.7 per cent and 1.0 per cent, over the next five, eleven and twenty-one years of the forecast respectively.

The employment rate (defined as employment as a share of total population) is significantly higher than the provincial average and will remain so over the forecast period. The provincial rate is around 50 per cent; in contrast, Northern Region's employment rates range between 55 per cent and 59 per cent. Employment will increase over the medium term because of mining and energy sectors, but these gains will not be sustained over the long term, and employment is forecast to contract in almost every year from 2014-2030.

Commercial output and retail sales are expected to behave similarly to the employment sector, as they are highly correlated. Commercial output and retail sales will grow on average 2.3 and 4.7 per cent over F2008-F2012 and 1.3 and 3.2 per cent over F2013-F2030 respectively.

7.5. Methodology

The main determinant of the commercial electricity sales forecast is the level of future economic activity in the province. This includes economic drivers such as retail sales, employment and commercial output. These economic variables are combined in the BC Hydro's SAE models that are used to develop commercial distribution sales for each of BC Hydro's four major service regions. The methodology for the commercial sales forecast is described in Appendix 1.2.

Drivers – At an aggregate level, consumption in the commercial sector is tied closely with economic activity in the province. The stronger the economy, the more services are needed and the greater the electricity consumption of the commercial sector. Regional economic drivers such as retail sales, employment, and commercial output are good indicators of electricity consumption in the sector. At a more detailed level, the consumption in the commercial sector is related to the growth in the number of facilities and the amount of energy required to service various end uses.

7.6. Risk and Uncertainties

Commercial sales models are highly dependent on the outcome of the regional economic drivers. The regional economic forecast comes from the Conference Board of Canada. In the SAE model, heating degree days and cooling degree days are used to calculate the heating and cooling variables. Total commercial sales are not as sensitive to weather compared to residential sales.

Factors Leading to Lower than Forecast Commercial Sales

- If the economic downturn extends past 2010, it might negate the effect of the short-term boost from 2010 Olympics.
- The pine beetle infestation will cause forestry employment to decline in the long-term.

- Improved equipment efficiency across the end uses
- The aging provincial population will decrease future employment growth.

Factors Leading to Higher than Forecast Commercial Sales

- The short and long-term effects of the 2010 Olympic Games, which could increase employment and bring in more immigrants from both inside and outside of Canada.
- Lowering of interest rates may encourage consumer expenditures.
- Substantially warmer summers (increasing air conditioning loads) or colder winters (increasing heating loads) relative to historical patterns.

Table 7.1. Commercial Sales Before DSM and Rate Impacts (GWh)

Fiscal Year	**Lower Mainland** Sales	**Vancouver Island** Sales	**South Interior** Sales	**Northern Region** Sales	**BC Hydro Total** Sales
Actual					
F2003	8,938	2,290	1,323	1,178	13,729
F2004	9,280	2,317	1,361	1,194	14,151
F2005	9,381	2,341	1,382	1,258	14,362
F2006	9,626	2,410	1,425	1,260	14,721
F2007	9,857	2,477	1,482	1,290	15,105
F2008	10,050	2,522	1,548	1,320	15,439
Forecast					
F2009	10,338	2,562	1,571	1,340	15,812
F2010	10,607	2,577	1,621	1,363	16,168
F2011	10,812	2,617	1,721	1,391	16,541
F2012	11,102	2,667	1,792	1,416	16,976
F2013	11,367	2,717	1,840	1,444	17,368
F2014	11,625	2,755	1,873	1,513	17,766
F2015	11,893	2,785	1,900	1,544	18,122
F2016	12,175	2,820	1,926	1,568	18,489
F2017	12,442	2,852	1,946	1,574	18,814
F2018	12,722	2,884	1,969	1,580	19,155
F2019	13,021	2,915	1,993	1,588	19,518
F2020	13,346	2,950	2,012	1,592	19,899
F2021	13,649	2,984	2,028	1,597	20,258
F2022	13,993	3,021	2,057	1,602	20,673
F2023	14,351	3,059	2,091	1,604	21,105
F2024	14,739	3,097	2,126	1,606	21,569
F2025	15,095	3,131	2,157	1,609	21,992
F2026	15,478	3,166	2,188	1,612	22,444
F2027	15,870	3,202	2,220	1,616	22,908
F2028	16,306	3,242	2,255	1,620	23,424
F2029	16,785	3,285	2,293	1,625	23,988
Growth Rates					
5 years*: F2003 to F2008	2.4%	1.9%	3.2%	2.3%	2.4%
5 years: F2008 to F2013	2.5%	1.5%	3.5%	1.8%	2.4%
11 years: F2008 to F2019	2.4%	1.3%	2.3%	1.7%	2.2%
21 years: F2008 to F2029	2.5%	1.3%	1.9%	1.0%	2.1%

*Historical growth rates not weather normalized. Forecast prepared are based on normal weather.

8 Industrial Forecast

8.1 Sector Description

BC Hydro's industrial sector is concentrated in a limited number of goods producing industries, the most prominent of which are pulp and paper, forestry, mining and chemicals. These customers are primarily served at transmission voltage. The remaining industrial load is made up of a large number of small and medium sized distribution-voltage served manufacturers. Approximately 80% of industrial sales are to customers served at transmission voltages (>60 kV) with the remaining 20% to distribution voltage accounts (<60 kV). BC Hydro's industrial sector currently accounts for 37% of BC Hydro's total annual billed sales.

Unlike the residential sector, industrial sector sales are not strongly correlated to weather but are more commodity-price driven. Electricity is used in a wide range of applications including fans, pumps, compression, conveyance and processes such as cutting, grinding, stamping and welding and electrolysis. In comparison to the commercial sector, space conditioning, lighting, refrigeration and freezing loads are relatively less important.

8.2. Forecast Summary

Total industrial sales were 18,737 GWh in F2008. The sales forecast to all industrial customers, before DSM and rate impacts, is expected to grow to 19,763 GWh in F2013, 21,282 GWh in F2019, and 20,856 GWh in F2029. These represent growth rates of 1.1% over the next five years (F2008 to F2013), 1.2% over the next 11 years (F2008 to F2019), and 0.5% over the next 21 years of the forecast (F2008 to F2029).

The slower growth rates in later forecast period reflects lowered growth expectations for the large pulp and paper sector which comprise a little under a half of all industrial sales. Revised expectations for these sectors are based on information and forecast data contained in industry and consultant reports referenced by BC Hydro.

Table 8.1 contains the industrial sales forecast before DSM and rate impacts.

8.3. Industrial Forecast Comparison

The 2008 Forecast before DSM and Rate Impacts, is significantly lower than the 2007 Forecast in the near-term, but, rises rapidly and after 2013 remains generally higher. The differences in the total industrial sales forecast compared to the 2007 Forecast are: down 1,311 GWh (-6.7%) in F2008/09, up 201 GWh (1.0%) in F2012/13, up 94 GWh (0.4%) in F2018/19 and up 46 GWh (0.2%) in F2027/28.

The main reasons for the difference between the 2008 Forecast and the 2007 Forecast are: (a) the global economic slowdown, (b) raised expectations for growth in mining and oil and gas customers (c) a lower industrial distribution sales forecast and (d) weakness in the pulp and paper sector,. Further explanation for these reasons includes:

(a) **The Global Economic Slowdown**: Calendar 2008 was a difficult year for industry, as commodity prices fell to very low levels. Consequently, customer demands were reduced in the near period of the forecast.

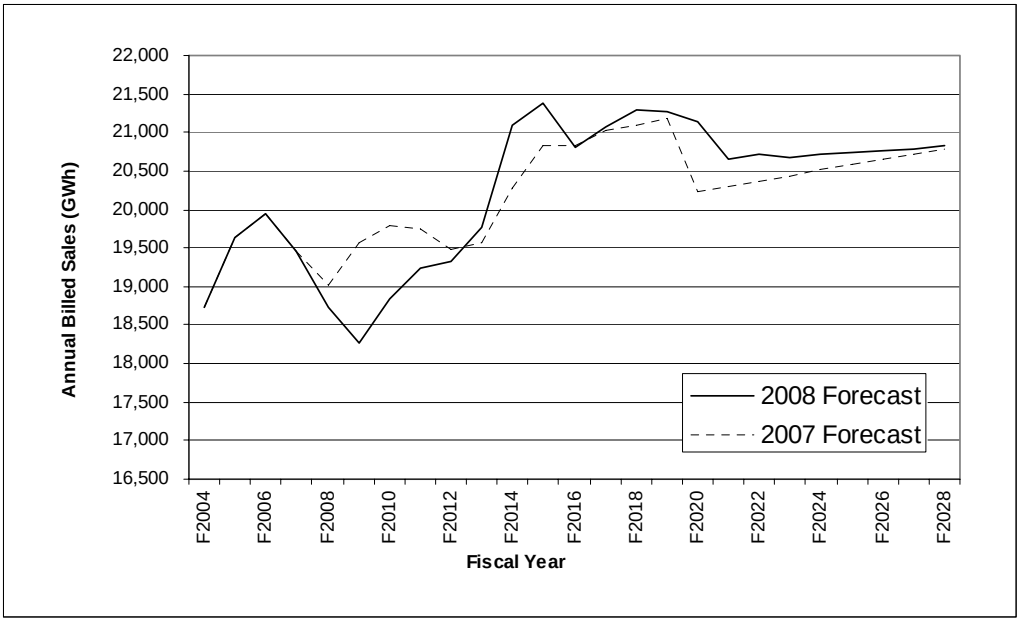
(b) **Raised Expectations For Mining and Oil and Gas**: Significant capital has been committed by the mining and oil and gas industries into exploration and development in British Columbia. As a result, development in these sectors is

expected to rapidly recover after the global slowdown and subsequently develop at a faster pace than what was expected in 2007.

(c) **Lower Industrial Distribution Forecast:** The industrial distribution load forecast is based on a regression model that estimates the relationship between sales and GDP. In addition, the 2008 Forecast incorporates long-term adjustments to wood sector to reflect the impact of the pine beetle infestation.

(d) **Weakness in the Pulp and Paper Sector:** Global competitiveness and market trend information from our consultant report suggest lower load requirements in the long run in the pulp and paper sector.

Figure 8.1. Comparison of Forecasts for Industrial Billed Sales before DSM and Rate Impacts



8.4. Key Issues and Sector Outlook

8.4.1 Forestry Background and Outlook

The BC Forest industry includes more than 100 major wood product producers located throughout the province along with 15 large pulp and paper mills. These facilities produce a wide range of products including dimensional and structural lumber, oriented strand board, medium density fiberboard, plywood, fuel pellets and other specialty products. Coastal saw mills currently operate in a very challenging financial environment because of higher harvesting costs caused by steep terrain, out-dated equipment and relatively high labour costs. In comparison, the interior industry has produced higher financial returns primarily because of higher efficiency levels and an abundant supply of low cost beetle-killed timber. Paper production is concentrated on the BC coast. Wood-products exports destined for the US market such as dimensional lumber, OSB, and plywood are generally produced in the BC interior while Asian product exports are generally produced on the BC coast.

BC Hydro has developed its forecast for wood and pulp and paper sales based on information from government ministries, industry research reports, forestry publications and its Key Account Managers.

The sections below briefly summarize the short-term and medium to long-term outlook for the Wood Products and the Pulp and Paper sectors.

Wood Products Outlook: Short-Term

The forestry sector as a whole faced a series of significant challenges in 2008, which include:

Weak US Housing Starts and Low Lumber Prices - After reaching a peak of 2.2 million housing starts in 2006, the US housing market is in a downturn that economists expect will last into F2010. Unfortunately, the speed of the decline in demand far exceeded industry curtailments and what resulted was a drop in lumber prices. By the end of December 2008, lumber prices were one half of what they were two years prior. In addition, BC producers were also faced with a new export tax.

Export Taxes - A new seven-year softwood lumber agreement with the United States took effect on October 12, 2006. In the short-term the most significant impact on BC producers is the export tax which increases, in increments, from 0% to 15% as the price of lumber falls.

Price of Lumber (USD per thousand board feet)	Export Tax
> 355	0 %
< 355 but > 335	5%
< 335 but > 315	10%
< 315	15%

A 15% tax coupled with current low lumber prices below $250/mbf U.S. has caused widespread lumber production curtailments across Canada.

Market Share - Over the last five years significant investments have been made in Eastern Europe's forestry industry. German softwood lumber exports to the US have risen more than 300% and now have a 10% market share. Russia's vast timber resources are another source of future softwood lumber competition. Canada's share of the Japanese housing market continues to decline because of European and Russian exports.

In the short-term, BC Hydro's forecast assumes that the weakness in the U.S. housing starts will carry through into 2009 and consequently, BC sawmills will continue operating far below capacity. By 2010, the market is expected to improve.

Wood Products Outlook: Medium-term to Long-term

Coastal forestry production is expected to remain flat for the foreseeable future. The primary causes include: 1) increased competition in established Canadian markets such as Japan; and 2) higher harvesting costs caused by steep terrain, out-dated equipment and higher labour costs.

Once interior production rebounds it will remain fairly stable for a number of years. Mills have an incentive to operate and take advantage of beetle-killed timber before the wood deteriorates.

Key issues for BC lumber sales in the medium-term include:

- Changes in domestic timber supply. A move to smaller, poorer quality, second growth timber on Vancouver Island and beetle destruction of large

volumes of wood are expected to eventually raise fibre costs. Although there has currently been a significant increase in the allowable cut to take advantage of dead and beetle-damaged timber, allowable cuts are expected to begin falling within 4-5 years.

- Changes in stumpage policy. The BC government has implemented market-based stumpage pricing in the coastal and interior regions. Stumpage prices are now determined based on timber auctions instead of market prices. This change has reduced stumpage rates on the coast and led to a moderate increase of rates in the BC interior. Within 10 years, the change should benefit interior producers who will pay less stumpage as the value of beetle killed wood declines due to degradation.
- Competition. Eastern European and Russian production increases will cause competition for Canadian exports.

In the longer term, interior forestry production will decline from the high levels experienced between 2004 and 2006 as the impact from the Mountain Pine Beetle is fully realized. The aggregate projections by the Ministry of Forests and Range in 2008 were relatively unchanged from those made in 2007. But BC Hydro has increased its load forecast for this sector in the Central Interior because it is now expected that logs will be shipped into the areas where sawmills are the biggest and the Pine Bootle effects are the most severe.

Pulp and Paper Outlook: Short-Term

The BC pulp and paper industry includes more than 20 mills scattered throughout all regions of the province. The industry produces and exports a wide variety of products including newsprint, unbleached kraft (UBK) and bleached chemical pulp and thermo-mechanical pulp (TMP) and marked bleached thermo-mechanical pulp (CTMP) which can come from either hardwood or softwood.

Softwood is predominantly used by mills in the Prince George, Quesnel and South Interior regions. Hardwood is used by more northern mills located in the Chetwynd area. Vancouver Island uses softwood to produce TMP and CTMP.

Bleached kraft pulp capacity has been in long-term decline since the mid-1990's as BC-based equipment is old. BC-based operations are losing market share to bigger and more competitive operations in South America.

BC newsprint producers face a different problem. Their market is rapidly shrinking as North American consumers increasingly turn to electronic platforms to obtain information. Moreover, advertisers are increasingly advertising in electronic mediums.

The global slowdown has exacerbated the demand decline for BC's pulp and newsprint. Making matters worse is a growing scarcity of fibre as curtailments in the lumber industry reduce the supply of fibre.

In the short-term, pulp and paper electrical consumption has been reduced as a number of the newsprint and pulp curtailments have been undertaken and have been announced to remain in place until market conditions improve.

Pulp and Paper Outlook: Medium to Long-term

The medium to long term prospects look challenging. The industry is expected to marginally decline. The key issues over the medium and long-term facing BC pulp producers are:

- The impact of the Mountain Pine Beetle infestation will have reduced interior harvest viability. This will reduce fibre supply for BC pulp mills which use residual chips from lumber and whole log chipping. This is expected to lower sales and production during middle part of the forecast period (between F2011 to F2016).
- Ongoing decline in the North American newsprint market, where demand has decreased by 4% annually for the past four years. This is expected to foreshadow a slow decline in the world newsprint market.
- Slow demand growth for most printing and writing paper grades, with some bright spots such as directory paper (example: Yellow Pages). Several BC companies continue to make a successful transition away from kraft pulp and newsprint to higher value products.
- Growing demand for paper products and market pulp by China and other developing economies because of increased needs for packaging materials and tighter markets for fibre (positive factors for BC).
- Continued expansion of production of newer, low cost mills in developing countries (negative factor for BC).
- The risk of major equipment failure as some assets near end-of-life. Some mills may be forced to close because they lack the cash flow to fix or replace their capital intensive assets.
- A number of BC pulp and paper mills are reasonably high cost producers compared to competitors in Latin America and Asia. A significant amount of re-investment would be needed to upgrade existing equipment.

In response to these issues, it is anticipated that producers will shift newsprint capacity to higher value coated and uncoated mechanical speciality papers. As such, there is some increase in sales reflected in the forecast towards F2017. Beyond that period, the pulp and paper sales forecast is relatively flat.

8.4.2. Mining Outlook

Some 20 mines currently purchase power from BC Hydro, with more metal mines and coal mines currently in development. Most production is for export and there is relatively little domestic processing or manufacturing based on mineral production. Coal is sold primarily to Japan and China with the demand for metallurgical coal decreasing in Japan but increasing in China. Reflected in the 2008 Forecast are a number of potential mining projects throughout the province. In light of the recent fall in commodity prices, global slowdown and tightness in the credit markets these projects have been discounted accordingly. Nevertheless they are still contained in the forecast as the global economy is expected to be in recovery by 2010.

BC mineral exploration spending, including gold, copper, molybdenum, zinc, and coal, has rebounded from a low of $40 million per year in 2000 to more than $416 million in 2007 and slightly falling to $367 million in 2008. By middle of 2008, a large number of sizable mines were scheduled to begin production in the near future; however, the recent financial crisis resulted in a dramatic fall in mineral prices and a

tightening in the credit markets. Consequently, most new mine start dates were deferred.

BC Hydro believes British Columbia is an attractive environment for the global mining industry to invest and produce. With economic recovery, the world's appetite for the limited resource of minerals will revive. Mineral prices will rebound and credit markets will regain confidence. As this occurs, the new mine projects that were delayed, will resume.

In the long run, BC Hydro's forecast is based on several production forecasts that maintain moderate level of growth in the mining industry. The growth pattern also reflects anticipated new mine start-ups and closures.

8.4.3 Chemical Outlook

The BC kraft chemical-based pulp and paper sector buys a significant portion of the province's chemical plant output. As such, the sales forecast are similar to trends in the pulp and paper sector forecast.

8.4.4 Industrial Distribution Outlook

Key industrial distribution sub-sectors are manufacturing (74%), wood products and forestry (4%), mining (7%), construction (9%), and agriculture and fishing (6%). BC Hydro does not have disaggregated GDP forecasts by industry category, so it has relied on overall GDP forecasts as the driver of industrial distribution sales. As such, the growth in industrial distribution load is has been lowered in the 2008 Forecast relative to the 2007 Forecast due to lower GDP projections. BC Hydro has made additional adjustments to the GDP-based regression forecast to account for a reduction in wood production expected in medium and long-terms.

8.5. Forecast Methodology

The methodology used in producing the industrial transmission-voltage forecast incorporates expertise from many sources. For further details, please refer to Appendix A1.3.

Drivers – The drivers of the industrial forecast include consultant reports, industry research reports and information on BC Hydro major transmission accounts. Specific production forecasts were available and are used to develop the sales forecast for the larger transmission pulp and paper accounts. A forecast of GDP developed by the Conference Board of Canada was used in a regression model to develop the long-term sales forecast for the larger transmission non-forestry sectors. The sales in industrial distribution before adjustments and DSM are based on GDP regression model forecast. Due to the economic downturn, the BC economy will grow less robustly with real GDP increasing 1.2% between 2007 and 2008. The average annual growth rate in GDP is forecast to be 2.4% over the next five years, 2.2% over the next 11 years and 2.0% over the next 21 years.

8.6. Risks and Uncertainties

The factors below highlight some of the items that may contribute to higher or lower sales in the industrial forecast.

Factors Leading to Lower than Forecast Sales

- The aggressive stimulus packages being adopted by governments and central banks may rekindle inflation. Central bank tightening measures to control

inflation could then stagnate the world economy. Such an event could slow down economic and load growth.

- A loss of confidence in the U.S. economy could increase in the value of the Canadian dollar. BC's coastal pulp and paper mills are particularly vulnerable when a high Canadian dollar coincides with depressed commodity prices.
- North American newsprint demand continues to decline. Chinese newsprint exports could increase significantly over the next 5 years leading to continued price declines and closures at BC facilities.
- The depressed housing market in the United States could persist if stimulus packages fail to stimulate the U.S. economy.
- A reduction in growth in BRIC countries (Brazil, Russia, India and China) growth could lead to a slowing of commodity demand and commodity prices for base metals, coal, and molybdenum.

Factors Leading to Higher than Forecast Sales

- Strengthening world demand for market pulp and energy-intensive paper grades could increase electricity demand in the pulp and paper sector. .
- Prolonged growth in China and India may lead to higher demand for wood, pulp, paper, chemical, and mineral products.

Table 8.1. Industrial Sales Before DSM and Rate Impacts (GWh)

Fiscal Year	Transmission Voltage Customers						Distribution	
	Metal Mines	Coal Mines	Wood	Pulp & Paper	Chemical	Other	All Sectors	Total Sales
Actual								
F2003	1,873	516	928	8,534	1,798	902	4,046	18,596
F2004	1,906	467	937	8,785	1,787	950	3,893	18,725
F2005	1,990	507	1,003	9,178	1,812	938	4,208	19,635
F2006	2,312	507	1,110	9,037	1,744	953	4,272	19,936
F2007	2,297	475	1,195	8,678	1,587	985	4,252	19,469
F2008	2,259	496	1,162	8,024	1,591	1,024	4,181	18,737
Forecast								
F2009	2,290	501	990	7,622	1,599	1,131	4,126	18,260
F2010	2,269	503	1,079	7,978	1,623	1,191	4,200	18,843
F2011	2,212	550	1,298	7,755	1,733	1,292	4,388	19,228
F2012	2,121	595	1,382	7,641	1,733	1,394	4,460	19,325
F2013	2,365	602	1,215	7,743	1,733	1,579	4,525	19,763
F2014	3,420	610	1,239	7,843	1,735	1,695	4,546	21,088
F2015	3,475	617	1,269	7,908	1,743	1,823	4,556	21,390
F2016	3,319	570	1,258	7,451	1,743	1,913	4,559	20,813
F2017	3,323	577	1,240	7,656	1,743	1,967	4,565	21,071
F2018	3,322	584	1,158	7,916	1,743	2,018	4,559	21,300
F2019	3,323	592	1,157	7,839	1,743	2,055	4,573	21,282
F2020	3,126	558	1,156	7,839	1,754	2,125	4,584	21,142
F2021	2,561	561	1,155	7,839	1,765	2,179	4,593	20,653
F2022	2,591	564	1,155	7,839	1,776	2,183	4,600	20,708
F2023	2,622	568	1,153	7,767	1,788	2,185	4,594	20,676
F2024	2,654	571	1,154	7,767	1,799	2,179	4,588	20,712
F2025	2,686	575	1,156	7,767	1,810	2,167	4,582	20,743
F2026	2,718	578	1,157	7,767	1,821	2,154	4,574	20,769
F2027	2,751	581	1,159	7,767	1,831	2,139	4,567	20,795
F2028	2,784	585	1,160	7,767	1,842	2,126	4,561	20,825
F2029	2,817	588	1,160	7,767	1,853	2,117	4,555	20,856
Growth Rates:								
5 years: F2003 to F2008	3.8%	-0.8%	4.6%	-1.2%	-2.4%	2.6%	0.7%	0.2%
5 years: F2008 to F2013	0.6%	4.8%	0.3%	-2.3%	1.8%	9.9%	1.3%	0.3%
11 years: F2008 to F2019	3.4%	2.0%	-0.3%	-0.9%	0.9%	6.9%	0.7%	0.8%
21 years: F2008 to F2029	1.0%	1.0%	-0.1%	-0.5%	0.7%	3.7%	0.3%	0.3%

9 Non-Integrated Areas and Other Utilities Forecast

9.1. Non Integrated Area Summary

Characteristics - The non-integrated area (NIA) consists of locations served by BC Hydro, but are not connected to the BC Hydro transmission grid. It has three components: the Purchase Area, Zone II, and Fort Nelson.

The Purchase Area consists of six locations in the South Interior, namely Lardeau, Crowsnest, Newgate, Kingsgate-Yahk, Kelly Lake, and Keenleyside Dam. BC Hydro's billing system does not break out sales to the Purchase Area locations separately, but information on energy and capacity purchases to serve the Purchase Area is available. To serve customers in the Purchase Area, BC Hydro purchases electricity from a number of neighbouring electric utilities.

Zone II consists of nine locations in the Northern Region, namely Masset, Sandspit, Atlin, Dease Lake, Eddontenajon, Telegraph Creek, Anahim Lake, Bella Bella, and Bella Coola.

In F2008, annual generation requirements for the Purchase Area, Zone II, and Fort Nelson were 15 GWh, 113 GWh, and 171 GWh respectively.

At the end of F2008, there were 6,510 accounts in Zone II, and 3,227 accounts in Fort Nelson, which together represented 0.55% of all the accounts in the BC Hydro service area.

In F2008, sales to the NIA represented about 0.54% of total BC Hydro service area sales. Fort Nelson is not connected to the BC Hydro transmission grid, but it is connected to the Alberta grid. Unlike Zone II customers, Fort Nelson customers are charged the same rates as BC Hydro Integrated system customers. In F2008, sales to Fort Nelson were 163 GWh, which was 59% of all the sales in the NIA. Because of activity in the oil and gas sector, there is more potential for growth in Fort Nelson than in other NIA locations.

Drivers – The drivers of the NIA forecast are the number of accounts and the average annual use per account. For each community, the number of accounts is driven by a population forecast for its local health area, which is provided by BC Stats. Average annual use per account is assumed to grow at the same rate as the rest of the Northern Region. In Fort Nelson, there are currently five large accounts that represent about 60% of all sales. Those five accounts are forecast separately and added to the forecast for the rest of the customers in Fort Nelson. The forecast also includes six new large accounts which are expected to be connected over the next four years.

Trends – With the exception of Fort Nelson, growth in the NIA tends to be slower than growth in the rest of the system. For Zone II, F2008 sales fell by 0.29% compared to F2007, and were 2.20% below the 2007 Forecast for F2008. For Fort Nelson, sales grew by 4.23% between F2007 and F2008. The Fort Nelson sales in F2008 in the 2008 Forecast were 14.29% below the expected sales in the 2007 Forecast. Excluding Fort Nelson, the new sales forecast for the NIA for F2013 is down by 4.43% compared to the 2007 Forecast because of the lower anchor point for F2008, and because of the lower trends associated with the lower anchor point. Including Fort Nelson, the new sales forecast for the NIA for F2013 is up by 68% mainly because of oil & gas sector load in the region.

Risks and Uncertainties – The main risks to the forecast for the NIA are discrete events such as the opening or closing of a large new account.

Table 9.1. Non Integrated Area Sales Before DSM and Rate Impacts (GWh)

Fiscal Year	**Purchase Area** Sales	**Zone II** Sales	**Fort Nelson** Sales	**Total NIA** Sales
Actual				
F2003	20 (estimates)	98	157	275
F2004	21 (estimates)	98	161	280
F2005	20 (estimates)	97	174	291
F2006	18 (estimates)	97	155	270
F2007	15 (estimates)	101	157	272
F2008	14 (estimates)	101	163	278
Forecast				
F2009	14	101	224	340
F2010	14	102	230	346
F2011	14	103	323	440
F2012	14	103	373	490
F2013	14	104	491	609
F2014	15	104	570	689
F2015	15	105	679	799
F2016	15	105	753	873
F2017	15	106	802	922
F2018	15	106	842	963
F2019	15	106	871	992
F2020	15	106	923	1,044
F2021	15	106	965	1,086
F2022	15	106	966	1,087
F2023	15	106	966	1,088
F2024	15	106	967	1,089
F2025	15	106	967	1,089
F2026	16	106	968	1,089
F2027	16	106	968	1,089
F2028	16	105	968	1,089
F2029	16	105	968	1,089
Growth Rates				
5 years: F2003 to F2008	-6.6%	0.5%	0.8%	0.2%
5 years: F2008 to F2013	0.7%	0.6%	24.6%	17.0%
11 years: F2008 to F2019	0.5%	0.5%	16.4%	12.3%
21 years: F2008 to F2029	0.6%	0.2%	8.8%	6.7%

Note: The sales in the table above represent part of the total sales for residential, commercial, and industrial sales as shown in other sections of this document.

Table 9.2. Non Integrated Area Generation Requirements (GWh)

Fiscal Year	Purchase Area	Zone II	Fort Nelson	Total NIA
Actual				
F2003	21	104	163	288
F2004	22	106	167	295
F2005	21	105	168	294
F2006	19	105	201	325
F2007	16	109	170	295
F2008	15	113	171	299
Forecast				
F2009	15	111	233	359
F2010	15	112	239	366
F2011	15	112	335	463
F2012	15	113	388	516
F2013	15	113	510	639
F2014	15	114	593	723
F2015	15	115	706	836
F2016	16	115	784	914
F2017	16	115	834	965
F2018	16	115	876	1,007
F2019	16	116	906	1,037
F2020	16	116	959	1,091
F2021	16	116	1,003	1,135
F2022	16	116	1,004	1,136
F2023	16	116	1,005	1,137
F2024	16	116	1,006	1,138
F2025	16	116	1,006	1,139
F2026	17	116	1,006	1,139
F2027	17	115	1,007	1,139
F2028	17	115	1,007	1,138
F2029	17	115	1,006	1,138
Growth Rates				
5 years: F2003 to F2008	-6.6%	1.6%	0.9%	0.7%
5 years: F2008 to F2013	0.7%	0.1%	24.5%	16.4%
11 years: F2008 to F2019	0.5%	0.2%	16.4%	12.0%
21 years: F2008 to F2029	0.6%	0.1%	8.8%	6.6%

Table 9.3. Non Integrated Area Peak Requirements (MW)

Fiscal Year	**Purchase Area** Peak	**Zone II** Peak	**Fort Nelson** Peak	**Total NIA** Peak
Actual				
F2003	6	21	25	52
F2004	6	24	26	56
F2005	6	23	29	58
F2006	5	21	34	61
F2007	5	24	29	58
F2008	4	25	30	60
Forecast				
F2009	5	24	45	74
F2010	5	24	51	79
F2011	5	24	54	83
F2012	5	24	62	91
F2013	5	25	84	114
F2014	5	25	94	123
F2015	5	25	115	144
F2016	5	25	124	153
F2017	5	25	132	161
F2018	5	25	138	168
F2019	5	25	143	173
F2020	5	25	151	181
F2021	5	25	158	188
F2022	5	25	159	189
F2023	5	25	159	189
F2024	5	25	159	189
F2025	5	25	159	189
F2026	5	25	159	189
F2027	5	25	159	189
F2028	5	25	159	189
F2029	5	25	159	189
Growth Rates				
5 years: F2003 to F2008	-5.9%	3.4%	4.0%	2.8%
5 years: F2008 to F2013	1.2%	-0.2%	22.6%	13.7%
11 years: F2008 to F2019	0.8%	0.1%	15.1%	10.1%
21 years: F2008 to F2029	0.7%	0.0%	8.2%	5.6%

Note: Non-Integrated peak requirements, including Fort Nelson, are not included in the peak forecast as shown in the next Chapter.

9.2. Other Utilities Summary

Characteristics – The Other Utilities served by BC Hydro are: City of New Westminster, Fortis BC, Seattle City Light and Hyder. The City of New Westminster is surrounded by BC Hydro's Lower Mainland region. The Fortis BC service area is part of south-eastern British Columbia, Seattle City Light is in the state of Washington, and Hyder is in the state of Alaska. Hyder is served at distribution voltage; the other three utilities are served at transmission voltage.

In accordance with a BCUC decision dated June 9, 1993, BC Hydro is obligated to provide Fortis BC with up to 200 MW under tariff rates.

BC Hydro is obligated to serve Seattle City Light in accordance with a treaty between British Columbia and Seattle dated March 30, 1984. The treaty terminates on January 1, 2066.

Since Stewart, BC, is connected to the BC Hydro grid, and since Hyder, Alaska, is 5 km away from Stewart, BC Hydro also serves Hyder.

In F2008, annual energy sales to City of New Westminster, Fortis BC, Seattle City Light, and Hyder were 442 GWh, 921 GWh, 310 GWh, and 1 GWh respectively.

Drivers – The forecast for the City of New Westminster is based on trend analysis. The forecast for Fortis BC is based on information received annually from that utility. The forecast for Seattle City Light is defined by the treaty, and the forecast for Hyder is 1 GWh per year.

Trends – The City of New Westminster is forecast to have modest growth of about 1% over the entire forecast period. The forecast for purchases by Fortis BC from BC Hydro is lower than last year's forecast. Both Seattle City Light and Hyder are forecast to have no significant growth.

Risks and Uncertainties – The main risk to the forecast for the City of New Westminster is a discrete event such as a large new account. The main risk to the forecast for Fortis BC is a change in how that utility plans to meet its supply requirements. Since the forecast for Seattle City Light is based on a signed treaty, the risk is minimal over the entire forecast period. The load for Hyder is so small, that any associated risks and uncertainties are also minimal.

Table 9.4. Sales to Other Utilities before Rate Impacts (GWh)

Fiscal Year	**City of New Westminster** Sales	**Fortis BC** Sales	**Seattle City Light** Sales	**Hyder, Alaska** Sales	**Total Other Utilities** Sales
Actual					
F2003	400	672	310	1	1,384
F2004	411	774	310	1	1,497
F2005	411	758	300	1	1,470
F2006	415	820	320	1	1,556
F2007	429	972	310	1	1,712
F2008	442	921	310	1	1,674
Forecast					
F2009	444	845	310	1	1,600
F2010	448	941	310	1	1,700
F2011	452	1,003	310	1	1,766
F2012	456	1,051	312	1	1,820
F2013	460	1,095	310	1	1,866
F2014	464	1,136	310	1	1,911
F2015	468	1,154	310	1	1,933
F2016	472	1,168	312	1	1,953
F2017	476	1,178	310	1	1,966
F2018	480	1,191	310	1	1,982
F2019	484	1,204	310	1	1,999
F2020	488	1,217	312	1	2,018
F2021	492	1,225	310	1	2,028
F2022	496	1,236	310	1	2,043
F2023	500	1,247	310	1	2,058
F2024	504	1,261	312	1	2,078
F2025	508	1,269	310	1	2,089
F2026	512	1,281	310	1	2,104
F2027	516	1,293	310	1	2,120
F2028	520	1,307	312	1	2,140
F2029	524	1,314	310	1	2,149
Growth Rates					
5 years: F2003 to F2008	2.0%	6.5%	0.0%	0.2%	3.9%
5 years: F2008 to F2013	0.8%	3.5%	0.0%	-3.1%	2.2%
11 years: F2008 to F2019	0.8%	2.5%	0.0%	-1.4%	1.6%
21 years: F2008 to F2029	0.8%	1.7%	0.0%	-0.8%	1.2%

10 Peak Forecast

10.1. Peak Description

BC Hydro's peak demand is defined as the maximum expected amount of electricity consumed in a single hour under an average cold temperature assumption referred to as the design temperature. BC Hydro is a winter peaking utility, as its demand is more sensitive to colder temperatures than warmer temperatures. The total BC Hydro system typically reaches its annual peak on a cold winter day between 5:00 pm and 6:00 pm. Vancouver Island has a morning and an evening peak as residential space heating is a larger component of the Island load.

The domestic peak includes distribution substation peaks, transmission customer peaks and the peak demand of the City of New Westminster and system transmission losses. The Integrated system peak demand is the domestic peak demand plus the peak demands from the other served utilities such as Fortis BC and system transmission losses.

Distribution substation peaks are the most sensitive to ambient temperature. Distribution peak demand is also driven by the number of residential accounts and employment. In addition, distribution peak demand includes other larger discrete loads such as shopping malls, waste treatment facilities and other infrastructure projects that contribute to the peak at specific distribution substations.

Transmission peak demand is responsive to external market conditions and changes in demands for BC's key industrial commodities such as wood, pulp and paper and mining sectors. Information in industry reports and market intelligence from BC Hydro's Key Account Mangers are key sources of information used to develop the transmission peak demand forecast.

10.2. Peak Forecast Summary

For the winter of F2008, the total integrated system peak forecast, including peak requirements from the other utilities served by BC Hydro, was 9,860 MW before weather adjustments and 10,597 MW, after weather adjustments. The integrated system peak forecast, before DSM and rate impacts is expected to grow from10,597 MW in F2008 to 11,379 MW in F2013, to 12,197 MW in F2019, and 13,899 MW in F2029. These increases represent growth rates of 1.8 per cent over the next five years (F2008 to F2013), 1.3 per cent over the next 11 years (F2008 to F2019), and 1.3 per cent over the next 21 years of the forecast (F2008 to F2029). The total integrated system peak forecasts before DSM and with rate impacts for all 21 years are provided in Appendix 4.

BC Hydro's all time total domestic system peak, which excludes purchases of peak demand from other utilities, was 10,113 MW occurred on November 29, 2006. The daily average temperature for that day recorded at the Vancouver International Airport (YVR) was -5.9 ºC[5]. For F2008, the actual domestic peak was 9,548 MW, which occurred on January 28th, 2008 during which the average daily temperature at

[5] The total BC Hydro distribution peak is the sum of four distribution peaks in each of the main four service regions. Each of the four distribution peaks have a design temperature based on the rolling average of the annual coldest daily average temperature over the most recent 30 years. For the Lower Mainland, the design temperature is -5.3 ºC; for Vancouver Island, the temperature is -3.6 ºC; for South Interior, the temperature is -16.4 ºC and for Northern Region, the temperature is -28.5 ºC.

YVR was -0.95 ºC. The weather adjusted domestic peak for the winter of F2008 was estimated as 10,265 MW.

Between F2007 and F2008, the weather normalized domestic system peak demand grew by 91 MW or about 1%. The total coincident distribution portion of the total peak grew, after weather adjustments, by 185 MW or 2.5%. The coincident transmission peak demand declined by 108 MW or 5.8% over the same time period. The non coincident transmission peak demand declined by 104 MW or 3.8%.

Winter F2009 Outlook:

The recent historical decline in the transmission peak reflects lower demand in the forestry sector and reduced load from several forestry customers. For F2009, lower transmission demand is expected to continue due to factors such as reduced loads from large pulp and paper transmission customers, a continued decline in U.S housing demand and reduced peak loads from other customers in the areas of pipelines and transportation. It is anticipated that the distribution peak will continue to experience moderate growth reflecting historical gains in housing starts however, as economic conditions have worsened over most of 2008, small industrial and commercial peak demands are expected to be reduced. Before DSM and rate impacts, the total coincident distribution peak demand is expected grow by 207 MW or 2.7% between F2008 and F2009.

10.3. Peak Forecast Comparison

10.3.1. Distribution Peak Comparison

The figure 10.1 and table 10.1 shows the 2007 and current total BC Hydro coincident distribution substation peak forecasts before DSM and rate impacts.

The distribution peak forecast is very close to last year's forecast. This year's forecast is growing at relatively the same rate as last year's forecast. This reflects (i) positive historical growth of 185 MW between F2007 and F2008, which puts upward pressure on the peak in line with last year; and (ii) differences in expected growth amongst the various regions have lead to overall little change in the forecast. For example, slower housing starts and employment growth in the Lower Mainland and Vancouver Island have resulted in lower forecast for these regions. However this has been offset by an improved outlook for the North reflecting future demand from oil and gas sector and for the South reflecting stronger demands from areas with more expected retirees and resorts. A third factor, which keeps this year's in line with last year, is that larger metropolitan areas in the Lower Mainland and Vancouver Island are expected to continue to grow from larger discrete projects including Olympic facilities and government projects in the areas of health care and transportation.

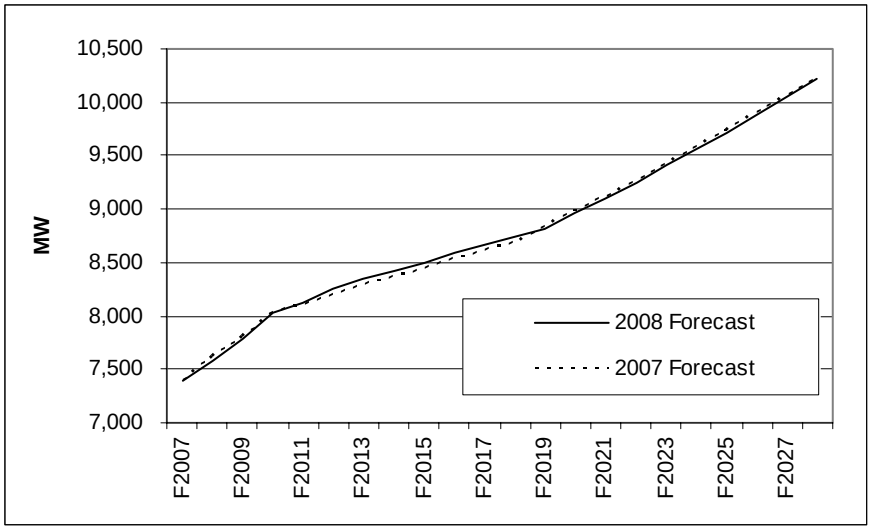
Long-term projections (the second 10 years of the forecast) reflect growth in the distribution energy forecast in each of the four major service regions.

Table 10.1 2007 and 2008 Distribution Peak Forecasts before DSM and Rate Impacts (MW)

Fiscal Year	2008 Forecast	2007 Forecast	2008 Forecast Less 2007 Forecast	% Difference
F2007	7,402*	7,402*	-	
F2008	7,586*	7,618	(32)	-0.4%
F2009	7,794	7,799	(5)	-0.1%
F2010	8,026	8,024	3	0.0%
F2011	8,124	8,103	21	0.3%
F2012	8,257	8,199	58	0.7%
F2013	8,352	8,283	68	0.8%
F2014	8,430	8,366	64	0.8%
F2015	8,507	8,447	59	0.7%
F2016	8,586	8,530	56	0.7%
F2017	8,659	8,610	49	0.6%
F2018	8,737	8,692	45	0.5%
F2019	8,812	8,832	(20)	-0.2%
F2020	8,957	8,975	(19)	-0.2%
F2021	9,104	9,121	(17)	-0.2%
F2022	9,254	9,270	(16)	-0.2%
F2023	9,407	9,421	(14)	-0.2%
F2024	9,562	9,575	(13)	-0.1%
F2025	9,720	9,732	(12)	-0.1%
F2026	9,881	9,892	(11)	-0.1%
F2027	10,045	10,055	(10)	-0.1%
F2028	10,212	10,221	(9)	-0.1%
F2029	10,382			

* = Weather Normalized Actual

Figure 10.1. Comparison of 2007 vs. 2008 BC Hydro's Distribution Peak Forecast before DSM and Rate Impacts



10.3.2. Transmission Peak Comparison

Figure 10.2 and table10.2 compares the 2007 and 2008 total BC Hydro coincident transmission peak forecasts before DSM and rate impacts. The transmission peak forecast is below last year's forecast for the entire forecast period. This reflects historical decline in the peak between F2007 and F2008 on a coincident and non-coincident basis. With this decline the peak demand starts from a lower point compared to last year's forecast. This year's forecast reflects announced shutdowns of customer operations in the forestry sector and reduced forecasts for pipelines and transportation customers.

In the long-term, demand in the forestry sector is forecast to lower due to the impact of pine beetle infestation and the assumption of low levels of investment in infrastructure in forestry operations. Over the long-term, (i.e. in the last 10 years) the long-term transmission energy forecast is below last year's forecast. This contributes to a slower growing transmission peak relative to last year's forecast.

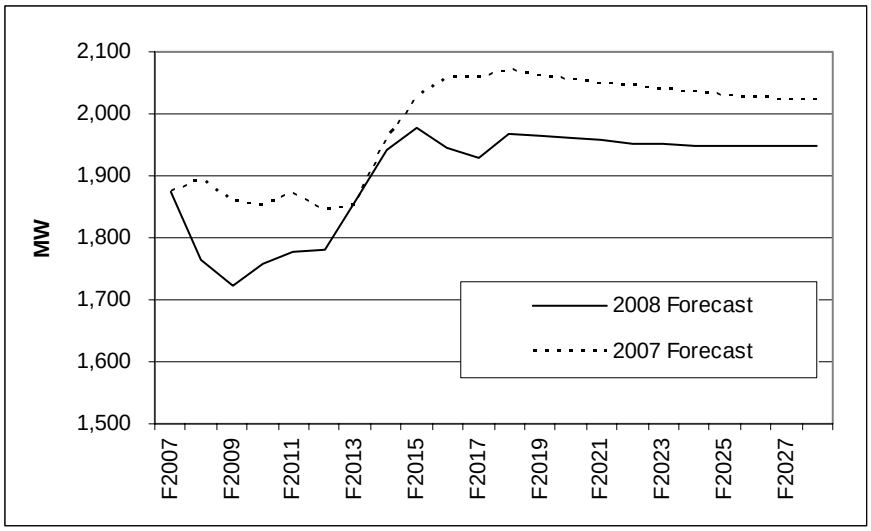
Note that this load does not include non-integrated peak load growth forecast for Fort Nelson as described in Chapter 9.

Table 10.2. 2007 and 2008 Transmission Peak Forecasts before DSM and Rate Impacts (MW)

Fiscal Year	2008 Forecast	2007 Forecast	2008 Forecast Less 2007 Forecast	% Difference
F2007	1,873*	1,873*	-	
F2008	1,766*	1,893	(127)	-6.7%
F2009	1,724	1,858	(134)	-7.2%
F2010	1,759	1,853	(93)	-5.0%
F2011	1,776	1,871	(95)	-5.1%
F2012	1,780	1,844	(63)	-3.4%
F2013	1,859	1,853	6	0.3%
F2014	1,942	1,958	(16)	-0.8%
F2015	1,977	2,027	(50)	-2.5%
F2016	1,944	2,058	(114)	-5.5%
F2017	1,931	2,058	(128)	-6.2%
F2018	1,967	2,069	(103)	-5.0%
F2019	1,966	2,062	(96)	-4.7%
F2020	1,961	2,056	(95)	-4.6%
F2021	1,957	2,050	(93)	-4.5%
F2022	1,953	2,044	(91)	-4.4%
F2023	1,950	2,039	(89)	-4.3%
F2024	1,949	2,035	(86)	-4.2%
F2025	1,948	2,031	(83)	-4.1%
F2026	1,947	2,027	(80)	-3.9%
F2027	1,948	2,024	(76)	-3.8%
F2028	1,949	2,021	(72)	-3.6%
F2029	1,952			

* = Actual

Figure 10.2. Comparison of 2007 vs. 2008 BC Hydro's Transmission Peak Forecast before DSM and Rate Impacts



10.3.3. System Forecast Comparison

Table 10.3 and Figure 10.3 compare the 2007 and 2008 total Integrated System peak forecasts before DSM and rate impacts. The Integrated Peak forecast is the sum of the coincident distribution, transmission, peak forecasts for the other utilities and system transmission losses.

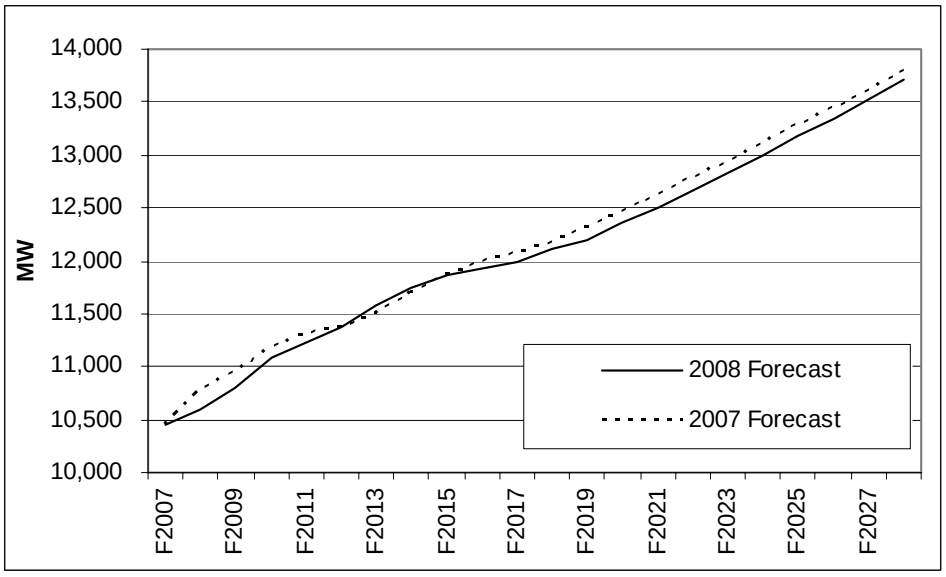
This year's forecast is generally below last year's forecast for most of the forecast period due to a reduced transmission peak forecast, specifically in the pulp and paper sector's newsprint and pulp production. However, lifting the load in the sector in the medium to long term is the oil and gas sector.

Table 10.3 Total Integrated Peak Forecast Comparison before DSM and Rate Impacts (MW)

Fiscal Year	2008 Forecast	2007 Forecast	2008 Forecast Less 2007 Forecast	% Difference
F2007	10,449*	10,449*	-	
F2008	10,597*	10,784	(186)	-1.7%
F2009	10,793	10,949	(156)	-1.4%
F2010	11,091	11,195	(103)	-0.9%
F2011	11,224	11,305	(81)	-0.7%
F2012	11,379	11,383	(4)	0.0%
F2013	11,571	11,487	84	0.7%
F2014	11,749	11,693	56	0.5%
F2015	11,871	11,859	12	0.1%
F2016	11,923	11,984	(61)	-0.5%
F2017	11,989	12,073	(84)	-0.7%
F2018	12,114	12,175	(60)	-0.5%
F2019	12,197	12,321	(125)	-1.0%
F2020	12,349	12,471	(121)	-1.0%
F2021	12,506	12,624	(118)	-0.9%
F2022	12,666	12,781	(114)	-0.9%
F2023	12,830	12,941	(110)	-0.9%
F2024	12,998	13,105	(106)	-0.8%
F2025	13,170	13,272	(102)	-0.8%
F2026	13,346	13,443	(97)	-0.7%
F2027	13,526	13,618	(92)	-0.7%
F2028	13,711	13,797	(87)	-0.6%
F2029	13,899			

* = Weather Normalized Actual

Figure 10.3. Comparison of 2007 vs. 2008 BC Hydro's Integrated System Peak Forecast before DSM and Rate Impacts



10.4. Peak Forecast Methodology

10.4.1 Distribution Peak Methodology

At the distribution level, electricity demand is closely linked to the historical trends in distribution substation load growth and the economic outlook for each forecast region in the province. As such, the regional economic outlook is one of the primary inputs into distribution peak demand forecasts. BC Hydro obtains a regional economic forecast from the Conference Board of Canada.

The distribution peak forecast is developed using forecasts from two main sources. These include forecasts from an econometric model referred to as the distribution peak guidelines forecast and forecasts for each of the BC Hydro's distribution substations. The substation forecasts are based on the growth in the guidelines forecasts, expected transfers among substations and anticipated new large loads (i.e. discrete projects) that are specific to each substation.

The distribution peak guideline forecast is prepared for 15 different planning areas for the first 11 years of the forecast period. The forecast provides a guideline for the total non-coincident (MVA) growth for all of the substations serving distribution customers in that area. The main stock drivers used in the model are the forecasts of employment and the number of residential customer accounts, which is driven by housing starts.

After the distribution peak guidelines and substation forecasts are completed for each of the 15 areas, the substation peak forecasts for each distribution substation is prepared. Next, these forecasts are aggregated from 15 planning areas to develop a total distribution substation peak for each the four major service regions (i.e. the Lower Mainland, Vancouver Island, Northern Region and South Interior). Regional power factors and coincidence factors are applied to aggregated forecasts to produce four regional coincident distribution peak forecast (MW). For the last 10 years of the forecast period, the distribution peak forecast for each region is derived using the growth rate in the distribution energy sales forecast.

A total BC Hydro distribution substation peak forecast is prepared as a coincident sum of the four regional distribution peak forecasts.

The equations and other details describing the development of the distribution peak forecast are located in Appendix A1.4.

10.4.2 Transmission Peak Methodology

The transmission peak forecast is prepared on a customer-by-customer account basis. Market intelligence from BC Hydro's key account managers, historical hourly load data and reports on industry outlooks are used to develop the transmission peak forecast. The forecast for each account is prepared on a non-coincident basis for system planning purposes. These forecasts are aggregated into four total regional peak forecasts (i.e. a total transmission peak forecast) for each of the four main service regions. Regional coincidence factors and power factors are applied to each of these total regional peak forecasts to establish regional coincident transmission peak forecasts. For the last 10 years of the forecast period, the transmission peak forecast for each region is derived using the growth rate in the transmission energy sales forecast.

A total BC Hydro transmission peak forecast is prepared as a coincident sum of the four regional transmission peak forecasts

The equations and other details describing the development of the transmission peak forecast are located in Appendix A1.4.

10.4.3. System Peak Forecast Methodology

A total system peak forecast is prepared as the sum of the total coincident distribution peak, total coincident transmission peak, total other utilities peak demands and total system transmission losses.

A system transmission loss ratio of 8.7% is applied to the domestic distribution and transmission peak forecasts based on historical information.

The system peak forecast is prepared for the BC Hydro domestic system and the total integrated system. The domestic peak demand is the peak demands of the total domestic distribution and transmission peaks, the peak demand of the City of New Westminster and system transmission losses. The Integrated peak demand is the domestic peak demand plus the peak demands from the other utilities (i.e. Seattle City Light and Fortis BC) and system transmission losses.

10.5. Risks and Uncertainties

Uncertainties and risks in the peak forecast come from several factors such as the assumptions on the growth of forecast drivers and model parameters to the anticipated normal weather assumption and its impact on the peak demand.

Upward Pressure on Peak Demand:

- The strong housing demand is continued in BC with the higher number of residential accounts growth.
- Stronger regional growth in employment than anticipated.
- Continued high commodity prices and market demand for BC's exports.
- More discrete spot load in distribution peak demand than predicted.

Downward Pressure on Peak Demand:

- Slow down in the housing market – more vacancies and less development than expected.
- Lower commodity prices and a slowdown in the US economy.
- The pine beetle infestation results in additional future forestry sector challenges

BC Hydro quantifies the overall uncertainty in the peak demand using the results of the Monte Carlo uncertainty model as described in section 5.

11 Glossary

Accrued Sales Monthly Accrued Sales are an estimate of electricity delivered within a specific month. Most customer meters are not read at every month-end, so the amount of electricity delivered in a month is not known precisely. In accordance with GAAP, monthly accrued sales are used for monthly financial reporting.

Backcasting Estimating econometric or other models over a historical time period and comparing the predictions of the models to actual results over the same time period.

Billed Sales The amount of electricity billed. Because bills are produced after the electricity has been delivered, monthly billed sales lag monthly delivery of electricity.

Binary Variable is a variable whose value is either zero or one. Binary variables are often used as independent variables in regression models in order to account for events that either occur or do not occur. In this latter context, binary variables are often referred to as "dummy variables" in regression.

Calibration Estimating econometric or other models over a historical time period.

Coincidence Factor A ratio reflecting the relative magnitude of a region's (or customer's or group of customers') demand at the time of the system's maximum peak demand to the region's (or customer's or group of customers') maximum peak demand.

Commercial Output Commercial output focuses on the provisions of services in the economy and so includes such things as public administration, insurance agents, bankers, wholesale and retail trade, food services, accommodation provisions etc.

Consumer Price Index (CPI) An inflation index calculated by comparing the price of a typical bundle of goods in the year in question to the price of the same goods in a set reference year.

Cooling Degree Day (CDD) is a measure of warmness, defined by the number of degrees above 18 degrees Celsius for the average daily temperature. CDDs are driver of utility air-conditioning electricity loads.

Demand-Side Management (DSM) Refers to activities that occur on the demand side of the revenue meter and are influenced by the utility. DSM activities result in a change in electricity sales. Past DSM savings include incremental load displacement and energy efficiency savings. Note that BC Hydro's historical sales include the impact of DSM savings realized up to that year.

Distribution voltage customer A BC Hydro customer who receives electricity via distribution lines that operates at lower voltages (60 kV and less).

Domestic System Peak includes the peak requirements for BC Hydro's distribution and transmission customers in its service territory; sales to the City of New Westminster and system transmission and distribution losses.

Econometric modelling The use of statistical techniques, typically regression analysis of time-series and/or cross-sectional data, to detect statistically verifiable relationships, coherent with economic theory, between an explained variable (e.g. electricity consumption) and explanatory variables (e.g. industry output, prices of alternative energy inputs and GDP).

Elasticity The proportionate change in a dependent variable, (e.g. electricity consumption, divided by the proportionate change in a specified independent variable; electricity price). A dependent variable is highly elastic with respect to a given independent variable if the calculated elasticity is much greater than one. The dependent variable is inelastic if the elasticity is less than one.

End-use model A model used to analyze and forecast energy demand, which focuses on the end uses or services provided by energy. Typical end uses are lighting, process heat and motor drive. For a given industry, the model estimates the influence of prices and technological change on the evolution of the secondary energy inputs required to satisfy the industry's end uses over time.

Energy The amount of electricity delivered or consumed over a certain time period, measured in multiples of watt-hours. A 100-watt bulb consumes 200 watt-hours in two hours.

Energy Efficiency Is the ratio of the energy service delivered from a process or piece of equipment to the energy input. Energy efficiency is a dimensionless number, with a value between 0 and 1 or, when multiplied by 100, is given as a percentage.

GAAP Generally Accepted Accounting Principles

Gigawatt-hour (GWh) A measure of electrical energy, equivalent to one million kilowatt-hours. (See Units of Measure.)

Gross Domestic Product (GDP) A measure of the total flow of goods and services produced by the economy over a specified time period, normally a year or quarter. It is obtained by valuing outputs of goods and services at market prices (alternatively at factor cost), and then aggregating the total of all goods and services.

Heating Degree Day (HDD) Is a measure of coldness, defined by the number of degrees below 18 degrees Celsius for the average daily temperature. HDDs are drivers of utility space heating electricity loads.

Integrated System That portion of the BC Hydro system which is connected as one whole. Non-integrated facilities refer to generating facilities that are not connected to the system, located in remote areas of the province.

Integrated System Peak includes the peak requirements for BC Hydro's distribution and transmission customers in its service territory; sales to Other Utilities, which includes Seattle City Light, New Westminster, Fortis BC and Hyder Alaska (Tongass Power and Light Co. Inc.); and system transmission and distribution losses.

Intensity A unitized measure of energy consumption, typically in kilowatt-hours per unit of stock. For example, kWh per account in the residential sector or kWh per unit of production in the industrial sector.

Kilowatt-hour (kWh) A measure of electrical energy, equivalent to the energy consumed by a 100-watt bulb in 10 hours. (See Units of Measure.)

Load The total amount of electrical power demanded by the utility's customers at any given time, typically measured in megawatts (MW).

Load Displacement Projects that involve the installation of self-generation facilities at customer sites, with the electricity generated being used on-site by the customer, with a resultant decrease in the purchase of electricity from BC Hydro.

Megawatt (MW) A unit used to measure the capacity or potential to generate or consume electricity. One MW equals one million watts. (See Units of Measure.)

Monte Carlo method A technique for estimating probabilities involving the construction of a model and the simulation of the outcome of an activity a large number of times. Random sampling techniques are used to generate a range of outcomes. Probabilities are estimated from an analysis of this range of outcomes.

MVA Megavolt-Amps – a unit of apparent power. Apparent power is real power in MW divided by power factor.

Natural conservation The increase in energy efficiency that would occur in the absence of any utility-induced demand-side management program, all other things being equal.

Non-coincident In general is the magnitude of a region's (or customer's or group of customers') demand at the time of its peak.

Non-Integrated Area (NIA) See Integrated System.

Normalization The correction of actual customer sales and peak demand for factors such as unusually warm or cold weather.

Ordinary Least Squares (OLS) is a method of choosing parameters to minimize the sum of squares of errors produced as a function of a set of variables.

Price elasticity of demand The percentage change in quantity demanded, divided by the percentage change in price that caused the change in quantity demanded.

Real price increases that have been adjusted for changes in prices of all goods. The nominal price of an item may rise by 10 per cent over a year, but inflation (and assumed wages) may have risen by seven per cent over the same time period. Therefore the effective price increase faced by the consumer is close to three per cent. It is necessary to deflate current prices by an appropriate inflation index (the CPI in Canada) to convert money values to constant prices or real terms.

Reference Forecast Before DSM and Rate Impacts is the energy and peak demand forecast developed under the current methodology. It is developed under the assumption that electricity rates increase at the rate of inflation and normal weather conditions.

Region A geographical sub-division of the BC Hydro service area used within the BC Hydro Load Forecast. Four regions exist: Lower Mainland, Vancouver Island, South Interior and the Northern Region.

Retail Sales are in nominal or current dollars whereas the output is measured in real dollars.

Stock A quantity representing a number of energy consuming units. For example, in the residential sector, stock is the number of accounts or housing units; in the commercial sector, stock is represented by the floor area of commercial building space.

System coincident peak demand The greatest combined demand of all BC Hydro customers faced by the generation system during a given fiscal year.

Transmission voltage customer A BC Hydro customer that is supplied its electricity via high-voltage transmission lines (60 kV or above).

Units of measure The large amounts of electricity generated and consumed on a system-wide basis are discussed in multiples of the basic units of watt and watt-hours. Kilowatts and megawatts are used to measure power, and kilowatt-hours, megawatt-hours, and gigawatt-hours are used to measure energy. The equivalence is:

1 kilowatt (kW)	=	1000 watts
1 megawatt (MW)	=	1000 kilowatts or 1 million watts
1 kilowatt-hour (kWh)	=	1000 watt-hours
1 megawatt-hour (MWh)	=	1000 kilowatt-hours or 1 million watt-hours
1 gigawatt-hour (GWh)	=	1000 megawatt-hours or 1 billion watt-hours

Appendix 1A Forecast Processes and Methodologies

There are a number of key components to the demand and sales forecast: the residential forecast; the commercial forecast (distribution and transmission voltage), the industrial forecast (distribution voltage and transmission voltage), and the regional and system peak forecasts. The peak forecast includes the distribution voltage and transmission voltage peak demands. This section covers the methodology used for each of these forecast components.

A1.1.1 Residential Sales Weather Normalization

Weather-normalized sales are an estimate of the sales that would have been made if normalized weather had been experienced (i.e. a 10 year rolling average of heating degree days. Sales are adjusted using heating and cooling degree-days, a standard practice in the utility industry. A heating degree-day (HDD) is measure of coldness, defined by the number of degrees below 18 degrees Celsius in (A1.1), for the average daily temperature. For example, if the average temperature on day d is 12 degrees Celsius then that day has 18-12 = 6 HDDs. The HDDs for a month are the sum of the HDDs for the days in that month.

Formally, for each day d, HDDs is defined in (A1.1) where max is the maximum function.

(A1.1) HDD_d = max (18°C – average daily temperature, zero)

Note that HDDs are never negative because space heating systems do not generally draw electricity demand at temperatures above 18°C.

Similarly, a CDD is a measure of warmth, defined by the number of degrees above 18 degrees Celsius in (A1.2), for the average daily temperature. For example, if the average temperature on day d is 22 degrees Celsius then that day has 22-18 = 4 CDDs. The CDDs for a month are the sum of the CDDs for the days in that month.

Formally, for each day d, CDDs is defined in (A1.2) where min is the minimum function.

(A1.2) CDD_d = min (average daily temperature – 18°C, zero)

Note that cooling degree days are never negative because space cooling systems do not generally draw electricity demand at temperatures below 18°C.

For each month m, HDDs and CDDs are added together to produce total degree days (TDD) as given in (A1.3)

(A1.3) $TDD_m = HDD_m + CDD_m$

We assume that the monthly residential use rate for a given class of residential accounts can be modelled using the following cubic polynomial (A1.4.).

(A1.4) $\text{use rate}_m = \alpha + \beta * TDD_m + \chi * TDD_m^2 + \delta * TDD_m^3 + \varepsilon_m$

The most recent 36 months of data available is used to estimate each regression, which is modelled using ordinary least squares. To calculate the weather-normalized use rate for a particular period, the total degree-days for the period are substituted into the estimated regression equation (A1.4).

It is important to note the following points:

- First, weather normalization is undertaken only for the residential sector since limited evidence exists of a weather response for the commercial distribution sector. When weather-normalized total sales and requirements are reported, only the residential part of the total is actually weather-normalized. Research is being conducted to determine if and how the commercial distribution loads should be weather normalized at the regional level.
- Second, the model expressed by equation A1.4 above normalizes the use per account or the use rate as opposed to sales. Normalized sales are then calculated as normalized use rate multiplied by the average number of accounts for the class. Eight customer classes are used in these calculations, namely a heating and non-heating class in each of the four regions.
- Third, because this forecast uses billed sales rather than the unknown actual consumption by class, monthly total degree-days are allocated using a 35/50/15 per cent adjustment to match the assumed pattern of meter reading. For example, to weather normalize the month of November, November sales would be regressed against the summation of 1) 35% of November degree days 2) 50% of October degree days and 3) 15% of September degree days.

A1.1.2 Commercial Sales Weather Normalization

BC Hydro is researching method to conduct weather normalization in the context of the Statistically Adjusted End Use Model.

A1.1.3 Peak Forecast Weather Normalization

Peak weather normalization is carried out for various substations to determine what the peak demand would be at design temperature. Design temperature is a rolling 30 year average of the coldest daily average temperature. See Appendix A1.4 under the peak methodology section for more details.

A1.1.4 Residential Forecast Methodology

The residential energy forecast is determined by forecasting the number of accounts times rate of use based on the following expression:

(A1.5) $RES = \Sigma_k \Sigma_j \Sigma_i R_{ijk} * RUR_{ijk}$,

where:

- RES is residential consumption;
- R is the number of residential accounts;
- RUR is the residential use rate;

- i indexes 20 appliances (space heating, space cooling, water heater, refrigerator, freezer, clothes washer, clothes dryer, dishwasher, range, lighting and so on);
- j indexes four housing types (single/duplex, row, apartment and other); and
- k indexes four regions (Lower Mainland, Northern Region, South Interior and Vancouver Island).

The residential energy forecast is determined by forecasting the number of accounts multiplied by the rate of use. The forecast in the growth of the number of residential accounts is based on a forecast of housing starts. The number of residential accounts is then the current number of residential accounts plus the forecast of additional accounts to be added each year.

The use rates forecast come from appliance saturation rates and unit energy consumption per end use (as well as their trends) to determine the average use rate by dwelling type, by region and changes in these rates over time.

Appliance saturation rates and unit energy consumption come from the Residential End-Use Energy Planning System model (REEPS) as updated using the 2006 Residential End Use Survey (REUS) and the Conservation Potential Review (CPR).

The residential Statistically Adjusted End Use (SAE) Models were also run in parallel with the REEPs model. The general framework of the SAE model is described in the commercial section following. This description also applies to the SAE models for the residential sector. Note that for the residential SAE model some of the economic drivers are different to the commercial sector economic drivers. The residential sector drivers include: disposable income, household sizes and weather as non-economic drivers.

A1.2. Commercial Forecast Methodology

Distribution

BC Hydro forecasts commercial distribution sales[6] by using the Statistically Adjusted End-Use model (SAE). This model incorporates end-use information, economic data, weather data and market data to construct regional forecasts.

The statistically adjusted end-use modeling framework begins by defining energy use (Use_m) in year and month (m) as the sum of energy used by heating equipment ($Heat_m$), cooling equipment ($Cool_m$), and other equipment ($Other_m$). Formally,

(A1.6) $$USE_m = Heat_m + Cool_m + \text{Other}_m$$

Equation (A1.4) can be shown in a regression form, as shown below in (A1.5):

(A1.7) $$USE_m = a + b_1 \times XHeat_m + b_2 \times XCool_m + b_3 \times XOther_m + \varepsilon_m$$

[6] The commercial sales are composed of commercial general rate class, transmission and BC Hydro Own Use, Irrigation, Street-lighting. The SAE model is used to forecast the sales for the commercial general rate class. The sales forecast for BC Hydro Own Use, Irrigation, and Street-lighting is done using historical sales data and trend analysis.

Here, $XHeat_m$, $XCool_m$, and $XOther_m$ are explanatory variables constructed from end-use information, economic drivers, dwelling data and weather data and ε_m is the error term for the regression. The estimated model can then be thought of as a statistically adjusted end-use model, where the estimated coefficients are the adjustment factors or the relative contribution by the major end uses to the total consumption.

The equations used to construct these X-variables are simplified end-use models, and the X-variables are the estimated usage levels for each of the major end uses based on the end use models.

Constructing XHeat. Space heating energy is specified to depend on the following types of variables:

- Heating degree days (weather),
- Heating equipment saturation levels (fraction of building stock for the commercial sector),
- Assumptions about heating equipment operating efficiencies,
- Average number of days in the billing cycle for each month,
- Economic variables include employment, retail sales and commercial output.

The heating variable is represented as the product of an annual equipment index and a monthly usage multiplier. That is,

(A1.8) $$XHeat_m = HeatIndex_m \times HeatUse_m$$

where, $XHeat_m$ is estimated heating energy use in a year (y) and month (m), $HeatIndex_y$ is the annual index of heating equipment in the year (y), and $HeatUse_m$ is the monthly usage multiplier.

The sub equation for $HeatIndex_m$ in (A1.8) is:

$$HeatIndex_y = \sum_{spaceheating} EndUseEnergy_{e,BaseYear} \times \frac{\left(Share_y / Eff_y \right)}{\left(Share_{BaseYear} / Eff_{BaseYear} \right)}$$

Where, y means year, e refers to the category of space heating, Share means saturation level of space heating, Eff means efficiency level of space heating based on Energy Information Administration (EIA) data, and Base Year means the year of the BC Hydro end use survey.

The sub equation for $XHeatUse_m$ in (A1.8) is:

$$HeatUse_m = Commercial\ GDPIndex^{\beta 1}_m \times EmploymentIndex^{\beta 2}_m \times RetailSalesIndex^{\beta 3}_m \times Heating\ Degree\ Days\ Index_m.$$

Where m refers to month specific values and the β values are the elasticities that apply to the various regional economic indices above (i.e., commercial GDP, employment, and retail sales) and small commercial sales. The economic indices for each variable are

developed based on a 12 month rolling average of the economic variable weighted by its average monthly value in the last historical year.

The heating equipment index (HeatIndex) depends on the space heating equipment saturation levels normalized by average operating efficiency levels. As a result, the index will increase over time if there are increases in heating equipment saturation levels, and will decrease over time if there are improvements in equipment and building efficiency levels. Heating system usage levels (HeatUse) are driven on a monthly basis by economic variables and non-economic factors, such as weather (Heating Degree Days).

Constructing XCool. The explanatory variable for cooling loads is constructed in a similar manner. The amount of energy used by cooling systems depends on the following types of variables:

- Cooling degree days (weather),
- Cooling equipment saturation levels (fraction of building stock for the commercial sector),
- Assumptions about cooling equipment operating efficiencies,
- Average number of days in the billing cycle for each month,
- Economic variables include employment, retail sales and commercial output.

The cooling variable is represented as the product of an equipment-based index and monthly usage multiplier. That is,

(A1.9) $$\mathrm{XCool}_m = \mathrm{CoolIndex}_m \times \mathrm{CoolUse}_m$$

where, $XCool_m$ is estimated cooling energy use in a year and month (m),

$CoolIndex_y$ is an index of cooling equipment for the year (y), and

$CoolUse_m$ is the monthly usage multiplier.

As with space heating, the cooling equipment index (CoolIndex) depends on the cooling equipment saturation levels normalized by average operating efficiency levels. As a result, the cooling index will increase over time if there are changes in cooling equipment saturation levels, and will decrease over time if there are improvements in equipment efficiencies or the thermal efficiency of buildings. Space cooling system usage levels (CoolUse) are driven on a monthly basis by several factors, including weather (Cooling Degree Days) and similar economic factors used to develop heating usage.

Constructing XOther. Monthly estimates of consumption for non-weather sensitive end uses can be derived in a similar fashion. Non-weather sensitive end-uses include lighting, refrigeration, cooking, clothes washing and drying, entertainment and other miscellaneous equipment. Based on end-use concepts, other sales are driven by:

- Appliance and equipment saturation levels,

- Appliance efficiency levels,
- Average number of days in the billing cycle for each month, and
- Economic factors

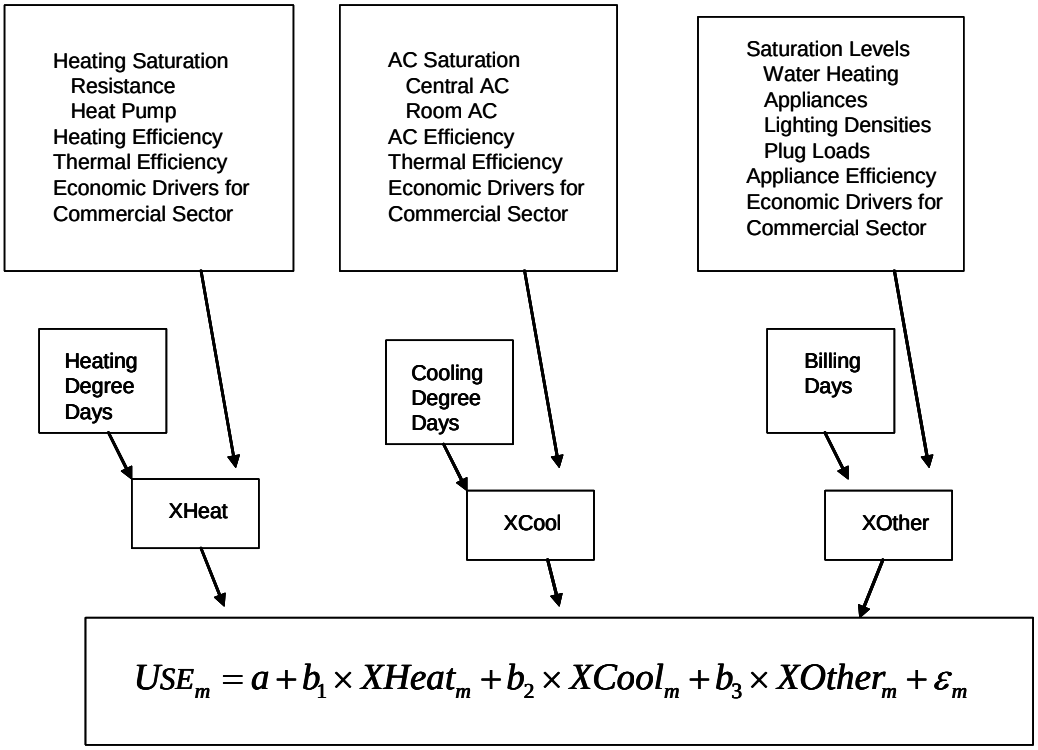
The explanatory variable for other uses is defined as follows:

(A1.10) $$XOther_m = OtherEqpIndex_m \times OtherUse_m$$

The first term on the right hand side of this expression ($OtherEqpIndex_y$) embodies information about appliance saturation and efficiency levels. The second term (OtherUse) captures the impact of changes in economic variables that impact use of other equipment. These economic variables are similar to those used for explaining heating and cooling.

The figure below summarized the inputs that are used in the construction of the regression variables (i.e. the predictor variables) for the commercial sector.

Figure A1.1 Statistically Adjusted End Use (SAE) Model



The main reason BC Hydro adopted the statistically adjusted end use model for the commercial sector is to enhance transparency. In the 2005 Forecast, the commercial sector load forecast was based on a regression approach using GDP as the main driver. Since the 2006 Forecast, BC Hydro has run the SAE models for the distribution class by the four regions. To investigate whether heating and cooling degree days should be included in the SAE models, multiple regressions were run to test the correlations. When HDD and CDD were included in the regional models, the degree of correlation greatly improved over the set of models without HDD and CDD.

Commercial Transmission

The commercial transmission energy forecast is developed using a Bottom-Up Account (BUA) methodology to reflect expected growth in the commercial transmission customers. Over the past two years a number of pipeline transportation companies have made proposals that would affect commercial transmission sales. BC Hydro will continue assessing if and when these loads should be included in the forecast.

A bottom up forecast is developed for the first 11 years of the forecast period. After that time period, the growth in the total commercial forecast is based on the following equation:

(A1.11) Sales Growth Rate = GDP Elasticity to Commercial Transmission Sales* Real GDP Growth Rate Forecast.

where:

- Real GDP Growth Rate Forecast is forecasted growth rate of real GDP as provided by the Conference Board of Canada.
- The GDP Elasticity of Commercial Transmission Sales is 0.39 based on a historical regression between commercial transmission sales and real GDP.

The regression model and the results of the regression are provided below. The commercial transmission regression model is based on the following expression

(A1.12) $CT = \alpha + \beta * GDP_t + \chi_1 * \text{binary variable} + \chi_2 * \text{binary variable}$

where:

- CT is commercial transmission sales
- α and β are the regression coefficients from a time series regression of commercial transmission sales on provincial GDP.
- The first binary variable χ_1 is used to account for the fact several oil and gas pumping stations started up in F2008. These stations account for about 45 per cent of the total commercial transmission growth between F2007 and F2008.
- The second binary variable χ_2 is used to adjust for the change in the BC Hydro billing system on commercial transmission sales. In 1996, BC Hydro undertook a signification reallocation of its customers between General Over and General Under 35 rate classes.

Model A1.10	**Model A1.10**
Estimation Method	OLS
Constant	309.9 (79.1)[7]
Independent X Variable	1.88 (0.65) (X = GDP)
Binary 1	119.81 (33.67) Binary for F2008
Binary 2	93.94 (31.62) Binary for F1996
Adjusted R-sq	0.85
Durbin-Watson	1.35
Autocorrelation Range (AR)	<1.82 or >0.72
Autocorrelation Detected?	No. DW is inconclusive

[7] Numbers in parenthesis are standard errors.

A1.3. Industrial Forecast Methodology

Industrial Distribution

The industrial distribution energy forecast is developed using regression methods based on the following expression:

(A1.13) $$INDD = (e^{\alpha + \beta * T})*GDP$$

where:

- INDD is industrial distribution sales
- α and β are the regression coefficients from a time series regression of industrial distribution sales on provincial real GDP.
- e is exponential base
- T is a time trend variable

The results of the industrial distribution regression forecast are provided in the table below.

Model A1.11	Model A1.11
Estimation Method	OLS
Constant	3.57(0.017)[8]
Independent Trend Variable	-0.016(0.002)
Adjusted R-sq	0.82
Durbin-Watson	2.090
Autocorrelation Range (AR)	1.34 < or >1.01
Autocorrelation Detected?	No. DW is outside AR

The forecast as produced by estimated regression and adjustments to regression based results are provided in the table below.

Table A1.1 Adjustments to Industrial Distribution

Fiscal Year	Regression Forecast Industrial Distribution OLS	Adjustments to the Regression Forecast[1]	Final Forecast Industrial Distribution Forecast plus Adjustments
F2009	4,277	(150)	4,126
F2010	4,280	(80)	4,200
F2011	4,346	43	4,388

[8] Numbers in parenthesis are standard errors.

F2012	4,394	66	4,460
F2013	4,437	88	4,525
F2014	4,462	84	4,546
F2015	4,476	80	4,556
F2016	4,487	72	4,559
F2017	4,497	68	4,565
F2018	4,505	54	4,559
F2019	4,515	58	4,573
F2020	4,520	65	4,584
F2021	4,525	69	4,593
F2022	4,531	69	4,600
F2023	4,537	57	4,594
F2024	4,540	48	4,588
F2025	4,542	40	4,582
F2026	4,540	34	4,574
F2027	4,539	28	4,567
F2028	4,537	24	4,561
F2029	4,535	20	4,555

Notes:

1. Adjustments shown above reflect the total sum of the following individual: (i) reductions in energy sales for temporary shutdown of Canfor sawmills, (ii) Pine Beetle impacts, (iii) additional distribution load from oil and gas loads in North East B.C.; and (iii) adjustment to reflect the short term tracking of the between actual sales up to December 2008 for F2009 and projected sales.

Industrial Transmission

The methodology used in forecasting the industrial, transmission-voltage consumption incorporates expertise from many sources. Although the forecast is performed on a sector basis, the methodology within each is basically a three step process: 1) creation of consultant reports, 2) internal verification of the reports and 3) compilation and forecast. The consultant reports, used to develop the forestry, mining and oil and gas sector loads, are produced by independent industry experts. Most of the reports generated provide a long-term economic outlook for that sector and individual production forecasts for each account within that sector. Other reports, such as those used to develop the forecast for the oil and gas sector, provided a detailed description of major gas reserves in North East B.C. and generated future production of natural gas.

The verification phase begins with the receipt of the consultant report. The report is distributed and presented within BC Hydro and feedback is solicited from various groups within BC Hydro. The report's short to long-term industry picture is compared to those by other industry experts. And, the individual account projections are developed in conjunction with BC Hydro's Key Account Management and Transmissions Connections office. In addition, BC Hydro's Market Forecasting group provides information and intelligence provided by government offices. Through this process, the estimates initially produced by the sector consultants may be improved and updated to include the most current industry developments.

During the compilation and forecasting process, the preceding information is compiled and used to produce the account forecast. Information such as:

- historical loads, power factors, load factors, production forecasts, energy intensity factors (such as kWh/ unit of output)

- expansion and expected in-service dates
- perceived risk of projects and new loads
- notes with discussions with Key Account Managers and other contacts

are compiled to develop a forecast for each transmission account in the areas of forestry, coal & metal mining and oil & gas-compression and processing accounts.

For the other industrial sectors (chemicals and other categories of accounts such as government, transportation, ports and smaller oil and gas) forecasts are developed on account-by-account basis for the first 11 years of the forecast and then extended by growth rate in GDP and elasticity to GDP. The industrial transmission elasticity of GDP used to develop the forecasts for the chemical and the other remaining category are estimated to 0.71[9] and 0.78 respectively. The results of the regression models that determined this elasticity are provided in the tables below.

Chemical Sector

The following regression model was used to develop elasticity to GDP estimates for the transmission chemical sector.

(A1.14) Sales = α + β*GDP_t + χ_1*binary variable

Where

- Sales is the transmission sales to the chemical sector
- GDP is total provincial real output
- The binary variable accounts for loss of a large chemical customer in F2007

Model A1.12	**Model A1.12**
Estimation Method	OLS
Constant	534.4 (373.1)
Independent X Variable	8.65 (2.8) (X = GDP)
Binary 1	-337.3(118.5)
Adjusted R-sq	0.41
Durbin-Watson	1.299
Autocorrelation Range (AR)	<1.56 or >0.86
Autocorrelation Detected?	No. DW is inconclusive

Remaining Sector

The following regression model was used to develop elasticity to GDP estimates for the various customers that make up the remaining transmission sector.

[9] While the elasticity was estimated to be 0.71, BC Hydro used an elasticity of 0.355. The higher elasticity did not provide a profile of chemical sales that was directionally consistent with the pulp and paper sales.

(A1.15) Sales = $\alpha + \beta * GDP_t + \chi_1 * trend$

Where

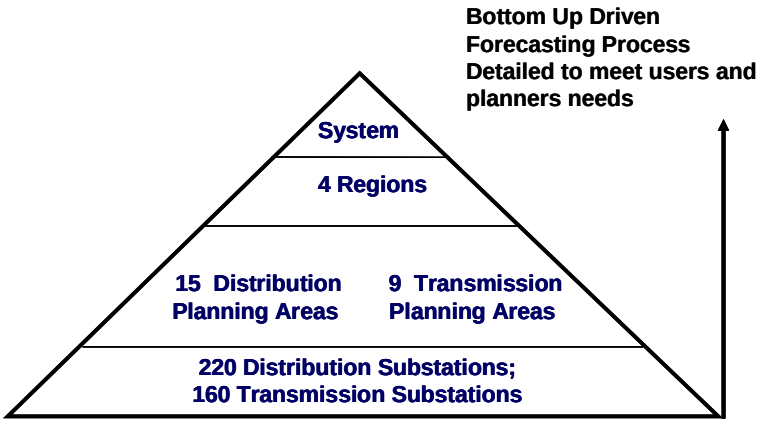
- Sales is sales for the remaining transmission sector
- GDP is total provincial real output
- Trend is a time trend variable

Model A1.13	Model A1.13
Estimation Method	OLS
Constant	95.03 (826.53)
Independent X Variable	5.34 (7.64) (X = GDP)
Trend	4.94(30.95)
Adjusted R-sq	0.78
Durbin-Watson	1.349
Autocorrelation Range (AR)	<1.56 or >0.86
Autocorrelation Detected?	No. DW is inconclusive

A1.4. Peak Forecast Methodology

The figure below shows that the bottom-up peak forecast methodology involves several steps for each of the distribution and transmission peak forecasts. The general description of the development stages in system peak forecast is provided following.

Figure A1.2 Peak Forecast Roll-up



The peak demand forecast is built up in three main stages, each incorporating several steps. First stage is the creation of the substation peak in MVA non-

coincident[10], second, the four main service region peak forecasts in MW are determined on a region coincident basis and third, the system peak in MW on a system coincident basis.

Stage 1: Substation Peak Forecast

The substation peak forecast is built up in several sub steps: 1 (a) first the weather normalized peak loads by substation/area and short-term forecasts are developed; 1 (b) second the substation peak forecast guidelines are developed from an econometric model for each planning area; 1(c) third an 11-year substation forecast for each substation is created; and, 1 (d) finally the substation and guideline peak forecast are averaged together.

The appropriate equations and description of the sub steps are provided below.

1 (a) Weather Normalized Substation Peak and Short-term Forecast

The equation below is the basis for a linear regression model that estimates the relationship between substation peak demand and temperature:

(A1.16) $KVA = \alpha + \beta * min$

where:

- KVA is the metered peak load; and
- min is the minimum mean temperature for the coldest day during the metered period.
- α and β are the regression coefficients from a time series regression of peak substation demands on temperatures.

Using the estimated regression coefficients, the weather-normalized peak is then calculated based on the design day temperature for that substation[11]:

(A1.17) $NKVA = \alpha + \beta * designmin$

where:

- NKVA is weather-normalized peak; and
- designmin is the design temperature for the substation.

The first step involves estimating a relationship between substation peak demand and temperature and determining weather normalized substation peak for each substation for the previous winter. This is produced by equation A1.15. The weather normalized substation peak along with historical growth rates of substation peak demands, expected transfers of substation load and expected discrete load

[10] Non-coincident is defined in the glossary.
[11] A regression model using non-linear variables was also used for weather normalization.

additions or closures are used by BC Hydro Distribution planners to prepare a short-term forecast for each substation for the upcoming winter. The first step is completed with an estimate of the weather normalized peak for each substation for the base year or the most recent historical year.

1(b) Distribution Peak Guideline Forecast.

In the section sub step, a distribution substation peak guideline forecast is prepared for 15 planning areas for the first 11 years of the forecast period using the following forecasting and (econometric model) equation:

(A1.18) $SK_{it} = [\alpha_1 SFDHTG + \alpha_2 SFDNON + \alpha_3 MULTHTG + \alpha_4 MULNON + \alpha_5 U35E + \alpha_6 O35E]$

where:

- SK_{it} is the total substation peak for the i^{th} planning area;
- SFDHTG is the number of single-family electrically heated homes;
- SFDNON is the number of single-family non-electrically heated homes;
- MULTHTG is the number of multi-family electrically heated homes;
- MULTNON is the number of multi-family non-electrically heated homes;
- U35E is annual energy consumption General under 35 kW;
- O35E is annual energy consumption General over 35 kW;
- the coefficients α1, α2, α3, and α4 are kW contribution to the distribution peak per dwelling in area i, for the four dwelling types under normal temperature conditions; and the coefficients, α5 and α6 represent the increase in peak demand due to a one-kWh increase in the General rate class Under 35 and Over 35 kW energy consumption.

  The forecasting equation for the distribution peak guideline model is provided in equation A1.18. The guideline forecast provides the expected total substation growth from the base year for each planning area. The drivers of the guideline forecast are based on regional economic information such as housing starts and employment. The guideline forecast is provided to BC Hydro Distribution planners from Market Forecast without adjustments for specific capacity additions or transfers.

1(c) Long-term Substation Forecast

In the third sub-step, an eleven-year substation peak forecast is prepared for each substation using the guidelines, trends in substation growth, forecast load transfers between substations and larger substation load additions. During this step, BC Hydro planners may have additional and information or revised information from field engineers on expected increases or decreases on discrete customer loads as well as operational requirements for substations. This new information, along with the impact of the guideline forecast, may result in a change to the initial short-term forecast for each substation forecast from the first step. The long-term forecasts for each substation are summed up to fifteen planning region totals. These are the total long-term substation forecasts for each planning region.

1(d) Average of Long-term Substation Forecast and Guideline Forecast

The fourth sub step is the calculation of the blending or averaging of the long-term substation forecast and the guideline forecast for each of the 15 planning areas. Prior to the forecasts being averaged, the long-term substation peak forecast and the guideline are aggregated from 15 planning areas into four regional total substation forecasts. These sets substation forecasts (i.e. the long-term substation forecast and the peak guideline forecast) are then averaged together for each of the four service regions based on the following equation:

(A1.19) $$PK_{it} = \Sigma_{it}\ SK_{itGuideline} + SK_{i\ Substation\ Forecast}$$

Stage 2: Regional Peak Forecast

The regional peak is forecast developed using:

(A1.20) $$RPK_{jt} = \Sigma_j\ [PK_{it}*DCF_j*PF_j + TP_j*TCF_j*PF_j + OP_j*OCF_j]$$

where:

- DCF is the regional distribution peak coincidence factor;
- PF is the regional power factor for distribution and transmission;
- TP is the transmission peak; this is the aggregate of the transmission account peak forecast in each service region.
- TCF is the transmission coincident factor;
- OP is the other utility peak sales;
- OCF is the other utility coincident factor; and
- PK is the weighted average distribution substation forecast

A transmission peak forecast is prepared for each commercial and industrial transmission account using a bottom-up approach. This involves using the historical peak data, information from Key Account Managers and market information and industry reports.

Stage 3: System Coincident Peak Forecast

Finally, system coincident peak is created as the sum of coincidence-adjusted regional peaks and it includes transmission losses:

(A1.21) $$SPK = (1 + TL)*\Sigma_j\ RPK_{jt}\ *SCF_j$$

where:

- TL is the transmission loss factor; and
- SCF are the system coincidence factors for each of the four regions.

Appendix 2. Monte Carlo Methods

This Appendix describes the Monte Carlo model that is used to assess the uncertainty associated with BC Hydro's Load Forecast. The description includes a discussion of the methodology, assumptions and parameters of the model.

Load forecasting involves considerable uncertainty. The demand for electricity depends on a large number of factors which fluctuate widely with time and which are difficult to measure. Some of these factors include population, gross domestic product, weather, technology, energy conservation programs (DSM), alternate energy source options, the business climate experienced by major customers and the changing tastes and customers. The challenge of assessing the uncertainty of the load forecast is to quantify the way in which uncertainty in the major causal factors flows through to impact the resultant load.

To quantify load forecast uncertainty, BC Hydro uses a Monte Carlo model and Monte Carlo simulation techniques. The model and simulation analysis proceeds as follows:

- First, several major input variables or causal factors are identified. These are: economic growth (measured by GDP); price of electricity (electricity rates); the effectiveness of DSM, weather (measured by heating degree days) and elasticity of load (with respect to GDP and BC Hydro electricity rates).
- Second, probability distributions are assigned to each input variable and a model is specified that defines the mathematical relationship between the input variable and the output variables.
- Third, a large number of random samples are taken from the input probability distributions. The model is used, with each sample as input, to calculate a large number of simulations of the output variables. These simulations are used to construct probability distributions for the output variables.

The Monte Carlo model calculates the impact of the major causal factors that drive load. The model perturbs the Reference forecast by calculating the impacts for each of the causal factors. The impact factors are random variables. Each of the sectors - Residential, Commercial and Industrial - is perturbed separately, and has separate impact factors, but essentially the same methodology is used for all of them. The model is implemented in Microsoft EXCEL augmented with Palisade Corporation's @RISK software. Energy demand for each sector is computed by the following equation.

(A2.1) $$E_t = {}_0E_t \, I_t^P I_t^G I_t^W I_t^U I_t^D$$

Here ${}_0E_t$ is base case energy demand, E_t is perturbed energy demand, and the impact factors are identified by their superscripts; P for electricity price (rates), G for GDP, W for weather, U for residual error and D for DSM.

Equation (A2.1) is used to calculate the random variable for energy demand before DSM. A random variable for DSM savings is then calculated and subtracted to give energy after-DSM.

Impact of GDP Uncertainty: In order to assess the impact of uncertainty in future GDP, the base case GDP is perturbed. The base case GDP is denoted by ${}_0G_t$ and

the perturbed GDP is denoted by G_t. The perturbed GDP starts off being equal to the base case GDP in the first year. It then grows at a growth rate equal to the base case GDP growth rate (${}_0g_t$) plus a random perturbation growth rate (g_t). This random perturbation is a normally distributed random variable with zero mean and a standard deviation of 1.70%. That is:

(A2.2) $g_t \sim N(0,1.70\%)$

The perturbed GDP is calculated by:

(A2.3.) $G_t = G_{t-1} [1 + {}_0g_t + g_t]$.

The impact factor for GDP is then given by the following equation:

(A2.4) $I^G_t = \exp(\alpha \ln(G_t / {}_0G_t)) = (G_t / {}_0G_t)^{\alpha}$

where α_0 is the elasticity of load with respect to GDP.

Impact of Price Uncertainty (BC Hydro electricity rates): The calculation of the impact factor for price changes (I^P_t) is treated similarly. A random variable, the perturbed price P_t , is calculated starting from the base case price ${}_0P_t$. The perturbed price starts out being equal to the base case price in the initial year. It then grows at a rate equal to the base case growth rate plus a random perturbation. In the model, the random perturbation has a triangular distribution with parameters (-2.5%, 0, +2.5%). However, unlike the case of GDP, the impact of price change is assumed to take place with time lags. This assumption is made because it may take customers some time to adjust their consumption to price changes. Moreover, customer capital investments in response to electricity rate changes may have to be made which will cause a delay in demand response.

The time lagged effect of price changes is modeled by introducing different elasticities for price changes that occurred at different time periods in the past and by making these elasticities decline geometrically as they refer to times more remote from the present.

Let ε_k be the Elasticity of Load at time t with respect to a price change at time t-k , k=0,1,2,..., and let λ be a parameter such that $0 < \lambda < 1$. Assume that:

(A2.5) $\varepsilon_k = \varepsilon_0 \lambda^k$

It follows that as k increases (as one goes back in time from time t), the elasticity defined here goes to zero, because the lag parameter is less than one.

The model also offers the option of a linear phase in from short to long run elasticity over a specified number of years. The phase in option is not used in the 2008 Forecast, as the price (customer rate) elasticities have been revised to be -0.05 for each sector over both short-term and long-term, as listed in Table A2.1.

Table A2.1 gives the elasticity parameters used in the current Monte Carlo model.

Table A2.1. Elasticity Parameter for Monte Carlo Model

	Mean	Probability Distribution (a,b,c)
Short-term Price Elasticities		
Residential	-0.050	Triangular (-0.075, -0.05, -0.025)
Commercial	-0.050	Triangular (-0.075, -0.05, -0.025)
Industrial	-0.050	Triangular (-0.075, -0.05, -0.025)
Long-term Price Elasticities		
Residential	-0.050	Triangular (-0.075, -0.05, -0.025)
Commercial	-0.050	Triangular (-0.075, -0.05, -0.025)
Industrial	-0.050	Triangular (-0.075, -0.05, -0.025)
GDP Elasticity		
Residential	0.670	Triangular (0.470, 0.670, 0.870)
Commercial	0.780	Triangular (0.580, 0.780, 0.980)
Industrial	0.500	Triangular (0.300, 0.500, 0.700)

In Table A2.1, Triang(a,b,c) refers to a probability distribution known as a triangular distribution because its graph is a triangle. This distribution is zero for values of its random variable less than a or greater than c. It has a maximum (most probable) value at b.

Residual error: This factor incorporates the effect on load of other factors such as changes in technology, consumer taste, household structure, business type, and inter-regional differences. The residual error factor starts out at 1.00 in the base year and grows at a rate that is, in each year, a random variable with the triangular distribution. The impact factor is defined by the following equations:

(A2.6) $$I^U_t = I^U_{t-1}(1 + g^U_t) \qquad I^U_0 = 1$$

where g^U_t denotes a random variable with a triangular distribution. Again, the @RISK software allows the specification of probability distributions in the model.

Impact of Demand Side Management Uncertainty. The impact of uncertainty in energy savings due to DSM is treated separately from the other impacts. DSM savings are viewed as a random variable (S_t). This variable is subtracted from the previously calculated before DSM energy demand to yield an after-DSM forecast.

(A2.7) $$E_t^{after} = E_t^{before} - S_t$$

The variability of DSM, as represented by the random variable S_t, was not incorporated into any of the 2008 Forecast uncertainty bands as presented in this document.

Impact of Weather: Variations in weather are an important source of uncertainty in load. The weather impact is most important for the residential and commercial loads, so weather impact is modeled only for these sectors. In British Columbia, the impact of cold weather on residential heating load is the most important weather effect and is modeled using heating degree days (HDD). HDD is an indicator of how much energy is needed to heat housing up to a comfortable temperature. BC Hydro summer cooling load is much smaller, so the small effect of cooling degree days (CDD) is not modeled.

The weather analysis is based on the last 10 years of daily temperature data at Vancouver International Airport. For every day, the number of heating degree days is calculated by the formula: HDD=max(0, Daily Temperature -18). Then, the annual sum of HDD is calculated for each year.

A standard probability distribution of the Beta type was found to provide the best fit to this data. The Beta distribution has 4 parameters, and is written Beta(a1,a2,Min,Max). Min and max are the maximum and minimum, while a1 and a2 determine the shape of the distribution.

The weather impact factor is calculated by:

(A2.8) $$I^W_t = \exp\{ \varepsilon_W \log(HDD_t / 2{,}725) \}$$

where ε_W is the elasticity of Residential or Commercial load with respect to HDD. ε_W is estimated judgmentally to be 0.374 for Residential and 0.05 for Commercial. The number 2,725 is the mean value of HDD in the Lower Mainland as calculated from a 10-year rolling historical average.

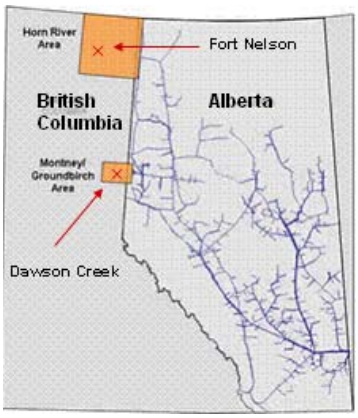
I^W_t is a random variable as are the other impact factors. However it differs from the other impact factors in that its properties are the same for all years. This is because weather in each year is independent of weather in all other years. Therefore the width of the 80% confidence region for I^W_t does not increase with time.

Appendix 3A. Northeast Oil and Gas

The oil and gas industry has significantly increased its interest in producing natural gas from NE B.C. Currently, oil and gas transmission customer loads comprises of only about five percent of total transmission load; within 20 years, BC Hydro expects this to grow 12 percent primarily due to activity in this region.

Figure A3.1. Map of Horn River Basin

Figure A3.2. Map of Fort Nelson and Dawson Creek



The industry's interest primarily lies in two regions of the province – Fort Nelson and Dawson Creek. Fort Nelson area is located within BC Hydro's service territory, but is integrated with the Alberta electricity system. Both regions are rich in natural gas that exist in sedimentary basins that until recently were uneconomic to produce because of the basins' low reservoir porosity and permeability. However, new drilling methods have been developed that fracture the sedimentary rock layers thereby freeing the gas. This technology was developed in similar basins in the U.S.; the gas is termed unconventional gas. The Fort Nelson region is believed to contain among the largest reserves of gas in North America.

Table A3.1 below provides the Reference load forecast for oil and gas load before DSM and rate impacts in the Fort Nelson Area.

Table A3.1. 2008 Annual and Incremental Reference (Mid) Load Forecasts for Oil and Gas Loads Before DSM and Rate Impacts in the Fort Nelson Area

	2008 Annual Total Reference Oil and Gas Load Forecast Fort Nelson Area (GWh)	2007 Annual Total Reference Oil and Gas Load Forecast Fort Nelson Area (GWh)	2008 Annual Incremental Total Reference Oil and Gas Load Forecast Fort Nelson Area (GWh)
	A	B	(A-B)
Forecast			
F2009	120	73	46
F2010	145	73	72
F2011	171	73	98
F2012	216	73	143
F2013	328	73	255
F2014	401	73	328
F2015	507	73	434
F2016	579	73	506
F2017	626	73	553
F2018	666	73	592
F2019	693	74	619
F2020	744	74	670
F2021	785	75	710
F2022	785	75	710
F2023	785	76	709
F2024	785	76	709
F2025	785	77	708
F2026	785	77	708
F2027	785	78	707
F2028	785	78	707
F2029	785		

More specifically, industry refers to the Fort Nelson play as Horn River and the gas as shale gas. The Dawson Creek play is more commonly referred to as the Montney; the gas is called tight. The technology for producing unconventional gas in the Horn River and Montney regions is still evolving towards lower costs, and greater field productivity.

There are four main reasons why BC Hydro updated its load forecast for oil and gas in NE B.C. These reasons are outlined as follows:

- When the 2007 Forecast was developed, the benchmark price for natural gas at

Henry Hub was around US$7 per million British thermal units (MMBtu). However, in the summer of 2008, market natural gas prices had increased to US$12/MMBtu. This rise in price created considerably more interest in unconventional NE B.C. gas development.

- Land sales in NE BC significantly increased during 2008 signaling that there could be a strong potential for future development of natural gas reserves in the region.

- Producer interest prior to the spring of 2008 was primarily from conventional gas producers. In subsequent months, several gas producers engaged in discussions with BC Hydro for electrical service. This included a draft interconnection request for service to the Horn River Basin for 20 to 40 MW, with an ultimate load of 100 to 120 MW.

- BC Hydro also became informed by way of reports of technological gains that were occurring in the industry, which would enhance the development of natural gas from NE B.C. These developments include a greater use of horizontal drilling, aggressive fracturing, and improved economies of scale in regional gas field development.

The confidence is signalled in the amount of money that producers have expended in drilling rights. In 2008, the government of BC sold $2.6 billion dollars of land drilling rights; most of the parcels of land were in the Horn River and Montney plays.

The updated forecast involved an iteration of top down and bottom up methodologies. Independent consultants' estimates on future gas production and total recoverable volumes in the Horn River and Montney regions were used in a regional top-down model. The bottom up approach, involved the collection of information provided by potential customers and other industry and government sources. The results from both approaches were integrated into a single forecast by region for inclusion in the load forecast update.

Appendix 3B. Electric Powered Vehicles

Renewed interest in electric vehicles (EVs) has been lead in part by record-high oil prices in early 2008, and growing concerns over Greenhouse Gas emissions and climate change.

In the BC Government's Throne Speech of February 16th 2009, it was stated: "Electric plug-in vehicles and other technologies aimed at reducing fossil fuel dependency will place new demands on our electricity system. We can meet those demands and create jobs and opportunities for our citizens. Our government will build on its clean energy plan with new directions to B.C. Hydro and the British Columbia Utilities Commission."

BC Hydro CEO, Bob Elton, in his Opening Statement to the 2008 LTAP hearings (Transcript 2, p. 251) said "And as set out in the evidentiary update, three electrification scenarios in particular, electric plug-in vehicles, residential space heating and water heating, and oil and gas facilities, have been considered for study and potential inclusion in future load forecasts when these loads become more visible and quantifiable."

EVs and plug-in hybrids have many attractive features. They are more energy efficient and have a fuel cost advantage over gasoline vehicles. They have lower emissions of greenhouse gasses and smog precursors. Their operation is quieter and electric vehicles should have considerable benefits in terms of maintenance. Their use could drastically reduce North American dependence on outside oil.

Researchers, governments and environmentalists have been working for many years to study, design and implement electric vehicles. Now all major automobile manufacturers have announced plans to produce and sell electric vehicles by 2015.

There are of course disadvantages to EVs and obstacles to their rapid, large-scale introduction. Most presently designed EVs have a range that is limited by current battery technologies and economics. This limits the distance between charges; (40 miles between charging for the Chevy Volt). While the average daily commute in the U.S. and Canada is less than 40 miles, most car owners want the option of taking an occasional trip of several hundred miles or more. Consumer acceptance may also be a limiting factor to EV growth. In comparison to traditional cars, the majority of current EV designs may lack the size, the speed, the attractive appearance, as well as limited carrying capability both in terms of people and luggage.

The purchase price of current EVs is high compared to comparable gasoline-powered cars. For example, the Tesla roadster has an attractive performance and a single-charge range of 245 miles, but currently costs $109,000 USD.

For the large scale introduction of EVs, a widespread system of rapid charging facilities, and an infrastructure of repair facilities will also be required. Electric cars will have to prove their reliability and safety. The design, style and size of electric vehicles will have to be acceptable to the public. The development of improved cost effective battery technology is also important to EV introduction.

Finally, automobile manufacturers will also have to investment capital to mass-produce EVs.

Government support of EV will also play a role in their future development. This may occur in areas of assessing environmental advantages, contributions to national security and support of EV purchase programs.

If EVs succeed in capturing a large share of the market, there will be an impact on BC Hydro's load. Preliminary estimates indicate that if the entire fleet of light duty automobiles in BC in 2008 were to be replaced by EVs, BC Hydro's Load would increase by 9,000 GWh per year, an increase of more than 15%. Complete replacement of the 2028 fleet would increase load by 11,500 GWh per year, an increase of more than 18%. This could have a profound impact on BC Hydro's peak capacity requirements, depending on the time of day that EVs are charged.

However, large numbers of electric vehicles could be introduced into BC Hydro's system without changing peak load, provided that charging is done during off-peak hours. To encourage charging at this time, rate initiatives could be used. Smart meters and intelligent network technology could also facilitate the accommodation of electric vehicles.

It is most likely that the number of electric vehicles actually introduced will fall far short of complete fleet conversion, especially in the next ten years. Actual introduction will depend on many variables such as advances in technology, especially battery technology, consumer acceptance, government support, and the state of the economy as a whole.

As the eventual adoption of significant numbers of electric vehicles is a real possibility in the long-term, BC Hydro is studying this issue and its effects on future resource needs.

As stated in the 2008 LTAP Evidentiary Update: "BC Hydro should have several years of warning with respect to growing EPV load. Manufacturers would have to retool, and there would be North American orders and sales. BC Hydro is monitoring EPV production targets by manufacturers such as Nissan and General Motors. BC Hydro is participating in EPV research with Manitoba Hydro, Hydro Quebec and 34 other electric utilities in North America through the Electric Power Research Institute."

Appendix 3C. Fuel Switching

Users of energy often have the option of using different forms of energy. Fuel switching, either to electricity or away from electricity, may have an impact on BC Hydro's load forecast. This section will briefly consider some kinds of fuel switching, none of which are included in the current load forecast, but which will be considered for inclusion in future forecasts.

The 2008 LTAP Evidentiary Update states that " to be prepared to meet future customer electricity requirements, BC Hydro is monitoring potential new loads that may result from future greenhouse gas (GHG)–related legislation, regulations and policy, new technologies and demographic trends. These prospective loads are not included in the mid 2008 load forecast, but have been considered as scenarios for study and potential inclusion in future load forecasts when these loads become more visible and quantifiable."

The broad themes of fuel switching scenarios are as follows:

Gasoline to Electricity – electric vehicles

There is the potential for a shift in the fuel used to power motor vehicles, away from gasoline to electricity. This could cause significant electricity load increases in the next 20 years. This is discussed in more detail in the previous chapter: Appendix 3B.

Space Heating – Electricity to Natural Gas or Natural Gas to Electricity

The two fuels most used for space heating in BC are natural gas and electricity. The natural gas requirement for residential gas heating served by Terasen is 42 PJ per year, which on an energy-equivalent basis is approximately 12,000 GWh per year of electricity consumption. This compares to approximately 3,000 GWh per year of current BC Hydro residential electric space heating. The choice of fuel that is most economical for space heating in homes, commercial buildings and various kinds of industrial heating depends on the relative efficiency of electric and natural gas heating systems, differences between the building shells and ducting requirements required for the types of space heating, and in the long term: future prices of natural gas and electricity.

Another key issue is the environmental effects of natural gas as a fuel for space heating as compared to electricity. Natural gas production and combustion results in CO_2 and other greenhouse gas (GHG) emissions. Electricity generation using natural gas as a fuel also produces GHG emissions, whether the generation is domestic or external to BC. The overall level of GHG emissions with respect to space heating type was a subject of considerable debate in the 2008 LTAP Hearing, and will likely be the subject of a more fulsome technical review.

Legislation, regulation and policies aimed at reducing GHG emissions may also promote electricity as a low-GHG impact to alternative to burning fossil fuels. Future direction in these areas may also have implications for heating fuel choice. At his point, BC Hydro is not including the impact of additional fuel switching for space heating in its load forecast. BC Hydro will continue to study possible impacts on load due to switching of space heating fuels.

Electrification in Natural Gas production

There is a potential for additional use of electricity in the production of natural gas, especially in the compression of gas to enable its transportation by pipeline. This technology shift would take place most easily in new gas fields where new infrastructure is being built. The rapid development of new gas reserves in the Ft. Nelson region of north-east BC could mean significant increases in load due to natural gas compression. BC

Hydro has included such additional loads for NE natural gas in its 2008 Forecast. Refer to Appendix 3A for a summary of this load impact in the 2008 Forecast. Potential new oil and gas loads that may result from GHG regulations and policies, that may result in further fuel switching activity has not been reflected in the current load forecast.

Truck Stop Electrification

Many large trucks are equipped with extended cabs that provide living and sleeping accommodations for the drivers. To power these cabs, the truck's diesel engines are left running while the truck are stopped, using large quantities of diesel fuel and producing significant emissions of GHGs and other pollutants. Within British Columbia, it has been proposed that truck stops be fitted with equipment that would allow trucks to plug into the electric grid.

Diesel engines could then be turned off and cabs could be powered by electricity. The B.C. Climate Action Plan calls for electrification of truck stops and ports. A pilot program is in development in coordination with the BC government. BC Hydro will monitor the issue of possible load impact arising from truck stop electrification.

Port Electrification

When cargo ships, cruise ships and other large ocean-going ships dock in port, they continue to run their diesel engines in order to power their on-board facilities. These facilities may be extensive and use a significant amount of energy. Port electrification involves outfitting docks to allow ships to plug into the shore side electric grid, and thereby turn off their diesels engines. This would result in substantial savings of diesel fuel and large reductions of GHG and other emissions.

The B.C. Climate Action Plan calls for electrification of truck stops and ports. BC Hydro will follow the issue of possible load impact arising from port electrification.

Summary and Conclusion

The types of fuel switching considered in this section will continue to be of interest to BC Hydro. All except natural gas electrification are not included in the current Reference Forecast, but may be included in a future load forecast when more developments and information regarding these impacts is available.

Appendix 4. Forecast Tables

Table A4.1 shows the Regional non-coincident (MVA) and coincident peak (MW) forecast for distribution before DSM and rate impacts.

Table A4.2 shows the Regional non-coincident (MVA) and coincident peak (MW) forecast for transmission before DSM and rate impacts.

Table A4.3 shows the Domestic and Regional peak forecast before DSM and rate impacts.

Table A4.4 shows the total distribution, transmission and domestic system peak forecast before DSM and rate impacts.

Table A4.5 summarizes BC Hydro's 2008 Reference Load Forecast before DSM and rate impacts.

Table A4.6 summarizes BC Hydro's 2008 Reference Load Forecast before DSM with rate impacts.

Table A4.7 summarizes BC Hydro's High Load Forecast resulting from the Monte Carlo uncertainty analysis before DSM and rate impacts.

Table A4.8 summarizes BC Hydro's Low Load Forecast resulting from the Monte Carlo uncertainty analysis before DSM and rate impacts.

Table A4.9 summarizes BC Hydro's High Load Forecast resulting from the Monte Carlo uncertainty analysis before DSM with rate impacts.

Table A4.10 summarizes BC Hydro's Low Load Forecast resulting from the Monte Carlo uncertainty analysis before DSM with rate impacts.

Table A4.1. Regional Non-Coincident and Coincident Distribution Peaks Before DSM and Rate Impacts

	Lower Mainland		Vancouver Island		South Interior		Northern Region	
	Non-Coinc. Peak (MVA)	Coinc. Peak (MW)	Non-Coinc. Peak (MVA)	Coinc. Peak (MW)	Non-Coinc. Peak (MVA)	Coinc. Peak (MW)	Non-Coinc. Peak (MVA)	Coinc. Peak (MW)
Actual								
F2008	4,327	4,048	1,822	1,667	994	944	737	670
Weather-Normalized Actual								
F2008	4,705	4,402	1,960	1,808	1,050	997	791	719
Forecast (Weather-Normalized)								
F2009	4,821	4,510	2,004	1,849	1,090	1,035	824	749
F2010	4,993	4,671	2,034	1,876	1,101	1,046	872	792
F2011	5,003	4,681	2,065	1,905	1,125	1,068	917	833
F2012	5,105	4,776	2,089	1,927	1,138	1,081	928	843
F2013	5,173	4,840	2,118	1,954	1,147	1,089	928	843
F2014	5,231	4,894	2,137	1,971	1,155	1,097	931	845
F2015	5,291	4,950	2,156	1,988	1,161	1,102	932	847
F2016	5,355	5,010	2,175	2,006	1,165	1,106	933	848
F2017	5,415	5,066	2,193	2,023	1,168	1,110	934	848
F2018	5,474	5,121	2,214	2,042	1,172	1,113	937	851
F2019	5,533	5,176	2,231	2,058	1,177	1,117	940	854
F2020	5,647	5,283	2,257	2,082	1,192	1,132	947	860
F2021	5,764	5,392	2,283	2,106	1,209	1,148	954	866
F2022	5,882	5,503	2,309	2,130	1,225	1,163	961	872
F2023	6,004	5,617	2,335	2,154	1,241	1,179	968	879
F2024	6,128	5,733	2,362	2,179	1,258	1,195	975	885
F2025	6,254	5,851	2,389	2,204	1,275	1,211	982	891
F2026	6,383	5,972	2,416	2,229	1,292	1,227	989	898
F2027	6,515	6,095	2,444	2,255	1,310	1,244	996	904
F2028	6,650	6,221	2,472	2,280	1,328	1,261	1,003	911
F2029	6,787	6,349	2,500	2,306	1,346	1,278	1,010	917
Growth Rates:								
5 years: F2008 to F2013	1.9%	1.9%	1.6%	1.6%	1.8%	1.8%	3.2%	3.2%
11 years: F2008 to F2019	1.5%	1.5%	1.2%	1.2%	1.0%	1.0%	1.6%	1.6%
21 years: F2008 to F2029	1.8%	1.8%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%

Notes:

1. Growth rates based on weather normalized actual peak.
2. Non-coinc. refers to non-coincident peak and coinc. refers to Regional Coincident peak.
3. Vancouver Island peak values include Gulf Island peak demand.

Table A4.2. Regional Non-Coincident and Coincident Transmission Peaks Forecast Before DSM and Rate Impacts

	Lower Mainland		Vancouver Island		South Interior		Northern Region	
	Non-Coinc. Peak (MW)	Coinc. Peak (MW)	Non-Coinc. Peak (MW)	Coinc. Peak (MW)	Non-Coinc. Peak (MW)	Coinc. Peak (MW)	Non-Coinc. Peak (MW)	Coinc. Peak (MW)
Actual								
F2008	636	465	567	418	361	227	1,088	717
Forecast								
F2009	640	441	527	398	375	259	1,022	714
F2010	679	468	532	401	383	265	1,022	714
F2011	647	446	513	387	405	280	1,078	753
F2012	650	447	464	350	462	320	1,077	752
F2013	656	452	464	350	471	326	1,182	825
F2014	663	456	465	351	478	330	1,294	904
F2015	668	460	467	352	478	331	1,338	935
F2016	659	454	461	348	468	324	1,314	918
F2017	728	501	448	338	469	324	1,234	862
F2018	735	506	491	370	470	325	1,236	863
F2019	736	507	489	369	471	326	1,235	862
F2020	738	508	489	369	488	337	1,208	844
F2021	740	510	489	369	506	350	1,182	825
F2022	742	511	489	369	524	362	1,156	807
F2023	744	513	489	369	543	375	1,131	790
F2024	746	514	489	369	562	389	1,106	772
F2025	749	516	488	369	583	403	1,082	755
F2026	751	517	488	369	604	417	1,058	739
F2027	753	519	488	369	626	432	1,035	723
F2028	755	520	488	368	648	448	1,012	707
F2029	758	522	488	368	671	464	990	692
Growth Rates:								
5 years: F2008 to F2013	0.6%	-0.6%	-3.9%	-3.5%	5.5%	7.5%	1.7%	2.8%
11 years: F2008 to F2019	1.3%	0.8%	-1.3%	-1.1%	2.4%	3.3%	1.2%	1.7%
21 years: F2008 to F2029	0.8%	0.5%	-0.7%	-0.6%	3.0%	3.5%	-0.4%	-0.2%

Notes:

1. Non-coinc. refers to non-coincident peak and coinc. refers to Regional Coincident peak.

Table A4.3. Domestic System and Regional Peak Forecast Before DSM and Rate Impacts

	Lower Mainland (MW)	Vancouver Island (MW)	South Interior (MW)	Northern Region (MW)	Domestic System (MW)	Vancouver Island with Trans. Losses (MW)
Actual						
F2008	4,733	2,085	1,346	1,387	9,530	2,191
Weather-Normalized Actual						
F2008	5,100	2,225	1,399	1,436	10,265	2,338
Forecast (Weather Normalized)						
F2009	5,174	2,247	1,494	1,463	10,450	2,358
F2010	5,369	2,278	1,511	1,506	10,748	2,390
F2011	5,365	2,293	1,548	1,586	10,881	2,394
F2012	5,468	2,277	1,600	1,595	11,036	2,378
F2013	5,538	2,304	1,615	1,668	11,228	2,406
F2014	5,599	2,322	1,627	1,749	11,406	2,425
F2015	5,660	2,341	1,633	1,781	11,528	2,445
F2016	5,715	2,354	1,630	1,765	11,580	2,459
F2017	5,819	2,361	1,634	1,710	11,646	2,466
F2018	5,881	2,412	1,638	1,714	11,772	2,519
F2019	5,938	2,427	1,643	1,716	11,854	2,534
F2020	6,047	2,451	1,670	1,704	12,007	2,559
F2021	6,159	2,475	1,697	1,691	12,163	2,584
F2022	6,273	2,499	1,725	1,680	12,324	2,609
F2023	6,389	2,523	1,754	1,668	12,488	2,634
F2024	6,507	2,548	1,784	1,657	12,656	2,659
F2025	6,628	2,572	1,814	1,647	12,828	2,685
F2026	6,752	2,598	1,845	1,637	13,004	2,712
F2027	6,878	2,623	1,876	1,627	13,184	2,738
F2028	7,006	2,649	1,909	1,618	13,368	2,765
F2029	7,137	2,675	1,942	1,609	13,556	2,792
Growth Rates:						
5 years: F2008 to F2013	1.7%	0.7%	2.9%	3.0%	1.8%	0.6%
11 years: F2008 to F2019	1.4%	0.8%	1.5%	1.6%	1.3%	0.7%
21 years: F2008 to F2029	1.6%	0.9%	1.6%	0.5%	1.3%	0.8%

Notes:

1. Regional peaks include distribution losses but exclude transmission losses, unless otherwise stated.
2. The Domestic Peak is defined in the Glossary.
3. Lower Mainland peak includes peak supply requirements to the City of New Westminster and supply requirements to Seattle City Lights.
4. South Interior peak includes peak supply requirements to Fortis BC and Northern includes Hyder
5. Peak forecasts and growth rates are on a weather-normalized basis.
6. The recorded Domestic peak for the winter of F2008 was 9,548 MW on January 28, 2008. The actual Domestic peak value as stated in the table has been reduced to account for losses associated with peak transfers to other utilities including Fortis BC and Seattle City Light.
7. Vancouver Island Peak with transmission losses is the Vancouver Island Regional peak before DSM adjusted for estimated transmission losses.
8. The Actual, Weather Normalized and Forecast peak values for all Vancouver Island peak values include the Gulf Island peak demand.

Table A4.4. Total Distribution Transmission and Domestic System Peak Forecast Before DSM and Rate Impacts

	Distribution	Transmission	Domestic System Peak
	Weather-Normalized Peak	Peak	Weather-Normalized Peak
	MW	MW	MW
Historical			
F2008	7,586	1,766	10,265
Forecast			
F2009	7,794	1,724	10,450
F2010	8,026	1,759	10,748
F2011	8,124	1,776	10,881
F2012	8,257	1,780	11,036
F2013	8,352	1,859	11,228
F2014	8,430	1,942	11,406
F2015	8,507	1,977	11,528
F2016	8,586	1,944	11,580
F2017	8,659	1,931	11,646
F2018	8,737	1,967	11,772
F2019	8,812	1,966	11,854
F2020	8,957	1,961	12,007
F2021	9,104	1,957	12,163
F2022	9,254	1,953	12,324
F2023	9,407	1,950	12,488
F2024	9,562	1,949	12,656
F2025	9,720	1,948	12,828
F2026	9,881	1,947	13,004
F2027	10,045	1,948	13,184
F2028	10,212	1,949	13,368
F2029	10,382	1,952	13,556
Growth Rates			
5 years: F2008 to F2013	1.90%	1.00%	1.80%
11 years: F2008 to F2019	1.40%	1.00%	1.30%
21 years: F2008 to F2029	1.50%	0.50%	1.30%

Notes:

1. Distribution peak includes distribution losses.
2. Domestic system includes total distribution peak, transmission peak, and supply requirements to the City of New Westminster and transmission losses.

LOAD FORECAST TABLES
Table A4.5-A4.10

Table A4.5. 2008 BC Hydro, Reference Load Forecast Before DSM and Rate Impacts

	BC Hydro Service Area Sales										Integrated System	
	Residential	Commercial	Industrial	Total BCH	Nwest Fortis BC	Total Domestic Sales	Firm Export	Total Firm Sales	Losses	Total Gross Requirement	Total Gross Requirement	Peak
	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(MW)
Actual												
F2004	15,899	14,151	18,725	48,775	1,185	49,960	313	50,273	4,778	55,051	54,756	9,911
F2005	15,620	14,362	19,635	49,618	1,169	50,787	301	51,088	4,642	55,731	55,437	9,762
F2006	16,241	14,721	19,936	50,898	1,235	52,133	321	52,454	5,167	57,621	57,296	9,617
F2007	16,853	15,105	19,469	51,427	1,400	52,828	311	53,139	5,138	58,277	57,982	10,371
F2008	17,462	15,439	18,737	51,639	1,363	53,002	311	53,313	5,720	59,034	58,735	9,861
Forecast												
F2009	17,394	15,812	18,260	51,466	1,289	52,755	311	53,066	5,284	58,350	57,991	10,793
F2010	17,900	16,168	18,843	52,911	1,389	54,300	311	54,611	5,426	60,037	59,671	11,091
F2011	18,295	16,541	19,228	54,065	1,455	55,520	311	55,831	5,549	61,380	60,917	11,224
F2012	18,646	16,976	19,325	54,948	1,507	56,455	313	56,767	5,648	62,416	61,900	11,379
F2013	19,057	17,368	19,763	56,187	1,555	57,742	311	58,053	5,773	63,826	63,187	11,571
F2014	19,322	17,766	21,088	58,176	1,600	59,776	311	60,087	5,941	66,028	65,306	11,749
F2015	19,653	18,122	21,390	59,165	1,622	60,786	311	61,097	6,040	67,137	66,301	11,871
F2016	19,983	18,489	20,813	59,286	1,640	60,926	313	61,239	6,078	67,317	66,403	11,923
F2017	20,378	18,814	21,071	60,263	1,654	61,917	311	62,228	6,178	68,406	67,441	11,989
F2018	20,638	19,155	21,300	61,094	1,671	62,765	311	63,076	6,262	69,339	68,331	12,114
F2019	20,962	19,518	21,282	61,762	1,688	63,450	311	63,761	6,339	70,100	69,063	12,197
F2020	21,292	19,899	21,142	62,333	1,705	64,038	313	64,351	6,411	70,762	69,671	12,349
F2021	21,683	20,258	20,653	62,594	1,717	64,311	311	64,623	6,462	71,085	69,950	12,506
F2022	21,970	20,673	20,708	63,352	1,732	65,084	311	65,395	6,546	71,941	70,805	12,666
F2023	22,335	21,105	20,676	64,116	1,747	65,863	311	66,174	6,635	72,809	71,671	12,830
F2024	22,692	21,569	20,712	64,973	1,765	66,738	313	67,050	6,731	73,781	72,643	12,998
F2025	23,113	21,992	20,743	65,847	1,777	67,624	311	67,936	6,828	74,764	73,625	13,170
F2026	23,393	22,444	20,769	66,605	1,793	68,399	311	68,710	6,913	75,623	74,484	13,346
F2027	23,739	22,908	20,795	67,442	1,809	69,251	311	69,562	7,007	76,569	75,430	13,526
F2028	24,088	23,424	20,825	68,336	1,827	70,163	313	70,476	7,108	77,584	76,445	13,711
F2029	24,490	23,988	20,856	69,334	1,838	71,172	311	71,483	7,219	78,702	77,564	13,899
Growth Rates:												
5 yrs F2008-F2013	1.8%	2.4%	1.1%	1.7%	2.7%	1.7%	0.0%	1.7%	0.2%	1.6%	1.5%	3.3%
11 yrs F2008-F2019	1.7%	2.2%	1.2%	1.6%	2.0%	1.6%	0.0%	1.6%	0.9%	1.6%	1.5%	2.0%
21 yrs F2008-F2029	1.6%	2.1%	0.5%	1.4%	1.4%	1.4%	0.0%	1.4%	1.1%	1.4%	1.3%	1.6%

Table A4.6 2008 BC Hydro, Reference Load Forecast Before DSM with Rate Impacts

	BC Hydro Service Area Sales										Integrated System	
	Residential	Commercial	Industrial	Total BCH	Nwest Fortis BC	Total Domestic Sales	Firm Export	Total Firm Sales	Losses	Total Gross Requirement	Total Gross Requirement	Peak
	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(MW)
Actual												
F2004	15,899	14,151	18,725	48,775	1,185	49,960	313	50,273	4,778	55,051	54,756	9,911
F2005	15,620	14,362	19,635	49,618	1,169	50,787	301	51,088	4,642	55,731	55,437	9,762
F2006	16,241	14,721	19,936	50,898	1,235	52,133	321	52,454	5,167	57,621	57,296	9,617
F2007	16,853	15,105	19,469	51,427	1,400	52,828	311	53,139	5,138	58,277	57,982	10,371
F2008	17,462	15,439	18,737	51,639	1,363	53,002	311	53,313	5,720	59,034	58,735	9,861
Forecast												
F2009	17,393	15,811	18,259	51,463	1,289	52,752	311	53,063	5,284	58,346	57,987	10,792
F2010	17,831	16,106	18,770	52,707	1,383	54,090	311	54,402	5,405	59,806	59,440	11,047
F2011	18,167	16,425	19,094	53,687	1,445	55,131	311	55,442	5,511	60,953	60,490	11,144
F2012	18,485	16,829	19,158	54,472	1,494	55,965	313	56,278	5,600	61,878	61,362	11,279
F2013	18,855	17,184	19,554	55,593	1,538	57,132	311	57,443	5,712	63,155	62,516	11,446
F2014	19,077	17,540	20,819	57,436	1,580	59,016	311	59,327	5,866	65,193	64,470	11,596
F2015	19,365	17,857	21,077	58,300	1,598	59,898	311	60,209	5,952	66,161	65,325	11,694
F2016	19,649	18,180	20,465	58,293	1,613	59,906	313	60,219	5,977	66,195	65,281	11,719
F2017	19,998	18,463	20,678	59,139	1,623	60,763	311	61,074	6,063	67,137	66,172	11,761
F2018	20,210	18,758	20,858	59,825	1,636	61,461	311	61,773	6,133	67,905	66,898	11,858
F2019	20,527	19,112	20,840	60,479	1,653	62,132	311	62,443	6,208	68,651	67,614	11,938
F2020	20,849	19,486	20,703	61,038	1,670	62,708	313	63,021	6,279	69,300	68,209	12,088
F2021	21,233	19,837	20,224	61,294	1,682	62,976	311	63,287	6,329	69,616	68,480	12,241
F2022	21,514	20,244	20,278	62,036	1,696	63,732	311	64,043	6,411	70,454	69,318	12,398
F2023	21,871	20,667	20,247	62,784	1,711	64,495	311	64,806	6,497	71,304	70,166	12,558
F2024	22,221	21,121	20,281	63,623	1,728	65,351	313	65,664	6,591	72,256	71,118	12,723
F2025	22,632	21,535	20,312	64,479	1,741	66,220	311	66,531	6,687	73,218	72,080	12,891
F2026	22,907	21,978	20,337	65,222	1,756	66,978	311	67,289	6,770	74,059	72,921	13,063
F2027	23,246	22,432	20,363	66,041	1,771	67,812	311	68,123	6,862	74,986	73,847	13,239
F2028	23,588	22,937	20,392	66,917	1,789	68,706	313	69,019	6,961	75,979	74,841	13,419
F2029	23,981	23,490	20,423	67,894	1,800	69,694	311	70,005	7,070	77,075	75,937	13,604
Growth Rates:												
5 yrs F2008-F2013	1.5%	2.2%	0.9%	1.5%	2.4%	1.5%	0.0%	1.5%	0.0%	1.4%	1.3%	3.0%
11 yrs F2008-F2019	1.5%	2.0%	1.0%	1.4%	1.8%	1.5%	0.0%	1.4%	0.7%	1.4%	1.3%	1.8%
21 yrs F2008-F2029	1.5%	2.0%	0.4%	1.3%	1.3%	1.3%	0.0%	1.3%	1.0%	1.3%	1.2%	1.5%

Table A4.7 2008 BC Hydro, High Load Forecast Before DSM and Rate Impacts

Fiscal Year	BC Hydro Service Area Sales										Integrated System	
	Residential	Commercial	Industrial	Total BCH	Nwest Fortis BC	Total Domestic Sales	Firm Export	Total Firm Sales	Losses	Total Gross Requirement	Total Gross Requirement	Peak
	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(MW)
Actual												
F2004	15,899	14,151	18,725	48,775	1,185	49,960	313	50,273	4,778	55,051	54,756	9,911
F2005	15,620	14,362	19,635	49,618	1,169	50,787	301	51,088	4,642	55,731	55,437	9,762
F2006	16,241	14,721	19,936	50,898	1,235	52,133	321	52,454	5,167	57,621	57,296	9,617
F2007	16,853	15,105	19,469	51,427	1,400	52,828	311	53,139	5,138	58,277	57,982	10,371
F2008	17,462	15,439	18,737	51,639	1,363	53,002	311	53,313	5,720	59,034	58,735	9,861
Forecast												
F2009	17,850	16,045	18,416	52,311	1,289	53,600	311	53,911	5,373	59,285	58,917	10,965
F2010	18,419	16,511	19,083	54,012	1,389	55,401	311	55,712	5,541	61,253	60,873	11,315
F2011	18,905	16,988	19,541	55,434	1,455	56,889	311	57,200	5,692	62,892	62,393	11,496
F2012	19,305	17,507	19,695	56,507	1,507	58,013	313	58,326	5,811	64,137	63,541	11,681
F2013	19,781	17,990	20,195	57,967	1,555	59,521	311	59,833	5,957	65,790	65,029	11,909
F2014	20,116	18,470	21,603	60,188	1,600	61,789	311	62,100	6,149	68,248	67,353	12,117
F2015	20,275	19,018	22,096	61,389	1,622	63,011	311	63,322	6,264	69,586	68,469	12,259
F2016	20,901	19,349	21,415	61,665	1,640	63,306	313	63,618	6,324	69,942	68,648	12,326
F2017	21,374	19,746	21,725	62,846	1,654	64,500	311	64,811	6,444	71,255	69,811	12,411
F2018	21,685	20,162	22,001	63,848	1,671	65,519	311	65,830	6,546	72,377	70,793	12,551
F2019	22,061	20,575	22,018	64,655	1,688	66,343	311	66,654	6,638	73,292	71,602	12,645
F2020	22,458	21,051	21,912	65,422	1,705	67,127	313	67,440	6,730	74,170	72,286	12,813
F2021	22,918	21,480	21,434	65,832	1,717	67,550	311	67,861	6,798	74,659	72,616	12,983
F2022	23,281	21,971	21,528	66,780	1,732	68,512	311	68,823	6,902	75,725	73,681	13,181
F2023	23,680	22,499	21,531	67,710	1,747	69,457	311	69,769	7,008	76,776	74,731	13,378
F2024	24,105	23,036	21,596	68,737	1,765	70,501	313	70,814	7,122	77,936	75,890	13,579
F2025	24,295	23,737	21,825	69,857	1,777	71,634	311	71,946	7,240	79,185	77,139	13,799
F2026	24,931	24,092	21,719	70,742	1,793	72,535	311	72,847	7,344	80,190	78,144	14,002
F2027	25,371	24,651	21,766	71,788	1,809	73,597	311	73,908	7,460	81,369	79,322	14,224
F2028	25,778	25,237	21,824	72,840	1,827	74,667	313	74,980	7,577	82,557	80,511	14,440
F2029	26,251	25,891	21,875	74,017	1,838	75,855	311	76,167	7,708	83,875	81,829	14,663
Growth Rates:												
5 yrs F2008-F2013	2.5%	3.1%	1.5%	2.3%	2.7%	2.3%	0.0%	2.3%	0.8%	2.2%	2.1%	3.8%
11 yrs F2008-F2019	2.1%	2.6%	1.5%	2.1%	2.0%	2.1%	0.0%	2.1%	1.4%	2.0%	1.8%	2.3%
21 yrs F2008-F2029	2.0%	2.5%	0.7%	1.7%	1.4%	1.7%	0.0%	1.7%	1.4%	1.7%	1.6%	1.9%

Table A4.8 2008 BC Hydro, Low Load Forecast Before DSM and Rate Impacts

Fiscal Year	BC Hydro Service Area Sales										Integrated System	
	Residential	Commercial	Industrial	Total BCH	Nwest Fortis BC	Total Domestic Sales	Firm Export	Total Firm Sales	Losses	Total Gross Requirement	Total Gross Requirement	Peak
	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(MW)
Actual												
F2004	15,899	14,151	18,725	48,775	1,185	49,960	313	50,273	4,778	55,051	54,756	9,911
F2005	15,620	14,362	19,635	49,618	1,169	50,787	301	51,088	4,642	55,731	55,437	9,762
F2006	16,241	14,721	19,936	50,898	1,235	52,133	321	52,454	5,167	57,621	57,296	9,617
F2007	16,853	15,105	19,469	51,427	1,400	52,828	311	53,139	5,138	58,277	57,982	10,371
F2008	17,462	15,439	18,737	51,639	1,363	53,002	311	53,313	5,720	59,034	58,735	9,861
Forecast												
F2009	16,972	15,570	18,094	50,636	1,289	51,925	311	52,236	5,196	57,433	57,092	10,626
F2010	17,402	15,809	18,588	51,799	1,389	53,187	311	53,499	5,310	58,808	58,467	10,867
F2011	17,731	16,091	18,903	52,725	1,455	54,180	311	54,491	5,410	59,901	59,478	10,959
F2012	18,010	16,441	18,946	53,398	1,507	54,904	313	55,217	5,488	60,705	60,244	11,075
F2013	18,363	16,753	19,326	54,443	1,555	55,997	311	56,308	5,592	61,900	61,350	11,235
F2014	18,549	17,068	20,563	56,179	1,600	57,780	311	58,091	5,736	63,826	63,220	11,374
F2015	18,663	17,423	20,906	56,991	1,622	58,612	311	58,924	5,813	64,737	64,036	11,466
F2016	19,091	17,643	20,211	56,944	1,640	58,584	313	58,897	5,837	64,734	64,004	11,492
F2017	19,401	17,882	20,410	57,694	1,654	59,348	311	59,659	5,913	65,572	64,817	11,523
F2018	19,608	18,155	20,590	58,353	1,671	60,024	311	60,335	5,980	66,315	65,542	11,620
F2019	19,872	18,457	20,548	58,877	1,688	60,565	311	60,876	6,042	66,918	66,134	11,679
F2020	20,145	18,783	20,381	59,310	1,705	61,015	313	61,328	6,099	67,427	66,587	11,803
F2021	20,480	19,069	19,894	59,444	1,717	61,161	311	61,472	6,136	67,608	66,753	11,934
F2022	20,728	19,418	19,917	60,063	1,732	61,795	311	62,106	6,205	68,311	67,456	12,067
F2023	20,994	19,762	19,854	60,611	1,747	62,358	311	62,669	6,270	68,940	68,084	12,188
F2024	21,314	20,154	19,859	61,327	1,765	63,091	313	63,404	6,352	69,756	68,900	12,329
F2025	21,439	20,613	19,966	62,018	1,777	63,796	311	64,107	6,426	70,533	69,677	12,464
F2026	21,880	20,870	19,841	62,592	1,793	64,385	311	64,696	6,496	71,192	70,336	12,603
F2027	22,161	21,260	19,849	63,270	1,809	65,079	311	65,390	6,572	71,963	71,107	12,751
F2028	22,465	21,673	19,852	63,990	1,827	65,817	313	66,130	6,654	72,784	71,929	12,901
F2029	22,800	22,166	19,869	64,835	1,838	66,673	311	66,984	6,749	73,733	72,877	13,059
Growth Rates:												
5 yrs F2008-F2013	1.0%	1.6%	0.6%	1.1%	2.7%	1.1%	0.0%	1.1%	-0.5%	1.0%	0.9%	2.6%
11 yrs F2008-F2019	1.2%	1.6%	0.8%	1.2%	2.0%	1.2%	0.0%	1.2%	0.5%	1.1%	1.1%	1.6%
21 yrs F2008-F2029	1.3%	1.7%	0.3%	1.1%	1.4%	1.1%	0.0%	1.1%	0.8%	1.1%	1.0%	1.3%

Table A4.9 2008 BC Hydro, High Load Forecast Before DSM with Rate Impacts

Fiscal Year	BC Hydro Service Area Sales										Integrated System	
	Residential	Commercial	Industrial	Total BCH	Nwest Fortis BC	Total Domestic Sales	Firm Export	Total Firm Sales	Losses	Total Gross Requirement	Total Gross Requirement	Peak
	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(MW)
Actual												
F2004	15,899	14,151	18,725	48,775	1,185	49,960	313	50,273	4,778	55,051	54,756	9,911
F2005	15,620	14,362	19,635	49,618	1,169	50,787	301	51,088	4,642	55,731	55,437	9,762
F2006	16,241	14,721	19,936	50,898	1,235	52,133	321	52,454	5,167	57,621	57,296	9,617
F2007	16,853	15,105	19,469	51,427	1,400	52,828	311	53,139	5,138	58,277	57,982	10,371
F2008	17,462	15,439	18,737	51,639	1,363	53,002	311	53,313	5,720	59,034	58,735	9,861
Forecast												
F2009	17,849	16,044	18,415	52,308	1,289	53,597	311	53,908	5,373	59,281	58,913	10,964
F2010	18,348	16,447	19,009	53,804	1,383	55,187	311	55,499	5,520	61,018	60,638	11,270
F2011	18,773	16,869	19,404	55,046	1,445	56,491	311	56,802	5,653	62,454	61,955	11,414
F2012	19,138	17,355	19,524	56,017	1,494	57,511	313	57,824	5,761	63,584	62,989	11,577
F2013	19,572	17,800	19,982	57,354	1,538	58,892	311	59,204	5,895	65,098	64,337	11,780
F2014	19,860	18,235	21,328	59,423	1,580	61,003	311	61,314	6,071	67,385	66,490	11,960
F2015	19,979	18,740	21,773	60,492	1,598	62,090	311	62,401	6,173	68,574	67,457	12,076
F2016	20,551	19,025	21,056	60,632	1,613	62,245	313	62,558	6,218	68,776	67,482	12,114
F2017	20,976	19,378	21,320	61,674	1,623	63,297	311	63,609	6,325	69,933	68,489	12,173
F2018	21,235	19,743	21,544	62,522	1,636	64,158	311	64,469	6,411	70,880	69,297	12,283
F2019	21,603	20,148	21,561	63,312	1,653	64,965	311	65,276	6,501	71,776	70,087	12,375
F2020	21,992	20,614	21,457	64,063	1,670	65,733	313	66,046	6,591	72,637	70,753	12,538
F2021	22,442	21,034	20,989	64,465	1,682	66,147	311	66,458	6,657	73,115	71,072	12,704
F2022	22,797	21,515	21,081	65,393	1,696	67,089	311	67,400	6,759	74,160	72,115	12,898
F2023	23,188	22,032	21,084	66,304	1,711	68,015	311	68,326	6,863	75,189	73,143	13,091
F2024	23,604	22,558	21,147	67,309	1,728	69,037	313	69,350	6,974	76,324	74,278	13,288
F2025	23,790	23,244	21,372	68,406	1,741	70,147	311	70,458	7,090	77,548	75,501	13,503
F2026	24,413	23,592	21,268	69,273	1,756	71,029	311	71,340	7,192	78,532	76,485	13,702
F2027	24,844	24,139	21,314	70,297	1,771	72,068	311	72,380	7,306	79,686	77,639	13,919
F2028	25,243	24,713	21,371	71,327	1,789	73,116	313	73,429	7,421	80,850	78,803	14,130
F2029	25,706	25,353	21,421	72,480	1,800	74,280	311	74,591	7,549	82,140	80,094	14,348
Growth Rates:												
5 yrs F2008-F2013	2.3%	2.9%	1.3%	2.1%	2.4%	2.1%	0.0%	2.1%	0.6%	2.0%	1.8%	3.6%
11 yrs F2008-F2019	2.0%	2.4%	1.3%	1.9%	1.8%	1.9%	0.0%	1.9%	1.2%	1.8%	1.6%	2.1%
21 yrs F2008-F2029	1.9%	2.4%	0.6%	1.6%	1.3%	1.6%	0.0%	1.6%	1.3%	1.6%	1.5%	1.8%

Table A4.10 2008 BC Hydro, Low Load Forecast Before DSM with Rate Impacts

Fiscal Year	BC Hydro Service Area Sales										Integrated System	
	Residential	Commercial	Industrial	Total BCH	Nwest Fortis BC	Total Domestic Sales	Firm Export	Total Firm Sales	Losses	Total Gross Requirement	Total Gross Requirement	Peak
	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(GW.h)	(MW)
Actual												
F2004	15,899	14,151	18,725	48,775	1,185	49,960	313	50,273	4,778	55,051	54,756	9,911
F2005	15,620	14,362	19,635	49,618	1,169	50,787	301	51,088	4,642	55,731	55,437	9,762
F2006	16,241	14,721	19,936	50,898	1,235	52,133	321	52,454	5,167	57,621	57,296	9,617
F2007	16,853	15,105	19,469	51,427	1,400	52,828	311	53,139	5,138	58,277	57,982	10,371
F2008	17,462	15,439	18,737	51,639	1,363	53,002	311	53,313	5,720	59,034	58,735	9,861
Forecast												
F2009	16,971	15,569	18,093	50,633	1,289	51,922	311	52,233	5,196	57,429	57,089	10,625
F2010	17,335	15,748	18,516	51,599	1,383	52,982	311	53,294	5,289	58,583	58,241	10,824
F2011	17,607	15,978	18,771	52,356	1,445	53,801	311	54,112	5,372	59,484	59,061	10,881
F2012	17,854	16,299	18,782	52,935	1,494	54,429	313	54,742	5,440	60,182	59,721	10,977
F2013	18,169	16,576	19,122	53,867	1,538	55,405	311	55,717	5,533	61,250	60,700	11,114
F2014	18,313	16,851	20,301	55,465	1,580	57,045	311	57,356	5,663	63,019	62,413	11,226
F2015	18,390	17,168	20,600	56,158	1,598	57,756	311	58,067	5,729	63,796	63,095	11,295
F2016	18,771	17,347	19,872	55,990	1,613	57,603	313	57,916	5,739	63,655	62,925	11,296
F2017	19,039	17,549	20,030	56,618	1,623	58,241	311	58,553	5,803	64,356	63,601	11,304
F2018	19,201	17,778	20,162	57,141	1,636	58,777	311	59,088	5,856	64,945	64,172	11,374
F2019	19,459	18,074	20,121	57,654	1,653	59,307	311	59,618	5,917	65,535	64,751	11,432
F2020	19,727	18,393	19,958	58,078	1,670	59,748	313	60,061	5,973	66,034	65,193	11,553
F2021	20,055	18,673	19,481	58,209	1,682	59,891	311	60,202	6,009	66,211	65,356	11,682
F2022	20,297	19,015	19,503	58,815	1,696	60,511	311	60,822	6,077	66,899	66,044	11,812
F2023	20,558	19,352	19,442	59,352	1,711	61,063	311	61,374	6,141	67,515	66,659	11,930
F2024	20,871	19,735	19,447	60,053	1,728	61,781	313	62,094	6,220	68,314	67,458	12,068
F2025	20,994	20,185	19,551	60,730	1,741	62,471	311	62,782	6,293	69,075	68,219	12,200
F2026	21,426	20,437	19,429	61,292	1,756	63,048	311	63,359	6,361	69,721	68,864	12,336
F2027	21,701	20,818	19,437	61,956	1,771	63,727	311	64,039	6,437	70,475	69,619	12,481
F2028	21,998	21,223	19,440	62,661	1,789	64,450	313	64,763	6,517	71,280	70,424	12,627
F2029	22,326	21,706	19,456	63,488	1,800	65,288	311	65,599	6,609	72,208	71,353	12,783
Growth Rates:												
5 yrs F2008-F2013	0.8%	1.4%	0.4%	0.8%	2.4%	0.9%	0.0%	0.9%	-0.7%	0.7%	0.7%	2.4%
11 yrs F2008-F2019	1.0%	1.4%	0.6%	1.0%	1.8%	1.0%	0.0%	1.0%	0.3%	1.0%	0.9%	1.4%
21 yrs F2008-F2029	1.2%	1.6%	0.2%	1.0%	1.3%	1.0%	0.0%	1.0%	0.7%	1.0%	0.9%	1.2%

25.0 Reference: Exhibit B-1, p. 4-1
BC Hydro's 2008 Load Forecast Update

1.25.3 Please repeat Table 4-1 by showing all years between F2009 to F2028.

RESPONSE:

Please refer to the response to BCUC IR 1.25.2, Attachment 1, Table A4.6 (page 94 of 98 of BC Hydro's 2008 Load Forecast).

The mid load energy forecast provided in Table 4-1 is the same as the Integrated System Total Gross Requirement forecast provided in Table A4.6 rounded to the nearest 100 GWh/year. The mid peak demand forecast provided in Table 4-1 is the same as the Integrated System Peak forecast provided in Table A4.6 rounded to the nearest 50 MW.

25.0 Reference: Exhibit B-1, p. 4-1
BC Hydro's 2008 Load Forecast Update

1.25.4 Please provide, for comparison purposes, the following:

	2008 Peak (MW)	2009 Peak (MW)	2008 Energy (GWh)	2009 Energy (GWh)
2007 Annual Load Forecast				
2008 Annual Load Forecast				
Actual Normalized (2008) Annualized (2009)				

RESPONSE:

The requested data for the BC Hydro total integrated system is provided below. The energy and peak values are for fiscal years. Forecast values are net of planned DSM and rate impacts. The 2007 and 2008 Load Forecasts are consistent with the 2008 LTAP and 2008 LTAP Evidentiary Update submissions, respectively.

	F2008 Peak (MW)	**F2009 Peak (MW)**	**F2008 Energy (GWh)**	**F2009 Energy (GWh)**
2007 Annual Load Forecast	**10,761**	**10,835**	**58,196**	**58,948**
2008 Annual Load Forecast		**10,697**		**57,688**
Actual Normalized (F2008)	**10,597**		**58,056**	
Actual (F2009)*		**10,294**		**57,381**

*** Actual values for F2009 are preliminary.**

25.0 Reference: Exhibit B-1, p. 4-1
BC Hydro's 2008 Load Forecast Update

1.25.5 Please repeat the above table for energy sales disaggregated by customer group: residential, commercial and industrial.

RESPONSE:

Please refer to the response to BCUC IR 1.25.2, Attachment 1, Table A4.6 (page 94 of 98 of BC Hydro's 2008 Load Forecast).

25.0 Reference: Exhibit B-1, p. 4-1
BC Hydro's 2008 Load Forecast Update

1.25.6 Please provide the basis of BC Hydro's assumption that the continued deterioration of domestic customer demand is a relatively short-term market condition.

RESPONSE:

Please refer to the response to BCUC IR 1.25.1.1.

26.0 Reference: Exhibit B-1, pp. 4-3, 4-4
Figures 4-1 and 4-2

1.26.1 Please provide the data used to create Figures 4-1 and 4-2 in tabular format. Please also supply the data in a workable electronic spreadsheet.

RESPONSE:

With respect to Figures 4-1 through 4-4 of the Filing please refer to the following tables. A workable electronic spreadsheet is provided as Attachment 1.

Waneta Transaction: Supply Demand Outlook: Energy

Table for Figure 4-1

Operating | Planning

(GWh)		F2010	F2011	F2012	F2013	F2014	F2015	F2016	F2017	F2018	F2019	F2020	F2021	F2022	F2023	F2024	F2025	F2026	F2027	F2028	F2029
Existing and Committed Supply																					
Heritage Hydroelectric		47,852	47,372	47,148	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565
Heritage Thermal / Market Purchases		2,471	1,613	890	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230
Resource Smart		255	255	282	305	325	404	444	457	457	457	457	457	457	457	457	457	457	457	457	457
Revelstoke Unit 5		0	65	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Existing Purchase Contracts (including Alcan 2007 EPA)		7,147	7,542	7,607	7,301	7,229	7,229	7,229	7,152	6,824	6,246	6,139	6,073	6,073	6,073	6,073	6,073	6,073	6,073	6,073	6,073
F2006 Call		587	1587	1975	2072	2105	2116	2127	2127	2127	2127	2127	2127	2127	2127	2127	2127	2127	2127	2127	2085
Standing Offer Program		0	123	330	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436
Sub-total	**(a)**	58,311	58,557	58,362	56,040	56,020	56,110	56,161	56,098	55,769	55,191	55,084	55,018	55,018	55,018	55,018	55,018	55,018	55,018	55,018	54,976
Proposed New Supply																					
Bioenergy Call Phase I		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	**(b)**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Additional Non-Firm Energy Supply																					
Non Firm / Market Allowance		0	0	0	2,500	2,500	2,500	1,875	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	**(c)**	0	0	0	2,500	2,500	2,500	1,875	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Supply	**(d) = a + b + c**	58,311	58,557	58,362	58,540	58,520	58,610	58,036	56,098	55,769	55,191	55,084	55,018	55,018	55,018	55,018	55,018	55,018	55,018	55,018	54,976
Demand - Integrated System Total Gross Requirements																					
2008 High Load Forecast Before DSM	**(e)**	60,770	62,104	63,217	64,609	66,830	67,912	68,056	69,169	70,080	71,004	71,779	72,232	73,266	74,311	75,473	76,648	77,680	78,809	80,000	81,321
2008 Mid Load Forecast Before DSM	**(f)**	59,440	60,490	61,362	62,516	64,470	65,325	65,281	66,172	66,898	67,614	68,209	68,480	69,318	70,166	71,118	72,080	72,921	73,847	74,841	75,937
2008 Low Load Forecast Before DSM	**(g)**	58,111	58,876	59,508	60,423	62,110	62,737	62,506	63,176	63,716	64,224	64,639	64,729	65,369	66,022	66,763	67,512	68,161	68,885	69,682	70,552
Demand Side Management																					
DSM Option A - in the Operating Period		1,129	1,933	3,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	**(h)**	1,129	1,933	3,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Load after DSM																					
2008 High Load Forecast after DSM	**(e - h)**	59,641	60,171	60,217	64,609	66,830	67,912	68,056	69,169	70,080	71,004	71,779	72,232	73,266	74,311	75,473	76,648	77,680	78,809	80,000	81,321
2008 Mid Load Forecast after DSM	**(f - h)**	58,311	58,557	58,362	62,516	64,470	65,325	65,281	66,172	66,898	67,614	68,209	68,480	69,318	70,166	71,118	72,080	72,921	73,847	74,841	75,937
2008 Low Load Forecast after DSM	**(g - h)**	56,982	56,943	56,508	60,423	62,110	62,737	62,506	63,176	63,716	64,224	64,639	64,729	65,369	66,022	66,763	67,512	68,161	68,885	69,682	70,552
Surplus / Deficit																					
		F2010	**F2011**	**F2012**	**F2013**	**F2014**	**F2015**	**F2016**	**F2017**	**F2018**	**F2019**	**F2020**	**F2021**	**F2022**	**F2023**	**F2024**	**F2025**	**F2026**	**F2027**	**F2028**	**F2029**
2008 High Load Forecast Surplus / Deficit	**(d - e + h)**	**-1,300**	**-1,600**	**-1,900**	**-6,100**	**-8,300**	**-9,300**	**-10,000**	**-13,100**	**-14,300**	**-15,800**	**-16,700**	**-17,200**	**-18,200**	**-19,300**	**-20,500**	**-21,600**	**-22,700**	**-23,800**	**-25,000**	**-26,300**
2008 Mid Load Forecast Surplus / Deficit	**(d - f + h)**	**0**	**0**	**0**	**-4,000**	**-5,900**	**-6,700**	**-7,200**	**-10,100**	**-11,100**	**-12,400**	**-13,100**	**-13,500**	**-14,300**	**-15,100**	**-16,100**	**-17,100**	**-17,900**	**-18,800**	**-19,800**	**-21,000**
2008 Low Load Forecast Surplus / Deficit	**(d - g + h)**	**1,300**	**1,600**	**1,900**	**-1,900**	**-3,600**	**-4,100**	**-4,500**	**-7,100**	**-7,900**	**-9,000**	**-9,600**	**-9,700**	**-10,400**	**-11,000**	**-11,700**	**-12,500**	**-13,100**	**-13,900**	**-14,700**	**-15,600**

Waneta Transaction: Supply Demand Outlook: Capacity

Table for Figure 4-2

Operating | Planning

(MW)		F2010	F2011	F2012	F2013	F2014	F2015	F2016	F2017	F2018	F2019	F2020	F2021	F2022	F2023	F2024	F2025	F2026	F2027	F2028	F2029
Supply Requiring Reserves																					
Existing and Committed Supply																					
Heritage Hydroelectric		9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707
Heritage Thermal / Market Purchases		951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951
Resource Smart		17	51	68	109	127	142	156	156	156	156	156	156	156	156	156	156	156	156	156	156
Revelstoke Unit 5		0	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480
Existing Purchase Contracts (excluding Alcan 2007 EPA)		665	669	669	669	669	669	669	669	654	599	572	572	572	572	572	572	572	572	572	572
F2006 Call		61	122	127	135	135	138	138	138	138	138	138	138	138	138	138	138	138	138	138	127
Standing Offer Program		0	12	30	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Sub-total	(a)	11,402	11,992	12,032	12,090	12,108	12,125	12,139	12,139	12,124	12,069	12,042	12,042	12,042	12,042	12,042	12,042	12,042	12,042	12,042	12,031
Proposed New Supply																					
Bioenergy Call - Phase I		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	(b)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Supply Requiring Reserves	**(c) = a + b**	11,402	11,992	12,032	12,090	12,108	12,125	12,139	12,139	12,124	12,069	12,042	12,042	12,042	12,042	12,042	12,042	12,042	12,042	12,042	12,031
Reserves (see footnote)																					
14% of Supply Requiring Reserves	**(d) = 14% * c**	1,596	1,679	1,684	1,693	1,695	1,698	1,699	1,699	1,697	1,690	1,686	1,686	1,686	1,686	1,686	1,686	1,686	1,686	1,686	1,684
Minus: 400 MW market reliance		400	400	400	400	400	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Reserves	**(e) = d - 400**	1,196	1,279	1,284	1,293	1,295	1,298	1,699	1,699	1,697	1,690	1,686	1,686	1,686	1,686	1,686	1,686	1,686	1,686	1,686	1,684
Supply Not Requiring Reserves																					
Existing and Committed Supply																					
Alcan 2007 EPA		241	204	204	198	198	198	198	163	163	163	163	163	163	163	163	163	163	163	163	163
Sub-total	(f)	241	204	204	198	198	198	198	163	163	163	163	163	163	163	163	163	163	163	163	163
Supply Not Requiring Reserves	**(f)**	241	204	204	198	198	198	198	163	163	163	163	163	163	163	163	163	163	163	163	163
Effective Load Carrying Capability																					
Supply Requiring Reserves - Reserves + Supply Not Requiring Reserves	**(g) = c - e + f**	10,446	10,917	10,951	10,995	11,011	11,026	10,638	10,603	10,590	10,542	10,519	10,519	10,519	10,519	10,519	10,519	10,519	10,519	10,519	10,510
Demand - Integrated System Total Gross Requirements																					
2008 High Load Forecast Before DSM	**(h)**	11,295	11,441	11,619	11,830	12,021	12,157	12,217	12,294	12,422	12,536	12,720	12,911	13,104	13,300	13,502	13,708	13,916	14,129	14,344	14,568
2008 Mid Load Forecast Before DSM	**(i)**	11,047	11,144	11,279	11,446	11,596	11,694	11,719	11,761	11,858	11,938	12,088	12,241	12,398	12,558	12,723	12,891	13,063	13,239	13,419	13,604
2008 Low Load Forecast Before DSM	**(j)**	10,800	10,847	10,938	11,063	11,172	11,231	11,221	11,229	11,294	11,339	11,455	11,570	11,691	11,816	11,943	12,074	12,210	12,349	12,494	12,639
Demand Side Management																					
DSM Option A - in the Operating Period		233	361	531	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	**(k)**	233	361	531	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Load after DSM																					
2008 High Load Forecast after DSM	**(h - k)**	11,062	11,081	11,089	11,830	12,021	12,157	12,217	12,294	12,422	12,536	12,720	12,911	13,104	13,300	13,502	13,708	13,916	14,129	14,344	14,568
2008 Mid Load Forecast after DSM	**(i - k)**	10,815	10,783	10,748	11,446	11,596	11,694	11,719	11,761	11,858	11,938	12,088	12,241	12,398	12,558	12,723	12,891	13,063	13,239	13,419	13,604
2008 Low Load Forecast after DSM	**(j - k)**	10,568	10,486	10,407	11,063	11,172	11,231	11,221	11,229	11,294	11,339	11,455	11,570	11,691	11,816	11,943	12,074	12,210	12,349	12,494	12,639
Effective Load Carrying Capability Surplus / Deficit		**F2010**	**F2011**	**F2012**	**F2013**	**F2014**	**F2015**	**F2016**	**F2017**	**F2018**	**F2019**	**F2020**	**F2021**	**F2022**	**F2023**	**F2024**	**F2025**	**F2026**	**F2027**	**F2028**	**F2029**
2008 High Load Forecast Surplus / Deficit	**(g - h + k)**	**-600**	**-150**	**-150**	**-850**	**-1,000**	**-1,150**	**-1,600**	**-1,700**	**-1,850**	**-2,000**	**-2,200**	**-2,400**	**-2,600**	**-2,800**	**-3,000**	**-3,200**	**-3,400**	**-3,600**	**-3,850**	**-4,050**
2008 Mid Load Forecast Surplus / Deficit	**(l) = g - i + k**	**-350**	**150**	**200**	**-450**	**-600**	**-650**	**-1,100**	**-1,150**	**-1,250**	**-1,400**	**-1,550**	**-1,700**	**-1,900**	**-2,050**	**-2,200**	**-2,350**	**-2,550**	**-2,700**	**-2,900**	**-3,100**
2008 Low Load Forecast Surplus / Deficit	**(g - j + k)**	**-100**	**450**	**550**	**-50**	**-150**	**-200**	**-600**	**-650**	**-700**	**-800**	**-950**	**-1,050**	**-1,150**	**-1,300**	**-1,400**	**-1,550**	**-1,700**	**-1,850**	**-2,000**	**-2,150**
Additional Supply Potential																					
Canadian Entitlement	**(m)**	350	0	0																	
Surplus / Deficit with Canadian Entitlement	**(l + m)**	**0**	**150**	**200**	**-450**	**-600**	**-650**	**-1,100**	**-1,150**	**-1,250**	**-1,400**	**-1,550**	**-1,700**	**-1,900**	**-2,050**	**-2,200**	**-2,350**	**-2,550**	**-2,700**	**-2,900**	**-3,100**

Reserve Footnote

BC Hydro's reserves are based on 14% of total supply excludingthe existing and proposed Alcan contracts and the 400 MW market reliance (until F2015).

Waneta Transaction: Supply Demand Outlook: Energy

Table for Figure 4-3

Operating | Planning

(GWh)			F2010	F2011	F2012	F2013	F2014	F2015	F2016	F2017	F2018	F2019	F2020	F2021	F2022	F2023	F2024	F2025	F2026	F2027	F2028	F2029
Existing and Committed Supply																						
Heritage Hydroelectric			47,852	47,372	47,148	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565	42,565
Heritage Thermal / Market Purchases			2,208	1,194	402	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230	3,230
Resource Smart			255	255	282	305	325	404	444	457	457	457	457	457	457	457	457	457	457	457	457	457
Revelstoke Unit 5			0	65	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Existing Purchase Contracts (including Alcan 2007 EPA)			7,147	7,542	7,607	7,301	7,229	7,229	7,229	7,152	6,824	6,246	6,139	6,073	6,073	6,073	6,073	6,073	6,073	6,073	6,073	6,073
F2006 Call			587	1587	1975	2072	2105	2116	2127	2127	2127	2127	2127	2127	2127	2127	2127	2127	2127	2127	2127	2085
Standing Offer Program			0	123	330	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436
	Sub-total	**(a)**	58,049	58,138	57,875	56,040	56,020	56,110	56,161	56,098	55,769	55,191	55,084	55,018	55,018	55,018	55,018	55,018	55,018	55,018	55,018	54,976
Proposed New Supply																						
Bioenergy Call Phase I			262	419	488	511	511	511	511	436	293	267	178	53	53	53	53	53	52	0	0	0
	Sub-total	**(b)**	262	419	488	511	511	511	511	436	293	267	178	53	53	53	53	53	52	0	0	0
Additional Non-Firm Energy Supply																						
Non Firm / Market Allowance			0	0	0	2,500	2,500	2,500	1,875	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	**(c)**	0	0	0	2,500	2,500	2,500	1,875	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Supply		**(d) = a + b + c**	58,311	58,557	58,362	59,050	59,031	59,121	58,547	56,534	56,063	55,458	55,261	55,071	55,071	55,071	55,071	55,071	55,071	55,018	55,018	54,976
Demand - Integrated System Total Gross Requirements																						
2008 High Load Forecast Before DSM		**(e)**	60,770	62,104	63,217	64,609	66,830	67,912	68,056	69,169	70,080	71,004	71,779	72,232	73,266	74,311	75,473	76,648	77,680	78,809	80,000	81,321
2008 Mid Load Forecast Before DSM		**(f)**	59,440	60,490	61,362	62,516	64,470	65,325	65,281	66,172	66,898	67,614	68,209	68,480	69,318	70,166	71,118	72,080	72,921	73,847	74,841	75,937
2008 Low Load Forecast Before DSM		**(g)**	58,111	58,876	59,508	60,423	62,110	62,737	62,506	63,176	63,716	64,224	64,639	64,729	65,369	66,022	66,763	67,512	68,161	68,885	69,682	70,552
Demand Side Management																						
Option A DSM - Adjusted			1,129	1,933	3,000	3,713	4,663	5,591	6,664	7,632	8,270	9,056	9,551	9,923	10,158	10,358	10,847	11,085	11,487	11,616	11,917	11,808
	Sub-total	**(h)**	1,129	1,933	3,000	3,713	4,663	5,591	6,664	7,632	8,270	9,056	9,551	9,923	10,158	10,358	10,847	11,085	11,487	11,616	11,917	11,808
Load after DSM																						
2008 High Load Forecast after DSM		**(e - h)**	59,641	60,171	60,217	60,896	62,168	62,321	61,392	61,537	61,810	61,948	62,227	62,309	63,108	63,952	64,626	65,562	66,193	67,194	68,084	69,513
2008 Mid Load Forecast after DSM		**(f - h)**	58,311	58,557	58,362	58,803	59,808	59,733	58,617	58,541	58,628	58,558	58,657	58,557	59,160	59,808	60,271	60,994	61,433	62,231	62,924	64,128
2008 Low Load Forecast after DSM		**(g - h)**	56,982	56,943	56,508	56,710	57,448	57,146	55,842	55,544	55,446	55,168	55,087	54,806	55,211	55,664	55,916	56,426	56,674	57,269	57,765	58,744
Surplus / Deficit																						
			F2010	**F2011**	**F2012**	**F2013**	**F2014**	**F2015**	**F2016**	**F2017**	**F2018**	**F2019**	**F2020**	**F2021**	**F2022**	**F2023**	**F2024**	**F2025**	**F2026**	**F2027**	**F2028**	**F2029**
2008 High Load Forecast Surplus / Deficit		**(d - e + h)**	**-1,300**	**-1,600**	**-1,900**	**-1,800**	**-3,100**	**-3,200**	**-2,800**	**-5,000**	**-5,700**	**-6,500**	**-7,000**	**-7,200**	**-8,000**	**-8,900**	**-9,600**	**-10,500**	**-11,100**	**-12,200**	**-13,100**	**-14,500**
2008 Mid Load Forecast Surplus / Deficit		**(d - f + h)**	**0**	**0**	**0**	**200**	**-800**	**-600**	**-100**	**-2,000**	**-2,600**	**-3,100**	**-3,400**	**-3,500**	**-4,100**	**-4,700**	**-5,200**	**-5,900**	**-6,400**	**-7,200**	**-7,900**	**-9,200**
2008 Low Load Forecast Surplus / Deficit		**(d - g + h)**	**1,300**	**1,600**	**1,900**	**2,300**	**1,600**	**2,000**	**2,700**	**1,000**	**600**	**300**	**200**	**300**	**-100**	**-600**	**-800**	**-1,400**	**-1,600**	**-2,300**	**-2,700**	**-3,800**

Waneta Transaction: Supply Demand Outlook: Capacity

Table for Figure 4-4

Operating | Planning

(MW)		F2010	F2011	F2012	F2013	F2014	F2015	F2016	F2017	F2018	F2019	F2020	F2021	F2022	F2023	F2024	F2025	F2026	F2027	F2028	F2029
Supply Requiring Reserves																					
Existing and Committed Supply																					
Heritage Hydroelectric		9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707
Heritage Thermal / Market Purchases		951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951	951
Resource Smart		17	51	68	109	127	142	156	156	156	156	156	156	156	156	156	156	156	156	156	156
Revelstoke Unit 5		0	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480
Existing Purchase Contracts (excluding Alcan 2007 EPA)		665	669	669	669	669	669	669	669	654	599	572	572	572	572	572	572	572	572	572	572
F2006 Call		61	122	127	135	135	138	138	138	138	138	138	138	138	138	138	138	138	138	138	127
Standing Offer Program		0	12	30	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Sub-total	(a)	11,402	11,992	12,032	12,090	12,108	12,125	12,139	12,139	12,124	12,069	12,042	12,042	12,042	12,042	12,042	12,042	12,042	12,042	12,042	12,031
Proposed New Supply																					
Bioenergy Call - Phase I		37	37	57	57	57	57	57	36	29	29	6	6	6	6	6	6	6	0	0	0
Sub-total	(b)	37	37	57	57	57	57	57	36	29	29	6	6	6	6	6	6	6	0	0	0
Supply Requiring Reserves	**(c) = a + b**	11,439	12,029	12,089	12,147	12,165	12,182	12,196	12,175	12,153	12,098	12,048	12,048	12,048	12,048	12,048	12,048	12,048	12,042	12,042	12,031
Reserves (see footnote)																					
14% of Supply Requiring Reserves	**(d) = 14% * c**	1,601	1,684	1,692	1,701	1,703	1,705	1,707	1,705	1,701	1,694	1,687	1,687	1,687	1,687	1,687	1,687	1,687	1,686	1,686	1,684
Minus: 400 MW market reliance		400	400	400	400	400	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Reserves	**(e) = d - 400**	1,201	1,284	1,292	1,301	1,303	1,305	1,707	1,705	1,701	1,694	1,687	1,687	1,687	1,687	1,687	1,687	1,687	1,686	1,686	1,684
Supply Not Requiring Reserves																					
Existing and Committed Supply																					
Alcan 2007 EPA		241	204	204	198	198	198	198	163	163	163	163	163	163	163	163	163	163	163	163	163
Sub-total	(f)	241	204	204	198	198	198	198	163	163	163	163	163	163	163	163	163	163	163	163	163
Supply Not Requiring Reserves	(f)	241	204	204	198	198	198	198	163	163	163	163	163	163	163	163	163	163	163	163	163
Effective Load Carrying Capability																					
Supply Requiring Reserves - Reserves + Supply Not Requiring Reserves	**(g) = c - e + f**	10,479	10,949	11,000	11,044	11,060	11,075	10,687	10,634	10,615	10,567	10,524	10,524	10,524	10,524	10,524	10,524	10,524	10,519	10,519	10,510
Demand - Integrated System Total Gross Requirements																					
2008 High Load Forecast Before DSM	(h)	11,295	11,441	11,619	11,830	12,021	12,157	12,217	12,294	12,422	12,536	12,720	12,911	13,104	13,300	13,502	13,708	13,916	14,129	14,344	14,568
2008 Mid Load Forecast Before DSM	(i)	11,047	11,144	11,279	11,446	11,596	11,694	11,719	11,761	11,858	11,938	12,088	12,241	12,398	12,558	12,723	12,891	13,063	13,239	13,419	13,604
2008 Low Load Forecast Before DSM	(j)	10,800	10,847	10,938	11,063	11,172	11,231	11,221	11,229	11,294	11,339	11,455	11,570	11,691	11,816	11,943	12,074	12,210	12,349	12,494	12,639
Demand Side Management																					
DSM Option A		233	361	531	658	816	973	1,151	1,321	1,450	1,579	1,679	1,756	1,810	1,859	1,946	2,005	2,082	2,120	2,179	2,174
Sub-total	(k)	233	361	531	658	816	973	1,151	1,321	1,450	1,579	1,679	1,756	1,810	1,859	1,946	2,005	2,082	2,120	2,179	2,174
Load after DSM																					
2008 High Load Forecast after DSM	(h - k)	11,062	11,081	11,089	11,171	11,205	11,184	11,066	10,972	10,972	10,957	11,041	11,155	11,293	11,441	11,555	11,702	11,833	12,009	12,165	12,394
2008 Mid Load Forecast after DSM	(i - k)	10,815	10,783	10,748	10,788	10,780	10,721	10,568	10,440	10,408	10,359	10,408	10,484	10,587	10,699	10,776	10,885	10,981	11,119	11,240	11,429
2008 Low Load Forecast after DSM	(j - k)	10,568	10,486	10,407	10,405	10,356	10,258	10,070	9,907	9,844	9,760	9,776	9,814	9,881	9,957	9,997	10,068	10,128	10,230	10,315	10,465
Effective Load Carrying Capability Surplus / Deficit		**F2010**	**F2011**	**F2012**	**F2013**	**F2014**	**F2015**	**F2016**	**F2017**	**F2018**	**F2019**	**F2020**	**F2021**	**F2022**	**F2023**	**F2024**	**F2025**	**F2026**	**F2027**	**F2028**	**F2029**
2008 High Load Forecast Surplus / Deficit	**(g - h + k)**	**-600**	**-150**	**-100**	**-150**	**-150**	**-100**	**-400**	**-350**	**-350**	**-400**	**-500**	**-650**	**-750**	**-900**	**-1,050**	**-1,200**	**-1,300**	**-1,500**	**-1,650**	**-1,900**
2008 Mid Load Forecast Surplus / Deficit	**(l) = g - i + k**	**-350**	**150**	**250**	**250**	**300**	**350**	**100**	**200**	**200**	**200**	**100**	**50**	**-50**	**-200**	**-250**	**-350**	**-450**	**-600**	**-700**	**-900**
2008 Low Load Forecast Surplus / Deficit	**(g - j + k)**	**-100**	**450**	**600**	**650**	**700**	**800**	**600**	**750**	**750**	**800**	**750**	**700**	**650**	**550**	**550**	**450**	**400**	**300**	**200**	**50**
Additional Supply Potential																					
Canadian Entitlement	(m)	350	0	0																	
Surplus / Deficit with Canadian Entitlement	**(l + m)**	**0**	**150**	**250**	**250**	**300**	**350**	**100**	**200**	**200**	**200**	**100**	**50**	**-50**	**-200**	**-250**	**-350**	**-450**	**-600**	**-700**	**-900**

Reserve Footnote

BC Hydro's reserves are based on 14% of total supply excludingthe existing and proposed Alcan contracts and the 400 MW market reliance (until F2015).

26.0 Reference: Exhibit B-1, pp. 4-3, 4-4
Figures 4-1 and 4-2

1.26.2 Please confirm if the attrition expectation is the only source of discrepancy between the load/resource balances presented in Figures 4-1 and 4-2 in this Application and the load/resource balances of the 2008 LTAP.

RESPONSE:

Confirmed. The change to BC Hydro's expectation of existing and committed IPP supply is the only substantive modification that has been made when compared to Figures 2-3 and 2-4 of Exhibit B-10 in the 2008 LTAP. There also are some formatting changes to reflect the advancement of time.

27.0 Reference: Exhibit B-1, pp. 4-5, 4-6
Load Resource Balances Prior to Adding Waneta Transaction

1.27.1 Please provide the data used to create Figures 4-3 and 4-4 in tabular format. Please also supply the data in a workable electronic spreadsheet.

RESPONSE:

Please refer to the response to BCUC IR 1.26.1.

27.0 Reference: Exhibit B-1, pp. 4-5, 4-6
Load Resource Balances Prior to Adding Waneta Transaction

1.27.2 Please explain in detail the differences (if any) between the load forecasts with DSM, the supply stack components and the load/resource gap between Figures 4-3 and 4-4 in this Application with the Base Resource Plan as presented in 2008 LTAP proceeding Exhibit B-10 Figures and Tables.

RESPONSE:

There are no differences in the Load Forecast with DSM.

Figures 4-3 and 4-4 in the Filing represent the load/resource balance prior to the planned addition of the following resources that were included in BC Hydro's 2008 LTAP Base Resource Plan:

- **Bioenergy Call Phase II;**
- **Clean Power Call;**
- **Mica Unit 5; and**
- **Future Resources.**

The modifications noted in the response to BCUC IR 1.26.2 also apply.

28.0 Reference: Exhibit B-1, pp. 4-7, 6-12
Waneta Transaction Effect on Load/Resource Gap & Demand Side Measures'
Priority over Waneta Transaction

"In the near term of the planning horizon, BC Hydro identified, in the 2008 LTAP, a planning firm energy deficit in F2013 and F2014 of 200 GWh and 500 GWh, respectively, based on its mid load forecast. As shown in Figure 4-5, BC Hydro's Waneta electricity, along with the increase in expected energy from Independent Power Producers (IPPs) described in section 4.1.2, would serve to eliminate that identified shortfall."

1.28.1 Please confirm that pursuant to B.C. Government's Special Direction No. 10 (SD 10), BC Hydro does not have to meet the self-sufficiency requirement until 2016. If confirmed, does this mean that the gap in F2013 and F2014 could be met by market transactions?

RESPONSE:

Confirmed.

The load/resource gap referenced in the preamble to this IR was after considering the full non-firm/market allowance of 2,500 GWh/year allowed in BC Hydro's planning energy reliability criterion for the period prior to the requirement to meet self sufficiency (2016). Were the 2,500 GWh/year non-firm/market allowance not considered, the gap would have been larger.

28.0 Reference: Exhibit B-1, pp. 4-7, 6-12
Waneta Transaction Effect on Load/Resource Gap & Demand Side Measures'
Priority over Waneta Transaction

"In the near term of the planning horizon, BC Hydro identified, in the 2008 LTAP, a planning firm energy deficit in F2013 and F2014 of 200 GWh and 500 GWh, respectively, based on its mid load forecast. As shown in Figure 4-5, BC Hydro's Waneta electricity, along with the increase in expected energy from Independent Power Producers (IPPs) described in section 4.1.2, would serve to eliminate that identified shortfall."

1.28.2 In BC Hydro's view, could the load forecast gap in the near term of the planning horizon (i.e. F2013 and F2014) be filled by: (a) ramping up DSM programs, (b) reliance on Burrard for the shortfall, and/or (c) imports?

RESPONSE:

In its response to BCUC IR 3.270.1 of the 2008 LTAP (Exhibit B-12), BC Hydro identified various alternatives to meeting the above referenced near term gap. Those alternatives included BC Hydro acquiring energy from Waneta.

As indicated in that response, BC Hydro may be able to fill some or all of the deficit with:

- **additional DSM to that in BC Hydro's DSM Plan, however it is too early to know if that will be possible; or**
- **increased generation from Burrard or market purchases as would be determined in the operational timeframe.**

29.0 Reference: Exhibit B-1, p. 4-10
Waneta Transaction Effect on High Load Forecast and Contingency Events

1.29.1 Given the global financial crisis in 2008 and subsequent economic recession, what is the probability of the high load forecast scenario?

RESPONSE:

The high load forecast in BC Hydro's 2008 Load Forecast was developed to have a 90 per cent chance of exceeding the actual load. BC Hydro continues to consider this probability assessment to be reasonable in the mid- to long-term.

29.0 Reference: Exhibit B-1, p. 4-10
Waneta Transaction Effect on High Load Forecast and Contingency Events

1.29.2 Please explain if, and how, the completed Waneta Transaction would affect Site C as an option in the Contingency Plan.

RESPONSE:

The completed Waneta Transaction would not affect Site C as a resource option or its availability for use as a contingency resource.

30.0 Reference: Exhibit B-1, p.5-2
GHG Offset Cost Scenarios

In the 2008 LTAP, BC Hydro adopted a scenario approach to assess the impact of GHG regulation and GHG offset variability. It relied on an independent consultant, Natsource, to develop GHG scenarios and price forecasts. In this Application, BC Hydro continues to rely on its market assessments with respect to GHG offset costs, natural and electricity price forecasts that were set out in the 2008 LTAP.

1.30.1 Subsequent to the filing of the LTAP application with the Commission, have there been new legislative developments in the provincial and federal governments, and U.S. jurisdictions that could have (i) altered the risk profile of resource alternatives and/or (ii) affected the probabilities assigned to natural gas and electricity price forecasts?

RESPONSE:

BC Hydro continues to rely on the probability assessments of its GHG offset cost scenarios as set out in the 2008 LTAP. Those scenarios, and the analysis on which they were founded, identified that significant uncertainty exists.

Subsequent to the 2008 LTAP filing, BC Hydro made the following update to the GHG offset cost scenarios in its response to BCUC IR 1.67.1 (Exhibit B3-4) of the 2008 LTAP:

> ***In light of the model estimates and price assumptions that have been published since December 2007, Natsource is of the view that future GHG prices are more likely to be closer to the upper bounds of the price ranges provided in Appendix G1 than to the lower bounds of the price ranges. As noted in Appendix G1, mid-point price estimates were provided to facilitate BC Hydro's price modeling, and did not represent central price estimates. Natsource has not changed its view that the Linked Markets scenario is the most likely of the three GHG scenarios to occur.***

More recently, the American Clean Energy and Security Act of 2009 (ACES), also known as the Waxman-Markley Bill, has been advancing. It was approved by the House of Representatives on June 26, 2009, but has not been approved by the Senate. This legislation was first described in the 2008 LTAP by Mr. Youngman of Natsource during the oral proceeding (Transcript Volume 9, Page 1583).

ACES, if ultimately put in force, would establish a form of cap-and-trade in the U.S. and set increasingly stringent GHG offset targets through time, with a target reduction of 17 per cent from the 2005 level by 2020, and approximately 80 per cent reduction from that level by 2050. (As a reference, the B.C. Government's targets set out in the Greenhouse Gas Target Reduction Act

(GGRTA) are 33 per cent reduction from the 2007 level by 2020, and 80 per cent reduction from that level by 2050.)

While the above two events do not significantly alter BC Hydro's view as to the uncertainties that continue to exist with the GHG offset cost estimates, they do support the view that the "Linked Markets" scenario is the most probable and that prices may be nearer the higher end of the price ranges for the three GHG offset cost scenarios that were prepared by Natsource and described at pages 5-2 to 5-4 of the Filing.

31.0 Reference: Exhibit B-1, pp. 5-15 to 5-24
UEC and Attributes Comparison

1.31.1 Please compare the UECs and attributes of Waneta Transaction electricity with WEP power acquisition. If necessary, please provide the information on a confidential basis.

RESPONSE:

The Waneta Transaction is the subject of this Filing. As described in section 2.4.3 of the Filing, the Waneta Expansion Project (WEP) is a project with both energy and dependable capacity being proposed for development by CPC/CBT (through their subsidiary Waneta Expansion Power Corporation (WEPC)).

The WEP was one of the projects identified in the 2008 LTAP, and described in section 3.3.10 of that application (Exhibit B-1). In that section, the UECs of WEP were provided on a confidential basis. BC Hydro continues to hold these costs which are calculated based on information provided by CPC in confidence. Following is a quoted passage from that section of the 2008 LTAP:

> ***3.3.10.1 Methodology***
>
> ***CPC has publicly stated that* [WEP] *is anticipated to have a maximum of 435 MW. However, the project size (the MW of capacity) as may be specified under its currently planned RFP for construction is 335 MW. For this reason, BC Hydro has assumed a 335 MW plant size for purposes of the 2008 LTAP analysis.***
>
> ***3.3.10.2 Results***
>
> ***The UECs are* [redacted] *and* [redacted] [in 2008 dollars] *for 6 per cent and 8 per cent real discount rates respectively [8 per cent and 10 per cent nominal]. The ultimate cost to, and value received by, BC Hydro would depend on the commercial terms for the acquisition of power from* [WEP]*, the system benefits that would be provided by* [WEP] *resulting from head gains and shaping benefits at Seven Mile and minor reductions in Seven Mile spill, as well as any other impacts* [WEP] *may have on the operation of the BC Hydro system.***

Based on the comparative UECs and the fact that the incremental energy that would be produced by WEP would be comprised of relatively more freshet energy than the energy provided by the Waneta Transaction, BC Hydro continues to believe that the Waneta acquisition is justified.

32.0 Reference: Exhibit B-1, p. 6-3
Optimum Sequence Portfolio Analysis

The Application states that the portfolio analysis in this section is consistent with, and uses the same modeling tools as, that presented in chapter 5 of the 2008 LTAP.

1.32.1 Please explain if the portfolio analysis in section 6.2.2 includes estimated incremental revenue that would result from the sale of the clean or renewable electricity from the Waneta Electricity or from the BC Hydro system. If yes, please provide the values and underlying assumptions used.

RESPONSE:

The economic analysis presented in the Filing does not include any incremental revenue that may be obtained by selling renewable energy credits, however, it does include forecasts of electricity trade revenue.

32.0 Reference: Exhibit B-1, p. 6-3
Optimum Sequence Portfolio Analysis

The Application states that the portfolio analysis in this section is consistent with, and uses the same modeling tools as, that presented in chapter 5 of the 2008 LTAP.

1.32.2 Has BC Hydro modeled both the carbon tax and the GHG offset requirements on natural gas- fired resources or either one without the other?

RESPONSE:

BC Hydro has modelled the application of the carbon tax or GHG offset requirements as follows:

- **Existing gas-fired generation:**
  - **Carbon tax applies through 2015;**
  - **GHG offsets apply 2016 and beyond;**
- **New gas-fired generation**
  - **GHG offset requirements apply in all years.**

The above is consistent with the application of the carbon tax or GHG offset requirements that was described in BC Hydro's response to BCUC IR 1.94.1 in Exhibit B-3 of the 2008 LTAP.

33.0 Reference: Exhibit B-1, pp. 6-3 and 6-5
Portfolio Analysis

1.33.1 Please provide the resources selected, the sequence, the capacity (installed and dependable), and energy (total and firm) for the two portfolios in the analysis – with and without Waneta Electricity.

RESPONSE:

The portfolio analysis evaluated BC Hydro's Waneta Electricity under five cost of thermal scenarios and under both eight per cent nominal and ten per cent nominal discount rates. The NPV results underlying the values provided in Table 6-3 of the Filing for each of the portfolio and scenario combinations are as follows.

Net benefit at eight per cent discount rate:

Cost of Thermal		Likelihood (%)	2010 – 2027 NPV Benefit ($ million)		
Gas	GHG		No Waneta	With Waneta	Difference (Net Benefit)
Low	Low	0.6	10,168	10,027	141
Mid	Mid	31.0	10,119	9,961	158
Mid	High	13.4	10,390	10,209	180
High	Mid	38.8	10,631	10,374	257
High	High	16.3	10,696	10,456	240
Weighted NPV			**10,458**	**10,245**	**212**

Net benefit at ten per cent discount rate:

Cost of Thermal		Likelihood (%)	2010 – 2027 NPV Benefit ($ million)		
Gas	GHG		No Waneta	With Waneta	Difference (Net Benefit)
Low	Low	0.6	8,666	8,626	40
Mid	Mid	31.0	8,649	8,584	65
Mid	High	13.4	8,856	8,786	70
High	Mid	38.8	9,166	9,031	135
High	High	16.3	9,221	9,105	116
Weighted NPV			**8,979**	**8,878**	**101**

Details of each portfolio are provided in the following tables. In these tables, the in-service date, location, capacity and energy values of each new resource selected for each portfolio

are provided. These tables do not identify BC Hydro's Waneta Electricity as a selected option in a portfolio, rather, in the portfolios that include Waneta, that electricity is assumed to become part of BC Hydro's base resources in January 2010.

The tables include a summary of resource additions selected through 2016 and through 2027. The summaries do not include the capacity and energy associated with BC Hydro's Waneta Electricity. Accordingly, the summary tables only show the resources that are needed to complete the portfolios as would be required to reliably and economically meet the forecast load. The difference between the capacity and energy shown in the summaries of the "with" and "without" cases is a snapshot indicator at 2016 and 2027 of the amount of supply that is being avoided at those time points by the Waneta Transaction.

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Low	Low	3000	Not considered	Waneta excluded. 8% discount rate.

PV (in 2010) - $ millions **10,168**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	134	0	0	0	134
Firm Energy (GWh)	1,877	0	0	0	1,877

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	139	1,528	0	0	1,666
Firm Energy (GWh)	2,070	8,929	0	0	10,999

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	CI	CI Small Hydro Bundle 1	35	1	142	112
2013	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2021	VI	250 CCGT VI	243	236	1,447	1,447
2024	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2025	KLY	100 SCGT KLY	103	98	155	155
2026	VI	500 CCGT VI	494	479	2,937	2,937

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Mid	Mid	3000	Not considered	Waneta excluded. 8% discount rate.

PV (in 2010) - $ millions 10,119

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	150	0	0	0	150
Firm Energy (GWh)	2,008	0	0	0	2,008

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	156	1,430	0	0	1,586
Firm Energy (GWh)	2,570	8,775	0	0	11,344

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	CI	CI Small Hydro Bundle 1	35	1	142	112
2013	LM	LM Small Hydro Bundle 2	179	49	898	637
2014	VI	VI Small Hydro Bundle 1	44	16	155	131
2016	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2021	VI	250 CCGT VI	243	236	1,447	1,447
2024	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2025	EK	EK Small Hydro Bundle 1	140	2	527	368
2026	VI	500 CCGT VI	494	479	2,937	2,937

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Mid	High	3000	Not considered	Waneta excluded. 8% discount rate.

PV (in 2010) - $ millions 10,390

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	134	0	0	0	134
Firm Energy (GWh)	1,877	0	0	0	1,877

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	187	1,430	0	0	1,617
Firm Energy (GWh)	2,466	8,775	0	0	11,240

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	LM	LM Small Hydro Bundle 2	179	49	898	637
2013	VI	MSW VI Bundle 1	51	51	411	411
2016	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2017	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2017	NIC	Biomass sawmillwaste NIC	33	33	267	267
2017	VI	VI Small Hydro Bundle 1	44	16	155	131
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2022	VI	250 CCGT VI	243	236	1,447	1,447
2024	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2026	VI	500 CCGT VI	494	479	2,937	2,937

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	High	Mid	3000	Not considered	Waneta excluded. 8% discount rate.

PV (in 2010) - $ millions 10,631

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	139	0	0	0	139
Firm Energy (GWh)	2,070	0	0	0	2,070

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	396	715	465	0	1,576
Firm Energy (GWh)	6,796	4,387	130	0	11,313

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	LM	LM Small Hydro Bundle 2	179	49	898	637
2013	VI	MSW VI Bundle 1	51	51	411	411
2016	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2016	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2017	NC	NC Small Hydro Bundle 1	162	25	722	543
2017	EK	EK Small Hydro Bundle 1	140	2	527	368
2018	LM	LM Small Hydro Bundle 4	156	29	709	526
2020	VI	VI Small Hydro Bundle 1	44	16	155	131
2021	NIC	NIC Small Hydro Bundle 1	174	4	469	660
2021	NIC	Biomass sawmillwaste NIC	33	33	267	267
2022	PR	Wind - PC28	153	32	536	536
2022	NIC	Mica 5	500	465	130	130
2023	CI	Wind - PC13	135	28	465	465
2024	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2025	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2026	CI	Wind - PC20	159	33	574	574
2027	CI	Wind - PC19	117	25	381	381
2027	LM	LM Small Hydro Bundle 5	154	31	664	466

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	High	High	3000	Not considered	Waneta excluded. 8% discount rate.

PV (in 2010) - $ millions 10,696

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	139	0	0	0	139
Firm Energy (GWh)	2,070	0	0	0	2,070

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	582	236	465	0	1,283
Firm Energy (GWh)	9,861	1,448	130	0	11,439

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	LM	LM Small Hydro Bundle 2	179	49	898	637
2013	VI	MSW VI Bundle 1	51	51	411	411
2016	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2016	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2017	NC	NC Small Hydro Bundle 1	162	25	722	543
2017	EK	EK Small Hydro Bundle 1	140	2	527	368
2018	LM	LM Small Hydro Bundle 4	156	29	709	526
2021	NIC	NIC Small Hydro Bundle 1	174	4	469	660
2021	NIC	Biomass sawmillwaste NIC	33	33	267	267
2022	CI	Wind - PC20	159	33	574	574
2022	NIC	Mica 5	500	465	130	130
2023	CI	Wind - PC13	135	28	465	465
2023	VI	VI Small Hydro Bundle 1	44	16	155	131
2024	PR	Wind - PC28	153	32	536	536
2024	CI	CI Small Hydro Bundle 2	58	2	232	178
2024	CI	Wind - PC16	99	21	323	323
2024	CI	Wind - PC19	117	25	381	381
2025	PR	Wind - PC18	138	29	467	467
2025	CI	Wind - PC11	126	26	409	409
2025	CI	Wind - PC14	144	30	463	463
2025	CI	Wind - PC21	99	21	310	310
2025	LM	LM Small Hydro Bundle 5	154	31	664	466
2026	KLY	KLY Small Hydro Bundle 2	33	2	121	89
2026	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2026	VI	Wind - VI14	35	7	103	103
2027	PR	Wind - PC35	117	25	390	390
2027	CI	Wind - PC15	108	23	329	329

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Low	Low	3000	Not considered	Waneta included. 8% discount rate.

PV (in 2010) - $ millions **10,027**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	100	0	0	0	100
Firm Energy (GWh)	1,049	0	0	0	1,049

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	105	1,528	0	0	1,633
Firm Energy (GWh)	1,354	8,929	0	0	10,283

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	CI	CI Small Hydro Bundle 1	35	1	142	112
2017	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2021	KLY	100 SCGT KLY	103	98	155	155
2022	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2025	VI	250 CCGT VI	243	236	1,447	1,447
2026	VI	500 CCGT VI	494	479	2,937	2,937

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Mid	Mid	3000	Not considered	Waneta included. 8% discount rate.

PV (in 2010) - $ millions 9,961

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	101	0	0	0	101
Firm Energy (GWh)	1,161	0	0	0	1,161

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	189	1,194	0	0	1,383
Firm Energy (GWh)	2,834	7,327	0	0	10,160

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2014	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2017	NIC	Biomass sawmillwaste NIC	33	33	267	267
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2022	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2025	VI	500 CCGT VI	494	479	2,937	2,937
2026	EK	EK Small Hydro Bundle 1	140	2	527	368
2026	VI	VI Small Hydro Bundle 1	44	16	155	131
2027	LM	LM Small Hydro Bundle 3	212	33	1,012	716

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Mid	High	3000	Not considered	Waneta included. 8% discount rate.

PV (in 2010) - $ millions **10,209**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	101	0	0	0	101
Firm Energy (GWh)	1,161	0	0	0	1,161

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	268	1,000	0	0	1,268
Firm Energy (GWh)	4,224	6,136	0	0	10,360

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2014	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2018	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2018	NIC	Biomass sawmillwaste NIC	33	33	267	267
2018	VI	VI Small Hydro Bundle 1	44	16	155	131
2021	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2023	NC	NC Small Hydro Bundle 1	162	25	722	543
2024	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2025	EK	EK Small Hydro Bundle 1	140	2	527	368
2026	CI	Wind - PC21	99	21	310	310
2026	VI	250 CCGT VI	243	236	1,447	1,447
2027	PR	Wind - PC28	153	32	536	536
2027	KLY	Greenfield 50 CCGT KLY	50	49	77	77

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	High	Mid	3000	Not considered	Waneta included. 8% discount rate.

PV (in 2010) - $ millions **10,374**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	105	0	0	0	105
Firm Energy (GWh)	1,354	0	0	0	1,354

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	453	479	0	0	932
Firm Energy (GWh)	7,675	2,939	0	0	10,614

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2014	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2018	NC	NC Small Hydro Bundle 1	162	25	722	543
2020	VI	VI Small Hydro Bundle 1	44	16	155	131
2021	NIC	NIC Small Hydro Bundle 1	174	4	469	660
2021	EK	EK Small Hydro Bundle 1	140	2	527	368
2022	LM	LM Small Hydro Bundle 4	156	29	709	526
2023	CI	Wind - PC13	135	28	465	465
2024	PR	Wind - PC28	153	32	536	536
2024	CI	Wind - PC20	159	33	574	574
2024	NIC	Biomass sawmillwaste NIC	33	33	267	267
2024	VI	Wind - VI14	35	7	103	103
2025	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2026	PR	Wind - PC18	138	29	467	467
2026	CI	Wind - PC21	99	21	310	310
2027	CI	Wind - PC14	144	30	463	463
2027	CI	Wind - PC19	117	25	381	381

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	High	High	3000	Not considered	Waneta included. 8% discount rate.

PV (in 2010) - $ millions **10,456**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	105	0	0	0	105
Firm Energy (GWh)	1,354	0	0	0	1,354

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	633	0	465	0	1,098
Firm Energy (GWh)	10,629	0	130	0	10,760

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2014	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2018	LM	LM Small Hydro Bundle 4	156	29	709	526
2021	NC	NC Small Hydro Bundle 1	162	25	722	543
2021	EK	EK Small Hydro Bundle 1	140	2	527	368
2022	PR	Wind - PC28	153	32	536	536
2022	VI	VI Small Hydro Bundle 1	44	16	155	131
2023	NIC	NIC Small Hydro Bundle 1	174	4	469	660
2024	CI	Wind - PC16	99	21	323	323
2024	CI	Wind - PC19	117	25	381	381
2024	CI	Wind - PC20	159	33	574	574
2024	NIC	Biomass sawmillwaste NIC	33	33	267	267
2025	PR	Wind - PC18	138	29	467	467
2025	CI	Wind - PC13	135	28	465	465
2025	CI	Wind - PC14	144	30	463	463
2025	LM	LM Small Hydro Bundle 5	154	31	664	466
2026	PR	Wind - PC35	117	25	390	390
2026	CI	CI Small Hydro Bundle 2	58	2	232	178
2026	CI	Wind - PC11	126	26	409	409
2026	CI	Wind - PC15	108	23	329	329
2026	CI	Wind - PC21	99	21	310	310
2026	KLY	KLY Small Hydro Bundle 2	33	2	121	89
2026	VI	Wind - VI14	35	7	103	103
2027	PR	Wind - PC31	242	51	768	768
2027	NIC	Mica 5	500	465	130	130

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Low	Low	3000	Not considered	Waneta excluded. 10% discount rate.

PV (in 2010) - $ millions **8,666**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	165	0	0	0	165
Firm Energy (GWh)	2,160	0	0	0	2,160

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	165	1,430	0	0	1,595
Firm Energy (GWh)	2,160	8,775	0	0	10,934

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	PR	Wind - PC28	153	32	536	536
2013	VI	MSW VI Bundle 1	51	51	411	411
2016	CI	Wind - PC20	159	33	574	574
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2021	VI	250 CCGT VI	243	236	1,447	1,447
2024	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2026	VI	500 CCGT VI	494	479	2,937	2,937

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Mid	Mid	3000	Not considered	Waneta excluded, 10% discount rate.

PV (in 2010) - $ millions **8,649**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	165	0	0	0	165
Firm Energy (GWh)	2,160	0	0	0	2,160

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	166	1,430	0	0	1,596
Firm Energy (GWh)	2,272	8,775	0	0	11,046

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	PR	Wind - PC28	153	32	536	536
2013	VI	MSW VI Bundle 1	51	51	411	411
2016	CI	Wind - PC20	159	33	574	574
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2017	CI	CI Small Hydro Bundle 1	35	1	142	112
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2021	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2025	VI	500 CCGT VI	494	479	2,937	2,937
2026	VI	250 CCGT VI	243	236	1,447	1,447

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Mid	High	3000	Not considered	Waneta excluded. 10% discount rate.

PV (in 2010) - $ millions 8,856

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	165	0	0	0	165
Firm Energy (GWh)	2,160	0	0	0	2,160

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	166	1,430	0	0	1,596
Firm Energy (GWh)	2,272	8,775	0	0	11,046

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	PR	Wind - PC28	153	32	536	536
2013	VI	MSW VI Bundle 1	51	51	411	411
2016	CI	Wind - PC20	159	33	574	574
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2017	CI	CI Small Hydro Bundle 1	35	1	142	112
2018	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2024	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2025	VI	500 CCGT VI	494	479	2,937	2,937
2026	VI	250 CCGT VI	243	236	1,447	1,447

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	High	Mid	3000	Not considered	Waneta excluded. 10% discount rate.

PV (in 2010) - $ millions 9,166

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	166	0	0	0	166
Firm Energy (GWh)	2,414	0	0	0	2,414

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	332	951	0	0	1,283
Firm Energy (GWh)	5,421	5,836	0	0	11,257

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	LM	LM Small Hydro Bundle 2	179	49	898	637
2013	VI	MSW VI Bundle 1	51	51	411	411
2016	PR	Wind - PC28	153	32	536	536
2016	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2017	CI	Wind - PC20	159	33	574	574
2018	CI	Wind - PC13	135	28	465	465
2021	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2023	CI	Wind - PC19	117	25	381	381
2023	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2024	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2025	EK	EK Small Hydro Bundle 1	140	2	527	368
2026	VI	VI Small Hydro Bundle 1	44	16	155	131
2026	VI	250 CCGT VI	243	236	1,447	1,447
2026	VI	Wind - VI14	35	7	103	103
2027	PR	Wind - PC18	138	29	467	467
2027	CI	Wind - PC16	99	21	323	323

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	High	High	3000	Not considered	Waneta excluded. 10% discount rate.

PV (in 2010) - $ millions **9,221**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	165	0	0	0	165
Firm Energy (GWh)	2,160	0	0	0	2,160

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	585	432	0	0	1,017
Firm Energy (GWh)	9,698	1,757	0	0	11,455

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2013	LM	LM Small Hydro Bundle 2	179	49	898	637
2013	VI	MSW VI Bundle 1	51	51	411	411
2016	PR	Wind - PC28	153	32	536	536
2016	CI	Wind - PC20	159	33	574	574
2017	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2018	CI	CI Small Hydro Bundle 1	35	1	142	112
2018	CI	Wind - PC13	135	28	465	465
2020	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2021	CI	Wind - PC19	117	25	381	381
2021	CI	Wind - PC21	99	21	310	310
2022	CI	Wind - PC14	144	30	463	463
2022	KLY	100 SCGT KLY	103	98	155	155
2023	EK	EK Small Hydro Bundle 1	140	2	527	368
2023	VI	VI Small Hydro Bundle 1	44	16	155	131
2024	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2025	PR	Wind - PC18	138	29	467	467
2025	CI	Wind - PC11	126	26	409	409
2025	CI	Wind - PC16	99	21	323	323
2025	NC	NC Small Hydro Bundle 1	162	25	722	543
2025	NIC	Biomass sawmillwaste NIC	33	33	267	267
2026	PR	Wind - PC31	242	51	768	768
2026	PR	Wind - PC35	117	25	390	390
2026	LM	LM Small Hydro Bundle 4	156	29	709	526
2026	VI	Wind - VI14	35	7	103	103
2027	PR	Wind - PC41	45	9	131	131
2027	KLY	100 SCGT KLY	103	98	155	155
2027	NIC	NIC Small Hydro Bundle 1	174	4	469	660

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Low	Low	3000	Not considered	Waneta included. 10% discount rate.

PV (in 2010) - $ millions **8,626**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	100	0	0	0	100
Firm Energy (GWh)	1,049	0	0	0	1,049

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	108	1,430	0	0	1,538
Firm Energy (GWh)	1,264	8,775	0	0	10,039

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	CI	CI Small Hydro Bundle 1	35	1	142	112
2017	VI	Wind - VI14	35	7	103	103
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2022	VI	250 CCGT VI	243	236	1,447	1,447
2024	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2026	VI	500 CCGT VI	494	479	2,937	2,937

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Mid	Mid	3000	Not considered	Waneta included. 10% discount rate.

PV (in 2010) - $ millions **8,584**

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	101	0	0	0	101
Firm Energy (GWh)	1,161	0	0	0	1,161

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	133	1,430	0	0	1,563
Firm Energy (GWh)	1,697	8,775	0	0	10,472

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2014	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	PR	Wind - PC28	153	32	536	536
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2022	VI	250 CCGT VI	243	236	1,447	1,447
2024	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2026	VI	500 CCGT VI	494	479	2,937	2,937

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	Mid	High	3000	Not considered	Waneta included. 10% discount rate.

PV (in 2010) - $ millions 8,786

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	101	0	0	0	101
Firm Energy (GWh)	1,161	0	0	0	1,161

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	133	1,430	0	0	1,563
Firm Energy (GWh)	1,697	8,775	0	0	10,472

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2014	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	PR	Wind - PC28	153	32	536	536
2018	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2022	VI	250 CCGT VI	243	236	1,447	1,447
2024	VI	500 CCGT VI	494	479	2,937	2,937
2026	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	High	Mid	3000	Not considered	Waneta included. 10% discount rate.

PV (in 2010) - $ millions 9,031

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	105	0	0	0	105
Firm Energy (GWh)	1,242	0	0	0	1,242

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	376	715	0	0	1,091
Firm Energy (GWh)	6,092	4,387	0	0	10,479

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2014	VI	MSW VI Bundle 1	51	51	411	411
2016	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2017	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2018	PR	Wind - PC28	153	32	536	536
2018	CI	CI Small Hydro Bundle 1	35	1	142	112
2021	PR	Wind - PC18	138	29	467	467
2021	CI	Wind - PC20	159	33	574	574
2022	CI	Wind - PC13	135	28	465	465
2023	CI	Wind - PC16	99	21	323	323
2023	VI	VI Small Hydro Bundle 1	44	16	155	131
2024	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2025	KLY	Greenfield 500 CCGT KLY	494	479	2,937	2,937
2026	CI	Wind - PC19	117	25	381	381
2026	EK	EK Small Hydro Bundle 1	140	2	527	368
2027	CI	Wind - PC14	144	30	463	463
2027	CI	Wind - PC21	99	21	310	310

Scenario:	Load	DSM	Gas / Elect. Price	GHG Costs	BGS Firm Energy	Site C	Other
	Mid	A - Moderate	High	High	3000	Not considered	Waneta included. 10% discount rate.

PV (in 2010) - $ millions 9,105

Supply Totals through 2016

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	105	0	0	0	105
Firm Energy (GWh)	1,354	0	0	0	1,354

Supply Totals through 2027

	Clean	Thermal	MCA/REV	Site C	Total
Dep. Capacity (MW)	595	236	0	0	831
Firm Energy (GWh)	9,427	1,448	0	0	10,875

DSM Level in:

2020	9,365 GWh	1,689 MW
2027	11,284 GWh	2,095 MW

Resources Selected

			Capacity - MW		Energy - GWh	
Year	Zone	Resource	Installed	Dependable	Total	Firm
2014	CI	CI Small Hydro Bundle 1	35	1	142	112
2016	KLY	KLY Small Hydro Bundle 1	68	5	276	193
2016	LM	LM Small Hydro Bundle 2	179	49	898	637
2016	VI	MSW VI Bundle 1	51	51	411	411
2017	LM	LM Small Hydro Bundle 3	212	33	1,012	716
2018	PR	Wind - PC28	153	32	536	536
2021	CI	Wind - PC19	117	25	381	381
2021	CI	Wind - PC20	159	33	574	574
2022	CI	Wind - PC13	135	28	465	465
2022	CI	Wind - PC16	99	21	323	323
2023	EK	EK Small Hydro Bundle 1	140	2	527	368
2024	PR	Wind - PC18	138	29	467	467
2024	CI	Wind - PC14	144	30	463	463
2024	CI	Wind - PC21	99	21	310	310
2024	VI	VI Small Hydro Bundle 1	44	16	155	131
2025	PR	Wind - PC35	117	25	390	390
2025	CI	Wind - PC11	126	26	409	409
2025	NC	NC Small Hydro Bundle 1	162	25	722	543
2025	LM	LM Small Hydro Bundle 4	156	29	709	526
2025	VI	Wind - VI14	35	7	103	103
2026	CI	Wind - PC15	108	23	329	329
2026	KLY	Greenfield 250 CCGT KLY	243	236	1,447	1,447
2027	PR	Wind - PC31	242	51	768	768
2027	NIC	Biomass sawmillwaste NIC	33	33	267	267

33.0 Reference: Exhibit B-1, pp. 6-3 and 6-5
Portfolio Analysis

1.33.2 Please provide the present values of the two portfolios, with and without Waneta Electricity.

RESPONSE:

Please refer to the response to BCUC IR 1.33.1.

34.0 Reference: Exhibit B-1, p. 6-6 to 6-8
Rate Impact

1.34.1 Please update the LTRIF as filed in the 2008 LTAP assuming the inclusion of the Waneta Transaction in the incremental revenue requirements analysis.

RESPONSE:

The LTRIF, as filed in response to BCUC IR 1.7.1 of Exhibit B-3 in the 2008 LTAP, with the inclusion of the Waneta Transaction is as follows:

Fiscal Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Rate Increase (nominal %)	**9**	**10**	**6**	**6**	**6**	**8**	**8**	**5**	**3**	**2**

Note that the above figures include the incremental revenue requirements analysis as updated for the response to BCUC IR 1.46.2, to incorporate and more accurately reflect BC Hydro's current estimate of the financing costs for the Waneta Transaction.

35.0 Reference: Exhibit B-1, pp. 5-11, 6-5
Discount and Exchange Rates

In section 5.2.5.2, BC Hydro states that the assumed 8 percent nominal discount rate aligns with its current definition of equity.

1.35.1 Please provide a summary of the calculation that resulted in this number, clarify whether the 8 percent is representative of its cost of capital or of equity, and discuss the impact that material changes in the Commission's generic ROE formula could have on the discount rate.

RESPONSE:

The eight per cent nominal discount rate is representative of BC Hydro's weighted average cost of capital, which is an estimate of the blended cost of equity and of debt, rounded to the nearest 50 basis points.

The eight per cent can be calculated by multiplying the ROE by the equity percentage and adding the result to the forecast cost of debt multiplied by the debt percentage as illustrated below:

ROE x Equity% = 13.05% x 30% = 3.92%

Cost of Debt x Debt% = 6.00% x 70% = 4.20%

Weighted average cost of capital (WACC) = 3.92% + 4.20% = 8.12%,

or eight per cent when rounded to the nearest 50 basis points.

The impact to BC Hydro's WACC due to any change in the BCUC's generic ROE formula could be calculated using the formula above. In general a one per cent increase in BC Hydro's ROE results in a corresponding 0.3 per cent increase in BC Hydro's WACC all else being equal.

35.0 Reference: Exhibit B-1, pp. 5-11, 6-5
Discount and Exchange Rates

In section 5.2.5.2, BC Hydro states that the assumed 8 percent nominal discount rate aligns with its current definition of equity.

1.35.2 What exchange rate was used for the years 2010-2027 in Table 6-3?

RESPONSE:

The exchange rate used in the analysis presented in Table 6-3 of the Filing is the same exchange rate as that used in the 2008 LTAP portfolio analysis and equals 0.93 U.S. dollars to the Canadian dollar.

35.0 Reference: Exhibit B-1, pp. 5-11, 6-5
Discount and Exchange Rates

In section 5.2.5.2, BC Hydro states that the assumed 8 percent nominal discount rate aligns with its current definition of equity.

1.35.2.1 Please reproduce Table 6-3 using a US dollar exchange rate of $0.93US to the Canadian dollar.

RESPONSE:

Please refer to the response to BCUC IR 1.35.2.

36.0 Reference: Exhibit B-1, pp. 3-6 to 3-9, Chapter 6

1.36.1 In Table 3-1, please explain why the capacity to BC Hydro drops from 249 MW to 162 MW for 2036 and beyond.

RESPONSE:

As part of the Waneta Transaction, Teck and BC Hydro have contemplated exchanges of capacity and energy that allow Teck to fully dispose of electricity that is surplus to its needs prior to January 1, 2036. Part of this exchange would include BC Hydro receiving a larger share of the Waneta capacity prior to this date in exchange for Teck receiving a larger share of the energy, on average, from closing through to January 1, 2036.

From and after January 1, 2036 capacity and energy from Waneta would accrue to Teck and BC Hydro directly in proportion to their ownership interests.

36.0 Reference: Exhibit B-1, pp. 3-6 to 3-9, Chapter 6

1.36.2 Use the energy and capacity volumes in Table 3-1 to generate a side-by-side comparison of Waneta costs and attribute values over the long term. The quantity and unit volume assigned for each attribute should be identified, and the source of each quantity and unit value number should be explained. Please provide a functioning spreadsheet that shows the information for each of at least 40 years, and discounts the total for each year at 8 and 10 percent nominal discount rates.

RESPONSE:

An Excel Workbook providing the requested information is attached in the response to BCUC IR 1.41.2. These computations are shown at lines 105 to 133 of the sheet labeled "Economic Evaluation".

The spreadsheet provides information on the following Waneta attributes that BC Hydro has quantified and evaluated as part of the transaction:

- **Dependable capacity, weighted by time of delivery;**
- **Firm energy (with a cap on the energy considered firm during the months of May, June and July to no more than one-third of the total energy supplied in other months), weighted by time of delivery; and**
- **Excess freshet energy (the energy in May, June and July that is not considered firm as a result of the cap in the previous bullet), weighted by time of delivery.**

The spreadsheet allows valuation of dependable capacity at either: (i) market based rates ($10/kW-year) throughout the time horizon, or market based rates until 2014, followed by the avoided cost of Mica Unit 5 ($34/kW-year in 2008$). For firm energy, the spreadsheet allows valuation at either:

- **Market forwards through 2014, followed by an avoided cost estimate based on the Clean Call Block portfolio of $99/MWh (2008$), as discussed in section 5.3.2.5.1 of the Filing;**
- **Market forwards through 2014, followed by an avoided cost estimate based on the Bioenergy Call Phase I RFP EPAs of $110.5/MWh (2008$), as set out in section 5.3.2.3 the Filing; or**
- **Market forwards through 2014, followed by an avoided cost estimate based on a second clean call block portfolio (Clean Call Block 2) of $124/MWh (in 2008$) as discussed in the response to JIESC IR 3.29.2 (Exhibit B-12) in the 2008 LTAP.**

Excess freshet energy is valued at the prices specified in the Clean Power Call request for proposals.

The following table provides a summary of the spreadsheet results at an eight per cent discount rate and an exchange rate of 0.93 U.S. dollars to the Canadian dollar:

	Net Benefit of Waneta Transaction		
	NPV to 2035	**NPV to 2045**	**NPV to 2049**
Capacity at market only, firm energy at:			
- market & Clean Call Block	**37.8**	**167.2**	**267.1**
- market & Bioenergy Call Phase I	**120.1**	**266.6**	**378.9**
- market & Clean Call Block 2	**216.8**	**383.4**	**510.2**
Capacity at market, followed by Mica Unit 5, firm energy at:			
- market & Clean Call Block	**94.3**	**230.6**	**335.6**
- market & Bioenergy Call Phase I	**176.6**	**330.1**	**447.5**
- market & Clean Call Block 2	**273.2**	**446.8**	**578.7**

36.0 Reference: Exhibit B-1, pp. 3-6 to 3-9, Chapter 6

1.36.2 Use the energy and capacity volumes in Table 3-1 to generate a side-by-side comparison of Waneta costs and attribute values over the long term. The quantity and unit volume assigned for each attribute should be identified, and the source of each quantity and unit value number should be explained. Please provide a functioning spreadsheet that shows the information for each of at least 40 years, and discounts the total for each year at 8 and 10 percent nominal discount rates.

1.36.2.1 Please repeat Table 3-1 and the previous question assuming all years are high rate years.

RESPONSE:

BC Hydro assumes that the question is referring to high stream flow years.

All of the products that BC Hydro has valued in the Waneta Transaction are firm, irrespective of water conditions. Therefore, the values identified in the response to BCUC IR 1.36.2 would be unaffected by a change in the stream flows.

36.0 Reference: Exhibit B-1, pp. 3-6 to 3-9, Chapter 6

1.36.2 Use the energy and capacity volumes in Table 3-1 to generate a side-by-side comparison of Waneta costs and attribute values over the long term. The quantity and unit volume assigned for each attribute should be identified, and the source of each quantity and unit value number should be explained. Please provide a functioning spreadsheet that shows the information for each of at least 40 years, and discounts the total for each year at 8 and 10 percent nominal discount rates.

1.36.2.2 Please repeat Table 3-1 and the previous question assuming all years are low rate years.

RESPONSE:

BC Hydro assumes that the question is referring to low stream flow years.

All of the products that BC Hydro has valued in the Waneta Transaction are firm, irrespective of water conditions. Therefore, the values identified in the response to BCUC IR 1.36.2 would be unaffected by a change in the stream flows.

36.0 Reference: Exhibit B-1, pp. 3-6 to 3-9, Chapter 6

1.36.2 Use the energy and capacity volumes in Table 3-1 to generate a side-by-side comparison of Waneta costs and attribute values over the long term. The quantity and unit volume assigned for each attribute should be identified, and the source of each quantity and unit value number should be explained. Please provide a functioning spreadsheet that shows the information for each of at least 40 years, and discounts the total for each year at 8 and 10 percent nominal discount rates.

1.36.2.3 Please repeat Table 3-1 and the previous question assuming all years are critical water rate years.

RESPONSE:

BC Hydro assumes that the question is referring to critical stream flow years.

All of the products that BC Hydro has valued in the Waneta Transaction are firm, irrespective of water conditions. Therefore, the values identified in the response to the BCUC IR 1.36.2 would be unaffected by a change in the stream flows.

36.0 Reference: Exhibit B-1, pp. 3-6 to 3-9, Chapter 6

1.36.3 In Table 3-2, please explain whether the "BC Hydro's Expectation of Teck's Reduction in Entitlement Usage" numbers have been reviewed with Teck, and whether Teck is in agreement with these numbers.

RESPONSE:

The entitlement reduction values provided in Table 3-2 prior to January 2036 were developed jointly by BC Hydro and Teck.

The values in Table 3-2 showing BC Hydro's expectation of Teck's reduction in entitlement usages have not been directly discussed with Teck. As explained in the response to BCUC IR 1.7.1.1, these values have been derived by estimating Teck's dispatch of its entitlement prior to the Waneta Transaction and comparing it to Teck's estimated dispatch of its reduced entitlement following the Waneta Transaction.

BC Hydro has discussed its perspectives on both dispatches with Teck. Specifically, the pre-transaction dispatch was shared with Teck in discussions centered around Teck's opportunity costs. BC Hydro shared its perspective on this dispatch and incorporated applicable input from Teck.

Similarly, BC Hydro provided Teck with information on the expected dispatch for the post-transaction cases, primarily to demonstrate how Teck could shape its reduced entitlement as needed to serve its Industrial Load, and incorporated feedback that it received.

The values specifically provided in Table 3-2 are simply the differences between the two dispatches.

The values from and after January 2036 were developed using the same approach as was used to develop the pre-January 2036 data, but reflecting the differences in the Term Sheet that apply to those periods (see the response to BCUC IR 1.16.1).

37.0 Reference: Exhibit B-1, Chapter 2, Physical, Historical and Commercial Context,
sec. 2.1.1 Plant Physical Condition, pp. 2-2 to 2-3

1.37.1 BC Hydro refers to several recent upgrades and life extensions at the plant. For each of the replacements and upgrades referenced, please provide an approximate age of the asset at the time it was upgraded or replaced and an approximate cost of the upgrade or replacement. If this information is not available from Teck, please provide other reference points that would allow the Commission to understand the typical level and frequency of sustaining capital expenditures for the plant to date.

RESPONSE:

Please refer the response to BCUC IR 1.15.4.

38.0 Reference: Exhibit B-1, Chapter 2, Physical, Historical and Commercial Context, sec. 2.4 pre-existing Surviving Contractual (Other) Arrangements, pp. 2-12 to 2-15

1.38.1 BC Hydro has developed water use plans for most of its hydroelectric facilities. Has Teck developed a water use plan for Waneta?

RESPONSE:

No.

38.0 Reference: Exhibit B-1, Chapter 2, Physical, Historical and Commercial Context, sec. 2.4 pre-existing Surviving Contractual (Other) Arrangements, pp. 2-12 to 2-15

1.38.2 Does BC Hydro expect to undertake a water use plan for Waneta as a result of its acquisition of an interest in the plant?

RESPONSE:

BC Hydro has no current plans in this regard.

38.0 Reference: Exhibit B-1, Chapter 2, Physical, Historical and Commercial Context, sec. 2.4 pre-existing Surviving Contractual (Other) Arrangements, pp. 2-12 to 2-15

1.38.3 Is there any likelihood a water use plan would be required by the Shareholder or expected by stakeholders / agencies as a result of the acquisition by BC Hydro? Could this affect future water allocation to the plant?

RESPONSE:

BC Hydro does not wish to speculate on the expectations of others nor on potential impacts of changes to water use plan requirements. Any expansion of water use plan requirements will be determined by the B.C. Government.

39.0 Reference: Exhibit B-1, Chapter 2, Physical, Historical and Commercial Context, sec. 2.2.2.3, Canal Plant Agreement, pp. 2-93 to 2-10

1.39.1 BC Hydro states that under the Canal Plant Agreement (CPA), the owners of non-BC Hydro projects receive monthly entitlements to energy and capacity that are derived from the estimated average annual generation capability of their projects, and that the difference between actual generation and contractual entitlement is received by (or the responsibility of) BC Hydro.

1.39.2 Does this mean that BC Hydro effectively already receives the benefits of intra-month dispatching capability of the projects?. Explain.

RESPONSE:

Yes, under the CPA, BC Hydro may utilize the benefits of the intra-month dispatching capability of the projects. In return, the Entitlement Parties receive dispatch flexibility in their use of entitlement that is designed to mirror the capability of their project(s).

BC Hydro has not attached any value to intra-month dispatchability capability of Waneta resulting from the Waneta Transaction.

Please refer to the response to BCUC IR 1.7.1.1 for additional details on the incremental scheduling value that BC Hydro would expect to receive as a result of reduced entitlements resulting from the Waneta Transaction.

39.0 Reference: Exhibit B-1, Chapter 2, Physical, Historical and Commercial Context, sec. 2.2.2.3, Canal Plant Agreement, pp. 2-93 to 2-10

1.39.1 BC Hydro states that under the Canal Plant Agreement (CPA), the owners of non-BC Hydro projects receive monthly entitlements to energy and capacity that are derived from the estimated average annual generation capability of their projects, and that the difference between actual generation and contractual entitlement is received by (or the responsibility of) BC Hydro.

1.39.3 In its evaluation of the value (cost-effectiveness) of the acquisition of its one-third ownership of the Waneta facility, please explain how BC Hydro has accounted for (and deducted) the value it currently receives from the plant, if any, under the CPA.

RESPONSE:

The following table shows the allocation of Waneta generation under average, high, low and critical water conditions for both the current situation (pre Waneta Transaction) and for the situation following the Waneta Transaction. For the purposes of this table:

- **Average water conditions are the average over the stream flow record from August 1938 to July 1988;**
- **High water conditions correspond to the 80th percentile of annual generation over that same period;**
- **Low water conditions correspond to the 20th percentile of annual generation over that same period; and**
- **Critical water conditions correspond to the average annual generation over the period from October 1940 through April 1946.**

As shown in the table, for average water conditions, Waneta's expected generation is 3,021 GWh. Currently under the CPA, Teck would receive an entitlement of 2,821 GWh in respect of this Waneta generation. The balance of Waneta generation (200 GWh) would accrue to BC Hydro as a coordination transfer under the CPA.

After the Waneta Transaction, the total generation at Waneta would be unchanged, but only two-thirds of it would accrue to Teck. Teck would continue to coordinate its two-thirds share of Waneta generation under the CPA and would receive a reduced, two-thirds, entitlement (1,881 GWh) in return.

The net benefit to BC Hydro of the Waneta Transaction would be the difference between the Waneta generation it would receive under the Waneta Transaction and the amount of Waneta generation it currently receives under the CPA. An examination of the table shows that this amount is a constant 940 GWh under all water conditions, and is equal to the reduction in Teck's entitlement.

Note that this table was developed for the current situation, before the development of the Waneta Expansion, and prior to the entitlement adjustments included as part of the Waneta Transaction. Those adjustments would affect the amount of generation that accrues to BC Hydro in any year, as outlined in Table 3-1 of the Filing, but would not alter the firmness of the energy received.

Please refer to the response to BCUC IR 1.7.1.1 for further details on BC Hydro's estimate of the timing of this entitlement reduction.

		Water Condition (GWh)			
		Critical	**Low**	**Average**	**High**
Pre-Waneta Transaction					
	Waneta Generation	2,552	2,745	3,021	3,370
	Teck's Entitlement	2,821	2,821	2,821	2,821
	Net Generation to BC Hydro	-269	-76	200	549
Post-Waneta Transaction					
	Waneta Generation	2,552	2,745	3,021	3,370
	Teck's Entitlement	1,881	1,881	1,881	1,881
	Net Generation to BC Hydro	671	864	1,140	1,489
Differences					
	Waneta Generation	0	0	0	0
	Teck's Entitlement	-940	-940	-940	-940
	Net Generation to BC Hydro	940	940	940	940

40.0 Reference: Exhibit B-1, Chapter 3 Commercial Arrangement, Sec. 3.3.3.5, Delivery of Capacity and Energy under the Waneta Transaction, pp. 3-6 to 3-9

1.40.1 Are the energy and capacity volumes in Table 3-1 average or firm volumes?

RESPONSE:

All of the values in Table 3-1 of the Filing prior to January 1, 2036 would be firm. They would not vary with water conditions and, further, would not be affected by advancements or delays in the WEP in-service dates, unit outages, force majeure or certain entitlement re-determinations (such as those that could occur due to changes in upstream project regulation).

The values from and after January 1, 2036 would be firm in that they do not vary with water conditions. However, they would be subject to changes in project characteristics or available flow.

40.0 Reference: Exhibit B-1, Chapter 3 Commercial Arrangement, Sec. 3.3.3.5, Delivery of Capacity and Energy under the Waneta Transaction, pp. 3-6 to 3-9

1.40.2 Please explain the calculation of firm energy and capacity volumes? Please demonstrate how the method used to calculate firm energy and capacity from Waneta is consistent with the method for firm energy and capacity from BC Hydro's heritage assets.

RESPONSE:

Please refer to the responses to BCUC IRs 1.9.4 and 1.39.3.

Since the entitlement reduction benefits would be firm under all water conditions, they would qualify as firm energy using any methodology consistent with that applied to BC Hydro's Heritage hydro assets.

40.0 Reference: Exhibit B-1, Chapter 3 Commercial Arrangement, Sec. 3.3.3.5, Delivery of Capacity and Energy under the Waneta Transaction, pp. 3-6 to 3-9

1.40.3 Please describe what BC Hydro's non-firm entitlement would be, if any.

RESPONSE:

There would be no non-firm entitlement. Please also refer to the responses to BCUC IRs 1.39.3 and 1.40.2.

BC Hydro would occasionally have the opportunity to purchase additional electricity from Teck under the Surplus Power Rights Agreement. Such opportunities would be expected to arise from time-to-time. However, such quantities are not predictable in advance and BC Hydro has placed no value on them in this filing.

41.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.1,
BC Hydro's Waneta Electricity, p. 5-15

In the first paragraph of this section BC Hydro states the levelized unit cost of energy being incurred as a result of the Transaction, including future operating costs and the effects of time of delivery that would result from applying the Energy Weighting Factors presented in an earlier section is $63.1/MW.h based on an eight percent discount rate and $78.6 / MWh based on a ten percent discount rate.

1.41.1 Please explain the difference between the values quoted in the text above and EAPs highlighted in Table 5-7.

RESPONSE:

The EAPs highlighted in Table 5-7 are computed in a manner that limits the amount of energy counted as firm supply during the freshet months from May through July to one-third of the total firm supply that would be delivered outside this period. The excess freshet energy is credited based on the estimated market prices of energy and this value is subtracted from the cost of the transaction. The EAP is then computed as the total present value cost of the Waneta Transaction minus the present value of the credit for excess freshet energy, all divided by the present value of the firm energy received (total firm energy received less excess freshet firm).

The unit costs quoted in the text provide the unit cost of firm energy capability without application of the freshet cap on firm energy. This calculation results in a slightly lower unit cost because all firm energy from the Transaction is treated as firm rather than have a portion being assigned a market value.

41.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.1,
BC Hydro's Waneta Electricity, p. 5-15

In the first paragraph of this section BC Hydro states the levelized unit cost of energy being incurred as a result of the Transaction, including future operating costs and the effects of time of delivery that would result from applying the Energy Weighting Factors presented in an earlier section is $63.1/MW.h based on an eight percent discount rate and $78.6 / MWh based on a ten percent discount rate.

1.41.2 Please file a working excel spreadsheet with the detailed calculations of the EAP, clearly showing all components of this calculation, including assumptions for and treatment of the capital costs of the transaction, operating costs, annual capacity and energy supply assumptions over the 40-year amortization, the firm and non-firm components of energy and capacity, the application of the Energy and Capacity Weighting Factors to the output, the adjustment for losses and Cost of Incremental Firm Transmission (CIFT) to the Lower Mainland, and the economic value of environmental attributes.

RESPONSE:

The requested working Excel spreadsheet is attached, with hard copies provided below.

The calculation of the unit energy cost corresponding to the $63.1/MWh value quoted in the preamble to this question is shown at lines 77-82 of the sheet labeled "Economic Evaluation". The values at eight per cent and ten per cent discount rate may be obtained by adjusting the applicable discount rate in cell C19 of this sheet.

The calculation of the EAP is shown at lines 84 - 102 of this same sheet. As before the EAP values at eight per cent and ten per cent discount rate may be obtained by adjusting the applicable discount rate in cell C19 of this sheet.

This spreadsheet contains some refinements to the computation of water rental fees attributable to BC Hydro's Waneta Electricity resulting in slightly higher unit energy costs and EAPs than quoted in the Filing. The following table documents the updated results:

	Filing $/MWh	**New Value $/MWh**
Unit Energy Cost at 8%	**63.1**	**63.4**
Unit Energy Cost at 10%	**78.6**	**78.8**
EAP at 8%	**65.7**	**66.1**
EAP at 10%	**85.2**	**85.4**

As identified in footnote 36 of the Filing, the above EAPs are based on the energy profile of BC Hydro's Waneta Electricity. BC Hydro has not included any explicit value in the EAP to reflect the possibly hourly firm credit that could be attributed to BC Hydro's Waneta Electricity.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
3		Month	Source / Units		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Totals/Avg.
4																	
5	**Data**																
6		Days			31	30	31	30	31	31	28	31	30	31	30	31	
7		NERC Holidays				1		1	1	1				1		1	
8		HLH			425.1	395.4	425.1	395.4	409.1	409.1	384.0	425.1	411.4	409.1	411.4	409.1	4909.7
9		SPH			106.3	98.9	106.3	98.9	102.3	102.3	96.0	106.3	102.9	102.3	102.9	102.3	1227.4
10		PH			318.9	296.6	318.9	296.6	306.9	306.9	288.0	318.9	308.6	306.9	308.6	306.9	3682.3
11		LLH			318.9	324.6	318.9	324.6	334.9	334.9	288.0	318.9	308.6	334.9	308.6	334.9	3850.3
12		Sum			744.0	720.0	744.0	720.0	744.0	744.0	672.0	744.0	720.0	744.0	720.0	744.0	8760.0
13																	
14		Teck's Ownership Fraction	0.666667														
15		Minimum Entitlement Take	68	MW													
16		50:50 Account	17000														
17		BPA Loss factor	1.90%														
18		Wheeling Rates															
19		- SPH & PH Sales	3.74	$/MW.h	[WT_HLH]												
20																	
21		- LLH Sales & Purchases	1	$/MW.h	[WT_LLH]												
22		Scheduling Agreement Incr.	1.0245														
23																	
24	**BC Hydro Weighting Factors**																
25		Energy - Super Peak	Clean Call		110%	116%	127%	129%	142%	141%	124%	124%	104%	90%	87%	105%	
26		Energy - Peak	Clean Call		101%	107%	112%	112%	120%	122%	113%	112%	95%	82%	81%	96%	
27		Energy - LLH	Clean Call		86%	91%	93%	99%	104%	105%	101%	99%	85%	70%	69%	79%	
28		Energy - HLH	Weighted Avg.		103%	109%	116%	116%	126%	127%	116%	115%	97%	84%	83%	98%	
29		Capacity	Alcan		5.0%	5.0%	5.0%	10.0%	25.0%	25.0%	15.0%	5.0%	2.5%	0.0%	0.0%	2.5%	
30																	
31	**Smelter Demand**																
32		Smelter - Energy	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	
33		Smelter - Capacity @ 100%	MW		202	204	207	210	212	212	211	209	207	205	203	202	
34		Buffer	MW		15	15	15	15	15	15	15	15	15	15	15	15	
35																	
36	**Current Entitlement**																
37		Capacity	MW		493.2	493.2	493.2	493.2	493.1	493.2	493.2	493.1	491.1	478.5	476.0	490.5	
38		Energy	MW.h		178,366	159,171	237,944	192,780	223,927	198,283	170,804	234,155	281,878	311,227	289,022	276,005	2,753,562
39		Energy with Scheduling Agmt	MW.h		182,737	163,072	243,776	197,505	229,415	203,143	174,990	239,894	288,786	318,855	296,105	282,769	2,821,047
40																	
41	**Expected Entitlement Post WEP**																
42		Capacity	MW		478.9	485.9	485.5	485.8	485.4	485.8	485.3	485.4	483.3	475.0	453.4	448.9	
43		Energy	MW.h		178,037	159,979	228,890	193,459	212,395	196,484	167,593	222,936	243,824	292,238	275,547	243,239	2,614,620
44		Energy with Scheduling Agmt	MW.h		182,400	163,900	234,500	198,200	217,600	201,300	171,700	228,400	249,800	299,400	282,300	249,200	2,678,700
45																	
46	**Entitlement Difference (Pre- WEP minus Post-WEP)**																
47		Capacity	MW		14.3	7.3	7.7	7.4	7.7	7.4	7.9	7.7	7.8	3.5	22.6	41.6	
48		Energy	MW.h		329	-808	9,054	-679	11,532	1,799	3,211	11,219	38,054	18,989	13,475	32,766	138,942
49		Energy with Scheduling Agmt	MW.h		337	-828	9,276	-695	11,815	1,843	3,290	11,494	38,986	19,455	13,805	33,569	142,347
50																	
51						Indicates data from Teck											

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1		**Product Definitions - Pre WEP - Closing to July 2013**																		
2																				
3		Month	Source / Units		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Annual	Nov-Feb	Freshet	Draft
29		**Section 1 - L&R Balance without agreement**																		
30		Entitlement Capacity	MW		493.2	493.2	493.2	493.2	493.1	493.2	493.2	493.1	491.1	478.5	476.0	490.5	490.1			
31		Maintenance Adj.	MW		0.0	89.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4			
32		Entitlement Energy	MW.h		178,366	159,171	237,944	192,780	223,927	198,283	170,804	234,155	281,878	311,227	289,022	276,005	2,753,562			
33		Scheduling Agreement Incr.	MW.h	##	4,371	3,901	5,832	4,725	5,488	4,860	4,186	5,739	6,908	7,628	7,083	6,764	67,485			
34		Net Entitlement Energy	MW.h		182,737	163,072	243,776	197,505	229,415	203,143	174,990	239,894	288,786	318,855	296,105	282,769	2,821,047	805,052	897,729	1,923,318
35																				
36		7% Adjustment	MW.h		-12,800	11,400	17,100	-3,450	16,050	-400	-12,200	4,500	-20,200	900	-20,700	19,800	0	0	0	0
37		% Adjustment			-7.00%	6.99%	7.01%	-1.75%	7.00%	-0.20%	-6.97%	1.88%	-6.99%	0.28%	-6.99%	7.00%				
38		50:50 Adjustment	MW.h		0	0	900	-900	0	51000	0	0	-51,000	9,200	-9,200	0	0	50,100	0	0
39		50:50 Account	MW.h		25,500	25,500	24,600	25,500	25,500	-25,500	-25,500	-25,500	25,500	-9,200	0	0				
40																				
41		Shaped Entitlement Energy	MW.h		169,937	174,472	261,776	193,155	245,465	253,743	162,790	244,394	217,586	328,955	266,205	302,569	2,821,047	855,152	897,729	1,923,318
42		Smelter	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
43		Surplus	MW.h		19,637	27,272	107,576	41,955	87,965	96,043	20,890	88,894	68,586	176,655	119,805	152,469	1,007,747			
44																				
45		Smelter Load @100%LF	MW		202.0	204.4	207.3	210.0	211.7	212.0	211.2	209.0	206.9	204.7	203.3	201.7	207.0			
46		Reserves on smelter	MW		9.4	9.5	9.7	9.8	9.9	9.9	9.8	9.7	9.6	9.5	9.5	9.4	9.6			
47		Buffer	MW		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0			
48		Total Smelter Requirement	MW		226.4	229.0	231.9	234.8	236.6	236.8	236.0	233.7	231.6	229.2	227.8	226.1	231.7			
49		Surplus Capacity	MW		266.8	175.2	261.3	258.4	256.5	256.4	257.2	259.4	259.5	249.3	248.2	264.4	251.0			
50		Less reserves	MW		11.9	7.8	11.6	11.5	11.4	11.4	11.4	11.5	11.5	11.1	11.0	11.8	11.2			
51		Net Surplus	MW		254.9	167.4	249.7	246.9	245.1	245.0	245.8	247.8	248.0	238.2	237.2	252.6	239.9			
52																				
53		**Entitlement Sales**																		
54		Energy at Waneta																		
55		- SPH	MW.h		4,909	6,818	26,536	10,489	21,991	24,011	5,223	22,223	17,147	24,361	24,393	25,837	213,937			
56		- PH	MW.h		14,728	20,454	79,607	31,466	65,974	72,032	15,668	66,670	51,440	73,084	73,178	77,510	641,811			
57		- LLH	MW.h		0	0	1,434	0	0	0	0	0	0	79,209	22,234	49,123	152,000			
58		-Total	MW.h		19,637	27,272	107,576	41,955	87,965	96,043	20,890	88,894	68,586	176,655	119,805	152,469	1,007,747			
59		-Weighted Sales	MW.h		20,276	29,795	124,193	48,772	110,396	121,734	24,180	102,228	66,700	137,301	95,838	140,345	1,021,757			
60																				
61		**Trade**																		
62		Energy at Waneta																		
63		- MAX LLH Purchase	MW.h		42,732	44,286	44,403	46,089	48,117	48,207	41,230	44,961	42,874	45,776	41,760	44,786				
64		- MAX Addn HLH Sales	MW.h		88,733	38,937	0	55,685	12,329	4,180	73,481	16,465	33,435	0	0	0				
65		- LLH Purchase	MW.h		42,732	38,937	0	46,089	12,329	4,180	41,230	16,465	33,435	0	0	0	235,397			
66		- SPH Sales	MW.h		10,683	9,734	0	11,522	3,082	1,045	10,308	4,116	8,359	0	0	0	58,849			
67		- PH Sales	MW.h		32,049	29,203	0	34,567	9,246	3,135	30,923	12,349	25,076	0	0	0	176,548			
68		-Weighted Sales	MW.h		44,121	42,539	0	53,579	15,472	5,298	47,724	18,935	32,516	0	0	0	260,183			
69		-Weighted Purchases	MW.h		36,750	35,433	0	45,628	12,822	4,389	41,643	16,300	28,420	0	0	0	221,384			
70																				
71		**Net Entitlement Use**																		
72		- SPH	MW.h		37,064	36,763	48,564	42,771	46,727	46,736	35,802	48,554	46,791	45,300	45,307	46,473	526,851			
73		- PH	MW.h		111,191	110,289	145,692	128,313	140,180	140,209	107,405	145,662	140,373	135,899	135,921	139,418	1,580,552			
74		- LLH	MW.h		21,682	27,420	67,519	22,071	58,559	66,797	19,584	50,178	30,422	147,756	84,977	116,679	713,644			
75		- Total	MW.h		169,937	174,472	261,776	193,155	245,465	253,743	162,790	244,394	217,586	328,955	266,205	302,569	2,821,047			
76																				
77		**Section 2 - L&R Balance with agreement**																		
78		**Agreed Entitlement Reflecting 1/3 Plant Sale**																		
79		Capacity	MW		226.7	229.2	232.1	235.0	236.8	237.1	236.2	234.0	231.8	229.5	228.0	226.4	235.0			
80		Energy	MW.h		141,772	139,590	162,517	160,417	152,943	135,428	127,512	155,500	188,821	136,300	171,983	140,517	1,813,300	576,300	448,800	1,364,500
81																				
82		**Industrial Load**																		
83		Smelter Load @100%LF	MW		202.0	204.4	207.3	210.0	211.7	212.0	211.2	209.0	206.9	204.7	203.3	201.7	207.0			
84		Buffer	MW		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0			
85		Reserve on Service to Smelte	MW		9.7	9.8	9.9	10.0	10.1	10.1	10.1	10.0	9.9	9.8	9.7	9.6	9.9			
86		Gross Smelter Requirement	MW		226.7	229.2	232.1	235.0	236.8	237.1	236.2	234.0	231.8	229.5	228.0	226.4				
87		Energy Demand	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
88																				
89		**CPA Entitlement Adjustments to Serve Industrial Load**																		
90		Allowed 7% Adjustment	MW.h		9,924	9,771	11,376	11,229	10,706	9,480	8,926	10,885	13,217	9,541	12,039	9,836				
91		Actual Adjustment	MW.h		8,528	7,610	-8,317	-9,217		1,051	8,166	0	-7,821		-9,583	9,583	0	0	0	0
92		% Adjustment			6.02%	5.45%	-5.12%	-5.75%	0.00%	0.78%	6.40%	0.00%	-4.14%	0.00%	-5.57%	6.82%				
93		50:50 Adjustment	MW.h						4,557	21221	6,222		-32,000	16,000	-16,000		0	32,000	0	0
94		50:50 Account	MW.h		16,000	16,000	16,000	16,000	11,443	-9,778	-16,000	-16,000	16,000	-16,000	0	0				
95																				
96		Shaped Entitlement Energy	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300	608,300	448,800	1,364,500
97																				
98		Smelter L& R Balance																		
99		- Capacity	MW		0	0	0	0	0	0	0	0	0	0	0	0	0			
100		- Energy	MW.h		0	0	0	0	0	0	0	0	0	0	0	0	0			
101																				
102		**Net Entitlement Use**																		
103		- SPH	MW.h		21,471	20,211	22,029	20,760	21,653	21,681	20,271	22,214	21,286	20,938	20,914	20,636	254,065			
104		- PH	MW.h		64,414	60,632	66,086	62,280	64,960	65,042	60,814	66,643	63,857	62,815	62,743	61,908	762,194			
105		- LLH	MW.h		64,414	66,357	66,086	68,160	70,887	70,977	60,814	66,643	63,857	68,547	62,743	67,557	797,041			
106		- Total	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
107																				
108		**Section 3 - Entitlement Reductions, Change in Dispatch & Clean Power Call (CPC) Evaluation**																		
109		**Reduction in BC Hydro's Obligation to Provide Entitlement**																		
110		- Capacity	MW		266.5	264.0	261.1	258.2	256.3	256.1	257.0	259.1	259.3	249.0	248.0	264.1	258.2			
111		- Energy	MW.h		40,965	23,482	81,259	37,088	76,472	67,715	47,478	84,394	99,965	182,555	124,122	142,252	1,007,747			
112		-Weighted Capacity, adjuste	MW		13.3	8.7	13.1	25.8	64.1	64.0	38.5	13.0	6.5	0.0	0.0	6.6	253.6			
113																				
114		**Change in Dispatch (Benefit to BC Hydro)**																		
115		- SPH	MW.h		15,592	16,552	26,536	22,011	25,073	25,056	15,530	26,340	25,505	24,361	24,393	25,837	272,786			
116		- PH	MW.h		46,777	49,657	79,607	66,033	75,220	75,167	46,590	79,019	76,516	73,084	73,178	77,510	818,358			
117		- LLH	MW.h		-42,732	-38,937	1,434	-46,089	-12,329	-4,180	-41,230	-16,465	-33,435	79,209	22,234	49,123	-83,397			
118		- Total	MW.h		19,637	27,272	107,576	41,955	87,965	96,043	20,890	88,894	68,586	176,655	119,805	152,469	1,007,747			
119		- Delivery Time Weighted	MW.h		27,647	36,901	124,193	56,723	113,047	122,643	30,262	104,862	70,796	137,301	95,838	140,345	1,060,556			
120																				
121		**CPC Evalaution**																		
122		Non Freshet Total	MW.h		558,818															
123		Freshet Limit	MW.h		186,273	41.5%														
124		Non-firm Freshet	MW.h		262,657	58.5%														
125		Total Freshet	MW.h		448,929	100.0%														
126																				
127		**CPC Firm**																		
128		- SPH	MW.h		15,592	16,552	26,536	22,011	25,073	25,056	15,530	26,340	25,505	10,108	10,121	10,720	229,145			
129		- PH	MW.h		46,777	49,657	79,607	66,033	75,220	75,167	46,590	79,019	76,516	30,325	30,364	32,161	687,435			
130		- LLH	MW.h		-42,732	-38,937	1,434	-46,089	-12,329	-4,180	-41,230	-16,465	-33,435	32,866	9,226	20,382	-171,490			
131		- Total	MW.h		19,637	27,272	107,576	41,955	87,965	96,043	20,890	88,894	68,586	73,299	49,710	63,264	745,090			
132		- Delivery Time Weighted	MW.h		27,647	36,901	124,193	56,723	113,047	122,643	30,262	104,862	70,796	56,970	39,766	58,233	842,041			
133																				
134		**CPC Non-firm**																		
135		- SPH	MW.h		0	0	0	0	0	0	0	0	0	14,253	14,272	15,116	43,641			
136		- PH	MW.h		0	0	0	0	0	0	0	0	0	42,760	42,815	45,349	130,923			
137		- LLH	MW.h		0	0	0	0	0	0	0	0	0	46,343	13,009	28,740	88,092			
138		- Total	MW.h		0	0	0	0	0	0	0	0	0	103,356	70,095	89,206	262,657			
139		- Delivery Time Weighted	MW.h		0	0	0	0	0	0	0	0	0	80,331	56,072	82,112	218,515			
140																				

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1		**Product Definitions - WEP In-service Year - Aug 2013 to Jul 2014**																		
2																				
3		Month	Source / Units		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Annual	Nov-Feb	Freshet	Draft
29		**Section 1 - L&R Balance without agreement**																		
30		Entitlement Capacity	MW		493.2	493.2	493.2	493.2	493.1	493.2	493.2	493.1	483.3	475.0	453.4	448.9	483.8			
31		Maintenance Adj.	MW		0.0	89.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4			
32		Entitlement Energy	MW.h		178,366	159,171	237,944	192,780	223,927	198,283	170,804	234,155	243,824	292,238	275,547	243,239	2,650,277			
33		Scheduling Agreement Incr.	MW.h	##	4,371	3,901	5,832	4,725	5,488	4,860	4,186	5,739	5,976	7,162	6,753	5,961	64,954			
34		Net Entitlement Energy	MW.h		182,737	163,072	243,776	197,505	229,415	203,143	174,990	239,894	249,800	299,400	282,300	249,200	2,715,231	805,052	830,900	1,884,331
35																				
36		7% Adjustment	MW.h		-12,764	11,400	17,064	-3,450	16,050	-400	-12,200	1,786	-17,486	1,900	-19,344	17,444	0	0	0	0
37		% Adjustment			-6.98%	6.99%	7.00%	-1.75%	7.00%	-0.20%	-6.97%	0.74%	-7.00%	0.63%	-6.85%	7.00%				
38		50:50 Adjustment	MW.h		0	0	900	-900	0	51000	0	0	-51,000	9,200	-9,200	0	0	50,100	0	0
39		50:50 Account	MW.h		25,500	25,500	24,600	25,500	25,500	-25,500	-25,500	-25,500	25,500	-9,200	0	0				
40																				
41		Shaped Entitlement Energy	MW.h		169,973	174,472	261,740	193,155	245,465	253,743	162,790	241,680	181,314	310,500	253,756	266,644	2,715,231	855,152	830,900	1,884,331
42		Smelter	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
43		Surplus	MW.h		19,673	27,272	107,540	41,955	87,965	96,043	20,890	86,180	32,314	158,200	107,356	116,544	901,931			
44																				
45		Smelter Load @100%LF	MW		202.0	204.4	207.3	210.0	211.7	212.0	211.2	209.0	206.9	204.7	203.3	201.7	207.0			
46		Reserves on smelter	MW		9.4	9.5	9.7	9.8	9.9	9.9	9.8	9.7	9.6	9.5	9.5	9.4	9.6			
47		Buffer	MW		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0			
48		Total Smelter Requirement	MW		226.4	229.0	231.9	234.8	236.6	236.8	236.0	233.7	231.6	229.2	227.8	226.1	231.7			
49		Surplus Capacity	MW		266.8	175.2	261.3	258.4	256.5	256.4	257.2	259.4	251.7	245.8	225.6	222.8	244.8			
50		Less reserves	MW		11.9	7.8	11.6	11.5	11.4	11.4	11.4	11.5	11.2	10.9	10.0	9.9	10.9			
51		Net Surplus	MW		254.9	167.4	249.7	246.9	245.1	245.0	245.8	247.8	240.5	234.8	215.6	212.8	233.9			
52																				
53		**Entitlement Sales**																		
54		Energy at Waneta																		
55		-Super Peak	MW.h		4,918	6,818	26,536	10,489	21,991	24,011	5,223	21,545	8,079	24,019	22,172	21,771	197,570			
56		-Peak	MW.h		14,755	20,454	79,607	31,466	65,974	72,032	15,668	64,635	24,236	72,058	66,515	65,313	592,711			
57		-Light Load	MW.h		0	0	1,398	0	0	0	0	0	0	62,123	18,669	29,460	111,650			
58		-Total	MW.h		19,673	27,272	107,540	41,955	87,965	96,043	20,890	86,180	32,314	158,200	107,356	116,544	901,931			
59		-Weighted Sales	MW.h		20,313	29,795	124,159	48,772	110,396	121,734	24,180	99,107	31,425	124,191	86,048	108,833	928,954			
60																				
61		**Trade**																		
62		Energy at Waneta																		
63		- MAX LLH Purchase	MW.h		42,732	44,286	44,403	46,089	48,117	48,207	41,230	44,961	42,874	45,776	41,760	44,786				
64		- MAX Addn HLH Sales	MW.h		88,697	38,937	0	55,685	12,329	4,180	73,481	19,179	66,641	0	0	0				
65		- LLH Purchase	MW.h		42,732	38,937	0	46,089	12,329	4,180	41,230	19,179	42,874	0	0	0	247,550			
66		- SPH Sales	MW.h		10,683	9,734	0	11,522	3,082	1,045	10,308	4,795	10,719	0	0	0	61,888			
67		- PH Sales	MW.h		32,049	29,203	0	34,567	9,246	3,135	30,923	14,384	32,156	0	0	0	185,663			
68		-Weighted Sales	MW.h		44,121	42,539	0	53,579	15,472	5,298	47,724	22,056	41,695	0	0	0	272,484			
69		-Weighted Purchases	MW.h		36,750	35,433	0	45,628	12,822	4,389	41,643	18,987	36,443	0	0	0	232,094			
70																				
71		**Net Entitlement Use**																		
72		- SPH	MW.h		37,073	36,763	48,564	42,771	46,727	46,736	35,802	48,554	40,083	44,958	43,086	42,407	513,523			
73		- PH	MW.h		111,218	110,289	145,692	128,313	140,180	140,209	107,405	145,662	120,248	134,873	129,258	127,220	1,540,568			
74		- LLH	MW.h		21,682	27,420	67,483	22,071	58,559	66,797	19,584	47,464	20,983	130,669	81,412	97,017	661,141			
75		- Total	MW.h		169,973	174,472	261,740	193,155	245,465	253,743	162,790	241,680	181,314	310,500	253,756	266,644	2,715,231			
76																				
77		**Section 2 - L&R Balance with agreement**																		
78		**Agreed Entitlement Reflecting 1/3rd Plant Sale**																		
79		Capacity	MW		226.7	229.2	232.1	235.0	236.8	237.1	236.2	234.0	231.8	229.5	228.0	226.4	231.9			
80		Energy	MW.h		141,772	139,590	162,517	160,417	152,943	135,428	127,512	159,929	184,392	136,300	172,093	140,407	1,813,300	576,300	448,800	1,364,500
81																				
82		**Industrial Load**																		
83		Smelter Load @100%LF	MW		202.0	204.4	207.3	210.0	211.7	212.0	211.2	209.0	206.9	204.7	203.3	201.7	207.0			
84		Buffer	MW		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0			
85		Reserve on Service to Smelte	MW		9.7	9.8	9.9	10.0	10.1	10.1	10.1	10.0	9.9	9.8	9.7	9.6	9.9			
86		Gross Smelter Requirement	MW		226.7	229.2	232.1	235.0	236.8	237.1	236.2	234.0	231.8	229.5	228.0	226.4				
87		Energy Demand	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
88																				
89		**CPA Entitlement Adjustments to Serve Industrial Load**																		
90		Allowed 7% Adjustment	MW.h		9,924	9,771	11,376	11,229	10,706	9,480	8,926	11,195	12,907	9,541	12,047	9,829				
91		Actual Adjustment	MW.h		8,528	7,610	-8,317	-9,217		1,051	8,166	0	-7,821		-9,693	9,693	0	0	0	0
92		% Adjustment			6.02%	5.45%	-5.12%	-5.75%	0.00%	0.78%	6.40%	0.00%	-4.24%	0.00%	-5.63%	6.90%				
93		50:50 Adjustment	MW.h						4,557	21221	6,222	-4,429	-27,571	16,000	-16,000		0	32,000	0	0
94		50:50 Account	MW.h		16,000	16,000	16,000	16,000	11,443	-9,778	-16,000	-11,571	16,000	-16,000	0	0				
95																				
96		Shaped Entitlement Energy	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300	608,300	448,800	1,364,500
97																				
98		Smelter L& R Balance																		
99		- Capacity	MW		0	0	0	0	0	0	0	0	0	0	0	0	0			
100		- Energy	MW.h		0	0	0	0	0	0	0	0	0	0	0	0	0			
101																				
102		**Net Entitlement Use**																		
103		- SPH	MW.h		21,471	20,211	22,029	20,760	21,653	21,681	20,271	22,214	21,286	20,938	20,914	20,636	254,065			
104		- PH	MW.h		64,414	60,632	66,086	62,280	64,960	65,042	60,814	66,643	63,857	62,815	62,743	61,908	762,194			
105		- LLH	MW.h		64,414	66,357	66,086	68,160	70,887	70,977	60,814	66,643	63,857	68,547	62,743	67,557	797,041			
106		- Total	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
107																				
108		**Section 3 - Entitlement Reductions, Change in Dispatch & Clean Power Call (CPC) Evaluation**																		
109		**Reduction in BC Hydro's Obligation to Provide Entitlement**																		
110		- Capacity	MW		266.5	264.0	261.1	258.2	256.3	256.1	257.0	259.1	251.5	245.5	225.4	222.5	256.9			
111		- Energy	MW.h		40,965	23,482	81,259	37,088	76,472	67,715	47,478	79,965	65,408	163,100	110,207	108,793	901,931			
112		-Weighted Capacity, adjuste	MW		13.3	8.7	13.1	25.8	64.1	64.0	38.5	13.0	6.3	0.0	0.0	5.6	252.4			
113																				
114		**Change in Dispatch (Benefit to BC Hydro)**																		
115		- SPH	MW.h		15,601	16,552	26,536	22,011	25,073	25,056	15,530	26,340	18,797	24,019	22,172	21,771	259,458			
116		- PH	MW.h		46,804	49,657	79,607	66,033	75,220	75,167	46,590	79,019	56,391	72,058	66,515	65,313	778,374			
117		- LLH	MW.h		-42,732	-38,937	1,398	-46,089	-12,329	-4,180	-41,230	-19,179	-42,874	62,123	18,669	29,460	-135,900			
118		- Total	MW.h		19,673	27,272	107,540	41,955	87,965	96,043	20,890	86,180	32,314	158,200	107,356	116,544	901,931			
119		- Delivery Time Weighted	MW.h		27,684	36,901	124,159	56,723	113,047	122,643	30,262	102,175	36,677	124,191	86,048	108,833	969,344			
120																				
121		**CPC Evalaution**																		
122		Non Freshet Total	MW.h		519,831															
123		Freshet Limit	MW.h		173,277	45.3%														
124		Non-firm Freshet	MW.h		208,823	54.7%														
125		Total Freshet	MW.h		382,100	100.0%														
126																				
127		**CPC Firm**																		
128		- SPH	MW.h		15,601	16,552	26,536	22,011	25,073	25,056	15,530	26,340	18,797	10,892	10,055	9,873	222,316			
129		- PH	MW.h		46,804	49,657	79,607	66,033	75,220	75,167	46,590	79,019	56,391	32,677	30,164	29,618	666,947			
130		- LLH	MW.h		-42,732	-38,937	1,398	-46,089	-12,329	-4,180	-41,230	-19,179	-42,874	28,172	8,466	13,360	-196,155			
131		- Total	MW.h		19,673	27,272	107,540	41,955	87,965	96,043	20,890	86,180	32,314	71,742	48,684	52,851	693,108			
132		- Delivery Time Weighted	MW.h		27,684	36,901	124,159	56,723	113,047	122,643	30,262	102,175	36,677	56,319	39,022	49,354	794,966			
133																				
134		**CPC Non-firm**																		
135		- SPH	MW.h		0	0	0	0	0	0	0	0	0	13,127	12,117	11,898	37,142			
136		- PH	MW.h		0	0	0	0	0	0	0	0	0	39,381	36,351	35,694	111,426			
137		- LLH	MW.h		0	0	0	0	0	0	0	0	0	33,951	10,203	16,100	60,254			
138		- Total	MW.h		0	0	0	0	0	0	0	0	0	86,458	58,672	63,693	208,823			
139		- Delivery Time Weighted	MW.h		0	0	0	0	0	0	0	0	0	67,872	47,027	59,479	174,378			

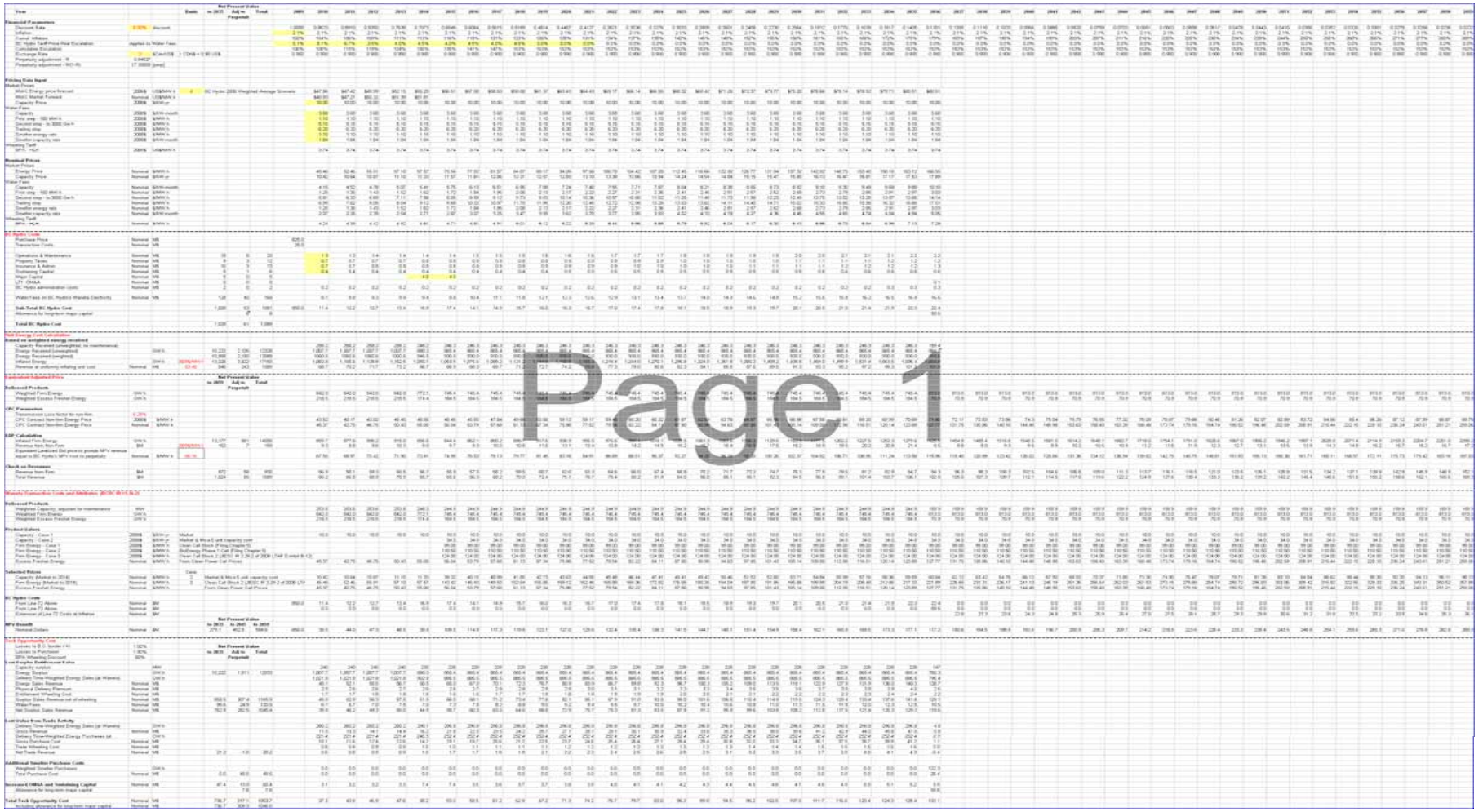
Product Definitions - Post WEP - Aug 2014 to Dec 2035

	Month	Source / Units		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Annual	Nov-Feb	Freshet	Draft
	Section 1 - L&R Balance without agreement																		
	Entitlement Capacity	MW		478.9	485.9	485.5	485.8	485.4	485.8	485.3	485.4	483.3	475.0	453.4	448.9	478.2			
	Maintenance Adj.	MW		0.0	89.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4			
	Entitlement Energy	MW.h		178,037	159,979	228,890	193,459	212,395	196,484	167,593	222,936	243,824	292,238	275,547	243,239	2,614,620			
	Scheduling Agreement Incr.	MW.h	##	4,363	3,921	5,610	4,741	5,205	4,816	4,107	5,464	5,976	7,162	6,753	5,961	64,080			
	Net Entitlement Energy	MW.h		182,400	163,900	234,500	198,200	217,600	201,300	171,700	228,400	249,800	299,400	282,300	249,200	2,678,700	788,800	830,900	1,847,800
	7% Adjustment	MW.h		-12,768	10,500	16,415	-1,031	13,450	-400	-12,019	3,153	-17,300	1,900	-19,344	17,444	0	0	0	0
	% Adjustment			-7.00%	6.41%	7.00%	-0.52%	6.18%	-0.20%	-7.00%	1.38%	-6.93%	0.63%	-6.85%	7.00%				
	50:50 Adjustment	MW.h		0	0	900	-900	0	51000	0	0	-51,000	9,200	-9,200	0	0	50,100	0	0
	50:50 Account	MW.h		25,500	25,500	24,600	25,500	25,500	-25,500	-25,500	-25,500	25,500	-9,200	0	0				
	Shaped Entitlement Energy	MW.h		169,632	174,400	251,815	196,269	231,050	251,900	159,681	231,553	181,500	310,500	253,756	266,644	2,678,700	838,900	830,900	1,847,800
	Smelter	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
	Surplus	MW.h		19,332	27,200	97,615	45,069	73,550	94,200	17,781	76,053	32,500	158,200	107,356	116,544	865,400			
	Smelter Load @100%LF	MW		202.0	204.4	207.3	210.0	211.7	212.0	211.2	209.0	206.9	204.7	203.3	201.7	207.0			
	Reserves on smelter	MW		9.4	9.5	9.7	9.8	9.9	9.9	9.8	9.7	9.6	9.5	9.5	9.4	9.6			
	Buffer	MW		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0			
	Total Smelter Requirement	MW		226.4	229.0	231.9	234.8	236.6	236.8	236.0	233.7	231.6	229.2	227.8	226.1	231.7			
	Surplus Capacity	MW		252.5	167.9	253.6	251.0	248.8	249.0	249.3	251.7	251.7	245.8	225.6	222.8	239.1			
	Less reserves	MW		11.2	7.5	11.3	11.2	11.1	11.1	11.1	11.2	11.2	10.9	10.0	9.9	10.6			
	Net Surplus	MW		241.2	160.5	242.3	239.8	237.8	237.9	238.2	240.5	240.5	234.8	215.6	212.8	228.5			
	Entitlement Sales																		
	Energy at Waneta																		
	- SPH	MW.h		4,833	6,800	24,404	11,267	18,388	23,550	4,445	19,013	8,125	24,019	22,172	21,771	188,787			
	- PH	MW.h		14,499	20,400	73,211	33,802	55,163	70,650	13,336	57,040	24,375	72,058	66,515	65,313	566,361			
	- LLH	MW.h		0	0	0	0	0	0	0	0	0	62,123	18,669	29,460	110,252			
	-Total	MW.h		19,332	27,200	97,615	45,069	73,550	94,200	17,781	76,053	32,500	158,200	107,356	116,544	865,400			
	-Weighted Sales	MW.h		19,960	29,716	112,989	52,393	92,305	119,399	20,582	87,461	31,606	124,191	86,048	108,833	885,483			
	Trade																		
	Energy at Waneta																		
	- MAX LLH Purchase	MW.h		42,732	44,286	44,403	46,089	48,117	48,207	41,230	44,961	42,874	45,776	41,760	44,786				
	- MAX Addn HLH Sales	MW.h		83,230	36,251	5,399	49,774	23,733	3,130	73,692	26,178	66,455	0	0	0				
	- LLH Purchase	MW.h		42,732	36,251	5,399	46,089	23,733	3,130	41,230	26,178	42,874	0	0	0	267,616			
	- SPH Sales	MW.h		10,683	9,063	1,350	11,522	5,933	782	10,308	6,544	10,719	0	0	0	66,904			
	- PH Sales	MW.h		32,049	27,188	4,049	34,567	17,800	2,347	30,923	19,633	32,156	0	0	0	200,712			
	-Weighted Sales	MW.h		44,121	39,604	6,249	53,579	29,785	3,967	47,724	30,104	41,695	0	0	0	296,829			
	-Weighted Purchases	MW.h		36,750	32,988	5,021	45,628	24,683	3,286	41,643	25,916	36,443	0	0	0	252,358			
	Net Entitlement Use																		
	- SPH	MW.h		36,987	36,074	47,782	43,550	45,974	46,013	35,024	47,772	40,129	44,958	43,086	42,407	509,756			
	- PH	MW.h		110,962	108,221	143,346	130,649	137,922	138,040	105,073	143,316	120,388	134,873	129,258	127,220	1,529,267			
	- LLH	MW.h		21,682	30,106	60,687	22,071	47,154	67,847	19,584	40,465	20,983	130,669	81,412	97,017	639,677			
	- Total	MW.h		169,632	174,400	251,815	196,269	231,050	251,900	159,681	231,553	181,500	310,500	253,756	266,644	2,678,700			
	Section 2 - L&R Balance with agreement																		
	Agreed Entitlement Reflecting 1/3rd Plant Sale																		
	Capacity	MW		226.7	229.2	232.1	235.0	236.8	237.1	236.2	234.0	231.8	229.5	228.0	226.4	235.0			
	Energy	MW.h		147,392	139,551	156,333	160,449	145,067	134,200	136,584	152,267	192,657	136,300	172,093	140,407	1,813,300	576,300	448,800	1,364,500
	Industrial Load																		
	Smelter Load @100%LF	MW		202.0	204.4	207.3	210.0	211.7	212.0	211.2	209.0	206.9	204.7	203.3	201.7	207.0			
	Buffer	MW		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0			
	Reserve on Service to Smelte	MW		9.7	9.8	9.9	10.0	10.1	10.1	10.1	10.0	9.9	9.8	9.7	9.6	9.9			
	Gross Smelter Requirement	MW		226.7	229.2	232.1	235.0	236.8	237.1	236.2	234.0	231.8	229.5	228.0	226.4				
	Energy Demand	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
	CPA Entitlement Adjustments to Serve Industrial Load																		
	Allowed 7% Adjustment	MW.h		10,317	9,769	10,943	11,231	10,155	9,394	9,561	10,659	13,486	9,541	12,047	9,828				
	Actual Adjustment	MW.h		2,908	7,649	-2,133	-9,249	10,155	7,107	-8,013	3,233	-11,657		-9,693	9,693	0	0	0	0
	% Adjustment			1.97%	5.48%	-1.36%	-5.76%	7.00%	5.30%	-5.87%	2.12%	-6.05%	0.00%	-5.63%	6.90%				
	50:50 Adjustment	MW.h						2,278	16393	13,329		-32,000	16,000	-16,000		0	32,000	0	0
	50:50 Account	MW.h		16,000	16,000	16,000	16,000	13,722	-2,671	-16,000	-16,000	16,000	-16,000	0	0				
	Shaped Entitlement Energy	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300	608,300	448,800	1,364,500
	Smelter L& R Balance																		
	- Capacity	MW		0	0	0	0	0	0	0	0	0	0	0	0	0			
	- Energy	MW.h		0	0	0	0	0	0	0	0	0	0	0	0	0			
	Net Entitlement Use																		
	- SPH	MW.h		21,471	20,211	22,029	20,760	21,653	21,681	20,271	22,214	21,286	20,938	20,914	20,636	254,065			
	- PH	MW.h		64,414	60,632	66,086	62,280	64,960	65,042	60,814	66,643	63,857	62,815	62,743	61,908	762,194			
	- LLH	MW.h		64,414	66,357	66,086	68,160	70,887	70,977	60,814	66,643	63,857	68,547	62,743	67,557	797,041			
	- Total	MW.h		150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
	Section 3 - Entitlement Reductions, Change in Dispatch & Clean Power Call (CPC) Evaluation																		
	Reduction in BC Hydro's Obligation to Provide Entitlement																		
	- Capacity	MW		252.2	256.7	253.4	250.8	248.6	248.7	249.1	251.4	251.5	245.5	225.4	222.5	246.3			
	- Energy	MW.h		35,008	24,349	78,167	37,751	72,533	67,100	35,116	76,133	57,143	163,100	110,207	108,793	865,400			
	-Weighted Capacity, adjuste	MW		12.6	8.4	12.7	25.1	62.2	62.2	37.4	12.6	6.3	0.0	0.0	5.6	244.9			
	Change in Dispatch (Benefit to BC Hydro)																		
	- SPH	MW.h		15,516	15,863	25,754	22,790	24,321	24,332	14,753	25,558	18,844	24,019	22,172	21,771	255,691			
	- PH	MW.h		46,548	47,588	77,261	68,369	72,963	72,997	44,258	76,673	56,531	72,058	66,515	65,313	767,073			
	- LLH	MW.h		-42,732	-36,251	-5,399	-46,089	-23,733	-3,130	-41,230	-26,178	-42,874	62,123	18,669	29,460	-157,364			
	- Total	MW.h		19,332	27,200	97,615	45,069	73,550	94,200	17,781	76,053	32,500	158,200	107,356	116,544	865,400			
	- Delivery Time Weighted	MW.h		27,332	36,332	114,218	60,343	97,408	120,079	26,663	91,649	36,858	124,191	86,048	108,833	929,954			
	CPC Evalaution																		
	Non Freshet Total	MW.h		483,300															
	Freshet Limit	MW.h		161,100	42.2%														
	Non-firm Freshet	MW.h		221,000	57.8%														
	Total Freshet	MW.h		382,100	100.0%														
	CPC Firm																		
	- SPH	MW.h		15,516	15,863	25,754	22,790	24,321	24,332	14,753	25,558	18,844	10,127	9,348	9,179	216,383			
	- PH	MW.h		46,548	47,588	77,261	68,369	72,963	72,997	44,258	76,673	56,531	30,381	28,044	27,537	649,149			
	- LLH	MW.h		-42,732	-36,251	-5,399	-46,089	-23,733	-3,130	-41,230	-26,178	-42,874	26,192	7,871	12,421	-221,132			
	- Total	MW.h		19,332	27,200	97,615	45,069	73,550	94,200	17,781	76,053	32,500	66,700	45,263	49,137	644,400			
	- Delivery Time Weighted	MW.h		27,332	36,332	114,218	60,343	97,408	120,079	26,663	91,649	36,858	52,361	36,279	45,886	745,408			
	CPC Non-firm																		
	- SPH	MW.h		0	0	0	0	0	0	0	0	0	13,892	12,824	12,592	39,308			
	- PH	MW.h		0	0	0	0	0	0	0	0	0	41,677	38,471	37,776	117,924			
	- LLH	MW.h		0	0	0	0	0	0	0	0	0	35,931	10,798	17,039	63,768			
	- Total	MW.h		0	0	0	0	0	0	0	0	0	91,500	62,093	67,407	221,000			
	- Delivery Time Weighted	MW.h		0	0	0	0	0	0	0	0	0	71,830	49,769	62,947	184,546			

Product Definitions - Post WEP, Post 2035

	Month	Source / Units	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Annual	Nov-Feb	Freshet	Draft
	Section 1 - L&R Balance without agreement																	
	Entitlement Capacity	MW	478.9	485.9	485.5	485.8	485.4	485.8	485.3	485.4	483.3	475.0	453.4	448.9	478.2			
	Maintenance Adj.	MW	0.0	89.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4			
	Entitlement Energy	MW.h	178,037	159,979	228,890	193,459	212,395	196,484	167,593	222,936	243,824	292,238	275,547	243,239	2,614,620			
	Scheduling Agreement Incr.	MW.h	4,363	3,921	5,610	4,741	5,205	4,816	4,107	5,464	5,976	7,162	6,753	5,961	64,080			
	Net Entitlement Energy	MW.h	182,400	163,900	234,500	198,200	217,600	201,300	171,700	228,400	249,800	299,400	282,300	249,200	2,678,700	788,800	830,900	1,847,800
	7% Adjustment	MW.h	-12,768	10,500	16,415	-1,031	13,450	-400	-12,019	3,153	-17,300	1,900	-19,344	17,444	0	0	0	0
	% Adjustment		-7.00%	6.41%	7.00%	-0.52%	6.18%	-0.20%	-7.00%	1.38%	-6.93%	0.63%	-6.85%	7.00%				
	50:50 Adjustment	MW.h	0	0	900	-900	0	51000	0	0	-51,000	9,200	-9,200	0	0	50,100	0	0
	50:50 Account	MW.h	25,500	25,500	24,600	25,500	25,500	-25,500	-25,500	-25,500	25,500	-9,200	0	0				
	Shaped Entitlement Energy	MW.h	169,632	174,400	251,815	196,269	231,050	251,900	159,681	231,553	181,500	310,500	253,756	266,644	2,678,700	838,900	830,900	1,847,800
	Smelter	MW.h	150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
	Surplus	MW.h	19,332	27,200	97,615	45,069	73,550	94,200	17,781	76,053	32,500	158,200	107,356	116,544	865,400			
	Smelter Load @100%LF	MW	202.0	204.4	207.3	210.0	211.7	212.0	211.2	209.0	206.9	204.7	203.3	201.7	207.0			
	Reserves on smelter	MW	9.4	9.5	9.7	9.8	9.9	9.9	9.8	9.7	9.6	9.5	9.5	9.4	9.6			
	Buffer	MW	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0			
	Total Smelter Requirement	MW	226.4	229.0	231.9	234.8	236.6	236.8	236.0	233.7	231.6	229.2	227.8	226.1	231.7			
	Surplus Capacity	MW	252.5	167.9	253.6	251.0	248.8	249.0	249.3	251.7	251.7	245.8	225.6	222.8	239.1			
	Less reserves	MW	11.2	7.5	11.3	11.2	11.1	11.1	11.1	11.2	11.2	10.9	10.0	9.9	10.6			
	Net Surplus	MW	241.2	160.5	242.3	239.8	237.8	237.9	238.2	240.5	240.5	234.8	215.6	212.8	228.5			
	Entitlement Sales																	
	Energy at Waneta																	
	-Super Peak	MW.h	4,833	6,800	24,404	11,267	18,388	23,550	4,445	19,013	8,125	24,019	22,172	21,771	188,787			
	-Peak	MW.h	14,499	20,400	73,211	33,802	55,163	70,650	13,336	57,040	24,375	72,058	66,515	65,313	566,361			
	-Light Load	MW.h	0	0	0	0	0	0	0	0	0	62,123	18,669	29,460	110,252			
	-Total	MW.h	19,332	27,200	97,615	45,069	73,550	94,200	17,781	76,053	32,500	158,200	107,356	116,544	865,400			
	-Weighted Sales	MW.h	19,960	29,716	112,989	52,393	92,305	119,399	20,582	87,461	31,606	124,191	86,048	108,833	885,483			
	Trade																	
	Energy at Waneta																	
	- MAX LLH Purchase	MW.h	42,732	44,286	44,403	46,089	48,117	48,207	41,230	44,961	42,874	45,776	41,760	44,786				
	- MAX Addn HLH Sales	MW.h	83,230	36,251	5,399	49,774	23,733	3,130	73,692	26,178	66,455	0	0	0				
	- LLH Purchase	MW.h	42,732	36,251	5,399	46,089	23,733	3,130	41,230	26,178	42,874	0	0	0	267,616			
	- SPH Sales	MW.h	10,683	9,063	1,350	11,522	5,933	782	10,308	6,544	10,719	0	0	0	66,904			
	- PH Sales	MW.h	32,049	27,188	4,049	34,567	17,800	2,347	30,923	19,633	32,156	0	0	0	200,712			
	-Weighted Sales	MW.h	44,121	39,604	6,249	53,579	29,785	3,967	47,724	30,104	41,695	0	0	0	296,829			
	-Weighted Purchases	MW.h	36,750	32,988	5,021	45,628	24,683	3,286	41,643	25,916	36,443	0	0	0	252,358			
	Net Entitlement Use																	
	- SPH	MW.h	36,987	36,074	47,782	43,550	45,974	46,013	35,024	47,772	40,129	44,958	43,086	42,407	509,756			
	- PH	MW.h	110,962	108,221	143,346	130,649	137,922	138,040	105,073	143,316	120,388	134,873	129,258	127,220	1,529,267			
	- LLH	MW.h	21,682	30,106	60,687	22,071	47,154	67,847	19,584	40,465	20,983	130,669	81,412	97,017	639,677			
	- Total	MW.h	169,632	174,400	251,815	196,269	231,050	251,900	159,681	231,553	181,500	310,500	253,756	266,644	2,678,700			
	Section 2 - L&R Balance with agreement																	
	Revised Entitlement Reflecting 1/3rd Plant Sale and Entitlement Adjustments																	
	Capacity	MW	319.3	323.9	323.7	323.9	323.6	323.9	323.5	323.6	322.2	316.7	302.3	299.3	318.8			
	Energy	MW.h	121,600	109,267	156,333	132,133	145,067	134,200	114,467	152,267	166,533	199,600	188,200	166,133	1,785,800	525,867	553,933	1,231,867
	Industrial Load																	
	Smelter Load @100%LF	MW	202.0	204.4	207.3	210.0	211.7	212.0	211.2	209.0	206.9	204.7	203.3	201.7	207.0			
	Buffer	MW	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0			
	Reserve on Service to Smelte	MW	9.7	9.8	9.9	10.0	10.1	10.1	10.1	10.0	9.9	9.8	9.7	9.6	9.9			
	Gross Smelter Requirement	MW	226.7	229.2	232.1	235.0	236.8	237.1	236.2	234.0	231.8	229.5	228.0	226.4	231.9			
	Energy Demand	MW.h	150,300	147,200	154,200	151,200	157,500	157,700	141,900	155,500	149,000	152,300	146,400	150,100	1,813,300			
	CPA Entitlement Adjustments to Serve Industrial Load																	
	Allowed 7% Adjustment	MW.h	8,512	7,649	10,943	9,249	10,155	9,394	8,013	10,659	11,657	13,972	13,174	11,629				
	Actual Adjustment	MW.h	2,908	7,649	-2,133	-9,249	10,155	7,107	-8,013	3,233	-11,657		-11,629	11,629	0	0	0	0
	% Adjustment		2.39%	7.00%	-1.36%	-7.00%	7.00%	5.30%	-7.00%	2.12%	-7.00%	0.00%	-6.18%	7.00%				
	50:50 Adjustment	MW.h					2,278	16393	13,329		-32,000	0	-827	827	0	32,000	0	0
	50:50 Account	MW.h	16,000	16,000	16,000	16,000	13,722	-2,671	-16,000	-16,000	16,000	0	827	0				
	Shaped Entitlement Energy	MW.h	124,508	116,916	154,200	122,884	157,500	157,700	119,783	155,500	122,876	199,600	175,744	178,589	1,785,800	557,867	553,933	1,231,867
	Smelter L& R Balance (from entitlement only)																	
	- Capacity	MW	92.6	35.4	91.5	88.9	86.8	86.8	87.3	89.6	90.4	87.2	74.2	72.9	82.0			
	- Energy	MW.h	-25,792	-30,284	0	-28,316	0	0	-22,117	0	-26,124	47,300	29,344	28,489	-27,500			
	Energy Purchases																	
	- Min Take	MW	45.3	45.3	45.3	45.3	45.3	45.3	45.3	45.3	45.3	45.3	45.3	45.3				
	- MAX LLH Purchase	MW.h	49,959	51,643	51,631	53,446	55,707	55,797	47,758	52,188	49,869	53,367	48,754	52,376				
	- Purchase for smelter	MW.h	25,792	30,284	0	28,316	0	0	22,117	0	26,124	0	0	0				
	- MAX Addn HLH Sales	MW.h	37,614	13,372	37,177	33,572	33,941	33,935	32,035	36,408	35,530	-13,216	-168	0				
	- Purchase for trade	MW.h	24,167	13,372	37,177	25,130	33,941	33,935	25,641	36,408	23,745	0	0	0				
	Total Supply (Shaped Entitlement plus Purchase)		174,467	160,572	191,377	176,330	191,441	191,635	167,541	191,908	172,745	199,600	175,744	178,589				
	Entitlement Allocation																	
	Smelter																	
	-Super Peak	MW.h	21,471	20,211	22,029	20,760	21,653	21,681	20,271	22,214	21,286	20,938	20,914	20,636	254,065			
	-Peak	MW.h	64,414	60,632	66,086	62,280	64,960	65,042	60,814	66,643	63,857	62,815	62,743	61,908	762,194			
	-Light Load	MW.h	38,622	36,072	66,086	39,844	70,887	70,977	38,697	66,643	37,733	68,547	62,743	67,557	664,408			
	Sales																	
	-Super Peak	MW.h	0	0	0	0	0	0	0	0	0	8,521	7,294	7,122	22,937			
	-Peak	MW.h	0	0	0	0	0	0	0	0	0	25,563	21,882	21,367	68,812			
	-Light Load	MW.h	0	0	0	0	0	0	0	0	0	13,216	168	0	13,384			
	-Weighted Sales	MW.h	0	0	0	0	0	0	0	0	0	37,882	24,186	27,991	90,059			
	Purchase Allocation																	
	Total Purchase		49,959	43,656	37,177	53,446	33,941	33,935	47,758	36,409	49,869	0	0	0	386,149			
	Smelter																	
	- SPH	MW.h	0	0	0	0	0	0	0	0	0	0	0	0	0			
	- PH	MW.h	0	0	0	0	0	0	0	0	0	0	0	0	0			
	- LLH	MW.h	25,792	30,284	0	28,316	0	0	22,117	0	26,124	0	0	0	132,634			
	-Weighted Smelter Purchase	MW.h	22,181	27,559	0	28,033	0	0	22,339	0	22,205	0	0	0	122,317			
	Sales																	
	- SPH	MW.h	6,042	3,343	9,294	6,283	8,485	8,484	6,410	9,102	5,936	0	0	0	63,379			
	- PH	MW.h	18,126	10,029	27,882	18,848	25,455	25,451	19,231	27,306	17,809	0	0	0	190,137			
	- LLH	MW.h	0	0	0	0	0	0	0	0	0	0	0	0	0			
	- Weighted Trade Sales	MW.h	24,953	14,608	43,032	29,214	42,595	43,013	29,679	41,870	23,092	0	0	0	292,056			
	- Weighted Trade Purchases	MW.h	20,784	12,168	34,574	24,879	35,298	35,632	25,897	36,044	20,183	0	0	0	245,460			
	Net Entitlement Use																	
	- SPH	MW.h	27,513	23,554	31,323	27,043	30,138	30,164	26,682	31,316	27,222	29,459	28,208	27,758	340,381			
	- PH	MW.h	82,540	70,661	93,968	81,128	90,415	90,493	80,045	93,949	81,666	88,378	84,625	83,274	1,021,143			
	- LLH	MW.h	14,455	22,701	28,909	14,714	36,946	37,042	13,056	30,234	13,989	81,763	62,910	67,557	424,276			
	- Total	MW.h	124,508	116,916	154,200	122,884	157,500	157,700	119,783	155,500	122,876	199,600	175,744	178,589	1,785,800			
	Section 3 - Entitlement Reductions, Change in Dispatch & Clean Power Call (CPC) Evaluation																	
	Reduction in BC Hydro's Obligation to Provide Entitlement																	
	- Capacity	MW	159.6	162.0	161.8	161.9	161.8	161.9	161.8	161.8	161.1	158.3	151.1	149.6	159.4			
	- Energy	MW.h	60,800	54,633	78,167	66,067	72,533	67,100	57,233	76,133	83,267	99,800	94,100	83,067	892,900			
	-Weighted Capacity, adjuste	MW	8.0	6.6	8.1	16.2	40.5	40.5	24.3	8.1	4.0	0.0	0.0	3.7	159.9			
	Change in Dispatch (Benefit to BC Hydro)																	
	- SPH	MW.h	9,474	12,520	16,459	16,507	15,836	15,849	8,343	16,456	12,907	15,498	14,878	14,649	169,375			
	- PH	MW.h	28,422	37,559	49,378	49,521	47,507	47,546	25,028	49,367	38,722	46,495	44,633	43,946	508,124			
	- LLH	MW.h	7,227	7,405	31,777	7,357	10,207	30,805	6,528	10,231	6,994	48,907	18,502	29,460	215,401			
	- Total	MW.h	45,124	57,484	97,615	73,385	73,550	94,200	39,898	76,053	58,624	110,900	78,012	88,055	892,900			
	- Delivery Time Weighted	MW.h	45,344	61,450	105,760	84,041	90,111	112,698	45,219	85,824	56,155	86,309	61,862	80,843	915,616			
	CPC Evalaution																	
	Non Freshet Total	MW.h	615,933															
	Freshet Limit	MW.h	205,311	74.1%														
	Non-firm Freshet	MW.h	71,656	25.9%														
	Total Freshet	MW.h	276,967	100.0%														
	CPC Firm																	
	- SPH	MW.h	9,474	12,520	16,459	16,507	15,836	15,849	8,343	16,456	12,907	11,489	11,029	10,859	157,726			
	- PH	MW.h	28,422	37,559	49,378	49,521	47,507	47,546	25,028	49,367	38,722	34,466	33,086	32,576	473,178			
	- LLH	MW.h	7,227	7,405	31,777	7,357	10,207	30,805	6,528	10,231	6,994	36,254	13,715	21,838	190,340			
	- Total	MW.h	45,124	57,484	97,615	73,385	73,550	94,200	39,898	76,053	58,624	82,208	57,829	65,274	821,244			
	- Delivery Time Weighted	MW.h	45,344	61,450	105,760	84,041	90,111	112,698	45,219	85,824	56,155	63,980	45,857	59,927	856,367			
	CPC Non-firm																	
	- SPH	MW.h	0	0	0	0	0	0	0	0	0	4,010	3,849	3,790	11,649			
	- PH	MW.h	0	0	0	0	0	0	0	0	0	12,029	11,547	11,369	34,946			
	- LLH	MW.h	0	0	0	0	0	0	0	0	0	12,653	4,787	7,622	25,061			
	- Total	MW.h	0	0	0	0	0	0	0	0	0	28,692	20,183	22,781	71,656			
	- Delivery Time Weighted	MW.h	0	0	0	0	0	0	0	0	0	22,329	16,005	20,915	59,249			

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	S	T
1		**BCHydro's Waneta Electricity**																	
2																		**Aug-Apr**	**May-Jul**
3		**Month**	**Source / Units**		**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Annual**	**Freshet**	**Draft**
4																			
5		**From Closing through July 2013**																	
6																			
7		**Reduction in Entitlement (Note 1)**																	
8		Capacity	MW		266.5	264.0	261.1	258.2	256.3	256.1	257.0	259.1	259.3	249.0	248.0	264.1	258.2		
9		Energy	MW.h		40,965	23,482	81,259	37,088	76,472	67,715	47,478	84,394	99,965	182,555	124,122	142,252	1,007,747	448,929	558,818
10																			
11		**BC Hydro's Expectation of Teck's Reduction in Entitlement Usage (Note 2)**																	
12		- SPH	MW.h		15,592	16,552	26,536	22,011	25,073	25,056	15,530	26,340	25,505	24,361	24,393	25,837	272,786		
13		- PH	MW.h		46,777	49,657	79,607	66,033	75,220	75,167	46,590	79,019	76,516	73,084	73,178	77,510	818,358		
14		- LLH	MW.h		-42,732	-38,937	1,434	-46,089	-12,329	-4,180	-41,230	-16,465	-33,435	79,209	22,234	49,123	-83,397		
15		- Total	MW.h		19,637	27,272	107,576	41,955	87,965	96,043	20,890	88,894	68,586	176,655	119,805	152,469	1,007,747	448,929	558,818
16																			
17																			
18		**From August 2013 to July 2014**																	
19																			
20		**Reduction in Entitlement**																	
21		Capacity	MW		266.5	264.0	261.1	258.2	256.3	256.1	257.0	259.1	251.5	245.5	225.4	222.5	251.9		
22		Energy	MW.h		40,965	23,482	81,259	37,088	76,472	67,715	47,478	79,965	65,408	163,100	110,207	108,793	901,931	382,100	519,831
23																			
24		**BC Hydro's Expectation of Teck's Reduction in Entitlement Usage**																	
25		- SPH	MW.h		15,601	16,552	26,536	22,011	25,073	25,056	15,530	26,340	18,797	24,019	22,172	21,771	259,458		
26		- PH	MW.h		46,804	49,657	79,607	66,033	75,220	75,167	46,590	79,019	56,391	72,058	66,515	65,313	778,374		
27		- LLH	MW.h		-42,732	-38,937	1,398	-46,089	-12,329	-4,180	-41,230	-19,179	-42,874	62,123	18,669	29,460	-135,900		
28		- Total	MW.h		19,673	27,272	107,540	41,955	87,965	96,043	20,890	86,180	32,314	158,200	107,356	116,544	901,931	382,100	519,831
29																			
30																			
31		**From August 2014 through 31 December 2035**																	
32																			
33		**Reduction in Entitlement**																	
34		Capacity	MW		252.2	256.7	253.4	250.8	248.6	248.7	249.1	251.4	251.5	245.5	225.4	222.5	246.3		
35		Energy	MW.h		35,008	24,349	78,167	37,751	72,533	67,100	35,116	76,133	57,143	163,100	110,207	108,793	865,400	382,100	483,300
36																			
37		**BC Hydro's Expectation of Teck's Reduction in Entitlement Usage**																	
38		- SPH	MW.h		15,516	15,863	25,754	22,790	24,321	24,332	14,753	25,558	18,844	24,019	22,172	21,771	255,691		
39		- PH	MW.h		46,548	47,588	77,261	68,369	72,963	72,997	44,258	76,673	56,531	72,058	66,515	65,313	767,073		
40		- LLH	MW.h		-42,732	-36,251	-5,399	-46,089	-23,733	-3,130	-41,230	-26,178	-42,874	62,123	18,669	29,460	-157,364		
41		- Total	MW.h		19,332	27,200	97,615	45,069	73,550	94,200	17,781	76,053	32,500	158,200	107,356	116,544	865,400	382,100	483,300
42																			
43																			
44		**From 1 January 2036 onwards**																	
45																			
46		**Reduction in Entitlement**																	
47		Capacity	MW		159.6	162.0	161.8	161.9	161.8	161.9	161.8	161.8	161.1	158.3	151.1	149.6	159.4		
48		Energy	MW.h		60,800	54,633	78,167	66,067	72,533	67,100	57,233	76,133	83,267	99,800	94,100	83,067	892,900	276,967	615,933
49																			
50		**BC Hydro's Expectation of Teck's Reduction in Entitlement Usage (Note 3)**																	
51		- SPH	MW.h		9,379	12,395	16,295	16,342	15,677	15,690	8,259	16,291	12,778	15,343	14,729	14,502	167,681		
52		- PH	MW.h		28,138	37,184	48,884	49,026	47,032	47,071	24,777	48,873	38,335	46,030	44,186	43,506	503,043		
53		- LLH	MW.h		7,155	7,331	31,460	7,283	10,105	30,497	6,463	10,129	6,924	48,418	18,317	29,166	213,247		
54		- Total	MW.h		44,673	56,909	96,639	72,651	72,815	93,258	39,499	75,293	58,037	109,791	77,232	87,174	883,971	274,197	609,774
55																			
56																			
57		**Note:**																	
58	1	Under the Waneta Transaction, BC Hydro's obligation to provide entitlement to Teck would be reduced by the amounts shown. Prior to 31 December 2035, these reductions are firm obligations of Teck.																	
59	2	Due to the scheduling flexibility provided under the CPA, the expected reduction in entitlement usage does not necessarily coincide month-by-month with the entitlement reductions.																	
60		This section provides BC Hydro's expectation of how the Waneta Transaction would reduce entitlement usage during the various time periods																	
61	3	After 31 December 2035, BC Hydro will incur one-third of the losses on Line 71. The numbers in this section reflect the reduction in entitlement plus loss compensation that BC Hydro is obligated to provide.																	



41.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.1,
BC Hydro's Waneta Electricity, p. 5-15

In the first paragraph of this section BC Hydro states the levelized unit cost of energy being incurred as a result of the Transaction, including future operating costs and the effects of time of delivery that would result from applying the Energy Weighting Factors presented in an earlier section is $63.1/MW.h based on an eight percent discount rate and $78.6 / MWh based on a ten percent discount rate.

1.41.3 BC Hydro has used a 40-year amortization period. What allowance was made for future capital costs on ongoing maintenance and refurbishment given the current age and state of the facilities.

RESPONSE:

BC Hydro has included its proportionate share of forecast sustaining capital costs and other identified costs in its evaluation of the Waneta Transaction. The forecast expenditure on sustaining capital for 2010 is $1.1 million, and BC Hydro's share would be about $0.4 million. For more detail on forecast capital expenditures, please refer to the response to BCUC IR 1.13.3 and to the spreadsheet provided in the response to BCUC IR 1.41.2.

In addition to costs forecast by Teck, BC Hydro included an allowance for $100 million (in 2008$) of sustaining capital expenditures in 2036 in its evaluation of the transaction.

42.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.2.1,
BC Hydro's F2006 Call for Tenders, pp. 5-16 to5-17

1.42.1 Please explain the derivation of the CPI escalator in Table 5-6.

RESPONSE:

The following response assumes the reference in this IR is to Table 5-8, and not Table 5-6.

Table 5-8 escalates the F2006 Call prices to mid-year 2009 dollars from January 1, 2006 dollars at 2.1 per cent per year.

43.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.2.2,
Alcan 2007 EPA, p. 5-18

1.43.1 Please explain the derivation of the EAP's for the Alcan 2007 EPA in Table 5-10. Are these for the firm component only?

RESPONSE:

An estimated EAP, which as defined is a price measure for firm energy, was calculated, using the framework set out in section 5.2.5.1 of the Filing, for the Alcan 2007 EPA based on information provided in the Alcan 2007 EPA proceeding. The calculation is based on:

- **the contractually firm component (Tier 1 Electricity) only, including both the Long-Term Electricity Purchase Agreement energy quantities and incremental energy quantities as defined in that filing;**
- **the transmission losses and cost of incremental firm transmission values filed in that proceeding;**
- **a credit for contractually non firm energy (Tier 2 Electricity) calculated based on the difference between the then forecast mid market price and the contractual cost of such energy;**
- **a credit for the value of the equichange and coordination services that were identified in that proceeding; and**
- **hourly firm credits of $10.8/MWh and $10.5/MWh, as set out in footnotes 40 and 41 of the Filing, based on the expected energy shaping that was presented in the Alcan 2007 EPA proceeding.**

44.0 Reference: Exhibit B-1, Chapter 5, Market Alternatives and Comparators, sec. 5.3.2.4,
Combined Cycle Gas Turbines, pp. 5-19 to 5-20

1.44.1 Please reconcile the EAP's for the CCGT scenarios in Table 5-12 with those filed in the 2008 LTAP. What changes were made in assumptions for these calculations compared with those filed in the 2007 LTAP.

RESPONSE:

The changes in assumptions made in calculating the EAP of a CCGT compared to those filed in the 2008 LTAP as part of Exhibit B-1-13 are provided in the table below.

Input	2008 LTAP	Waneta Analysis
Cost Estimates	**2008$.**	**2009$.**
Capital costs	**2008 overnight cost estimates.**	**Assumed an In-Service Date (ISD) of 2014 with real escalation of construction costs up to the ISD.**
Gas price	**A 30-year levelized price for the period 2008-2037 was used. 30 years was used as a blanket number to encompass different thermal plants with various project lives.**	**A 25-year levelized price for the period 2014-2038 was used. 25 years corresponds to the estimated project life of a CCGT.**
GHG offset costs	**A 30-year levelized price for the period 2008-2037 was used.**	**A 25-year levelized price for the period 2014-2038 was used.**
CIFT adjuster	**CIFT values published by BCTC in August 2007 were used. Applicable value for a CCGT located in Kelly Lake is approximately $12/kW-year**	**Updated CIFT values published by BCTC in October 2008 were used. Applicable value for a CCGT located in Kelly Lake is approximately $15/kW-year**
Capacity credit	**Calculated based on a unit value of capacity of $25.9/kW-year established for the Resource Options Update of the 2008 LTAP (Exhibit B-1-1, Appendix F11).**	**Calculated based on a unit value of capacity of $34/kW-year for Mica Unit 5 in the 2008 LTAP Chapter 6, and consistent with the value derived for the Clean Power Call and presented in the response to IPPBC IR 1.15.1 (Exhibit B-3) in the 2008 LTAP.**

45.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.2.2, Optimum Sequence Portfolio Analysis, pp. 6-3 to 6-6

1.45.1 Please provide a working excel spreadsheet that calculates the net benefits outlined in Tables 6-2 and 6-3. Please ensure the spreadsheet reflects the intra- and inter-year assumptions used in the calculations, the supply and cost assumptions used in the base portfolio analysis (i.e. portfolio without Waneta), and the supply, cost and other benefits assumptions used in the Waneta portfolio analysis. Include the market price assumptions used for surplus sales / purchases and any scenarios BC Hydro has evaluated.

RESPONSE:

The results presented in Tables 6-2 and 6-3 are based on the results of optimization models used for system operations and resource planning at BC Hydro. These are large computer programs that do not lend themselves to be converted to working spreadsheets.

- **The system operations optimization tool is the Marginal Cost Model. It is used by BC Hydro to optimize the near term operation of the BC Hydro system for domestic needs and trade activity with the goal of maximizing net income.**

  In the Filing, the analysis is based on BC Hydro's May 2009 monthly energy modeling used for BC Hydro's internal operations planning, and includes all inputs and assumptions that were then current as to reservoir and stream flow conditions, maintenance plans, short term load forecasts, and external market conditions.

- **The resource planning tool used is System Optimizer (SO) described in section 5.3.2 of Exhibit B-1 and in the response to BCUC IR 1.154.1 of the 2008 LTAP (Exhibit B-3).**

  In the Filing, the analysis is based on BC Hydro's 2008 Mid Load Forecast. The resource options data is the same as is used in the 2008 LTAP analysis. These options are documented in Appendix F-1 of Exhibit B-1-1 of the 2008 LTAP. The GHG offset, natural gas and electricity market price assumptions are provided in Chapter 5 of the Filing and are the same assumptions as used in the 2008 LTAP.

  SO carries out the optimization analysis by looking at the load/resource balance and trade opportunities within the super-peak, on-peak and off-peak hours for both weekdays and weekends of each month. The model optimally shapes the monthly energy from supply acquisitions such as Waneta into these time periods such that the domestic load is satisfied while maximizing trade revenue. The model does not simulate inter-month or inter-year shaping of energy.

45.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.2.2, Optimum Sequence Portfolio Analysis, pp. 6-3 to 6-6

1.45.2 Please provide a table summarizing the load / resource balance assumptions for the, with and without, Waneta portfolios by year, and the main differences in the sources of supply between the two portfolios by year.

RESPONSE:

Please refer to the response to BCUC IR 1.33.1.

45.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.2.2, Optimum Sequence Portfolio Analysis, pp. 6-3 to 6-6

1.45.3 Please describe and explain what level of sustaining capital for Waneta BC Hydro has assumed in its economic analysis.

RESPONSE:

BC Hydro's estimate of the operating, maintenance and sustaining capital for the first six years, expressed in year of expenditure (nominal) dollars is set out in response to BCUC IR 1.13.3. The forecast through 2036 is provided in the spreadsheet attachment to the response to BCUC IR 1.41.2. An allowance of $100 million (2008 dollars) of sustaining capital expenditure was included in 2036.

The economic analysis set out in section 6.2.2 was completed in constant dollars and the operating, maintenance and sustaining capital cost streams are based on the above identified costs.

45.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.2.2, Optimum Sequence Portfolio Analysis, pp. 6-3 to 6-6

1.45.4 Please describe and explain the value of capacity assumptions BC Hydro has used in its portfolio analysis.

RESPONSE:

The portfolio analysis provided in section 6.2.2 of the Filing compares the cost of two portfolios, one with the Waneta Electricity and one without. Each portfolio is an optimally selected list of resources for a specified scenario of market conditions that, when added to BC Hydro's system, meets its planning criteria. In this type of analysis, no single cost or value of capacity is required or applied.

This analysis is consistent with the analysis in the 2008 LTAP, and recognizes the BCUC's suggestion in the 2007 Alcan EPA Decision (page 99) that BC Hydro compare equivalent portfolios rather than individual resource options that are incomplete substitutes for the resource being acquired.

The SO model calculates the cost of a portfolio of resources to meet a certain scenario. That overall cost reflects the capacity and energy contribution of the existing resources, the resources selected in that portfolio/scenario simulation as well as the net value of trade. The value or benefit of a resource that is being analyzed, such as BC Hydro's Waneta Electricity, is calculated as the difference in net present value cost of a simulation that includes that resource as compared to a simulation that does not include that resource. This would include the net benefit of any deferrals of capacity made possible by the resource.

The net benefit captures the value that is produced through the different resource selections that result, and the corresponding capacity and energy contributions that are provided by the resource that is being tested. Each resource that is selected has a firm energy and dependable capacity contribution and a monthly profile of the energy it provides. The analysis includes both the cost of serving the domestic load and any trade-related costs or benefits that may be available.

45.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.2.2, Optimum Sequence Portfolio Analysis, pp. 6-3 to 6-6

1.45.5 Please confirm the operating, maintenance and sustaining capital cost assumptions used in the analysis. What method / data sources were used to estimate these expenditures? Was any real escalation in expenditures assumed? Given BC Hydro has conducted an analysis in nominal dollars, has BC Hydro assumed at a minimum nominal escalation in its share of operating, maintenance and sustaining capital costs over the period of analysis? If not, why not?

RESPONSE:

Please refer to the response to BCUC IR 1.45.3.

45.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.2.2, Optimum Sequence Portfolio Analysis, pp. 6-3 to 6-6

1.45.6 Please confirm whether BC Hydro has included any terminal value for Waneta or other projects in this analysis beyond the 18-year analysis period.

RESPONSE:

BC Hydro has not included any terminal value beyond the 18-year portfolio analysis period. BC Hydro expects there to be significant additional economic benefit that results from the Waneta Transaction beyond this analysis period.

45.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.2.2, Optimum Sequence Portfolio Analysis, pp. 6-3 to 6-6

1.45.7 Has BC Hydro included any intra-month scheduling value for Waneta in its economic analysis? Please explain whether and how this value is an incremental value relative to the benefits BC Hydro derives under the current Canal Plant Agreement.

RESPONSE:

As described in the response to BCUC IR 1.45.1, BC Hydro has included intra-month scheduling value for Waneta that is simulated based on the six monthly time periods within each month. This type of analysis will pick up some, but not all, of the intra-month scheduling value.

Each base simulation (the simulation without the Waneta Transaction) models capacity and energy that BC Hydro receives from plants associated with the CPA as a result of its rights including those under the CPA. The simulations that include the Waneta Transaction models the capacity and energy that BC Hydro would receive from the plants associated with the CPA as modified by the Waneta Transaction. As a result, the difference between the "with" and "without" cases will include the estimate of the intra-month scheduling benefit of the Waneta Transaction.

45.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.2.2, Optimum Sequence Portfolio Analysis, pp. 6-3 to 6-6

1.45.8 Has BC Hydro included in its economic analysis any costs or benefits associated with the proposed Surplus Power Rights Agreement?

RESPONSE:

Not directly. The Surplus Power Rights Agreement generally would provide BC Hydro with a right to purchase market-priced power and BC Hydro typically already has that option through Powerex trading activities.

The Surplus Power Rights Agreement would impact Teck's ability to dispatch its entitlement and this was considered in the development of the expected monthly and hourly entitlement usage following the Waneta Transaction. Please refer to the response to BCUC IR 1.7.1.1.

It is expected that certain provisions of the Surplus Power Rights Agreement, such as the opportunity to purchase unplanned surplus at attractive prices, would provide some benefits to BC Hydro, but these opportunities would be difficult to predict and were not quantified in the Filing.

46.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.3, Analysis of Estimated Rate Impacts, pp. 6-6 to 6-8

1.46.1 Please provide a working excel spreadsheet showing the underlying calculation of incremental rate increases / decreases in Figure 6-1.

RESPONSE:

Please refer to the response to BCUC IR 1.46.2.

46.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.3, Analysis of Estimated Rate Impacts, pp. 6-6 to 6-8

1.46.2 Please provide a present value calculation of the incremental annual increases and decreases in the revenue requirement to F2027 under an 8 percent and 10 percent discount rate.

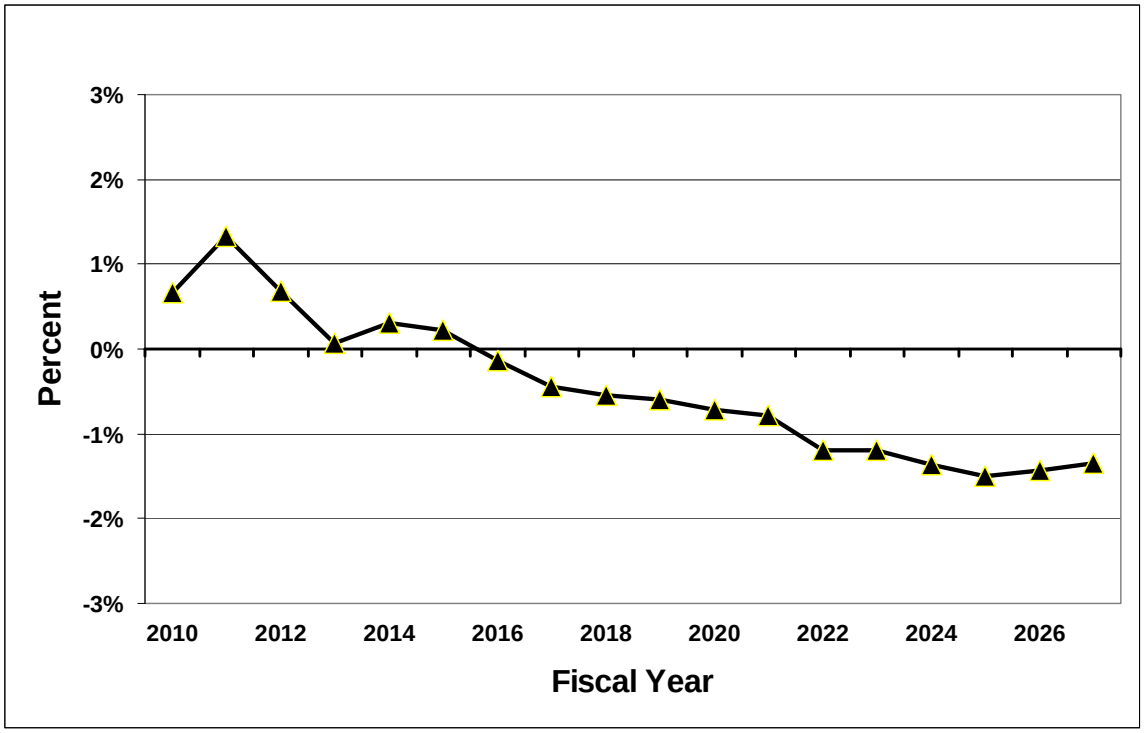
RESPONSE:

Consistent with the BCUC's determinations in the 2006 IEP/LTAP, BC Hydro considers its economic analysis set out in the Filing to be its primary evaluation tool. Near term revenue requirements, the resulting calculated rate impacts, and the longer term trends in these numbers, provide useful information and are all part of what BC Hydro considered in assessing the Waneta Transaction. However, BC Hydro did not consider that determining the net present value of rate impacts over a part of the economic life of the assets would assist this assessment.

The requested calculation yields a positive (beneficial) net present value of the revenue requirement to F2027 (less than half of the assumed life for amortizing the asset) of $167 million and $114 million based on an per cent and 10 per cent nominal discount rate, respectively. For the reason set out above, BC Hydro is not relying on these positive values to support its proposed expenditure on the Waneta Transaction since the economic analysis, elaborated in Chapter 6 of the Filing, is the preferred tool for that purpose.

Attachment 1 to this IR response provides the underlying calculation of the incremental rate increases/decreases in an Excel spreadsheet. The requested net present value calculation and values are set out on lines 17 and 18 of the attachment. Below is an update of the rate impact chart presented as Figure 6-1 in the Filing. The forecast has been updated to incorporate, and more accurately reflect, BC Hydro's current estimate of the financing costs for the Waneta Transaction.

Annual Estimated Incremental Rate Increase/Decrease
Impacts of Waneta Transaction



47.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.4.1 Schedule and Timing Availability, p. 6-9

1.47.1 BC Hydro states the Waneta resource is the only available within BC to fill a resource shortfall in F2013 and F2014. Please confirm the government's self-sufficiency requirement takes effect F2016. Does BC Hydro consider it should pay any premium to acquire a domestic resource prior to this requirement?

RESPONSE:

BC Hydro confirms that the B.C. Government's self-sufficiency requirement becomes mandatory in 2016.

BC Hydro's Waneta Electricity is the only identified new firm long-term supply resource that is available immediately within B.C. with no development risk. As set out in the responses to BCUC IRs 1.28.1 and 1.28.2, there are other resources that do not share these characteristics available to meet the referenced shortfall and, prior to 2016, BC Hydro has applied the maximum market allowance consistent with its planning criteria of 2,500 GWh/year of market purchases in its analysis.

BC Hydro does not believe it is paying any premium to acquire Waneta Electricity prior to the self-sufficiency requirement or beyond.

48.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.4.2, Term, p. 6-9

1.48.1 Does BC Hydro have any explicit evidence concerning the expected remaining useful life of the assets to be acquired?

RESPONSE:

Please refer to the response to BCUC IR 1.15.4.

49.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.4.3, Energy and Capacity Reliability, p. 6-9

1.49.1 BC Hydro suggests the energy and capacity portions of BC Hydro's Waneta Electricity are both physically and financially firm. Would there be situations where Teck could be making up shortfalls with market purchases from outside B.C.? If so, how is the full firm energy and capacity assumed by BC Hydro consistent with SD10?

RESPONSE:

The contractual right that BC Hydro is obtaining with respect to generating unit outages in the Waneta Transaction has value to BC Hydro and its customers, but does not detract from BC Hydro's Waneta Electricity being considered consistent with SD 10.

As identified in Chapter 2 of the Filing, the Waneta generating station has proven to have very high reliability with average forced outage factors well under one per cent. As stated on page 2-3, the forced outage factors and overall plant availability at Waneta compare favourably with similar sized hydroelectric projects owned by BC Hydro.

To the extent there are forced outages, BC Hydro expects that plant and system operations would be managed to minimize or eliminate any potential spill.

The above is consistent with what BC Hydro does with any of its generating facilities, all of which are considered supply sources available to meet any supply conditions that are created by SD 10.

In addition to the above, Teck is taking forced outage risk with respect to the Waneta generating units through 2035. In the event of a unit outage, Teck would have the option of reducing its load or purchasing electricity from the market.

49.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.4.3, Energy and Capacity Reliability, p. 6-9

1.49.2 Please provide an estimate of the firm energy and capacity associated with the resource post 2035 under current water allocations and historical flows (after the Waneta Upgrade Project) after Teck's obligation to assume both unit reliability risk and force majeure risk is removed.

RESPONSE:

After 2035 BC Hydro assumes one-third of the unit reliability risk and force majeure risk associated with Waneta. The impacts of these risks, however, are expected to be minimal under the assumed condition with additional generation capacity provided by WEP.

The firm energy and capacity associated with the Waneta Transaction post-2035 is therefore estimated at 884 GWh/year and 163 MW, respectively. These estimates have been adjusted to include the transmission loss compensation that BC Hydro is obligated to provide.

If WEP were not to be installed, the net risk-adjusted firm energy and capacity amounts would also be higher.

50.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.4.9, Alignment with Government Policy Objectives, p. 6-12

1.50.1 BC Hydro cites government energy objectives and specifically refers to the government's objective to encourage public utilities to reduce GHG emissions. BC Hydro suggests that with this transaction BC Hydro would secure additional electricity that does not emit GHG's. Given this supply already exists and is presumably displacing supplies in other jurisdictions, does the acquisition result in any net reduction in GHG within the WECC? Is it BC Hydro's position that the government's energy objectives apply only to emissions within BC and that effects beyond BC are irrelevant such that the Commission should not weigh them in comparing the public interest impact of two alternatives with different global GHG impacts?

RESPONSE:

BC Hydro's reference to the B.C. Government objectives are in relation to requirements placed on BC Hydro and the future supplies that BC Hydro acquires. By entering into the Waneta Transaction, BC Hydro is acquiring an additional source of electricity that does not produce GHG emissions and, by doing so, is managing its current and future GHG obligations and risks.

It is unclear to BC Hydro whether there would be any medium- to long-term impact of entering into the Waneta Transaction on GHG emissions in the WECC. Each jurisdiction will set its GHG mitigation and renewable energy requirements and presumably utilities will act to implement those requirements with or without the Waneta supply.

51.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.5, Teck's Opportunity Cost, pp. 6-13 to 6-20

1.51.1 Please file in confidence any analysis RBC Capital Markets conducted for BC Hydro regarding Teck's financial situation, the value of the assets to Teck or another purchaser (including cost of capital assumption), and the optimal structure of the transaction.

RESPONSE:

RBC Capital Markets (RBC) was engaged by BC Hydro to assist in the analysis of the Waneta Transaction, including assessment of alternative structures, valuation, negotiation strategy and tactics and support in regulatory approval with respect to any transaction contemplated.

RBC worked very closely with BC Hydro in developing both its understanding of the opportunities available to Teck and models to assess the value of an interest in the Waneta Assets. Periodically, information was presented to a special committee of the Board (Special Committee), which had been formed to follow the assessment and negotiation process, and to the Board. Presentations developed for the Special Committee and the Board, and related discussion, included:

- **review of Teck's financial and strategic position, including options to raise capital in support of its debt reduction initiatives;**
- **alternative transaction structures; and**
- **valuation considerations.**

While delivered in RBC's presentation format, these presentations were developed with legal counsel to BC Hydro, and in certain elements included the views of management and legal counsel in addition to those of RBC.

The evaluation of the Waneta Transaction by BC Hydro, and related work of RBC, evolved over several months. Having had extensive discussion of Teck's financial situation in early meetings, many of the subsequent updates on this aspect of the transaction were verbal. Teck's financial situation improved with the passage of time, as they were able to restructure and later refinance their debt obligations. At the same time, the structural options for a transaction narrowed. Accordingly, the presentations to the Special Committee and the Board became more focused on valuation and the specifics of the structure of the Waneta Transaction.

The culmination of RBC's work was the preparation of a fairness opinion that provided RBC's final assessment of the transaction from a financial perspective. A copy of RBC's fairness opinion is attached.

BC Hydro respectfully asks that it be relieved of the request to file any additional detail of the presentations provided to it by RBC. The basis for this request is that the additional detail sought is not directly probative of the issues before the BCUC in this proceeding but would be harmful to BC Hydro's interest if publicly available.

As described above, RBC's advice was and remains highly sensitive from a commercial perspective. Disclosure of this information could not only prejudice the Waneta Transaction (which remains non-binding), but could also hamper BC Hydro's future negotiations with counterparties by shedding light on its negotiation strategies and analytical tools. While BC Hydro appreciates the BCUC is prepared to receive the information in confidence, it is concerned that under the BCUC's confidentiality guidelines, any party may seek to have the information produced with or without restrictions on circulation and the outcome of any such application cannot be predicted with certainty.

As disclosed in the Filing, BC Hydro has relied on RBC's work to support its conclusion that the Waneta Assets were acquired at a price that takes due regard of Teck's opportunity cost. Disclosure of the fairness opinion provides the BCUC and all parties with confirmation of the nature of the advice BC Hydro received on that issue. Review of the backup for RBC's reasoning as disclosed to BC Hydro's management and Board will not be probative of whether the transaction as proposed serves the public interest.

BC Hydro has relied on its own analysis to conclude that the transaction price is lower than BC Hydro's avoided cost. It is the latter that drives BC Hydro's conclusion that the Waneta Transaction is cost-effective and therefore in the public interest and the information necessary to support that conclusion has been filed in this proceeding.

RBC Capital Markets®

RBC Dominion Securities Inc.
21st Floor, Park Place
666 Burrard Street
Vancouver, BC V6C 3B1
Telephone: (604) 257-7110

June 17, 2009

The Board of Directors
British Columbia Hydro and Power Authority
333 Dunsmuir Street, 18th floor
Vancouver, BC V6B 5R3

To the Board:

RBC Dominion Securities Inc. ("RBC"), a member company of RBC Capital Markets, understands that BC Hydro and Power Authority ("BC Hydro") intends to enter into a non-binding term sheet (the "Term Sheet") that outlines the key terms and conditions of agreements that BC Hydro intends to negotiate and enter into with Teck Resources Ltd. ("Teck") regarding the purchase by BC Hydro of a 1/3rd interest (the "Waneta Interest") in the assets and entitlements of the Waneta hydroelectric facility ("Waneta") and related co-ownership and other agreements governing operation of Waneta (the "Transaction").

BC Hydro has retained RBC to provide advice and assistance to BC Hydro in evaluating the Transaction, including the preparation and delivery to the board of directors of BC Hydro (the "Board") of RBC's opinion (the "Fairness Opinion") as to the fairness of the consideration to be paid under the Transaction, from a financial point of view, to BC Hydro. RBC has not prepared a valuation of the Waneta Interest, BC Hydro or any of their respective securities or assets and the Fairness Opinion should not be construed as such.

Engagement

BC Hydro initially contacted RBC regarding a potential advisory assignment in early March 2009, and RBC was formally engaged through an agreement between BC Hydro and RBC (the "Engagement Agreement") dated March 24, 2009. The terms of the Engagement Agreement provide that RBC is to be paid a fee for its services as financial advisor, including fees that are contingent on completion of the Transaction or certain other events. In addition, RBC is to be reimbursed for its reasonable out-of-pocket expenses and to be indemnified by BC Hydro in certain circumstances. RBC consents to the inclusion of the Fairness Opinion in its entirety and a summary thereof in any application or submission with the British Columbia Utilities Commission (the "BCUC") related to any approvals sought in conjunction with the Transaction.

RBC acts as a trader and dealer, both as principal and agent, in major financial markets and, as such, may have had and may in the future have positions in securities of the Province of British Columbia (the "Province"), Teck or any of their respective associates or affiliates and, from time to time, may have executed or may execute transactions on behalf of such companies or clients for which it received or may receive compensation. As an investment dealer, RBC conducts research on securities and may, in the ordinary course of its business, provide research reports and investment advice to its clients on investment matters, including with respect to the Province, Teck or the Transaction.

Credentials of RBC Capital Markets

RBC is one of Canada's largest investment banking firms, with operations in all facets of corporate and government finance, corporate banking, mergers and acquisitions, equity and fixed income sales and trading and investment research. RBC Capital Markets also has significant operations in the United States and internationally. The Fairness Opinion expressed herein represents the opinion of RBC and the form and content herein have been approved for release by a committee of its directors, each of whom is experienced in merger, acquisition, divestiture and fairness opinion matters.

Scope of Review

In connection with our Fairness Opinion, we have reviewed and relied upon or carried out, among other things, the following:

1. the most recent draft, dated June 15, 2009, of the Term Sheet;
2. certain financial and operating information provided by Teck with respect to Waneta;
3. financial models prepared by management of BC Hydro relating to the Waneta Interest;
4. audited financial statements of Teck for each of the five years ended December 31, 2008;
5. the unaudited interim reports of Teck for the quarter ended March 31, 2009;
6. annual reports of Teck for each of the two years ended December 31, 2008;
7. the Notice of Annual Meeting of Shareholders and Management Information Circulars of Teck for each of the two years ended December 31, 2008;
8. annual information forms of Teck for each of the two years ended December 31, 2008;
9. discussions with senior management of BC Hydro and Teck;
10. discussions with BC Hydro's auditors and legal counsel;
11. the BC Hydro annual report for the year ended March 31, 2008;
12. the Canal Plant Agreement;
13. public information relating to the business, operations, financial performance and stock trading history of selected public companies considered by us to be relevant;
14. public information with respect to other transactions of a comparable nature considered by us to be relevant;
15. public information regarding the power industry;
16. representations contained in certificates addressed to us, dated as of the date hereof, from senior officers of BC Hydro and Teck, respectively as to the completeness and accuracy of the information upon which the Fairness Opinion is based; and
17. such other corporate, industry and financial market information, investigations and analyses as RBC considered necessary or appropriate in the circumstances.

RBC has not, to the best of its knowledge, been denied access by BC Hydro to any information requested by RBC.

Assumptions and Limitations

With the Board's approval and as provided for in the Engagement Agreement, RBC has relied upon the completeness, accuracy and fair presentation of all of the financial and other information, data, advice, opinions or representations obtained by us from public sources, or provided to us by BC Hydro, Teck or their representatives or advisors or otherwise obtained by us pursuant to the Engagement Agreement (collectively, the "Information"). The Fairness Opinion is conditional upon such completeness, accuracy and fair presentation of such Information. Subject to the exercise of professional judgment and except as expressly described herein, we have not attempted to verify independently the completeness, accuracy or fair presentation of any of the Information.

Senior officers of BC Hydro have represented to RBC in a certificate (the "BC Hydro Certificate") delivered as of the date hereof, among other things, that (i) the Information (as defined above) provided orally by, or in the presence of, certain officers or employees of BC Hydro or in writing by BC Hydro or any of its subsidiaries or their respective agents to RBC for the purpose of preparing the Fairness Opinion was, at the date the Information was provided to RBC, and is at the date hereof complete, true and correct in all material respects, and did not and does not contain any untrue statement of a material fact in respect of BC Hydro, its subsidiaries, the Transaction or, to the best of their knowledge (without having made inquiry), the Waneta Interest and did not and does not omit to state a material fact in respect of BC Hydro, its subsidiaries, the Transaction or, to the best of their knowledge (without having made inquiry), the Waneta Interest necessary to make the Information or any statement contained therein not misleading in light of the circumstances under which the Information was provided or any statement was made; and that (ii) since the dates on which the Information was provided to RBC, except as disclosed in writing to RBC, there has been no material change, financial or otherwise, in the financial condition, assets, liabilities (contingent or otherwise), business, operations or prospects of BC Hydro, any of its subsidiaries or, to the best of their knowledge (without having made inquiry), the Waneta Interest and no material change has occurred in the Information or any part thereof which would have or which would reasonably be expected to have a material effect on the Fairness Opinion.

Senior officers of Teck have represented to RBC in a certificate (the "Teck Certificate") delivered as of the date hereof, among other things, that (i) the Information (as defined in the Teck Certificate) provided orally by, or in the presence of, an officer or employee of Teck or in writing by Teck or any of its subsidiaries or their respective agents to RBC (whether directly or indirectly through BC Hydro) regarding the Acquired Interest was at the date the Information was provided by Teck, and is at the date hereof, free from material misstatements of fact, and to the extent not based on fact was prepared on the basis of assumptions considered reasonable at the time of its preparation; and that (ii) since the dates on which the Information was provided by Teck there has been no material change, financial or otherwise, in the financial condition, assets, liabilities (contingent or otherwise), business, operations of the Waneta Interest and no material change has occurred in the Information or any part thereof which would have or which would reasonably be expected to have a material effect on the Fairness Opinion.

In preparing the Fairness Opinion, RBC has made several assumptions, including that all of the conditions required to implement the Transaction will be met.

The Fairness Opinion is rendered on the basis of securities markets, economic, financial and general business conditions prevailing as at the date hereof and the condition and prospects, financial and otherwise, of BC Hydro and its subsidiaries and affiliates, and Waneta as they were reflected in the Information and as they have been represented to RBC in discussions with management of BC Hydro and Teck. In its analyses and in preparing the Fairness Opinion, RBC made numerous

assumptions with respect to industry performance, general business and economic conditions and other matters, many of which are beyond the control of RBC or any party involved in the Transaction.

The Fairness Opinion has been provided for the use of the Board and may not be used by any other person or relied upon by any other person other than the Board without the express prior written consent of RBC. The Fairness Opinion is given as of the date hereof and RBC disclaims any undertaking or obligation to advise any person of any change in any fact or matter affecting the Fairness Opinion which may come or be brought to RBC's attention after the date hereof. Without limiting the foregoing, in the event that there is any material change in any fact or matter affecting the Fairness Opinion after the date hereof, RBC reserves the right to change, modify or withdraw the Fairness Opinion.

RBC believes that its analyses must be considered as a whole and that selecting portions of the analyses or the factors considered by it, without considering all factors and analyses together, could create a misleading view of the process underlying the Fairness Opinion. The preparation of a fairness opinion is a complex process and is not necessarily susceptible to partial analysis or summary description. Any attempt to do so could lead to undue emphasis on any particular factor or analysis.

Fairness Conclusion

Based upon and subject to the foregoing, RBC is of the opinion that, as of the date hereof, the consideration to be paid under the Transaction is fair from a financial point of view to BC Hydro.

Yours very truly,

RBC Dominion Securities Inc.

RBC DOMINION SECURITIES INC.

51.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.5, Teck's Opportunity Cost, pp. 6-13 to 6-20

1.51.2 Please file in confidence a working spreadsheet showing the calculation of values provided in Table 6-4 and included all input assumptions.

RESPONSE:

Please refer to the spreadsheet included in the response to BCUC IR 1.41.2. BC Hydro is making no request for confidentiality for this spreadsheet.

52.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.6, Risk Analysis, pp. 6-13 to 6-27

1.52.1 Please confirm what discount rate and term was used to derive the Present Values in Table 6-5.

RESPONSE:

The present values in Table 6-5 are based on an eight per cent nominal discount rate and a term of 40 years.

52.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.6, Risk Analysis, pp. 6-13 to 6-27

1.52.2 BC Hydro indicates the Operating Agreement would contemplate thresholds on operating and sustaining costs that can be incurred at the plant above which BC Hydro would have to be in agreement for the costs to proceed. While this appears to give BC Hydro some control over decisions, please explain how it would reduce the risk to ratepayers arising from a real need to increase operating and sustaining capital requirements to maintain the physical asset.

RESPONSE:

It will not reduce this risk. Ratepayers will face the ongoing financial risk associated with BC Hydro's one-third ownership interest in the same way they would for any other contractual commitment made by BC Hydro.

52.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.6, Risk Analysis, pp. 6-13 to 6-27

1.52.3 Has BC Hydro included any explicit allowance, over and above normal operating and sustaining capital expenditures, to resolve the cavitation issues on Unit 3 in its economic analysis, or a sensitivity analysis?

RESPONSE:

Yes, based on advice from Teck, BC Hydro included a $12 million total expected sustaining capital expenditure (BC Hydro's portion is $4 million) for the Unit 3 upgrade in 2015. Please refer to the response to BCUC IR 1.13.3.

52.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.6, Risk Analysis, pp. 6-13 to 6-27

1.52.4 Please explain why a 10 percent increase in sustaining capital, operating expenses, and water rentals over the life of the transaction is a realistic representation of risk to ratepayers.

RESPONSE:

The information that BC Hydro presented on the risks related to a ten per cent increase in sustaining capital, operating expenses and water rental fees was intended to quantify the sensitivity of the overall cost (in $/MWh) of the Waneta Transaction to changes in the annual costs, not to suggest that a ten per cent increase was the maximum ratepayer exposure. (To clarify, the risk analysis assumed an increase of ten per cent for all annual costs including operating, maintenance, routine sustaining capital, taxes, insurance and water fees.)

The results indicate that the overall Waneta Transaction cost is relatively insensitive to changes in annual costs – i.e., that a ten per cent increase in annual costs (including a $10 million increase in the $25 million transaction cost estimate) translates into a three per cent increase in overall $/MWh cost.

52.0 Reference: Exhibit B-1, Chapter 6, Economic Analysis, sec. 6.6, Risk Analysis, pp. 6-13 to 6-27

1.52.5 Please compare the real levelized sustaining and operating expenditures (on a $/MWh of average energy basis) assumed by BC Hydro in its base case analysis of the economic value of the transaction to the current average sustaining and operating expenditures on BC Hydro's heritage assets (on a comparable $/MWh of average energy basis).

RESPONSE:

As provided in the attached worksheet, the current sustaining capital and operating unit costs for BC Hydro's Heritage hydro assets are approximately $4.4/MWh and $2.7 /MWh, respectively. In comparison, the sustaining capital and operating costs assumed by BC Hydro in its analysis of the Waneta Transaction are estimated to be $1.5/MWh and $1.9/MWh, respectively. The differences in the values likely result from the fact that Waneta was recently upgraded while many of the BC Hydro Heritage hydro assets either are in the process of being upgraded, or are expected to be upgraded in the near future.

53.0 Reference: Exhibit B-1, Chapter 7
Aboriginal Consultation

In 2003, the British Columbia Environmental Assessment Office ("EAO") issued an environmental assessment certificate for the Waneta Hydroelectric Expansion Project. The Assessment Report prepared by the EAO describes the First Nations setting and discusses the potential effects of the project on asserted aboriginal rights and title.

1.53.1 Please provide a copy of the EA certificate decision and all documents related to the EA certificate decision.

RESPONSE:

Please refer to Attachment 1 of this IR from the attached CD.

IN THE MATTER OF
THE *ENVIRONMENTAL ASSESSMENT ACT*, S.B.C. 2002, c. 43 (THE "ACT")

AND

IN THE MATTER OF
AN APPLICATION FOR AN ENVIRONMENTAL ASSESSMENT CERTIFICATE
(THE "APPLICATION")

BY

WANETA EXPANSION POWER CORPORATION
(THE "PROPONENT")

FOR THE

WANETA HYDROELECTRIC EXPANSION PROJECT (THE "PROJECT")

ENVIRONMENTAL ASSESSMENT CERTIFICATE #E07-04

Whereas:

A. The Project is a 435 megawatt hydroelectric power generation facility that includes an intake approach channel, two power tunnels, surface powerhouse containing two turbine-generator units, tailrace channel, 10 km 230 kilovolt transmission line, construction site and temporary facilities, excavation materials disposal areas, and access roads;

B. The Proponent proposes to design, construct and operate the Project adjacent to the Waneta Dam and Waneta Generating Station (WGS) owned by Teck Cominco Metals Ltd. ("TCML") on the Pend d'Oreille River near its confluence with the Columbia River in southern British Columbia, approximately 800 metres north of the Canada-United States border;

C. The Project constitutes a reviewable project pursuant to Part 4 of the Reviewable Project Regulation (B.C. Reg. 370/02);

D. On December 30, 2002, the Executive Director of the Environmental Assessment Office (EAO), in accordance with section 4(1)(a) of the Act, delegated certain statutory and regulatory powers to a Project Assessment Director;

E. On June 12, 2003, the Project Assessment Director issued an Order under section 10(1)(c) of the Act, stating that the Project requires an Environmental Assessment Certificate (Certificate);

F. On September 22, 2003, the Project Assessment Director issued an Order under section 11 of the Act, setting the scope, procedures and methods for the environmental assessment of the Project;

G. On March 21, 2006, the Executive Director, in accordance with section 4(1)(a) of the Act, delegated certain statutory and regulatory powers to another Project Assessment Director;

H. On April 26, 2006, the Project Assessment Director issued an Order under section 13 of the Act, amending certain provisions of the section 11 Order;

I. On June 8, 2006, the Project Assessment Director accepted for review the Application filed by the Proponent for a Certificate for the Project, and established a public comment period for the Application;

J. On June 8, 2006, the Project Assessment Director determined that the notification and consultation measures undertaken and proposed by the Proponent for both the public and First Nations were adequate;

K. On June 8, 2006, the Project Assessment Director accepted for concurrent review under the Act, the applications filed by the Proponent for a water licence under the *Water Act* and Crown land tenure under the *Land Act*;

L. On November 16, 2006, the Project Assessment Director suspended the 180-day time limit for completion of the review of the Application under section 24(2) of the Act, and required the Proponent to provide additional information to complete the review;

M. On February 5, 2007, the Project Assessment Director resumed the 180-day time limit for completion of the review of the Application under section 24(2) of the Act;

N. On February 6, 2007, the Minister of Environment issued an Order under section 30 of the Act, suspending the assessment of the Project, the 180-day time limit referred to in section 3 of the Prescribed Time Limits Regulation, B.C. Reg. 372/2002, and the time limit referred to in section 6(2)(b) of the Public Consultation Policy Regulation, B.C. Reg. 373/2002;

O. In October 2007, the Minister of Environment repealed the Order under section 30 of the Act, thus resuming the assessment of the Project, the 180-day time limit referred to in section 3 of the Prescribed Time Limits Regulation, B.C. Reg. 372/2002, and the time limit referred to in section 6(2)(b) of the Public Consultation Policy Regulation, B.C. Reg. 373/2002;

P. The Application was made available for review by the public and by representatives from federal, provincial and local government agencies, American federal and state agencies, and the Ktunaxa Nation Council and Okanagan Nation Alliance;

Q. The Project Assessment Director prepared a report on the potential effects of the Project, entitled the "Waneta Hydroelectric Expansion Project Assessment Report" (Assessment Report);

R. The Executive Director has referred the Application, the Assessment Report, and Recommendations of the Executive Director and Reasons for Recommendations pursuant to section 17 of the Act, to the Minister of Environment (Minister) and the Minister of Energy, Mines and Petroleum Resources, (hereafter the Ministers); and,

S. The Ministers have considered the Application, the Assessment Report, and the Recommendations of the Executive Director and Reasons for Recommendations.

Now Therefore,

The Ministers, pursuant to section 17(3) of the Act, hereby issue this Certificate to the Proponent for the Project, subject to the following conditions (Conditions):

Conditions

1. The Proponent must cause the Project to be designed, located, constructed and operated in accordance with the Conditions of this Certificate, the documents listed in Schedules A and B, and must comply with all of the Conditions of this Certificate to the reasonable satisfaction of the Minister.

2. Where in the reasonable opinion of the Minister, there is a conflict or inconsistency between any of the documents listed in Schedule A, Condition 1 must be interpreted so that the contents of the later dated document will vary, repeal, rescind, or supersede, as the case may be, the contents of earlier dated documents listed in Schedule A.

3. Where, in the reasonable opinion of the Minister, there is a conflict or inconsistency between any of the documents listed in Schedule A and the documents listed in Schedule B, Condition 1 must be interpreted so that Schedule B will vary, repeal, rescind or supersede, as the case may be, the earlier dated documents listed in Schedule A.

4. Where, in the reasonable opinion of the Minister, there is a conflict or inconsistency between Schedules A or B and the Conditions which follow, these Conditions must take precedence over and supersede the relevant provision(s) of Schedules A or B.

5. Despite Condition 1 above, if prior to one year following the commencement of commercial power production from the Project, the Proponent proposes a material change to the design, location, construction or operation of the Project as described in the documents listed in Schedules A or B, and the change may, in the opinion of the Executive Director, have the potential for significant adverse effects, the Proponent must then provide to the Executive Director:
   a) an application in writing to amend the Certificate pursuant to section 19(1) of the Act; and,
   b) plans, analysis, records and other information necessary for an effective assessment by the Executive Director of the proposed change.

6. Prior to start of construction of the Project, the Proponent shall enter into an agreement, acceptable to the Comptroller of Water Rights ("Comptroller"), with TCML to use water in the Project that is licensed for use in WGS.

7. Further to the agreement referenced in Condition 6, whenever water licensed for use in WGS is used in the Project, the Proponent shall ensure water discharges shall be as follows:
   a) for mean daily flows below 566 cms, a minimum continuous 6-hour night time flow from June 1 to July 31 of 142 cms, and a minimum continuous day-time flow of 283 cms; and,
   b) for mean daily flows above 566 cms, a minimum continuous flow from June 1 to July 15 of 566 cms.

8. The water discharges referred to in Condition 7 may be adjusted or modified to the satisfaction of the Comptroller and Fisheries and Oceans Canada for the following reasons:
   a) the cumulative duration of low flows falling to 142 cms is longer than predicted, or the observed near-bottom velocities are on average less than modeled predictions based on the accuracy of flow pattern predictions for the Project monitored through one complete spawning/incubation season after commencement of commercial power production;
   b) a statistically significant increase in egg predation related to the change of flows after commencement of operations based on egg predation field sampling during the annual white sturgeon spawning period, monitored for six years;
   c) the results of the Proponent's monitoring program show negative project related effects on white sturgeon not predicted in the Application; or
   d) new scientific data demonstrates presently unknown harm to white sturgeon from Boundary Release flow-through associated with the Project; and,
   e) written notice is provided by either the Proponent, the Comptroller or Fisheries and Oceans Canada of a reasonable basis to conclude that unexpected harm may occur to white sturgeon as a result of the water discharge in Condition 7 and a change in these water discharges can be expected to mitigate or remedy unexpected effects or harm.

9. The Proponent must participate to the satisfaction of the Comptroller in Water Use Plans, and Plan revisions, involving all power licensees on the Pend d'Oreille River in British Columbia.

10. Further to Condition 9, the Proponent must implement changes to Operating Procedures directed by the Comptroller in accordance with Water Use Plans and Plan revisions.

11. The Proponent must prepare or cause to be prepared an Environmental Management Plan (EMP), Environmental Work Plans (EWPs) and Task Plans (TPs) in the Owner's Commitments and Owner's Environmental Requirements for Construction (OERC), in accordance with the commitments made in the documents listed in Schedule B.

12. The Proponent must provide the EMP to the Comptroller and the Regional Managers, Environmental Protection and Stewardship Divisions, Ministry of Environment, for approval prior to the start of construction of the Project.

13. Further to Condition 12, the Proponent must provide any amendments to the approved EMP and the OERC to the Comptroller, the Regional Managers, Environmental Protection and Stewardship Divisions, Ministry of Environment, and with respect to the OERC, Section B, the District Manager, Ministry of Transportation, for approval prior to construction of those portions of the Project related to the amendments sought.

14. The Proponent upon request by the Comptroller or the Regional Managers, Environmental Protection and Stewardship Divisions, Ministry of Environment, or the District Manager, Ministry of Transportation, for specific EWPs must provide the EWPs to them for information prior to the start of construction activities related to those EWPs.

15. The Proponent must implement the EMP, EWPs and TPs to the satisfaction of the Regional Managers, Environmental Protection and Stewardship Divisions, Ministry of Environment, the Comptroller and the District Manager, Ministry of Transportation.

16. Notwithstanding wording in the documents listed in Schedule B, the Proponent must perform or cause to be performed to the satisfaction of the Executive Director, EAO, each and every commitment or requirement in Schedule B.

17. The Proponent must submit to the Executive Director reports on the status of compliance with the Conditions of this Certificate, and the Owner's Commitments made in Schedule B, at the following points in Project development:

    a) one month prior to the start of construction of the Project, for all Conditions and commitments;

b) one month after commercial power production commences, for all Conditions and commitments;
c) one year after commercial power production commences, for all Conditions and commitments; and,
d) at other times, if required by the Executive Director, either for all Conditions and commitments, or for selected Conditions and commitments, as specified by the Executive Director.

18. This Certificate is of no force or effect until signed by the Ministers.

19. This Certificate does not constitute a permit, licence, approval or any other authority required under any other enactment.

20. The Proponent, except in connection with granting security to Project lenders or other financing entities or financing facilities, must obtain the written consent of the Minister, such consent not to be unreasonably withheld or delayed, prior to disposing, whether legally, beneficially or otherwise, of:

a) this Certificate, or any right, title or interest conferred by this Certificate; or
b) the Project.

Duration of Certificate

21. The Proponent must have, in the reasonable opinion of the Minister, substantially started the construction of the Project within five years of the date of issue of this Certificate, otherwise this Certificate expires.

Suspension, Cancellation and Amendment of Certificate

22. This Certificate may be subject to cancellation, suspension in whole or in part, amendment, or the attachment of new Conditions, for any of the following reasons:

a) the Minister has reasonable and probable grounds to believe that the Proponent is in default of:

i. an Order of the Courts under section 35(2), 45 or 47 of the Act;
ii. an Order of the Minister made under section 34 or 36 of the Act; or,
iii. one or more requirements or Conditions of this Certificate; or

b) the Proponent or its officers or employees, when acting on behalf the Proponent, have been convicted of an offence under the Act, with respect to the Project.

The Conditions of this Certificate are agreed to by the Proponent this

4th day of October, 2007

Victor Jmaeff
Vice President, Power Supply and Marketing
Waneta Expansion Power Corporation

Honourable Barry Penner
Minister of Environment

Honourable Richard Neufeld
Minister of Energy, Mines and
Petroleum Resources

Issued this 13th day of November, 2007, in Victoria, British Columbia.

SCHEDULE A

WANETA HYDROELECTRIC EXPANSION PROJECT (THE "PROJECT")

1. Volume 1 – Main Document – Environmental Assessment Certificate Application for the Waneta Hydroelectric Expansion Project, submitted by Waneta Expansion Power Corporation (Proponent) to Brian Murphy (EAO) May 2006.

2. Volume 2 – Background Reports: Aquatic and Terrestrial Resources and Modelling – Environmental Assessment Certificate Application for the Waneta Hydroelectric Expansion Project, submitted by Waneta Expansion Power Corporation (Proponent) to Brian Murphy (EAO) May 2006.

3. Volume 3 – Background Reports: Land Use Investigations and Other – Environmental Assessment Certificate Application for the Waneta Hydroelectric Expansion Project, submitted by Waneta Expansion Power Corporation (Proponent) to Brian Murphy (EAO) May 2006.

4. Waneta Expansion Power Corporation – Ktunaxa Nation Consultation: Record of Communication, Consultation and Accommodation, March 2006, Environmental Assessment Certificate Application, Appendix 10 F of Volume 1, Section 10.

5. Waneta Expansion Power Corporation – Okanagan Nation Consultation: Record of Communication, Consultation and Accommodation, March 2006, Environmental Assessment Certificate Application, Appendix 10 G of Volume 1, Section 10.

6. Letter dated July 26, 2006, from Bill Freeman (Proponent) to John Krebbs (Columbia Basin Fish and Wildlife Compensation Program) in response to comments regarding the Project.

7. Letter dated July 26, 2006, from Bill Freeman (Proponent) to Martin Hlavacek (Calgary, Alberta) in response to comments regarding the Project.

8. Letter dated July 26, 2006, from Bill Freeman (Proponent) to Chuck Chatten (Nelson, BC) in response to comments regarding the Project.

9. Letter dated July 26, 2006, from Bill Freeman (Proponent) to John Gwilliam (Trail Wildlife Association) in response to comments regarding the Project.

10. Letter dated July 26, 2006, from Bill Freeman (Proponent) to Fred Buckley (Trail, BC) in response to comments regarding the Project.

11. Report dated August 31, 2006, from Bill Freeman (Proponent) to Brian Murphy (EAO) titled "Response to Review Period Questions and Comments from the Public, First Nations and Agencies."

12. Report dated September 15, 2006, and titled "Report on Communication and Consultation Activities with the Public and the First Nations."

13. Fax dated September 22, 2006, from Bill Freeman (Proponent) to Brian Murphy (EAO) providing responses to comments dated August 18, 2006, from Jay Johnson and Heidi McGregor (Okanagan Nation Alliance) regarding the Environmental Assessment Certificate Application.

14. Fax dated September 22, 2006, from Bill Freeman (Proponent) to Brian Murphy (EAO) providing responses to comments dated September 12, 2006, from Bill Green (Canadian Columbia River Inter-tribal Fisheries Commission) on behalf of Ktunaxa Nation Council, regarding the Environmental Assessment Certificate Application.

15. Waneta Expansion Power Corporation's Responses to Questions and Comments (Round 2) from First Nations and Government Agencies dated September 29, 2006, regarding the Environmental Assessment Certificate Application.

16. Waneta Expansion Power Corporation presentation to the Fisheries Working Group on October 5, 2006, on the Waneta Expansion Power Corporation Proposed Approach for Compensating Shallow Water Effects and White Sturgeon and Waneta Expansion Flow-Through Effects – A Review Of Evidence And Hypotheses.

17. Letter dated October 24, 2006, from Bruce Duncan (Columbia Power Corporation) to Pieter Bekker (Ministry of Environment) in response to Mr. Bekker's letter regarding BC Hydro's draft Seven Mile Water Use Plan and Order.

18. Document titled "Pre-Feasibility Assessment and Conceptual Design for Shallow Water Habitat Compensation Related to the Waneta Expansion Project", November 2006.

19. Letter dated December 1, 2006, from Bill Freeman (Proponent) to Chris Morgan (Ministry of Environment) in response to comments regarding coordinated power operations and concerns related to water licensees, as outlined in a letter dated September 19, 2006, to Brian Murphy (EAO).

20. Letter dated December 4, 2006, from Bill Freeman (Proponent) to Berni Claus (Environment Canada) in response to comments regarding accidents and malfunctions and terrestrial wildlife, submitted to Steve McNaughton (EAO) by email on November 21, 2006, and by letter from Dr. Christine Bishop to Brian Murphy (EAO) on November 27, 2006.

21. Letter dated December 13, 2006, from Bill Freeman (Proponent) to Bill Green (Canadian Columbia River Inter-tribal Fisheries Commission) in response to comments submitted to Steve McNaughton (EAO) on November 26, 2006, on behalf of the Ktunaxa National Council, regarding the Owner's Commitments Table and Owner's Environmental Requirements for Construction.

22. Letter dated December 15, 2006, from Bill Freeman (Proponent) to Berni Claus (Environmental Canada) in response to CWS/STB comments of December 8, 2006.

23. Letter dated December 19, 2006, from Llewellyn Mathews (Proponent) to Brian Murphy (EAO) in response to questions regarding whether the Proponent's shallow water habitat compensation proposal could increase fish stranding, with attached letter dated December 18, 2006, from Golder Associates to Llewellyn Mathews.

24. Letter dated December 19, 2006, from Pieter Bekker (Ministry of Environment, Water Stewardship Division) to Darren Sherbot, BC Hydro, Bruce Duncan, Columbia Power Corporation, and Richard Deane, Teck Cominco, and copied to Brian Murphy (EAO) in response to questions regarding the timing of the future review of the Seven Mile Water Use Plan.

25. Email dated January 17, 2007, from Llewellyn Mathews (Proponent) to Brian Murphy (EAO) noting revisions to the Proponent's shallow water habitat compensation proposal, with attached document Pre-Feasibility Assessment and Conceptual Design for Shallow Water Habitat Compensation, November 2006, revised January 17, 2007.

26. Email dated January 22, 2007, from Bill Freeman (Proponent) to Steve McNaughton (EAO) regarding monitoring related to the western skink.

27. The Proponent's Supplemental Analysis – Waneta Expansion Project EACA Review, June 2007, Analysis of the Potential for Boundary Release Flow-Through to Affect White Sturgeon Spawning/Incubation Success.

SCHEDULE B

WANETA HYDROELECTRIC EXPANSION PROJECT (THE "PROJECT")

1. Owner's Commitments, Revised, September 28, 2007 (Waneta Hydroelectric Expansion Project, Environmental Assessment Certificate Application, Volume 1, Section 11, Appendix 11A).

2. Owner's Environmental Requirements for Construction (OERC), Sections A-G, Revision 2, January 15, 2007 (Waneta Hydroelectric Expansion Project, Environmental Assessment Certificate Application, Volume 1, Section 9, Appendix 9A).

The above documents can be accessed through the EAO Project Information Centre website.

BRITISH COLUMBIA
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INFORMATION BULLETIN

For Immediate Release
2007ENV0124-001452
Nov. 13, 2007

Ministry of Environment

WANETA HYDROELECTRIC EXPANSION PROJECT APPROVED

VICTORIA – Waneta Expansion Power Corporation (the proponent) has received an environmental assessment (EA) certificate for a new powerhouse adjacent to the existing Waneta Dam on the Pend d'Oreille River. Environment Minister Barry Penner and Energy, Mines and Petroleum Resources Minister Richard Neufeld made their decision to grant the EA certificate after considering the details of a comprehensive review led by B.C.'s Environmental Assessment Office (EAO).

The project consists of the construction and operation of a new 435-megawatt hydroelectric power plant and a 10-kilometre long, 230-kilovolt transmission line.

The new power plant, expected to be in-service by 2011, will provide more than 700 gigawatt-hours per year of renewable energy, the equivalent energy for more than 70,000 households, without the need for new dam construction, new reservoir formation or additional flooding of existing reservoirs. The project will reduce the amount spilled at the existing Waneta Dam and therefore reduce total gas pressure downstream, improving Columbia River water quality to the benefit of aquatic species.

The project is consistent with the B.C. government's goal to reduce greenhouse gas emissions while contributing to the Energy Plan's commitment to make British Columbia electricity self-sufficient by 2016.

In addition to the provincial environmental assessment process, the proposal also triggered an environmental assessment under the Canadian Environmental Assessment Act, so the EAO and federal agencies have harmonized the environmental assessment process and prepared a joint report for decision-makers. Based on this report, the EAO has concluded that effects from the project will be within acceptable levels, subject to implementation of mitigation measures and commitments agreed to by the proponent.

Before the project can proceed, the federal Minister of the Environment's decision and the necessary provincial authorizations and regulatory approvals from the responsible federal authorities are required.

The provincial EA certificate contains 51 major commitments that the proponent must implement throughout the various phases of the project. Some key commitments include:

- Mitigating any potential incremental effects of the project to the endangered white sturgeon through the implementation of precautionary measures and adaptive management.
- Providing compensation measures for the loss of shallow-water habitat as a result of the project.
- Continuing project information sharing and consultation with First Nations.

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- Developing specific mitigation measures to protect the habitat of the endangered yellow-breasted chat.

Capital costs for the project are estimated to be $400 million and would create approximately 680 person-years of employment over the 42-month construction period. Estimated annual revenues to the B.C. government from water rentals will be $5 million.

More information on the environmental assessment certificate can be found at www.eao.gov.bc.ca.

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Media contact: Kate Thompson
Manager, Media Relations
250 953-4577

For more information on government services or to subscribe to the Province's news feeds using RSS, visit the Province's website at www.gov.bc.ca.

WANETA HYDROELECTRIC EXPANSION PROJECT (PROJECT)

RECOMMENDATIONS OF THE EXECUTIVE DIRECTOR AND REASONS FOR RECOMMENDATIONS

Pursuant to section 17 of the *Environmental Assessment Act* S.B.C. 2002, c. 43 (Act), the Executive Director of the Environmental Assessment Office (EAO) provides the following recommendations and reasons relating to the Project. In preparing this document, the following have been considered:

- The Project Application for an Environmental Assessment Certificate (Certificate) including Appendices (Application);
- All subsequent Project review documentation identified in Schedule A to the proposed (Certificate);
- The Waneta Expansion Power Corporation's (Proponent) Commitments attached as Schedule B to the proposed Certificate; and,
- The Project Assessment Report/Comprehensive Study Report (Joint Report);

The Executive Director recommends that a Certificate be issued for the Project, for the following reasons:

1. The environmental assessment (EA) of the Project was carried out in accordance with the scope, procedures and methods identified in the Orders issued by the Project Assessment Director under section 11 of the Act on September 22, 2003, and section 13 of the Act, April 26, 2006 (the section 11 and 13 Orders).

2. The EA of the Project addressed the potential effects identified in the section 11 and 13 Orders, including the potential for environmental, social, economic, heritage and health effects, and potential effects on First Nations interests.

3. Measures relating to the distribution of information about the Project to the public have been carried out by the Proponent in accordance with the section 11 and section 13 Orders, and have included public open houses.

4. Measures relating to the distribution of information about the Project to First Nations have been carried out by the Proponent in accordance with the section 11 and section 13 Orders. The Project is situated in the asserted traditional territories of (i) the Okanagan First Nations, comprised of the

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Lower Similkameen Indian Band, Okanagan Indian Band, Osoyoos Indian Band, Penticton Indian Band, Westbank First Nation, Upper Nicola Indian Band, Upper Similkameen Indian Band; (ii) the Ktunaxa Nation Council comprised of the Lower Kootenay Band, St. Mary's Indian Band, Tobacco Plains Indian Band and Akisqnuk First Nation, in Canada, and two Bands in the U.S.; (iii) the Shuswap Indian Band which had been a member of the Ktunaxa Nation Council (formerly known as the Ktunaxa/Kinbasket Tribal Council) when the EA was initiated.

5. Opportunities have been provided by the Project Assessment Director for First Nations consultation in the assessment process and for addressing Aboriginal interests related to the Project. Ten meetings were held during the EA review process to discuss Okanagan Nation Alliance and Ktunaxa Nation Council interests and concerns. Many of these sessions were held in a working group format, and also involved provincial, federal and local government agencies, as well as U.S. agencies. Funding assistance for First Nations participation was provided by both EAO and the Proponent.

6. Opportunities have been provided by the Project Assessment Director for federal, provincial and local government agencies, as well as agencies of neighbouring jurisdictions in the U.S., to participate in the review process, as members of a multi-disciplinary advisory Working Group chaired by EAO, as well as participation in a technical working sub-group for aquatic/fisheries (Fisheries Working Group) and also chaired by EAO. The Working Group engaged in preliminary scoping of the Project, and all subsequent stages of the assessment process and the Fisheries Working Group addressed specific issues arising from the review that required special attention and information analysis. Since the Project triggered a federal comprehensive study level of review under the *Canadian Environmental Assessment Act* (CEAA), the assessment process has been designed to harmonize federal and provincial reviews, and has resulted in a Joint Report.

7. Issues identified by the public, the First Nations, provincial, federal and local government agencies and neighbouring jurisdictions, that fall within the scope of assessment of the Project, have been considered. The Joint Report identifies these issues and documents practical means to prevent or reduce to an acceptable level any potential significant adverse effects of the Project.

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8. With respect to public consultation, five written submissions were received during the 45-day formal public comment period on the Application between June 16, 2006 and July 31, 2006. The issues raised were related to the transmission line and construction activities and included the following: the spread and control of invasive plant species (noxious weeds); alteration of forest cover; proliferation of power lines and increased access; effects on watersheds (water quality and downstream water rights holders); effects on farming activities; and increased traffic. The need to further consider an alternative route for the Project transmission line was expressed, and in response to this request from private landowners having property along the transmission line corridor, as well as local government, the Proponent commissioned a report on alternative routes and provided it to the interested parties. The report concluded that the originally proposed transmission line route would pose the least environmental impact. The Proponent has satisfactorily responded to the public on the issues raised.

9. Provincial, federal and local government issues, and the concerns of neighbouring jurisdictions, were identified and addressed through Project Working Group meetings, and meetings between the Proponent, EAO and individual agencies throughout the process. The key issues that required more extensive review and resolution were associated with effects of the Project on white sturgeon; the Shallow Water Habitat Compensation Program; wildlife species at risk under the *Species at Risk Act*; impacts on rare plant communities; spread of noxious weeds; and re-suspension of contaminated sediments. The Proponent has satisfactorily responded to the issues raised by provincial, federal and local government agencies.

10. The potential transboundary effects of the Project are related to total gas pressure levels and shallow water habitat from the operation of the Project power plant. The total gas pressure effects are expected to have moderate positive residual impact because of the reduction in spill. The Washington State Department of Ecology supports the Project because of the probable reduction in total gas pressure downstream. The terrestrial and aquatic study areas approved for the EA of the Project did not extend south of the Canada-U.S. border. Potential reductions in productivity of shallow water habitat and potential stranding of fish were brought to the attention of U.S. regulators who did not find them of sufficient concern to raise as issues. The Proponent has provided a conceptual design for shallow water habitat compensation to address downstream impacts in Canada as required by Fisheries and Oceans Canada policy.

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11. The EA associated with the Project has satisfactorily addressed the effects identified in the Application Terms of Reference, issued for the Project in May, 2004.

12. All potential significant adverse effects of the Project are considered by EAO to be manageable to an acceptable level through:

    - The implementation of the Proponent's proposed design and mitigation and compensation measures, as identified in the Application and Proponent's Commitments;
    - Compliance with, and implementation of, the commitments and conditions specified in the Certificate, if granted; and,
    - Compliance with subsequent statutory permits, licences and approvals, or any authority required under any other enactment.

13. The Project Assessment Director is satisfied that First Nations consultation by the provincial Crown has been appropriate in the circumstances; that the likelihood of significant adverse impacts on the current use of the lands and resources for traditional uses by First Nations is low; that the recommended Proponent mitigation measures are adequate and represent an appropriate balance between the concerns of the First Nations and the potential impact of a decision to issue a Certificate for the Project.

14. Federal Responsible Authorities have collaborated in the preparation of the Joint Report and support the conclusions set out in the Joint Report. The Joint Report is intended to be used as a Comprehensive Study required under CEAA.

15. The Project is in the broad public interest of supplying reliable power to the citizens in the Province of British Columbia.

16. The Project is anticipated to create approximately 680 person-years of construction employment and four permanent jobs during operations. Capital costs of the Project are estimated to be $400 million. Construction is expected to take 42 months with operations commencing in 2011.

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The Executive Director's recommendation that a Certificate be issued for the Project is made subject to the following provision:

1. The final form of the Owner's Commitments, dated September 28, 2007, and the Owner's Environmental Requirements for Construction, Section A-G, Revision 2 dated January 15, 2007, should be given the force of law by being made a condition of the Certificate, if the Project is approved.

Robin Junger
Executive Director
Environmental Assessment Office

Dated: Oct. 17/07

WANETA HYDROELECTRIC EXPANSION PROJECT

ASSESSMENT REPORT

With Respect to

Review of the Application for an Environmental Assessment Certificate
Pursuant to the *Environmental Assessment Act*, S.B.C. 2002, c. 43

and

COMPREHENSIVE STUDY REPORT

With Respect to

Requirements of a Comprehensive Study
Pursuant to the *Canadian Environmental Assessment Act*, S.C. 1992, c. 37

October 17, 2007

Prepared by
Environmental Assessment Office

and

Fisheries and Oceans Canada
Transport Canada

Canada

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS/ACRONYMS

Application	Application for an Environmental Assessment Certificate under BCEAA
BCEAA	British Columbia *Environmental Assessment Act (S.B.C. 2002, c. 43)*
°C	Degrees Celsius
CEAA	*Canadian Environmental Assessment Act (S.C. 1992, c. 37)*
CEA Agency	Canadian Environmental Assessment Agency
EAO	Environmental Assessment Office
Project	Waneta Hydroelectric Expansion Project
Proponent	Waneta Expansion Power Corporation
Report	Joint provincial Assessment Report/federal Comprehensive Study Report
U.S.	United States of America

EXECUTIVE SUMMARY

BACKGROUND

On June 8, 2006, the British Columbia Environmental Assessment Office (EAO) accepted for formal review the Waneta Expansion Power Corporation's (Proponent) Environmental Assessment Certificate Application (Application) for the development of the Waneta Hydroelectric Expansion Project (Project). The Project involves the construction and operation of a new 435 megawatt hydroelectric powerplant at the existing Waneta Dam, owned by Teck Cominco Metals Ltd., on the Pend d'Oreille River, approximately 400 metres upstream of its confluence with the Columbia River.

The Project is located in the West Kootenay region of southeastern BC, south of the city of Trail, just off Highway 22A approximately 800 metres north of where the highway crosses the Canada-United States (U.S.) border. Trail, Castlegar and Nelson are the main population centres in the project area. The nearest U.S. community is Northport in Washington State, approximately 18 kilometres southwest of the border.

The Project is a reviewable project under the British Columbia *Environmental Assessment Act*, and requires a federal comprehensive study under the *Canadian Environmental Assessment Act*. The Project requires federal approvals under the *Fisheries Act* and *Navigable Waters Protection Act*. Applications for a provincial water license under the *Water Act,* and Crown land tenure under the *Land Act* were reviewed concurrently with the environmental assessment process.

EAO and the Canadian Environmental Assessment Agency, Fisheries and Oceans Canada, and Transport Canada have collaboratively reviewed the Application and prepared this joint provincial Assessment Report/federal Comprehensive Study Report (Report). This Report is the common basis for provincial and federal decisions about the development of the Project.

The Proponent and the Project

The Proponent is an incorporated joint venture company owned by Columbia Power Corporation and Columbia Basin Trust Energy Inc., a subsidiary of the Columbia Basin Trust. The Columbia Power Corporation is a Crown corporation wholly owned by the Province of BC. The Columbia Basin Trust is controlled by a Board of government-appointed directors. The Columbia Power Corporation and Columbia Basin Trust were brought together in 1995 as partners in power development by the Columbia Basin Accord, to identify and realize sustainable development opportunities in the Canadian Columbia River Basin.

The Project is one of three core Columbia Power Corporation and Columbia Basin Trust power projects. The other two are the Keenleyside Powerplant Project on the Columbia River, now known as the Arrow Lakes Generating Station, and the Brilliant Expansion Project on the lower Kootenay River. In 1994, the Province entered into an agreement with Teck Cominco Metals Ltd. to purchase certain expansion rights at the existing Waneta Dam and powerplant. These development rights were then vested in Columbia Power Corporation. In 2000, Columbia Basin Trust Energy Inc. purchased a 50 percent interest in the expansion rights from Columbia Power Corporation.

The Pend d'Oreille Water Reserve, which was amended in July, 2003, sets aside all the unrecorded water of the Pend d'Oreille River and its tributaries for power production purposes to a joint venture or subsidiary of Columbia Power Corporation/Columbia Basin Trust Energy Inc. The Waneta Cooperation Agreement between Columbia Power Corporation/Columbia Basin Trust Energy Inc. and Teck Cominco was signed in June 2004. This agreement came into force with renewal of the multi-party Canal Plant Agreement in April 2006. A Release Coordination Agreement has been negotiated between the Proponent and Teck Cominco and comes into effect in conjunction with the Waneta Cooperation Agreement. The Release Coordination Agreement contains provisions to allow water licensed for one facility to be used by the other facility to produce coordination benefits that would be shared under the Canal Plant Agreement.

Flow Regulation in the Columbia Basin

In Canada and the U.S. there has been extensive flood control and hydroelectric development on the Columbia River system that provide significant flow regulation, including on the mainstem Columbia River, Kootenay River, and Pend d'Oreille River. Over 90 percent of the Pend d'Oreille River watershed is within the States of Washington, Idaho and Montana. The remainder is within southeastern BC. The lower Pend d'Oreille River flows through BC for about 25 kilometres before it joins the Columbia River 800 metres upstream of the Canada-U.S. border.

Teck Cominco's Waneta Dam hydroelectric facility and BC Hydro's Seven Mile Dam hydroelectric facility upstream are located on the lower Pend d'Oreille River. Upstream of the Seven Mile Reservoir is the Boundary Dam hydroelectric facility in Washington State, and there are nine other facilities further upstream of this that provide substantial flow regulation. Pend d'Oreille Basin flow regulation commenced in 1938 with construction of the Kerr Dam at the outlet of Flathead Lake.

Flows in the Canadian section of the Pend d'Oreille are coordinated by BC Hydro under the Canal Plant Agreement. Under the Canal Plant Agreement, BC Hydro is delegated the responsibility to manage the flows through the existing Waneta and proposed Waneta Expansion facilities in order to optimize system generation (it is normally beneficial for power generation to minimize spill at the dam). Currently, without the Project, generating capacity at the Waneta facility is less than that of the Seven Mile facility. Any restrictions on flows as a result of various licence conditions are incorporated into the Canal Plant Agreement Operating Procedures which BC Hydro must abide by in their management of the system.

Hydroelectric facilities with large reservoirs are able to increase flows and power generation during day-time hours when there is more demand for electricity, and reduce flows and power generation during night-time hours when there is less demand for electricity. This is known as block loading. Block loading at the Boundary Dam results in rapid and extreme fluctuations in discharge with lower downstream flows, often zero discharge during night-time light load hours, and higher downstream flows, up to 1,472 cubic metres per second (without spilling at the dam), during day-time heavy load hours. The Seven Mile Reservoir downstream has limited storage capacity (only sufficient for daily pondage) and must pass whatever flows are received from upstream on an average daily basis.

Operation of the Boundary Dam facility has a significant effect on flow in the lower

Pend d'Oreille River, but there is minimal coordination between BC Hydro and the operator of that facility. Under existing flow regulation conditions, BC Hydro re-regulates (shapes) block flow releases received from Boundary to minimize spill at Waneta, which causes the Seven Mile Reservoir to fluctuate significantly on a daily basis. BC Hydro also re-regulates to provide minimum flows during the white sturgeon spawning period downstream of Waneta, which is a condition of Teck Cominco's Environmental Assessment Certificate for its Waneta Upgrade Project (increasing Teck Cominco's generating capacity at its existing Waneta powerplant).

Project Description

The project powerplant is adjacent to the existing Waneta Dam, owned by Teck Cominco Metals Ltd. The Project would use water flows from the Pend d'Oreille River, currently spilled by the existing Waneta Generating Station and may also use flows that are licensed for use in Waneta Generating Station in accordance with the Release Coordination Agreement. The Project will generate approximately 435 megawatts of electricity, and produce more than 700 gigawatt-hours of electricity. This is equivalent to meeting the electricity needs of more than 70,000 households.

The new powerplant will consist of: a short intake approach channel above the Waneta Dam to a gated twin intake structure; a surface powerhouse containing two vertical shaft turbine-generator units; upper and lower sections of two power tunnels, each connected by a vertical shaft; and, a tailrace channel conveying powerhouse flows from the draft tubes to the existing Waneta Generating Station tailrace located just downstream of the toe of the Waneta Dam.

The Project will be interconnected with the BC Hydro transmission grid at the Selkirk Substation by a new 10 kilometre, 230 kilovolt transmission line.

Powerhouse construction will require realignment of a short portion of the Waneta-Nelway Road to accommodate the powerhouse excavation and realignment of the existing private access road from Highway 22A to the existing Waneta Generating Station. The existing private access road from the Waneta-Nelway Road to the dam deck will be upgraded and slightly extended to provide access to the new intake structure. There are no stream crossings associated with these roads. Other construction-related activities include the storage/disposal of excavated materials, aggregate processing and concrete production; temporary facilities are also required for offices, worker parking, storage and staging, workshops and site services. For construction of the transmission line, use of an estimated 19 kilometres of existing access roads will be required, of which a small percentage will require upgrading. In addition, construction will require approximately 1.1 kilometres of new single season access roads, for which there are no stream crossings.

The total capital cost (2006 dollars) for building the Project is expected to exceed $400 million. Estimated operating and maintenance costs (2006 dollars) are expected to be in the vicinity of $8 million annually. With continuing powerplant overhauls and upgrades, the operating life of the Project is expected to be 100 years or more.

The Project will divert a portion of Pend d'Oreille River flow around the Waneta Dam and existing generating station, reducing spill at the Waneta Dam. The Project will also remove the hydraulic constraint on the upstream operation of BC Hydro's Seven Mile

Dam, allowing releases from Boundary Dam upstream in Washington State to effectively flow through the lower section of the Pend d'Oreille River without being altered (re-regulated) by hydroelectric operations at the Seven Mile and Waneta dam facilities. BC Hydro's Water Use Plan for the Canadian portion of the Pend d'Oreille River, which will guide its future operations, was finalized and formally implemented in December 2006. However, there is some uncertainty as to what the future flow regulation regime on the lower portion of the Pend d'Oreille may be, since operations upstream at the Boundary Dam in Washington State are subject to upcoming review and re-licensing (expected from 2009 to 2011).

CONSULTATION

Public

EAO established a 45-day public comment period on the Application which took place in June and July 2006, and during this time a public open house was held in the community of Trail. Notices/advertisements were placed in local newspapers, inviting public comment on the Project and inviting the public to attend the open house event. Copies of the Application were made available for viewing during the comment period at Columbia Power Corporation's Castlegar office and at six public libraries located in Castlegar, Trail, Rossland, Fruitvale, Salmo and Nelson.

In addition to the above, during the concurrent review of other provincial enactments, the Ministry of Environment, Water Stewardship Division, wrote to three water licensees and seven property owners notifying them of the application by the Proponent for a licence under the *Water Act* for the Project, and seeking feedback as to whether the parties felt their rights may be adversely affected in regards to both water licence holders or applicants on the Pend d'Oreille River, and landowners whose properties may be affected by the transmission line and any required access.

During the 45-day public comment period, EAO received five submissions from the public, three of which were comment forms submitted during the public open house in Trail. Of the five submissions received, two were from local/regional fish/wildlife stakeholder organizations and one was from a land owner who would be affected by the transmission line. The issues raised were related to the transmission line and construction activities, and included the following: the spread and control of invasive plant species (noxious weeds); alteration of forest cover; proliferation of power lines and increased access; effects on watersheds (water quality and downstream water rights holders); effects on farming activities; and increased traffic.

First Nations Consultation and Interests

The Project is situated within the asserted traditional territory of the Okanagan Nation Alliance and the Ktunaxa Nation Council. Okanagan Nations include the: Lower Similkameen Indian Band; Okanagan Indian Band; Penticton Indian Band; Upper Nicola Indian Band; Upper Similkameen Indian Band, Osoyoos Indian Band; and, the Westbank First Nation. The Ktunaxa Nations include the: Akisqnuk First Nation; Lower Kootenay Band; St. Mary's Indian Band; and Tobacco Plains Indian Band in Canada and two Indian Bands in the U.S.

The project site is located within territory that appears to have been historically used by the Sinixt or Lakes people before the onset of the 20th Century. It would appear that today, most Sinixt people reside on the Colville Reservation in Washington State, and are registered members of the Colville Confederated Tribes. In 1956, the federal government declared the Sinixt to no longer exist in Canada. The Province lacks information as to the basis for any claim that there is a communal group in British Columbia which would qualify as an "Aboriginal peoples of Canada" within the meaning of section 35(1) of the *Constitution Act*, 1982.

Nothing in this Report is to be taken as any admission by Canada, for purposes of the Report or for other purpose, in respect of any statements pertaining to Aboriginal rights, including Aboriginal title. Canada takes the view that references to Aboriginal rights and title are included in this Report to meet provincial requirements and their inclusion does not mean that Canada accepts or agrees with these statements.

Okanagan Nation Alliance

The Okanagan Nation communities and Indian Reserves nearest to the Project are located in the Okanagan Valley, approximately 254 kilometres west by road (the Osoyoos Indian Band and Indian Reserve). There are no Okanagan Nation Indian Reserves located within the Pend d'Oreille watershed.

Ethnographic evidence suggests that, while there was interaction between the Okanagan and Sinixt people, the Sinixt were a politically distinct group of Okanagan speaking people, although the Sinixt and the North Okanagan shared the same language and culture.

Okanagan Nation Alliance consultation opportunities were provided by EAO during the assessment of the Project, and included opportunities for addressing technical issues as well as asserted rights and title issues associated with the Project. Ten meetings were held during the environmental assessment process to discuss Okanagan Nation Alliance interests and concerns, and many of these sessions were held in working group format, involving other provincial, as well as federal and local government agencies.

Both EAO and the Proponent provided funding for the Okanagan Nation Alliance's participation in the process. As one of the provisions under the Okanagan Nation Alliance-Proponent Consultation Agreement (dated October 14, 2004), the Proponent commissioned a report to document Okanagan Nation Alliance traditional use activities in the project area (Aboriginal Interests and Use Study). The work involved the following components: a review of the historical information for the area; interviews with Elders and knowledgeable community members; site visit with Elders to become familiar with the area and scope of the Project; and an archaeological predictive model. The Proponent's background reports included – Background Report #7 – First Nations' Aboriginal Interests and Traditional Use in the Waneta Hydroelectric Expansion Project Area: A Summary and Analysis of Known and Available Information was prepared by Bouchard and Kennedy Research Consultants. Background Report #8 – Archaeological Impact Assessment of the Waneta Hydroelectric Expansion Project was prepared by Madrone Environmental Services Ltd.

Okanagan Nation Alliance issues of concern include changes to habitat availability and suitability, amount, timing and basis for monitoring, possible impacts to the white

sturgeon population, sedimentation and aquatic protection, reporting impacts and alterations to work plans.

If the Project is approved, the Okanagan Nation Alliance will continue to be involved in the Project prior to, during and after construction. Provided that the Proponent implements the actions described in the summary of Commitments listed in Appendix 4 – Proponent's Commitments, EAO is satisfied that the likelihood of significant adverse effects on the current use of land and resources for traditional purposes by Aboriginal groups represented by the Okanagan Nation Alliance is low. These commitments seek to balance the ongoing importance of this site to those groups with the current need for this Project and the opportunity to contribute to satisfying the continuing and growing public need for power production.

Ktunaxa Nation Council

The Ktunaxa Nation community closest to the project site was identified to be near Creston about 133 kilometres from the Project by road. There are no Ktunaxa Nation Indian Reserves located within the Canadian portion of the Pend d'Oreille watershed.

Linguistically, the Ktunaxa people speak a common tongue, the Kutenai language. The word "Kutenai" is sometimes used to refer to the people as well as to the language. Culturally, speakers of the Kutenai language are classified as part of the Plateau Culture Area.

Both the Proponent and EAO provided funding for the Ktunaxa Nation Council participation in the process. As one of the provisions under the Ktunaxa Nation Council-Proponent Consultation Agreement dated March 2005, the Proponent commissioned a report to document Ktunaxa Nation Council traditional use activities in the project area (Aboriginal Interests and Traditional Use Report). The Ktunaxa Nation Council prepared the Aboriginal Interests and Traditional Use Report dated September 6, 2006. Information was obtained about Ktunaxa interests in the proposed project area and Arrow Lakes mainly from the Ktunaxa Nation Council's activities including audio and video taped interviews, project reports and a compilation of various correspondences. In addition, there were the two Background Reports #7 and #8 (noted above) prepared by the Proponent's consultants.

Ktunaxa Nation Council consultation opportunities were provided by EAO during the assessment of the Project, and included opportunities for addressing technical issues as well as asserted rights and title issues associated with the Project. Ten meetings were held during the environmental assessment process to discuss Ktunaxa Nation Council interests and concerns, and many of these sessions were held in working group format, involving other provincial, as well as federal and local government agencies.

The Ktunaxa Nation Council issues of concerns include white sturgeon juvenile overwintering habitat within the Waneta Eddy, predation on white sturgeon eggs and larvae in the Pend d'Oreille-Columbia confluence area and cumulative effects of the Project on the recovery potential for the endangered Upper Columbia River white sturgeon population.

If the Project is approved, the Ktunaxa Nation Council will continue to be involved in the Project prior to, during and after construction. Provided that the Proponent implements

the actions described in the summary of Commitments listed in Appendix 4 – Proponent's Commitments, EAO is satisfied that the likelihood of significant adverse effects on the current use of land and resources for traditional purposes by Aboriginal groups represented by the Ktunaxa Nation Council is low. These commitments seek to balance the ongoing importance of this site to those groups with the current need for this Project and the opportunity to contribute to satisfying the continuing and growing public need for power production.

POTENTIAL PROJECT EFFECTS

To assist with the environmental assessment review of the Project, EAO established and chaired a multi-disciplinary advisory Working Group, and a technical working sub-group for aquatic/fisheries issues. Working Group participants included provincial and federal government agencies, local governments, First Nations and U.S. federal and state government agencies.

Environmental Effects

The Project will have both positive and potentially adverse environmental effects.

Benefits

The Project will:

- Provide new hydro electricity without the need for new dam construction, new reservoir formation, or additional flooding of existing reservoirs.
- Avoid greenhouse gas emissions from coal-fired thermal generation by 700,000-800,000 tonnes of carbon dioxide equivalents per year over 100 years or more.
- Reduce spill at Waneta Dam and thus reduce total gas pressure to the benefit of downstream Columbia River water quality and aquatic resources.
- Result in a slight reduction in fish entrainment mortality due to lower mortality rates for fish that pass through the new powerplant compared to fish that presently pass through the existing powerplant and spillway.
- As a result of the location and alignment of the powerhouse and the diversion of previously spilled water through it, increase the amount and suitability of habitat (feeding, holding and possibly rearing) for resident fish species (including white sturgeon) in the Waneta Dam plunge pool/spillway and upper tailrace area.
- Remove an estimated 14,000 to 20,000 cubic metres of submerged metals contaminated sediments that have accumulated in the forebay of the Waneta Dam from upstream historical mining operations, and reduce the potential for any contaminated sediments that remain in this area to be re-suspended and flushed into downstream environments.
- Substantially reduce the frequency and magnitude of water level fluctuations in the Seven Mile Reservoir and to a lesser extent in Waneta headpond, and:
    - Improve the primary and secondary productivity of riparian and nearshore littoral aquatic habitats for wildlife and fish by approximately 37 times the less than one hectare area lost downstream of the Waneta Dam.
    - Likely reduce metals leaching from old mine tailings within the Seven Mile Reservoir thereby improving water and sediment quality and habitat downstream.

Potential Adverse Effects

Terrestrial Resources

The Project will:

- Permanently change an estimated 76 hectares of land primarily as a result of the transmission line, though some areas have been subject to previous disturbance. Vegetation and wildlife habitat will be affected through removal or conversion of forest attributes and the loss of wildlife trees, with some residual impacts on rare plant communities, listed plants, wildlife habitats and wildlife.
- Potentially affect several wildlife species at risk listed under the *Species at Risk Act* (most likely western skink, racer, rubber boa, Lewis's woodpecker and yellow-breasted chat).
- Likely exacerbate the spread of noxious weeds through vegetation clearing, soil disturbance and movement of vehicles/equipment, which will negatively impact (displace) plant communities. (Noxious weeds and spotted knapweed in particular are a serious problem within the project area and considerable effort has been expended to limit their establishment and spread. A multi-agency noxious weed pest management plan has recently been implemented).

Aquatic Resources

Construction activity associated with the new intake could potentially result in the short-term suspension into the water column of sediments contaminated with metals that have settled in the Waneta forebay, and these sediments could be washed downstream.

Because the Project will eliminate the incentive to re-regulate Boundary Dam releases at Seven Mile Dam, Boundary flows will pass through the Canadian Pend d'Oreille River to its confluence with the Columbia River. This Boundary flow-through will potentially result in some changes in physical conditions (flow velocities and water levels) at the confluence and downstream:

- It is anticipated that there will be some alterations in flow velocity patterns in the Waneta Eddy in the Columbia River. The eddy provides important deepwater feeding, holding, rearing and overwintering habitat for adult and juvenile white sturgeon, and is used by adult sturgeon for pre-spawning staging and for holding, post-spawning. The principal concern involves the potential that during light load hour periods and under conditions of low Columbia flows, there would be an increase in flow velocity in portions of the eddy, which would reduce the area/extent of deepwater (depths of 15 metres or greater), low velocity (0.5 metres per second or less) near bottom habitat during the winter period. The extent of this change is small relative to the modelled amount of low velocity habitat, and subject to confirmation of the modelling upon analysis of post-project monitoring of near-bottom velocities.
- It is anticipated that there will be some alterations in flow velocity patterns in the Pend d'Oreille–Waneta plume that extends into and along the bank of the Columbia River in the confluence area, which is the only known spawning site for this white sturgeon population in Canada. The Proponent has proposed modifications to the existing White Sturgeon Flow Augmentation Program to mitigate these changes in flow velocity patterns, including lowering the primary threshold for load shaping and

delaying it two weeks to better-match the majority of spawning events. Specifically, the anticipated effects during the sturgeon spawning period are:

- Increased frequency and magnitude of flow fluctuations between light load hours and heavy load hours have the potential to alter flow conditions within the spawning area.
- There will be an increase in the frequency of lower light load hour flows and frequency with which these flows drop down to the minimum White Sturgeon Flow Augmentation Program flows established for sturgeon spawning under the Waneta Upgrade Project (about two more days in an average year with the proposed modifications to the flow program). During this same period, there will also be an increase in the frequency of higher heavy load hour flows. The concern is that the lower light load hour flows (that will occur on about 13 days in an average year with the proposed modifications to the flow program) will reduce velocities in the egg incubation area and this may result in an increase in predation of white sturgeon eggs or larval fish (by predator species thought to be excluded by higher velocity flow conditions). This may largely be offset by the increase in heavy load hour flows that will increase velocities in the area and may reduce predation (to be confirmed by post-project monitoring).

- Approximately 0.4 hectare years of shallow water habitat (on average, the area affected over the period of one year) in the Columbia River will be dried and subject to reduced productivity (based on seasonal averages). This will be offset by shallow water habitat compensation proposed by the Proponent.

During the last century, the construction of hydroelectric projects on the Columbia River and many of its tributaries resulted in the formation of large impoundments and the segregation of white sturgeon populations. One of the few remaining flowing sections of the Columbia River, from the Hugh L. Keenleyside Dam near Castlegar downstream to Lake Roosevelt in Washington State, supports a small population of white sturgeon.

Population studies determined that juvenile age-classes were essentially absent from this population, and that little or no juvenile recruitment was occurring. Spawning has been recorded but very few young fish have been found, indicating that few young sturgeon are surviving to adulthood. Almost all fish in this population are greater than 30-years-old (individuals can live as long as 100 or more years). Reasons cited for the decline of the population include factors related to: exploitation and incidental catch; dams and reservoirs; flow regulation; water quality; contaminants, nutrients, habitat diversity and geomorphology; and changes in fish species composition.

A recovery initiative began in 2000 with an agreement signed by Fisheries and Oceans Canada, the Ministry of Environment and BC Hydro. In August 2006, Columbia River white sturgeon was listed as Endangered under Schedule 1 of the *Species at Risk Act*. The *Species at Risk Act* prohibits killing of or harm to individuals of species listed as Endangered or Threatened, and damaging the Critical Habitat or residences of such individuals.

Mitigation

During the planning and design stage, potential adverse effects have been avoided or mitigated by:

- Locating the new powerhouse and intake structures close to those of the existing Waneta generating facility, which serves to minimize the overall construction footprint and keep much of the construction within the existing disturbed Waneta site.
- Metal-contaminated sediments in the Waneta forebay will be dredged prior to intake excavation, and dewatered, stored and remediated at a nearby, previously disturbed site in accordance with applicable regulations for disposal on industrial lands.
- Selecting the preferred transmission route contiguous with BC Hydro's line to Selkirk which will serve to reduce required land clearing and the impacts that would be associated with a separate transmission route. This transmission line route will cross headpond tributaries at higher elevation sections where the streams are typically ephemeral in nature. Locating structure sites close to existing access trails will minimize the need for construction of new access trails.
- Utilizing to the extent possible, existing gravel pits and previously disturbed areas for the storage of excavated materials which will minimize the land-based disturbance resulting from the Project.
- Designing powerplant capacity at a size to reduce total gas pressure formed downstream of the Waneta Dam. This will also reduce the frequency of total gas pressure formation due to spill during forced and planned outages of individual generating units.
- Sizing the powerplant to accommodate the maximum flows passing through the system from upstream hydroelectric facilities to reduce spill and bring the lower Pend d'Oreille into hydraulic balance. This will result in habitat creation benefits in the upstream Seven Mile Reservoir, and will provide greater availability of habitat in the Waneta Dam plunge pool/spillway and upper tailrace area.
- Designing the configuration and alignment of the tailrace of the new powerhouse to yield pre-project and post-project flow patterns in the Pend d'Oreille-Columbia confluence area that are nearly identical. The powerplant tailrace alignment will have a negligible effect on flow patterns at the confluence of the Pend d'Oreille and Columbia rivers.
- Installing turbines in the powerhouse that will help reduce overall fish mortality related to spill and entrainment at the combined Waneta facility.
- Adopting operational criteria that will retain existing flow protection measures for downstream fish and fish habitat (minimum flows during the sturgeon spawning period).

Subsequent to submission of the Proponent's Application, in August 2006, the Upper Columbia River population of white sturgeon was listed in Schedule 1 of the *Species at Risk Act* which prohibits harm or harassment of listed species at an individual level. This listing prompted Fisheries and Oceans Canada to request the Proponent provide additional mitigation of potential harm of Boundary Dam flow-through to white sturgeon at an individual level. The Proponent responded with proposed modifications to the existing White Sturgeon Flow Augmentation Program, shifting the primary minimum flow protection schedule two weeks later and reducing the minimum flow threshold from 708 cubic metres per second, to 566 cubic metres per second, as well as proposing elements of a monitoring program to confirm effects predictions and facilitate development of additional mitigation if warranted.

Most potential adverse environmental effects associated with the Project (construction and operation) are expected to be prevented or mitigated by applying standard and project-specific environmental management practices. The Proponent has developed an Environmental Management Program that includes criteria (identified in the Application) that will inform specific Environmental Work Plans to prevent, monitor, manage and mitigate various potential environmental impacts. The Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

Compensation

Terrestrial Effects

To control noxious weeds, the Proponent will participate with other stakeholders in funding cooperative weed control initiatives in areas potentially impacted by project facilities.

As compensation for non-mitigatable terrestrial effects, the Proponent will provide $50,000 per year over seven years (to a total of $350,000) for a terrestrial compensation program. The funding period reflects the Project's expected 3.5-year construction period and an equivalent 3.5-year post-construction period. Activities are to be negotiated with regional Ministry of Environment staff and could include participation in: listed plant community and species inventory initiatives; local recovery planning and initiatives for listed animal species potentially impacted by the Project (such as surveys prior to, during and post-construction); a wildlife tree creation project; enhancement of terrestrial habitats at or near the development site; and habitat protection through land acquisition.

Aquatic Effects – White Sturgeon

Based on population-level analyses, the Proponent has asserted that:

- Expected changes in hydraulic conditions below Waneta Dam due to the alignment of the powerplant tailrace, the diversion of flow through the new powerplant, or passage of Boundary flow-through should not result in negative impacts on the white sturgeon population. Restricting the powerplant outfall to the main channel of the Pend d'Oreille River has mitigated the majority of potential changes to the habitats used by white sturgeon in the confluence area of the Pend d'Oreille and Columbia rivers.
- Analysis indicates that the hydraulic effects of the powerplant outflow are similar to pre-project conditions. Changes in water levels and flow velocities associated with passing Boundary Dam flows unchanged down river are not likely to cause negative impacts on white sturgeon spawning success or impacts on rearing.

With the proposed modifications to the existing White Sturgeon Flow Augmentation Program the Project is not likely to cause a harmful alteration, disruption or destruction of white sturgeon habitat and does not require habitat compensation. To confirm those conclusions, the Proponent has proposed to monitor near-bottom velocities and egg predation rates and has committed to participate in Water Use Planning on the Pend d'Oreille River and to re-negotiate flow mitigation measures if analyses show that further mitigation is warranted.

Aquatic Effects – Shallow Water Habitat

The Proponent believes that the net residual effect of flows being passed through from Boundary Dam unchanged should be considered neutral to positive, because the expected physical increase in habitat area upstream exceeds the lost habitat downstream by a very large margin. However, as Fisheries and Oceans Canada habitat policy does not allow the passive habitat gains to off-set habitat losses, the Proponent has developed a conceptual Fish and Fish Habitat Compensation Plan that would address the Fisheries and Oceans Canada habitat policy requirement of no-net-loss for the shallow water habitat that would be lost downstream of Waneta Dam. The compensation plan will be finalized to the satisfaction of Fisheries and Oceans Canada in consultation with BC Ministry of Environment and First Nations prior to authorizations being issued under the *Fisheries Act*. (The compensation plan does not involve white sturgeon habitat.)

Socio-Economic Effects

The Project will have both positive and potentially adverse socio-economic effects.

Benefits

Construction

The Project is expected to generate the following employment and procurement benefits over its 3.5-year (42-month) construction period:

- 680 person-years of direct employment;
- $60 million in direct employment earnings on a pre-tax basis;
- $5 million after tax income from indirect and induced employment; and,
- $25 million in local spending for the procurement of construction materials, supplies and services.

The Project is expected to generate $16.8 million in tax revenue by direct employment, and $1.9 million in tax revenue by workers employed due to indirect or induced spending.

Operations

Once operational, the Project will generate output at full capacity during the freshet months of April, May, June and July, and below capacity for the rest of the year depending on most efficient water allocation between the generating units at Waneta Expansion and the Waneta Generating Station. The Project will generate more than 700 gigawatt-hours per year of renewable energy (additional capacity).

Full and part-time operational and maintenance employment for the powerplant and transmission line is likely to be four person-years annually. Actual employment will be two full time and three seasonal jobs per year.

The Project will create a stream of revenues from power sales. Net revenues on a present value basis are estimated to be in the magnitude of $25 million over an

evaluation period of 60 years. Half of project earnings will accrue to the Province as the sole shareholder of Columbia Power Corporation, and the other half will be available for re-investment or spending in the region through the Columbia Basin Trust to further the interests of those most affected by the Columbia River Treaty.

Incremental revenues from the new powerplant operations will accrue to both the provincial and Regional District governments starting in year 2011. Water rentals paid to the Province during operation will be about $5 million annually. Grants-in-lieu of property taxes paid to the Regional District of Kootenay Boundary are expected to be approximately $500,000 per year.

Potential Adverse Effects

The Project will:

- Require a total of approximately 15 hectares of private lands, involving 11 blocks/lots/parcels and five parties (10 individuals), for the statutory right-of-way over private lands required for the transmission line and access routes within the statutory right-of-way corridor. The private lands involved range from approximately 8 hectares to 130 hectares and the areas affected by the statutory right-of-way range from approximately 0.8 hectares to 5.5 hectares. In terms of area, the greatest effect will be a 0.8 hectare statutory right-of-way through the 8 hectare parcel.
- Require exclusion of 7 hectares of land from the Agricultural Land Reserve; non-farm use of land within the Agricultural Land Reserve (approval of non-farm use for two complete parcels totalling 94.5 hectares, though only part of each parcel will be required); a utility corridor of 1.5 hectares within the Agricultural Land Reserve; and 3 hectares of Agricultural Land Reserve lands owned by Arrow Lakes Power Corporation at Selkirk Substation for utility corridor use.
- Affect 3 placer claims during construction.

There are 10 recorded archaeological sites in the general project area but none of the sites are located in areas likely to be affected by the Project.

Mitigation

During the planning and design stage, potential adverse construction effects have been avoided or mitigated by:

- Adopting a Base Concept situated on the Pend d'Oreille River rather than on the originally-preferred Columbia River site, which will avoid temporary detours of Highway 22A traffic and a possible re-alignment of the Burlington Northern and Santa Fe rail bed.
- Selecting the preferred transmission route contiguous with BC Hydro's line to Selkirk which will serve to reduce required land clearing and to minimize impacts of a separate transmission route.
- Utilizing, to the extent possible existing gravel pits and previously disturbed areas for the storage and disposal of excavated materials.
- Sizing the powerplant to accommodate the maximum flows passing through the system from upstream hydroelectric facilities, to reduce spill and bring the lower

Pend d'Oreille into hydraulic balance. This will result in habitat creation benefits in the upstream Seven Mile Reservoir.

Most potential adverse socio-economic effects associated with the Project (construction and operation) are expected to be prevented or mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program that includes criteria (identified in the Application) that will inform specific Environmental Work Plans to prevent, monitor, manage and mitigate various potential environmental impacts. The Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

Compensation

The Proponent will need to take steps to conclude legal agreements with private land-owners with respect to temporary access during construction and subsequent statutory right-of-way required for the project transmission line. The Proponent has had initial negotiations with potentially affected landowners and anticipates advancing and concluding these negotiations if it is determined that the Project can proceed. The Proponent will seek to reach an agreement with the private landowners on fair and reasonable compensation for accessing the Project transmission corridor to confirm the environmental assessment of this area and to allow construction and maintenance of the transmission line. To address the loss of timber values on private land, affected landowners will be directly compensated, based on the results of a timber cruise.

In cases where there is a conflict between the objectives of surface rights holders and placer mineral rights holders, first priority to the use of the land is given to the holder to which rights were issued first. The Proponent has an option to acquire surface property rights to the powerhouse site and to construction facilities sites associated with the Project. The Proponent will exercise its option to purchase upon approval of the Project, and has indicated that the surface rights (holders) take precedence over those of the placer mineral rights (holders). The Proponent cannot allow access to placer claim sites during construction except by special arrangement with the Proponent and provided that such access is deemed safe and does not interfere with and/or obstruct construction in any way.

CONCLUSIONS

Environmental Effects

EAO and the federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse environmental effects in regards to: air quality; noise; geology and soils; vegetation; wildlife and wildlife habitat; hydrology; water quality; fish and fish habitat; and transboundary effects.

Air Quality, Noise and Contaminated Soils

The Ministry of Environment, Environmental Protection Division, indicated that in general, it was satisfied that the assessments, plans and commitments provided meet the higher level requirements of the Division.

The Regional District of Kootenay Boundary Board of Directors passed a resolution indicating that the Proponent's responses to the issues raised by the Regional District are considered to be adequate.

Vegetation, and Wildlife and Wildlife Habitat

The Ministry of Environment, Environmental Stewardship Division, is supportive of the Proponent's mitigative measures and compensation commitments.

The Ministry of Forests and Range concluded that the Project would have negligible effects on the forested/timber land base and noted that no Old Growth Management Areas would be affected.

Environment Canada is satisfied with the Proponent's mitigative and monitoring measures related to wildlife species listed under the *Species at Risk Act*.

Contaminated Sediments and Water Quality

The Ministry of Environment, Environmental Protection Division, indicated that in general, it was satisfied that the assessments, plans and commitments provided meet the higher level requirements of the Division. In regards to the management of contaminated sediment in the Waneta forebay, the Contaminated Materials Management Environmental Work Plan must be approved by the Ministry prior to the commencement of works.

Environment Canada stressed to the Proponent that: Subsection 36(3) of the *Fisheries Act*, administered by Environment Canada, prohibits the discharge of deleterious substances to waters frequented by fish, or to a place where those substances might enter such waters; the *Migratory Birds Convention Act* prohibits the deposition of substances harmful to migratory birds in water or areas frequented by migratory birds; and, adherence to the proposed courses of action identified does not relieve it (the Proponent) of the requirement to comply with the *Fisheries Act* or the Migratory Bird Regulations.

The federal Responsible Authorities found the Proponent's responses to issues raised dealing with the potential environmental effects of accidents and malfunctions to be reasonable and not likely to cause significant adverse environmental effects.

Fish and Fish Habitat

White Sturgeon

Fisheries and Oceans Canada has determined that various measures incorporated into the project design and including proposed changes to the White Sturgeon Flow Augmentation Program provide adequate mitigation for protection of the *Species at Risk Act* listed Upper Columbia River population of white sturgeon. With successful implementation of the proposed operational flows, monitoring and adaptive management program, the anticipated operations are not likely to cause a significant adverse effect on white sturgeon within the aquatic study area.

Shallow Water Habitat

Fisheries and Oceans Canada has determined that the Conceptual Design for Shallow Water Habitat Compensation provides a satisfactory conceptual level compensation plan meeting Fisheries and Oceans Canada's environmental assessment needs regarding effects on shallow water habitats. With successful implementation of the compensation measures proposed, the anticipated operations are not likely to cause a significant adverse effect on shallow water habitat within the aquatic study area, and any project effects on fish species (other than white sturgeon discussed above), including species listed under the *Species at Risk Act* (Columbia mottled sculpin, and Umatilla Dace) would likely be negligible. If the Project is to proceed, the detailed mitigation and compensation plan will be finalized and attached to a section 35(2) *Fisheries Act* authorization.

Transboundary Effects

The Project is excepted from the application of the *International River Improvements Act* since there will be no significant incremental flow and level effects at the border resulting from the operation of the Project. The Proponent has informed the federal Minister of the Environment of the case for exception and has provided the required documentation.

The State of Washington Department of Ecology indicated that it supports the Project because of the probable reduction in total gas pressure downstream, and although this effect will probably be modest based on the Project alone, the combined effects of the Project and future gas abatement measures taken at facilities in Washington State will likely be significant.

The U.S. Fish and Wildlife Service provided no comment on the Project. The facilitation of the proposed capacity of passing block loading originating from Boundary Dam in the U.S. through Seven Mile and Waneta facilities will result in increased daily flow fluctuations in the Columbia River between the Canada-U.S. border and Lake Roosevelt over most non-freshet portions of the year, with resultant increases in river elevations, reductions in productivity of shallow water habitat and potential stranding of fish. These effects have been brought to the attention of U.S. regulators who did not find them of sufficient concern to raise as issues. The Canadian Columbia River Inter-tribal Fisheries Commission, representing First Nation interests on both sides of the border, raised these issues as unmitigated concerns warranting compensation and monitoring. Without U.S. regulatory interest, compensation and monitoring of these effects are outside the mandate of this environmental assessment review.

Socio-Economic Effects

EAO is satisfied that the Project is not likely to result in significant adverse socio-economic effects in regards to: public safety and health; communities and economy; heritage and archaeological resources; land and resource use; and navigable waters. The federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse environmental effects including effects to the above socio-economic factors resulting from a change in the environment.

Transportation

The Ministry of Transportation concluded that the issues it raised regarding potential effects on public safety and health related to temporary use of local and regional road systems during construction have been adequately addressed.

Communities and Economy

The Regional District of Kootenay Boundary Board of Directors passed a resolution indicating that the Proponent's responses to the issues raised by the Regional District are considered to be adequate.

Energy

According to BC Hydro's 2006 Integrated Electricity Plan, electricity demand will grow between 25 and 45 percent over the next 20 years. The Ministry of Energy, Mines and Petroleum Resources indicated that the Project could help meet this need and contribute to the Energy Plan's energy security and reliability objective.

Heritage and Archaeological Resources

The Archaeological Branch of the Ministry of Tourism, Sport and the Arts concluded that, in the absence of any identified impacts, Archaeology Branch interests are unaffected by the proposed Project and there is no known archaeological reason why the Project should not proceed as proposed.

Mineral Resources

The Ministry of Energy, Mines and Petroleum Resources indicated that any issues regarding priority of mineral tenure rights will be addressed according to the requirements of the *Mineral Tenure Act*.

Forest Resources

The Ministry of Forests and Range concluded that the Project would have negligible effects on the forested/timber land base.

Agricultural Resources

The Agricultural Land Commission has approved applications under the *Agricultural Land Commission Act* for non-farm use of Agricultural Land Reserve property, and the exclusion of land from the Agricultural Land Reserve to allow project activities and infrastructure. The Regional District of Kootenay Boundary has no objections to the non-farm use and exclusion from Agricultural Land Reserve property required for the Project.

Navigable Waters

Transport Canada concluded that issues raised regarding the potential for impacts on navigation have been adequately addressed. Final designs of the Project will be submitted to Transport Canada for consideration of approval pursuant to the *Navigable*

Waters Protection Act. The Proponent has stated that the Project's design and construction will comply with the requirements under this federal legislation.

Conclusions under the BC *Environmental Assessment Act* (BCEAA) and the *Canadian Environmental Assessment Act (*CEAA*)*

The general conclusion of the assessment is that the Project is not likely to cause significant adverse environmental effects with the implementation of the proposed Environmental Management Program and commitments, including compliance effects monitoring and follow-up measures (see Appendix 4 – Proponent's Commitments).

Pursuant to the requirements of BCEAA, EAO is satisfied that:

- The process and documents generated as part of this environmental assessment review adequately identify and address the potential adverse environmental, economic, social, heritage or health effects of the Project;
- Public and First Nations consultation, and the distribution of information to the public and First Nations, have been adequate;
- Issues identified during the review process by the public, the Ktunaxa Nation Council and Okanagan Nation Alliance, federal and provincial government agencies, U.S. agencies, and local governments have been adequately addressed by the Proponent during the review of the Application and other supporting documentation; and,
- Practical means have been identified to prevent or reduce to an acceptable level any potential adverse effects.

The provincial Minister of Environment and the Minister of Energy, Mines and Petroleum Resources will consider this Report and other accompanying materials in making their decision on the Application and issuance of an Environmental Assessment Certificate to the Proponent under BCEAA.

Pursuant to the requirements of section 16(1) and 16(2) under CEAA, the Responsible Authorities have determined that, taking into consideration the federal Comprehensive Study Report and the implementation of the proposed mitigation measures, the Project is not likely to cause significant adverse environmental effects.

The federal responsible authorities for the Project (Fisheries and Oceans Canada and Transport Canada) will submit to the federal Minister of Environment and the Canadian Environmental Assessment Agency, a Comprehensive Study Report (this current joint provincial Environmental Assessment Report and federal Comprehensive Study Report) that includes a summary of what was considered in the environmental assessment and a determination of significance of effects based on consideration of the following:

- The environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project, in combination with other projects or activities that have been or will be carried out;
- The significance of the effects referred to above;
- Comments from the public;
- Measures that are technically and economically feasible, and that would mitigate any significant adverse environmental effects of the Project;

- Purpose of the Project;
- Alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;
- Need for, and the requirements of, any follow-up program in respect of the Project; and,
- Capacity of renewable resources that is likely to be significantly affected by the Project to meet the needs of the present and those of the future.

Upon receiving the Comprehensive Study Report, the Canadian Environmental Assessment Agency will provide an opportunity for the public to access the report and provide comments on it. Following this public comment period, the federal Minister of the Environment will consider the Comprehensive Study Report and the public comments received. The Minister must then either refer the Project back to the Responsible Authorities to take a course of action under section 37 of CEAA or refer the Project to environmental mediation or review panel in accordance with section 29 of CEAA.

PART A – GENERAL BACKGROUND

1. INTRODUCTION

1.1 Background

Environmental assessment is an important component of major project planning and approval. Its primary goal is to identify and assess the potential environmental effects that may result from the development of a proposed project, and to develop measures for mitigating and/or managing those effects. Through the review process, potential effects of a proposed project are identified and evaluated early, providing the opportunity for a project to be modified before irreversible project design and construction decisions are made. This opportunity for early intervention results in improved project design and helps to avoid costly mistakes for proponents, governments, communities and the environment. In Canada, all provinces and the federal government implement environmental assessment procedures to assist them in making decisions on whether proposed large-scale projects should be approved for development. Environmental assessment helps ensure that project decision-making and planning by governments and proponents are informed.

Each of the responsible federal and provincial government agencies has a mandate to review any and all aspects of the Waneta Hydroelectric Expansion Project environmental assessment, at its discretion and without restriction. Within this overall context, the different agencies have certain specialized interests, mandates and responsibilities.

In British Columbia, the Environmental Assessment Office (EAO) is established under the BC *Environmental Assessment Act* (S.B.C. 2002, c.43) (BCEAA) to administer and manage provincial environmental assessments.

The Canadian Environmental Assessment Agency (CEA Agency), in coordination with Fisheries and Oceans Canada as the lead Responsible Authority and Transport Canada as a Responsible Authority, has the responsibility to ensure that all process requirements of the *Canadian Environmental Assessment Act* (S.C. 1992, c. 37) (CEAA) are carried out in accordance with the applicable regulations and guidelines. The CEA Agency has been coordinating much of the work with EAO related to the environmental assessment of the Waneta Hydroelectric Expansion Project.

Environment Canada provides technical assistance on matters relating to federal responsibilities involving migratory birds, species at risk, wetlands, water quality, toxics management, climatology, and air quality.

On June 8, 2006, EAO accepted for formal review the Waneta Expansion Power Corporation's (Proponent) Environmental Assessment Certificate Application (Application) for the development of the Waneta Hydroelectric Expansion Project (Project). This Project involves the construction and operation of a new hydroelectric powerplant on the bank of the Pend d'Oreille River, just north of the Canada-U.S. border in the West Kootenay Region of BC. Under Part 4 of the Reviewable Projects Regulation (B.C. Reg. 370/2002), the Project is a reviewable project and subject to the BC provincial environmental assessment process. Transport Canada and Fisheries and

Oceans Canada have determined that an environmental assessment under CEAA is required in relation to the proposal and are therefore Responsible Authorities[1] for this Project as section 5(1) of the *Navigable Waters Protection Act* and sections 32 and 35(2) of the *Fisheries Act* have been triggered.

It has also been determined that the proposal is subject to the following provision of the Comprehensive Study List Regulations of CEAA: The proposed construction, decommissioning or abandonment of a hydroelectric generating station with a production capacity of 200 megawatts or more. Accordingly, a comprehensive study process was initiated for the Project by the responsible authorities.

As this Project falls under the authorities of both provincial and federal legislations, EAO and the CEA Agency have collaboratively reviewed the Application and subsequently prepared this Report to advise their respective Ministers of their conclusions and recommendations.

This Report has been prepared jointly by the Province of BC and the Government of Canada to fulfill the reporting requirements for the environmental assessment conducted under each jurisdiction. Provincially, this Report is the basis for determining whether potentially significant adverse effects can be prevented or reduced to an acceptable level through practical means. Federally, this Report provides the basis for determining the significance of potential adverse environmental effects.

1.2 Purpose of the Joint Report

In accordance with section 6.1 of the bilateral Canada-British Columbia Agreement on Environmental Assessment Cooperation (Agreement), EAO and the CEA Agency jointly prepared this Report to meet legal requirements of both governing bodies.

A joint Report makes unnecessary the preparation of a separate BC provincial Environmental Assessment Report and a federal Comprehensive Study Report, to promote a "one project – one review" approach, when regulatory requirements of both levels of governments are triggered by a proposed major project. This approach avoids uncertainty and duplication between the provincial and federal environmental assessment processes. Under the Agreement, BC and Canada consent that, when an environmental assessment of a project is required pursuant to legal requirements of both governments, a cooperative environmental assessment would be conducted, using an integrated framework to generate the type and quality of information and conclusions on environmental effects required by all decision-making parties. Moreover, BC and Canada agreed that their subsequent decision-making affecting the Project development will be based on the findings and recommendations of a single joint Report. The resulting report is expected to address a broad range of environmental, health and safety, socioeconomic, community and First Nations issues, and consider together the concerns of all interested parties.

[1] Under section 2 of CEAA, "Responsible Authority", in relation to a project, means a federal authority that is required pursuant to subsection 11(1) to ensure that an environmental assessment of the Project is conducted.

Conforming to the intents of the Agreement, this joint Environmental Assessment Report has been prepared with consideration for the information requirements of both an Environmental Assessment Report under BCEAA and a Comprehensive Study Report under CEAA. Key requirements of an Environmental Assessment Report and a Comprehensive Study Report are, respectively, as follows:

Key requirements of a BC Environmental Assessment Report:

- Brief description of the Project;
- Report on the adequacy of the Proponent's public and First Nations consultations;
- Summary of issues considered during the Application review;
- Report on whether the Application has considered and adequately addressed the Project's identified potential environmental, health, heritage, social and economic effects; and,
- Measures required, to prevent or reduce to an acceptable level, any adverse effects of the proposed Project.

Key requirements of a federal Comprehensive Study Report:

- Potential environmental effects of the Project, including the environmental effects[2] of any accidents or malfunctions that may occur in connection with the Project and any cumulative effects that are likely to result from the Project in combination with other projects or activities that have been or would be carried out;
- Measures that are technically and economically feasible to mitigate any adverse environmental effects of the Project;
- Report on all public concerns raised in relation to the Project and how they have been addressed;
- Conclusions, based on the Comprehensive Study Report and public comments, with respect to whether the Project is likely to result in significant adverse environmental effects;
- Any other matter relevant to the assessment, such as the need for the Project and alternatives to the Project, that the Responsible Authority may require to be considered;
- The purpose of the Project; and,
- Alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;

[2] "Environmental effect" is defined as:

- Any change that the Project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(2) of the *Species at Risk Act.*.
- Any effect of any change on:
  - Health and socio-economic conditions;
  - Physical and cultural heritage;
  - Current use of lands and resources for traditional purposes by Aboriginal persons; or,
  - Any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.
- Any change to the Project that may be caused by the environment, whether any such change or effect occurs within or outside Canada.

- The need for, and requirements of, any follow-up program in respect of the Project; and,
- The capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future.

This Report is organized into six major sections, Part A to Part F, and 6 appendices that collectively identify the key issues raised during the environmental assessment review and how these issues have been or could be mitigated or addressed, the Proponent's commitments, and additional regulatory approvals required for the Project. The following is a brief description of each major section:

- Part A – provides the regulatory context and key Project information.
- Part B – discusses consultations with two First Nations, the Ktunaxa Nation and the Okanagan Nation, and their interests.
- Parts C and D – discusses potential environmental and socio-economic effects, issues raised and Proponent responses, proposed mitigation, and significance of residual effects and conclusions.
- Part E – reports on specific CEAA requirements.
- Part F – reports the independent conclusions of EAO and the federal Responsible Authorities.

1.3 Environmental Assessment Process

1.3.1 Provincial Review Process

EAO is the neutral provincial agency that coordinates the environmental assessment of reviewable project proposals in BC. EAO is responsible for ensuring that project environmental assessments:

- Are comprehensive and technically sound;
- Involve all potentially interested parties;
- Are conducted in an open, timely and efficient manner; and,
- Adhere to applicable provincial legislation and regulations.

By law, proponents of certain major project development proposals in BC must obtain Environmental Assessment Certificates before they proceed. Pursuant to section 5 of BCEAA, projects meeting criteria established by the Reviewable Projects Regulation (B.C. Reg. 370/2002), are subject to the environmental assessment review process.

Through the environmental assessment process, the Province evaluates proposed major project developments within the context of its regulatory and policy framework and technical expectations. The essential objectives of the environmental assessment process is to identify any foreseeable adverse impacts throughout the life cycle of a proposed project – including construction, start-up, operation, decommissioning and abandonment – to determine ways to eliminate, minimize or mitigate those adverse impacts. Environmental, economic, social, heritage and health effects are all considered in the provincial review process. In this manner, the government determines the overall acceptability of a proposal for major project development.

The review process results in advice and recommendations from EAO to the responsible Ministers relating to the granting of an Environmental Assessment Certificate. The issuance of an Environmental Assessment Certificate signifies that key issues relevant to the determination of whether the Project development should, or should not, proceed have been resolved or can be resolved by technically feasible means as development proceeds.

Under BCEAA, a proponent can expect the provincial environmental assessment review process to normally take up to 180 days (approximately six months) from the date the Application review commences to the date the Application is referred to the responsible Ministers for decision. The responsible Ministers have 45 days to make a decision on whether to issue an Environmental Assessment Certificate.

Concurrent Approvals

Certain project developments, in addition to BCEAA, may also be subject to the requirements of other provincial regulatory requirements, some of which require authorizations, permits, licences and approvals. Under section 23 of BCEAA and the Concurrent Approval Regulation (B.C. Reg. 371/2002), a proponent may request that applications, for some or all provincial approvals related to the project, be reviewed at the same time as the provincial environmental assessment is conducted. The issuance of an Environmental Assessment Certificate does not guarantee that necessary authorizations, permits, licences and approvals would be also granted.

EAO coordinates with the relevant regulatory agency to ensure that its review is completed within the mandated 180-day timeframe. Once an Environmental Assessment Certificate is issued for a project, the regulatory authority must, within 60 days following the issuance of the Environmental Assessment Certificate, either issue an approval, refuse to issue an approval, or specify a later date on which the Proponent may expect a decision, along with an explanation for the delay.

The Proponent submitted a written request for a concurrent review of applications for a water licence (under the *Water Act)* and Crown land tenure (under the *Land Act)* to EAO on September 13, 2005. On June 8, 2006, the Proponent's request for a concurrent review was accepted. A list of provincial approvals required for the development of the Project is in Appendix 5.

Provisions for the concurrent review of applications for provincial authorizations, permits, licences and approvals do not apply to either federal or local government approvals. For federal and local government approvals, a proponent must make separate applications to the appropriate authorities.

1.3.2 Federal Review Process

The federal government's environmental assessment process evaluates proposed projects[3] which trigger an environmental assessment under CEAA. Through the federal

[3] "Project" means (a) in relation to a physical work, any proposed construction, operation, modification, decommissioning, abandonment or other undertaking in relation to that physical work, or (b) any proposed physical activity not relating to a physical work that is prescribed or is within a class of physical activities that is prescribed pursuant to regulations made under CEAA.

environmental assessment review, possible environmental effects, proposed measures to mitigate adverse effects, and potential significant adverse environmental effects after mitigation is taken into account, are identified. A federal environmental assessment is also an important tool for promoting sustainable development. An environmental assessment of a project is required before a federal authority exercises a power, duty or function in respect of the project as per section 5(1) of CEAA.

Within the federal legislative framework, the Minister of the Environment is responsible for the administration of CEAA. The environmental assessment process implemented under the authority of CEAA, as well as the implementation of any other requirements and procedures established by the Act and its regulations, is administered by the CEA Agency, an independent federal body accountable to Parliament, through the federal Minister of the Environment. The CEA Agency works in partnership with federal departments and agencies, provinces and territories, environmental and Aboriginal groups, industry and others to ensure that environmental assessment review efforts are coordinated and harmonized.

As the Project entered the environmental assessment process well in advance of October 30, 2003, its environmental assessment review is not subject to the requirements of the 2003 CEAA. The environmental assessment review for this Project proceeded under former federal regulatory provisions. For the purposes of this Report, the description that follows reflects the federal review process and procedures in effect prior to the 2003 amendment of CEAA.

Under the federal environmental assessment process, there are four different types of reviews: screenings, comprehensive studies, mediations and review panels. The majority of proposed project developments subject to a federal review undergo a screening.

Some projects require comprehensive studies. A Comprehensive Study under CEAA is required when a proposed project or class of projects is prescribed in the CEAA Comprehensive Study List Regulations. Examples of such projects include large-scale oil and natural gas developments, nuclear power developments, electrical-generation projects, industrial plants and certain projects in national parks and others.

Under section 21 of CEAA, a Responsible Authority must ensure that a Comprehensive Study is conducted and a Comprehensive Study Report is prepared and provided to the Minister and the CEA Agency. The public will then be provided with an opportunity to comment on the report. Following this public comment period, the Minister of the Environment will consider the Comprehensive Study Report and the public comments received. The Minister must then either refer the project back to the responsible authorities to take a course of action under section 37 of CEAA or refer the project to environmental mediation or review panel in accordance with section 29 of CEAA.

If the Project is referred back to the Responsible Authority for a course of action, the Responsible Authority may exercise any power or perform any duty or function that would permit the Project, or part of the Project, to be carried out, such as issuing a permit or authorization, if the Comprehensive Study Report concluded that the Project is either not likely to cause significant adverse environmental effects or that the adverse effects can be justified in the circumstances. The Responsible Authority is then responsible for ensuring that the implementation of any mitigation measures is fully

carried out. If, taking into account the implementation of mitigation measures that the Responsible Authority considers appropriate, the Comprehensive Study Report found the Project likely to cause significant adverse environmental effects that cannot be justified, the Responsible Authority shall not take any further action to allow the Project to proceed, without the approval of the Governor in Council. If the Minister refers the Project to a mediator or review panel, that authority is then mandated to evaluate the Project and prepare a report for the Minister and for the Responsible Authority. Upon receipt, the Responsible Authority considers the report and responds to the report with a course of action that is approved by the Governor in Council.

Potential federal Responsible Authority (Fisheries and Oceans Canada, and Transport Canada) approvals that will be required for the proposed Project, should it proceed, are listed in Appendix 6.

1.3.3 Cooperative Review Process

The governments of Canada and BC are signatories to the bilateral Canada-British Columbia Agreement on Environmental Assessment Cooperation (Agreement). This Agreement creates an administrative framework within which the two parties can cooperatively exercise their respective powers and duties established by CEAA, BCEAA and regulations made pursuant to those Acts. For Canada, this Agreement applies to any person or body that is required to ensure an environmental assessment is conducted under CEAA and its regulations. In BC, this Agreement applies to EAO. In general, for project developments on federal lands where Canada has an environmental assessment responsibility, Canada is the lead party in the joint environmental assessment review; for project developments that are on lands within BC's provincial boundaries where BC has an environmental assessment responsibility, BC is the recognized lead party.

The Agreement fosters cooperation between the two levels of government concerning the environmental assessment review of proposed project developments, to avoid duplication while respecting the constitutional powers and statutory responsibilities of each level of government. The Agreement sets out the principles for carrying out a cooperative environmental assessment and describes the roles and responsibilities of the parties in implementing a cooperative environmental assessment review. The objectives of the Agreement are to achieve greater efficiency and effectiveness in the use of public and private resources and, to achieve greater certainty and predictability for participants in the environmental assessment review of proposed project developments.

At times, a multi-jurisdictional environmental assessment review is necessary if a proposed project development triggers regulatory requirements of more than one jurisdiction. For a joint environmental assessment review, representatives of BC and Canada collaboratively develop a federal/provincial Project Work Plan to coordinate their review activities and responsibilities. Such activities may include, but are not limited to, the following:

- Determining the scope of the project development to be assessed and the factors, and the scope of the factors, to be considered, including those relating to policy and legislative requirements;

- Identifying and consulting with the federal Responsible Authorities and the federal regulated authorities participating in the joint review;
- Identifying opportunities for notification, public consultation and, where BC is the lead party, reviewing the Application and related documentation for an Environmental Assessment Certificate under BCEAA;
- Identifying opportunities for coordinating First Nations participation in the joint environmental assessment process;
- Identifying opportunities for determining and documenting the information requirements and analyses necessary to meet the legislated environmental assessment requirements of both jurisdictions; and,
- Negotiating a mutually agreeable schedule for the completion of the joint review, recognizing legislated timelines, including all required notifications and opportunities for consultation.

For a joint environmental assessment review for which BC is the lead party, the role of EAO is to neutrally administer and manage the environmental assessment process. The role of the CEA Agency is to act as the principal point of contact for federal authorities during the assessment process, and consolidate information requirements for the environmental assessment as well as coordinate the actions of federal authorities with those of the provincial EAO.

Provided that the information generated by the joint review meets the requirements of both parties, each party would use the information generated to make its advice and recommendations to their respective Ministers.

2. PROJECT INFORMATION

2.1 Proponent

The Waneta Expansion Power Corporation is the Proponent seeking regulatory approval to develop and operate the proposed Waneta Hydroelectric Expansion Project. The Proponent is an incorporated joint venture company owned by Columbia Power Corporation and Columbia Basin Trust Energy Inc., a subsidiary of the Columbia Basin Trust. Established under the *Business Corporations Act*, the Columbia Power Corporation is a Crown corporation wholly owned by the Province of BC. The Columbia Basin Trust is controlled by a Board of government-appointed directors, half of whom are nominated by local Regional Districts and First Nations.

The Columbia Power Corporation and the Columbia Basin Trust were brought together in 1995 as partners in power development by the Columbia Basin Accord and a binding Financial Agreement between the Province and the Columbia Basin Trust. The Columbia Basin Accord was created to identify and realize sustainable development opportunities in the region of BC negatively affected by the construction of three large dams in the Canadian portion of the Columbia River Basin during the 1960s under the Canada/U.S. Columbia River Treaty. The Columbia Basin Accord established three new hydroelectric projects as core projects for joint venture development, collectively referred to as the Columbia Basin Power Projects.

In 1994, the Province entered into an agreement with Teck Cominco Metals Ltd. to purchase certain expansion rights at the existing Waneta Dam and its powerplant. These development rights were then vested in Columbia Power Corporation. In 2000, Columbia Basin Trust Energy Inc. purchased a 50 percent interest in the expansion rights from Columbia Power Corporation. The Columbia Power Corporation/Columbia Basin Trust Energy Inc. right to carry out the Project includes the following:

- The benefit of the hydraulic head and reservoir created by Waneta Dam;
- The right to abut to Waneta Dam;
- The benefit of the spillways and headworks at Waneta Dam;
- The right to obtain any lands owned by Teck Cominco required by the Project as fee simple, as easements or as statutory rights-of-way; and,
- The right to connect to Teck Cominco's Line 71, transmission line.

The Pend d'Oreille Water Reserve, originally in favour of BC Hydro, was amended in favour of Columbia Power Corporation/Columbia Basin Trust Energy Inc. in July, 2003. The revised reserve sets aside all the unrecorded water of the Pend d'Oreille River and its tributaries at Waneta for power production purposes to a joint venture or subsidiary of Columbia Power Corporation, Columbia Basin Trust Energy Inc. (the Proponent, the Waneta Expansion Power Corporation). The Waneta Cooperation Agreement between Columbia Power Corporation/Columbia Basin Trust Energy Inc. and Teck Cominco was signed in June 2004. This agreement came into force with renewal of the multi-party Canal Plant Agreement in April 2006. The Cooperation Agreement requires Teck Cominco to cooperate with the Proponent in all aspects of project permitting, land transfer and inclusion of the Project in the renewed Canal Plant Agreement. The Cooperation Agreement requires the Proponent to support an amendment to the Pend d'Oreille Water Reserve to allow the provincial Comptroller of Water Rights to issue a water licence to Teck Cominco for its Waneta Upgrade Project that is subordinate to any licence issued for the Waneta Hydroelectric Expansion Project. A Release Coordination Agreement has been negotiated between the Proponent and Teck Cominco and comes into effect in conjunction with the Waneta Cooperation Agreement. The Release Coordination Agreement contains provisions to allow water licensed for one facility to be used by the other facility to generate coordinated power benefits that would be shared under the Canal Plant Agreement. It is anticipated that the Release Coordination Agreement will be a condition to the Comptroller of Water Rights issuing authorizations under the *Water Act* for the Project [the new water license application by the Proponent for 764 cubic metres per second of water from the Pend d'Oreille River for the purpose of general waterpower and the extension of Teck Cominco licensed rights to allow use in the Project].

2.2 Project Description

The proposed Project is one of three core Columbia Power Corporation and Columbia Basin Trust power projects (Keenleyside Powerplant Project – now known as the Arrow Lakes Generating Station – Brilliant Expansion Project and the Waneta Expansion Project) under the umbrella of the Columbia Basin Power Projects.

The Project is located in the West Kootenay region of southeastern BC, near the city of Trail, approximately 0.8 kilometres north of the Canada-U.S. border off Highway 22A. (See Appendix 1, Figure 1 – Project Location and Area Generation Facilities.) Trail,

Castlegar and Nelson are the main population centres in the project area. Limited rural population exists in the immediate area of the Waneta Dam and the proposed project facilities. The nearest U.S. community is Northport, approximately 18 kilometres southwest of the border.

The Project is a new hydroelectric generating facility on the right bank of the Pend d'Oreille River, near its confluence with the Columbia River, adjacent to the existing Waneta Dam, owned by Teck Cominco Metals Ltd. (See Appendix 1, Figure 2 – Aerial View of Project Area; Figure 3 – Rendering of Project Intake and Powerhouse; and Figure 4 – Base Concept – Plan View.) The Project would use surplus water flows from the Pend d'Oreille River, not currently used by the existing Waneta Generating Station, and with generating capacity of approximately 435 megawatts will produce more than 700 gigawatt-hours of electricity (additional capacity). This is equivalent to meeting the electricity needs of more than 70,000 households (the power produced on the Canadian section of the Pend d'Oreille River can serve approximately 500,000 homes, and with the addition of the Project this number will rise to over 570,000 homes).

The Project will be interconnected with the BC Hydro transmission grid at the Selkirk Substation by a new 10 kilometre, 230 kilovolt transmission line (see Appendix 1, Figure 5 – Base Concept Transmission Line Route).

Powerhouse construction will require realignment of a short portion of the Waneta-Nelway Road to accommodate the powerhouse excavation and realignment of the existing private access road from Highway 22A to the existing Waneta Generating Station. The existing private access road from the Waneta-Nelway Road to the dam deck will be upgraded and slightly extended to provide access to the new intake structure. There are no stream crossings associated with these roads. Other construction-related activities include the storage/disposal of excavated materials, aggregate processing and concrete production; temporary facilities are also required for offices, worker parking, storage and staging, workshops and site services. The locations of worksites associated with these construction activities are shown in Appendix 1, Figure 6.

If approved, the Proponent proposes the use of a Design-Build Project Implementation Strategy to achieve optimal timeliness, cost-effectiveness, transparency and accountability. A Design-Build strategy aims to encourage industry to optimize the project design within prescribed boundaries and then, when approvals are obtained, for industry to construct the Project for the best quality-weighted fixed price possible.

Project construction is scheduled to begin in 2007/08 and commercial operation would commence by 2011, assuming a 3.5-year (42 month) construction period. Once completed, the Project would provide ongoing revenue to the Columbia Basin Trust and the Province of BC. It will also create regional employment and social benefits for communities throughout the Columbia Basin.

The total capital cost (2006 dollars) for building the Project is expected to exceed $400 million. Estimated operating and maintenance costs (2006 dollars) including water rentals and grants-in-lieu, but excluding periodic equipment replacement costs, are expected to be in the vicinity of $8 million annually.

With continuing powerplant overhauls and upgrades, the economic life of the Project is expected to be 100 years or more.

2.3 Alternatives to the Project

"Alternatives to the Project" is defined as functionally different ways to meet the Project need and achieve the Project purpose, from the perspective of the Proponent. The purpose of the analysis of alternatives to the Project is to validate that the preferred alternative is a reasonable approach to meeting the need and purpose for the Project.

For this Project, the Proponent explored energy alternatives to the Waneta expansion. The Proponent concluded that the only alternatives in the region able to produce an increment of energy similar to the proposed expansion of the Waneta facilities would be thermal projects, using fossil fuels such as coal, coal bed methane or natural gas. While natural gas is comparatively the preferred choice among these fuel alternatives, the use of natural gas raises several environmental, public health and economic concerns. The use of natural gas involves high costs relating to the rising wholesale price for natural gas in North America, high costs of meeting emission standards and/or purchasing emission credits, and produces greenhouse gases and nitrogen oxides that can cause smog, acid rain and fine particulates. Moreover, while BC has a number of sites where large hydro projects could be developed, these sites are remote and not located in the region. Also, the need to create storage and long transmission lines make these hydro projects difficult and costly to develop.

In contrast, the expansion of an existing facility would provide energy and capacity to meet growing Canadian energy demand without the loss of terrestrial resources that would be associated with development of a new site. Relative to the alternatives explored, the Proponent determined that the expansion of the existing Waneta facilities was competitive on a sustainable development basis. As a result, the Proponent concluded that the Project, as described in the Application, is the preferred alternative for increased power generation.

2.4 Alternative Means of Carrying Out the Project

"Alternative means of carrying out the Project" is defined as various ways that the Project can be implemented or carried out, in a manner that is technically and economically feasible. This could include, for example, alternative locations, routes and methods of development, implementation and mitigation. Under CEAA, the consideration of alternative means and the environmental effects of any such alternative means are required for every comprehensive study.

The project design alternatives considered by the Proponent included different locations and arrangements for the proposed powerhouse, and different routes as well as designs for the proposed transmission line. In total, three potential powerhouse locations were evaluated (the left bank of the Pend d'Oreille River, the left bank of the Columbia River, and the right bank of the Pend d'Oreille River) and two transmission line routes along with line designs were considered between the proposed powerhouse and BC Hydro's Selkirk Substation.

Powerhouse

All three possible powerhouse locations were evaluated with one or more project arrangements (layouts) and several installed generating capacities. The Proponent's evaluation of alternatives took into consideration the following constraints identified for the project area:

- Proximity of Canada-U.S. border limiting available work areas to the north of Waneta;
- Lack of flat land to support construction and worker infrastructure;
- Steep terrain along the right bank of the Pend d'Oreille River;
- Steeper terrain along the left bank of the Pend d'Oreille River;
- Potential conflicts with Highway 22A and the Burlington Northern Santa Fe Railway;
- Proximity of the Pend d'Oreille-Columbia confluence and its important fish habitat;
- Need for Teck Cominco to have continuous access to its facilities during construction; and,
- Need to avoid/minimize disruption to Teck Cominco's existing Waneta generation.

The option of locating a powerhouse on the left bank of the Pend d'Oreille River was rejected because it was concluded to be technically not feasible and uneconomic. A surface powerhouse could not be built at this location due to steep terrain, and an underground powerhouse would cost substantially more and produce less energy than other arrangements. Using longer water conveyance tunnels, the powerhouse would need to be located on the left bank of the Columbia River, downstream of the confluence with the Pend d'Oreille, and this would physically disrupt Highway 22A and the Burlington Northern Santa Fe Railway.

The option of locating a surface powerhouse on the left bank of the Columbia River (upstream of the confluence with the Pend d'Oreille) was rejected because it was concluded to be economically not feasible due to increased costs associated with unfavourable bedrock topography and disruption of Highway 22A and the Burlington Northern Santa Fe Railway (the highway and railway occupy the river bench and there would be limited space in which to locate a powerhouse and undertake construction).

In considering both of the above options, there was concern that the diversion of Pend d'Oreille River flows through a powerhouse situated on the Columbia River would likely have significant adverse effects on unique white sturgeon habitat in the Waneta Eddy and confluence areas.

The Proponent opted to pursue powerplant development options only on the right bank of the Pend d'Oreille River. The option of an underground powerhouse connected to the existing Waneta Generating Station powerhouse with underground water conveyance tunnels was rejected, because it was concluded to be technically and economically not feasible due to significant safety concerns related to the proximity of construction activities to the existing powerhouse.

After considering the above noted alternative powerhouse arrangements, a surface powerhouse located on the right bank of the Pend d'Oreille River was selected. Three alignments for the lower power tunnel(s) and tailrace were evaluated. Installed

generating capacities were also evaluated ranging from 125 to 435 megawatts, in either one-unit or two-unit configurations. The base concept selected (435 megawatts, two-unit, twin tunnel/shaft option, and tailrace alignment of 45-60 degrees from the Pend d'Oreille River centerline) was considered to have the least impact on the existing Waneta facilities, and the most economic and environmental merits.
The environmental effects of the above alternative means of carrying out the project powerhouse are discussed in Part E, Section 2.

Transmission Line

The existing five 60 kilovolt transmission lines and single 230 kilovolt transmission line (Line 71), which connect the existing Waneta Generating Station to the transmission grid, do not have the capacity to accept the output from the Project. A new 230 kilovolt transmission line is therefore required to connect the Project to the nearest suitable point on the bulk transmission grid. The connection must be made at an existing substation rather than directly into the nearby 500 kilovolt transmission line 5L98, because direct connection would unacceptably compromise the integrity of the bulk transmission system.

Two transmission line routes, Route 1 and Route 2 (see Appendix 1, Figure 5), and various line designs were considered between the project powerhouse and BC Hydro's Selkirk Substation (the major substation in the project area interconnecting to the provincial bulk transmission system) were considered using a set of 10 selection criteria: length of line; right-of-way clearing; cost; construction complexity; terrestrial impacts; aquatic impacts; aesthetic impacts; landowner impacts; permitting; and operational considerations.

Route 1 begins by paralleling Teck Cominco's existing 71 Line, then runs parallel to BC Hydro's Line 5L98 along its north side for 8.5 kilometres until it reaches Selkirk Substation. The total length of Route 1 is approximately 10 kilometres. Two structure designs were considered for Route 1: a standard wood-pole single circuit H-frame type, and a single-pole design. The single-pole design would permit approximately 6.5 metres less statutory right-of-way clearing than the H frame design, but would require twice as many structures, and each structure would need to be 10 to 12 metres taller. The selected H-frame design represents least cost and a lower visual impact. The existing 64 metres wide electrical clearance zone width of BC Hydro's Line 5L98 will need to be extended by approximately 21 metres to accommodate the new line from Waneta. If overlap of the two transmission statutory right-of-ways were not possible, a further 9 metres clearing of statutory right-of-way would be required.

Route 2 would utilize the existing Teck Cominco 71 Line statutory right-of-way between Waneta and the point where the 71 Line passes underneath BC Hydro's 230 kilovolt lines from the Seven Mile Generating Station to Selkirk Substation, a distance of approximately 8 kilometres. A new double-circuit line would be constructed over the first section. From this point, a single-circuit line would be constructed northward parallel to the BC Hydro lines along the west side of the statutory right-of-way for approximately three kilometres to the Selkirk Substation. The total length of new line would be approximately 11.5 kilometres.

The new double-circuit line between Waneta and the BC Hydro lines would involve structure-for-structure replacement of the existing 71 Line H-frame and single pole

structures with double-circuit H-frame structures. This would allow the construction of the new line within the existing statutory right-of-way. Three other designs were considered and eliminated for this section:

- A separate single circuit parallel to the existing 71 Line, which would require considerably more clearing (approximately 34 hectares);
- Over-building existing 71 Line was deemed not feasible reflecting the nature of the existing structures and present-day design standards; and,
- Under-building existing 71 Line was deemed not feasible reflecting the nature of the existing structures and present-day standards.

Constructing a new double-circuit line adjacent to the existing 71 Line, and then removing the existing 71 Line, was eliminated as an option because, although the old statutory right-of-way could be reclaimed, the incremental environmental impact associated with clearing the new parallel statutory right-of-way would be inconsistent with minimizing environmental impacts. The single-circuit section of the new line from the intersection of the 71 Line corridor with the BC Hydro corridor to the Selkirk Substation would use standard H-frame construction and require an incremental 21 metre width of statutory right-of-way on the western boundary of the existing BC Hydro right-of-way.

The two transmission line routes were compared and Route 1 was found to be superior to Route 2 in 9 of the 10 criteria noted above, and was selected for the Base Concept. However, both routes are considered to be technically and economically feasible. The environmental effects of the above alternative means of carrying out the project transmission line are discussed in Part E, Section 2.

2.5 Project Scope

In general, the project scope refers to the physical facilities and activities that comprise the Project for purposes of the assessment. This usually includes all dedicated on-site and off-site facilities needed for the Project to function, as well as activities associated with operating those facilities. The project scope also identifies which of the Project's development phases – construction, operations, modification, dismantling and abandonment – are to be included in the assessment. In most situations, all phases are included for projects with a definite life expectancy (e.g. mines), whereas for projects with an indeterminate life expectancy (e.g. hydroelectric facilities), the assessment does not normally include dismantling and abandonment.

The Proponent submitted to EAO, on May 30, 2003, a description to provide an overview of the Project. On June 12, 2003, EAO issued a section 10 Order to the Proponent confirming that the Project is reviewable under BCEAA and, therefore, requires an Environmental Assessment Certificate. The cover letter accompanying the section 10 Order confirmed that the Project would be also subject to a review under CEAA, and that CEAA assessment requirements would be integrated into the BC environmental assessment process.

During the Project pre-application stage, EAO, Transport Canada and Fisheries and Oceans Canada agreed to assess the same scope of project, consistent with the Canada-British Columbia Agreement on Environmental Assessment Cooperation. On

September 22, 2003, EAO issued a section 11 Order which generally outlined the scope of the Project and scope of assessment for the provincial environmental assessment review. On October 30, 2003, Fisheries and Oceans Canada issued a letter confirming that the Project would require an environmental assessment as a comprehensive study and confirming that the federal scope of the Project would include the same physical works and physical activities as the provincial assessment.

The section 11 Order required the Proponent to prepare a draft Terms of Reference for its Application, and specified a process for the review and approval of the draft Terms of Reference. The Order required the draft Terms of Reference to fully identify the scope of the Project. The final Terms of Reference was approved by EAO in May 2004. On April 26, 2006, EAO issued a section 13 Order to the Proponent, amending sections of the earlier section 11 Order, advising that the Application would be screened by EAO with advice from provincial and federal agencies and First Nations participants.

The project scope considered in the provincial and federal environmental assessment processes is comprised of the following components:

a) Powerplant comprised of the following:
   - Access roads including realignment of a portion of the Waneta-Nelway road, realignment of the existing private access road from Highway 22A to the existing Teck Cominco powerhouse, and construction of a short section of new road from the Waneta-Nelway Road on the alignment of an existing private access road to provide access to the power intakes;
   - Short intake approach channel above the Waneta Dam to a gated twin intake structure;
   - Upper and lower sections of two power tunnels, each connected by a vertical shaft;
   - Surface powerhouse with a generating capacity of 435 megawatts and containing two vertical shaft turbine-generator units (the hydraulic capacity of the powerhouse will be 764 cubic metres per second;
   - Tailrace channel to the existing Waneta tailrace located close to the toe of the Waneta Dam;

b) Ten kilometre 230 kilovolt transmission line from Waneta to BC Hydro's Selkirk Substation, and access roads; and,

c) Temporary facilities including those for site offices, worker parking, storage and staging, workshops and site services, explosive storage, excavated materials disposal area(s) and aggregate processing and concrete production.

The project scope defined for the Project is based on the "Base Concept". The Base Concept represents the design that the Proponent considers most likely to be constructed at the project site. Analysis and findings submitted reflect the environmental effects of constructing the 435 megawatt Base Concept. In actuality, during the proposal competition stage, the Proponent expects that the industry would seek to improve on and optimize the Base Concept. Consequently, the resulting optimized design may differ in some respects from the Base Concept. However, the plant hydraulic and generating capacities would not be greater than those presented in the Base Concept.

2.6 Need for and Purpose of the Project

The Proponent is an incorporated joint venture company owned by Columbia Power Corporation and Columbia Basin Trust Energy Inc., a subsidiary of the Columbia Basin Trust. The Columbia Power Corporation is a Crown corporation wholly owned by the Province of BC. The Columbia Power Corporation and the Columbia Basin Trust were brought together in 1995 as partners in power development by the Columbia Basin Accord and a binding Financial Agreement between the Province and the Columbia Basin Trust.

The Project is one of three core Columbia Power Corporation and Columbia Basin Trust power projects. Once operational, the Project will create a stream of revenues from power sales. Half of project earnings will accrue to the Province as the sole shareholder of Columbia Power Corporation, and the other half will be available for re-investment or spending in the region through the Columbia Basin Trust to further the interests of those most affected by the Columbia River Treaty.

According to BC Hydro's 2006 Integrated Electricity Plan, electricity demand will grow between 25 and 45 percent over the next 20 years. The Project will contribute to reducing BC's current net imports of electricity, most of which are supplied from thermal generation utilizing fossil fuels.

The primary purpose of the Project is to optimize the power generating capacity of the existing Waneta Dam on the Canadian Pend d'Oreille River by fully using the flows that enter Canada from Boundary Dam, located 27 kilometres upstream of the Waneta Dam. A secondary purpose is to realize water quality and air quality benefits as a result of reducing spill at Waneta and providing new electricity without producing greenhouse gases.

When the existing Waneta Dam and generating station became operational in 1954, the upstream dams at Seven Mile and Boundary were not yet constructed. Since the construction of the two upstream dams and subsequent expansion of their generating capacities, the Waneta Dam, in its present configuration and discharge capacity, is a bottleneck in hydroelectric operations within the Canadian section of the Pend d'Oreille River.

Boundary Dam (owned and operated by Seattle City Light in U.S.) and Seven Mile Dam (owned and operated by BC Hydro), both located upstream of the Waneta Dam (see Appendix 1, Figure 1 – Project Location and Area Generation Facilities), have generation discharge capacities of approximately 1,470 cubic metres per second. The generation capacity of the Waneta Dam following the completion of upgrades currently underway would be approximately only 915 cubic metres per second, still 555 cubic metres per second below the capacities of the Boundary and Seven Mile facilities. Daily average flows greater than the Waneta discharge capacity are spilled resulting in unused hydroelectrical potential, while lesser flows are re-regulated by fluctuating Seven Mile Reservoir to avoid spill at Waneta.

Moreover, spills increase the amount of total dissolved gas saturation (referred to as total gas pressure) in the water released from Waneta Dam. Elevated levels of total gas pressure have the potential to result in detrimental effects on fish and aquatic life that use shallow water habitat in the Columbia River downstream of Waneta Dam.

The Project will stabilize the reservoir levels at the Seven Mile Dam, and achieve hydraulic balance with the two upstream facilities. Upstream power discharge flows, usually shaped by daily block loading (see Part C, Section 6 – Hydrology) from the Boundary Dam, would then pass directly through the Seven Mile Dam and then the Waneta Dam with minimal spill, thus significantly reducing the loss of unused hydroelectrical potential, as well as reducing the negative impacts of total gas pressure on fish and aquatic life while increasing daily fluctuations in river levels and velocities downstream.

2.7 Description of Existing Environment

The forestry, mining, construction and utilities industries generate much of the employment and economic activity in and near the project area. The areas surrounding the project powerhouse site and transmission line route are sparsely populated. Greater Trail, Nelson and Castlegar are the largest communities in the project area. Greater Trail, the closest community, with an estimated population of 20,500 in the Local Health Area, is most likely to experience the effects of the Project. However, all communities and the region within a 100 kilometres radius of the Project will also experience effects to some degree.

The area surrounding Waneta Dam lies within the Columbia Mountains of the Cordilleran region of western Canada. The Waneta Dam is situated near the western edge of the Selkirk Mountains. The valley of the Pend d'Oreille River displays moderately steep bedrock slopes. The region is mostly underlain by volcanic rocks. Overburden in the project area consists mainly of residual soil from in-situ weathering of the parent rocks. Overburden depths range up to 12 metres in residual soil and up to 15 metres in river alluvium. There are numerous landslides. Glacial deposits up to 100 metres thick are exposed along the Columbia and Pend d'Oreille valleys. The deposits exposed along the Pend d'Oreille are not as extensive.

The major aquatic systems in the project area are the Columbia and Pend d'Oreille Rivers. In Canada and the U.S. there has been extensive flood control and hydroelectric development on the Columbia River system that provide significant flow regulation, including the mainstem Columbia River, Kootenay River, and Pend d'Oreille River. The operation of facilities also affects water temperature and total gas pressure levels. Elevated levels of total gas pressure occur when water is released through spillways during periods of high flow.

The Columbia and Pend d'Oreille Rivers exhibit a high degree of variability in terms of physical parameters of water depth, velocity, temperature, and chemistry. This variability results from a combination of natural factors (e.g., air temperature, precipitation, drainage basin characteristics, etc.) and anthropogenic factors (hydroelectric development, watershed disturbances, pollution, etc.). Most of the native fish species that are present at self-sustaining population levels have adapted to or are able to tolerate the existing levels of natural and human-induced variability. The lower Columbia River supports a diverse assemblage of 27 fish species that includes 13 sportfish species and 14 non-sportfish species.

Upstream of the Pend d'Oreille-Columbia confluence, the Columbia River 30-year average mean, minimum and maximum flows are 1,998 cubic metres per second,

692 cubic metres per second and 3,949 cubic metres per second, respectively. At the Canada-U.S. border downstream of the Pend d'Oreille-Columbia confluence, the Columbia River 30-year average mean, minimum and maximum flows are 2,771 cubic metres per second, 1,123 cubic metres per second and 5,498 cubic metres per second, respectively. The recorded mean flow in the Pend d'Oreille River at Waneta from 1955 to 1990 was 820 cubic metres per second, with mean monthly flows ranging from 362 cubic metres per second in August, to 1889 cubic metres per second in June.

Lower slopes of the project area (450 to 1,100 metres elevation) lie within the very dry, warm variant of the Interior Cedar-Hemlock biogeoclimatic subzone. This subzone is characterized by very hot, dry summers and mild winters with light snowfall and shallow snowpacks of short duration. The dry, warm variant of the Interior Cedar-Hemlock biogeoclimatic subzone extends from about 1,000 to 1,200 metres elevation. Uppermost slopes (1,200 metres to 1,450 metres) are classified within the Columbia-Shuswap Interior Cedar-Hemlock moist, warm variant. Grassland, shrubland, and disturbed weedy habitats dominate the powerhouse area. Forest cover types along the transmission line include pure coniferous or mixed stands, with Douglas-fir and western larch leading, and western red cedar present in draws.

Broad wildlife habitat types within the project area include forests, shrublands, grasslands, disturbed grasslands, riparian areas and rocky areas. Habitat attributes present include wildlife trees, coarse woody debris, eroding banks and wildlife travel corridors. The project area supports approximately 203 vertebrate wildlife species (5 amphibian, 7 reptile, 45 mammal and 146 bird species).

3. ASSESSMENT OF THE PROJECT

3.1 Scope of the Assessment

The objective of scoping is to identify and classify potential environmental effects resulting from the range of project development activities and actions. The subsequent assessment then analyzes and evaluates these effects and prescribes measures to mitigate potential negative effects through project design and/or management practices, or proposes suitable compensation measures where effects cannot be mitigated by practical means.

Provincial Scope of Assessment

The September 22, 2003, section 11 Order issued by EAO, advised the Proponent that the assessment of the Project will include consideration of the following potential effects:

1. Construction activities, including: excavated materials disposal; aquatic resources; future fish passage opportunities; terrestrial resources; socio-economics; health and safety; First Nations interests; archaeological and heritage resources; traffic; land use; existing Waneta hydroelectric facilities; recreation; and visuals.
2. Operation activities, including: dissolved gas supersaturation; fish entrainment; flow patterns and temperature at the confluence of the Columbia and Pend d'Oreille rivers and their effects on fish habitat and aquatic resources; changes in headpond levels and downstream flows from load shaping and their

effects on fish habitat and aquatic resources to the international boundary; and terrestrial effects.

The Order further specified that:

- The assessment will take into account practical means to prevent or reduce to an acceptable level any potential significant adverse effects, and if it is not practical to mitigate, the assessment will propose practical means to compensate for any residual adverse effects.
- The effects of dismantling and abandonment of the Project are not included in the scope of the assessment.

Because of the long lifespan of the Project and the end of its economic life projecting far into the future, as long as 100 or more years with overhauls and up-grades, it was not generally meaningful to address future decommissioning and abandonment. Should future decommissioning or abandonment be necessary, associated activities would be subject to the regulatory environment at that time and a separate environmental assessment would be done in accordance with the then prevailing legislation.

The Proponent submitted its Application for the Project to EAO on March 31, 2006. On April 26, 2006, an Order under section 13 was issued amending the section 11 Order. The Application was screened according to procedures set out in the section 11 Order and section 13 Order to determine compliance with the information requirements of the May 2004 Approved Terms of Reference. EAO subsequently accepted the Application with input from the Responsible Authorities and other Federal Authorities, and the formal 180-day review period under BCEAA began on June 8, 2006.

Federal Scope of Assessment

Through the cooperative environmental assessment process the Application was also evaluated by Responsible Authorities, based on the factors required for a Comprehensive Study Report, as per section 16 of CEAA. The scope of the factors to be taken into consideration is determined by the Responsible Authorities. The factors to be assessed for the federal review are as follows:

- Environmental effects (see definition in footnote on page 3) of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project as scoped, and any cumulative environmental effects that are likely to result from the Project as scoped in combination with other projects or activities that have been or would be carried out (environmental effects under CEAA does not include direct socio-economic effects of the Project);
- Significance of the environmental effects referred to above;
- Comments from the public that are received in accordance with the Act and the regulations; and,
- Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project as scoped;
- Purpose of the Project;
- Alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;
- Need for, and the requirements of, any follow-up program in respect of the Project;

and,

- Capacity of renewable resources that is likely to be significantly affected by the Project to meet the needs of the present and those of the future.

3.2 Information Considered

In conducting the environmental assessment for this Project, EAO, federal Responsible Authorities and review participants considered a range of information. The Proponent's Application is comprised of three volumes of information – Volume 1 is the Assessment Report, and Volumes 2 and 3 contain the supporting Background Reports referenced in Volume 1. These three volumes can be accessed on EAO's website. In addition, during the course of the environmental assessment review the following information was also considered:

- Correspondences between EAO and the Proponent;
- Provincial government agencies' comments and submissions;
- Responsible Federal Authorities' comments and submissions;
- Local government comments and submissions;
- First Nations' comments and submissions;
- Other jurisdictions' comments and submissions;
- Public comments and submissions;
- Proponent's responses to received comments and submissions; and,
- Proponent's baseline and impact studies.

Information considered during the course of the Project's environmental assessment review process is available on EAO's website (www.eao.gov.bc.ca), accessible under the Project's name, Waneta Hydroelectric Expansion Project.

The development of conclusions and recommendations presented in this Report are based on the review of information considered to be components of the overall Application and includes the Proponent's commitments (see Appendix 4 – Proponent's Commitments) and proposals for monitoring requirements and mitigation measures.

3.3 Impact Assessment Methodology

In an effort to deliver a thorough impact assessment, the Proponent undertook inter-related environmental planning activities, including consultation with the public, First Nations, and government agencies, environmental issue scoping, preliminary project design considerations, and assessments of specific environmental effects. These activities have enabled the Proponent to conduct analysis on project impacts and management practices. Wherever possible, the Proponent has used the results to improve the environmental design and mitigation planning for the Project's Base Concept.

In accordance with the Approved Terms of Reference for additional baseline studies, the Proponent undertook the following studies to determine the Project's environmental impacts:

- Bathymetric survey of Columbia/Pend d'Oreille Confluence;
- Underwater video footage of the bathymetry survey area;
- Total dissolved gas supersaturation monitoring and modeling study;

- Inventory and assessment of contaminated sites – Stage 1 Preliminary Site Investigations and Stage 2 Preliminary Site Investigations of project worksites;
- Terrestrial environmental impact assessment;
- Field inventory and impact assessment: Butterflies, moths and dragonflies; and,
- 3-D numerical modeling of flow vectors, velocities and water temperature in the Pend d'Oreille-Columbia confluence area.

In addition to the requirements set out by the Approved Terms of Reference, the Proponent also completed the following studies:

- Archaeological impact assessment;
- Overview of fish and fish habitat resources;
- Evaluation of alternative transmission line routes;
- Traffic impact assessment; and,
- Future fish passage feasibility at Waneta Dam.

Based on consultation with involved agencies and pursuant to the process established by the section 11 Order, the Proponent identified potential positive and negative effects resulting from interactions between project activities and the elements of the receiving environments. The Proponent categorized effects into three categories:

1. Impacts that have been avoided or mitigated during the planning and design phase of the Project;
2. Impacts that can be readily anticipated and can be mitigated during construction using standard management practices; and,
3. Potential impacts that require further analysis to determine their probability, nature, extent and significance.

For those impacts requiring further analysis, the Proponent conducted "impact analyses"[4] to identify applicable standard mitigation measures or, where necessary, special mitigation and compensation measures to address the effects.

Also in accordance with the Approved Terms of Reference requirements, the Proponent identified direct project impacts that may result in effects with the potential to accumulate in the environment, or subsequent effects on other projects and activities. For such impacts, the Proponent conducted cumulative effects assessments[5].

To give greater meaning to the relative levels of significance noted for different interactions, the Proponent interpreted the CEA Agency's guidance for interpreting impact significance as follows. The significance of an impact was categorized into

[4] Impacts categorized as requiring an impact assessment analysis are defined by the Proponent as potential positive or negative effects requiring environmental analysis and assessment to discern either the nature or extent of environmental impact and to identify the type and extent of mitigation warranted for negative effects.

[5] Methodology for a cumulative effect assessment is as follows:

- Identifying those direct effects that may result in partially mitigated residual effects of any magnitude;
- Determine the significance of the residual effect to either the ecosystem or the social receiving environment;
- Ascertain the potential of the residual effect to accumulate in the environment;
- Select for cumulative effects analysis those residual effects with the potential to accumulate; and,
- Analyze the cumulative contribution of the specific project effect relative to known or foreseen effects of other past, current or future area projects and activities.

severity levels based on a measure of how adverse or beneficial an effect may be on a valued ecosystem component. The impact significance assigned to adverse effects then determines the type and extent of management measures required. These criteria were applied also to the ranking of significance of positive project effects. Criteria used to rank the impact significance of both direct effects (including residual effects) and cumulative effects are illustrated in the following table:

Impact Significance	Criteria
Negligible	Impacts avoided by design, or fully mitigated, or having effects that are not meaningfully measurable.
Low	Impacts that result in subtle changes that are likely measurable, but which neither constitute nor result in a population effect.
Moderate	Impacts that are measurable and result in changes of potential ecological significance.
High	Impacts that produce measurable changes and that are significant with respect to alterations of ecosystem structure and function.
Unknown	Impacts that cannot be categorized into the above classification due to a lack of information or data.

In the case of species listed as endangered, threatened or extirpated under the federal *Species at Risk Act*, the threshold for significance shifts to an individual level rather than a population or ecosystem level. Otherwise, any effects identified greater than at a negligible level would be carried forward as a "residual effect" for analysis within the cumulative effects assessment.

4. PARTICIPATION OF PUBLIC AND GOVERNMENT AGENCIES

EAO, CEA Agency and federal Responsible Authorities/Federal Authorities are responsible for ensuring that project information is adequately distributed and that the public is consulted during the environmental assessment review of a project. The public participation for the federal environmental assessment process followed the provincial process, sharing the formal public comment period described under Section 4.1 below.

Opportunity will be provided for public input on the Project and the associated environmental assessment through commentary on this cooperative provincial/federal Report. The CEA Agency will facilitate public access to this Report, including administering a formal public comment period. All comments submitted will be provided to the Responsible Authorities and will become part of the public registry for the Project. Responsible Authorities will be required to provide a response to comments and indicate whether and how they are to be considered in the assessment of the Project. They also need to determine if the comments would change their conclusions.

4.1 Participation of Public and Government Agencies

Communications and consultation with project stakeholders are an integral part and a

driving force of the environmental assessment process. Early involvement of reviewing agencies, First Nations and community stakeholders is expected to maximize coordination and cooperation during the environmental assessment process, and to optimize the proposed project concept and the meaningfulness of the scoping and evaluation of potential impacts.

The Proponent undertook consultations in accordance with requirements set out in the section 11 Order, issued on September 22, 2003. During the pre-application stage, public consultation activities focused on investigating and responding to issues identified during the Terms of Reference period. For this Project, the Proponent consulted with the public in general, with regional and local stakeholders, with responsible government agencies and with First Nations that have indicated that the proposed project area lies within their traditional territories. The discussion contained in this section of the Report is related to the participation of public and government agencies. The participation of First Nations is discussed separately in Part B of this Report.

EAO established a 45-day comment period on the draft Terms of Reference which took place in October and November 2003, and during this time two public open houses, attended by the Proponent and EAO, were held in the communities of Fruitvale and Trail. Notices/advertisements were placed in local newspapers, inviting public comment on the draft Terms of Reference, and inviting the public to attend the two open house events. Radio advertisements advising the public about the locations and times of the open houses were aired on two West Kootenay radio stations. Copies of the draft Terms of Reference, as well as a letter advertising the open houses, were sent to 26 local government representatives and corporate stakeholders, and personal invitations to the open houses, in the form of written letters, were issued to 31 other project stakeholders. Specific contact was made with land and tenure holders in the vicinity of the Project and along the proposed transmission line corridor to address issues and concerns.

As set out in the section 11 Order, the Proponent was required to include in its Application, a summary and evaluation of public consultation activities that it had already carried out in relation to the Project, and a proposal for a public consultation program that it would carry out for purposes of the review of the Application. These past and proposed public consultation programs were considered to be adequate by EAO.

Further consultation activities were undertaken during the review of the Application. EAO established a 45-day comment period which took place from June 16 to July 31, 2006. During this time a public open house, attended by the Proponent and EAO, was held in the community of Trail. Notices/advertisements were placed in local newspapers, inviting public comment on the Application, and inviting the public to attend the open house event. Specifically, the public was invited during this period to comment on the potential environmental, economic, social, heritage or health effects of the Project. Copies of the Application were made available for viewing during the comment period at Columbia Power Corporation's Castlegar office and at six public libraries located in Castlegar, Trail, Rossland, Fruitvale, Salmo and Nelson.

In addition to the above, during the concurrent review of other provincial enactments, the Ministry of Environment, Water Stewardship Division, wrote to three water licensees and seven property owners notifying them of the application by the Proponent for a licence under the *Water Act* for the Project (new water licence for 764 cubic metres per second

of water from the Pend d'Oreille River for the purpose of general waterpower). Specifically, the Ministry of Environment, Water Stewardship Division, noted that, when considering the licensing of the diversion and use of water for the Project the Comptroller of Water Rights wished to determine if the parties felt their rights may be adversely affected by the proposal, in regards to both: water licence holders or applicants on the Pend d'Oreille River; and landowners whose properties may be affected by the transmission line and any required access.

Proponent communications and consultation activities continued throughout the public review period, primarily to publicize the availability of the Application, to explain the benefits of the Project and how potential negative impacts would be mitigated, as well as to address questions that might arise.

As required by the section 11 Order, within 45 days after the completion of the comment period on the Application, the Proponent submitted to EAO a written report on the results of its public consultation activities, noting views, issues and concerns raised by the public with respect to the Project and how they are to be addressed.

Information relating to the Project was posted on EAO's website (electronic-project information centre) and made available to the public. This included the notices for the two formal comment periods and public open houses, Approved Terms of Reference, Application, Proponent's report on the results of its public consultation activities, the comments received from government agencies, First Nations and the public, and the Proponent's responses to these comments.

Consultative interactions with provincial, federal, local and First Nations government agency representatives took place during the pre-application preparation of the Approved Terms of Reference, addressing agency concerns, priorities and requirements for the environmental assessment of the Project. Local officials provided specific area knowledge and data needed in the assessment of potential project effects, as well as feedback on community issues likely to be affected by the Project, including economic development, employment and infrastructure. Section 10 of Volume 1 of the Application provides a record of meetings and informal contacts between the Proponent, or Proponent consultants, and ministry or agency staff. Project planning, design, and environmental assessment of potential construction and operational impacts were adjusted, as warranted, to recognize and incorporate government agency comments received.

To assist with the environmental assessment review of the Project, EAO established and chaired a multi-disciplinary advisory Working Group, and a technical working sub-group for aquatic/fisheries issues. This began in March 2002 and continued through the development of the Approved Terms of Reference, review of the Application, and drafting of this Report. Working Group participants included provincial and federal government agencies, local governments, First Nations and U.S. federal and state government agencies. Participation by the representatives from these organizations varied and depended, for example, on mandate, level of interest, and scope of issues. All participants were provided with the available information about the Project and advised of the opportunities to provide input/feedback. Working Group and aquatic/fisheries sub-group meetings began in March 2002, continued throughout the environmental assessment review, and were chaired by EAO. Separately, a terrestrial workshop was held on November 24, 2004, which provided an opportunity for input from

First Nations, federal and provincial agencies and the public on potential plant and wildlife impacts. Appendix 2 is a list of the Working Group participants.

The Proponent has indicated that communication activities will continue should they receive an Environmental Assessment Certificate for this Project. Planned activities will include disseminating information on the implementation of the construction commitments relating to public safety along Highway 22A and other roads, establishing a Community Impact Management Committee, and fulfilling reporting obligations of the Owner and the Design-Build Contractor.

4.2 Issues Raised by Public and Government Agencies

Public

Recurring concerns raised in public meetings were related to labour supply and how the Project would be contracted. In response, the Proponent confirmed, in their Application submitted to EAO, their expectation that construction labour would be employed under the terms of the collective agreement used by Columbia Power Corporation and Columbia Basin Trust in building their previous Columbia Basin power projects.

The need to further consider an alternative route for the project transmission line was also expressed because of concerns relating to land use and environmental effects associated with statutory right-of-way clearing. In response to this request from a private land owner having property along the proposed transmission line corridor, as well as local government, the Proponent commissioned a report on alternative transmission routes and provided it to private land owners along the proposed transmission line route. The report concluded that the originally proposed transmission line route (Route 1, paralleling BC Hydro's 5L98 line to Selkirk Substation) would pose the least environmental impact.

During the 45-day comment period on the Application, EAO received five submissions from the public, three of which were comment forms submitted during the public open house in Trail. Of the five submissions received, one was from the Columbia Basin Fish and Wildlife Compensation Program (a joint venture between BC Hydro, the Ministry of Environment, and Fisheries and Oceans Canada to conserve and enhance fish and wildlife populations affected by the construction of BC Hydro dams in Canada's portion of the Columbia Basin), one was from the Trail Wildlife Association, and one was from one of the land owners who would be affected by the transmission line. The issues raised in the five submissions are discussed below.

1. The Columbia Basin Fish and Wildlife Compensation Program noted that the transmission line for the Project will impact conservation property the Program manages and that it needs to be actively involved in plans for access, weed control and alteration of forest cover in the area.

   Proponent Response: 1) Specifications for controlling the spread of invasive plants are outlined in the Application; 2) Vegetation management requirements that incorporate site and species specific guidelines into an overall treatment prescription will be developed; 3) Maintenance activities will be coordinated with other transmission owners/operators in the area in order to minimize the frequency of activities and associated soil disturbance; and 4) Participation by

the Program to ensure optimal delivery of compensation measures for terrestrial impacts would be desirable.

2. The Trail Wildlife Association expressed concern about: the proliferation of power lines and associated increased access in the Pend d'Oreille Valley; potential invasion of noxious weeds into right-of-ways; removal of mature Douglas-fir forest cover; and substantial gaps in the wildlife assessments conducted where the transmission line route crosses private lands. The Association also: requested the opportunity to review the draft environmental management plan that would be completed; noted the importance of there being an independent third party monitor onsite during statutory right-of-way clearing and transmission line construction; and requested to be involved in proposed compensation activities.

   Proponent Response: 1) A site preparation Environmental Work Plan will be completed prior to statutory right-of-way clearing activities; 2) Specific comments on the requirements for clearing activities (Appendix 9A of the Application) are welcome; 3) Work Plans will be reviewed for compliance with requirements; and 4) Participation by the Association in delivery of compensation measures for terrestrial impacts would be supported.

3. A land owner that would be affected by the Project commented that: two of the proposed worksites for project construction requirements are leased from Teck Cominco and farmed; the Reith Creek and Lime Creek watersheds could be affected by construction of the transmission line; the environmental effect of the Project would be less if the transmission line were double stacked with the Teck Cominco Line 71 transmission line (Route 2); and weed control has been an issue on the existing transmission line statutory right-of-way.

   Proponent Response: 1) Agreements with Teck Cominco give it the right with appropriate notice to use lands designated as project worksites, the sites in question may or may not be used, and if used they would not be available for farming during construction but could be restored for future agricultural use; 2) There will be no instream works during transmission line construction and no negative residual environmental effects are expected within the watersheds of Reith Creek and Lime Creek; 3) The comparative transmission line analysis undertaken showed that there is a greater potential for impacts on terrestrial resources along the alternate route corridor (Route 2) because the existing transmission line cannot be double-circuited, a new double-circuit transmission line would need to be constructed, and the additional cleared area would impact significantly higher wildlife habitat, biodiversity and forest resource values than along the selected corridor (Route 1); and 4) Provisions have been made for weed control measures to be applied in the selected transmission line statutory right-of-way and means are being sought to implement these on a cooperative basis with BC Hydro and adjacent land-owners.

4. A member of the public: expressed concern about increases in traffic during construction, was skeptical about the effectiveness of mandatory car pooling for construction workers, and suggested two possible sites for designation as parking; and highlighted the socio-economic and environmental benefits of the Project including reductions in aquatic total gas pressure, reductions in

greenhouse gas emissions, job creation, skills training and apprenticeships, and the benefits to the local economy from money spent on goods and services.

Proponent Response: Sections of the Application containing related information were provided. Construction of the Project will continue to provide the regional benefit spin-offs that have occurred in building the Arrow Lakes and Brilliant Expansion projects.

5. A member of the public questioned whether clearing would be necessary under the transmission line in locations where conductor height will always be above 20 metres.

   Proponent Response: 1) Transmission line construction and operation standards require minimum uniform statutory right-of-way clearances for safety reasons; and 2) Specific measures to accommodate habitat needs for wildlife have been identified.

Provincial and Federal Government Agencies

During the review of the Application, provincial and federal government agencies identified a number of issues. The subject of most concern was the potential effects of the Project on the Upper Columbia River white sturgeon and their habitat from operation of the Project. In August 2006, the Upper Columbia River white sturgeon was listed as Endangered under Schedule 1 of the federal *Species at Risk Act*. Other significant issues raised included potential adverse effects relating to:

- Shallow water fish habitat downstream in the Columbia River from operation of the Project;
- Other federally and/or provincially listed fish and wildlife species;
- The presence of contaminated sediments in the Waneta Dam forebay and area of the project intake, and downstream water quality during construction;
- The effects of blasting during construction on white sturgeon and other fish species;
- Adherence to water quality guidelines and criteria, and ensuring deleterious substances are prevented from entering water courses during construction activities;
- Transmission line construction on downstream water rights holders;
- Land owners whose properties may be affected by the transmission line and any required access; and,
- Public vehicle access being maintained on the Waneta-Nelway Road.

Local Government

During the 45-day comment period on the Application, the Regional District of Kootenay Boundary: 1) indicated that temporary industrial use permits will be required for several of the proposed worksites identified for construction of the Project; 2) identified that some of the proposed temporary uses associated with the Project do not conform to zoning requirements and requested that the Proponent commit to ensuring that temporary industrial use permits be obtained for all uses of the worksites that do not conform to zoning requirements before the design-build contractor commences the use

of sites for those purposes; 3) recommended that three areas be improved as recreation sites and dedicated as a legacy for the recreation use of the general public; 4) recommended the footprint of the transmission line be reduced by double-circuiting with Teck Cominco's Line 71 transmission line as far as possible; and 5) recommended that the Proponent commit to providing passage for salmon stocks in case they are ever re-established in the upper Columbia River.

Proponent Response:

1. The Waneta Expansion Power Corporation is a Crown Agency as per section 14 of the BC *Interpretation Act* and is, therefore, formally exempt from being bound or affected by local government zoning, bylaws and regulations. Notwithstanding, the Proponent has committed to cooperating with all levels of government to address project concerns to the extent feasible.

2. Following discussion with the Regional District of Kootenay Boundary Planning Department, the Proponent will restrict locating a batch plant or crushing facilities on Worksites D3 and D4, which are located near a residential area. As well, the Proponent's Community Impact Management (Advisory) Committee will include a representative from the Regional District of Kootenay Boundary, as well as other members of the community, to assist in mitigating potential impacts and keep members informed on the Project.

3. The area south of the Waneta Bridge is owned by Teck Cominco and Burlington Northern Santa Fe Railway. Its current use by the public for camping/parking is not officially authorized. The Proponent has the right to use these areas on a temporary basis during construction and if they are used they will be restored. The Proponent will establish an information/interpretive centre immediately south of the bridge if Teck Cominco and Burlington Northern Santa Fe Railway agree to such use of this specific site, and if the Regional District of Kootenay Boundary agrees to contribute on-going maintenance.

4. Double circuiting of the Teck Cominco Line 71 transmission line has been studied (Background Report #9 in the Application). The study concludes that although the option of double-circuiting the Teck Cominco Line 71 transmission line requires less overall new clearing than the Transmission Base Concept (24 hectares versus 30 hectares), it crosses higher value habitat areas, and has greater negative impacts on environmental and aesthetic values. As well, both construction and operational complexity is increased with the double circuiting option. These factors contributed to the selection of this option (Route 1 – parallel to BC Hydro's 500 kilovolt 5L98 transmission line) as the Transmission Base Concept, despite the six hectares incremental clearing requirement. A later review considered the construction of a new double circuit transmission line parallel to the existing Teck Cominco Line 71 transmission line, followed by removal of the existing line after the new double-circuit transmission line was in service. This option proved undesirable because the impacted area was approximately 30 hectares (the same as the Base Concept), but with greater negative environmental and aesthetic impacts as identified in the previous study.

5. The construction of the Project will not negatively impact fish passage by precluding the implementation of future fish passage options (Background Report

#6 in the Application). Future fish passage up the Pend d'Oreille, in the event that anadromous fish are restored to the upper Columbia River, is an objective that will require the participation and cooperation of numerous stakeholders to negotiate and resolve a number of biological, physical and economic issues and constraints. The Proponent is committed to participate in all future discussions on this topic with fisheries management agencies, First Nations, hydro system owners and other stakeholders, and would contribute to establishing fish passage facilities at Waneta in the same proportion as the relative benefits received from the dam.

The Cities of Trail and Rossland, and Villages of Montrose, Fruitvale and Warfield, which are within the Regional District of Kootenay Boundary, did not independently comment on the Project during the 45-day comment period.

U.S. Federal and State Agencies

During the 45-day comment period on the Application, federal and state agencies from the U.S. did not identify any issues or concerns with the Project.

The Federal Energy Regulatory Commission noted that: 1) It has an interest in the Project because hydroelectric projects located upstream and downstream of the Waneta Dam fall under its jurisdiction; 2) It is engaged in the re-licensing process for the Boundary Hydroelectric Project upstream of the Waneta Dam on the Pend d'Oreille River; 3) It appreciates being kept informed of the progress of the Project; and 4) The Proponent may wish to participate in the re-licensing process for the Boundary Dam Project to keep informed of changes in the Project.

The U.S. Fish and Wildlife Service requested that it continue to be kept informed about the progress of the environmental assessment review of the Project.

The State of Washington Department of Ecology indicated that it supports the Project because of the probable reduction in total gas pressure downstream, noting that this effect will probably be modest based on the Project alone, but likely significant when combined with future gas abatement measures at the Boundary and Box Canyon dams upstream in the U.S. The Department requested a copy of the total gas pressure monitoring program plan and the monitoring data when they become available.

Summary of Comments and Responses

Appendix 3 to this Report contains the issues raised by the public and government agencies during the review of the Application and the Proponent's responses. Key issues within the scope of the environmental assessment review are captured in the discussion below under Part C – Environmental Effects, and Part D – Socio-Economic Effects.

4.3 Conclusions

EAO reviewed the Proponent's past and proposed public consultation programs presented in the Application and determined these to be adequate. EAO and the Responsible Authorities are satisfied that the public consultation measures and

distribution of information undertaken by the Proponent during the environmental assessment process was sufficient, and that the public was adequately involved.

Comments about the Project received from local, provincial and federal governments were considered in the environmental assessment process. Participation in the environmental assessment review of the Project by Washington State was undertaken in accordance with the Memorandum of Understanding between the Washington State Department of Ecology and the British Columbia Environmental Assessment Office.

EAO and the Responsible Authorities are satisfied that the issues raised by the public during the environmental assessment review of the Project, deemed to be within the scope of the review, have been adequately considered.

This cooperative provincial/federal Report considered comments received from the public. In addition, public comment received on the conclusions and recommendations and any other aspect of this Report will be taken into consideration by the federal Minister of the Environment in the federal environmental assessment decision statement.

PART B – FIRST NATIONS CONSULTATIONS AND INTERESTS

As set out in the section 11 Order, the Proponent was required to include in its Application, a summary and evaluation of First Nation consultation activities that it had already carried out in relation to the Project, and a proposal for a First Nation consultation program that it would carry out for purposes of the review of the Application. During the screening of the Application, with the participation of First Nations, these past and proposed First Nations consultation programs were considered to be adequate by EAO.

As set out in the section 11 Order, within 45 days after the completion of the comment period on the Application, the Proponent was required to provide a written report on the results of its consultation conducted with First Nations. Appendix 3 contains the issues raised by First Nations during the review of the Application and the Proponent's responses. These issues are discussed below under Part B – First Nations Consultation and Interests, Part C – Environmental Effects, and Part D – Socio-Economic Effects, and Part E – Specific CEAA Requirements.

Aboriginal rights are those practices, customs or traditions which were integral to the distinctive culture of the Aboriginal group claiming the rights, prior to contact with Europeans. *Aboriginal title* is a form of Aboriginal right. According to *Delgamuukw*,[6] in order to support a claim for Aboriginal title, a First Nation must show exclusive use and occupation prior to the assertion of British sovereignty in 1846. Other dates may also be relevant. Aboriginal title is a *sui generis*, inalienable right in land and, as such, is more than the right to engage in specific activities which may themselves be Aboriginal rights. Rather, it confers the right to use the land for a variety of activities. Aboriginal title encompasses the right to exclusive use and occupation of land, the right to choose to what uses that land can be put, and that lands held pursuant to Aboriginal title have an inescapable economic component. Existing Aboriginal rights are now protected by section 35 of the *Constitution Act, 1982.*

Nothing in this Report is to be taken as any admission by Canada for the purposes of this Report or for other purpose, in respect of any statements pertaining to Aboriginal rights, including Aboriginal title. Canada takes the view that references to Aboriginal rights and title are included in this Report to meet provincial requirements and their inclusion does not mean that Canada accepts or agrees with these statements.

As required under CEAA, this section of the Report addresses potential changes to the environment caused by the Project, and the effect of those changes on the current use of lands and resources for traditional purposes by Aboriginal persons. For the purposes of this Report it is important to keep in mind the scope of the Project as set out in Part A, Section 2.5.

[6] *Delgamuukw v. British Columbia*, (1997) 153 D.L.R. (4th) at par. 143

1. OKANAGAN NATION ALLIANCE

1.1 First Nations Setting

The Project is situated within the area indicated by Okanagan First Nations to be their traditional territory. The Okanagan Nations include the: the Lower Similkameen Indian Band; Okanagan Indian Band; Osoyoos Indian Band; Penticton Indian Band; Upper Nicola Indian Band; Upper Similkameen Indian Band; and the Westbank First Nation. The Okanagan Nation communities and Indian Reserves nearest to the Project are located in the Okanagan Valley approximately 254 kilometres by road to the west (the Osoyoos Indian Band and Indian Reserve). There are no Okanagan Nation Indian Reserves located within the Pend d'Oreille watershed. The Okanagan Nation Alliance have commented previously that a reserve cannot be equated with a traditional territory. While Indian Reserves are not determinative of the Okanagan Nation Alliance traditional territory, they are one indication of where current Okanagan Nation Alliance community life is centered.

The Okanagan Nation Alliance represents the collective interest of these seven member Bands located in the Okanagan, Similkameen and Nicola Valleys. The Okanagan Nation Alliance to the best of their ability, monitor and review all major activities for adverse environmental, cultural and spiritual impacts. This is accomplished through Okanagan Nation Alliance community cooperation and input. The Okanagan Nation Alliance have indicated that they represent the Aboriginal interests of the Sinixt in Canada.

The Project is situated within a territory that appears to have been historically used by the Sinixt or Lakes people before the onset of the 20th Century. It would appear that today, most Sinixt people reside on the Colville Reservation in Washington State, and are registered members of the Colville Confederated Tribes. In 1956 the federal government declared the Sinixt to no longer exist in Canada. The Province lacks information regarding the Sinixt as to the basis for any claim that there is a communal group in British Columbia which would qualify as an "Aboriginal peoples of Canada" within the meaning of section 35(1) of the Constitution Act, 1982.

The Okanagan Nation Alliance indicates that when the Sinixt moved south of the Canada-U.S. border, the Sinixt were integrated into the Okanagan Nation. Both the Sinixt and Colville speak dialects of the Okanagan-Colville language. There is significant ethnographic evidence which would indicate that while there was interaction between the Okanagan and Sinixt, the Sinixt people were a distinct group of Okanagan speaking people with a territory separate from the Northern Okanagan – the current Okanagan Nation Alliance groups. The Okanagan Nation Alliance indicates that the Sinixt and the Northern Okanagan shared the same language, culture, history and traditions. However ethnographic sources indicate that there would appear to be no overarching political or governance connection between the Northern Okanagan and the Sinixt people.

1.2 Information Sources

As one of the provisions under the Okanagan Nation Alliance – Waneta Expansion Power Corporation (Proponent) Consultation Agreement (dated October 14, 2004), the Proponent commissioned a report to document Okanagan Nation Alliance traditional use

activities in the project area (Aboriginal Interests and Use Study). The Okanagan Nation Alliance prepared the Aboriginal Interests and Traditional Use Study dated May 2006. The Okanagan Nation Alliance prime objective of the Aboriginal Interests and Traditional Use Study is the protection and preservation of the heritage value resources of the Okanagan Nation Alliance. The work involved the following components:

- A review of historical information for the area;
- Interviews with Elders and knowledgeable community members;
- Site Visit with Elders to become familiar with the site area and scope of the Project; and,
- Archaeological Predictive Model.

On December 5-6, 2005, Okanagan Nation Alliance Elders made a site visit to the project area with the Proponent representatives. A field reconnaissance was also undertaken during this time; unfortunately, due to snow cover, not much could be seen. Stops were made along the transmission line route where an archaeological study had identified potential for containing evidence of past Aboriginal land use. The Okanagan Nation Alliance prepared a short report on the field reconnaissance and site visit as part of the Aboriginal Interests and Traditional Use Study.

The Okanagan Nation Alliance provided an initial submission on July 28, 2006 during the Application review period on potential impacts of the Project indicating that this represents their initial comments and additional detailed comments would follow. On August 29, 2006, EAO received comments from the Okanagan Nation Alliance dated August 18, 2006 on protecting water resources and fisheries habitat. In correspondence dated September 18, 2006, the Okanagan Nation Alliance provided comments on the Waneta Hydroelectric Expansion Project Response to Review Period Questions and Comments from the Public, First Nations and Agencies, August 2006.

The Proponent's Application included 11 Background Reports that were submitted as appendices to provide additional information on Aboriginal interest and uses, as well as supporting documentation on the range of environmental studies undertaken by the Proponent to evaluate project impacts. Background Report #7[7] – First Nations' Aboriginal Interests and Traditional Use in the Waneta Hydroelectric Expansion Project Area: A Summary and Analysis of Known and Available Information was prepared by Bouchard and Kennedy Research Consultants. Background Report #8[8] – Archaeological Impact Assessment of the Waneta Hydroelectric Expansion Project was prepared by Madrone Environmental Services Ltd.

[7] Background Report #7, "First Nations Aboriginal Interests and Traditional Use in the Waneta Hydroelectric Expansion Project Area: A Summary of Known and Available Background Information", August 20, 2004 (Rev. 11/2005), prepared by Bouchard and Kennedy Research Consultants. This Background Report was commissioned as an independent review of historical records of First Nations traditional use. The report was prepared from known and available literature sources without the involvement of any of the First Nations.

[8] Background Report #8, "Archaeological input Assessment for the Waneta Hydroelectric Expansion Project" prepared by Bjorn O. Simonsen, Archaeologist, Madrone Environmental Services Ltd.

1.3 Okanagan Nation Alliance Involvement in the Environmental Assessment Process

On January 31, 2002, EAO invited the Okanagan Nation Alliance including member Bands to participate in an inter-agency meeting on February 20-21, 2002 in Castlegar so the Proponent could introduce its plans for the Project, get an early understanding of the potential effects of the Project, and an opportunity for agencies and First Nations to advise the Proponent of their interests.

Following the issuance of the September 22, 2003 section 11 Order, the Proponent initiated formal consultation with the Okanagan Nation Alliance, as directed by the section 11 Order. The draft Terms of Reference document was distributed to the Okanagan Nation Alliance for the 45-day comment period (October 10 to November 24, 2003) in accordance with the section 11 Order. Comments on the draft Terms of Reference were received from the Okanagan Nation Alliance on November 24, 2003. Following EAO approval of the draft Terms of Reference in May 2004, the Proponent engaged the Okanagan Nation Alliance in negotiations for a formal consultation agreement.

Representatives from the Okanagan Nation Alliance participated actively in government agency Working Groups established by EAO to review the Project. This included participation in ten Working Group meetings.

EAO provided funding to the Okanagan Nation Alliance to help cover participation costs during the environmental assessment review of the Project. This included attending technical Working Group meetings and providing comments on the Application and the Proponent's responses to Okanagan Nation Alliance comments. Funding was also provided for reviewing drafts of the Report.

1.4 Okanagan Nation Alliance Involvement with the Proponent

The Proponent advised First Nations, in a general way, in the late 1990s of its intent to develop the Project. EAO also required the Proponent to undertake consultations with the Okanagan Nation Alliance on the effects of the Project, and to report the outcome of these consultations to EAO. Specific consultations between the Proponent and Okanagan Nation Alliance began in 2002 and contributed to the draft Terms of Reference that was issued for review in 2003. The Proponent made early and ongoing efforts to consult the Okanagan Nation Alliance about the Project. These included providing funding for the Okanagan Nation Alliance, and also efforts to obtain agreements and arrangements to address any potential impact on asserted Aboriginal rights.

Following approval of the draft Terms of Reference for this Application in the spring of 2004, discussions between the Okanagan Nation Alliance and the Proponent increased with the goal of negotiating a formal consultation agreement. On October 14, 2004, negotiations resulted in an Okanagan Nation Alliance-Proponent Consultation Agreement. This document provides the framework for negotiations on community benefits that would be provided by the Proponent without prejudice to the interests of the Okanagan Nation Alliance. In addition, via this document, the Proponent agreed to provide opportunities and necessary funding to the Okanagan Nation Alliance to facilitate their review and comment on the background reports and draft Application, at

an early stage. The intent of early Okanagan Nation Alliance involvement by the Proponent was to allow time for an exchange of views and information and to undertake cooperative identification and assessment of Aboriginal interests of the Okanagan people. During the course of consultation, the Okanagan Nation Alliance provided significant feedback on the materials particularly on the following areas of importance:

- Technical issues of concern in each of the Background Reports;
- Adverse impacts of the Project on the asserted rights and interests of the Okanagan Nation Alliance indicated or suggested by any of the Background Reports; and,
- Adverse impacts of the Project on the current use of lands and resources by the Okanagan Nation Alliance for traditional purposes indicated or suggested by any of the Background Reports.

On December 5-6, 2005, Okanagan Nation Alliance Elders made a site visit to the Project area with the Proponent representatives. The Okanagan Nation Alliance prepared a short report on the field reconnaissance and site visit as part of the Aboriginal Interests and Traditional Use Study.

As a consequence of the Proponent's communication and consultation activities, a clearer and more inclusive representation of the Okanagan people's historical use of lands and resources in the project area was prepared for the Proponent's Application to EAO.

The Proponent provided a confidential detailed record (Volume 4 of the Application) of communication and consultation to EAO.

The Proponent met with representatives from the Okanagan Nation Alliance approximately 11 times between June 2004 and August 2006, to attempt to identify and address Okanagan Nation Alliance concerns regarding the Project, to develop a consultation agreement and to discuss a possible community benefits proposal/agreement.

The Okanagan Nation Alliance reported to EAO that it has a beneficial working relationship with the Proponent that was established in past projects within the Okanagan Nation Alliance traditional territory.

1.5 Traditional Occupation and Use of the Project Area

The Aboriginal Interests and Traditional Use Study prepared by the Okanagan Nation Alliance for the Proponent, presents some ethnographic information, compiled from existing sources. In addition, Bouchard and Kennedy prepared Background Report #7 for the Project "First Nations' Aboriginal Interests and Traditional Use in the Waneta Hydroelectric Expansion Project Area: A Summary and Analysis of Known and Available Information". This information indicates the Lakes people occupied a settlement in the Waneta area. The Lakes people made their home near the Arrow Lakes and were estimated at about 500 people prior to 1780. However, largely due to smallpox, the population had decreased to about 150 by 1820. Just prior to 1846, when the U.S.-Canada boundary was established under the Oregon Boundary Treaty, the Lakes People spent the majority of their time in their traditional homeland north of the international boundary.

After 1846, the Lakes people gradually shifted their primary settlements and focus of subsistence activity southwards to the vicinity of Kettle Falls, Washington State. The reasons for this southward migration would appear to include the establishment of Fort Shepherd in 1856-57, just north of the Canada-U.S. border, which became an important centre for the Lakes people, and the establishment of the Colville Indian Reservation in Washington State in 1872. Notwithstanding the gradual movement south, there is evidence to suggest that the Arrow Lakes people continued to use the Arrow Lakes and Slocan regions up until the 1930's. On October 5, 1953, Annie Joseph, the last known surviving member of the Arrow Lakes Band, died. Canada subsequently declared the Arrow Lakes Band to be extinct and transferred the reserve to BC in 1956. According to Bouchard and Kennedy, the Okanagan and the Lakes people are distinct groups of Okanagan-Colville speaking people with their own distinct territories. The Okanagan Nation Alliance indicates that the Sinixt and the Northern Okanagan shared the same language, culture, history and traditions. However, ethnographic sources indicate that there would appear to be no overarching political or governance connection between the Northern Okanagan and the Sinixt people.

The Okanagan Nation Alliance also claim Aboriginal rights and title to the proposed project area. The project area lies within the Lakes traditional territory, an area the Okanagan Nation Alliance considers to be subsumed within the boundaries of the First Nations that make up the Okanagan Nation Alliance. The Okanagan Nation Alliance is also of the opinion that the Okanagan and Similkameen Bands have clear historic ties to Fort Shepherd, located less than a mile north of the 49th parallel. While Fort Shepherd is outside of the project area, the Okanagan Nation Alliance believes that its location is in close enough proximity to the project area and should be considered. Therefore, an analysis of the traditional occupation and use of the project area would be incomplete without a discussion of the Lakes people's occupation and use of the project area, and circumstances surrounding Fort Shepherd.

The summary of the general pattern of historic and pre-historic land-use and occupation of lands in the project area indicates that there was at least one large village at or in close vicinity to the Waneta Dam. It is believed that a Lakes settlement existed in the Pend d'Oreille River area, prior to the 1900s, on the east side of the Columbia River and immediately north of the Canada-U.S. border. In earlier times, Lakes winter villages were situated on either side of the Columbia River. Also, the presence of archaeological remains from numerous Aboriginal campsites located along both sides of the Columbia River between a settlement now called Northport and the border, attests to the productivity of the area. During the 1800s, the Lakes people underwent a demographic transition and shifted their primary settlements and the focus of their subsistence activities south, to near Kettle Falls in Washington State. By the early 1870s, when the Colville Indian Reservation was established in the U.S., most of the Lakes people were living south of Canada-U.S. border. The relatively more systematic Lakes use of the project area and its surrounding land was severely lessened by the time ethnographers began to study these people in the early 20th century. Still, the Lakes people continued to use and occupy the project area for several more decades after the period of demographic transition. Mining and construction activity involving extensive land disturbance that began in the mid-1800s may have removed archaeological signs of this Aboriginal community.

A second Lakes village site stood at the site of the Hudson's Bay Company's Fort Shepherd, about two kilometres north of the Canada-U.S. border and on the west side

of the Columbia River. Bouchard and Kennedy documented that, soon after the construction of Fort Shepherd, the Fort became the headquarters for several hundred Lakes Indians. The Fort was almost directly across the Columbia River from the site of the proposed Project. Lakes people lived around this fort and became custodians of the structures when the post was not in operation between 1860 and 1863. After the Hudson's Bay Company reopened the Fort, the Fort continued to be an important centre for the Lakes people. Fort Shepherd was permanently closed in the 1870s but Lakes people are believed to have resided at the location after that date. The Okanagan Nation Alliance state in their Aboriginal Interests and Traditional Use Study that "Fort Shepherd was closed in 1870, the buildings emptied and left in the care of the local Indian Chief. A name has not yet been located for this Indian Chief. As such, it seems that the Fort Shepherd area has explicit historic ties with the Okanagan and Similkameen." However, Bouchard and Kennedy state on page 29 of Background Report #7 that after the Fort closed it was in the care of the Lakes people. Fort Shepherd burned to the ground in 1872. The Okanagan Nation Alliance Aboriginal Interests and Traditional Use Study states that it was noted during the interviews that a number of Similkameen packers for the Hudson's Bay Company used the Pend d'Oreille River, on a regular basis, to navigate between Fort Hope and Fort Shepherd. Several other Lakes communities continued living off-Reservation in Washington State until around 1910, when the remaining few Lakes communities migrated to the Colville Reservation.

The site of Fort Shepherd was also the location of a previous large Aboriginal settlement for a considerable time before the establishment of the Fort. Most research suggests that the First Nations occupants of these villages were associated with the Lakes people. It was noted in the research data submitted that another ancient settlement might also have existed on the east bank of the Columbia, in the Waneta area. The location of this Aboriginal village may have varied over the years, as reports differ on its precise location. An examination conducted by an archaeological field crew from the Madrone Environmental Services Ltd. (Madrone) in November 2004, however, failed to locate any archaeological evidence of an ancient Aboriginal settlement. Madrone hypothesized that the failure to locate evidence does not mean the absence of a settlement but, because of the high level of disturbance of the land in that area over the years to accommodate construction, mining and other activities, archaeological evidence in the forms of deposits and remains might have been forever lost.

Available literature concerning the Similkameen, Okanagan and Northern Okanagan provides virtually no information about traditional use by these groups of the project area. According to Bouchard and Kennedy, the absence of information is due to the extremely limited presence of these peoples in the study region, apart from their social, linguistic and possibly political relationship with the Lakes.

From their research and literature review, Bouchard and Kennedy concluded that some activities such as hunting, fishing and gathering for food and materials might have been carried out in the Columbia River-Pend d'Oreille confluence region, in the vicinity of the Project, by Plateau First Nations, including the Lakes people. Similarly, the Okanagan Nation Alliance submitted data that indicate the Okanagan-Colville people's sustenance was dependent on local vegetation and animals as a resource for food, medicine, and materials. The Okanagan Nation Alliance indicates that a seasonal food quest would precipitate the gathering of this food. In May or early June, early salmon runs would begin to appear; root digging would take place in the late spring and early summer;

berries and seeds would be gathered throughout the summer and early fall; upland hunting would take place in the fall.

The Aboriginal Interests and Traditional Use Study prepared by the Okanagan Nation Alliance provides a list of some of the natural vegetation, animal resources and land uses that will be impacted and affected by the Project:

- Fauna: mule deer, rabbit, moose, grouse, squirrel, weasel, duck, pheasant, and wild turkey.
- Flora: buck brush, fir tree pitch, white birch bark, potatoes, wild onions, low growing juniper, yellowbell, cambium, moss, cedar roots huckleberries, raspberries, carrot, Saskatoon berries, soap berries, mariposa lily, yellow avalanche lily, black caps, red twinberry, gooseberry, carnaby loveage, bitter root, sage, rose hips, chocolate lily, scarlet gillia, tamarack tops, balsam bark, chocolate tips, black moss hazelnut, chokecherries, thimble berries and devil's club.
- Fish/reptile: coho, lake trout, kokanee, sturgeon, white fish, ling cod, suckers, eels, fresh water clams, squaw fish, chum salmon, sockeye, steelhead, spring salmon and rainbow trout.

Recorded data on plant foods used traditionally by First Nations people in the upper Columbia River region comes primarily from ethnographic information. Ethnobotanical data clearly show that the collection of these foods began in the early spring and extended until late fall. While there is strong evidence that the Lakes people used plants, the locations from which these plants were obtained are not clear. Some locations to which the Lakes people went to gather important species like huckleberries and Saskatoon berries were recorded and some of these areas were in the Arrow Lakes/upper Columbia region, but no such locations within the project area have been reported.

Of the approximately 95 birds that Bouchard and Kennedy identified among the Okanagan-Colville (including Lakes) 16 were used for food. Birds were shot with a bow and arrow, killed with snares, or occasionally, clubbed. Ruffed grouse and Blue grouse were a popular food among the Lakes and Colville and apparently commonly eaten by the Okanagan-Colville. Spruce grouse were hunted by the Lakes people. Lewis's Woodpecker was used for ceremonial purposes by the Okanagan-Colville but were apparently not eaten as these birds were not considered edible. The western bluebird was believed by the Okanagan-Colville to bring happiness to people because these birds were one of the first small birds that appeared in the spring. Waterfowl and ducks and their eggs were a staple part of the diet of the Plateau Indians. However, no information was found in any available material to indicate the species of birds, if any, that were hunted specifically in or near the project area.

The pursuit of deer, elk, goat and bear, among other species, was a central aspect of the Plateau people's subsistence activities, and to some extent these species continue to supplement their diet. According to the research of Bouchard and Kennedy, known and available ethnographic data do not identify the specific species of animals and birds that were traditionally hunted by the Okanagan-Colville people in the project area. Table 2 in the Proponent's Background Report #7 lists 16 culturally significant species of animals and Table 3 lists three culturally significant fish species that are found, or likely to be

found, in the general environs of the Project area. Most of these species of animals are common and widely distributed in the project area.

Research data indicate that significant numbers of salmon came up the Columbia River and reached the Arrow Lakes region, in the early 19th century. Three of the five Pacific salmon species frequented the upper Columbia system, prior to the building of numerous dams along the river. Species considered most significant by the Colville and Lakes was the King (Chinook) salmon that ascended the Columbia River in June and continued its run until August. These runs continued until the completion of the Grand Coulee Dam circa 1940. This fish also occupied a significant position in their mythology. Sockeye and Coho were considered to be of less economic value than the Chinook and were ancillary to the Chinook fishery. Freshwater fish such as trout and sturgeon are also economically important.

Bouchard and Kennedy documented only one salmon fishing site in the project area. This harvesting location is a Lakes salmon fishery that existed at the Pend d'Oreille/ Columbia confluence prior to the completion of the Grand Coulee Dam circa 1940. No salmon is believed to have been able to get to the project area of the Columbia River since completion of the Grand Coulee Dam. With the exception of salmon, no recorded evidence of other species of fish Aboriginal people caught in the project area was noted.

There are 10 archaeological sites that have been recorded in the general area of the Project; however, there have been several detailed archaeological studies in the immediate vicinity of the project area that did not locate any sites in the specific project area. As noted in the Aboriginal Interests and Traditional Use Study prepared by the Okanagan Nation Alliance and the Archaeological Overview Assessment and Archaeological Impact Assessment undertaken by the Proponent, only two locations (Terrace #1 Archaeological Impact Assessment and Terrace #2 Archaeological Impact Assessment) along the transmission line corridor were flagged as having potential for containing sub-surface archaeological deposits. However, sub-surface shovel testing at both of these sites did not reveal any evidence of archaeological deposits or remains. The absence of archaeological sites in this area as noted in the Aboriginal Interests and Traditional Use Study prepared by the Okanagan Nation Alliance may have been a result of the historic impacts to the landscape, especially the small terrace just above the dam.

Bjorn Simonsen's, Archaeological Impact Assessment of the Waneta Hydroelectric Expansion Project, 2004 study (Background Report #8) concluded that none of the potential impact locations examined within the project area contain any evidence of either past Aboriginal land-use or of occupation in the form of archaeological deposits or remains. Further this is consistent with the Archaeological Overview Assessment which found no definitive information to suggest that any specific impact locations would contain evidence of past Aboriginal land use features or settlement sites. This is also consistent with the results of most of the previous archaeological field studies within the lower Pend d'Oreille-Columbia rivers confluence area, whereby little or no archaeological evidence of Aboriginal occupation has been observed by archaeologists working in this area. On the basis of these findings it is Madrone's opinion that the Project will have no negative impact on archaeological resources.

1.6 Current Occupation and Use of the Project Area for Traditional Purposes

As noted above, the Okanagan Nation Alliance communities and Indian Reserves nearest to the Project are located in the Okanagan Valley approximately 254 kilometres west by road (the Osoyoos Indian Band and Indian Reserve). There are no Okanagan Nation Alliance Indian Reserves located within the Pend d'Oreille watershed.

According to the Aboriginal Interests and Traditional Use Study prepared by Okanagan Nation Alliance the collective territory of the Okanagan Nation is far reaching and extends over approximately 69,000 square kilometres. The northern area of this territory is close to the area of Mica creek, just north of modern day Revelstoke, BC and the eastern boundary is near Kootenay Lake. The southern boundary extends to the vicinity of Wilbur, Washington and the western border reaches into the Nicola Valley.

The Okanagan Nation Alliance noted that Okanagan people use a wide variety of plants and animals, (see Section 1.5) and that some of these will be impacted and affected by the Project.

In the Aboriginal Interests and Traditional Use Study it states that Okanagan Nation Elders made a site visit trip on December 5-6, 2005. The group was provided a brief overview of the Project and later a guided tour of the area. Unfortunately due to the time of year there was snow cover and not much could be seen by the Elders.

Two recommendations were made in the Aboriginal Interests and Traditional Use Study prepared by the Okanagan Nation Alliance:

1) A further recommendation based on the results of the elder interviews and various meetings held is to host a camp in the area during the late spring, early summer season for the purpose of verifying and collecting traditional use plants as well as undertaking a field reconnaissance of areas identified as a result of a predictive modelling exercise.

By the time the Proponent had received the Aboriginal Interests and Traditional Use Study the "late spring, early summer" had already passed by, however, the Proponent has stated that they would be happy to host a tour of the area either this fall or next spring at the Elders' convenience.

2) Columbia Power Corporation to support the Okanagan Nation Alliance in conducting a monitoring program as the site is being restored.

The Proponent has stated that reports generated by the Environmental Monitor for the regulatory agencies will be forwarded to the Okanagan Nation Alliance at their request. Additional environmental monitoring may be discussed as a part of the Community Benefits Agreement if this is a priority for the Okanagan Nation Alliance.

1.7 Okanagan Nation Alliance Issues Raised and Proponent Responses

The following specific concerns were raised by the Okanagan Nation Alliance with respect to the Project.

a) Habitat availability and suitability

The Project Approved Terms of Reference for Environmental Assessment Certificate Application 2004 requested a thorough assessment of the changes to aquatic habitat availability and suitability encompassing the Waneta Dam to the U.S. border, the Confluence, and the Columbia River upstream to the Fort Shepherd Eddy. Multiple sites historical datasets duration and frequency is inadequate to meet the initial goal. Baseline parameters capturing adequate water quality data to depict aquatic health within these areas are required pre-project. The number of measurements should reflect the annual and seasonal variation in all areas.

Proponent Response: The Proponent is uncertain as to the issue being raised in the comment. The Proponent has conducted extensive modeling, field studies and analysis that, in the Proponent's opinion, provides a thorough assessment of incremental project changes to aquatic habitat availability and suitability in the Project's draft Terms of Reference – approved primary aquatic study area. Baseline water quality data in the areas mentioned are monitored through the Columbia River Integrated Monitoring Program and provide an adequate baseline against which potential post-project affects can be determined.

b) Amount of monitoring pre-construction to determine possible impacts and post construction commitment to documenting aquatic protection

The Okanagan Nation Alliance would like more details on the proposed monitoring and follow-up program. A copy of the expected monitoring outcomes and deliverables will help clarify this point.

The Okanagan Nation Alliance would like to see a preventative environmental action plan that uses precautionary limits to ensure fisheries populations and aquatic habitat are not impacted. The onus to detect procedures that could cause negative effects to the white sturgeon population should be completed by the contractor. The Project should self regulate and report findings to regulating agencies and First Nations.

Proponent Response: The Proponent questions the value of providing detailed monitoring plans until such time as it is determined that monitoring is the approach required. The Proponent believes that if the Project receives the required regulatory approvals, then fisheries populations and aquatic habitat would not be negatively impacted and the concerns expressed by the Okanagan Nation Alliance will be addressed in accordance with the laws and regulatory requirements in effect at that time.

c) Reporting impacts and alterations to work plans

The activities that require Environmental Work Plans to be submitted are outlined and fish populations and aquatic habitat protection should be added to this list. The Proponent's commitment to produce Environmental Work Plans should include planned actions to ensure enhancement and no net loss occurs.

Proponent Response: The Proponent's Environmental Management Program and associated Environmental Work Plans deal strictly with appropriate construction practices and obligations. They do not deal with fish habitat compensation (enhancement). The fish compensation plan will be implemented by the Proponent as a

separate project and will include consultation with the Okanagan Nation Alliance. Upon request the Proponent will provide to the Okanagan Nation Alliance the monthly reports that will be provided to regulatory agencies.

d) References to monitoring and modeling based on inadequate data sets (frequency, sample sites distribution and abundance)

There is still some question on the observations of juvenile white sturgeon distributions and habitats within the eddy during light load hour periods. Additional information is required to ensure conclusions represent light load hour period risk to white sturgeon.

Proponent Response: The Proponent believes that the analysis undertaken specifically in response to this issue plus the additional information and analysis completed for the Application is sufficient to allow a reasonable assessment of impacts on reductions of low velocity habitats in Waneta Eddy. The Proponent's purpose was to provide a level of comfort that the likelihood of the Project having a measurable effect on sturgeon use of the eddy was very low and highly unlikely to be measurable in the population. The Proponent attempted to do this through multiple lines of evidence approach similar to what is often used in other risk analysis where hard data is limited but decisions are required. In summary, the Proponent provided the following: empirical and biological data that indicated the 0.5 cubic metres per second value used to assess project effects was conservative and not likely measurable; data to illustrate that the incremental frequency of occurrence of flows with the potential to reduce the extent of low velocity area was low; biological assessments, based on available behavioural and population data, that support the likely effects of the predicted changes will be minor; and information that shows the overall impacts of the Project on low velocity habitat during the periods of the year would be beneficial. The Proponent believes that, taken alone, the individual lines of evidence could be argued as insufficient to assess risk. When considered as a whole the Proponent believes the data support their assessment of low risks of the Project to white sturgeon that use low velocity habitats in the Waneta Eddy.

e) Pre-construction monitoring deadline too tight

Proponent Response: The required pre-project studies were all completed sometime ago and are reported in the Application. In addition, the Proponent has commenced additional pre-project monitoring of yellow-breasted chat nesting, Lewis's Woodpecker nesting and area road-kill as committed to in the Application.

f) Concerns about possible impacts to white sturgeon population

Proponent Response: The Proponent is prepared to hear and discuss this matter with the Fisheries Working Group. Harmful alteration of fish habitat requires a Fisheries Authorization. If monitoring indicates the Project will result in any unanticipated and unauthorized harmful alteration of fish habitat, the Proponent will work with Fisheries and Oceans Canada and others as appropriate to address the impacts. The Proponent believes that the Project will not result in any incremental loss to the sturgeon population as natural recruitment is already virtually non-existent and there will be no irreversible loss of sturgeon habitat.

The Proponent has prepared additional analysis providing more detail on the Proponent's original conclusion of no harm to white sturgeon. Not withstanding this analysis and conclusion, as requested by Fisheries and Oceans Canada the Proponent has proposed an enhancement to the existing White Sturgeon Flow Augmentation Program, together with precautionary monitoring and adaptive management measures.

g) Commitment to protect aquatic habitat in the case of natural extreme weather events

Changes to natural flows due to extreme weather events should be considered and flow regimes altered to ensure variability does not negatively impact white sturgeon habitat and aquatic habitat.

Proponent Response: Extreme high flow events are generally expected to be beneficial to white sturgeon. The White Sturgeon Flow Augmentation Program is designed to address low flow events. The Proponent does not have the ability to address significant weather related flow variability. Flow management on the Canadian portion of the Pend d'Oreille River is the responsibility of BC Hydro under the Canal Plant Agreement. BC Hydro, in conjunction with the U.S. Army Corps of Engineers, uses real time hydrometric modeling in their management of the system, with flood control being the top priority.

h) Sedimentation and aquatic protection during construction

The exposure of contaminated sediments to aquatic organisms is a concern. Post-project monitoring is requested to evaluate the potential effects of contaminants on the aquatic organisms and the transboundary reach population of sturgeon.

The Okanagan Nation Alliance would like to see an increase in benthic invertebrate and periphyton data capture and assessment as a method of determining aquatic ecosystem health. Shoreline sample sites should include areas with potential impacts from contaminated sediments during construction and post construction. This data will aid in assessing changes to aquatic ecosystem health from pre construction phases to post construction.

Proponent Response: The only known sediments that could potentially be of concern to aquatic life are the contaminated sediments in the forebay area. These sediments will be removed in advance of the main intake construction activity. Contaminated sediment removal will be closely monitored in accordance with the criteria and requirements of the Proponent's Environmental Management Program and associated Environmental Work Plans. The downstream water quality monitoring program will be on-going for the duration of construction after sediment removal, a period of 3 to 3.5 years. The water quality material for the Project supported by the required monitoring will provide a very clear indication of the potential for damage to aquatic life by any re-suspended metal contaminants. The Okanagan Nation Alliance will be included on the list of recipients for the methodology information.

i) Importance of follow-up monitoring to assess the aquatic habitat effects from the Project

The Okanagan Nation Alliance requests a follow-up program to clarify the uncertainties of effects on fish populations.

Proponent Response: Other than the uncertainty related to potential project effects on sturgeon habitats and potential stranding related effects, the Proponent's analysis does not indicate other indigenous populations will be negatively affected by the Project. The uncertainty related to sturgeon will be addressed either through contribution to a research program or development of a monitoring program. The Proponent can provide the Okanagan Nation Alliance with a copy of post-project monitoring reports on fish stranding. Practices to best mitigate fish stranding are dealt with by hydro operators through the Columbia Operations Fishery Advisory Committee. The Okanagan Nation Alliance should contact the Columbia Operations Fishery Advisory Committee chairperson if it wishes to get involved in these issues.

j) Commitment to ensure the fisheries habitat compensation adheres to Fisheries and Oceans Canada specifications from the Habitat Compensation Plan

Proponent Response: The Okanagan Nation Alliance will be consulted in the development of the fish compensation monitoring program. Results of the eventual effectiveness of the monitoring program will also be provided to the Okanagan Nation Alliance. The Proponent also understands the Okanagan Nation Alliance will also be consulted by Fisheries and Oceans Canada on documents to be prepared as part of the Fisheries Authorization process including the details of other aquatic monitoring plans.

k) Interest in the information from listed species monitoring

Proponent's Response: The Okanagan Nation Alliance will be included on the list of recipients for these materials.

l) Future Okanagan Nation Alliance participation

The Okanagan Nation Alliance state that they have the professional fisheries and aquatics capacity to be involved in monitoring and evaluating different components of the Project. The Okanagan Nation Alliance would like to explore these opportunities with the Proponent. It is also imperative for the Okanagan Nation Alliance that they continue to be involved in any post EAO approval processes and that the Proponent facilitates this requirement.

Proponent Response: As stated in the Proponent's letter of September 22, 2006, they will enter into discussions with the Okanagan Nation Alliance regarding their internal expertise and will undertake to inform the Okanagan Nation Alliance of any opportunities to provide environmental monitoring services, which the Proponent may contract directly. The Proponent will involve the Okanagan Nation Alliance in any post Application environmental approvals it may seek that, as a condition of approval, require public and First Nations consultation.

m) The Okanagan Nation Alliance is concerned that the Project will contribute to the reduction of fisheries abundance and aquatic resources within the Pend d'Oreille and Columbia River

Proponent Response: The Proponent is not clear on the basis for the Okanagan Nation Alliance concerns. As indicated in the Application, fish productivity in the Seven Mile Reservoir is expected to increase with no change to the Waneta Reservoir. Reduced total gas pressure levels in the downstream environment are also expected to be a benefit. There is not expected to be any significant impact to the Columbia River fishery. In addition, the Proponent will be implementing a fish compensation program to address identified residual impacts. Therefore the overall impact of Project should be beneficial to fish productivity.

n) The Okanagan Nation Alliance would like to see monitoring and assessment requirements implemented to derive best management practices and methodology to detect adverse effects and mitigate risk to fisheries abundance and aquatic resources (and where possible enhance habitat). The Proponent should focus on net environmental "gain" rather than simply a "no net loss" policy as a more advantageous goal for the Project

Proponent Response: The Proponent believes the Application fulfills the requirement of the Approved Terms of Reference to provide a full assessment of cumulative environmental effects. The Proponent's commitments include provision for post-project monitoring of the Project's effects, but it is not anticipated that they would monitor the effects of other future projects. The Proponent has taken steps to include mitigative prescriptions and compensation proposals, where feasible, that contribute to a net environmental enhancement. The Proponent believes the combined environmental effects of the Project taking into consideration air, water, and land values, will be positive.

1.8 Conclusions

The process of notifying and consulting with the Okanagan Nation Alliance about the Project has complied with the requirements outlined in the section 11 procedural Order issued to the Proponent. All issues raised by the Okanagan Nation Alliance during the review, which are deemed to be within the scope of the environmental assessment review, have been considered in the review process and the documents generated as part of the review.

During the environmental assessment review, EAO has considered the Application, information provided by the Okanagan Nation Alliance; Okanagan Nation Alliance comments on the potential effects of the Project; responses by the Proponent and government agencies; and the discussions during project Working Group meetings; site visits and Okanagan Nation Alliance and EAO meetings.

Based on this information EAO is of the view that there will be minimum impact on the Okanagan Nation Alliance asserted Aboriginal rights from this proposed Project. Provided that the Proponent implements the actions described in the summary of Commitments listed in Appendix 4 – Proponent's Commitments, EAO is satisfied that the likelihood of significant adverse effects on the current use of lands and resources for traditional purposes by Aboriginal groups represented by the Okanagan Nation Alliance

is low. These commitments seek to balance the ongoing importance of this site to those groups with the current need of this Project and the opportunity to contribute to satisfying the continuing and growing public need for power production.

EAO is recommending that, if the Project is approved, the Ministers give the force of law to the Proponent's commitments by including them as a condition of the Environmental Assessment Certificate.

The Responsible Authorities have considered the information provided in the proponent's Application and this Report and have determined, taking into consideration the proposed mitigation measures, that the Project is not likely to cause significant adverse environmental effects on the current use of lands and resources for traditional purposes by the Okanagan Nation Alliance.

2. KTUNAXA NATION COUNCIL

2.1 First Nations Setting

Ktunaxa Nation Council is the governing body representing the Ktunaxa Nation, one of two recognized First Nations in Canada that has indicated Aboriginal interests in the project area. Ktunaxa Nation Council represents the collective Aboriginal interests of the Ktunaxa people, comprised of approximately 1,000 First Nations people that includes the Lower Kootenay Band, St. Mary's Indian Band, Tobacco Plains Indian Band and Akisqnuk First Nation in Canada, and two Bands in the U.S. Linguistically, the Ktunaxa people speak a common tongue, the Kutenai language. The word, "Kutenai" is sometimes used to refer to the people as well as to the language. Culturally, speakers of the Kutenai language are classified as part of the Plateau Culture Area.

The Project is situated within a territory that appears to have been historically used by the Sinixt or Lakes people before the onset of the 20th Century. It would appear that today, most Sinixt people reside on the Colville Reservation in Washington State, and are registered members of the Colville Confederated Tribes. In 1956 the federal government declared the Sinixt to no longer exist in Canada. The Province lacks information regarding the Sinixt as to the basis for any claim that there is a communal group in British Columbia which would qualify as an "Aboriginal peoples of Canada" within the meaning of section 35(1) of the *Constitution Act*, 1982.

Ktunaxa Nation Council has indicated that areas proposed for the construction of the Project falls within the Ktunaxa Nation's traditional territory. A 1993 map of the Ktunaxa Nation traditional territory claims areas west of the Columbia River, from the U.S. border northwards alongside the Arrow Lakes to the Big Bend, and east to the Continental Divide. In 1998, the Ktunaxa Nation made an assertion to the Federal Court of Appeal that their Aboriginal territory also includes the Arrow Lakes region. A more recent Ktunaxa map (2004) delineates a more expansive traditional territory.

The closest current Ktunaxa community to the project site was identified to be near Creston about 133 kilometres from the Project by road. This population of this community is approximately 130 people. The Ktunaxa Nation Council is currently involved in the BC Treaty Commission process.

2.2 Information Sources

As one of the provisions under the Ktunaxa Nation Council-Proponent Consultation Agreement dated March, 2005, the Proponent commissioned a report to document Ktunaxa Nation Council traditional use activities in the project area (Aboriginal Interests and Traditional Use Report). The Ktunaxa Nation Council prepared the Aboriginal Interests and Traditional Use Report dated September 2006. The Ktunaxa Nation Council state that information was obtained about Ktunaxa interests in the proposed project area and Arrow Lakes mainly from the Ktunaxa Nation Council's archives including audio and video taped interviews, project reports and a compilation of various correspondence. It also relied on publications on the west and east Kootenay regions of BC that include Kootenay Indians relation to the region.

The Ktunaxa Nation Council provided an initial submission on August 8, 2006 during the Application review period on potential impacts of the Project, indicating that this represents their initial comments and that final comments would follow. On September 12, 2006, the Ktunaxa Nation Council provided comments on Ktunaxa Nation interests that were followed by the Aboriginal Interests and Traditional Use Report. In correspondence dated September 18, 2006, the Ktunaxa Nation Council provided comments on the Proponent's response to Review Period Questions and Comments from the Public, First Nations and Agencies, September 2006.

The Proponent's Application, including 11 Background Reports that were submitted as appendices to provide additional information on Aboriginal interests and uses, as well as supporting documentation on the range of environmental studies undertaken by the Proponent to evaluate potential project impacts. Background Report #7 – First Nations' Aboriginal Interests and Traditional Use in the Waneta Hydroelectric Expansion Project Area: A Summary and Analysis of Known and Available Information, was prepared by Bouchard and Kennedy Research Consultants. Background Report # 8 – Archaeological Impact Assessment of the Waneta Hydroelectric Expansion Project was prepared by Madrone Environmental Services Ltd.

2.3 Ktunaxa Nation Council Involvement in the Environmental Assessment Process

On January 31, 2002, EAO invited the Ktunaxa Nation Council to participate in an inter-agency meeting on February 20-21, 2002 in Castlegar. The purpose of the meeting was for the Proponent to introduce its plans for the Project so participants could get an early understanding of the potential effects of the Project and an opportunity for agencies and First Nations to advise the Proponent of their interests.

Following the issuance of the September 22, 2003 section 11 Order, the Proponent initiated formal consultation with the Ktunaxa Nation Council, as directed by the section 11 Order. The draft Terms of Reference document was distributed to the Ktunaxa Nation Council for the 45-day comment period (October 10, 2003 to November 24, 2003) in accordance with the section 11 Order. Comments on the draft Terms of Reference were received from the Ktunaxa Nation Council on November 24, 2003. Following EAO approval of the draft Terms of Reference in May 2004, the Proponent engaged the Ktunaxa Nation Council in negotiations for a formal consultation agreement. Representatives from the Ktunaxa Nation Council participated actively in government agency Working Groups established by EAO to review the Project. This included

participation in ten Working Group meetings.

EAO provided funding to the Ktunaxa Nation Council to help cover participation costs during the environmental assessment review of the Project. This included attending technical Working Group meetings and providing comments on the Application and the Proponent's responses to Ktunaxa Nation Council comments. Funding was also provided for reviewing drafts of the Report.

2.4 Ktunaxa Nation Council Involvement with the Proponent

The Proponent advised First Nations, in a general way, in the late 1990s of its intent to develop the Project. EAO also required the Proponent to undertake consultations with the Ktunaxa Nation Council on the effects of the Project, and to report the outcome of these consultations to EAO. Specific consultations between the Proponent and the Ktunaxa Nation Council began in 2002 and contributed to the draft Terms of Reference that was issued for review in 2003. The Proponent made early and ongoing efforts to consult the Ktunaxa Nation Council about the Project. These included providing funding for Ktunaxa Nation Council participation in pre-application technical Working Group meetings and also efforts to obtain agreements and arrangements to address any potential infringement of asserted Aboriginal rights.

Following approval of the draft Terms of Reference for this Application in the spring of 2004, discussions between the Ktunaxa Nation Council and the Proponent increased with the goal of negotiating a formal consultation agreement. On March 31, 2005, negotiations resulted in a Ktunaxa Nation Council-Proponent Consultation Agreement. This document provides the framework for negotiations on community benefits that would be provided by the Proponent without prejudice to the interests of the Ktunaxa Nation Council. In addition, via this document, the Proponent agreed to provide opportunities and necessary funding to the Ktunaxa Nation Council to facilitate their review and comment on the background reports and draft Application, at an early stage. The intent of early Ktunaxa Nation Council involvement by the Proponent was to allow time for an exchange of views and information and to undertake cooperative identification and assessment of Aboriginal interests of the Ktunaxa people. During the course of consultation, the Ktunaxa Nation Council provided significant feedback on the materials particularly on the following areas of importance:

- Technical issues of concern in each of the Background Reports;
- Adverse impacts of the Project on the asserted rights and interests of the Ktunaxa Nation Council indicated or suggested by any of the Background Reports; and,
- Adverse impacts of the Project on the current use of lands and resources by the Ktunaxa Nation Council for traditional purposes indicated or suggested by any of the Background Reports.

As a consequence of the Proponent's communication and consultation activities, a more inclusive representation of the Ktunaxa people's asserted traditional use of lands and resources in the project area was prepared for the Proponent's Application to EAO.

The Proponent provided a confidential detailed record (Volume 5 of the Application) of communication and consultation to EAO. The Proponent met with representatives from the Ktunaxa Nation Council approximately 12 times, between December 2003 and

March 2006, to attempt to identify and address Ktunaxa Nation Council concerns regarding the Project, to develop a Consultation Agreement and to discuss a possible community benefits proposal/agreement.

The Ktunaxa Nation Council has expressed disappointment regarding the Proponent's reluctance to engage in meaningful negotiations regarding an Impact Management and Benefits Agreement with the Ktunaxa Nation Council. The Proponent has responded that it did not see the need for the impact management part of the agreement given the commitments it has made through the environmental assessment process relating to impact mitigation, compensation, inspection, reporting, monitoring and follow-up. The Ktunaxa Nation Council reported to EAO that it has a working relationship with the Proponent that was established in past projects.

2.5 Traditional Occupation and Use of the Project Area

The Aboriginal Interests and Traditional Use Report prepared by the Ktunaxa Nation Council for the Proponent presents some ethnographic information, compiled from existing sources. In addition Bouchard and Kennedy prepared Background Report #7 for the Project "First Nations Aboriginal Interest and Traditional Use in the Waneta Hydroelectric Expansion Project Area: A Summary and Analysis of Known and Available Information".

From their research and literature review, Bouchard and Kennedy concluded that some activities such as hunting, fishing and gathering for food and materials might have been carried out in the Columbia River-Pend d'Oreille confluence region, in the vicinity of the Project, by Plateau First Nations, including the Ktunaxa people. The pursuit of deer, elk, goat and bear, among other species, was a central aspect of Ktunaxa subsistence activities, and to some extent continues to supplement their diet. One source (Schaeffer 1966) cited by Bouchard and Kennedy indicated that the Ktunaxa people also used bears in elements of their ceremonies. The Ktunaxa people were also active hunters of waterfowl. Birds, ducks and eggs were indicated also as part of the Ktunaxa people's staple diet. Spruce grouse were hunted by the Ktunaxa people. Although the Ktunaxa people also ate fish and plants, meat was of considerable economic significance. Some of these resources might have been obtained in the project area. According to the research of Bouchard and Kennedy, known and available ethnographic data does not identify the specific species of animals and birds that were traditionally hunted by the Ktunaxa people in the project area. Table 2 in the Proponent's Background Report #7 lists 16 culturally significant species of animals, and Table 3 lists three culturally significant fish species that are found, or likely to be found, in the general environs of the project area. Most of these species of animals are common and widely distributed in the project area.

Recorded data on plant foods used traditionally by First Nations people in the upper Columbia River region comes primarily from ethnographic information. Ethnobotanical data clearly show that the collection of these foods began in the early spring and extended until late fall. While information on how plants were used is generally strong, information about where the plants were obtained is not readily available. Locations for very significant plant gathering of important plants such as huckleberries and Saskatoon berries are recorded in the literature and some of these areas have been recorded in the Arrow Lakes/upper Columbia region. However, no such location has been reported for the project area.

Some culturally significant plants that are found, or likely to be found, in the project area, and the uses of these by the Ktunaxa people are listed in Table 1 of Background Report #7. Table 1 lists a total of 29 plant species.

In the Aboriginal Interests and Traditional Use Report prepared by the Ktunaxa Nation Council it states the Ktunaxa are referred to in the literature under a variety of names including Kootenay, Kutenai, Cootenaha, Lakes, Flatbow and others. In BC the Ktunaxa territory covers approximately 70,000 square kilometres of southeastern BC commonly known as the Kootenay region of BC. The Ktunaxa is a cultural isolate, meaning the language is related to none other. According to the Aboriginal Interests and Traditional Use Report, the Lower Ktunaxa led a life that was oriented towards the usage of the lower Kootenay and Columbia River systems.

The Aboriginal Interests and Traditional Use Report states that Hudson Bay records indicate Kutenai Indians traded furs at Fort Colville and Fort Shepherd (Waneta area). Further, the Aboriginal Interests and Traditional Use Report notes a 1989 Kutenai National Resource Book prepared by the Kutenai Language Task Force intended for use by the local Kootenay area schools identified hunting and fishing areas that extended to the 49th parallel near the Waneta border.

The Aboriginal Interests and Traditional Use Report describes other known Ktunaxa sites, which include pictographs located six miles below Burton that indicate a battle between Indians from the south, (Colville). It also mentions Ktunaxa place names that include Fort Shepherd – Akankunawu and Pend d'Oreille River – Kamanquku.

The Aboriginal Interests and Traditional Use Report prepared by the Ktunaxa concludes with two quotes. The first quote is from Wayne Choquette's evaluation of ethnohistory and states "A number of studies have been done on the West Kootenay area by ethnographers and anthropologists that have suggested that the Shuswap, Okanagan/Colville, Kalispel, or Ktunaxa are the Aboriginal people of this area. Some say this is shared territory and was used by one or the other groups for various activities such as gathering, hunting, fishing and spiritual practices. Based on the archaeological data and the interviews held (during the Ktunaxa Kinbasket Tribal Council 2006 study) it would seem that the reality is likely closer to joint mutual usage of this area amongst all of these cultures and not necessarily exclusively by one or another at any given point in time". However, this reality of joint mutual usage based on archaeological data does not seem to be supported by the archaeology background or the second quote in the conclusion to the Aboriginal Interests and Traditional Use Report.

In the archaeology background of the Aboriginal Interests and Traditional Use Report it states "No pre-contact cultural deposits or features were encountered in either study within the proposed project area." The second quote found in the conclusion of the Aboriginal Interests and Traditional Use Report is from Bjorn Simonsen's Archaeological Impact Assessment of the Project, 2004, (Background Report #8). "Our findings are also consistent with the results of most of the previous archaeological field studies within the lower Pend d'Oreille-Columbia River confluence area, whereby little or no archaeological evidence of Aboriginal occupation has been observed by archaeologists working in the area." The second quote continues, "On the basis of these findings, it is our opinion that the proposed Waneta Hydroelectric Expansion Project will have no negative impact on archaeological resources. Following from this, it is our opinion that

additional archaeological investigations are not warranted for this project and we recommend the Waneta Expansion hydroelectric development proceed, as proposed."

The conclusion of the Aboriginal Interests and Traditional Use Report ends with the following paragraph, "Finally, Ktunaxa have long had an interest in the West Kootenay and the Arrow Lakes area as evidenced by Oral History, Ktunaxa name places and family relations. Although the proposed Waneta Expansion Power Project Area does not contain archaeological evidence of historic Aboriginal use, Ktunaxa people frequenting the West Kootenay area via the waterways, to war, fish, hunt, or trade furs at Fort Colville and Fort Shepherd exists in historical correspondence. The site specific area of the Waneta Hydroelectric Expansion Project lies within the realms of the Ktunaxa traditional territory. There is no doubt in the teachings of the Ktunaxa Elders that their ancestors occupied the Arrow Lakes area, as they refer to the region, including the surrounding Waneta Expansion Powerplant Project area. Archaeology evidence is unknowingly disturbed by sight-seers, picnickers, and hikers who frequent ancient Aboriginal settlements in parks, along rivers and lakes for recreation purposes."

2.6 Current Occupation and Use of the Project Area for Traditional Purposes

According to the Aboriginal Interests and Traditional Use Report on May 21, 1992, the Ktunaxa Kinbasket Tribal Council adopted by resolution, a declaration formed in consultation with knowledgeable Elders. This included statements on both the land and the territory. The territory covers approximately 27,000 square miles and includes the project area. The Ktunaxa population is approximately 1,000 people living on and off reserves. There are currently six Bands in the traditional Ktunaxa territory with four in BC. In 1996 the British Columbia Treaty Commission accepted a Statement of Intent for Treaty negotiations submitted by the Ktunaxa Kinbasket Tribal Council. The statement was accompanied by a traditional territory and treaty negotiation map.

As mentioned previously the closest Band to the project area is the Lower Kootenay Indian Band in Creston, BC approximately 133 kilometres by road to the project area.

While Ktunaxa Nation Council expressed to the Proponent an interest in knowing what culturally important plants and animals exist on any lands that may be disturbed by the project construction, Ktunaxa Nation Council did not indicate a present intention or desire to harvest or use such terrestrial resources in the project area.

The Aboriginal Interests and Traditional Use Report provided information on the historical Ktunaxa use of the Arrow Lakes and West Kootenay region. The Aboriginal Interests and Traditional Use Report states a formal Traditional Use Study component is not included in this report, as time constraints and other matters prevented an in-depth Traditional Use Study. The Aboriginal Interests and Traditional Use Report further states that to conduct a formal Traditional Use Study of the proposed Project a road trip with Elders familiar with the area would have to be done. This did not occur due to the various constraints mentioned above.

2.7 Ktunaxa Nation Council Issues Raised and Proponent Responses

The following concerns were raised by the Ktunaxa Nation Council with respect to the Project.

a) White sturgeon juvenile overwintering habitat within the Waneta Eddy

Proponent Response: Winter does not likely represent a critical period for sturgeon in the Columbia River. The flows that produce the modeled effect of concern happen very infrequently (at low Columbia River flows) and produce a relatively minor change for only a portion of the day. At more typical winter flows in the Columbia, the greater frequency of daily flow events will increase low velocity habitat, which would be a benefit of the Project. The values used in the analysis for potential effects were conservative, and it is expected that with more sampling, more variability would be found, not less. The evidence examined indicates a low risk to white sturgeon overwintering. The increased frequency of low flow periods from the flow-through of Boundary releases in winter will serve to increase deep water low velocity habitat.

b) Predation on white sturgeon eggs and larvae in the Pend d'Oreille- Columbia confluence area

Proponent Response: The data indicates that the majority of eggs are deposited in the Columbia River downstream from the main influence of the Pend d'Oreille tailrace plume and minimum White Sturgeon Flow Augmentation Program flows. Stomach content analysis indicates that egg predation is low and incidental, not directed. The modeling indicates there are potential benefits in velocity patterns during increased daily flow volumes and equal credence should be given to this in reaching a conclusion based on risk. The flows of concern occur during the latter part of the spawning period after the bulk of spawning and egg incubation has occurred (77 percent of spawning occurs before the period of concern). The Case 2 flow scenario modeling, under which the concern was identified, is an extreme condition. The modeling results provide a static snap-shot of a highly dynamic area. The validity of any analysis of project effects at the level of detail attempted (by Fisheries Working Group members) is questionable, and attempts to quantify potential changes using this approach will have large potential errors. The Proponent has not attempted to use this same approach to quantify benefits of higher daily post-project flows other than to state they may have offsetting benefits.

Construction or operation of Boundary Dam upstream in Washington State did not have any detectable effect on the overall timing and magnitude of flows during the white sturgeon spawning period. Boundary block loading operations did not occur during a substantial portion of the sturgeon spawning period. The changes produced by Boundary construction and operation during the period of recruitment failure are minor and outside the main sturgeon spawning period. There is no evidence in the data to support a reasonable conclusion of any linkage between anticipated incremental changes in Pend d'Oreille flows and white sturgeon recruitment failure.

It is extremely improbable that all recruitment occurred during the latter part of the spawning period when flows in the Pend d'Oreille system were typically declining rapidly and water temperatures were sub-optimal. It is more reasonable to assume that recruitment would occur during the early to mid portions of the spawning period when Pend d'Oreille flows would provide optimal flow and temperature conditions. Flows during these periods are essentially unchanged from pre-Boundary conditions. Flow-through effects of project operations will be limited to an increased frequency of low White Sturgeon Flow Augmentation Program flow events that will occur in the latter part of the spawning period.

The Proponent postulated that data suggests that the various anthropogenic factors that have directly affected the aquatic environment of the mainstem Columbia River are primarily responsible for the recruitment failure in the white sturgeon population. Therefore, there is no apparent linkage between the flow-through of Boundary Dam releases and the potential for increased egg predation that would have any impact on present or future white sturgeon recruitment success.

The Proponent has prepared additional analysis which reaffirms the Proponent's original conclusion of no harm to white sturgeon. Not withstanding this analysis and conclusion, as requested by Fisheries and Oceans Canada the Proponent has proposed an enhancement to the existing Waneta White Sturgeon Flow Augmentation Program, together with precautionary monitoring and adaptive management measures.

c) Cumulative effects of the Project on the recovery potential for the endangered Upper Columbia River white sturgeon population

Proponent Response: Although there are many factors that cumulatively "may" contribute significantly to recruitment failure there is no evidence to support the reviewer's hypothesis that present egg mortality rates are a significant factor limiting to sturgeon recruitment, or that there is presently "excessively high levels" of egg mortality. The further hypothesis that these levels of predation "may well include" effects of seasonal and daily load shaping from the Pend d'Oreille is also unsupported.

Regarding the reviewer's assertion that sturgeon recruitment failure may result from a cumulative effect of Pend d'Oreille and Columbia flow regulations, it is the Proponent's understanding that the only primary cause-effect relationship that can reasonably be detected through examination of available information on recruitment failure timing is the regulation of the Columbia River mainstem. This is supported by the Upper Columbia White Sturgeon Recovery Initiative plan (2002) which states (page 33) "The modern recruitment failure in the Upper Columbia white sturgeon population coincides with the construction since 1968 of three large Columbia River mainstem dams."

With regard to the reviewer's comment that existing Waneta operations may contribute to recruitment failure, the Proponent has not encountered any information that would support this belief and would carefully consider any data received from the Ktunaxa Nation Council (Canadian Columbia River Inter-tribal Fisheries Commission) that provides the basis for this statement.

d) Compensation for loss of shallow water habitat downstream in the Columbia River from flow-through of Boundary Dam releases, and potential adverse effects on Columbia mottled sculpin

Proponent Response: Approximately 0.4 hectare years of shallow water habitat (on average, the area affected over the period of one year) in the Columbia River will be dried and subject to reduced productivity due to flow-through of Boundary releases. This habitat loss is based on seasonal averages and not daily maximums. Several achievable compensation options have been identified and a conceptual Fish and Fish Habitat Compensation Plan (i.e. design and feasibility study, predictions of created habitat and use, and calculation of habitat gains that achieves no-net-loss, etc.) has been completed that meets the habitat policy requirements of Fisheries and Oceans Canada. The compensation plan will be finalized prior to authorizations being issued

under the *Fisheries Act*. The preferred option at/near Fort Shepherd upstream of the Pend d'Oreille-Columbia confluence would involve re-contouring an area of river bank/channel where fish stranding is a known problem. This proposed compensation downstream of Waneta is in addition to the significant fish habitat gains that will be realized upstream in the Seven Mile Reservoir, and, to a lesser extent the Waneta headpond, with reduced frequency and magnitude of water level fluctuations from the flow-through of Boundary Dam releases.

Columbia mottled sculpin occur in the Columbia River upstream of the affected area, but have never been documented in the aquatic study area for the Project. Most of the habitat of the affected area is relatively steep and not subject to stranding events and the risk of stranding of this species is expected to be very low. This assessment would be verified through a monitoring program which will be incorporated into the Fish and Fish Habitat Compensation Plan.

e) Ktunaxa or other First Nations are not in an area looking for one specific resource but for other things such as berry picking, gathering medicines, fishing and hunting. The Columbia River was an important travel corridor for the Ktunaxa and other First Nations

Proponent Response: The Proponent has recognized that the Ktunaxa may have traditionally exploited more than one resource in an area and would travel between resource areas. However, the Proponent has received no specific evidence of the Columbia corridor adjacent to Waneta being used by the Ktunaxa.

f) The recording of 10 archaeology sites in the area shows that insufficient archaeological research has been done in the area

Proponent Response: The 10 archaeological sites in the general area are the only archaeological sites on record. In addition, the Proponent's archaeological investigations and field reconnaissance did not locate any additional sites in the specific project area. There have, in fact, been several detailed archaeological studies in the immediate vicinity of the Waneta Project but none have found (any) sites as outlined in the Application Background Report #8. The absence of archaeological sites in this area could be attributed to a number of factors including low historical use by First Nations, and sites destroyed by past development and/or natural forces.

g) All dams have some effects on the fisheries and will continue as long as the dams are there (where are the salmon?)

Proponent Response: Salmon were not present at Waneta Dam when it was originally built. Construction of the Project will not preclude installing fish passage at Waneta should salmon someday return.

h) When dealing with traditional harvesting and use of plants or wildlife and current use we can not be site or resource specific; First Nations traditional use follows the resources (no boundaries). The resource may be plentiful in one area one year and sparse the next so a group may have to travel to other places. There are certain conditions that affect First Nations, including the abundance of various fish and wildlife populations, in turn affected by factors like weather and dams

Proponent Response: During the course of consultation with First Nations, no evidence was presented regarding specific resource use in the project area. However, as outlined in the Application, the Proponent has concluded that the protective and mitigative measures presented will ensure that there are no uncompensated residual effects of the Project on any resources identified as being of general traditional interest to First Nations.

i) Non-sportfish species are just as important to the eco-system as sportfish and should not be written off because fishermen don't fish them. The study suggests bigger rainbow trout will survive the entrainment, what does this do for the age structure of the population? Is there an age cap that could be detrimental to the survival of the rainbow? If only the older ones are surviving what is replacing dead fish?

Proponent Response: The issue of fish entrainment was addressed in the Application and the conclusion of the analysis provided was that for a given total flow, post-project fish entrainment mortality would be lower than pre-project entrainment due to reallocation of the flows through the new powerhouse. Rainbow trout was used as an example to illustrate that the Project would not result in an incremental increase in entrainment mortality. The species that would be most affected by entrainment are introduced exotics and entrainment of these species may have benefits as a food source to downstream fish species such as white sturgeon. On the basis of this information, the Fisheries Working Group, which consisted of representatives from the provincial and federal agencies and First Nations (including the Canadian Columbia River Inter-Tribal Fisheries Commission, the technical representatives for the Ktunaxa Nation Council), reached consensus that entrainment from the Project was not an issue that would require compensation.

Information provided in the Application Background Report #1 indicates that Waneta headpond does not support a self-reproducing resident population of rainbow trout. Rainbow trout that are present in the headpond are either entrained from Seven Mile Reservoir, or are members of the stocked population in Cedar Creek. In most years these fish must leave the headpond in the summer since water temperatures at that time can exceed the upper lethal temperature for the species. Therefore, the age structure of the population that resides in the headpond on a seasonal basis is determined by summer water temperatures, which will not be affected by the Project.

2.8 Conclusions

The process of notifying and consulting with the Ktunaxa Nation Council about the Project has complied with the requirements outlined in the section 11 procedural Order issued to the Proponent. All issues raised by the Ktunaxa Nation Council during the review, which are deemed to be within the scope of the environmental assessment review, have been considered in the review process and the documents generated as part of the review.

During the environmental assessment review EAO has considered: the Application; information provided by the Ktunaxa Nation Council; Ktunaxa Nation Council comments on the potential effects of the Project; responses by the Proponent and government agencies; and the discussions during the Project Working Group meetings, and Ktunaxa Nation Council and EAO meetings.

Based on this information EAO is of the view that there will be minimum impact on the Ktunaxa Nation Council asserted Aboriginal rights from this proposed Project. Provided that the Proponent implements the actions described in the summary of Commitments listed in Appendix 4 – Proponent's Commitments, EAO is satisfied that the likelihood of significant adverse effects on the current use of lands and resources for traditional purposes by Aboriginal groups represented by the Ktunaxa Nation Council is low. These commitments seek to balance the ongoing importance of this site to those groups with the current need for this Project and the opportunity to contribute to satisfying the continuing and growing public need for power production.

EAO is recommending that, if the Project is approved, the Ministers give the force of law to the Proponent's commitments by including them as a condition of the Environmental Assessment Certificate.

The Responsible Authorities have considered the information provided in the proponent's Application and this Report and have determined, taking into consideration the proposed mitigation measures, that the Project is not likely to cause significant adverse environmental effects on the current use of lands and resources for traditional purposes by the Ktunaxa Nation Council.

PART C – ENVIRONMENTAL EFFECTS

Study Areas

The terrestrial and aquatic study areas (Appendix 1 – Figure 7) were divided into primary areas and secondary areas. Primary areas are those where the potential effects, if any, are expected to be the direct effects of project construction and operation activities. Secondary areas are those where indirect effects may occur.

Terrestrial Study Area

The primary terrestrial study area includes the following:

- The powerplant worksite;
- Worksites that will be used temporarily during construction (this includes access roads);
- Worksites where excavated materials will be placed; and,
- A 10 kilometre long transmission corridor from the powerhouse to the Selkirk Substation, which will parallel for 8.5 kilometres the north side of the existing BC Hydro transmission statutory right-of-way.

Secondary terrestrial study areas are those where indirect effects may occur and/or may support animal populations that move in and out of the primary study area. The secondary area encompasses all sites from valley bottom to the height of land (600 metres to 1,100 metres elevation) within the following (this includes existing access roads that will be used for construction of the transmission line):

- Area south of the proposed transmission line to the banks of the Pend d'Oreille River, extending eastward from the Waneta Dam to Nine Mile Creek;
- Area north of the proposed transmission line, extending westward from the Selkirk Substation to Blizzard Mountain and including the east bank of the Columbia River;
- Area west of the Columbia River extending northward from the international boundary to the Trail Airport and including a 500 metre wide section of Columbia River shoreline; and,
- Area south of the Pend d'Oreille River from Highway 22A east along the shoreline to the mouth of Cedar Creek.

Aquatic Study Area

The boundaries of the primary aquatic study area encompass the reaches of the Pend d'Oreille River immediately above and below Waneta Dam, and the reaches of the Columbia River where direct and backwater effects can be expected as a result of flow-changes through Waneta following project completion. The primary study area on the Pend d'Oreille includes the confluence and runs approximately 1.25 kilometres upstream of the Waneta Dam to Cedar Creek. The downstream boundary of the primary study area on the Columbia is at the Canada-U.S. border, and the upstream boundary on the Columbia is approximately 4.5 kilometres upstream of the confluence with the Pend d'Oreille River, at the location of the Fort Shepherd Eddy.

Flow-through changes associated with the expansion powerplant will be most evident within the 300 metre tailwater reach immediately below Waneta Dam, but will have the potential to influence hydraulic patterns and flow characteristics within the confluence area and adjacent mainstem Columbia River. The upstream boundary of the primary study area on the Columbia River includes a natural hydraulic control in the river and denotes the upstream area of influence of potential hydraulic changes caused by present or future operations at Waneta Dam.

Three highly significant habitat features are located within the primary study area of the Columbia River:

- The area along the south bank of the Columbia and Pend d'Oreille confluence is the only known white sturgeon spawning area between the Hugh L. Keenleyside Dam and the U.S. border.
- The Waneta Eddy at the confluence is an important feeding, rearing and overwintering site for white sturgeon and a variety of other native resident fish species.
- Fort Shepherd Eddy is an important area for white sturgeon and other fish species.

The secondary aquatic study area has two main reaches. One reach extends from Cedar Creek in the Waneta headpond through Seven Mile Dam to Boundary Dam on the Canada-U.S. border. This includes the portion of the Pend d'Oreille from which fish could potentially be entrained through the new powerplant. It includes most of the Waneta headpond and includes the Seven Mile Reservoir, where pre-project water level fluctuations and water residence times are expected to change as a result of the Project achieving hydraulic balance with upstream powerplants.

The secondary aquatic study area on the mainstem of the Columbia River extends from the upstream boundary of the primary area for a distance of approximately 4 kilometres. This section is included because of its proximity to sites adjacent to the left bank of the Columbia River that may be used for the storage and/or processing of excavated materials.

Beyond the aquatic study area boundaries, the federal Responsible Authorities also considered, at a conceptual level, incremental and cumulative effects of anticipated project operations on the Columbia River mainstem downstream of the Canada-U.S. border to Lake Roosevelt.

1. AIR QUALITY

The area surrounding the project powerhouse site is sparsely populated. Air quality levels around the project powerhouse site are generally good, considering its heavy industrial development and proximity to the city of Trail where, 17 kilometres north of the Waneta Dam on the banks of the Columbia River, Teck Cominco Metals Ltd. operates one of the world's largest fully integrated zinc and lead smelting and refining plant.

Climate data was used from stations located at Waneta (1913 to 1977) and the Ministry of Environment Trail airport site at Columbia Gardens, located approximately

5.5 kilometres north of the Waneta Dam. Data used to characterize the winds in this region were those observed at the Trail Airport. During the period of record from July 7, 1999 to April 30, 2004, about 18.9 percent of the predominant winds blew from the north-northeast. That frequency of north-northeast winds is likely the result of the winds being channelled down the Columbia River valley. Winds from other directions, particularly from the north and south, would also likely be influenced by the topography of the valley. The percentage of calm wind speeds (defined as wind speeds less than 0.5 metres per second) shows a low frequency of calms at 4.3 percent. No wind direction is associated with calm wind data. About 5 percent of the north-northeast winds for the period of record from July 7, 1999 to April 30, 2004 had wind speeds less than 1.5 metres per second. Wind speed summaries show that approximately 42 percent of the hourly winds had speeds less than or equal to 1.5 cubic metres per second, and about 60 percent of the winds had hourly speeds less than 2.5 metres per second. Similarly, the wind data show a pattern of wind directions heavily influenced by the north-south aligned Columbia River Valley, and a relative low incidence of hourly calm conditions varying between 3.6 percent in autumn to 6.1 percent in winter.

1.1 Potential Project Effects

The environmental issue scoping and effects assessment for the Project identified that airborne emissions and/or particulate matter (such as dust) associated with some activities during the construction of the Project could potentially have an adverse effect on air quality. This includes the following:

- *Site Access* – Road construction and construction traffic.
- *Site Materials Management* – Management of contaminated soils; and transportation and storage of excavated rock/overburden.
- *Powerplant Construction* – Surface excavation.
- *Powerplant Temporary Facilities* – Aggregate processing; concrete batch plant; open air storage areas; warehouses, offices and shops; and equipment services area.
- *Transmission Line Construction* – Access road construction; statutory right-of-way clearing; and construction and installation.
- *Vehicle/Equipment Maintenance.*
- *Decommissioning of Construction Areas* – Powerplant temporary areas; and, transmission line temporary areas.

The above potential impacts on air quality during construction are mitigatable through standard management practices.

The operation of the Project is not expected to have any adverse effects on air quality. The Project will serve to reduce greenhouse gas emissions by reducing the incremental need for fossil-fuelled electricity generation. Fossil-fuelled generating technologies are recognized to be major greenhouse gas emitters and are widely considered to contribute to global warming. The Project, which will generate more than 700 gigawatt-hours per year of renewable energy (additional capacity), is expected to avoid 700,000 to 800,000 tonnes of carbon dioxide equivalents per year. This estimate is based on the total life-cycle emissions for 100 percent coal-fired thermal generation electricity in the Alberta market.

1.2 Issues Raised and Proponent Responses

Worksites D3 and D4, approximately 5 kilometres north of the Waneta Dam are located near a residential area. Following discussion with the Regional District of Kootenay Boundary Planning Department, the Proponent will restrict locating the aggregate processing and concrete batch plant to these worksites. As well, the Proponent's Community Impact Management (Advisory) Committee will include a representative from the Regional District of Kootenay Boundary, as well as other members of the community, to assist in mitigating potential impacts and keep members informed on the Project.

1.3 Proposed Mitigation

Construction

The potential construction effects on air quality identified above are expected to be prevented and/or mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The following management practices will be applied through the Environmental Management Program and Environmental Work Plans, including an Air Quality Protection Environmental Work Plan, to prevent or mitigate potential construction effects on air quality:

- All fugitive dust will be minimized and controlled, including but not limited to that arising from such activities as equipment movement, clearing, development of and work within the site, and stockpiling of soils, excavated rock or other construction materials.
- If the level of dust generated at the site is considered to be unacceptable dust will be controlled at its source to contain and limit the release of particles to acceptable levels.
- Water sprays will be used, as necessary, to control cement and fly ash dust during truck loading and unloading operations.
- Materials awaiting transportation and being transported will be covered or wetted.
- Dust nuisance and hazards on public highways and roads will be prevented. Paved roads and highways used during construction will be wet swept to keep them free and clear at all times of dust, mud and other materials deposited by and from equipment.
- Roads, parking and storage areas will be wetted during dry periods.
- Application and handling of any dust palliative, with the exception of water, will comply with specified requirements and guidelines, including the BC Air Quality Objectives and Guidelines.
- All evaporative emissions will be controlled to meet BC Air Quality Objectives and Guidelines.

- All exhaust emissions will be controlled. Equipment exhaust systems will function in a manner to control exhaust emissions to meet regulatory requirements and BC Air Quality Objectives and Guidelines.
- All necessary regulatory permits will be obtained prior to commencing construction and operation of any equipment with point-source air emissions (such as exhaust vents or stacks).
- Fugitive particular matter levels caused by dust, open burning smoke, equipment exhausts and other equipment emissions will be minimized and measures will be promptly undertaken to address and rectify situations where these levels are unacceptable or the subject of public complaints.
- Fugitive particulate matter levels and equipment emissions will be monitored.

Operations

The Project is a "zero emission" energy project, and no operational design measures can be implemented to reduce emission characteristics. During operations there will be minor emissions associated with road maintenance and use (dust), and vehicle use.

1.4 Significance of Residual Effects and Conclusions

No significant residual adverse effects on air quality are expected. Potential adverse effects on air quality resulting from construction activities and actions are expected to be prevented or mitigated through application of standard and project-specific management practices, the Environmental Management Program and Environmental Work Plans, and monitoring to ensure compliance.

The residual effect of reducing greenhouse gas emissions by reducing the incremental need for fossil-fuelled electricity generation is considered to be positive, with cumulative potential.

Conclusions

The Ministry of Environment, Environmental Protection Division, indicated that, in general, it was satisfied that the assessments, plans and commitments provided in the Application meet the higher level requirements of the Division, and relevant Environmental Work Plans cited in the Environmental Management Program and Commitments must be available to the appropriate agencies upon request.

The Regional District of Kootenay Boundary Board of Directors passed a resolution indicating that the Proponent's responses to the issues raised by the Regional District are considered to be adequate.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with

input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse environmental effects in regards to air quality.

2. NOISE

The area surrounding the project powerhouse site is sparsely populated. Noise levels around the project powerhouse site are generally good, considering its heavy industrial development and proximity to the Trail airport site at Columbia Gardens, located approximately 5.5 kilometres north of the Waneta Dam.

2.1 Potential Project Effects

The environmental issue scoping and effects assessment for the Project identified that noise associated with some activities during the construction of the Project could potentially have an adverse effect on the acoustic environment. This includes the following:

- *Site Access* – Road construction and construction traffic.
- *Site Materials Management* – Transportation and storage of excavated rock/overburden.
- *Powerplant Construction* – surface excavation; underground excavation; structural work; tailrace rock plug removal; and intake rock plug removal.
- *Powerplant Temporary Facilities* – Aggregate processing; and equipment services area.
- *Transmission Line Construction* – Access road construction; statutory right-of-way clearing; and construction and installation.
- *Vehicle /Equipment Maintenance.*
- *Decommissioning of Construction Areas* – Powerplant temporary areas; and transmission line temporary areas.

The above potential impacts on the acoustic environment during construction are mitigatable through standard management practices.

The operation of the Project is not expected to have any adverse effects on the acoustic environment.

2.2 Issues Raised and Proponent Responses

Worksites D3 and D4, approximately 5 kilometres north of the Waneta Dam are located near a residential area. Following discussion with the Regional District of Kootenay Boundary Planning Department, the Proponent will restrict locating the aggregate processing and concrete batch plant at these worksites. As well, the Proponent's Community Impact Management (Advisory) Committee will include a representative from the Regional District of Kootenay Boundary, as well as other members of the community, to assist in mitigating potential impacts and keep members informed on the Project.

2.3 Proposed Mitigation

Construction

Potential adverse effects from noise during construction activities and Project operation are expected to be prevented and/or mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The following management practices will be applied through the Environmental Management Program and Environmental Work Plans, including a Noise Control Environmental Work Plan, to prevent or mitigate potential construction effects on the acoustic environment:

- Noise generated by construction and operation activities will be minimized and controlled to meet the requirements of the BC *Workers Compensation Act*, Occupational Health and Safety Regulation, Part 7.
- In scheduling and carrying out construction and operation activities, disturbance to local area residents and wildlife caused by the generation of noise from construction activities will be minimized.
- Prompt measures will be undertaken to address and rectify situations where noise levels are unacceptable or the subject of public complaints.
- Noise levels will be monitored on site and in representative areas that may be affected by construction noise and the results of this monitoring will be reported.
- Safety advisories will be issued with respect to noise levels in and around work areas.
- Muffling devices will be used on externally deployed engines.

Operations

Any concerns about noise levels at the powerhouse site from the operation of the Project are expected to be addressed though compliance with applicable legislation and permits, application of common management practices, and consideration of common design practices during engineering and structural design.

2.4 Significance of Residual Effects and Conclusions

No significant residual adverse effects on the acoustic environment are expected. Potential adverse effects from noise during construction activities and actions are expected to be prevented or mitigated through application of standard and project-specific management practices, the Environmental Management Program and Environmental Work Plans, and monitoring to ensure compliance.

Conclusions

The Ministry of Environment, Environmental Protection Division, indicated that, in general, it was satisfied that the assessments, plans and commitments provided in the Application meet the higher level requirements of the Division, and relevant Environmental Work Plans cited in the Environmental Management Program and Commitments must be available to the appropriate agencies upon request.

The Regional District of Kootenay Boundary Board of Directors passed a resolution indicating that the Proponent's responses to the issues raised by the Regional District are considered to be adequate.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse environmental effects in regards to noise.

3. GEOLOGY AND SOILS

The region that includes the Project site is mostly underlain by volcanic rocks. Overburden in the project area consists mainly of residual soil, the product of in-situ weather of the parent rock. There are numerous landslides in the vicinity of the Project, with overburden sliding on the relatively steep bedrock contact. Riverbeds contain very coarse alluvial deposits of sand, gravel and boulders. Overburden depths range up to 12 metres in residual soil and up to 15 metres in river alluvium. The ground surface

consists of overburden, except where bedrock is visible along the shoreline, in excavated slopes around the existing powerhouse, and in the access road cuts.

Approximately 900,000 cubic metres (bulked volume) of excavated rock, overburden and topsoil will be moved and stored at identified worksites during construction of the powerhouse. Activities will include site preparation, topsoil and surface soil removal, and excavated rock and overburden deposition. Materials are expected to be transported from the powerhouse area to disposal sites (Worksites A, C, D and E, with preference likely being given to Worksites A1, A3, D1 and D2) by road (Highway 22A) using trucks.

Metals contamination, specifically antimony, arsenic, cadmium, chromium, copper, lead, tin and zinc in concentrations exceeding the applicable BC Contaminated Sites Regulation – Industrial Land Use (CSR IL) standards, is present in surficial soils (i.e. one metre below ground surface or less) at the powerplant site and Worksites A1, A3 and C2. The elevated metals concentrations in surficial soils across the project worksites are likely associated with a regional issue, which Teck Cominco is actively addressing through a wide area human health and ecological risk assessment.

Metals contamination has also been identified in the sediments in the forebay of the Waneta Dam from past mining operations upstream. Removal of an estimated 14,000 to 20,000 cubic metres of submerged sediments will be required during construction. The potential adverse effects of the removal of contaminated sediments from the headpond forebay are discussed in Part C, Section 7 – Water Quality.

3.1 Potential Project Effects

The environmental issue scoping and effects assessment for the Project identified potential adverse environmental effects associated with site preparation (clearing, grubbing and stripping), topsoil and surface soil removal, and excavated rock and overburden deposition (transport and storage). This includes the following:

<u>Contaminated Soils Management</u>

- *Effects on Terrain, Soils and Air* – Cross-contamination of soils (if contaminated surface soil is not segregated from the underlying uncontaminated soils during excavation; uncontaminated excavated materials are relocated to sites where the ground surface is contaminated; or, contaminated materials are relocated to sites that are not contaminated); minor elevation changes in terrain; and dust generation during excavation and transport.
- *Effects on Surface Water Quality* – Runoff from disturbed soil in areas of excavation and stockpiled material, and contaminant loadings to surface water.
- *Effects on Groundwater* – Potential percolation of contaminated water through to the groundwater table.

Infiltration of contaminated runoff water from the one-time construction related stockpiles to groundwater is unlikely. The contaminants of concern are metals, and the contaminant levels identified in soils are not likely to generate leachate contaminated with dissolved metals. In addition, metals will preferentially adhere to soil particles. As water percolates through the subsurface soils towards the groundwater table, the

subsurface soils will act as a filter and limit the ability of soil particles to reach the groundwater table.

Excavated Materials Management

- *Effects on Terrain, Soils and Air* – Changes in topography and elevation of terrain; and dust generation during excavation and transport.
- *Effects on Surface Water* – Runoff from disturbed soil in areas of excavation and stockpiled material, and sediment loadings to surface water.
- *Effects on Groundwater* – Changes in rainwater percolation characteristics with associated changes in groundwater recharge rates.
- *Metal Leaching and Acid Rock Drainage* – metal leaching/acid rock drainage from surface and underground materials excavated, exposed or disturbed during construction activities has the potential to affect water quality and aquatic resources.

The potential effects to local groundwater recharge rates from changes in percolation characteristics is considered minor in the context of regional groundwater recharge.

Potential adverse effects related to air quality are discussed in Part C, Section 1 – Air Quality.

The potential spread of invasive plant species associated with soil disturbance during construction activities, particularly in regards to the transmission line, is discussed in Part C, Section 4 – Vegetation.

Seismicity and slope stability are discussed in Part E, Section 1 – Effects of the Environment on the Project.

3.2 Issues Raised and Proponent Responses

No significant issues were raised during the environmental assessment review concerning potential adverse environmental effects of the Project associated with site preparation, topsoil and surface soil removal, and excavated rock and overburden deposition. (The potential spread of invasive plant species associated with soil disturbance during construction activities is discussed in Part C, Section 4 – Vegetation.)

Issues were raised relating to potential adverse socio-economic effects associated with these activities and: permanent relocation of a portion of the Waneta-Nelway Road (see Appendix 1, Figure 2); impacts to the surface of Highway 22A from heavy construction traffic and the potential need for re-paving post-construction; and, Ministry of Transportation highway/road access permit requirements. These issues are discussed in Part D, Section 1 – Public Safety and Health, and Section 2 – Communities and Economy.

3.3 Proposed Mitigation

Construction

During the planning and design stage, potential adverse construction effects have been avoided or mitigated by:

- Locating the new powerhouse and intake structures close to those of the existing Waneta generating facility, which serves to minimize the construction footprint and keep much of the construction within the existing, previously disturbed powerplant site.
- Adopting a Base Concept situated on the Pend d'Oreille River rather than on the originally-preferred Columbia River site, which will avoid temporary detours of Highway 22A traffic and a possible re-alignment of the Burlington Northern and Santa Fe rail bed.
- Selecting the preferred transmission route contiguous with BC Hydro's 5L98 Line to Selkirk which will serve to reduce required land clearing and to minimize impacts of a separate transmission route.
- Utilizing to the extent possible existing gravel pits and previously disturbed areas for the storage of excavation material, which will minimize the land-based disturbance resulting from the Project.

Potential adverse effects associated with site preparation (clearing, grubbing and stripping), topsoil and surface soil removal, and excavated rock and overburden deposition (transport and storage) during construction are expected to be prevented and/or mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The Environmental Work Plans that will be applied through the Environmental Management Program to prevent and/or mitigate potential construction effects include the: Worksite Isolation Environmental Work Plan, Site Preparation Environmental Work Plan; Excavation Environmental Work Plan; Excavated Materials Relocation Environmental Work Plan; Water Quality Protection Environmental Work Plan; Erosion, Sediment and Drainage Control Environmental Work Plan; Contaminated Materials Management Environmental Work Plan; and, Site Restoration Environmental Work Plan.

The following management practices will be applied through the Environmental Management Program and Environmental Work Plans to prevent or mitigate potential construction effects.

Contaminated Soils Management

- Surface soils recovered from the powerplant worksite will be stockpiled in a suitable nearby location for subsequent reuse in restoring disturbed powerplant

worksite areas. Only acceptable materials excavated from the powerplant site will be used as infilling material at other proposed worksites. Any use of these surface soils in the restoration of other construction areas would be subject to a Soil Relocation Agreement under the requirements of the BC *Environmental Management Act*.

- Stockpiles of potentially contaminated materials will be placed on a liner to segregate them and prevent cross-contamination with underlying uncontaminated soils.
- Erosion from stockpiles and other potentially erodible materials will be controlled as required by covering with tarps or polyethylene sheeting and by controlling runoff.
- Excavated materials placed at Worksites A1 and A3 will be capped with material that will provide a long-term stable foundation for the placement of the previously stripped material.
- Soils containing elevated metals concentrations will be used in concrete production.
- Metals-contaminated soils excavated at the powerplant site will be removed and safely disposed of at a permitted facility.

Excavated Materials Management

- Worksites that will be used for the disposal of excavated materials have been identified, and criteria for the finished surface elevation of worksites established.
- Work will be confined within worksites. Boundaries will be set around the perimeter of worksites to isolate them. The locations of Environmental Protection Zones and Restricted Activity Zones have been established within worksites. Site specific requirements have been established for Restricted Activity Zones.
- During site preparation grubbing will be minimized and where possible root systems shall be left in place as a measure to maintain ground stability and control erosion. Grubbing will only be undertaken where required for excavation purposes.
- During site preparation stripping will be minimized as a precaution against erosion. Necessary stripping will be timed to minimize the exposure of stripped areas to erosion.
- Areas to be excavated for construction or otherwise prepared for construction support activities (laydown and work areas) will be stripped of surface soils to a depth of not less than 300 millimetres, except as approved in gravel pit areas. Stripped surface soils will be stockpiled on the sites from which they are removed and wherever possible subsequently used for the restoration of those sites.
- The location of all stockpiles to be made during site preparation will be shown on the Site Preparation Environmental Work Plan.
- Prior to commencing any excavation work, all drainage channels including creeks and creek beds, natural draws, gullies and ditches entering the area to be excavated will be diverted around the excavation area. Surface water will be prevented from entering excavations and groundwater seepage will be controlled to minimize erosion and water-borne sediment.
- Erosion, sediment and drainage controls will be installed prior to the start of construction to prevent erosion and to control sediment in runoff water from laydown and work areas. Positive drainage will be maintained in and around all

laydown and work areas and drainage provisions shown in the Erosion, Sediment and Drainage Control Environmental Work Plan.
- Stockpiles of stripped materials will not be placed in areas adjacent to watercourses, riparian areas or other environmentally sensitive areas, and in areas where natural drainage or storm water runoff could cause erosion.
- The Erosion, Sediment and Drainage Control Environmental Work Plan covering excavation will provide specific details of how sediment resulting from excavation activities will be controlled.
- Stockpiles and fills will be stabilized and protected against erosion.
- Once construction activities have concluded, worksites will be re-vegetated to replace and enhance the native grasses and plants cleared during site preparation (excavated rock stored on Worksites D1 and D2 will be used in future by the Ministry of Transportation, and will not be re-vegetated).

Metal Leaching and Acid Rock Drainage

Metal leaching and acid rock drainage are naturally-occurring processes that are caused when minerals containing metals and sulphur (called sulphides) come into contact with both air and water. When sulphides are exposed to water and the oxygen from air, they rust (or oxidize). This oxidizing of sulphides can also produce acid. If this acid is mobilized and carried by water, the process is called 'acid rock drainage'. The acid in acid rock drainage can leach metals from surrounding rocks, causing drainage that has high amounts of dissolved metals (such as iron, aluminum, copper, lead, silver or zinc). This process is called 'metal leaching'. Other metals can also be leached from rocks in non-acidic drainage (such as selenium and zinc, molybdenum, nickel, arsenic and antimony).

Not all rocks that contain sulphide minerals will become acid-generating. Whether this will occur depends on the amount of neutralizing minerals and materials (such as limestone) that are present in the rocks. If there is balance, or if there is an excess of neutralizing minerals, the rocks may not generate metal leaching/acid rock drainage.

The process of excavation greatly increases the amount of rock surface area that can be exposed to oxygen and water. The potential for environmental impacts depends on many factors, including the amount of metals in the drainage, the amount of acid-neutralizing ability in nearby rocks and water, the amount of dilution available in streams and the sensitivity of the receiving environment. If the potential for leaching of acid and metals is identified through test work, there are strategies that can be used to prevent and manage metal leaching/acid rock drainage.

Sampling and testing of rock materials will take place during excavation activities to ensure that materials are not prone to metal leaching or acid rock drainage. Should rock be identified as having potential for metal leaching or acid rock drainage, an Environmental Work Plan will be written and the rock will be disposed of on site in accordance with the Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia, BC Ministry of Energy, Mines and Petroleum Resources.

Operations – Powerplant

Site Environmental Management

A plan will be developed to address and manage the small area of project lands around the powerplant. Land maintenance measures will include: maintaining drainage features, such as ditches and culverts; regular inspection of access roads and maintenance to ensure serviceable conditions; maintaining an appropriate vegetative cover that stabilizes the ground and prevents erosion; monitoring of re-vegetated areas and conducting remedial re-vegetation measures as required to achieve site restoration objectives; controlling noxious weeds; and cutting or mowing vegetation that interferes with plant operations.

Operations – Transmission Line

Access Road Maintenance

Potential adverse effects associated with the condition of access roads used for Transmission Line construction are expected to be prevented and/or mitigated by applying standard and project-specific management practices. The Site Restoration Environmental Work Plan developed for construction will describe the measures that will be taken to leave the access roads used for Transmission Line construction in a stable condition with proper drainage and minimal potential for erosion. These measures include: achieving self maintaining conditions as soon as practicable; minimizing further ground disturbance except as necessary for required seeding and planting; reseeding as soon as practicable and establishing dense herbaceous ground cover using native seed mixes; on an area-specific basis, re-establishing cleared shrubbery by supplemental planting of low-growing native shrubs; and providing erosion controls in areas prone to erosion to minimize roadway erosion.

Annual inspections will be conducted during the first three years, after the snowmelt period, of the access roads to identify any parts of those roads requiring remedial action. Remedial action will be undertaken where required to repair any erosion or prevent a potential wash out of the access roads. Thereafter, access road condition will be monitored as part of the regular transmission line inspection program. Routine operations and maintenance activities will be scheduled to avoid use of the access roads during periods likely to cause damage to the roads due to saturated soils.

3.4 Significance of Residual Effects and Conclusions

No significant residual adverse effects relating to geology and soils are expected. Potential adverse effects associated with excavated materials management, including contaminated soils, from site preparation, topsoil and surface soil removal, and excavated rock and overburden deposition during construction are expected to be prevented or mitigated through application of standard and project-specific management practices, the Environmental Management Program and Environmental Work Plans, and monitoring to ensure compliance, as well as compliance with the BC *Environmental Management Act* (re contaminated soils).

Conclusions

The Ministry of Environment, Environmental Protection Division, indicated that, in general, it was satisfied that the assessments, plans and commitments provided in the Application meet the higher level requirements of the Division, and relevant Environmental Work Plans cited in the Environmental Management Program and Commitments must be available to the appropriate agencies upon request.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse environmental effects in regards to geology and soils.

4. VEGETATION

The project area spans three Interior Cedar-Hemlock biogeoclimatic subzones, and supports 210 plant species (17 tree, 33 shrub, 147 herb and 13 other) within grasslands, shrublands and forests.

There are two plant communities in the project area within the very dry warm variant of the Interior Cedar-Hemlock subzone that the BC Conservation Data Centre considers to be rare in BC. Vegetation inventory is lacking for this uncommon subzone (Interior Cedar-Hemlock) and both communities have not yet been formally described by the Conservation Data Centre. The first is a grassland community (Sumac – bluebunch wheatgrass) located on the south-facing slope below the Waneta-Nelway Road. The second is a mature open forest community (Ponderosa pine – black cottonwood – poison ivy) located at the proposed new powerhouse. Both communities have been invaded by cheatgrass and noxious weed species as a result of previous nearby disturbance.

Five vascular plant species listed by the BC Conservation Data Centre were found in the project area. They include blue-listed (species of special concern) pink fairies, blue-

listed Spanish clover, blue-listed narrow-leaved skullcap, red-listed (extirpated, endangered or threatened species) common Clarkia, and red-listed porcupine grass.

Spanish clover was found to be abundant along the transmission line statutory right-of-way and was also found in open habitat above the Waneta Dam. Common Clarkia was found in the powerhouse area. Pink fairies were detected on the western portion of the transmission line statutory right-of-way. Narrow-leaved skullcap was found in grassland habitat overlooking the powerplant and along the transmission line statutory right-of-way. Porcupine grass was detected at Worksite D1. There are also historical records for the red-listed Prairie Rocket in the project area; however, this species was not confirmed during field surveys.

Many project sites have been previously disturbed. Disturbed grasslands dominated by weedy species or cultivated fields with seeded agronomic species occur within the powerplant area, lower transmission line statutory right-of-way and Worksites A, C, D, E, F, G, H, I, J and L. Significant portions of Worksites A1, B, D1 and D2 have been previously cleared for industrial purposes and are currently not vegetated.

At least 14 noxious weed species are known to occur locally. Five of these species are confirmed in the project area. Spotted knapweed is the most widespread and pervasive species and it is a serious problem within the powerplant and proposed excavated materials storage areas, and along the access routes to the lower and west transmission line statutory right-of-way. Considerable effort has been expended to limit the establishment and spread of noxious weeds in the project area and a multi-agency noxious weed pest management plan has recently been implemented. Approaches used to date include herbicide treatment, mechanical and cultural control, as well as biological control.

4.1 Potential Project Effects

The Project is located in an area that is already occupied by industrial facilities and transportation infrastructure. As a result, a relatively small amount of clearing is required for powerplant construction. The largest portion of required clearing is associated with the construction of the transmission line. The 10 kilometres transmission line statutory right-of-way from the powerhouse to the Selkirk Substation will parallel the north side of the existing BC Hydro transmission line 5L98 statutory right-of-way for 8.5 kilometres, and will result on average in an incremental addition of 55 metres of statutory right-of-way width. Approximately 76 hectares of land will be permanently changed by the Project. This includes the following: powerhouse, intake and tailrace area – 9.8 hectares; worksites – 15.6 hectares; transmission line electrical clearance zone (electrical clearance zone) – 20.3 hectares; transmission line Tree Management Zone – 30.0 hectares. Some of these areas have been subject to previous disturbance. There are other areas that will experience some temporary change. For construction of the transmission line, use of an estimated 19 kilometres of existing access roads will be required, of which a small percentage will require upgrading. In addition, construction will require approximately 1.1 kilometres of new single season access roads, for which there are no stream crossings.

The environmental issue scoping and effects assessment for the Project identified that the following project components/phases could potentially have adverse effects on vegetation: management of contaminated sediment; parking; surface excavation;

excavated materials transport and storage; powerplant temporary facilities; transmission line access roads; transmission line statutory right-of-way clearing; transmission line temporary facilities; transmission line construction and installation; decommissioning of powerplant temporary areas; and decommissioning of transmission line temporary areas.

Activities such as clearing, grubbing and stripping during these various construction components/phases could potentially have an adverse effect on vegetation. This includes the following:

- *Contaminated Sediment Management* – Sediment deposition at Worksite F would result in the temporary loss of 1.7 hectares of south-facing grassland and shrubland habitat where there are occurrences of blue-listed Spanish clover. Portions of this worksite were altered in 2006 by clearing and excavation activities associated with construction of a Teck Cominco Metals Ltd. switchyard facility. Further baseline assessment is needed prior to using this site.
- *Surface Excavation* – Excavation in the powerplant, tailrace and intake areas will result in permanent loss of an estimated 9.8 hectares of mixed grassland, shrubland and forest vegetation within the uncommon very dry warm variant Interior Cedar-Hemlock biogeoclimatic subzone. Two rare plant communities (noted above) found within the excavation footprint area will be lost. Red-listed Common Clarkia and blue-listed Spanish clover were confirmed within or directly adjacent to areas to be excavated.
- *Excavated Materials Transport and Storage* – An estimated 30 red-listed porcupine grass plants are found at Worksite D1, which will continue to be used as an active gravel pit and materials processing site by the Ministry of Transportation, utilizing excavated rock from the Project that will be placed there for Ministry of Transportation use. This is the only occurrence of this species confirmed within the project area, but it has previously been documented nearby.
- *Transmission Line Access Roads* – Construction of a minimum of 1,150 metres of new single-season access trails will be required. Access trail construction will result in permanent modification to a minimum of 0.5 hectares of primarily immature to mature coniferous, deciduous and mixed forest. Structure site preparation will alienate an additional 0.1 hectares. An estimated 200 metres of new access trails will be constructed in grassland and shrubland along the new corridor, where listed plant species (pink fairies, Spanish clover, and narrow-leaved skullcap) occurrences and fragile soils are concentrated.
- *Transmission Line Statutory Right-of-Way Clearing* – will involve cutting of all trees and selected tall-growing shrubs at ground level in an approximate 30 metre wide electrical clearance zone. The total electrical clearance zone area for the new transmission line is approximately 25.6 hectares, of which 5.3 hectares are shared with existing transmission lines. All low-growing shrubs and other desirable low-growing vegetation (i.e., vegetation not exceeding 3 metres height during all life phases, and conifers <1 metre in height) will be retained in the electrical clearance zone. Within a further 25-35 metre wide Tree Management Zone, all trees that pose a safety hazard because of lean or projected growth within 10 years will be removed or topped. A new Tree Management Zone encompassing an estimated 30 hectare area will be required only on the north side of the proposed line. Statutory right-of-way construction will result in the permanent conversion of an estimated 20.3 hectares comprising

mainly immature to mature mixed forest habitat, with some climax shrubland and grassland, into early seral edge habitat. An additional 30 hectares of the Tree Management Zone will experience partial tree removal. Skid trails will impact an estimated 2.7 hectares. There are several occurrences of blue-listed Spanish clover and pink fairies along the statutory right-of-way.

- *Spread of Noxious Weeds* – Generally, it is anticipated that vegetation clearing, soil disturbance and compaction, and vehicle/equipment movement associated with the above noted construction components/phases is likely to exacerbate the spread of noxious weeds and negatively impact plant communities. Spotted knapweed in particular is expected to displace native vegetation. Transmission line statutory right-of-way clearing coupled with drying of the corridor microclimate and access trail construction and structure site preparation is likely to exacerbate the spread of invasive weeds from the existing BC Hydro and Teck Cominco statutory right-of-ways.

Potential adverse effects on vegetation that may result from accidents or malfunctions during construction or operations, involving encroachment on designated protected areas, fire, and leak or spill of hazardous material are discussed in Part E, Section 3 – Environmental Effects of Accidents and Malfunctions.

The flow-through of Boundary Dam releases during operation of the powerplant (see Part C, Section 6 – Hydrology) will have secondary positive effects on terrestrial resources. There will be a substantial reduction in the frequency and magnitude of water level fluctuations in the Seven Mile Reservoir and to a lesser extent in Waneta headpond. Mudflats and eroded banks will be more productive and less prone to erosion. Shoreline trees will be less susceptible to erosion or instability.

4.2 Issues Raised and Proponent Responses

Issues raised during the environmental assessment review concerning potential adverse effects of the Project on vegetation are documented in Appendix 3 – Issues Raised and Proponent's Responses. The most significant or key issues were:

1. *Gaps in the assessments conducted where the transmission line route crosses private lands.*

   Proponent Response: The area that was not accessed during detailed field assessments extends from kilometre 3.2 to kilometre 7.2 in the Lime and Four Mile Creek drainages. For inaccessible portions of the statutory right-of-way, the most recent available air photos, orthophotos, forest cover maps, soil capability maps and various background reports and existing resource information were used to interpret likely impacts of transmission line construction and operation on wildlife, habitat, riparian, forestry and agricultural resource values. However, it is intended when access is obtained for transmission line construction, that additional site-specific assessment for habitat features of significance (e.g., bat roost, snake den, veteran wildlife trees, etc.) will be conducted to further address mitigation needs.

   Numerous, appropriate protection measures have been proposed in the Environmental Management Program for the Project (see Section 4.3 – Proposed Mitigation) for all resource values, including those on the private lands not accessed during field studies. If some specific resource value on the private land is identified

that has not yet been assessed on the ground, such information will be taken into account in the detailed planning of the transmission line. A commitment has been made to conduct additional rare plant surveys in all work areas including the private lands.

2. *Increased spread/invasion of noxious weeds.*

   Proponent Response: The existing abundance and distribution of noxious weed species in the project area and the potential for the Project to exacerbate this existing problem has been recognized and considered in the Environmental Management Program for the Project (see Section 4.3 – Proposed Mitigation).

3. *Use of herbicide in managing vegetation in the transmission line statutory right-of-way.*

   Proponent Response: The specific intent of herbicide use during the pre-construction, construction and decommissioning phases of the Project is to minimize the further establishment and spread of invasive species. The objective of transmission line vegetation management during operations is to prevent vegetation from getting too close to the energized line. This is generally achieved by fostering a vegetative community under the line that is slow growing and in most places this can be achieved through periodic mechanical trimming or removal of higher growing species and will not require herbicides. However, the use of herbicides at some time in the future cannot be completely ruled out in specific locations.

4. *Proliferation of power lines and associated increased access in the Pend d'Oreille valley.*

   Proponent Response: The effects of the extensive number of existing transmission lines, associated roads and other access routes traversing through the low to middle elevations of the Pend d'Oreille Valley are acknowledged and noted in the Application Cumulative Effects Analysis. The transmission line base concept (Route 1) attempts to minimize incremental impacts of a new line by means of construction adjacent to the existing 500 kilovolt BC Hydro line. This alignment substantially reduces the requirements for incremental statutory right-of-way clearing and for new access road/trail construction. It also makes possible the simultaneous maintenance of overlapping lines and statutory right-of-ways, which should minimize incremental disturbance in the future. The Project will not result in any new publicly accessible access routes into wildlife habitat areas approaching and beyond the transmission line corridor. Funding for terrestrial impacts compensation is being provided and priorities for compensation can be established in multi-agency, multi-stakeholder discussions.

5. *The Project will exacerbate the rate of removal of mature Douglas-fir forest on crown and private lands in the Pend d'Oreille Valley. Analysis is needed to see if the remaining mature forests exceed the minimums under the Kootenay/Boundary Land Use Plan. Should there be a shortfall mature timber land should be acquired to replace the timber removed.*

Proponent Response: The cumulative effects analysis included an evaluation of actual early, mature and old forest seral stage distributions in comparison with target distributions prescribed in the Biodiversity Guidebook of the *Forest Practices Code*. This analysis was undertaken for the Pend d'Oreille Landscape Unit as a whole. Results indicate that targets for early seral (age class 0-2) representation are currently exceeded, whereas targets for old seral (age class 8) representation are not met. Target distributions for mature and old forest combined (age class 6-8) are currently being met. The establishment of additional early seral plant communities with the Project will tend to shift thresholds for early seral representation further away from recommended targets. However, the Project will involve no clearing of age class 8 forest and only a minor amount of clearing of mature forest. No consideration is currently being given to acquiring lands with mature timber. However, priorities for the proposed terrestrial compensation program will be negotiated with the Ministry of Environment in consultation with other stakeholders.

6. *Does the amount of road access related disturbance identified include both statutory right-of-way clearing and transmission line construction/installation needs?*

   Proponent Response: Initial estimates are considered to address both clearing and installation needs, and given the proximity to existing access roads, significant increases in trail construction allowances are not expected. Access trail estimates do not include skid trails that will be used for statutory right-of-way clearing. These are not established trails, but are created as the clearing occurs and will represent an expected temporary impact of an additional 2.7 hectares.

4.3 Proposed Mitigation

Construction

During the planning and design stage, potential adverse construction effects have been avoided or mitigated by:

- Locating the new powerhouse and intake structures close to those of the existing Waneta generating facility, which serves to minimize the construction footprint and keep much of the construction within the existing, previously disturbed powerplant site.
- Selecting the preferred transmission route contiguous with BC Hydro's 5L98 Line to Selkirk which will serve to reduce required land clearing (incremental clearing) and to minimize impacts of a separate transmission route. Locating structure sites close to existing access trails (on Teck Cominco's 230 kilovolt Line and BC Hydro's 500 kilovolt Line) will minimize the need for construction of new access trails.
- Utilizing to the extent possible existing gravel pits and previously disturbed areas for the storage of excavation material, which will minimize the land-based disturbance resulting from the Project.

Potential adverse effects associated with site preparation (clearing, grubbing and stripping) during construction are expected to be prevented and/or mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application

that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The Environmental Work Plans that will be applied through the Environmental Management Program to prevent and/or mitigate potential construction effects include the: Worksite Isolation Environmental Work Plan; Site Preparation Environmental Work Plan; Excavation Environmental Work Plan; Excavated Materials Relocation Environmental Work Plan; Noxious and Nuisance Weed Control Environmental Work Plan; Contaminated Materials Management Environmental Work Plan; and Site Restoration Environmental Work Plan.

The following management practices will be applied through the Environmental Management Program and Environmental Work Plans to prevent or mitigate potential construction effects.

In general:

- Existing vegetation will be retained when/where practicable.
- The extent and duration of soil disturbance will be minimization when/where practicable.
- Standard practices with respect to site preparation, vegetation clearing and site restoration will be adopted.
- The spread of noxious weeds within the project worksites will be monitored and controlled.

Site Preparation, Excavation and Materials Storage

- Vegetation to be retained or vegetation located beyond the designated clearing limits in the Site Preparation Environmental Work Plan will not be disturbed. If vegetation beyond the designated clearing limits is damaged or removed, the disturbed area shall be immediately re-seeded or re-planted to establish appropriate native groundcover and prevent the establishment of noxious weeds.
- Work will be confined within worksites. Boundaries will be set around the perimeter of worksites to isolate them. The locations of Environmental Protection Zones and Restricted Activity Zones have been established within worksites. Site specific requirements have been established for Restricted Activity Zones.
- Material storage sites will be selected with the least significant site being used first (based on plant community, wildlife habitat and wildlife use values), and progressing if needed to the more sensitive sites. Native vegetation found along the margins of all storage sites will be retained and the clearing of trees and shrubs during site preparation will be minimized wherever possible.
- During site preparation grubbing will be minimized and where possible root systems will be left in place as a measure to maintain ground stability and control erosion. Grubbing will only be undertaken where required for excavation purposes.
- Transmission line statutory right-of-way clearing will be scheduled over fall/winter (September to March) to minimize soil disturbance and impacts to listed plants.

Where practical, clearing debris that is generated will be chipped and/or distributed in the statutory right-of-way. Sparse large woody debris will be left as wildlife habitat, and remaining debris requiring disposal will be piled and burned. Burn piles will be established to coincide with planned structure sites (or other disturbed sites such as access trails) to reduce the net area impacted by mineral soil disturbance. Burn pile locations will be stripped to mineral soil, with topsoil reserved for subsequent restoration. Construction trails will be fully deactivated after use. All disturbed areas (e.g., structure sites, burn piles, access roads, etc.) will be re-seeded with appropriate native seed mixes as soon as possible following disturbance.

Listed Plant Species

- Vegetation clearing, stripping and grubbing and associated heavy equipment use will be confined to designated and clearly marked excavation areas to avoid unnecessarily impacting listed plant communities and species.
- Listed plant species will be surveyed, marked and fenced during the flowering season prior to start of construction. Fenced occurrences will be treated as Environmental Protection Zones. Where this is not possible (areas subject to grubbing, stripping, excavation or storage of excavated materials), listed plants will be dug up and transplanted to a nearby suitable and relatively undisturbed location in early fall prior to start of construction. Areas where transplants are attempted will be permanently located, marked, tended for a period of three years to promote/maximize plant survival, and systematically monitored. Success (by plant species, by site and overall) will be reported on at the conclusion of the monitoring.
- Temporary parking (powerhouse and Worksite areas) will not be constructed in proximity to fenced occurrences of listed plant species. If this is not practical due to site congestion then listed plant occurrences will be transplanted.
- Only hand felling will be conducted along sensitive areas of the transmission line statutory right-of-way (sections 1 and 2, which are comprised mainly of grassland and shrubland communities with scattered merchantable trees). In these areas access construction, structure site preparation, and pole setting and conductor stringing will be undertaken from mid-October to mid-April, when plant species are dormant. Rather than constructing new skid trails in these areas, felled trees will be left on site in a manner that eliminates Douglas-fir beetle risk. Restoration activities in these areas will be undertaken in April to minimize disturbance to listed species and address weed concerns early in the growing season.

Noxious Weed Control

- The Noxious Weed Control Environmental Work Plan to control and monitor the spread of spotted knapweed and other invasive species within the project area will be developed in collaboration with other agencies to ensure that it is consistent with other pest management plans and weed management control efforts underway in the Pend d'Oreille Valley.
- In excavated material disposal areas and along access routes weed control measures will be used, as appropriate, to minimize further spread of invasive species. The weed control measures planned involve the use of herbicides but

the use of chemical control will be avoided as much as possible in areas with listed plants and herbicide-free zones will be maintained in riparian areas.

- To minimize weed invasion from existing access roads and trails along the Teck Cominco and BC Hydro statutory right-of-ways, these roads and trails will be treated prior to the onset of access construction or transmission line statutory right-of-way clearing activities. Site-specific methods for control of invasive species that combines mowing, weed whacking, hand-pulling and/or herbicide application (as appropriate to satisfy riparian and biodiversity constraints) will be developed in consultation with other stakeholders including area landowners. Vehicles and heavy equipment will be decontaminated when they are first brought on-site, and then strictly confined to access roads/trails. Equipment with low ground-bearing pressure will be used to minimize the potential for soil disturbance and weed establishment and spread.

Site Restoration

- Stripped surface soils will be stockpiled on the sites from which they are removed and wherever possible subsequently used for the restoration of those sites.
- Once construction activities have concluded, worksites will be re-vegetated to replace and enhance the native grasses and plants cleared during site preparation. (Excavated rock stored on Worksites D1 and D2 will be used in future by the Ministry of Transportation, and will not be re-vegetated. Worksites J and L will be restored and re-vegetated to their current condition, and Worksite K will be replanted following project demobilization.)
- Reseeding will be undertaken as soon as practicable (and within one growing season of construction completion) to achieve a stable plant community. The selection of seed mixes and native plant species will be based on their known suitability to the site-specific growing conditions and suitability to provide forage and cover for prevalent wildlife species. Disturbed areas adjacent to the powerplant, tailrace and intake excavation footprint (other than exposed rock and areas that will be paved) will be stabilized and re-seeded with a suitable native species seed mix as soon as possible after soil disturbance.
- The success of the re-vegetation program will be monitored annually, with replanting as necessary to satisfy site-specific target densities of tree/shrub species and percent herbaceous ground cover.
- Site-specific weed control measures will be implemented as necessary in accordance with the Noxious Weed Control Environmental Work Plan to minimize weed invasion in newly re-seeded and re-planted areas.
- Restoration activities in site sensitive areas of the transmission line statutory right-of-way (sections 1 and 2) will be undertaken in April to address weed concerns early in the growing season.
- In regards to contaminated soils and sediments (see Part C, Section 3 – Geology and Soils, and Section 7 – Water Quality), given the uncertainty with respect to the chemical composition of stockpiled/fill material, re-vegetation duration and success (powerplant, intake and tailrace areas and associated worksites) will be monitored to determine prescription effectiveness and make any necessary adjustments, using an adaptive management approach.

Operations

The following management practices will be applied to prevent and/or mitigate potential operational effects.

Powerplant – Site Environmental Management

A plan will be developed to address and manage project lands around the powerplant, which will include:

- Vegetation management requirements (including weed control) and restrictions.
- A rare plant species inventory and special management requirements for rare plant communities including a periodic inventory update, marking or other protective measures, and special management practices that may be recommended to promote propagation.

Transmission Line – Vegetation Management

Vegetation management requirements will be developed to manage vegetation on the Transmission Line statutory right-of-way and maintain minimum clearance limits to the conductor in a manner that minimizes adverse environmental impact. The requirements will promote the maintenance and/or development of a low shrub layer that minimizes the amount of tall growing vegetation and invasive weeds requiring control.

An inventory of listed species of plants that exist on the statutory right-of-way prior to construction will be maintained. This inventory will be updated on a regular basis, initially every five years. The inventory will be limited to the first (west) 2.5 kilometres of the statutory right-of-way unless the initial survey identifies listed species of plants on other sections of the statutory right-of-way.

The vegetation management requirements will include the following:

- Rare plant species or community occurrences to be marked on the ground prior to the start of vegetation management activities. These areas will be protected and any herbicide use in the vicinity is to be done in such a way that the rare plant species or communities are not impacted. Slashing of selected tall vegetation will be done if required.
- Vegetation management activities in the electrical clearance zone will focus on tall growing species (likely to grow within clearance limits for the conductor) that will present a danger to line security within the next scheduled maintenance cycle. Disturbance to the shrub layer will be minimized.
- Only those trees in the Tree Management Zone that pose a threat to worker safety or line security prior to the next scheduled maintenance period will be removed.
- No herbicides will be used within riparian zones or in a manner that could affect marked listed plant species locations.
- Control of the establishment and spread of invasive weeds is to be considered a priority. Annual inspections will be conducted during the first five years of sites disturbed by line construction and remedial activities taken as required to establish appropriate ground cover and to control weeds.

- Work will be undertaken with the adjacent transmission line owner and other interested parties in regional weed control programs.

4.4 Significance of Residual Effects and Conclusions

The impact analyses for the Project identified that the following residual impacts to vegetation will result from project construction activities:

1. Loss of listed plant species and rare plant community occurrences resulting from powerhouse construction (i.e. intake excavation, contaminated sediment management and storage of excavated material);
2. Loss and conversion of forest and shrub-dominated plant communities resulting from transmission line construction (i.e. access trail construction and statutory right-of-way clearing); and,
3. Establishment and encroachment of invasive weeds on sites disturbed by construction activity, despite best efforts at weed control activities, and their effects on listed plant species.

To compensate for the loss of listed plant occurrences in project worksites where disturbance is unavoidable, the Proponent will establish a program to remove listed plants from areas of unavoidable disturbance (based on the final project design) and transplant them to a nearby suitable location (see Section 4.3 – Proposed Mitigation).

Approximately 76 hectares of land will be permanently changed by the Project, primarily as a result of the transmission line and the removal or conversion of forest attributes. Some of these areas have been subject to previous disturbance. Although most of the construction activities will be conducted in a manner designed to mitigate effects, some residual impacts on rare plant communities and listed plants will remain. The overall magnitude of these residual construction effects is assessed to be of Moderate significance.

To control noxious weeds, the Proponent will participate with other stakeholders in funding cooperative weed control initiatives in areas potentially impacted by project facilities.

As compensation for these non-mitigatable terrestrial effects, the Proponent will commit to provide $50,000 per year over seven years (to a total of $350,000) for a terrestrial compensation program. The funding will become available upon commencement of construction and may be spent in variable annual amounts. The seven-year funding period reflects the Project's expected 3.5-year construction period and an equivalent 3.5-year post-construction period. Activities are to be negotiated with regional Ministry of Environment staff, and could include participation in listed plant community and species inventory initiatives to be undertaken within the very dry, warm variant Interior Cedar-Hemlock subzone of the West Kootenay. Information gathered would be provided to the BC Conservation Data Centre to augment their existing database for this ecosystem type.

A long-term net positive residual impact of Moderate significance is anticipated on upstream plant communities from operation of the powerplant and the reduced magnitude and frequency of water level fluctuations in upstream areas.

Conclusions

The Ministry of Forests and Range concluded that the Project would have negligible effects on the forested/timber land base and noted that no Old Growth Management Areas would be affected.

The Ministry of Environment, Environmental Stewardship Division, is supportive of the Proponent's mitigative measures and compensation commitments, and considered the issues it raised to be satisfactorily addressed.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse environmental effects in regards to vegetation.

5. WILDLIFE AND WILDLIFE HABITAT

The project area supports approximately 203 vertebrate wildlife species (5 amphibian, 7 reptile, 45 mammal and 146 bird species). The area supports or likely supports 13 species which are listed provincially or under the *Species at Risk Act* as species at risk (Table 1).

Table 1 – Listed Wildlife Species in the Project Area

Species	BC Status*	*Species at Risk Act* **
Western Toad	Yellow-listed	1 - SC
Coeur d'Alene Salamander	Blue-listed	1 - SC
Western Skink	Blue-listed	1 - SC

Species	BC Status*	*Species at Risk Act* **
Rubber Boa	Yellow-listed	1 - SC
Racer	Blue-listed	SC
Townsend's Big-eared Bat	Blue-listed	
Grizzly Bear	Blue-listed	3 - SC
Wolverine	Blue-listed	SC
American Badger	Red-listed	1 - E
Western Grebe	Red-listed	
Great Blue Heron	Blue-listed	
Lewis's Woodpecker	Red -listed	1 - SC
Yellow-breasted Chat	Red-listed	1 - E

*red-listed = extirpated, endangered or threatened; blue-listed = of special concern; yellow-listed = not at risk
** 1 = Schedule 1 species that are legally protected; E = Endangered; SC = Special Concern

Western toads are uncommon in the primary study area. Shallow water margins of the Seven Mile and Waneta reservoirs provide suitable breeding habitat and uplands with dense vegetation cover and an abundance of invertebrates would likely be used.

Coeur d'Alene salamanders have been confirmed breeding upstream of the Seven Mile Dam and are closely associated with riparian forest habitat, especially waterfall splash zones and wet seeps with moss and rock fissures. This habitat type is limited in the project area, but some potential does occur on the south side of the reservoir, below the Waneta Dam. Mossy seeps, wet pools and splash zones with rock fissures found here were searched, however no salamanders were detected.

Western skinks were recorded in the primary study area and detections provide evidence for a local breeding population, and there is some potential for habitat impacts and direct disturbance. Most sightings were in the powerhouse area, or within 100 metres of either the BC Hydro transmission corridor statutory right-of-way, or the Teck Cominco statutory right-of-way, east of the Seven Mile Road. Both of the latter areas are subject to cattle grazing. Skinks were not found on portions of the power line access roads with dense spotted knapweed cover. Skinks were also found adjacent to Worksites F and L.

Rubber boas were found along the western portion of the transmission corridor and they have also been recorded along the Teck Cominco statutory right-of-way. Sightings imply the presence of a breeding population. Rubber boas are occasionally killed on roads within the study area.

Racers were detected in the primary study area close to the transmission line corridor, both above and below the Seven Mile Road. Active dens have been found near Four Mile and Beaver Creeks. Suitable habitat is widespread along the transmission line route. Racers are occasionally killed on roads in the study area.

Townsend's big-eared bats are known to roost locally. Rocky outcrops and cliff areas along the Waneta and Seven Mile reservoirs provide potential habitat for this species. Big-eared bats feed mainly on moths; moth production along the Columbia River in the vicinity of the study area is high in late spring and could represent an important local food source for bat (and bird) species.

Grizzly bears are very uncommon but occasionally sighted in the Pend d'Oreille Valley. This species tends to den at high elevations and is unlikely to overwinter within the primary study area. Overall, grizzly bears are wide-ranging and the project area would represent only a part of a year-round home range.

Wolverines have historically been recorded in the Pend d'Oreille valley (3 trapline harvest records between 1962 and 1987) but these animals are typically found in rugged mountainous areas within alpine tundra and sub-alpine forests. Therefore, wolverines are unlikely to make significant use of lower elevation disposal, powerplant or transmission corridor areas.

American badgers have historically been recorded/observed in the Pend d'Oreille valley (1 trapline harvest record in 1957, and sightings in the late 1980's to early 1990's). Two large dens potentially used by badgers were found during project field surveys but neither appeared to be recently active. Badgers require friable soil and an abundance of suitable prey (i.e. Columbia ground squirrel, northern pocket gopher). Based on available information, these habitat conditions are found at lower elevations in the valley. Badgers tend to avoid areas of high human use and the powerplant and proposed disposal areas have low habitat suitability due to persistent human disturbance. The probability of this species being present in the study area is very low and no direct impacts are expected; only to potential future recovery habitat if re-introductions were ever undertaken.

Western grebes are fish-eating birds that breed colonially in stands of emergent vegetation along the shallow margins of medium to large-sized freshwater lakes. The project area does not provide suitable breeding habitat for this species. Western Grebes were observed upstream of the Waneta Dam, and the Seven Mile and Waneta reservoirs appear to be used primarily for staging during migration.

Great blue herons appear to forage regularly in the project area and may be breeding nearby. Based on observations in the Arrow Forest District, this species occurs locally year-round. Herons are quite sensitive to disturbance, shoreline development and recreational activity. They forage in shallow water along the banks of lakes, slow-moving rivers and wetlands where they feed mainly on small fish. Shallow water feeding areas are limited in the project area, but there is some suitable foraging habitat.

Lewis's woodpeckers (at least three) were consistently observed foraging in the open grassland areas at Worksite A during May and June of 2004. At least one pair was confirmed nesting at this site, but the nest failed when both European Starlings and a Northern Flicker were observed active at this site. Competition for nest cavities with European Starlings has been identified as a potential limiting factor for this species. They did not re-occupy the site in 2005 or 2006. The abundance of open foraging habitat and scattered ponderosa pine and Douglas-fir snags in the project area provides suitable breeding and feeding habitat for this species, and it has nested nearby at Beaver Creek in past years.

Yellow-breasted chats were thought to breed only in the Okanagan and Similkameen Valleys of BC. In May of 2004, this species was confirmed nesting on the Teck Cominco L71 transmission line statutory right-of-way (approximately 225 metres west of the Seven Mile Road). Two males were first detected singing and a female was confirmed incubating at a nest, after which time the nest was either predated or abandoned and no additional nests were found in the area. This was the only site where they were detected in 2004. Three chat territories including one successful nest were confirmed within the project area in 2005. Chats are migratory in BC and are present on their breeding grounds only from mid-May to early August. Any activity that results in the loss, reduction or fragmentation of dense shrubby areas (e.g. agricultural development, transportation and utility infrastructure development and maintenance activities, livestock grazing, and logging) can be detrimental to chats. Impacts may be direct, due to disturbance or mortality during the breeding season, or indirect as a result of habitat loss, reduced habitat suitability, and increased susceptibility to nest predation or brown-headed cowbird parasitism.

Of the above, the Project is most likely to affect the following species listed under the *Species at Risk Act*: western skink, racer, rubber boa, Lewis's woodpecker, and yellow-breasted chat.

The project area also supports approximately 80 species of butterfly of which 7 or more are listed provincially.

The project area has high habitat value and diversity, including:

- a regionally significant ungulate winter range supporting whitetail deer, mule deer, rocky mountain elk and moose populations;
- a diversity of forest and shrubland breeding habitats important for bats, migratory songbirds and raptors;
- riparian areas (e.g. reservoir, river, streams, wetlands, mudflats, gravel bars) used by a variety of wildlife species;
- rocky habitats (e.g. outcrops, talus and cliffs) and eroding banks important for reptiles; and,
- wildlife trees of high value used by a diversity of cavity nesters and other wildlife tree-dependent species.

5.1 Potential Project Effects

The Project is located in an area that is already occupied by industrial facilities and transportation infrastructure. As a result, a relatively small amount of clearing is required for powerplant construction. The largest portion of required clearing is associated with the construction of the transmission line.

The environmental issue scoping and effects assessment for the Project identified that the following project components/phases could potentially have adverse effects on wildlife and/or wildlife habitat: contaminated sediment management; construction traffic; parking; surface excavation; intake approach excavation and intake rock plug removal; tailrace channel excavation and rock plug removal; excavated materials transport and storage; aggregate processing and concrete batch plant; other powerplant temporary facilities; transmission line access roads; transmission line statutory right-of-way

clearing; transmission line stream crossings; transmission line temporary facilities; transmission line construction and installation; worker facilities and use; decommissioning of powerplant temporary areas; decommissioning of transmission line temporary areas.

The potential effects on wildlife and wildlife habitat include the following:

Construction Traffic

- Loss and/or alteration of wildlife habitat from vegetation clearing and management.
- Increase in wildlife disturbance and effects on wildlife movement patterns from higher traffic volumes and temporary fencing.
- Increase in incidents of wildlife-vehicle collisions and roadkill mortality (ungulates would be at higher risk during winter months; reptiles, small mammals, birds and insects would be more susceptible during spring, summer and fall; reptiles and amphibians are relatively slow moving and bask on road surfaces and listed species such as racer, rubber boa, and western skink are vulnerable to roadkill).

Contaminated Sediment Management

- Sediment removal from the Waneta forebay and its deposition at Worksite F will result in displacement and increased mortality to wildlife species such as racer, rubber boa, and western skink.
- The habitat suitability of 1.7 hectares of mixed grassland and shrubland will be affected.

Powerplant and Facilities Construction

- Loss of forest, shrubland and grassland habitat.
- Temporary disturbance, permanent displacement and risk of mortality to wildlife including listed species.
- Loss of approximately 9.8 hectares of low elevation mixed grassland, shrubland and forest habitat in the powerplant area.
- Loss of specific habitat attributes currently used for nesting, denning, roosting, foraging, bedding and overwintering.
- Loss of an existing wildlife movement corridor, access to water and existing low velocity shallow water habitat in the forebay.
- Reduced habitat suitability of adjacent areas due to disturbance and potential noxious weed encroachment and spread.

Transmission Line Construction

- Loss and alteration of existing forest and shrubland habitat in a 25 hectare area due to clearing.
- Risk of increased spread of noxious weeds.
- Disturbance, displacement and increased risk of mortality for wildlife including listed species.
- Disruption of movement and flight paths.

- Permanent conversion of approximately 25.6 hectares into early seral edge habitat.
- Loss of additional wildlife tree habitat in a 30 hectare Tree Management Zone.
- Reduced suitability of winter range and forest interior habitat due to clearing.
- Removal and depletion of mature forest attributes currently used for nesting, denning, roosting, foraging, perching, bedding and overwintering.
- Reduced habitat suitability due to soil disturbance, compaction and noxious weed invasion and spread.

Powerplant and Transmission Line Operation

- An estimated loss of less than one hectare of riparian habitat downstream of the powerplant from the general increase in the frequency and magnitude of downstream flow fluctuations.
- Disturbance, displacement and risk of mortality to wildlife including listed species during transmission line maintenance from flyover and ground-based inspections, and/or removal of nesting, roosting, denning, feeding or perching habitat attributes.
- Potential bird/bat collisions with power lines and towers.
- Habitat simplification and decreased suitability due to changes in vegetation structure, density, composition, and removal of habitat attributes (e.g. large trees, snags and tall shrubs).

Potential adverse effects on wildlife and wildlife habitat that may result from accidents or malfunctions during construction or operations, involving vehicle/wildlife collisions, human/wildlife encounters, excessive disturbance of wildlife, adverse effects of blasting, fire, and leak or spill of hazardous material are discussed in Part E, Section 3 – Environmental Effects of Accidents and Malfunctions.

The flow-through of Boundary Dam releases during operation of the powerplant (see Part C, Section 6 – Hydrology) will have secondary positive effects on terrestrial habitat and resources.

A substantial reduction in the frequency and magnitude of water level fluctuations in the Seven Mile Reservoir and to a lesser extent in Waneta headpond will decrease the extent of littoral area exposure and promote greater primary and secondary productivity upstream. Wildlife habitats such as shallow water littoral zones, mudflats and eroded banks will be more productive and less prone to erosion. Shoreline trees representing valuable habitats for nesting, roosting and perching will be less susceptible to erosion or instability.

Increased water level stability will provide significant benefits to wildlife that breed and/or over-winter in or adjacent to reservoirs. There will be a substantial increase (i.e., approximately 37 times the less than one hectare lost in the tailrace area of Waneta Dam) in the net wetted area within the Seven Mile Reservoir terrestrial drawdown zone. Riparian wildlife species that forage on aquatic vegetation, invertebrates or fish in shallow water along the reservoir margins will experience an increase in foraging habitat availability and suitability. Reduced fluctuations will increase winter ice stability and ungulates may experience a reduced risk of mortality or injury associated with breaking through ice.

The general increase in the frequency and magnitude of downstream flow fluctuations will result in an estimated loss of less than one hectare of riparian habitat downstream. It will also lower benthic productivity and riparian habitat suitability for fish and wildlife foraging in downstream areas. A minor increase in fish stranding may also occur, which will benefit those species that scavenge on stranded fish. Any changes to fish populations in reservoir, headpond and downstream areas, and hence to food supplies for piscivorous wildlife, will vary by fish species and life history. Most fish-eating wildlife species are opportunistic foragers that feed on both coarse and sport fish and exhibit prey switching as prey availability changes. For this reason, minor shifts in prey availability resulting from altered productivity, entrainment rates, and subtle changes to fish species composition are unlikely to have significant impacts on this wildlife guild.

5.2 Issues Raised and Proponent Responses

Issues raised during the environmental assessment review concerning potential adverse effects of the Project on wildlife and wildlife habitat are documented in Appendix 3 – Issues Raised and Proponent's Responses. The most significant or key issues were:

1. *Gaps in the assessments conducted where the transmission line route crosses private lands.*

   Proponent Response: See Part C, Section 4 – Vegetation, and Subsection 4.2 – Issues Raised and Proponent Responses.

2. *Increased spread/invasion of noxious weeds.*

   Proponent Response: See Part C, Section 4 – Vegetation, and Subsection 4.2 – Issues Raised and Proponent Responses, and Subsection 4.3 – Proposed Mitigation.

3. *Proliferation of power lines and associated increased access in the Pend d'Oreille valley.*

   Proponent Response: See Part C, Section 4 – Vegetation, and Subsection 4.2 – Issues Raised and Proponent Responses.

4. *The Project will exacerbate the rate of removal of mature Douglas-fir forest on crown and private lands in the Pend d'Oreille Valley.*

   Proponent Response: See Part C, Section 4 – Vegetation, and Subsection 4.2 – Issues Raised and Proponent Responses.

5. *Mitigation and monitoring for listed wildlife species, including the western skink, racer, rubber boa, western toad, and yellow-breasted chat.*

   Proponent Response: Right-of-way clearing for the transmission line, access trail construction and structure placement, and major operation and maintenance activities are scheduled to avoid any disturbance to breeding chats. Clearing of vegetation in chat-occupied and suitable habitat will be minimized where technically and reasonably practical. Powerhouse construction activities are not expected to interfere with chat breeding activity. Annual surveys for chat breeding activity will be

continued over the first few years of operation (monitoring will take place for a minimum of five years after construction of the transmission line). Fencing will be used to exclude cattle from Proponent-owned lands having chat-suitable habitat. Racers, rubber boa and western skink are found scattered throughout the project area. Western toads were not found during project inventories, but a few records exist for the valley. No snake dens were found during project surveys. Snake den surveys will be conducted in the year proceeding construction. Western skinks will be relocated from project worksites where impacts on skink habitat are unavoidable, and follow-up monitoring undertaken to evaluate the success of relocations. Roadkill monitoring data gathered in 2006 indicated some roadkill mortality of racer (4) and western toad (1). Roadkill will be monitored prior to and during construction. If monitoring reveals high levels of roadkill from project-related traffic agencies will be consulted about mitigation measures. Post-construction traffic will not be significantly greater than currently exists, there will not be any new permanent roads, and post-construction monitoring is not required.

5.3 Proposed Mitigation

Construction

During the planning and design stage, potential adverse construction effects have been avoided or mitigated by:

- Locating the new powerhouse and intake structures close to those of the existing Waneta generating facility, which serves to minimize the construction footprint and keep much of the construction within the existing, previously disturbed powerplant site.
- Selecting the preferred transmission route contiguous with BC Hydro's 5L98 Line to Selkirk will serve to reduce required land clearing (incremental clearing) and to minimize impacts of a separate transmission route.
- Utilizing to the extent possible existing gravel pits and previously disturbed areas for the storage of excavation material will minimize the land-based disturbance resulting from the Project.

Potential adverse effects associated with construction activities are expected to be prevented or mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The Environmental Work Plans that will be applied through the Environmental Management Program to prevent and/or mitigate potential construction effects include the: Worksite Isolation Environmental Work Plan; Site Preparation Environmental Work Plan; Excavation Environmental Work Plan; Excavated Materials Relocation Environmental Work Plan; Noxious and Nuisance Weed Control Environmental Work Plan; Contaminated Materials Management Environmental Work Plan; and, Site Restoration Environmental Work Plan.

The following management practices will be applied through the Environmental Management Program and Environmental Work Plans to prevent and/or mitigate potential construction effects (also see Part C, Section 4 – Vegetation, and Subsection 4.3 – Proposed Mitigation).

In general:

- Clearing will be minimized and undertaken only where required to facilitate construction. Existing vegetation will be retained when/where practicable.
- The extent and duration of ground/soil disturbance will be minimized when/where practicable in all clearing operations, and be avoided to the greatest reasonable extent in Restricted Activity Zones and in all riparian areas.
- Standard practices with respect to site preparation, vegetation clearing and site restoration will be adopted.
- Except as required to satisfy Restricted Activity Zone limitations and restrictions, clearing will not be undertaken during the bird nesting season.
- The spread of noxious weeds within the project worksites will be monitored and controlled.

Construction Traffic

- Carpooling will be promoted and an off-site park and ride facility considered to reduce vehicle traffic.
- A speed limit reduction will be implemented and the need for driver awareness and caution promoted.
- Unnecessary congestion will be avoided near any confirmed dens of listed reptiles and amphibians during their active period.
- Roadkill will be monitored prior to and during construction to determine potential project-related roadkill, with emphasis on listed reptiles and amphibians. Site specific mitigation will be designed if project-related roadkill is identified.

Contaminated Sediment Management

- Worksite F will be re-seeded and re-planted with native plant species, monitored for re-vegetation success, and noxious weed control measures implemented as necessary.
- Reptile and amphibian activity will be monitored in work areas from mid-April to mid-October, and, if necessary, listed reptiles and amphibians will be collected and relocated to suitable areas.
- Ongoing monitoring and investigation will be conducted to evaluate the effectiveness of any western skink relocations from Worksite F and the powerplant worksite.
- Drift fencing or other measures will be used along the perimeter of work areas if problem access of small wildlife is detected.

Powerplant and Facilities Construction

- Worksite boundaries will be established to exclude habitat features of significance.

- Environmental Protection Zones have been identified to protect wildlife, including listed species, and important attributes that provide cover, residual habitat and movement corridors.
- Restricted Activity Zones have been identified that will limit the nature and timing of acceptable work activities to minimize impacts on wildlife, including listed species, and habitat features.
- Lewis's woodpecker and yellow-breasted chat activity will be monitored to avoid any active breeding sites.
- Disturbed areas will be stabilized, enhanced with topsoil and re-seeded and re-planted with native plant species. Noxious weed control measures will be undertaken in cooperation with other area stakeholders.
- In any problem locations, drift fences will be constructed along the perimeter of excavation areas, and if necessary, listed reptiles and amphibians will be collected and relocated to suitable areas. Ongoing monitoring and investigation will be conducted to evaluate the effectiveness of any western skink relocations from Worksite F and the powerplant worksite.
- To replace lost habitat attributes, wildlife trees will be created, large coarse woody debris and rocks/boulders scattered on site, and bird nest and bat boxes erected.

Transmission Line Construction

- Noxious weeds on roads/trails will be treated before construction or statutory right-of-way clearing. Equipment will be decontaminated and restricted to access roads. Noxious weeds will be monitored and site-specific control methods implemented as necessary.
- Yellow-breasted chat activity will be monitored; territories and habitats with high suitability mapped; new access trails, pullouts and structure sites delineated to avoid breeding habitat; and, the density and structure of existing shrublands retained.
- Harvested trees will be limbed and the limbs spread in the statutory right-of-way as short term browse for ungulates.
- The boundaries of riparian management areas will be flagged and felling/clearing restricted to a minimum. Trails will be avoided near streambeds; surface drainage patterns maintained; logs will not be skidded/yarded across streams; trees will be felled away from streams; and woody debris in streams left undisturbed.
- Dead standing trees will be maintained wherever possible. Hazard trees that can be safely topped and have value as wildlife trees shall be topped so as to retain as much of their residual height as safely possible. On a site-specific basis, the density and distribution of wildlife trees that will remain upon completion of construction will be determined. New wildlife trees will be created within the new Tree Management Zone to mitigate for losses along the corridor and access trails.
- Pole setting and conductor stringing will be conducted from mid-October to mid-April. Treated poles, refuelling containers and explosives will be appropriately covered, contained and stored.
- Re-seeding and re-planting will be conducted within one growing season of construction completion and monitored for success. Seed mixes and native

plants will be selected based on site-specific growing conditions and suitability for wildlife forage/cover.

Operations

The following management practices will be applied to prevent and/or mitigate potential operational effects (also see Part C, Section 4 – Vegetation, and Subsection 4.3 – Proposed Mitigation).

Powerplant – Site Environmental Management

A plan will be developed to address and manage project lands around the powerplant, which will include:

- Wildlife issues and management requirements to keep wildlife away from dangerous areas, such as the intake, and special management practices to protect listed species and their habitats on Proponent lands. An inventory of listed species found on project lands will be conducted in Years 1, 3 and 5 after commencement of operation, and thereafter at 5-year intervals.
- General housekeeping requirements to discourage nuisance wildlife.

Transmission Line – Vegetation Management

Routine ground-based inspection and maintenance will be scheduled to avoid unsuitable conditions. Scheduling will be coordinated with other line owner/operators to minimize the frequency of statutory right-of-way visits and disturbance.

Vegetation management requirements will be developed to manage vegetation on the Transmission Line statutory right-of-way. The vegetation management requirements will include the following:

- Whenever possible, low-growing vegetation will be retained, hazard trees will be topped rather than felled, and wildlife trees along the corridor assessed as safe retained.
- Non-essential vegetation management activities likely to disrupt bird nesting will not be permitted between April 15 and August 15.
- Annual breeding surveys for yellow-breasted chat will be conducted for a minimum of five years after construction of the transmission line. Maintenance activities will not be conducted in chat breeding habitat between late April and early August.
- Restrictions will be applied on the first 3 kilometres to protect yellow-breasted chat habitat. Existing shrub density and structure will be maintained, and cattle excluded.

Transmission Line – Pole Replacement and Disposal

After several decades individual treated wood poles that have reached the end of their useful life will be identified during routine transmission line maintenance and will be replaced. The wood pole disposal practices will be reviewed to verify that they conform

to standard industry practices of the day and to Environment Canada guidelines for the disposal of industrial treated wood.

Species at Risk Act Listed Species

The Project is most likely to affect the following 5 species listed under the *Species at Risk Act*.

Western Skink

To minimize potential impacts, the scheduling of transmission line access road construction and transmission line statutory right-of-way clearing is confined to periods when skinks are inactive.

Within areas subject to excavation or fill deposition (i.e. powerhouse areas and at Worksite F) where impacts on skink habitat are unavoidable, an environmental monitor will be required to monitor for reptiles and amphibians, and to collect and/or shepherd away individuals and move them to suitable habitat outside the footprint of fenced work areas. The Proponent will undertake ongoing monitoring and investigation, which will begin prior to mobilization, to evaluate the effectiveness of skink relocations from Worksite F and the powerplant worksite. The Proponent will consult with, and seek the agreement of Environment Canada and the Ministry of Environment regarding appropriate monitoring objectives and methods for this initiative during the work plan development phase.

To quantify roadkill mortality and identify potential problem areas where additional mitigation measures may be necessary, roadkill mortality will be systematically monitored within the project area. Roadkill surveys will be conducted annually prior to and during construction. As such, an index of listed species roadkill mortality during construction will be tracked on a monthly basis and compared to the monthly levels during the pre-construction phase. If listed species roadkills exceed a doubling of pre-construction values, the Proponent will initiate consultation with the appropriate agencies to develop and implement effective mitigation in a timely manner. If the increase could clearly be attributed to increased traffic associated with the Project, the Proponent has committed to covering reasonable costs associated with developing and implementing mitigation measures. The Proponent will also strive to minimize incremental increases in roadkill mortality by promoting awareness of listed species and the need for driver caution, and encouraging workers to carpool. Post-construction, other non-project related factors will influence traffic volume and roadkill rates to a much greater degree than the Project possibly could. This is based on workforce projections for maintenance and operation of the essentially unmanned facility.

Racer and Rubber Boa

During surveys conducted for snakes, features suitable for snake denning were noted as being relatively abundant in the project area but no active snake dens were confirmed. Given the terrain (dry, sandy and rocky soils with abundant rock outcrops, cracks and fissures) that covers substantial portions of the project area, it would be difficult to comprehensively survey all sites. The Proponent committed to conducting further snake den surveys in the year proceeding construction, focusing specifically on portions of the

primary study area with high den potential, based on previous reptile and amphibian surveys.

Within areas subject to excavation or fill deposition (i.e. powerhouse areas and at Worksite F), an environmental monitor will be required to monitor for reptiles and amphibians, and to collect and/or shepherd away individuals and move them to suitable habitat outside the footprint of fenced work areas.

Listed species roadkill mortality is discussed under western skink, above.

Lewis's Woodpecker

Lewis's woodpecker is known to breed at Worksite A, however, they did not re-occupy the site in 2005 or 2006. Impacts on Lewis's woodpeckers and their habitat are dependent on their likelihood to reoccupy site A3 for breeding, the magnitude and physical extent of impacts to their habitat, and their sensitivity to construction disturbance.

If monitoring at Worksite A3 indicates that Lewis's woodpeckers return to this nesting area and subsequently abandon it due to disturbance, another potentially suitable nearby breeding site will be identified and enhanced to provide habitat similar to that in the disturbed area. Monitoring of the use of Worksite A3 and any nearby enhanced site by Lewis's woodpecker will be conducted either until use is documented or for a maximum of three years post-construction during which time further efforts to improve the suitability of the habitats may be undertaken.

Yellow-Breasted Chat

Statutory right-of-way clearing for the transmission line is scheduled from November to March in areas of the corridor where chat activity is known or likely based on habitat suitability. Transmission line access trail construction and structure site placement are scheduled from mid-October to mid-April on sections 1 and 2 of the transmission line corridor, to avoid any disturbance to breeding chats.

Powerhouse construction activities are not expected to interfere with chat breeding activity, given that chats have not been documented in this area and suitable habitat is lacking.

As long as use of access roads adjacent to breeding areas is avoided during the chat breeding period, no incremental direct disturbance impacts to chats are expected. Major operation and maintenance activities are scheduled to exclude the period from late April to mid-August. To minimize direct disturbance impacts to chats, work scheduling for major activities will be extended to exclude the period from end of April to end of August.

The Proponent has initiated and is committed to undertaking chat breeding activity and reproductive success surveys annually within the project area prior to and during construction. Occupied and highly suitable breeding habitats will be mapped and new access trails, pullouts, structure sites and new infrastructure will be delineated to avoid known or highly suitable chat breeding habitat to the greatest possible extent. Annual surveys for chat breeding activity and reproductive success will be continued over the first few years of operation to further identify chat breeding activity. The results will be

evaluated to identify effectiveness of chat protection measures. To achieve this end, it is expected that monitoring will continue through at least one vegetation management cycle.

The Proponent will attempt to retain a target of 10 trees measuring ≥3 metres height per acre within portions of the electrical clearance zone that are currently known or suitable as chat breeding habitat. Where this is not possible due to line clearances and/or a lack of existing trees of appropriate spacing, emphasis will be placed on the retention and supplementary planting of endemic low-growing shrubs (i.e., shrub species such as oceanspray, Saskatoon berry, snowberry, mallow ninebark, rose species., etc.) that are abundant in occupied chat territories at Waneta. Chat habitat projects will be a priority for the terrestrial compensation program and the Proponent would be pleased to work with Environment Canada to identify acceptable projects.

The Proponent has committed to excluding cattle from Waneta Expansion Power Corporation-owned lands having chat-suitable habitat. This will require fencing, and hence will permit year-round exclusion of cattle from these lands. Dealing with cattle use of other lands in concert with the respective landowners will be considered as part of the terrestrial compensation program.

The Proponent commits to minimizing the necessary clearing of vegetation in chat-occupied and suitable habitat along the transmission line through strategic corridor alignment, tower placement and increasing tower height where this is technically and reasonably practical. There is, however, one point along the existing BC Hydro 5L98 transmission line where the new line will have to cross under the existing line. This junction point is in the vicinity of the 2005 and 2006 chat "Highliner" territory. Using site specific information on chat habitat use, the Proponent will attempt to optimize the crossing point and alignment in order to minimize chat habitat impacts in this area. The Proponent also commits to restoring any impacted areas in suitable chat habitat by planting supplemental low-growing shrubs. As mentioned above, chat habitat projects will also be a priority for the terrestrial compensation program.

5.4 Significance of Residual Effects and Conclusions

The impact analyses for the Project identified that the following residual impacts to wildlife and wildlife habitat will result from project construction activities (also see Part C, Section 4 – Vegetation, and Subsection 4.4 – Significance of Residual Effects and Conclusions):

1. Increased disturbance and potential mortality of wildlife and listed species (disturbance – western skink, racer, rubber boa, Lewis's woodpecker, and yellow-breasted chat; potential mortality – western skink, racer, rubber boa) associated with construction activities and increased vehicle traffic in project areas;
2. Loss of wildlife habitats and associated impacts to wildlife and listed species (western skink, and Lewis's woodpecker) resulting from powerhouse construction (i.e., intake excavation, contaminated sediment management and storage of excavated material); and,
3. Loss and conversion of forest and shrub-dominated wildlife habitats, and associated impacts to wildlife and listed species (western skink, racer, rubber

boa, and yellow-breasted chat) resulting from transmission line construction (i.e., access trail construction and statutory right-of-way clearing).

To quantify roadkill mortality and identify potential problem areas where additional mitigation measures may be necessary, roadkill mortality will be systematically monitored within the project area prior to and during construction. Such monitoring will consider all wildlife but place special emphasis on listed reptiles and amphibians. If roadkill monitoring data indicate that project-related traffic may be a significant factor and that mitigative or compensation actions are warranted, then the Proponent will offer to cost share initiatives with relevant provincial agencies. All monitoring data gathered will be provided to the BC Conservation Data Centre to augment their database for listed reptiles and amphibians.

Approximately 76 hectares of land will be permanently changed by the Project, primarily as a result of the transmission line and the removal or conversion of forest attributes. Some of these areas have been subject to previous disturbance. Although most of the construction activities will be conducted in a manner designed to mitigate effects, some residual impacts on wildlife and wildlife habitat will remain. The overall magnitude of these residual construction effects is assessed to be of Moderate significance.

As compensation for these non-mitigatable terrestrial effects, the Proponent will commit to provide $50,000 per year over 7 years (to a total of $350,000) for a terrestrial compensation program. The funding will become available upon commencement of construction and may be spent in variable annual amounts. The 7-year funding period reflects the Project's expected 3.5-year construction period and an equivalent 3.5-year post-construction period. Activities are to be agreed to by the regional Ministry of Environment staff and could include:

- Participation in local recovery planning and initiatives for listed animal species impacted by the Project. This may include annual surveys for yellow-breasted chat breeding activity and reproductive success within the terrestrial study area prior to, during and post-construction.
- Participate in a wildlife tree creation project to create additional valuable wildlife trees over and above those provided as mitigation for transmission line construction.
- Enhancement of terrestrial habitats at or near the development site. The funded activities would attempt to reflect the extent to which different habitat types, attributes and dependent wildlife guilds are likely to be affected by the Project.
- Habitat protection through land acquisition or other means of conservation of valuable habitat.

A long-term net positive residual impact of Moderate significance is anticipated on upstream wildlife habitats, wildlife and listed species from operation of the powerplant and the reduced magnitude and frequency of water level fluctuations in upstream areas.

Conclusions

The Ministry of Forests and Range concluded that the Project would have negligible effects on the forested/timber land base and noted that no Old Growth Management Areas would be affected.

The Ministry of Environment, Environmental Stewardship Division, is supportive of the Proponent's mitigative measures and compensation commitments, and considered the issues it raised to be satisfactorily addressed.

Environment Canada is satisfied with the Proponent's mitigative and monitoring measures related to wildlife species listed under the *Species at Risk Act*.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to cause significant adverse environmental effects in regards to wildlife and wildlife habitat.

6. HYDROLOGY

Flow Regulation in the Columbia Basin

In Canada and the U.S. there has been extensive flood control and hydroelectric development on the Columbia River system that provide significant flow regulation, including on the mainstem Columbia River, Kootenay River, and Pend d'Oreille River. One of the few remaining flowing sections of the Columbia River is from Hugh L. Keenleyside Dam downstream to Lake Roosevelt. The distance from Hugh L. Keenleyside Dam to the Canada-U.S. border is approximately 55 kilometres.

The Arrow Lakes impoundment above Hugh L. Keenleyside Dam is operated in accordance with the Columbia River Treaty, to achieve flood control objectives and to maximize power production for the entire Columbia River System. Typically, Treaty operations require this reservoir to be drawn down for flood control by March 31 each year, with refill targeted for July 31. High reservoir levels are normally maintained for the remaining summer months. During the reservoir refill period, discharge is usually in the range of 142 cubic metres per second to 850 cubic metres per second, during the drawdown period this discharge ranges from 1,000 cubic metres per second to 2,700 cubic metres per second. The minimum permissible combined discharge from

Hugh L. Keenleyside Dam and/or Arrow Lakes Generating Station is 142 cubic metres per second. The mean annual discharge at Hugh L. Keenleyside Dam is 1,120 cubic metres per second.

The Kootenay River joins the Columbia approximately 10 kilometres downstream of the Hugh L. Keenleyside Dam. Flows at Brilliant Dam and Generating Station consist of regulated outflows from Kootenay Lake through BC Hydro's Kootenay Canal Plant and the four parallel FortisBC plants, and unregulated flows from the Slocan River. The flows are generally lowest between August and April with higher flows occurring between May and July. Peak flows are attenuated by flow regulation at the upstream reservoirs and in Kootenay Lake. The mean annual discharge at Brilliant Dam is 848 cubic metres per second.

Over 90 percent of the Pend d'Oreille River watershed is within the States of Washington, Idaho and Montana. The remainder is within southeastern BC. The lower Pend d'Oreille River flows through BC for about 25 kilometres before it joins the Columbia River 800 metres upstream of the Canada-U.S. border. The pattern of runoff for the Pend d'Oreille River is typical of river basins dominated by snowmelt events. During the fall and winter, snow is accumulating and river flows are relatively low. The spring runoff or freshet generally commences in April and usually peaks in May or June leading to an overall increase in stream flow. After the freshet, flows decline during the summer. The cycle begins anew in the fall with rainfall followed by another round of snow accumulation. The recorded mean flow in the Pend d'Oreille River at Waneta from 1955 to 1990 was 820 cubic metres per second, with mean monthly flows ranging from 362 cubic metres per second in August to 1889 cubic metres per second in June.

Columbia River flows at the Canada-U.S. border combine the main flow in the Columbia River, represented by Water Survey Canada Station No.08NE049, and flows from the Pend d'Oreille River. Mean annual flow in the Columbia River at the International Boundary for the period 1973-2002 is 2,771 cubic metres per second. Mean monthly flows range from 2,168 cubic metres per second in March to 4,172 cubic metres per second in June.

Project Operation

Teck Cominco's Waneta Dam hydroelectric facility and BC Hydro's Seven Mile Dam hydroelectric facility upstream are located on the lower Pend d'Oreille River. Upstream of the Seven Mile Reservoir is the Boundary Dam hydroelectric facility in Washington State, and there are nine other facilities further upstream of this that provide substantial flow regulation. The principal upstream storage dams are the Hungry Horse and Kerr dams, both on the Flathead River, and the Albeni Falls Dam on the main stem of the Pend d'Oreille River. Pend d'Oreille Basin flow regulation commenced in 1938 with construction of the Kerr Dam at the outlet of Flathead Lake.

Flows in the Canadian section of the Pend d'Oreille are coordinated by BC Hydro under the Canal Plant Agreement. Under the Canal Plant Agreement, BC Hydro is delegated the responsibility to manage the flows through the existing Waneta and proposed Waneta Expansion facilities in order to optimize system generation (it is normally beneficial to minimize spill at the Waneta Dam). Currently, without the Project, hydraulic capacity at the Waneta facility is less than that of the Seven Mile facility. Any restrictions on flows as a result of various licence conditions are incorporated into Canal Plant

Agreement Operating Procedures which BC Hydro must abide by in their management of the system.

Hydroelectric facilities with daily storage capacity such as Boundary Dam are able to increase flows and power generation during day-time hours when there is more demand for electricity, and reduce flows and power generation during night-time hours when there is less demand for electricity. This is known as block loading. Block loading at the Boundary Dam results in rapid fluctuations in discharge with low downstream flows during night-time light load hours, and high downstream flows during day-time heavy load hours. The maximum heavy load hour flow block can be up to 1,472 cubic metres per second and the minimum light load hour flow block is often zero discharge. The Seven Mile Reservoir downstream, which also only has limited storage capacity (only sufficient for daily pondage), must pass whatever flows are received from upstream on an average daily basis.

Operation of the Boundary Dam facility has a significant effect on flow in the lower Pend d'Oreille River, and there is a high level of coordination between BC Hydro and the operator of that facility. Under existing flow regulation conditions, BC Hydro re-regulates (shapes) block flow releases received from Boundary to minimize spill at Waneta, which causes the Seven Mile Reservoir to fluctuate significantly on a daily basis. BC Hydro also re-regulates to provide minimum flows during the white sturgeon spawning period downstream of Waneta, which is a condition of Teck Cominco's Environmental Assessment Certificate for its Waneta Upgrade Project (increasing generating capacity at its existing Waneta powerplant).

The Project will divert flow around the Waneta Dam and existing generating station, thereby reducing spill at the Waneta Dam. The Project will also remove the hydraulic constraint on the upstream operation of BC Hydro's Seven Mile Dam, allowing releases from Boundary Dam upstream in Washington State to effectively flow through the lower section of the Pend d'Oreille River without being altered (re-regulated) by hydroelectric operations at the Seven Mile and Waneta Dam facilities.

BC Hydro's Water Use Plan for the Canadian portion of the Pend d'Oreille River, which will guide its future operations, was finalized and legally implemented in December 2006. However, there is some uncertainty as to what the future flow regulation regime on the lower portion of the Pend d'Oreille may be. Operations upstream at the Boundary Dam in Washington State are subject to upcoming review and re-licensing and the outcomes (expected from 2009 to 2011) of that future process is uncertain.

6.1 Potential Project Effects

The Project will use water that is normally spilled at the Waneta Dam for power generation. Post-project, for an average year, reduced spill will occur for about one month from late May to late June.

In addition, for an average year with Waneta operating in hydraulic balance with upstream hydroelectric operations, post-project flows downstream of Waneta will vary from pre-project flows from March through late May and for part of July. The Project will revise existing requirements of the White Sturgeon Flow Augmentation Program established for Teck Cominco's Waneta Upgrade Project, from the start of June to the end of July.

During current pre-project operations, daily water levels in the Seven Mile Reservoir fluctuate more than 1 metre during 6 months of the year. Fluctuations of more than 3 metres per day are observed in May and July. These fluctuations reduce available fish habitat and have a negative impact on shoreline terrestrial habitat.

Post-project, when reservoir operations will no longer be required to avoid spill at Waneta Dam, daily reservoir fluctuations will be a fraction of a metre, except in the mid-May through July period when some flow re-regulation will continue to be required to satisfy existing requirements of the White Sturgeon Flow Augmentation Program.

The flow patterns in the 400-metre length of the Waneta tailrace area and in the larger Pend d'Oreille-Columbia confluence area are important features of this significant aquatic habitat. To assess potential project impacts in these areas a large-scale, 3 dimensional numerical model was developed for modeling underwater flow parameters. The model was subject to extensive technical review by regulatory agencies and deemed acceptable for the analysis undertaken in the environmental assessment.

Extreme variations in flow conditions occur in the tailrace area as a result of seasonal flow variations and operation of the existing power facilities, resulting in opportunistic use of this tailrace habitat by fish. This makes profiling of baseline habitat use difficult. Good baseline data was obtained for the larger confluence area, which is of greater importance to white sturgeon and which was subject to the greatest modeling effort.

The high resolution, three dimensional numerical model was adapted and optimized to simulate and predict flow conditions at the confluence of the Columbia and Pend d'Oreille rivers. The modeling included provision of full three dimensional current profiles, realistic representation of the strong flows including standing waves in the shallow water area through which the Pend d'Oreille River travels as it enters the confluence area, and simulation of water temperatures and depths.

Operation of the project powerplant, and its flow diversion around Waneta Dam and convergence in the Waneta Dam tailrace, may change downstream water elevations/levels**,** flow velocities and water temperatures, and have the potential to impact fish habitat. The potential biological effects from operation of the Project on fish and fish habitat are discussed under Part C, Section 7 – Water Quality, Section 8 – Fish and Fish Habitat, and Section 9 – Transboundary Effects.

Flow Diversion through Powerplant

The three dimensional numerical model was applied to a total Pend d'Oreille discharge of 1,472 cubic metres per second during the spring freshet period. This case represents the largest possible diversion of flow between the existing Waneta Dam and powerhouse and the project powerhouse. Under pre-project conditions, 540 cubic metres per second of water is spilled, while 932 cubic metres per second passes through the existing powerhouse. Under post-project conditions, a total of 764 cubic metres per second, corresponding to the full hydraulic capacity of the Project, is diverted from the Waneta Dam to the project powerhouse, leaving 708 cubic metres per second passing through the existing Waneta powerhouse.

The comparison of the pre-project and post-project flow patterns for the spawning/egg deposition and Waneta Eddy areas indicates no discernable differences. All predicted temperature changes from pre-project to post-project conditions are below 0.7ºC.

Flow velocity patterns and water temperature gradients in the confluence of the Columbia and Pend d'Oreille rivers are independent of whether water is spilled over the Waneta Dam or diverted through the project powerplant.

The powerplant tailrace alignment at 45 to 60 degrees from the Pend d'Oreille River centerline will have a negligible effect on flow patterns downstream of the Highway 22A Bridge.

Flow-through of Boundary Releases

With the Project in place, hydraulic balance will be established on the Pend d'Oreille River, with releases from Boundary Dam effectively flowing through the downstream section of the Pend d'Oreille River without being altered by the downstream hydroelectric dams. With the Project in place, the Boundary Dam average daily discharge of 932 cubic metres per second results in lower flows during light load hours at the 142 cubic metres per second levels required by the White Sturgeon Flow Augmentation Program and higher flows of 1,472 cubic metres per second during heavy load hours, compared to pre-project flows, which are estimated at 932 cubic metres per second.

Flow-through of Boundary Dam releases will result in some changes in physical flow conditions (i.e. alteration of flow patterns) downstream of the Project at the confluence of the Columbia and Pend d'Oreille rivers, and in the Waneta Eddy area.

The 3-D numerical model simulations were used to determine Boundary flow-through effects on white sturgeon habitat in the Waneta Eddy area. White sturgeon typically use the deeper waters of the eddy area at levels of 0.5 metres above the river bed, in total water depths usually exceeding 15 metres. At these deep, near-bottom levels, the environmental parameters of flow speed and water temperature are considered to be important physical parameters of white sturgeon habitat. Based on present knowledge of white sturgeon behaviour, the area where near-bottom water flow speeds are less than 0.5 metres per second are considered to be favourable for white sturgeon, so changes in the areal extent of various near-bottom flow speeds were computed from the numerical model results. Water temperature changes between post-and pre-project model-derived temperatures were also computed.

The detailed results for all scenarios modeled (5 cases) showed that for the Waneta Eddy and sturgeon spawning area along the south shore of the Columbia River:

- For heavy load hours the range of predicted changes in the areal extent of velocities < 0.5 metres per second included: a negligible net change in velocity area/habitat; a slight increase in low flow velocity area/habitat (favourable); and, a slight reduction in low flow velocity area/habitat (negative).
- For light load hours the range of predicted changes in the areal extent of velocities < 0.5 metres per second included: no net change in velocity area/habitat; a slight increase in low flow velocity area/habitat (favourable); a slight reduction in low velocity area/habitat (negative); and a moderate decrease

of approximately 28 percent in low velocity area/habitat (negative). (Reductions of this magnitude of low velocity area in the Waneta Eddy occur under both pre-project and post-project conditions, and are limited to periods of comparatively low Columbia River flows that only infrequently occur in the winter.)

- Overall, despite a large difference between pre-project and post-project flows during both light load hours and heavy load hours, on a representative day (in July) the flow pattern in the Waneta Eddy is predicted to be relatively constant.
- Overall, it is predicted that post-project there will be a slight expansion in high velocity flow area along the south shore of the Columbia River (at 0 – 500 metres downstream of the Highway 22A Bridge) during heavy load hour sturgeon spawning flows. (Minimum flows established under the White Sturgeon Flow Augmentation Program will be maintained during light load hours.)

6.2 Issues Raised and Proponent Responses

Issues raised and proponent response related to the potential biological effects from the operation of the Project are discussed under Part C, Section 7 – Water Quality, Section 8 – Fish and Fish Habitat, and Section 9 – Transboundary Effects.

6.3 Proposed Mitigation

Proposed mitigation related to the potential biological effects from the operation of the Project is discussed under Part C, Section 7 – Water Quality, Section 8 – Fish and Fish Habitat, and Section 9 – Transboundary Effects.

6.4 Significance of Residual Effects and Conclusions

The significance of residual effects and conclusions related to the potential biological effects from the operation of the Project are discussed under Part C, Section 7 – Water Quality, Section 8 – Fish and Fish Habitat, and Section 9 – Transboundary Effects.

Conclusions

The Project is excepted from the application of the *International River Improvements Act* since there will be no significant incremental flow and level effects at the border resulting from the operation of the Project. The Proponent has informed the federal Minister of the Environment of the case for exception and has provided the required documentation.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);

- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to cause significant adverse environmental effects in regards to hydrology.

7. WATER QUALITY

Water temperature and total dissolved gas levels are the key water quality characteristics in the region.

Water temperature data recorded between 1990 and 2003 show that Columbia River water temperatures peak in August generally between 18 and 19 degrees Celsius (°C), and may occasionally reach 20°C. Temperatures are lowest in January and February and are typically between approximately 2 and 4°C. Water temperature in the river is determined in part by withdrawals from Arrow Lakes Reservoir, discharging through Hugh L. Keenleyside Dam outlet works and/or Arrow Lakes Generating Station, and by water temperature in the Kootenay River. The temperature of the Hugh L. Keenleyside Dam/Arrow Lakes Generating Station discharge, and the resulting downstream water temperature in the Columbia River, is strongly influenced by wind events on the reservoir, which can temporarily mix layers of thermally stratified water. These wind events typically result in short-term reductions in temperature of water released from the reservoir.

The operation of dams on the Columbia River and its tributaries can result in elevated levels of total gas pressure when water is released through spillways during periods of high flow. High levels of total gas pressure can be potentially harmful to fish and aquatic life that use shallow water habitat.

Columbia River total gas pressure levels have been monitored within the primary aquatic study area. Historical data indicate that maximum total gas pressure levels can approach 130 percent total gas pressure. With the construction of Arrow Lakes Generating Station in 2001 and the Brilliant Expansion in 2006, the amount of spill at Hugh L. Keenleyside Dam and Brilliant Dam will be reduced. These projects will reduce total gas pressure levels in the Columbia River, expressed in terms of the duration of sustained periods of high total gas pressure, in excess of 120 percent total gas pressure.

In most years since 1990, hourly water temperatures have been obtained for the Pend d'Oreille River (either in the Waneta Dam forebay or the tailrace). Mean daily water temperatures of the Pend d'Oreille River followed a very uniform pattern during the 1990 to 2003 period of record. Mean daily water temperatures typically peak in August and can attain maximum temperatures of approximately 25°C in most years. Peak temperatures exceed 22°C. Minimum temperatures occur in January and February and typically range from just above freezing (0.2°C) to about 2°C.

Water temperature and dissolved oxygen data collected at 1 metre depth intervals in March, June, and July 1993 indicated that the Waneta headpond was well-mixed and isothermal throughout the water column. The greatest temperature differences between surface and bottom waters were recorded in the summer (in July, 18.1°C at surface and 17.0°C near bottom). Similar conditions were recorded in 1994. The Waneta headpond receives inflow directly from Seven Mile Reservoir, which also is typically isothermal, although weak stratification may occur during extended periods of hot weather and stable reservoir levels.

The existing Waneta Dam powerplant has four Francis turbines that will have, with the completion of the final upgrade, a maximum discharge of 915 metres per second. At this maximum discharge, Waneta Dam will still be the bottleneck plant within the Pend d'Oreille system, as discharge from upstream facilities (Seven Mile Dam and Boundary Dam) typically exceeds 915 metres per second. This excess discharge from the upstream facilities must be spilled at Waneta.

There has been a long history of mining activity within the Canadian portion of the Pend d'Oreille River drainage basin and of lead-zinc smelting at Trail. The mining activity tailings and effluents have in the past impacted water quality, which today is reflected in some higher than expected chemical concentrations of some chemical parameters in river sediments. The smelting activity has in the past contributed to airborne emissions that are detected in soils and plants. Beyond this, the area is known to have high concentrations of certain naturally occurring minerals, such as cadmium.

Prior to 1978, effluent from the tailings pond of a lead-zinc mine and concentrator was discharged into the Salmo River. A second mine produced lead, zinc and tungsten concentrates until 1973 and significant effects have been detected in previous water quality monitoring programs. A third mine was located at the confluence of the Salmo River with the Pend d'Oreille River and the tailings pile on the bank of the Pend d'Oreille River was flooded by the filling of the Seven Mile Reservoir. Bottom-dredging operations for gold at the Salmo River confluence also may have been a source of mercury contamination, as mercury was used for gold separation and recovery techniques.

All water quality parameters recorded in Waneta headpond in 1994 were within working criteria, except for mercury and zinc. Concentrations of mercury (0.0004 milligrams per litre) and zinc (0.055 and 0.036 milligrams per litre) exceeded the maximum levels acceptable for aquatic life (0.0001 milligrams per litre for mercury and 0.014 milligrams per litre for zinc). Elevated levels of these metals also were recorded in Seven Mile Reservoir in 1994.

Construction of the intake approach for the Project will require excavation of part of the forebay of the existing Waneta Dam. The subject area consists of bedrock overlain by a layer of sediment. Initial investigation found that the bottom of the forebay consists mainly of either cobbles/gravels intermixed with sand/silt, or a sand/silt/clay composite. Samples taken from the surface of the submerged sediments were tested for contaminants and the results compared to the Canadian Council of Ministers of Environment sediment quality criteria for freshwater sediment and the BC Sediment Quality Guidelines. Analysis showed that the criteria and guidelines for arsenic, lead, zinc and/or cadmium were exceeded for all sample sites. In addition, the mercury concentrations approached the limits established by the criteria and guidelines.

Subsequent investigations used geophysical techniques to complete bathymetric and acoustic sub-bottom profiling of an area approximately 150 metres by 250 metres. As part of the study, drill hole samples of the sediments were tested to assess whether the baseline contamination previously identified at the sediment surface extended to depth. Assessed contaminant concentrations were compared to the Canadian Council of Ministers of Environment freshwater sediment quality criteria and BC Sediment Quality Guidelines. Results indicated that: sediment thickness in the approach channel area falls within an approximate range of 1 to 8 metres; all sediment sample concentrations exceeded the Canadian Council of Ministers of Environment criteria and BC Sediment Quality Guidelines for arsenic, cadmium, lead and zinc; and one sample exceeded the Canadian Council of Ministers of Environment criteria and BC sediment quality guideline limits for mercury, while concentrations in the other samples approached the criteria and guideline limits.

7.1 Potential Project Effects

Construction

The environmental issue scoping and effects assessment for the Project identified that the following construction components/phases of the Project could potentially have direct adverse effects on surface water quality: contaminated sediment management; intake approach excavation and intake rock plug removal; and, tailrace channel excavation and rock plug removal. Construction activities for other project components/phases that could indirectly affect surface and groundwater water quality, such as site preparation (clearing, grubbing and stripping), excavation, transport and storage of excavated material, contaminated soils management, and metal leaching/acid rock drainage, are discussed in Part C under Section 3 – Geology and Soils, and Section 4 – Vegetation.

The potential effects on water quality include the following:

Contaminated Sediment Management

Removal of an estimated 14,000 to 20,000 cubic metres of submerged metals contaminated sediments will be required in the forebay of the Waneta Dam during construction. The sediments will be dredged from the forebay and transported via a temporary pipeline to a dredgeate de-watering facility in which the sediments will be contained. Worksite F adjacent to the forebay area will be used to de-water and store the sediments. The contaminated sediments will be removed from the forebay area prior to excavation of the intake approach, intake and powerplant excavation.

Potential adverse effects from the dredging and de-watering processes include the following:

- Sediment removal has the potential to disturb and re-suspend the contaminated sediments. If unmanaged, these sediments could have deleterious effects on surface water quality within the Waneta forebay and the downstream environment.
- The sediments will be removed to Worksite F as slurry. De-watering of these sediments could potentially result in contaminated water and suspended sediments being discharged into the environment with the potential for adverse effects on surface waters.

- The slurry of contaminated sediments and water from the dewatering process could potentially infiltrate and contaminate groundwater.

In addition to the above, during powerplant operation the velocity of intake flows could potentially re-suspend any remaining sediment in the forebay area.

Intake Approach and Tailrace Channel Excavation and Rock Plug Removal

Blasting and excavation of the intake approach upstream from the rock plug will be conducted using means such as blasting workpads. Clean blast rock from the excavation of the portion of the intake behind the rock plug will be deposited upstream of the plug, covering the area of the intake that requires excavation, to create an above-water workpad, through which drilling and blasting activities will be conducted. The workpad used for intake approach excavation will abut the intake rock plug and that rock plug removal will be conducted in conjunction with intake excavation.

Rockfill workpads will be used for the tailrace works in the same manner as for the intake approach excavation and rock plug removal. Removal of the tailrace rock plug will require instream blasting followed by excavation of the fractured bedrock material.

Placement of the rockfill workpads, drilling and blasting through the workpads, and subsequent excavation of the workpads and blasted clean rock will generate some sediment in the intake area and downstream. This sediment will be almost entirely rock flour from remaining dust on the placed clean rockfill and rock residue from drilling and blasting.

Potential adverse effects from blasting and excavation activities include the following:

- The work may result in some short-term, slightly elevated levels of suspended sediments in the downstream environment, including the Columbia River immediately following blasting and during the brief period required for excavation of the blasted materials. (Consideration was given to timing this construction activity to coincide with white sturgeon spawning in an attempt to provide increased turbidity to help protect newly hatched young sturgeon from predation. However, for safety reasons, intake and tailrace excavation and plug removal works are expected to be conducted during low flow periods, which are likely to occur outside the white sturgeon spawning period of June and July.)
- Use of explosives could introduce deleterious substances into the aquatic environment.

Potential adverse effects on water quality that may result from accidents or malfunctions during construction or operations, involving failure of temporary containment systems, removal of contaminated sediments, and leaks or spills of hazardous material are discussed in Part E, Section 3 – Environmental Effects of Accidents and Malfunctions.

<u>Operations</u>

The Project will divert flow around the Waneta Dam and existing generating station, reducing spill at the Waneta Dam, and this will result in a change in water quality characteristics downstream in regards to total gas pressure. The Project will also allow releases from Boundary Dam upstream in Washington State to effectively flow through

the downstream section of the Pend d'Oreille River without being altered by hydroelectric operations at the Seven Mile and Waneta dams (see Part C, Section 6 – Hydrology). This will result in some potential changes in water quality characteristics at the confluence of the Columbia and Pend d'Oreille rivers in regards to water temperature.

The environmental issue scoping and effects assessment for the Project also identified that operation of the powerplant could potentially have effects on surface water quality relating to maintenance activities and sedimentation. Transmission line maintenance activities could potentially have adverse effects on surface water quality, and this is discussed in Part C under Section 3 – Geology and Soils, and Section 4 – Vegetation.

Potential effects from operation of the powerplant include the following:

Powerplant Maintenance Activities

During powerplant maintenance activities there is the potential for oil and chemical spills, which, if they occurred, could adversely affect downstream water quality.

Sedimentation

The flow-through of Boundary Dam releases during operation of the powerplant will substantially reduce the frequency and magnitude of water level fluctuations in the Seven Mile Reservoir, and there may be slight changes downstream in water level elevations of the Waneta headpond. The stability of reservoir banks will increase, and the amount of sediment introduced downstream will be reduced. Old mine tailings within the upper reaches of Seven Mile Reservoir are currently inundated with rising water levels during the storage period and subsequently dewatered during reservoir drafting. Stabilization of reservoir levels will likely reduce leaching, thereby improving water and sediment quality downstream. The potential for any contaminated sediments remaining in the forebay post-construction to be re-suspended and flushed into downstream environments will also be reduced.

Temperature

Water temperature changes between post- and pre-project model-derived temperatures were computed. Post-project changes in near-bottom water temperatures in the deep near-bottom relatively cool waters of the Waneta Eddy are predicted to be less than 0.7ºC for both light load hours and heavy load hours. The much warmer Pend d'Oreille River water temperatures are confined to a band within 100 metres of the southern Columbia River shoreline.

Total Gas Pressure

The increase in Waneta Dam total powerhouse flow capacity from 915 cubic metres per second to 1680 cubic metres per second will substantially reduce spill during seasonal high flow periods and thereby reduce downstream total gas pressure levels. Model results show that this will result in a reduction in the number of days on which total gas pressure exceeds 110 percent total gas pressure in the Waneta Dam tailrace and at the Canada-U.S. border. There is a remote possibility the new powerplant could entrain air, which could result in an increase in total gas pressure during normal operations.

Waneta forebay and upstream Columbia River total gas pressure levels often exceed 110 percent total gas pressure, which limits the benefit at the total gas pressure exceedance level that can be achieved by reducing spill at Waneta Dam. The Boundary and Box Canyon dams in the U.S. upstream of Waneta Dam are major total gas pressure producers. Forebay total gas pressure levels will typically pass unchanged through the powerplant. Total gas pressure levels below Waneta Dam may remain relatively high during high flow periods even though Waneta Dam is producing little or no total gas pressure. However, as upstream total gas pressure levels at U.S. and Canadian facilities are reduced through the introduction of total gas pressure reduction measures, the relative total gas pressure benefits from the Project will increase.

During high spill periods total gas pressure will be further reduced by maintaining the current usage pattern of the Waneta Dam spillway bays, which minimizes total gas pressure generation. Because the new powerplant is further away from the spillway, there is a decreased probability that bubbles produced by spillway operations will be entrained by powerhouse discharges. This may further reduce total gas pressure beyond the values predicted.

The Project is expected to have Moderate (positive) residual impacts related to total gas pressure creation at Waneta. Model results demonstrate that the Project will have beneficial effects on both the Pend d'Oreille River and Columbia River total gas pressure regimes. This will have a positive effect on downstream aquatic resources. However, during high flow years most of the dams in the upper Columbia Basin will still produce elevated levels of total gas pressure when the hydraulic capacity of their powerplants is exceeded and excess water is spilled.

7.2 Issues Raised and Proponent Responses

Issues raised during the environmental assessment review concerning potential adverse effects of the Project on water quality are documented in Appendix 3 – Issues Raised and Proponent's Responses. The most significant or key issues were:

1. *The conclusion that the velocity of flows in the tailrace below the Waneta Dam and the dilution effect of the Columbia River will abate any effect of fugitive contaminated sediments being flushed downstream from construction activities in the Waneta Dam forebay is questioned.*

   Proponent Response: Contaminated sediments will be removed in advance of the main intake construction activity and this will be closely monitored. The downstream water quality monitoring program will be on-going for the duration of construction after sediment removal, a period of around three to three and a half years. The water quality criteria for the Project and the required monitoring will provide a clear indication of the potential for damage to aquatic life by any re-suspended metal contaminants. The Proponent is confident that, with the controls in place, construction will be completed without harm to aquatic life. Because any sediments with heavy metals will settle out downstream in areas where contaminated sediments likely originating from upstream sources in both the Pend d'Oreille and Columbia rivers have historically been deposited, they are unlikely to pose any additional potential risk in downstream areas.

2. *An evaluation is needed of the risk from remaining exposed contaminated sediment following completion of dredging in the Waneta Dam forebay.*

   Proponent Response: Existing powerplant operations at Waneta do not mobilize the exposed sediments that currently exist. Any risk from remaining exposed sediment following completion of dredging will be dependent upon any re-suspension during operations. All sediment will be removed down to bedrock in the area of the intake approach. In peripheral areas where further excavation for the intake approach is not planned but where the velocity of intake flows during powerplant operation could potentially re-suspend sediment, remaining sediment deposits will be capped as necessary using suitably sized rock and/or sand and gravel materials to prevent re-suspension. Post-construction monitoring will be undertaken at the start of powerplant operations to confirm that no remaining sediments are being mobilized and, in the unlikely event this occurs, it will be addressed.

3. *The Reith Creek and Lime Creek watersheds could be affected by construction of the transmission line. Specific measures to address potential water quality and quantity issues for water licensees should be identified.*

   Proponent Response: No instream work will be required during transmission line construction. Negative residual effects are not predicted or anticipated in the watersheds of Reith and Lime Creeks. In the event that Transmission Line construction results in damage to existing licensed water sources and their associated water-taking systems, the Contractor shall promptly repair damage. (See Part C, Section 3 – Geology and Soils, and Section 4 – Vegetation, for proposed mitigation measures relating to transmission line construction and maintenance.)

7.3 Proposed Mitigation

During the planning and design stage, potential adverse effects have been avoided or mitigated by:

- Retaining powerplant capacity at a desirable size to reduce total gas pressure formed downstream of the dam. This will also reduce the frequency of total gas pressure formation due to spill during forced and planned outages of individual generating units.
- Selecting the preferred transmission route contiguous with BC Hydro's 5L98 Line to Selkirk. This transmission line route will cross 5 headpond tributaries at higher elevation sections where the streams are typically ephemeral in nature.

Potential adverse effects associated with construction activities are expected to be prevented and mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The Environmental Management Program requirements for water quality management include specific criteria and requirements for: water quality protection; erosion, sediment and drainage control; drilling and blasting; aggregate processing washwater; concreting and grouting; truck and equipment washing; and, water quality monitoring. The Environmental Work Plans that will be applied through the Environmental Management Program to prevent and/or mitigate potential construction effects include the: Site Preparation; Excavation Environmental Work Plan; Excavated Materials Relocation Environmental Work Plan; Water Quality Environmental Work Plan; Erosion, Sediment and Drainage Control Environmental Work Plan; Grouting Environmental Work Plan; Contaminated Materials Management Environmental Work Plan; Spill Prevention, Preparedness and Response Environmental Work Plan; and, Site Restoration Environmental Work Plan.

The following management practices will be applied through the Environmental Management Program and Environmental Work Plans to prevent and/or mitigate potential construction effects (proposed mitigation for construction activities that could indirectly affect surface water quality, such as site preparation, excavation, and transport and storage of excavated material, are discussed in Part C under Section 3 – Geology and Soils, and Section 4 – Vegetation.)

Construction

Contaminated Sediment Management

The Proponent has committed to preparing a detailed Contaminated Materials Management Environmental Work Plan for the removal and management of contaminated material from the headpond, in accordance with regulatory requirements. Contaminated material will be removed prior to the main excavation of the intake channel approach.

Actions to address the potential effects of contaminated sediments on surface and groundwater quality will include:

- Processing of contaminated sediments removed from the Waneta forebay within a de-watering facility to be constructed at Worksite F. This facility will include the placement of the sediments onto an impermeable liner, which will prevent cross-contamination between the sediments and the underlying ground surface and protect groundwater quality. Water collection and treatment facilities will provide protection to surface water and groundwater quality. Water generated from the de-watering process will be collected and diverted for discharge to a surface water body under a Ministry of Environment permit.
- Use of a low turbidity hydraulic auger dredge to protect surface water quality by minimizing the re-suspension and subsequent transport of metals contaminated sediments from the worksite. The key benefits of this approach include a relatively low risk to the environment during dredging operations, low turbidity generation, and operational controls that further minimize the re-suspension of sediments.
- Implementation of control measures to supplement the minimization of sediment re-suspension that the low turbidity hydraulic auger dredge achieves, and containment of contaminated sediments and the protection of down stream surface water quality. Water flow and potential transport dynamics at the site will

be analyzed, and an intensive monitoring program implemented to allow collection of real time data and modify dredging activities to further reduce turbidity generation.

- Following the completion of dredging activities, testing will be conducted to confirm the status of the dredged material. Depending on the residual concentrations of metals, the consolidated sediments may remain at Worksite F, where they will be re-worked during the rehabilitation and re-vegetation of the worksite, or transported off-site to an approved contaminated waste facility. Root zone soil removed from the powerplant site may be used to cap the used portion of this site to promote effective re-vegetation.
- All sediment will be removed down to bedrock in the area of the intake approach. In peripheral areas where further excavation for the intake approach is not planned but where the velocity of intake flows during powerplant operation could potentially re-suspend sediment; remaining sediment deposits will be capped as necessary using suitably sized rock and/or sand and gravel materials to prevent re-suspension.

No negative residual project impacts are expected. The Proponent anticipates that the measures discussed above will appropriately mitigate effects associated with the management of contaminated sediments within the project area. Any deleterious heavy metals that become re-suspended within the forebay during sediment removal would quickly be flushed through the Waneta facilities into turbulent downstream habitats. For this reason, the Proponent does not anticipate any effects of contaminants on fish and fish-eating species in the forebay. Because sediments with heavy metals will settle out downstream in areas where contaminated sediments likely originating from upstream sources in both the Pend d'Oreille and Columbia rivers have historically been deposited, they are unlikely to pose any additional potential risk to riparian wildlife and fish-eating species in downstream areas.

Intake Approach and Tailrace Channel Excavation and Rock Plug Removal

Actions to address the potential effects of intake approach and tailrace channel excavation and rock plug removal on surface water quality will include:

- Excavating largely in the dry for the intake approach and the tailrace channel.
- Conducting activities during low flow periods.
- Using means such as blasting workpads. During excavation, environmentally acceptable, clean, fines-free, excavated rock will be stockpiled for subsequent use to facilitate in water drilling, blasting and excavation.
- All blasting in or near watercourses will be carried out using waterproof explosives to ensure that contamination from deleterious substances will not occur. Blasting activities will adhere to applicable regulations and Environmental Management Program criteria and requirements. All instream or near-stream blasting will be conducted according to Fisheries and Oceans Canada Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters.
- Managing waste materials and hazardous materials to avoid them entering the Pend d'Oreille River.

Given the high velocities in the tailrace area, sediments would be quickly transported downstream into the Columbia River where they would be diluted and dispersed. The

low levels of sediment expected with implementation of the above measures would not have detectable effects on fish or benthic invertebrates in the downstream environment. Residual project impacts are expected to be negative but of Low significance.

Operations

Powerplant Maintenance Activities

During operation of the Project, accidents or malfunctions could occur that result in adverse effects on water quality, such as oil and chemical spills. This will be addressed and mitigated using standard management practices implemented through an Emergency Preparedness Plan, and Spill Prevention, Preparedness and Response Plan. (See Part E, Section 3 – Environmental Effects of Accidents and Malfunctions.)

The Spill Prevention, Preparedness and Response Plan will include:

- Key responsibilities.
- Identification of oil and other hazardous materials held on site and subject to possible spill.
- General guidelines for the use of such materials (e.g. use of secondary containment at all times).
- Specifications for storage of such materials.
- Waste disposal requirements.
- Hazardous material handling and spill response training requirements.
- Spill response materials to be held on site, including their locations and contents.
- Immediate spill response actions to be followed, including specific actions for high risk events.
- Monitoring (water quality/soil) that is to be conducted routinely and in the event of a spill.
- Identification of off-site/external spill response resources that may be available.
- Notification procedures to be followed in the event of a spill.

Total Gas Pressure

A monitoring program for project-related total gas pressure effects will be established during powerplant operation to: verify that the new powerplant does not result in increased total gas pressure because of unanticipated air entrainment; and, recalibrate the existing total gas pressure model to account for potential changes in total gas pressure formation because of the new tailrace location.

The monitoring program will follow the procedures used in the pre-project monitoring program and will be conducted during freshet immediately following the initiation of operations. Data collected that will be useful in determining operational changes to the Waneta Dam spillways will be provided to Teck Cominco. A detailed monitoring program to verify the predicted benefits of the Project will be described in the Fish and Fish Habitat Mitigation and Compensation Plan for the Project.

7.4 Significance of Residual Effects and Conclusions

No significant residual adverse effects relating to surface or ground water quality are expected from construction or operation of the Project. Potential adverse effects associated with the management of contaminated sediments, construction of the intake approach and tailrace channel, and powerplant maintenance activities are expected to be prevented or mitigated through application of standard and project-specific management practices, the Environmental Management Program and Environmental Work Plans, and monitoring to ensure compliance, as well as compliance with the BC *Environmental Management Act* (re contaminated sediment management). With regard to total gas pressure, the Project would cause reduction of spill from the existing Waneta facility in the late spring/early summer period which is anticipated to result in positive residual effects of beneficial reductions in total gas pressure extending possibly hundreds of miles downstream.

Conclusions

The Ministry of Environment, Environmental Protection Division, indicated that in general, it was satisfied that the assessments, plans and commitments provided in the Application meet the higher level requirements of the Division, and relevant Environmental Work Plans cited in the Environmental Management Program and Commitments must be available to the appropriate agencies upon request.

In regards to the management of contaminated sediment in the Waneta forebay, the Contaminated Materials Management Environmental Work Plan must be approved by the Ministry of Environment, Environmental Protection Division, prior to the commencement of works, and the plan is to include water quality in the values to be protected (in addition to protection of fish and aquatic habitat), and additional information or assessment related to the extent, magnitude and fate of remaining contaminated sediments.

Environment Canada stressed to the Proponent that: Subsection 36(3) of the *Fisheries Act*, administered by Environment Canada , prohibits the discharge of deleterious substances to waters frequented by fish, or to a place where those substances might enter such waters; the *Migratory Birds Convention Act* prohibits the deposition of substances harmful to migratory birds in water or areas frequented by migratory birds; and, adherence to the proposed courses of action identified does not relieve the Proponent of the requirement to comply with the *Fisheries Act* or the Migratory Bird Regulations.

The State of Washington Department of Ecology indicated that it supports the Project because of the probable reduction in total gas pressure downstream, and although this effect will probably be modest based on the Project alone, the combined effects of the Project and future gas abatement measures taken at Box Canyon and Boundary dams in Washington State will likely be significant. The Department requested a copy of the total gas pressure monitoring program plan and monitoring data as they become available.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;

- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to cause significant adverse environmental effects in regards to water quality.

8. FISH AND FISH HABITAT

The major aquatic systems in the study area are riverine and exhibit a high degree of daily, weekly, monthly and yearly variability in terms of physical parameters of water depth, velocity, temperature, and chemistry. This variability results from a combination of natural factors (e.g., air temperature, precipitation, drainage basin characteristics, etc.) and anthropogenic factors (hydroelectric development, watershed disturbances, pollution, etc.). Most of the native fish species (with the exception of white sturgeon) that are present at self-sustaining population levels have adapted to or are able to tolerate the existing levels of natural and human-induced variability.

Most of the native fish species in the primary and secondary aquatic study area live their entire lives within this area and, as a result, have adapted to some degree to seasonally induced changes in habitat. For example, Umatilla dace and Columbia mottled sculpin are very common in the Kootenay River downstream of Brilliant Dam, which is an area that is subjected to frequent daily load shaping activities originating from operations of the Lower Kootenay Generation System. In the lower section of the Kootenay River, both species are present in the highest densities recorded for the species within the Columbia River between Hugh L. Keenleyside Dam and the Canada-U.S. border, indicating that these species are able to tolerate some level of existing natural and anthropogenic flow variability.

The two main effects of the existing Waneta Dam on the movement of resident fish species are the physical blockage of upstream movements into the Pend d'Oreille River and the potential for injury or mortality of fish that move downstream past the dam, either through the generation units or via the spillways.

Elevated concentrations of metals in fish muscle tissues have previously been reported for fish populations in the Pend d'Oreille River.

The assessment of potential project impacts on fish and fish habitat considered the following areas:

- Waneta forebay: the lowermost section of Waneta headpond that extends approximately 1.25 kilometres upstream from Waneta Dam to the confluence of Cedar Creek.
- Waneta tailwater: the unimpounded section of the Pend d'Oreille River that extends from the base of Waneta Dam approximately 400 metres downstream to the confluence with the Columbia River (immediately below the Highway 22A Bridge crossing).
- Pend d'Oreille-Columbia confluence: the mixing zone of the two rivers that extends from the Pend d'Oreille River mouth downstream to the Canada-United States border.
- Waneta Eddy: a large unique hydraulic feature situated immediately upstream of the Pend d'Oreille-Columbia confluence.
- Downstream Columbia River: the approximately 5.0 kilometres long section between Fort Shepherd Eddy and the Canada-U.S. border.
- Fort Shepherd Eddy: a large, deep (up to 50 metres) hydraulic feature that represents the uppermost limit of potential hydraulic effects from project operations.

These areas also encompass all of the fish bearing systems that may potentially be affected by the clearing, access, construction and excavated materials disposal activities of the Project, including the proposed transmission line.

In total, 35 fish species have been recorded from the Waneta study area. Of these, 21 species have been recorded in Waneta headpond, 17 species in the Waneta tailwater, and 27 species in the lower Columbia River. Of the 35 species of fish identified, 6 species are listed under provincial and/or federal legislation (Table 2).

Studies of fish species composition and distribution in Waneta headpond and Seven Mile Reservoir indicate that the fish species assemblages in these water bodies consist mainly of non-sportfish species, dominated by redside shiner, northern pikeminnow, and sucker species. Although salmonids (rainbow trout and bull trout) have been recorded in Waneta headpond, they are present in very low abundance and do not represent members of resident headpond populations. Waneta headpond does not provide suitable habitats for the maintenance of resident salmonid sportfish species. The headpond does provide for all life requisites of the resident non-sportfish species, but none have been identified within the Waneta forebay area. None of the habitats available in the Waneta headpond forebay are critical to any species in the headpond.

Several minor tributaries enter Waneta headpond. Most enter on the north shore and are high gradient, ephemeral streams that contain flows only during spring freshet or following heavy rainfall events. Their lower reaches are inaccessible to fish that would enter from the headpond. The fish production capabilities of all tributaries that flow into Waneta headpond from the north have been assessed and rated as low to nil.

The lower Columbia River supports a diverse assemblage of 27 fish species that includes:

- 13 sportfish species – white sturgeon, kokanee, rainbow trout, brown trout, bull trout, brook trout, cutthroat trout, mountain whitefish, lake white fish, walleye, yellow perch, smallmouth bass, burbot; and

- 14 non-sportfish species – longnose sucker, largescale sucker, bridgelip sucker, carp, redside shiner, northern pikeminnow, peamouth, umatilla dace, longnose dace, leopard dace, prickly sculpin, torrent sculpin, mottled sculpin, shorthead sculpin.

White sturgeon are relatively abundant in the project area.

Flows in the tailwater area under all but minimum discharge from Waneta Dam and high Columbia flow levels are very swift and turbulent. The tailwater area receives low fish use during average to high discharges from Waneta Dam due to high water velocities (>3 metres per second) and turbulent flow conditions throughout most of the tailwater channel. Columbia River resident species such as white sturgeon, rainbow trout, mountain whitefish and kokanee may make feeding forays into the tailwater area and could reside in the plunge pool during non-spill periods when the area becomes a large backwater eddy. These fish would likely be displaced during spill. Given the generally inhospitable flow regime in the tailwater area, it is unlikely that the tailwater provides preferred habitat for most of the fish species that use the Waneta area.

The Pend d'Oreille-Columbia confluence area, Waneta Eddy, downstream Columbia River and Fort Shepherd Eddy provide a wide variety of important habitats for a wide variety of resident fish species. The most important habitat features in the primary study area are the Pend d'Oreille-Columbia confluence area and Waneta Eddy. Theses areas provide for all life requisites of white sturgeon. These areas also are used by most of the other native fish species that reside in the downstream Columbia River, but important mainstem shallow water habitats used by these species can also be found in abundance outside the primary aquatic study area boundaries.

Several native fish species that use the lower Columbia River are listed provincially or under the *Species at Risk Act* as species at risk (Table 2).

Table 2 – Listed Fish Species in the Project Area

Species	BC Status*	*Species at Risk Act* **
White Sturgeon	Red-listed	1 - E
Umatilla Dace	Red-listed	SC
Columbia Mottled Sculpin	Blue-listed	1 - SC
Shorthead Sculpin	Blue-listed	1 - T
Bull Trout	Blue-listed	
Cutthroat Trout	Blue-listed	

*red-listed = extirpated, endangered or threatened; blue-listed = of special concern
** 1 = Schedule 1 species that are legally protected; E = Endangered; T = Threatened; SC = Special Concern.

Bull trout and cutthroat trout have been recorded in the lower Columbia River but in very low abundance suggesting an incidental use of the area for feeding or as a movement

corridor. The primary or secondary aquatic study areas for the Project do not appear to contain important habitats necessary for the survival of these species.

A resident population of shorthead sculpin is present in the lower reaches of Beaver Creek, located approximately 9 kilometres upstream of the Canada-U.S. border. Only one individual has been recorded in the Columbia River downstream from Beaver Creek and this individual was likely a member of the Beaver Creek population. The Beaver Creek area is not located within the primary or secondary aquatic study areas for the Project.

Columbia mottled sculpin are relatively common in the Columbia River within the primary and secondary aquatic study areas for the Project, but were most commonly recorded within a few kilometres downstream of Beaver Creek. Previous sampling efforts have recorded Columbia mottled sculpins in low abundance within the study area; but the area does not appear to provide unique habitats for this species that are not available elsewhere in the system.

Umatilla dace have been recorded in the lower Columbia River in low numbers, but appear to be limited in distribution to areas upstream of Fort Shepherd Eddy. Results of past sampling efforts in the Pend d'Oreille-Columbia confluence area indicated low use by Umatilla dace. There is no evidence to suggest the area in close proximity to Waneta Dam contains important habitats for Umatilla dace.

White Sturgeon

During the last century, the construction of hydroelectric projects on the Columbia River and many of its tributaries resulted in the formation of large impoundments and the segregation of white sturgeon populations. One of the few remaining flowing sections of the Columbia River, from Hugh L. Keenleyside Dam downstream to Lake Roosevelt, supports a small remnant population of white sturgeon.

Population studies conducted in British Columbia (Hugh L. Keenleyside Dam to the U.S. border – approximately 55 kilometres) in the early 1990s determined that juvenile age-classes were absent from this population, and there is little or no juvenile recruitment occurring. Spawning has been recorded but very few young fish have been found, indicating that few young sturgeon survive to adulthood. Almost all fish in this population are greater than 30 years old. Sturgeon individuals can live as long as 100 or more years.

The upper Columbia River white sturgeon has been red-listed by the BC Conservation Data Centre since 1994. A recovery initiative began in 2000 with an agreement signed by Fisheries and Oceans Canada, Ministry of Environment, and BC Hydro. The initiative is a coalition of Canadian and American fisheries agencies, First Nations, industry and stakeholders. A recovery team was established and a Recovery Plan developed (November 28, 2002). The Recovery Plan cites as reasons for the decline of the population factors related to: exploitation and incidental catch; dams and reservoirs; flow regulation; water quality; contaminants, nutrients, habitat diversity and geomorphology; and changes in fish species composition. In August 2006, Columbia River white sturgeon were listed as Endangered under Schedule 1 of the *Species at Risk Act*. Section 32 of the *Species at Risk Act* prohibits harm to individuals and Critical Habitats of species listed as Endangered or Threatened.

The Fort Shepherd Eddy and the Pend d'Oreille-Columbia confluence, consisting of the Waneta Eddy and the Waneta Dam tailwater (collectively referred to as the Waneta Area) are important habitats for various life history stages of white sturgeon:

- Both the Fort Shepherd and Waneta eddies are large depositional areas used as holding, feeding and rearing habitat for both adults and juveniles (two of four high use areas that are used all year for a variety of life stages).
- The Pend d'Oreille-Columbia confluence provides habitat for spawning and egg incubation (the influence of the Waneta Dam tailrace plume extends into the Columbia River).
- The Waneta Eddy is used for pre-spawning staging, and post-spawning holding habitat.
- Use of the Waneta tailwater area is opportunistic and based on spill frequencies.

From April 1 to November 15, the Waneta Eddy is used by adult and juvenile white sturgeon for feeding, holding and rearing purposes. The eddy likely also serves as a staging area for white sturgeon prior to spawning. Use of this area for the above activities has been observed to be greatest in the deeper portions of the eddy (typically at depths over 15 metres). However, the fish often make feeding forays outside the eddy, with frequency dictated by the availability of food in the mainstem Columbia River. Furthermore, low velocity habitat in the eddy at depths of 15 metres or greater has been identified as important habitat for juvenile white sturgeon because it provides feeding and holding areas for energy conservation during high flow conditions.

From November 15 to April 1, the eddy is used for overwintering by adult and juvenile age classes of white sturgeon within the area. The majority of use occurs within the deepest and slowest sections of the eddy. As such, suitable overwintering habitat within the eddy is defined as areas with depths greater than 15 metres and flow velocities less than 0.5 metres per second.

Spawning occurs annually in the Waneta Area from early May to late July. The spawning area is located in the Pend d'Oreille-Columbia confluence area downstream of the Highway 22A Bridge, and the egg deposition and incubation zone extends downstream from this area to the Canada-U.S. border and possibly beyond. To date, the Waneta area is the only known white sturgeon spawning location in BC in the lower Columbia River. One other spawning location has been identified 18 kilometres downstream in Washington State.

Monitoring of spawning activity has confirmed that the eggs spawned are viable and can be successfully hatched in situ. The general absence of juvenile white sturgeon from the population suggested that recruitment failure likely occurs at an early developmental stage. The factors that result in very high mortality rates of white sturgeon larvae are not known, but likely relate to hydroelectric dam construction, in combination with other anthropogenic factors that have impacted the Columbia River Basin since the 1960s. Analysis of spawning data collected from the Waneta area since 1993 has been conducted to determine whether spawn timing varies from year-to-year and if physical variables like temperature and discharge could explain the variation in timing. Spawn timing does vary from year to year but based on 11 years of data, does not appear to be related to flow in the Pend d'Oreille River. The identification of what factors drive spawn timing and frequency have been confounded by a broodstock collection program that in

the past several years has annually removed up to eight pre-spawning females from the spawning population. These individuals were spawned in captivity to provide the juveniles necessary to rebuild and recover the population. This program is expected to continue in the foreseeable future. At present, the environmental cues that stimulate spawning of white sturgeon in the Waneta Area are poorly understood but are suspected to be related to a combination of:

- spring freshet timing – spawning always occurs on the descending limb of the spring Pend d'Oreille River hydrograph;
- water temperature – spawning always occurs at mean daily water temperatures over 14° C; and,
- day length – over 80 percent of spawning events occur between the second week in June and the first week in July, which corresponds to the summer solstice.

The timing and magnitude of anthropogenic manipulation of river flow in relation to environmental conditions in a particular year may affect initiation of spawning or may temporarily interrupt spawning, if changes occur once spawning has commenced. However, the variables examined have, at best, indicated a very weak relationship between flow and spawning activity.

Given the importance of the Waneta Area for white sturgeon, Waneta Dam operations during the white sturgeon spawning season were identified as a possible factor that could affect spawning activity. This was concluded to be of greatest concern during low flow years when, during periods of low power demand, load factoring operations from upstream dams would result in low flows below Waneta Dam. A White Sturgeon Flow Augmentation Program was implemented in 1996 as a condition of approval for Teck Cominco's Waneta Upgrade Project (upgrade of the existing powerplant at the Waneta Dam) to enhance conditions for white sturgeon spawning and egg incubation in the Waneta Area during periods of low flow (defined as periods during the spawning season when mean daily flow in the Pend d'Oreille River drops below 708 cubic metres per second). Under the White Sturgeon Flow Augmentation Program, minimum heavy load hours/day-time and light load hours/night-time flows of 283 cubic metres per second and 142 cubic metres per second, respectively, were established with the intention that a minimum day-time flow would provide a mean column water velocity of 0.8 metres per second (a value considered to be the minimum necessary to induce spawning activity) in the upper portion of the spawning area.

In 2006, the Ministry of Environment (Environmental Stewardship Division), Fisheries and Oceans Canada, and Teck Cominco, all members of the Upper Columbia White Sturgeon Recovery Initiative, collectively indicated that the results from 3 years of monitoring to assess the effects of the White Sturgeon Flow Augmentation Program on sturgeon spawning activity were inconclusive.

8.1 Potential Project Effects

Construction

The environmental issue scoping and effects assessment for the Project identified that the following construction components/phases of the Project could potentially have direct

adverse effects on fish and fish habitat: contaminated sediment management; and intake and tailrace excavation and rock plug removal.

Construction activities for other project components/phases that could potentially have indirect adverse effects on fish and fish habitat, such as impacts to surface water quality from site preparation, excavation, transport and storage of excavated material, contaminated soils management, and metal leaching/acid rock drainage, are discussed in Part C under Section 3 – Geology and Soils, and Section 4 – Vegetation.

The discussion of potential adverse effects on fish and fish habitat follows (also see Part C, Section 7 – Water Quality, and Subsection 7.1 – Potential Project Effects).

Contaminated Sediment Management

Excavation for the powerplant intake approach will have the potential to disturb and re-suspend contaminated sediments, which could have deleterious effects on fish within the forebay if not properly managed. Subsequent transport of contaminated sediments through the existing powerhouse could also impact aquatic habitat downstream of the dam, where theoretically the contaminants could become available for uptake into the aquatic food chain.

Effects on headpond resident fish are expected to be very short-term in nature and will likely result in behavioural displacement from the disturbance site because of the excavation activity. Sediments re-suspended by construction activity will settle quickly, or will be entrained through Waneta Dam into the downstream receiving environment where flow velocities and additional Columbia River flow volumes will result in rapid downstream transport and substantial dilution. These sediments will ultimately be deposited in downstream areas where contaminated sediments from both the Pend d'Oreille and Columbia rivers have historically settled out. As a result, the predicted low inputs of contaminated sediment that will be re-suspended during project construction should not pose increased risks to fish.

Intake Excavation and Rock Plug Removal

Headpond-resident fish are known to use the forebay area in the vicinity of the intake excavation area, although the reported use of this area is low and is mainly limited to minnow and sucker species. Overpressures from blasting activities associated with intake approach excavation and removal of the intake rock plug have the potential to injure or kill fish in the forebay area of the headpond.

Excavation of the blasted materials has the potential to increase suspended sediment concentrations in downstream waters. The effects of slightly elevated suspended sediment concentrations are expected to be minor and short-term.

Pend d'Oreille River flows during powerplant construction are expected to remain unchanged from existing conditions. Waneta Dam and the Waneta Generating Station will continue to discharge flows received from upstream facilities. However, a request could be made to lower the headpond to its minimum operating level, or reduce generation during short periods to facilitate intake excavation and rock plug removal. If the headpond level is lowered, fish use of the lower, potentially fish-accessible reaches of the headpond tributaries could be affected. With the exception of Cedar Creek, the

remaining headpond tributaries have limited drainage basins with intermittent or sub-surface flows, exhibit high gradients with large coarse substrates, and most have impassable upstream fish migration barriers located within 50 metres or less of the mouth. These tributaries are generally considered to be non-fish bearing.

Cedar Creek is the only headpond tributary that is fish-bearing, but use of the lower reaches by headpond-resident fish stocks is limited. These stocks should not be adversely affected by a short-term drawdown of the headpond.

Tailrace Excavation and Rock Plug Removal

Removal of the tailrace rock plug will require instream blasting followed by excavation of the fractured bedrock material. Blasting has the potential to cause direct mortality of fish in the immediate vicinity due to blast overpressures, and the potential to disturb white sturgeon that frequently use the confluence and eddy areas and may occasionally use the Waneta Dam plunge pool. Increases in suspended sediment levels (i.e., pulverized rock particles) produced by the blast and subsequent excavation have the potential to affect benthic productivity or incubating fish eggs downstream.

Velocities in the tailwater area of Waneta Dam in the immediate vicinity of the tailrace plug and channel excavation area are usually very high and flow conditions are extremely turbulent during most of the year. These flow conditions limit and likely preclude the use of this area by white sturgeon and other fish species during spill periods.

Potential impacts on white sturgeon and other fish species will also depend upon the timing of plug removal. Instream blasting conducted during the white sturgeon spawning period (June through July) has the greatest potential to harm this species. During light load hour low flow periods, there is increased potential for fish use of the tailrace area, and increased risk of adverse effects to all resident species that may be present.

Important white sturgeon habitat features in the construction area include the Waneta Eddy and the Pend d'Oreille-Columbia confluence area (situated in the Columbia River below the Highway 22A and Burlington Northern Santa Fe Railway bridges in the Columbia River, approximately 200 metres downstream from the tailrace excavation area) and to a lesser degree, the Waneta Dam spillway plunge pool (situated approximately 100 metres upstream from the proposed tailrace plug outlet). The large distance of these areas away from the blasting zone, combined with the turbulent flow conditions downstream and upstream from the blast source, will ensure rapid dissipation of blast wave pressures. In addition to the horizontal separation distance between these important habitats and the tailrace plug, there is also a vertical separation of 12 to 15 metres or more, due to the greater depth of the plunge pool and Waneta Eddy relative to the tailrace invert. This will further reduce the possibility of adverse effects from instream blasting on white sturgeon and other fish species that inhabit these areas. The only anticipated detectable impact will be short-term, slightly elevated levels of suspended sediments (rock flour) in downstream waters, which would occur immediately following the blasts and during the brief period required for excavation of the blasted materials. Given the high velocities in the tailrace area, these sediments would be quickly transported downstream into the Columbia River where they would be diluted and dispersed, avoiding detectable effects on fish or benthic invertebrates.

Potential adverse effects on fish and fish habitat that may result from accidents or malfunctions during construction or operations, involving leaks or spills of hazardous material, failure of temporary containment systems, adverse effects of blasting, removal of contaminated sediments and powerplant forced outage are discussed in Part E, Section 3 – Environmental Effects of Accidents and Malfunctions.

Operations

The Project will divert flow around the Waneta Dam and existing generating station reducing spill at the Waneta Dam. The Project will also allow releases from Boundary Dam upstream in Washington State to effectively flow through the downstream section of the Pend d'Oreille River without being altered (re-regulated) by hydroelectric operations at the Seven Mile and Waneta Dam facilities (see Part C, Section 6 – Hydrology). The environmental issue scoping and effects assessment for the Project identified that the diversion of flow and flow-through of upstream releases could potentially have adverse effects on fish and fish habitat (potential project effects on water quality are discussed in Part C, Section 7 – Water Quality).

The discussion of potential effects from operation of the powerplant follows:

Flow Diversion through Powerplant and Downstream Flow Patterns

Results of the modelling show that the post-project outflow from the combined Waneta facility (whether from the dam spillways, the existing powerhouse, the project powerhouse, or a combination of these) will have minimal and very minor effects on downstream flow (and temperature) patterns in the Waneta Eddy and Columbia-Pend d'Oreille confluence, respectively. These changes are well within the natural short-term variability that occurs at present. Therefore, the addition of the project powerhouse as another point of flow release will not result in negative residual effects on the suitability of these habitats for white sturgeon or other resident fish species.

The main anticipated effect of the location and alignment of the project powerhouse and the diversion of spill through it will be an increase in the amount and suitability of feeding habitats for white sturgeon and other fish species in the Waneta Dam spillway area. The diversion of all or a portion of the spill flows will allow greater use of the spillway plunge pool for feeding/holding and possibly rearing (for white sturgeon and other resident fish species) than was possible during pre-project conditions. In addition, during periods when all flow is diverted through the project powerhouse, the amount of suitable feeding/holding and rearing habitat in the upper portion of the tailrace area should increase, due to the formation of a large backwater area upstream from the project powerhouse tailrace channel.

Flow Diversion through Powerplant and Fish Entrainment

The Project will increase the hydraulic capacity of the combined Waneta powerhouses by up to 764 cubic metres per second, which will alter the existing pattern of forebay velocities and potentially alter the rate of fish entrainment through the combined facilities. Some of the fish that would otherwise pass downstream via the existing powerhouse or over the spillway will pass through the project powerplant and may be killed or injured. The number of fish that were previously killed by passing through the upgraded existing powerhouse is 49 fish. The estimated number of rainbow trout that

will be killed annually through the project turbines is 42 fish, and the reduction in fish killed over the spillway is 10 fish. This yields an estimated annual net decrease in fish mortality of 17 fish. No negative residual project impacts are expected related to fish entrainment mortality at Waneta. The analysis presented above indicates that for a given total flow at Waneta, total entrainment mortality will be lower than pre-project entrainment mortality, due to re-allocation of flow through the new powerhouse. Fish entrainment mortality occurring within the project powerhouse will be offset by reduced mortality through the existing Waneta powerplant and spillway.

Flow-Through of Boundary Releases – Waneta Eddy

Flow-through of Boundary Dam releases will result in some potential changes in physical conditions in the Waneta Eddy area. Available flow data and modelling results indicate no changes to the essential features of the Waneta Eddy. Feeding, holding and rearing habitats for white sturgeon are not expected to be significantly affected by the Project during average, high, or low flow years. The preference for deeper water areas that remain more stable over a wide variety of discharge conditions in both systems, and the lower reliance on the Waneta Eddy for feeding and rearing in the warm-water season will also reduce the potential for adverse project-related flow effects on this habitat. Availability of food from this source is also expected to continue. There is no evidence to suggest that operation of the Project will directly or indirectly influence food availability or production in the project area at levels that would affect white sturgeon growth.

However, in average flow years in the Pend d'Oreille and Columbia rivers, flow-through of Boundary Dam releases will result in minor changes to flow patterns in the Waneta Eddy during the overwintering period. Most of these changes are expected to occur in the latter part of the overwintering period in mid to late March when water temperatures in the two systems generally exceed 5ºC. At these higher temperatures, fish begin feeding more actively and start to disperse out of overwintering areas; therefore, the maintenance of large areas of suitable overwintering habitat is less critical than would be the case if these flows occurred in the mid-winter period. During heavy load hour periods, the Project is expected to produce a minor increase in suitable overwintering habitat. Re-regulation of the flows will still occur when required to maintain minimum white sturgeon spawning flows (White Sturgeon Flow Augmentation Program) by using storage in the Seven Mile Reservoir. Normal operations of the Project will result in increased frequency of light load hour minimum flows when less re-regulation of Boundary Dam discharge occurs. During light load hour periods, no change in suitable overwintering habitat is expected.

The predicted minor or negligible effects of project operations on water velocities (and near-bottom water temperatures) within the Waneta Eddy are not considered biologically significant, and are not expected to result in negative effects on use of the eddy for purposes of feeding, holding, rearing or overwintering by white sturgeon or other fish species.

Flow-Through of Boundary Releases – Pend d'Oreille-Columbia Confluence

Flow-through of Boundary Dam releases will result in some potential changes in physical conditions at the confluence of the Columbia and Pend d'Oreille rivers.

Flow-through will result in changes in frequency of light load hour flows during the white sturgeon spawning period. Rapid fluctuations in discharge due to flow-through of Boundary flow fluctuations have the potential to alter the amount of spawning habitat or cause displacement of spawned eggs or larval fish. Immediately after larvae become mobile, they will likely exit the study area and likely continue rearing in the U.S., where the impacts of the Project will be substantially attenuated.

In average and high-flow years, modeling of pre- and post-project flow conditions predicted that the main changes will be to flow conditions that occur on the "shoulders" of the freshet period. Changes analyzed will mainly occur during periods in which mean daily flows are between 915 cubic metres per second (pre-project constructed hydraulic capacity including Teck Cominco Upgrades) and 1,680 cubic metres per second (post-project constructed hydraulic capacity including Teck Cominco Upgrades), and on the ascending shoulder of the freshet in average and high-flow years. These conditions generally occur in late April and May prior to the white sturgeon spawning period. In these years, the freshet in the Pend d'Oreille system generally occurs from late May to early July, and mean daily flows typically exceed the capacity of Boundary Dam. This results in all the plants on the lower Pend d'Oreille system generating at full capacity all day, with excess water being spilled. As a result, block loading at Boundary rarely occurs in June and early July, which is the peak of the white sturgeon spawning period. Therefore, flow conditions in the confluence area will rarely be affected by post-project operations during such years.

A second project-related change to flow patterns in average and high-flow years in the confluence area during the white sturgeon spawning period will occur on the descending shoulder of the freshet period in late June to mid-July, when mean daily flows decline below the capacity of Boundary Dam and the facility begins to block load. This will result in more instances of block loaded flow patterns from Boundary being passed through to the Waneta confluence area when mean daily flows are between 915 cubic metres per second and 1,680 cubic metres per second. The net effect of this change will be to increase the frequency and duration of higher velocity heavy load hour flows in the white sturgeon spawning and egg deposition area. There will be a corresponding increase in the frequency of lower flows and lower water velocities in the spawning area and some increase in the number of days when the light load hour flows will trigger minimum flows as required by the White Sturgeon Flow Augmentation Program. In an average water year, flow-through of Boundary releases will result in approximately 20 days where minimum flows are below pre-project conditions, of which approximately 10 days will be at the minimum flows established under the White Sturgeon Flow Augmentation Program or 13 days and 2 days, respectively, under the modified White Sturgeon Flow Augmentation Program (these 10/2 days would occur in the latter portion of the white sturgeon spawning period, after the first week in July, when the bulk of spawning is already completed – over 80 percent of spawning events occur between the second week in June and the first week in July).

Daily flow changes in the spawning area have occurred every year in past pre-project operations. There is no evidence to indicate that they have influenced spawning activity, egg survival or recruitment success. Based on analysis of available information on spawning activity and flow, there is no evidence to indicate that the timing or frequency of white sturgeon spawning is related to hourly, daily, or monthly flow releases from the Pend d'Oreille River. There also is no evidence to suggest a relationship between spawning habitat conditions in the Waneta confluence area and subsequent white

sturgeon recruitment. As long as there is enough daily average flow to meet the pre-project flow required to provide White Sturgeon Flow Augmentation Program conditions (day and night flows of 283 cubic metres per second and 142 cubic metres per second respectively), there should be no change in post-project protection for spawning white sturgeon and their early life history stages.

The modeling has indicated that the important overall habitat patterns within the spawning area will remain nearly unchanged with the Project in operation. A potential concern regarding post-project flow changes is related to the trade-off between the expected positive effects of the higher, more suitable daytime spawning flows and the increased frequency of lower night-time flows, which could allow predatory species to gain greater access to spawned eggs or larval white sturgeon. Analysis of the available information on potential egg predators and the timing of white sturgeon recruitment failure do not support a hypothesis that egg predation was in the past, is presently, or will likely be in the future (post-project), a factor limiting white sturgeon recruitment. Considering the large number of variables that could influence egg predation rates by resident fish, it would be very difficult to develop study programs to quantify predation effects with reasonable accuracy.

Flow-through of Boundary flows is overall not expected to result in negative effects on white sturgeon spawning activities, egg incubation, and larval survival at a population level. The proposed modifications to the White Sturgeon Flow Augmentation Program may provide a higher level of protection afforded white sturgeon during the early life stages post-project relative to that now provided by the White Sturgeon Flow Augmentation Program. However, since white sturgeon spawning and subsequent recruitment cannot be demonstrated to be linked to these or other higher flows, factors other than those associated with pre- and post-project operations at Waneta are most likely responsible for the current recruitment failure of Upper Columbia River white sturgeon.

Examination of 11 years of information on white sturgeon use of the Waneta area and results of the flow and temperature modeling studies do not provide any data to suggest the Project will have any negative effects on white sturgeon production at a population level.

Flow-Through of Boundary Releases – Shallow Waters Upstream of Waneta

The flow-through of Boundary releases without the need for re-regulation at Seven Mile will affect wetted shoreline areas and associated fish habitat upstream of Waneta. Increased water level stability will be realized within both Waneta headpond and Seven Mile Reservoir, with the greatest effect occurring in Seven Mile. Stabilization of reservoir water levels will increase the amount of productive habitat and improve primary and secondary productivity within the two reservoirs.

Modeling of water levels was conducted to evaluate potential gain and loss of wetted areas and fish habitat. The slight changes in water level elevations of Waneta headpond were assumed to be Low (Positive) post-project effects. Post-project wetted area variability and loss of productive habitat in the Seven Mile Reservoir are essentially eliminated. The only exception, resulting in some productive habitat loss, is shown to occur during the White Sturgeon Flow Augmentation Program period from mid-May to late July. In contrast, under present pre-project conditions, there is considerable wetted

area variability, with associated reduced productive habitat levels. The calculated post-project increase in productive habitat is typically about 10 hectares in most months, with larger values, up to 30 hectares, in April to mid-May and in July.

The primary benefit of reduced water level fluctuations in Seven Mile Reservoir will be a weighted area effect that accounts for the recovery time of the rewetted littoral area. The littoral area will be restored to a much higher level of primary and secondary productivity. These effects will result in increases in overall habitat suitability and availability within the reservoir. Stabilization of Seven Mile Reservoir levels would increase productive fish habitat by approximately 10 hectares in most months and up to 30 hectares in April to mid-May and in July compared to the pre-project condition.

Flow-Through of Boundary Releases – Shallow Waters Downstream of Waneta

The flow-through of Boundary releases without the need for re-regulation at Seven Mile will affect wetted shoreline areas and associated fish habitat below Waneta Dam.

Post-project, there will be an increase of daily fluctuations in water levels below Waneta Dam and some loss of productive habitat will occur. Some loss of habitat may have a negative effect on downstream primary and secondary productivity, and may also affect the distribution of invertebrate populations. Other potential adverse impacts include fish displacement, fish stranding, and egg stranding and spawning of species other than white sturgeon.

Modeling of water levels was conducted to evaluate potential loss of wetted areas and fish habitat. Post-project wetted area variability is modestly increased, resulting in a minor decrease in productive habitat. The estimated decrease is typically much less than 1 hectare in most months with somewhat larger values, typically about 1 hectare, in April to mid-May, July and early November. The maximum daily decrease in productive habitat over the full year is under 2 hectares. On a monthly basis, the total downstream reductions in productive habitat will be less than or close to 1 hectare. The largest reductions would likely occur in April to mid-May, July and early November. Under high flow conditions during white sturgeon spawning from May 16 to June 30, the White Sturgeon Flow Augmentation Program flow minimum would limit the maximum reduction in productive habitat to about 0.2 hectares. Under low flow conditions, minimum day and night White Sturgeon Flow Augmentation Program flow minimums would limit the maximum reduction to 0.5 hectares or less. Annually, the average daily reduction in productive habitat relative to pre-project condition was estimated to be from 0.3 hectares/day with the White Sturgeon Flow Augmentation Program to 0.4 hectares/day without the White Sturgeon Flow Augmentation Program.

The residual impacts on shallow water fish habitat associated with flow-through of Boundary Dam releases is predicted to be a: reduction of productive habitat by less than 1 hectare; slight increase in invertebrate and fish stranding; slight increase in the downstream displacement of rearing and feeding fish; and, a negligible change in whitefish egg stranding rates.

Stranding, the isolation of riverine life forms from flowing surface water as a result of declining water level, commonly occurs in shallow water habitats and leads to increased mortality of fish. This is influenced by the topography/slope of channel banks/beds, substrate type, and the habitat preferences of fish species and their life stages.

Dace and sculpin species at the larval and juvenile stage would likely be most susceptible to stranding. Columbia mottled sculpin within the confluence and downstream areas are considered to be susceptible to stranding based on nearshore habitat preferences. However, post-project, a combination of low fish use of high velocity areas and steep bank slopes will likely diminish stranding. Fish stranding is expected to be minimal, and would likely only occur in early spring and late fall.

A resident population of shorthead sculpin (listed as threatened under Schedule 1 of the *Species at Risk Act*) is present in the lower reaches of Beaver Creek located approximately 9 kilometres upstream of the Canada-U.S. border (not within the study areas for the Project). Only one individual has been recorded in the Columbia River downstream from Beaver Creek. Columbia mottled sculpin (listed as being of special concern under Schedule 1 of the *Species at Risk Act*) are relatively common in the Columbia River within the study areas for the Project, but were most commonly recorded within a few kilometres downstream of Beaver Creek. Previous sampling efforts have recorded Columbia mottled sculpins in low abundance within the study area; but the area does not appear to provide unique habitats for this species that are not available elsewhere in the system. Umatilla dace (listed as being of special concern under the *Species at Risk Act*) have been recorded in the lower Columbia River in low numbers, but appear to be limited in distribution to areas upstream of Fort Shepherd Eddy. There is no evidence to suggest the area in close proximity to Waneta Dam contains important habitats for Umatilla dace.

The fish community structure in the lower Columbia River has been substantially altered due to river regulation by upstream facilities on the Columbia River. Fish in the lower Pend d'Oreille and lower Columbia rivers have also been exposed to load shaping since the construction of Waneta Dam in 1954. It can be assumed that the species assemblage present within the project area represents those species that are adaptable to fluctuating water levels and velocities. As the incremental effects of Boundary flow-through releases are anticipated to result in only minor changes to flow velocity variations and water level fluctuations downstream of Waneta, the incremental impacts on the fish assemblage in the area are predicted to be low.

Predictions of seasonal fluctuations in productive habitat suggest that, in a given year, the decrease in productive habitat downstream of the Waneta Dam will be much smaller, (by a factor of 37), than the increase in productive habitat values upstream of Waneta Dam in the Seven Mile Reservoir. Therefore, the Project will yield a substantial net increase in productive habitat area between Boundary Dam and the Pend d'Oreille-Columbia confluence area.

8.2 Issues Raised and Proponent Responses

Issues raised during the environmental assessment review concerning potential adverse effects from construction of the Project and powerplant operations on fish and fish habitat are documented in Appendix 3 – Issues Raised and Proponent's Responses.

The most significant or key issues raised were related to powerplant operations as opposed to construction activities. There is disagreement between members of the Fisheries Working Group and the Proponent over the interpretation of the potential biological effects of the flow-through of Boundary Dam releases on flow patterns in the Waneta Eddy and the Pend d'Oreille-Columbia confluence. The disagreement is

confounded by the fact that BC Hydro's Water Use Plan for its Seven Mile facility, which will guide its future operations, was finalized and legally implemented in December 2006, and, operations upstream at the Boundary Dam in Washington State are subject to review and re-licensing (expected from 2009 to 2011).

Issues raised during the environmental assessment review concerning potential adverse effects of the Project on Fish and Fish Habitat are documented in Appendix 3 – Issues Raised and Proponent's Responses. The most significant or key issues were:

1. *The results of the modeling* (see Part C, Section 6 – Hydrology) *indicate that there will potentially be an alteration of flow velocity patterns in the Waneta Eddy, with potential adverse effects on white sturgeon. Specifically, there is the potential for reduced suitability of overwintering holding, feeding and rearing habitat from a potential reduction in the amount of area of near bottom low flow velocities, and potential increase in near bottom flow velocities.*

   Proponent Response: Winter does not likely represent a critical period for sturgeon in the Columbia River. The flows that produce the modeled effect of concern happen very infrequently (at low Columbia River flows) and produce a relatively minor change for only a portion of the day. At more typical winter flows in the Columbia, the greater frequency of daily flow events will increase low velocity habitat, which would be a benefit of the Project. The values used in the analysis for potential effects were conservative, and it is expected that with more sampling, more variability would be found, not less. The evidence examined indicates a low risk to white sturgeon overwintering. The increased frequency of low flow periods from the flow-through of Boundary releases in winter will serve to increase deep water low velocity habitat.

2. *The results of the modeling* (see Part C, Section 6 – Hydrology) *indicate that there will potentially be an alteration of flow velocity patterns in the Waneta plume that extends into the Columbia River, with potential adverse effects on white sturgeon spawning, and the survival of eggs and larvae. Specifically, the minimum White Sturgeon Flow Augmentation Program flow criteria during light load hours/night-time would extend further into the sturgeon spawning period, and this could potentially result in an increase in the presence of fish species (such as sculpins and suckers) and aquatic invertebrate organisms (such as Hydrozoa), thought to be excluded by high velocity flow conditions, that may opportunistically feed on sturgeon eggs and larvae (i.e. result in increased predation).*

   Proponent Response: The data indicates that the majority of eggs are deposited in the Columbia River downstream from the main influence of the Pend d'Oreille tailrace plume and minimum White Sturgeon Flow Augmentation Program flows. Stomach content analysis indicates that egg predation is low and incidental, not directed. The modeling indicates there are potential benefits in velocity patterns during increased daily flow volumes and equal credence should be given to this in reaching a conclusion based on risk. The flows of concern occur during the latter part of the spawning period after the bulk of spawning and egg incubation has occurred (77 percent of spawning occurs before the period of concern). The Case 2 flow scenario modeling, under which the concern was identified, is an extreme condition. The modeling results provide a static snap-shot of a highly

dynamic area. The validity of any analysis of project effects at the level of detail attempted (by Fisheries Working Group members) is questionable, and any attempts to quantify potential changes using this approach will have large potential errors. The Proponent has not attempted to use this same approach to quantify benefits of higher daily post-project flows other than to state they may have offsetting benefits.

Construction or operation of Boundary Dam upstream in Washington State did not have any detectable effect on the overall timing and magnitude of flows during the white sturgeon spawning period. Boundary block loading operations did not occur during a substantial portion of the sturgeon spawning period. The changes produced by Boundary construction and operation during the period of recruitment failure are minor and outside the main sturgeon spawning period. There is no evidence in the data to support a reasonable conclusion of any linkage between anticipated incremental changes in Pend d'Oreille flows and white sturgeon recruitment failure.

It is extremely improbable that all recruitment occurred during the latter part of the spawning period when flows in the Pend d'Oreille system were typically declining rapidly and water temperatures were sub-optimal. It is more reasonable to assume that recruitment would occur during the early to mid portions of the spawning period when Pend d'Oreille flows would provide optimal flow and temperature conditions. Flows during these periods are essentially unchanged from pre-Boundary conditions. Flow-through effects of project operations will be limited to an increased frequency of low (White Sturgeon Flow Augmentation Program) flow events that will occur in the latter part of the spawning period.

The data suggests that the various anthropogenic factors that have directly affected the aquatic environment of the mainstem Columbia River are primarily responsible for the recruitment failure in the white sturgeon population.

Therefore, there is no apparent linkage between the flow-through of Boundary Dam releases and the potential for increased egg predation that would have any impact on present or future white sturgeon recruitment success.

3. *Compensation for loss of shallow water habitat downstream in the Columbia River from flow-through of Boundary Dam releases, and potential adverse effects on Columbia mottled sculpin.*

   Proponent Response: Approximately 0.4 hectare years of shallow water habitat (on average, the area affected over the period of one year) in the Columbia River will be dried and subject to reduced productivity due to flow-through of Boundary releases. This habitat loss is based on seasonal averages and not daily maximums. Several achievable compensation options have been identified and a conceptual fish and fish habitat compensation plan (i.e. design and feasibility study, predictions of created habitat and use, and calculation of habitat gains that achieves no-net-loss, etc.) completed that meets the habitat policy requirements of Fisheries and Oceans Canada. The compensation plan will be finalized prior to authorizations being issued under the *Fisheries Act*. The preferred option at/near Fort Shepherd upstream of the Pend d'Oreille-Columbia confluence

would involve re-contouring an area of river bank/channel where fish stranding is a known problem. This proposed compensation downstream of Waneta is in addition to the significant fish habitat gains that will be realized upstream in the Seven Mile Reservoir, and to a lesser extent the Waneta headpond, with reduced frequency and magnitude of water level fluctuations from the flow-through of Boundary Dam releases.

Columbia mottled sculpin occur in the Columbia River upstream of the affected area, but have never been documented in the aquatic study area for the Project. Most of the habitat of the affected area is relatively steep and not subject to stranding events and the risk of stranding of this species is expected to be very low. This assessment would be verified through a monitoring program which will be incorporated into the fish and fish habitat compensation plan.

8.3 Proposed Mitigation

During the planning and design stage, potential adverse effects from powerplant operations have been avoided or mitigated by:

- Sizing the powerplant to accommodate the maximum flows passing through the system from upstream hydroelectric facilities, to reduce spill and bring the lower Pend d'Oreille into hydraulic balance. This will result in habitat creation benefits in the upstream Seven Mile Reservoir, and will provide greater availability of holding and feeding habitat in the existing plunge pool of Waneta Dam.
- Designing the configuration and alignment of the tailrace of the new powerhouse to yield pre-project and post-project flow patterns in the Pend d'Oreille-Columbia confluence area that are nearly identical. The powerplant tailrace alignment at 45 to 60 degrees from the Pend d'Oreille River centerline will have a negligible effect on flow patterns downstream of the Highway 22A Bridge. This eliminates the potential for impacts on white sturgeon spawning in the confluence area and fish activity in the Waneta Eddy.
- Installing modern, efficient Francis turbines in the project powerhouse that will be more "fish-friendly" than the turbines in the existing Waneta powerhouse, and that will help reduce overall fish mortality related to spill and entrainment at the combined facility.
- Adopting operational criteria that will retain existing flow protection measures (White Sturgeon Flow Augmentation Program) for downstream fish and fish habitat, and further modifications to the White Sturgeon Flow Augmentation Program shifting it two weeks later and reducing the higher first protection level flows from 708 cubic metres per second to 566 cubic metres per second which collectively elevate protection for a greater portion of the egg incubation period.
- Retaining powerplant capacity at a size to reduce total gas pressure formed downstream of the Waneta Dam and improve water quality (see Part C, Section 7 – Water Quality).

<u>Construction</u>

The potential adverse effects on fish and fish habitat include the following:

Contaminated Sediment Management

See Part C, Section 7 – Water Quality, and Subsection 7.3 – Proposed Mitigation.

Intake and Tailrace Excavation and Rock Plug Removal

See Part C, Section 7 – Water Quality, and Subsection 7.3 – Proposed Mitigation. All instream or near-stream blasting will be conducted according to Fisheries and Oceans Canada Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters. A hydrophone and seismograph monitoring system will be implemented to monitor overpressures and confirm compliance with Fisheries and Oceans Canada guidelines. If monitoring shows that overpressures are approaching or exceeding guidelines blasting activities will be suspended and procedures modified to reduce overpressures. The blast pressure wave velocities can be further reduced by modification of the blasting techniques (e.g., increased delay between detonations or smaller charge sizes) to further minimize possible fisheries impacts. Blasting procedures will be included in the Excavation Environmental Work Plan.

Mitigation measures for intake rock plug removal are expected to exclude fish from the overpressure blast zone where overpressures could exceed guidelines for fish. If headpond drawdown is implemented briefly for intake rock plug removal, minor short-term effects may result on the relatively low number of fish that use the area near the mouth of Cedar Creek.

As an additional measure to reduce the potential for adverse effects on fish from tailrace excavation and plug removal activities, tailrace in-river blasting activities will be precluded during periods of non-spill heavy load hours discharge from Waneta Dam to reduce the probability of having excess overpressures near locations where sturgeon may occur. There is no defined seasonal period in which sturgeon can be assumed to be absent from the tailrace area, and an appropriate seasonal construction window for this activity cannot be identified. White sturgeon habitat features in the Waneta Eddy, Columbia-Pend d'Oreille confluence area, and the Waneta Dam spillway plunge pool are some distance away from the tailrace excavation blasting zone. This, combined with the turbulent flow conditions downstream and upstream from the blast source, will ensure rapid dissipation of blast wave pressures. In addition to the horizontal separation distance between these habitats and the tailrace plug, there is also a vertical separation of 12 to 15 metres or more, due to the greater depths relative to the tailrace invert. This will further reduce the possibility of adverse effects from blasting on white sturgeon and other fish species. As an additional mitigation, tailrace blasting will be precluded from the sturgeon spawning period and from low-load hours.

Management measures have proven to be effective at protecting white sturgeon and other fish species during in-channel blasting associated with the Brilliant Expansion Project. Implementation of similar measures for tailrace channel excavation and tailrace plug removal for the Project is expected to have the same result.

Residual project impacts are expected to be negative but of Low significance, and will not have measurable effects on fish or fish habitat within the project area. As a result, no compensation measures for this activity have been identified.

Operations

Mitigation established during the planning and design stage is discussed above. With the listing of white sturgeon on Schedule 1 of the *Species at Risk Act* in August 2006, the review's earlier focus on mitigating project effects on white sturgeon at a population level needed to be expanded to address harm to white sturgeon at an individual level (e.g. eggs and larvae) to comply with the *Species at Risk Act* section 32 general prohibitions against killing, harming, harassing, capturing or taking individuals of listed species. On January 29, 2007, Fisheries and Oceans Canada notified the Proponent that restrictions to load shaping would be required to mitigate potential adverse effects of project operations on white sturgeon egg survival and spawning/incubation success.

Subsequent discussions on mitigation measures culminated in the Proponent's submission of a Supplemental Analysis entitled *Analysis of the Potential for Boundary Release Flow-Through to Affect White Sturgeon Spawning/Incubation Success* (June 2007) which proposes revisions to the White Sturgeon Flow Augmentation Program as a precautionary measure. The revisions include lowering the first protection level of the White Sturgeon Flow Augmentation Program from 708 cubic metres per second to 566 cubic metres per second, and shifting the start/stop dates two weeks later, to begin on June 1 and end on July 15. This shift combined with the lowered threshold would improve alignment of the higher first protection level flows with the majority of spawning events, and reduce the amount of time that project flows would be at their lowest protection level of 142 cubic metres per second (two days more per year on average in addition to the 11 days currently seen and compared to 10 days more without the revisions[9]). By maintaining higher near-bottom velocities, these revisions would offer greater protection against predation of the portion of incubating eggs found in the upper confluence area subject to the influence of project flows.

Also as part of the June 2007 Supplementary Analysis, the Proponent has proposed an adaptive management program to verify model predictions and effectiveness of these revisions to the White Sturgeon Flow Augmentation Program. This adaptive management approach involves monitoring flows, verifying model predictions, select monitoring of spawning and egg deposition, and measuring egg predation rates. Pending results of this monitoring and analyses, the Proponent has committed to revise flows if appropriate. Similarly, the Proponent indicated willingness to participate in future Water Use Planning for the Pend d'Oreille system and abide by any flow revisions resulting from that process.

White sturgeon are known to inhabit the Waneta Eddy and during non-spill periods have been observed in the plunge pool area below the existing Waneta Generating Station spillways. The presence of this species above and below the outlet of the Project increases the likelihood that during periods when the Project is shut down, white sturgeon may enter the tailrace area and draft tube of the powerplant, and may encounter harm from the turbine, pipes or valves within the unit. The Proponent has opted to take a pro-active approach to sturgeon protection by incorporating measures in the facility design to exclude sturgeon from the draft tube at times that a unit is not operating. The mitigation method or combination of methods that will be selected to

[9] Note: Currently, the first protection level of the White Sturgeon Augmentation Flow Program begins on May 16 and lasts until July 1.

exclude sturgeon from the Project draft tubes has not yet been determined. Fisheries and Oceans Canada will be involved in the review of the proposed design which will be finalized prior to issuance of the *Fisheries Act* authorization needed to commence operations of the Project. Presently, research is being conducted into methods that exclude sturgeon from the draft tubes at some other hydroelectric facilities on the upper Columbia River.

Mitigation related to the operation of the project powerplant and water quality is discussed under Part C, Section 7 – Water Quality. Mitigation related to accidents or malfunctions during powerplant operations is discussed in Part E, Section 3 – Environmental Effects of Accidents and Malfunctions. Mitigation related to the operation of the project transmission line and water quality is discussed under Part C, Section 4 – Vegetation, and Section 7 – Water Quality.

8.4 Significance of Residual Effects and Conclusions

Construction

Potential construction related impacts on the aquatic environment can be mitigated such that there will be no measurable effects on fish populations in the project area, and a potential for Low level residual effects. Consequently, no measures for fish and fish habitat compensation works related to construction of the Project have been identified. The residual effects of project construction (unavoidable re-suspension of sediments) have been considered in the cumulative effects assessment.

Powerplant Operation – Waneta Eddy and Columbia-Pend d'Oreille Confluence

In regards to potential adverse effects on fish and fish habitat in the Waneta Eddy and Columbia-Pend d'Oreille Confluence from operation of the Project, the Proponent concluded that these have been mitigated through design specifications. Specifically:

- Expected changes in hydraulic conditions below Waneta Dam due to the alignment of the powerplant tailrace should not result in negative impacts to white sturgeon. Restricting the powerplant outfall to the main channel of the Pend d'Oreille River has mitigated the majority of potential changes to the Waneta Eddy and to the Columbia-Pend d'Oreille confluence area used by white sturgeon.
- Decreased spill may allow increased feeding use of the Pend d'Oreille River above the confluence area.

The Proponent provided evidence that effects of incremental flow shaping facilitated by the Project would not cause population-level effects on white sturgeon. While these arguments satisfied previous assessment needs, the subsequent listing of white sturgeon under Schedule 1 of *Species at Risk Act* necessitated mitigation of predicted increased opportunities for predation of white sturgeon eggs at an individual level. The *Species at Risk Act* Sec 32(1) general prohibitions against killing, harming, harassing, capturing or taking individuals of an endangered species also apply to eggs and larvae. Without further mitigation, such opportunities for egg predation were predicted to occur 10 days more for an average year and affect perhaps 5% of the furthermost upstream portion of white sturgeon egg deposition. With the additional mitigation proposed in the adaptive management program including proposed modifications to the White Sturgeon

Flow Augmentation Program, the occurrence of these minimum flows would increase 2 days rather than 10 days, and be further offset by increases in daytime flows.

In regards to monitoring of post-project conditions, the Proponent has proposed an adaptive management program to confirm predicted effects and revise mitigative flow restrictions if so indicated.

The Proponent is committed to working with other hydro facility operators and participating in the recovery planning process under the *Species at Risk Act* to develop reasonable white sturgeon recovery actions relating to hydro system operations.

In spring 2007 Fisheries and Oceans Canada completed a Recovery Potential Analysis for the listed populations of white sturgeon to determine which existing activities that could be violating prohibitions against harm to individuals or criical habitat might qualify for permits or exemptions under the *Species at Risk Act*. This Recovery Potential Analysis found that it may be reasonable to allow some continuing incidental harm contingent on the establishment of appropriate habitat restoration that is deemed sufficient to increase natural recruitment to historic levels and to hatchery supplementation that is deemed sufficient to avoid future genetic bottlenecks. The Recovery Potential Analysis also suggested which habitats are likely to be designated as critical through the recovery planning process, and thereby protected under *Species at Risk Act*. In the Waneta area, habitats within the Pend d'Oreille River from the Highway 22A Bridge to the Columbia River and the Columbia River from there to the international border will likely be deemed critical on an annual basis during June, July and the first week of August, based on known timing of spawning and incubation. Also within the study area, the Waneta Eddy likely will be critical habitat for juvenile rearing, overwintering and perhaps staging of this population. These habitats are affected by load-shaping operations from facilities on the Pend d'Oreille.

In summary, residual effects of project operations downstream potentially include: minor altered near-bottom flow velocities in a portion of white sturgeon rearing habitat within Waneta Eddy; and infrequent (modelled at 2 days during spawning season per year on average) changes in nearbottom velocities in a portion of white sturgeon spawning area in the Pend d'Oreille confluence. While both residual effects are anticipated to be mostly offset by mitigation, they are subject to confirmation through monitoring and an adaptive management program, and have been considered in the cumulative effects assessment of this Report.

In conclusion, Fisheries and Oceans Canada finds with the proposed design, construction and operational mitigative measures together with the proposed adaptive management program, which collectively will be finalized within a Fish and Fish Habitat Mitigation and Compensation Plan, that federal responsibilities for white sturgeon under the *Species at Risk Act, Fisheries Act,* and *Canadian Environmental Assessment Act* can be met.

Powerplant Operation – Shallow Waters Downstream of Waneta

In regards to potential adverse effects on fish and shallow water fish habitat downstream of Waneta from operation of the Project, the Proponent concluded that design specifications will result in a net residual effect that should be considered neutral to positive when taking into account stabilization of Seven Mile headpond levels.

The net effect of the increased flow variations that will result from passing through Boundary Dam discharges with less re-regulation will be a substantial increase in the net weighted wetted area in Seven Mile Reservoir and to a lesser extent the Waneta headpond. This area is estimated to be approximately 37 times the shallow water area projected to be lost downstream of the Waneta Dam. However, the comparative gains in habitat area are diminished in value when considering lower productivity of headpond habitat relative to higher productivity of losses in the Columbia River and the different species assemblages they support. Further, while Fisheries and Oceans Canada habitat policy recognizes "passive" gains in habitat such as afforded by the anticipated reservoir operations, these are not to be formally counted as compensation.

Other headpond benefits to fisheries resources are anticipated. The limited number of native salmonids that migrate between the Salmo River and Seven Mile Reservoir should benefit from more stable flows during the winter period when they reside in the reservoir. Entrainment rates of all species should be reduced with increased average water levels in Seven Mile Reservoir resulting in reduced access to the powerplant intakes, although net entrainment could increase as populations in Seven Mile Reservoir respond positively to the new habitat.

The Proponent believes that the net residual effect of project operations (i.e., flows being passed through from Boundary Dam unchanged) should be considered neutral to positive, because the expected physical increase in habitat area upstream exceeds the lost habitat downstream by a very large margin. However, in keeping with Fisheries and Oceans Canada habitat policy, the Proponent has developed a conceptual fish and fish habitat compensation plan to address the Fisheries and Oceans Canada habitat policy requirement of no-net-loss for the shallow water habitat that would be lost downstream of Waneta Dam. The compensation plan (*Pre-Feasibility Assessment and Conceptual Design for Shallow Water Habitat Compensation Related to the Waneta Expansion Project*, November 2006, Revised 17 January, 2007) will be finalized prior to authorizations being issued under the *Fisheries Act*.

In summary, the residual effects of the Project on shallow water habitats is anticipated to be an increase in productivity of this habitat in the Seven Mile headpond, and a relocation of shallow water habitat downstream of the Project to a proposed compensation site upstream of the project area. This could result in an increase in shallow water habitat productivity on the Canadian side of the border. The residual effects owing to loss of shallow water habitat downstream of the U.S. border, is discussed in Part C, Section 9 – Transboundary Effects. Residual effects have been considered in the cumulative effects analysis (Part E, Section 5).

Conclusions

Powerplant Operation – Waneta Eddy and Columbia-Pend d'Oreille Confluence

Fisheries and Oceans Canada has determined that the mitigative elements incorporated into the design of the Project together with the Proponent's commitments and description of an adaptive management approach to monitoring at a conceptual level of detail addresses Fisheries and Oceans Canada's environmental assessment needs. With successful development and implementation of above plans Fisheries and Oceans Canada and EAO have determined that the operation of the proposed powerplant is not

likely to cause a significant adverse environmental effect on fish and fish habitat in the Waneta Eddy and Pend d'Oreille confluence area.

Powerplant Operation – Shallow Waters Downstream of Waneta

Fisheries and Oceans Canada has determined that the Proponent's report *Pre-Feasibility Assessment and Conceptual Design for Shallow Water Habitat Compensation Related to the Waneta Expansion Project* (November 2006, Revised January 17, 2007), provides a satisfactory conceptual level compensation plan meeting Fisheries and Oceans Canada's environmental assessment needs regarding effects of proposed operations on shallow water habitats. With successful implementation of the compensation measures proposed, the anticipated operations are not likely to cause a significant adverse effect on shallow water habitat within the aquatic study area. If the Project is to proceed, the detailed Fish and Fish Habitat Mitigation and Compensation Plan will be finalized and attached to a section 35(2) *Fisheries Act* authorization.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities considered, among other reports and documents listed in this assessment Report, the Proponent's report *Pre-Feasibility Assessment and Conceptual Design for Shallow Water Habitat Compensation Related to the Waneta Expansion Project* (November 2006, Revised 17 January 2007).

Based on the information in this Report, and provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, Fisheries and Oceans Canada and EAO are satisfied that the operation of the powerplant is not likely to cause significant adverse environmental effects in regards to fish and fish habitat in the shallow Canadian waters downstream of Waneta.

9. TRANSBOUNDARY EFFECTS

The terrestrial and aquatic study areas (primary and secondary) approved for the environmental assessment of the Project did not extend south of the Canada-U.S. border. Any environmental effects from the Project in the U.S. are not quantitatively assessable using the baseline studies undertaken. However, broad qualitative considerations of potential project effects are discussed below.

9.1 Potential Project Effects

The potential transboundary effects of the Project are related to total gas pressure levels and shallow water aquatic habitat from the operation of the project powerplant (see Part C, Section 6 – Hydrology, Section 7 – Water Quality, and Section 8 – Fish and Fish Habitat).

Total Gas Pressure

The Project will divert flow around the Waneta Dam and existing generating station reducing spill at the Waneta Dam. As discussed in Part C, Section 7 – Water Quality, the reduction in spill is expected to have Moderate (positive) residual impacts related to total gas pressure creation at Waneta, with beneficial effects on Columbia River total gas

pressure regimes and aquatic resources downstream in Washington State. However, during high flow years most of the dams in the upper Columbia Basin will still produce elevated levels of total gas pressure when the hydraulic capacity of their powerplants is exceeded and excess water is spilled.

Aquatic Habitat

The Project will also allow releases from Boundary Dam upstream in Washington State to effectively flow through the downstream section of the Pend d'Oreille River without being altered (re-regulated) by hydroelectric operations at the Seven Mile and Waneta Dam facilities to maximize power output. Impacts within the transboundary reach of the Columbia River (U.S. and Canada) that will exist once the Project is constructed, will not be caused by powerplant operations, but rather will be the direct result of operations of U.S.-based facilities upstream on the Pend d'Oreille River, particularly the Boundary Dam.

Identification of effects of project operations on productive aquatic habitat in the U.S. section of the flowing Columbia River is limited to qualitative assessments based on the types of effects and their expected significance identified in the Columbia River above the border. Limited increases in the frequency of minimum flows resulting from flow-through of Boundary Dam releases will result in a small but measurable loss of physical nearshore shallow water habitat in the Waneta confluence area. This same type of reduction in habitat is expected within the10 kilometre length of the Columbia River downstream of the border (the approximate distance from the border to full pool level of Lake Roosevelt). The extent of habitat that will be affected is unknown and will vary seasonally and among years, depending on the elevation of Lake Roosevelt. Based on the predominantly steep sided channel configuration in this reach, the affected area is expected to be low relative to the remaining available habitat throughout the entire flowing transboundary reach of the Columbia River.

Based on current information on habitat availability, suitability, and resident fish use of the flowing section of the Columbia River south of the Canada-U.S. border, a qualitative assessment of project effects in this area was conducted. Extrapolation of the predicted effects described for the river from Waneta Dam to the boundary suggests the net effects of the Project on displacement of fish, fish stranding, and egg stranding and spawning (for species other than white sturgeon) in this U.S. section of the Columbia River is expected to be Low.

Regarding the potential effects of the Project on spawning, incubation and larval survival of white sturgeon in the Columbia River downstream from the Canada-U.S. border, the spawning area near Northport, Washington, has only recently been identified and flow or temperature related cues that may affect spawning activity in this area may be subject to similar fluctuations that are associated with spawning in the Waneta confluence area. The Northport spawning area is located approximately 15 kilometres downstream from the border and therefore flow-through related changes to water level or velocity will be substantially reduced from those experienced at the Waneta confluence. Any post-project changes are expected to be within the range of conditions presently experienced on an intra and inter-annual basis. Any thermal effect on incubating white sturgeon eggs in the Northport area is expected to be minor and limited to very small daily changes with no change to net cumulative thermal units.

9.2 Issues Raised and Proponent Responses

Issues raised during the environmental assessment review concerning potential transboundary effects of the Project are documented in Appendix 3 – Issues Raised and Proponent's Responses. The most significant or key issue was:

1. *The argument that the effects on productive habitat in the Columbia River downstream of the Canada-U.S. border result from U.S. based facilities is incorrect as the effects currently do not occur and will occur as the result of the proposed operation of Canadian facilities. Effects on productive habitat downstream of the border should be compensated for and monitored.*

   Proponent Response: The compensation program for shallow water habitat is to address downstream impacts in Canada as required by Fisheries and Oceans Canada policy.

9.3 Proposed Mitigation

Mitigation established during the planning and design stage is discussed in Part C, under Section 8 – Fish and Fish Habitat, Subsection 8.3 – Proposed Mitigation. No other mitigation is proposed related to the operation of the project powerplant.

9.4 Significance of Residual Effects and Conclusions

In summary, residual environmental effects of the Project in transboundary areas may result due to lower total gas presure levels from reduced spill during operations, measurable increases hydrologic fluctuations from passing Boundary Dam load shaping through Seven Mile and Waneta facilities, and potential loss of productive capacity of shallow water fish habitat for approximately 10 km from increased fluctuations in water surface levels. Residual effects have been considered in the cumulative effects analysis.

The Project is excepted from the application of the *International River Improvements Act* since there will be no significant incremental flow and level effects at the border resulting from the operation of the Project. The Proponent has informed the federal Minister of the Environment of the case for exception and has provided the required documentation.

The State of Washington Department of Ecology indicated that it supports the Project because of the probable reduction in total gas pressure downstream, and although this effect will probably be modest based on the Project alone, the combined effects of the Project and future gas abatement measures taken at Box Canyon and Boundary dams in Washington State will likely be significant. The Department requested a copy of the total gas pressure monitoring program plan and monitoring data as they become available.

The U.S. Fish and Wildlife Service provided no comment on the Project. The facilitation of the proposed capacity of passing block loading originating from Boundary Dam in the U.S. through Seven Mile and Waneta facilities will result in increased daily flow fluctuations in the Columbia River between the Canada-U.S. border and Lake Roosevelt over most non-freshet portions of the year, with resultant increases in river elevations, reductions in productivity of shallow water habitat and potential stranding of fish. These

effects have been brought to the attention of U.S. regulators who did not find them of sufficient concern to raise as issues. The Canadian Columbia River Inter-tribal Fisheries Commission, representing First Nation interests on both sides of the border, raised these issues as unmitigated concerns warranting compensation and monitoring. Without U.S. regulatory interest, compensation and monitoring of these effects are outside the mandate of this environmental assessment review.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to cause significant adverse transboundary environmental effects.

PART D – SOCIO-ECONOMIC EFFECTS

Study Area

The socio-economic study area (Appendix 1 – Figure 8) is focused on a sub-region of the West Kootenay that includes the major communities of Nelson, Castlegar, Rossland, Warfield, Trail, Montrose, Fruitvale and Salmo.

The socio-economic study area only covers Canadian territory and extends over the major population sub-regions in the Columbia River valley south of Arrow Lakes and in the Kootenay River valley west of Kootenay Lake. These sub-regions fall under the jurisdiction of the respective Regional Districts of Kootenay Boundary and Central Kootenay.

CEAA Requirements

As this Report is intended to meet the purposes of both the provincial and federal environmental assessment requirements, it contains matters relating to all potential socio-economic effects of the Project. However, when evaluating the significance of environmental effects pursuant to CEAA, the Responsible Authorities and the Minister will take into account environmental effects as defined in CEAA, summarized as follows:

> "Any change that the Project may cause in the environment; any effect of any change to environment caused by the Project on health and socio-economic conditions, including physical and cultural heritage; the current use of lands and resources for traditional purposes by Aboriginal persons; or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; or any change to the Project that may be caused by the environment."

Socio-economic information that is not directly related to the assessment of environmental effects as per CEAA was noted. A report on the assessment of the current use of lands and resources for traditional purposes by Aboriginal persons is provided in Part B of this Report entitled First Nations Consultations and Interests.

1. PUBLIC SAFETY AND HEALTH

1.1 Potential Projects Effects

The socio-economic issue scoping and effects assessment for the Project identified that the following project components/phases could potentially have adverse effects on public safety and health: construction traffic; and, accidents and malfunctions.

Construction Traffic

Project truck and worker traffic on Highway 22A and Seven Mile Dam Road will affect the local and regional road system on a temporary basis during construction. The increase in traffic volume has the potential to result in overall slower travel speeds and increased accident potential on Highway 22A during the construction period. Increased heavy truck traffic will result in more truck merging and turning among through-traffic on

these roadways. The increased interaction between construction and public traffic has public safety implications in terms of a possible increase in the number and severity of accidents. Specific potential impacts include: degraded road conditions; potential for lost materials from loaded trucks; vehicle damage and accidental injury and material loss; slower access to the project site and the Canada-U.S. border from Trail; and, slow response in the event of emergency.

As well, safety and health issues may also arise from the transportation and hauling of hazardous materials including: accidental loss of explosive and hazardous materials; road damage due to spillage; and public insecurity over hazardous materials transport and concern for the health and safety of the traveling public.

Accidents and Malfunctions (Construction and Operation)

Reasonably foreseeable accidents and malfunctions that have a potential to occur during project construction in the vicinity of the powerplant and transmission line are: vehicle/wildlife collisions; human/wildlife encounters; major leak or spill of hazardous material(s); and fire. Accidents and malfunctions that have a potential to occur only in the vicinity of the powerplant are: adverse effects of blasting; and major sewage leak or spill.

Reasonably foreseeable accidents and malfunctions that have a potential to occur during project operation in the vicinity of the powerplant and transmission line are plant forced outage and fire. In addition, a major leak or spill of hazardous material could occur in the vicinity of the powerplant.

Potential adverse effects on public safety and health that may result from accidents or malfunctions during construction or operations, involving failure of temporary containment systems, removal of contaminated sediments, and leaks or spills of hazardous material are discussed in Part E, Section 3 – Environmental Effects of Accidents and Malfunctions.

1.2 Issues Raised and Proponent Responses

Issues raised during the environmental assessment review concerning potential adverse effects of the Project on public health and safety are documented in Appendix 3 – Issues Raised and Proponent's Responses. The most significant or key issues were:

1. *A Traffic Management Plan specific to the Project is required that will identify the impacts of all project-related traffic to the existing street system and mitigative measures to ensure the safety of all road users. Ministry of Transportation approval of the plan is required prior to commencement of project construction. Upon receipt of applications with details for access locations, permits will be issued with specific site conditions.*

   Proponent Response: A commitment has been made to prepare a Traffic Management Environmental Work Plan that will contain all of the critical construction-related traffic flow provisions. There will be ongoing consultation with the Ministry of Transportation to identify and address any impacts to the highway system, and obtain necessary permits.

2. *Relocation of a portion of the Waneta-Nelway Road is subject to continued uninterrupted public use as an alternate route during Seven Mile Dam Road closures (due to winter avalanche activity).*

   Proponent Response: The Waneta-Nelway Road (see Appendix 1, Figure 2) will be closed through the powerplant worksite for the duration of project construction. Public use of the closed portion will be allowed during emergencies such as avalanches and rock falls on the Seven Mile Dam Road.

3. *A pre-construction survey of Highway 22 is to be undertaken to assess post-construction impacts to Highway 22. Remediation may be required and could include re-paving due to heavy construction traffic including off-road vehicles.*

   Proponent Response: Pre-and post-construction surveys will be done.

1.3 Proposed Mitigation

Construction

During the planning and design stage, potential adverse construction effects have been avoided or mitigated by adopting a Base Concept situated on the Pend d'Oreille River rather than on the originally-preferred Columbia River site, which will avoid temporary detours of Highway 22A traffic and a possible re-alignment of the Burlington Northern and Santa Fe rail bed.

Potential adverse effects associated with construction activities are expected to be prevented or mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The Environmental Work Plans that will be applied through the Environmental Management Program to prevent and/or mitigate potential construction effects include the: Traffic Management Environmental Work Plan; Public Safety Management Environmental Work Plan; Communications Environmental Work Plan; and, Spill Prevention, Preparedness and Response Environmental Work Plan. The Environmental Management Program requirements to address potential accidents and malfunctions include specific criteria and requirements for: waste and hazardous material management; and environmental monitoring and reporting (see Part E, Section 3 – Environmental Effects of Accidents and Malfunctions).

The following management practices will be applied through the Environmental Management Program and Environmental Work Plans to prevent and/or mitigate potential construction effects: regular road condition reviews, signage and posting of decreased speed limits where applicable; protection of material and rock loads in accordance with standard management practices and regulations; posting of signage outlining alternative route suggestions; public notification of construction traffic and large

vehicle turning points; regular monitoring of storage containers and hazardous material transport vehicles; hazardous materials public awareness campaigns through signage and public notices; and site excavations with safe side slopes that are properly shored and fenced to protect construction workers and the public.

Operations

The Proponent will develop a plan to address and manage public safety for the routine safety risks associated with the operation of the powerplant. This will be separate from, and in addition to, an Emergency Preparedness Plan (see Part E, Section 3 – Environmental Effects of Accidents and Malfunctions).

The Public Safety Management Plan will be coordinated with the public safety plan for the existing Waneta Dam facility and include: key responsibilities; identification of public safety risks; preventative measures to be put in place such as barrier fences, warning signs and an intake boom; maintenance requirements for public safety signage and facilities; and requirements to include discussion and review of public safety issues at regular plant personnel meetings.

The Proponent will discuss, with Teck Cominco and FortisBC, public safety issues associated with sudden changes in discharge resulting from the combined operation of the Project and the existing Waneta Dam facilities. Additional safety measures will be developed and implemented if additional risks resulting from the combined facilities are identified.

1.4 Significance of Residual Effects and Conclusions

No negative impacts are anticipated with the implementation of mitigation measures, and because of the temporary effects of construction traffic.

Conclusions

The Ministry of Transportation concluded that the issues it raised regarding potential effects on public safety and health related to temporary use of local and regional road systems during construction have been adequately addressed.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse socio-economic effects in regards to public safety and health.

2. COMMUNITIES AND ECONOMY

2.1 Potential Project Effects

The socio-economic issue scoping and effects assessment for the Project identified that there could be potential effects on the following elements of the socio-economic environment: regional economy; labour market; demography; housing; social and support services; and community stability. (The potential effects of the Project on traffic and road systems during construction are discussed under Part D, Section 1 – Public Safety and Health.)

The Project has the potential to create economic and social benefits for local residents within the project area and the Columbia Basin in terms of employment and training opportunities, earnings, and the long-term legacy of skills in the region.

Construction Impacts on Existing Waneta Facilities

Teck Cominco and FortisBC require access to existing facilities at Waneta. Available land areas are such that access to these facilities and access to the project powerplant work area must be shared. The Proponent will ensure that construction activities are undertaken in a manner that will allow Teck Cominco and FortisBC continuing access to existing facilities under their jurisdiction. Upon completion of construction, a permanent shared access road will be developed to serve the existing facility and the project powerplant. No negative residual project impacts are expected. Standard and project-specific management practices are available and will be used to manage and mitigate all potential adverse effects.

In-migration Related to Construction

Although the majority of the project workers will be local residents, it is expected that construction labour requirements will exceed the locally available labour supply, thereby necessitating some in-migration of workers from outside the socio-economic study area. In-migration of workers will inject new earnings into the regional economy and help to preserve and enhance the broad range of technical and occupational skills now available in the Columbia Basin. This inflow of people will temporarily create additional demand for housing and use of social and community services and facilities.

Even in the peak year of construction, in-migrants would add less than 0.5 percent to the local population within the Trail Local Health Area, the community closest to the project site, and 0.1 percent to the socio-economic study area as a whole. If all in-migrants should choose to locate in the Trail Local Health Area in the peak year, their addition would offset projected population loss in the Trail area and restore the population to its 2004 level. Therefore, the impact of in-migrant workers and their dependents is expected to have negligible effect on the Trail Local Health Area.

The demand for housing by in-migrant workers will vary by year; but the maximum demand would be 75 units in year two of construction. This figure represents less than one percent of the total existing housing stock and hotel/motel accommodation in the Greater Trail area, and less than 0.2 percent of total accommodation in the Central Kootenay and Kootenay Boundary Regional Districts. The additional demand for a maximum of 75 units of accommodation will not exceed the current or future accommodation supply of the region, even if in-migrant demand is concentrated in the immediate Trail area. If demand is dispersed, it is unlikely to have any perceivable impact, as has been the case with other hydropower construction projects in the region.

Although at present the Trail hospital is operating at capacity, it is expected that the small demand associated with the Project would not create additional pressure and would be accommodated by the hospital.

Schools in the Kootenay School District have experienced declining enrolment for several years. The maximum additional demand for enrolment is estimated to be 20 students. This number of additional students would represent approximately 1 percent increase in enrolment in Trail schools, (if all located there) and only a 0.5 percent increase if dispersed throughout the region. This is well within the schools' enrolment capacity.

There are approximately 400 licensed day care spaces in the West Kootenay region, with an enrolment rate of 37 per 1000 children age 13 and under. Assuming all child dependents (estimated maximum of 20) in the peak year of construction fall in this age bracket, average rate of demand would result in only one additional child seeking daycare.

Fire, police and emergency services should also see negligible, if any, effect from the expected inflow of workers and their families to the region. This is based in part on the relatively small size of the expected in-migrant population, as well as the fact that both the total population and housing stock are not expected to increase beyond current levels. In addition, the in-migrant population is not anticipated to be a high-risk group. As a result, additional demand, if any, for fire, police and emergency services is unlikely to be noticeable.

Although relatively small in number, project-related worker in-migrations will help offset loss of skilled workers to other construction projects in BC. The region's enhanced skill and labour market might motivate other industries to take advantage of this locally-based expertise with other projects of their own, or possibly attract other industries to locate within the region. The region should benefit from the demand for goods and services by in-migrants and the encouragement of economic development. The in-flow of workers and dependents for the Project will make a positive contribution to the region by stabilizing demand for housing and community facilities and services.

Employment and Procurement Benefits

The Project is expected to generate the following employment and procurement benefits over its 3.5-year construction period:

- 680 person years of direct employment;
- $60 million in direct employment earnings on a pre-tax basis;

- $5 million after tax income from indirect and induced employment; and,
- $25 million in local spending for the procurement of construction materials, supplies and services.

The Collective Agreement between Columbia Hydro Constructors and the Allied Hydro Council, which will guide the supply of labour for the Project, provides for preferential employment of local area qualified workers. Based on the collective labour agreement and experience with other similar projects, it is assumed that local residents will comprise 75 percent of the project labour force, as well as 50 percent of the managers and engineers. The ratio of full time to part-time labourer and trades jobs is estimated to be 4:1.

Direct employment will generate indirect and induced employment income within the region. Use of local subcontractors and purchases of materials and services by the Contractor during project construction will generate employment, earnings and business opportunities both within the project area, and elsewhere in the Columbia Basin and BC. These factors are expected to boost total earnings in the regional economy and create more opportunities for business.

As the closest community within the study area, Trail is most likely to be the primary beneficiary of these employment and income spin-offs. However, all communities and the immediate surrounding region within the 100 kilometre area of the site will also benefit to some degree. This in-flow of employment earnings and their spin-off effects will have a stabilizing effect on the community by supporting the sustainability of local goods and service suppliers, as well as community facilities and services in the region.

The Project has the potential to create economic and social benefits for women, visible minorities and persons with disabilities within the project area. This potential is measured in terms of employment and training opportunities for these individuals under the equity hiring terms of the Columbia Hydro Constructors/Allied Hydro Council Agreement. The agreement provides for preferential employment of local area people and establishes targets for local area equity hiring and training. Currently the target is 10 percent of employment for women, visible minorities and persons with disabilities. This target has so far been exceeded on the Brilliant Expansion Project.

Once the Project is in operation, full and part-time operational and maintenance employment for the powerplant and transmission line is likely to be 4 person-years annually. Actual employment will be two full time and three seasonal jobs per year. Corresponding total pre-tax earnings would be close to $1 million. Most of this would be injected into the local economy.

Government Revenues

The Project will generate provincial and federal personal income tax revenues from those who work directly on the Project and those who are employed because of indirect or induced spending. $16.8 million in tax revenue will be generated by direct employment over the lifetime of the Project ($11.4 million as federal government revenue, and $5.4 million as provincial government revenue). $1.9 million in tax revenue will be generated by workers employed due to indirect or induced spending ($1.3 million as federal government revenue, and $0.6 million as provincial government revenue). The Proponent is exempt from corporate income tax.

Following the issuance of a Water Licence, from construction start until powerplant start-up, the Comptroller of Water Rights will charge water rental fees on licensed capacity, but not energy generation. This will generate $156,600 in provincial government revenue during the construction period. Total Crown land tenure fees are estimated to be $25,000 during construction.

Once operational, the Project will create a stream of revenues from power sales. Net revenues on a present value basis are estimated to be in the magnitude of $25 million over an evaluation period of 60 years. Half of project earnings will accrue to the Province as the sole shareholder of Columbia Power Corporation, and the other half will be available for re-investment or spending in the region through the Columbia Basin Trust to further the interests of those most affected by the Columbia River Treaty.

Incremental revenues from the new powerplant operations will accrue to both the provincial and Regional District governments starting in year 2011. Water rentals fees paid to the Province during operation will be about $5 million annually. Land tenure fees paid to the Province during operation will be approximately $2,000 annually. Grants-in-lieu of property taxes paid to the Regional District of Kootenay Boundary are expected to be approximately $500,000 per year.

Electricity Demand

Once operational, the Project will generate output at full capacity during the freshet months of April, May, June and July, and below capacity for the rest of the year depending on most efficient water allocation between the generating units at Waneta Expansion and the Waneta Generating Station. The Project will generate more than 700 gigawatt-hours per year of renewable energy (additional capacity).

The Proponent's marketing plan includes long and short-term power sales opportunities where increasing demand and deficiencies in electricity supply are forecast. These opportunities would likely be a combination of responding to future requests for new power from BC Hydro and FortisBC, as well as short term sales into the market.

With continuing powerplant overhauls and upgrades, the economic life of the Project is expected to be 100 years or more.

2.2 Issues Raised and Proponent Responses

Issues raised during the environmental assessment review concerning potential adverse effects of the Project on public health and safety are documented in Appendix 3 – Issues Raised and Proponent's Responses. The most significant or key issues were:

1. *The Project involves a transmission line across crown and private land. The private land involves 11 blocks/lots/parcels and 5 parties (10 individuals). Approximately 15 hectares of private lands will be required for the statutory right-of-way for the transmission line and access routes within the statutory right-of-way corridor. Additional requirements for temporary access during construction via existing access roads on private lands will have to be negotiated. The request for Land Act tenure to the Crown land crossed is being reviewed concurrently with the Application for the Project. If the Project is approved, the Ministry of Environment, Water Stewardship Division, anticipates that the Proponent will negotiate in good faith with the affected*

private land owners to determine fair and reasonable compensation.

Proponent Response: The private lands involved range from approximately 8 hectares to 130 hectares and the areas affected by the statutory right-of-way range from approximately 0.8 hectares to 5.5 hectares. In terms of area, the greatest effect will be a 0.8 hectare statutory right-of-way through the 8 hectare parcel. The Proponent has had initial negotiations with potentially affected landowners and anticipates advancing and concluding these negotiations, if it is determined that the Project can proceed. The Proponent will seek to reach an agreement with the private landowners on fair and reasonable compensation for accessing the project transmission corridor to confirm the environmental assessment of this area (see Part C, Section 4 – Vegetation, and Subsection 4.2 – Issues Raised and Proponent Responses) and to allow construction and maintenance of the transmission line. To address the loss of timber values on private land, affected landowners will be directly compensated, based on the results of a timber cruise.

2. *Increased spread/invasion of noxious weeds associated with the construction of the Project, in particular the transmission line, could exacerbate this already existing problem on adjacent private agricultural and forested lands and adversely affect land owners* (see Part C, Section 4 – Vegetation).

   Proponent Response: The existing abundance and distribution of noxious weed species in the project area and the potential for the Project to exacerbate this existing problem has been recognized and considered in the Environmental Management Program for the Project. The Noxious Weed Control Environmental Work Plan (see Part C, Subsection 4.3 – Proposed Mitigation) to control and monitor the spread of spotted knapweed and other invasive species within the project area will be developed in collaboration with other agencies to ensure that it is consistent with other pest management plans and weed management control efforts underway in the Pend d'Oreille Valley. The Proponent will participate with other stakeholders in funding cooperative weed control initiatives in areas potentially impacted by project facilities.

3. *The Reith Creek and Lime Creek watersheds could be affected by construction of the transmission line. Specific measures to address potential water quality and quantity issues for water licensees should be identified.*

   Proponent Response: No instream work will be required during transmission line construction. Negative residual effects are not predicted or anticipated in the watersheds of Reith and Lime Creeks (see Part C, Section 7 – Water Quality).

4. *The Proponent should commit to taking a primary/leadership role in providing passage for salmon stocks in case they are ever re-established in the upper Columbia.*

   Proponent Response: The construction of the Project will not negatively impact fish passage by precluding the implementation of future fish passage options. Future fish passage up the Pend d'Oreille, in the event that anadromous fish are restored to the upper Columbia River, is an objective that will require the participation and cooperation of numerous stakeholders to negotiate and resolve a number of biological, physical and economic issues and constraints. If there is consensus that

passage of anadromous fish is socially desirable, which results in direction from fisheries management agencies, the Proponent will contribute to establishing fish passage facilities at Waneta. It is anticipated that the owner of the existing Waneta Dam and Generating facility would have the primary responsibility for establishing fish passage. The Proponent's commitment is to participate in, and cost share, those efforts in the same proportion as the relative benefits received from the dam. It is also expected that other stakeholders that will benefit from the establishment of fish passage, such as fisheries agencies and First Nations, will also contribute to such a project.

2.3 Proposed Mitigation

Potential adverse effects associated with construction activities are expected to be prevented or mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The Proponent will monitor project effects on the various elements of the socio-economic environment. A Community Impact Management Committee will review impacts monitoring information and may advise on measures to address any unforeseen project impacts related to worker hiring, new workers relocation to the area, and traffic issues etc.

2.4 Significance of Residual Effects and Conclusions

No negative residual effects relating to communities and the local or regional economy are expected from the construction and operation of the Project.

Conclusions

The Regional District of Kootenay Boundary Board of Directors passed a resolution indicating that the Proponent's responses to the issues raised by the Regional District are considered to be adequate.

According to BC Hydro's 2006 Integrated Electricity Plan, electricity demand will grow between 25 and 45 percent over the next 20 years. The Ministry of Energy, Mines and Petroleum Resources indicated that the Project could help meet this need and contribute to the Energy Plan's energy security and reliability objective.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local

governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO and the federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse socio-economic effects in regards to communities and economy.

3. HERITAGE AND ARCHAEOLOGICAL RESOURCES

Beginning in the early 1800s, non-Aboriginal activities were recorded in the project area. British land-based fur trade explorations provide context for the earliest non-Aboriginal presence in the Pend d'Oreille River region. Around 1840s, the Colville District reached the apex of its fur and "country-produce" production. However, in 1846, as a result of the Oregon Treaty, the Hudson's Bay Company began its gradual withdrawal from the areas that are now known as western U.S., however, remained active in the northern areas that are now part of Canada. Around 1856, the Hudson's Bay Company constructed Fort Shepherd. The establishment of Fort Shepherd brought increased economic activity to this area until 1870, when the Hudson's Bay Company permanently closed the Fort.

While the discovery of gold in 1864 brought exploration activities to the lower Pend d'Oreille River area, between the period of 1870s and 1880s, there are very few site-specific historical records denoting the community and economic situation in the lower Pend d'Oreille River valley area. In the late 1890s, construction of the Nelson and Fort Shepherd Railway began. This economic initiative by the Nelson and Fort Shepherd Railway Company led to the creation of a settlement known as "Waneta".

In 1895, the company received a Crown grant of public lands that included the site of the Waneta settlement and the area that later became the site of the Waneta Dam. While some community structures and facilities were built in and near the Waneta settlement, the area attracted little development for the next several decades and the area remained a remote part of BC. By the late 1940s, Waneta residents had virtually abandoned the settlement. In 1950, construction of the Waneta Dam created an economic boom that was short-lived; no permanent settlement remained in the area after construction was completed.

Information on ten previously recorded archaeological sites in the general project area was obtained from the Archaeology and Registry Services Branch of the BC Ministry of Tourism, Sport and the Arts by the Proponent. According to the Proponent none of the sites are located in areas likely to be affected by the Project.

The Proponent conducted an Archaeological Overview Assessment and a follow-up Archaeological Impact Assessment of the project area. The areas investigated included the powerhouse site, the transmission line route and excavated rock disposal areas.

3.1 Potential Project Effects

Literature review conducted by the Proponent indicates that no historical structures remain within the immediate areas of the Project. Areas in the confluence of the Pend d'Oreille and Columbia rivers featured only marginally in BC's fur trade, gold rush, exploration, and railway booms. A remote part of the Province, the area remained devoid of extensive development during these periods of economic boom in BC. Consequently, this area holds relatively weak non-Aboriginal heritage value.

Based on their review of past archaeological investigations carried out in the general vicinity of the project area, information on previously recorded archaeological sites in the project area and field investigations for the Project, the Proponent concluded that the areas proposed for the powerhouse do not have any potential for archaeological deposits. No archaeological or other evidence of past Aboriginal land-use or settlement have been previously observed in any area associated with the proposed powerhouse site.

Two river terrace features located within the proposed transmission line corridor were determined to have some potential for sub-surface archaeological evidence of past Aboriginal land-use and, subsequently, additional sub-surface testing of these areas was conducted. Analysis of findings resulting from these tests indicates no sub-surface evidence of archaeological deposits or remains.

Similarly, a small portion of the excavated rock disposal areas was determined to require additional testing. Subsequent surface examination of this location indicated that this area was not in the disposal zone. Sub-surface testing for deposits yielded no evidence of pre-contact Aboriginal land-use.

The Proponent concluded that the Project would have no negative impact on archaeological resources and that additional archaeological investigations are not warranted.

3.2 Issues Raised and Proponent Responses

Issues raised during the environmental assessment review concerning potential archaeological resources of the Project are documented in Part B and Appendix 3.

3.3 Proposed Mitigation

Representative standard management practices that will address construction activities having potential to impact the cultural and heritage environment are:

- Application of archaeological and heritage site monitoring during construction;
- Application of standard stop-work and evaluation measures if previously unknown resources are encountered on the project site.
- The Proponent will ensure that if any potential archaeological materials are exposed during construction activities work will be halted and not resumed in the

vicinity until appropriate mitigation measures have been implemented and approval has been received from the Ministry of Tourism, Sport and the Arts – Archaeology Branch.

3.4 Significance of Residual Effects and Conclusions

No residual effects on heritage and archaeological resources relating to the construction and operation of the Project have been identified.

Conclusions

The Ministry of Tourism, Sport and the Arts – Archaeology Branch concluded that in the absence of any identified impacts, Archaeology Branch interests are unaffected by the proposed Project and there is no known archaeological reason why the Project should not proceed as proposed.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO is satisfied that the Project is not likely to result in significant adverse socio-economic effects in regards to heritage and archaeological resources. The federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse environmental effects to heritage and archaeological resources resulting from a change in the environment.

4. LAND AND RESOURCE USE

4.1 Potential Project Effects

The issue scoping and effects assessment for the Project identified that there is potential for the following specific elements of the receiving environment to be adversely affected by construction of the project powerplant and transmission line: forest resources; agricultural resources; mineral resources; recreation and tourism; and viewscapes.

Forest Resources

Timber from a minimum of 1.5 hectares will likely be removed from the powerhouse and intake areas. Volumes of additional merchantable timber removed from access roads, parking areas and entrances to work areas are not considered to be significant. The overall impact of powerplant construction on forestry resources is considered to be of negligible significance.

Crown land along the proposed transmission line is within Atco Lumber Ltd.'s operating area. An estimated 10 hectares will be directly impacted in the electrical clearance zone, (in addition to cutting/topping of danger trees in the adjacent Tree Management Zone). Removal of merchantable timber within an estimated 10 hectare area may constrain or delay future harvesting opportunities in areas adjacent to the corridor, because of biodiversity and wildlife habitat adjacency and connectivity requirements. Based on the relatively small size of the area affected (less than 0.01 percent of Atco's operating area) and estimated timber volumes per hectare, this loss of forest resource values to Atco is considered of Negligible significance.

Remaining privately owned segments that require clearing for the new transmission line statutory right-of-way and access trails comprise an estimated 15 hectares (electrical clearance zone) and involves 11 blocks/lots/parcels and 5 parties (7 individuals). Selective tree cutting/topping will be conducted in the Tree Management Zone. To address the loss of timber values on private land, affected landowners will be directly compensated, based on the results of a timber cruise survey (see Part D, Section 2 – Communities and Economy).

Assuming that affected private landowners will be compensated for the full economic value of timber resources and that affected Crown lands represent less than 0.01 percent of the operating area of Atco Lumber Ltd., residual impacts of transmission line construction are considered to be of Negligible significance.

Agricultural Resources

Some lands required for or affected by project activities are within the Agricultural Land Reserve and/or are used for agricultural purposes. In particular, Worksite F (to be used for contaminated sediment management), the powerplant intake, and transmission line areas do not conform to acceptable land use activities within the Agricultural Land Reserve (Rural Zone 4).

The Proponent has filed applications with the Agricultural Land Commission for, and not withstanding the Application, the Commission has approved applications for the following:

- exclusion of 7 hectares of land from the Agricultural Land Reserve for construction of project infrastructure;
- non-farm use of 94.5 hectares within the Agricultural Land Reserve for purposes of construction of transmission line and temporary lay-down areas (this approval was granted for two complete parcels of land though only part of each parcel will be required); and,
- a utility corridor of 1.5 hectares within the Agricultural Land Reserve for construction of the transmission line; and,

- an additional 3 hectares of Agricultural Land Reserve lands owned by Arrow Lakes Power Corporation (a Columbia Power Corporation/Columbia Basin Trust Energy Inc. affiliated company) at Selkirk Substation for utility corridor use.

There are 53,539 hectares within the Agricultural Land Reserve in the Regional District of Kootenay Boundary. Given the small size of the area requested for removal from the Agricultural Land Reserve and its relatively low agricultural value, residual effects on agricultural resources are considered to be of Negligible significance, assuming that restoration plans and weed management and monitoring measures are implemented satisfactorily.

Mineral Resources

Upon application by the Proponent, the Ministry of Energy, Mines and Petroleum Resources established a "no registration" reserve in the project powerhouse area from the Waneta Dam downstream to below the Highway 22A Bridge. This reserve places restrictions on any new mineral or placer mining in the area of the reserve and protects project activities. In addition, there is an existing conditional reserve in place associated with the Waneta Dam facilities which permits acquisition of tenure subject to conditions; and, this reserve has been revised to cover the Project.

Mineral claims that exist in the general project area outside of the areas protected by the reserves are not expected to be affected by the Project.

Permanent installations and construction activities will affect four existing placer claims, one at the location of the powerhouse and tailrace within the area protected by the new reserve, and three outside of the areas protected by the reserves. The holders of the placer claims have been advised about the Project and its potential impact on their claims. The Proponent has an option to acquire surface property rights to the powerplant site and to construction facilities sites associated with the Project. The Proponent will exercise its option to purchase upon approval of the Project. The Proponent has indicated that these surface rights originate prior to the placer claims and take precedence over them. The Proponent cannot allow access to placer claim sites during construction except by special arrangement with the Proponent and provided that such access is deemed safe and does not interfere with and/or obstruct construction in any way.

There will be a residual impact on the one placer claim at the location of the powerhouse and tailrace which will preclude future working of a portion of the claim. Excavation will essentially remove any potential placer minerals from affected areas within the claim. The Proponent contends that removal of such minerals in the absence of the Project would be extremely difficult and would not be viable for the claim holder. The Proponent has successfully negotiated a "Quit Claim Agreement" with this claim holder.

The residual impact of the Project on placer claims is considered to be Negligible based on factors such as the absence of proof of economic value, and absence of on-going placer mining activity. In cases where there is a conflict between the objectives of surface rights holders and placer mineral rights holders, first priority to the use of the land is given to the holder to which rights were issued first. In the case of the Project, the Proponent has indicated that the surface rights (holders) take precedence over those of the placer mineral rights (holders).

Recreation and Tourism

A number of standard measures are proposed to ensure public safety while minimizing the potential for negative impacts to recreational users and visitors to the project area. These include close monitoring of recreational activity; posting of relevant notifications/warnings to clubs, newspapers and site-specific signage; temporary road/area closures related to blasting, excavation and materials removal, as required; and temporary access restrictions to specific worksites or the transmission corridor during the construction and site reclamation phase. These measures may result in some short-term site-specific impacts with respect to the nature, location and quality of recreational opportunities.

Given the confined area to be occupied by the powerplant and construction areas, as well as the temporary nature of the anticipated impacts, no residual impacts are expected to either recreational resources or their use following completion of the Project.

Viewscapes

The clearing of trees in the expansion powerplant area and the addition of the new transmission line will have a minor effect on prevailing viewscapes. New wires and poles will be visible between the powerhouse and the existing BC Hydro transmission line. These effects will be mitigated by the low level of tree removal required, and by area topography and vegetation structure, which will restrict sight lines and minimize the visibility of openings. There will be no impact on viewscapes where the new transmission line parallels the existing BC Hydro transmission line, as the existing line in these areas is generally not visible from existing roads and highways.

No negative residual project impacts are expected. Since several transmission lines exist in the project area, the incremental impact of the new transmission line will not be obvious to the casual observer.

4.2 Issues Raised and Proponent Responses

1. *Worksites D3 and D4 have been leased from Teck Cominco and farmed for several years.*

   Proponent Response: Agreements with Teck Cominco give Waneta Expansion Power Corporation the right to use the lands designated as Worksites D3 and D4 for the Project. Consistent with the industrial zoning and with Teck Cominco's end-use objectives, these two parcels are intended to be used for the storage of surplus excavated materials and/or a variety of construction support activities. If used at all, it is likely that these areas will be used as flat-ground laydown areas. Such activities are not expected to impair the property for resumption of its present agricultural use following construction. While these sites may not be available for farm use during construction and their future use is uncertain, proposed restoration for these sites recommends returning them to their current agricultural state.

2. *It is recommended that Goose Flats, Echo Beach, and the camping area located south of the bridge be improved as recreation sites and dedicated as a legacy for the recreational use of the general public.*

Proponent Response: The area south of the Waneta (Highway 22) Bridge is owned by Teck Cominco and Burlington Northern Santa Fe Railway. Its current use by the public for camping/parking is not officially authorized. Waneta Expansion Power Corporation has the right to use these areas on a temporary basis during construction, and if they are used, they will be restored. Waneta Expansion Power Corporation will establish an information/interpretive centre immediately south of the bridge if Teck Cominco and Burlington Northern Santa Fe Railway agree to such use of this specific site, and if the Regional District of Kootenay Boundary agrees to contribute on-going maintenance. The nature of this information/interpretive centre at the confluence of the Columbia and Pend d'Oreille rivers, and arrangements for its establishment will be developed with the property owners and Regional District of Kootenay Boundary once project construction begins.

4.3 Proposed Mitigation

During the planning and design stage, potential adverse construction effects have been avoided or mitigated by:

- Locating the new powerhouse and intake structures close to those of the existing Waneta generating facility, which serves to minimize the construction footprint and keep much of the construction within the existing, previously disturbed powerplant site.
- Selecting the preferred transmission route contiguous with BC Hydro's line to Selkirk which will serve to reduce required land clearing and to minimize impacts of a separate transmission route.
- Utilizing, to the extent possible, existing gravel pits and previously disturbed areas for the storage of excavation material, which will minimize the land-based disturbance resulting from the Project.

Potential adverse effects associated with construction activities are expected to be prevented or mitigated by applying standard and project-specific management practices. The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The following are examples of management actions or practices that will be applied to prevent and/or mitigate potential construction effects relating to land and resource use:

- Protection against wildfires;
- Minimized alteration of agricultural land quality and the fragmentation of agricultural lands;
- Consideration of reasonable concerns by mineral claim holders;
- Monitoring of cyclists and other non-vehicular recreational users of Highway 22A and use of cautionary signage;
- Posting of signs at boat launches and the distribution of notices at local fishing clubs to warn anglers of construction activities;

- Restriction of public access to temporary worksites; and,
- Appropriate restoration of sites temporarily used for construction.

4.4 Significance of Residual Effects and Conclusions

No negative residual effects relating to land and resource use are expected from the construction and operation of the Project.

Conclusions

The Ministry of Forests and Range concluded that the Project would have negligible effects on the forested/timber land base and noted that no Old Growth Management Areas would be affected.

The Agricultural Land Commission has approved applications under the *Agricultural Land Commission Act* for non-farm use of Agricultural Land Reserve property, and the exclusion of land from the Agricultural Land Reserve to allow project activities and infrastructure. The applications were approved on the grounds of community need or the lands having very limited or no significant agricultural potential, and subject to appropriate measures being taken to prevent the spread of noxious weeds, and temporary construction areas being fully reinstated for agriculture upon completion of the Project. The Regional District of Kootenay Boundary has no objections to the non-farm use and exclusion from Agricultural Land Reserve property required for the Project.

The Ministry of Energy, Mines and Petroleum Resources indicated that any issues regarding priority of mineral tenure rights will be addressed according to the requirements of the *Mineral Tenure Act*.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO is satisfied that the Project is not likely to result in significant adverse socio-economic effects in regards to land and resource use. The federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse environmental effects to land and resource use resulting from a change in the environment.

5. NAVIGABLE WATERS

Transport Canada has assessed the physical characteristics of the waterway, in relation to the Project and it has been found that the Pend d'Oreille River will allow for the navigation of "vessels", as defined in section 14 of the *Navigable Waters Protection Act*. Moreover, as the definition of a 'work' contained in section 3 of the *Navigable Waters Protection Act* captures the Project within that meaning, it follows then, that the *Navigable Waters Protection Act* would apply to the works associated with the Project.

An overview of existing navigation within the vicinity of the Project was included in the Application. Navigation in the project area is dominated by activities associated with recreational boating in the Pend d'Oreille valley, within the headpond area, and in the Columbia River from the Pend d'Oreille River confluence to the U.S. border.

The *Navigable Waters Protection Act* provides the federal government with the authority to require that the construction or placement of any structure or physical works in, upon, over, under through or across any navigable waterway in Canada is reviewed and approved under section 5 of the Act. The administrative definition of navigable waters includes any body of water capable of being navigated by floating vessels of any description for the purpose of transportation, commerce or recreation.

5.1 Potential Project Effects

The design and location of the Project may have possible effects on navigation in the waterways surrounding the project area. In the Application and supplemental materials, the Proponent assessed the potential for effects of the Project on recreation and proposed measures to mitigate these potential effects.

5.2 Issues Raised and Proponent Responses

There were no issues concerning potential effects of the Project on navigation raised by the Proponent, other government agencies and/or the First Nations during the environmental assessment review.

5.3 Proposed Mitigation

A number of standard mitigation measures are proposed by the Proponent to ensure public safety while minimizing the potential for negative impacts to recreational users and visitors to the project area. These include:

- Close monitoring of the recreational activity;
- Posting of relevant notifications/warnings to clubs, in newspapers and site-specific signage;
- Prevent access through any part of the construction site to the river for kayaking, fishing and other activities;
- Temporary road/boat launch/area closures related to blasting, excavation and material removal, as required; and,
- Temporary access restrictions to specific worksites or the transmission corridor during the construction and site reclamation phases.

Environmental effects of projects on navigation are taken into consideration as part of environmental assessments when the effects are indirect, that is when the effect is the result of a change in the environment. The following mitigation is required to be incorporated into the construction and operation phases of this Project to ensure that the indirect environmental effects on navigation are mitigated. These mitigation measures will also form the basis of the conditions that will be provided in the *Navigable Waters Protection Act* approval:

- Construction material and debris are not allowed to become waterborne;
- All temporary piles, false works, debris, etc., are to be completely removed from the waterway;
- Any materials or equipment used in construction are to be marked in accordance with the Collision Regulations of the *Canada Shipping Act* when located in or on a waterway;
- In the event that the operation of the works is terminated, it will be the Proponent's responsibility to remove the works and the associated equipment in its entirety;
- Any works associated with in water habitat compensation will be submitted to Transport Canada for navigation review;
- On completion, the owner shall install a permanent control boom fronting the intake channel at an appropriate distance upstream, additionally, yellow cautionary buoys are to be placed and maintained in the same alignment as the control boom and on the upstream side. These buoys shall be spaced no more that 20 metres apart and shall comply with the provision of the Private Buoy Regulations of the *Canada Shipping Act*;
- The owner shall install and maintain warning signs at appropriate locations upstream of the works that advise of the presence of the intake channel;
- Debris control and removal will be the responsibility of the owner. Transport Canada/Navigable Waters Protection Division will monitor compliance; and,
- The owner shall provide unimpeded access to the Minister or his/her representatives for inspection and/or monitoring purposes.

5.4 Significance of Residual Effects and Conclusions

No significant residual effects on navigation are expected. Potential adverse effects from navigation during construction and operation are expected to be prevented or mitigated through the application of the above mitigation strategies.

During the environmental assessment review of the Project, EAO and the federal Responsible Authorities have considered:

- The Proponent’s Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent’s Responses);

- The Proponent's responses to issues raised (Appendix 3 – Issues Raised and Proponent's Responses); and,
- The Proponent's Commitments, as updated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation and compensation as indicated above and implements the actions described in the Commitments listed in Appendix 4, EAO is satisfied that the Project is not likely to result in significant adverse socio-economic effects in regards to navigable waters. The Federal Responsible Authorities are satisfied that the Project is not likely to result in significant adverse environmental effects to navigable waters resulting from a change in the environment.

PART E – SPECIFIC CEAA REQUIREMENTS

1. EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Seismicity

The region that includes the Waneta Dam site has a very low level of historical seismicity and there has been no significant fault movement for several million years. Most of the catalogued earthquakes within a 200 kilometres radius of Waneta are low level disturbances (< M3). The largest event on record (M5) occurred 130 kilometres to the southeast in 1942. Active zones occur in Puget Sound and Flathead Lake area in Montana over 400 kilometres and 290 kilometres away, respectively. It is estimated that peak ground acceleration might be 0.16g corresponding to a 10,000 year return period.

The Waneta Dam was designed to withstand seismic events that might be felt in the Waneta area. The Project will be designed to meet seismic guidelines and standards. A large earthquake might cause a power outage; but is unlikely to result in increased discharge through the powerplant.

Slope Stability

Slope instability occurs about 300 metres – 650 metres upstream from the dam on the right bank and leads to erosion due to a lack of vegetation growth. This contributes to increased sediment loading in the headpond. The Waneta Dam is founded on bedrock. In extreme flood events, the increased sediment load would be carried downstream under such turbulent conditions. Downstream of the dam, the lower river terrace is retained by a concrete wall that parallels the river over a distance of approximately 200 metres. The wall is of varying height and founded on the bedrock riverbank.

The potential for a major landslide to cause a sudden change or cessation in flows in the Pend d'Oreille is extremely unlikely. Measures to deal with floods, droughts and floating debris will also deal with this possibility. Geologic formations at Waneta and along the power line route are not considered to have landslide potential.

Floods

Flood magnitude was determined using Environment Canada's CFA 3.1 software. The presence of the Project provides an additional safe route for passage of water. The design level is for a 1 in 200 year event; in an extreme event the powerhouse would be flooded but not compromised.

It is likely that extreme flood events would also create additional floating debris which would be handled by the existing booms. In the unlikely event that the booms could not handle the debris, the booms could be raised to allow a short term passage of debris over the spillway.

Climate Change

It is anticipated that, for Canada as a whole, and BC in particular, summer and fall precipitation will increase (based on studies by the Climate Impacts Group, University of Washington). It is also predicted that there will be significant reductions in snowpack due to warming trends which will affect timing of peak run-off and peak flows. This will lead to earlier onset of peak spring flows, lengthening of low flow periods and increased winter flows due to increased temperatures (i.e. precipitation as rain, not snow). This will mean that the Project will have an altered power production profile and potentially

reduced power production. This will not necessarily mean, however, that project viability will be affected because the climate change effects will be system-wide and under such conditions the price of power will likely increase.

Droughts
If the dry season is prolonged, then the Project would undergo reduced power production. This possibility would likely be tied to climate change, as discussed above.

Ice Formation
There is no record of significant ice formation on the Waneta headpond and the construction of the Project will not cause this situation to change. If ice formation does occur, then the floating ice will be treated as floating debris and allowed to pass over Waneta's spillway.

Wildfires
There is a low risk of wildfires due to natural causes or human carelessness. Fire adjacent to the transmission line that would result in a powerplant shutdown, would likely result in water being spilled over Waneta Dam.

Groundwater Seepage
During low flow periods, groundwater seepage contributes 2-19 percent of the creek flows that enter the Pend d'Oreille. Tests on the bedrock in the vicinity of the intake indicate relatively impervious conditions, leading to the conclusion that the temporary rock plug will effectively isolate the site from the headpond during construction. Groundwater is expected to seep into the tunnels but is not likely to impact on operations. The area mainly consists of impervious bedrock.

Some of the effects of the environment on the Project identified above may occur throughout the life of the Project. Information related to environmental effects of the Project can be found throughout the discussion in Part C as well as Part E, Section 3 entitled Environmental Effects of Accidents or Malfunctions.

2. ENVIRONMENTAL EFFECTS OF ALTERNATIVE MEANS

Part A, Section 2.4 describes the alternative means of carrying out the Project. CEAA considers the various ways, which are technically and economically feasible, that a project can be implemented or carried out, and the environmental effects of any such alternative means. This could include alternative locations, routes and methods of development, implementation and mitigation.

Given that the location of the resource was fixed, the Proponent considered whether or not there was an alternative development possible by: relocating the powerhouse; altering powerhouse components and capacities; relocating the transmission line route; and altering the transmission line design.

Table 3 summarizes the various alternative means of carrying out the Project that were examined by the Proponent, their technical and economic feasibility, and potential environmental effects.

Table 3 – Alternative Means of Carrying out the Project

Alternative Means	Technical and Economic Feasibility	Potential Environmental Effects
Powerhouse		
Siting the powerhouse on the left bank of the Pend d'Oreille River	Technically and economically not feasible (powerhouse would need to be located on the left bank of the Columbia River, downstream of the confluence with the Pend d'Oreille)	• Greater adverse effects on white sturgeon habitat • Disruption of Burlington Northern Santa Fe Railway and Highway 22A
Siting the powerhouse on the left bank of the Columbia River (upstream of the confluence with the Pend d'Oreille)	Economically not feasible	• Greater adverse effects on white sturgeon habitat • Disruption of Burlington Northern Santa Fe Railway and Highway 22A
Siting an underground powerhouse (connected to the existing Waneta powerhouse) on the right bank of the Pend d'Oreille River	Technically and economically not feasible	• Concerns as to the adequacy of the rock cover and stability of powerhouse cavern
Siting a surface powerhouse on the right bank of the Pend d'Oreille River (the selected option), with alternative alignments of components [lower power tunnels(s) and tailrace]	Technically and economically feasible	• Greater extent and volume of overburden excavation • Reduced ability to isolate the work area from the river during construction • Greater impact on existing tailrace hydraulics and fish habitat during operation
Siting a surface powerhouse on the right bank of the Pend d'Oreille River (the selected option), with alternative installed generating capacities ranging from 125 to 435 megawatts (the selected option)	Technically and economically feasible (the selected option, 435 megawatts, was deemed most economic; while reduced generating capacities may be feasible, there would be a point below which this would be economically not feasible	• Lower generating capacity would maintain higher levels of spill over the Dam and higher levels of total gas pressure • Lower generating capacity would result in less flow changes downstream and reduce effects on downstream aquatic habitat associated with flow

		changes
Transmission Line		
Transmission line Route 2 – new double-circuit line utilizing the existing Teck Cominco 71 Line statutory right-of-way	Technically and economically feasible	• An increase in length by 1.5 kilometres, but 6 hectares less statutory right-of-way clearing • Additional clearing in high value ungulate winter range zone • Greater soil disturbance associated with difficult terrain which may increase risk of noxious weed spread • Higher overall potential to impact habitats associated with listed species • Greater potential for sedimentation and aquatic impacts due to soil disturbance • 20 percent greater impact on private land, with some farming activity on affected land
Transmission line Route 2 – separate single circuit parallel to the existing Teck Cominco 71 Line statutory right-of-way	Technically and economically feasible	• Approximately 34 hectares more clearing required
Transmission line Route 2 – new double-circuit line adjacent to the existing Teck Cominco 71 Line statutory right-of-way, then removing 71 Line	Technically and economically feasible	• Although old statutory right-of-way could be reclaimed, incremental impact from clearing new statutory right-of-way
Transmission line Route 1 (the selected option paralleling the existing BC Hydro statutory right-of-way) – single pole design (vs. the selected wood-pole H-frame type)	Technically and economically feasible	• 6.5 metres less statutory right-of-way clearing width, but more and taller structures • If overlap with BC Hydro's statutory right-of-way were not possible, 9 metres more statutory right-of-way clearing width would be required

Based on the above exercise, the Proponent concluded that the proposed means of

undertaking the Project was the most economically feasible of the options identified. As well, all of the other options outlined would result in greater environmental, and in some cases social impacts than the proposed Project.

3. ENVIRONMENTAL EFFECTS OF ACCIDENTS AND MALFUNCTIONS

Accidents and malfunctions might occur during project construction or operations. The greatest risk to the environment is likely to occur during construction activities.

The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of and compliance with the Environmental Management Program.

The Environmental Management Program requirements to address potential accidents and malfunctions during construction activities include specific criteria and requirements for: waste and hazardous material management; and environmental monitoring and reporting. The Environmental Work Plans that will be applied through the Environmental Management Program to prevent or mitigate potential accidents and malfunctions during construction activities include the: Contaminated Materials Management Environmental Work Plan; Spill Prevention, Preparedness and Response Environmental Work Plan; Water Quality Protection Environmental Work Plan; and, Erosion, Sediment and Drainage Control Environmental Work Plan.

During operation of the Project, accidents and malfunctions that may occur will be addressed through an Emergency Preparedness Plan, and Spill Prevention, Preparedness and Response Plan. Specific measures for addressing foreseeable accidents and malfunctions will include emergency response planning, inspections, environmental audits, and staff training/orientation. The procedures will be updated regularly.

<u>Accidents and Malfunctions during Construction</u>

Reasonably foreseeable accidents and malfunctions that have a potential to occur during construction in the vicinity of the powerplant and transmission line are: encroachment on designated protected areas; vehicle/wildlife collisions; human/wildlife encounters; excessive disturbance of wildlife; major leak or spill of hazardous material(s); failure of temporary containment systems; and fire. Accidents and malfunctions that have a potential to occur only in the vicinity of the powerplant are: adverse effects of blasting; removal of contaminated sediments and major sewage leak or spill.

Encroachment on Designated Protected Areas

Designated protected areas will have site boundaries marked before construction begins. Environmental Protection Zones and Restricted Activity Zones will be established to distinguish levels of sensitivity. These designations will be incorporated

into the Worksite Isolation Environmental Work Plan. As all designated areas will be clearly marked it is predicted that incidences would result in minimal damage to vegetation or soils. There is a possibility that soils could be adversely affected through compaction or slope failure with an area of impact likely no greater than the size of the construction vehicle involved. Such incidents are unlikely to occur and will have minor impacts that are reversible.

If a construction activity accidentally encroaches on these designated areas, the environmental monitor will report such incidents immediately and damage will be assessed by qualified professionals. Measures will be developed to remedy such occurrences, as appropriate.

Vehicle/Wildlife Collisions

There are a number of factors influencing whether vehicles will collide with wildlife such as speed, traffic volume, visibility and seasonal activity of wildlife. The most likely areas where vehicle/wildlife collisions might occur would be in transport of construction or waste materials along Highway 22A, Seven Mile Road, and other local roads. Occasional wildlife-vehicle collisions occur on these roads and this pattern is likely to continue.

Human/Wildlife Encounters

The majority of human/wildlife encounters are predicted to be with bears as most other wildlife are more likely to avoid construction activities and noise. Bears, however, are known to habituate to human activities and access to garbage is the primary cause of bear/human interaction. While plans exist to use bear-proof containers for garbage, there is a potential for waste to be treated carelessly by workers at the site. Workers will therefore receive training regarding proper disposal of waste, other deterrent measures, and procedures to follow when bears are sighted and/or close encounters occur.

Excessive Disturbance of Wildlife

Encroachment on sensitive wildlife habitat, interference with wildlife migratory corridors, excessive construction noise and excessive dust levels can contribute to excessive disturbance of wildlife. The potential for such disturbance is being minimized wherever possible through the scheduling of work activities to avoid the critical activity periods of listed or sensitive species. Despite these measures, disturbances of wildlife are likely to occur along access roads, and on the perimeter of the worksites. As these are all controlled activities through the Environmental Management Program, wildlife disturbance is expected to be of limited extent and over time, most animals are expected to avoid work areas. In addition, if excessive disturbances increase, measures will be taken to reduce their impact.

Major Leak or Spill of Hazardous Material(s)

Hazardous materials (such as fuel, oil, grease, coolants, hydraulic fluids, cementitious materials and concrete residue, and paints and thinners) will be safely handled, stored, used and disposed of. This includes, but is not limited to: complying with the BC *Workers Compensation Act*, Occupational Health and Safety Regulation (and associated guidelines and policies); off-site storage of hazardous materials; inventory control to

track transport of hazardous materials; designated storage areas on site; equipment refuelling and servicing controls off-site; and designated waste disposal areas. If these measures should fail and a major leak or spill of hazardous material occurs, then the Spill Prevention, Preparedness and Response Environmental Work Plan would be followed to minimize impacts. Although time delays may occur between the time of the spill and the response, the nature of the materials and the volumes being handled would ensure that minimal adverse environmental effects would occur in the zone of impact. In the unlikely event that a major spill occurred that would be beyond the ability of on-site staff to manage, the Spill Prevention, Preparedness and Response Environmental Work Plan will detail measures to deal with the situation quickly and effectively.

However, if a spill occurs the environmental effects would, depending upon the specific circumstances and location, include potential impacts to elements of the physical receiving environment (surface water quality, and ground water), elements of the aquatic receiving environment (aquatic habitat and fish resources, and listed species), elements of the terrestrial receiving environment (plant communities, wildlife habitat, wildlife and listed species), and elements of the land and resource use receiving environment (water resources, and recreation and tourism).

Hazardous materials will be appropriately transported, stored and used. For example:

- Any aboveground Liquid storage facility with a capacity greater than 4,000 litres or any underground Liquid storage facility will be designed and sealed by a qualified Professional Engineer.
- All Liquid storage tanks with a nominal capacity in excess of 205 litres will be locked and secured when not in use. Automatic shut-off nozzles shall be installed on all Equipment operating fluid dispensing units used with storage tanks having a nominal capacity in excess of 205 litres.
- All Liquid storage containers with a nominal capacity of less than 205 litres, used as a Liquid cache or to transport Liquids on Site will be secured during transport and/or carried by hand in a manner that prevents upset and spillage of contents. Liquid storage containers in a cache or permanently or semi-permanently carried in service trucks will have the required secondary containment.
- Small Liquid storage containers will have secure sealed and/or lockable outlets and employ spigots or pumps appropriate to their use and size.

Failure of Temporary Containment Systems

Sediment control ponds and concrete washwater storage and treatment facilities may unexpectedly fail. As the number of these facilities is relatively large and spread out, there is a higher likelihood that a failure might occur and result in environmental damage. Depending on the size of the containment system, a failure could quickly cover a large surface area and seep into the soils and water courses. Failure of one of these facilities at the powerhouse site would result in the rapid spread of sediment-laden waters or concrete washwater across the soils, potentially spilling into the Pend d'Oreille River. Sediment laden water would not adversely affect the Pend d'Oreille; however, concrete washwater is poisonous to fish and could result in fish mortalities if spilt in the Pend d'Oreille. If such an incident occurred at night when construction workers are not on site, the damage could be greater as response time would be much longer. Such an event is unlikely to occur as these ponds would be operated to minimize the potential for

such an occurrence. The Spill Prevention, Preparedness and Response Environmental Work Plan will ensure workers are trained to respond appropriately to such events.

Fire

On a construction site there is the potential for a fire due to equipment sparks or overheating, careless actions of workers, electrical failure, or other sources. Firefighting equipment and fire suppression supplies will be available throughout construction. At the powerhouse fires are likely to be small and readily contained and extinguished causing minimal damage. As the town of Trail is close by, a larger fire can be brought under control without major damage to the environment. Along the transmission line, however, the potential exists for a small fire to cause a forest fire. This could be potentially devastating to the environment. As construction will proceed in compliance with fire codes and fire protection standards, the likelihood of such an event occurring is very small. A Fire Plan will be developed to ensure that staff are properly trained and that fire fighting equipment is always readily available and in good working order.

Adverse Effects of Blasting

Blasting will be required at the powerhouse site throughout the excavation phase of construction. Blasting can create sudden, severely loud noise explosions and send shock waves through a water body. These impacts can create stress for wildlife, particularly during the breeding season, and can seriously injure or kill fish. Due to the heightened level of activity at the powerhouse site and the large volume of water passing down the Pend d'Oreille at all times, it is expected that wildlife will avoid the construction site and that fish will experience little impact as the noise waves will be attenuated by the fast flowing river. To further ameliorate noise impact reduction blasting mitigation measures will be executed according to standard management practices. As these are regularly practiced at all worksites, it is anticipated that impacts on the environment due to blast noise emissions will be minimal and short lived.

Removal of Contaminated Sediments

Contaminated sediments will be removed from the forebay of the powerhouse during construction by dredging using a low turbidity hydraulic auger dredge and pumping dredged materials via a pipeline to temporary storage containers. This activity has the potential for re-suspending the material being dredged and contaminating the water where the dredging occurs. There is also a potential for the pipeline to break or for the sediment pond to spill over during dredging. This could result in dredged material spilling onto the land and running into the Pend d'Oreille River. The extent of damage to the environment due to any of these events is anticipated to be localized and quickly remedied though Environmental Work Plans, including: the Contaminated Materials Management Environmental Work Plan; Spill Prevention, Preparedness and Response Environmental Work Plan; Water Quality Protection Environmental Work Plan; and, Erosion, Sediment and Drainage Control Environmental Work Plan. It is therefore anticipated that the impact of contaminated sediments on the environment will be minimal and unlikely to occur.

Major Sewage Leak or Spill

A temporary onsite sewage disposal system, including a septic tank and tile field, or holding tank and portable toilet system may be located on site at the powerhouse. Either of these sewage facilities could leak or spill during operation. As they will be located at the powerhouse site, impacts on the environment will be localized. It is not anticipated that a spill could contaminate the Pend d'Oreille River as the amount of material spilled will be small. Any spill on land will be addressed through the Spill Prevention, Preparedness and Response Environmental Work Plan. Thus, any leak or spill will be unlikely to spread and the impacts will be short-term.

Accidents and Malfunctions during Operations

Reasonably foreseeable accidents and malfunctions that have a potential to occur during operation in the vicinity of the powerplant and transmission line are plant forced outage and fire. In addition, a major leak or spill of hazardous material could occur in the vicinity of the powerplant.

Plant Forced Outage

A plant forced outage would occur if one of the turbines fails to operate or is in need of repairs. The water would be passed through the other turbines at the facility, if they are not already running at capacity, or the water would be spilled. BC Hydro may restrict flows to Waneta to avoid spills. If none of the project turbines can utilize the water, then operation of the Waneta Dam would be undertaken as it would have been without the Project; that is, the water would be utilized through the BC Hydro Canal Plant Agreement or spilled as is currently done and flows in the Pend d'Oreille would temporarily return to pre-project conditions. Thus, conditions in the river for fish and fish habitat would be no worse than currently is the case.

Fire

In preparation for potential fires in operation of the plant, heat and smoke detectors, alarms, automatic water deluge systems on each generator and power transformer, chemical fire extinguishers, and pressurized water extinguishers with fire hoses will be installed strategically in the powerhouse. The most likely source of a fire would be paints, lubricants, oil, diesel and fuel or overheating or sparking equipment. A Fire Plan and staff training are expected to provide for containment of fires such that environmental damage is unlikely and minimal. A large fire would result in heat damage to vegetation, smoke creating air quality impacts and burning of fuels, lubricants and paints releasing airborne contaminants. It is anticipated that such an event would be unlikely and damage would be confined mainly to the powerplant site.

Transmission line fires could result from arcing, a downed line, or inadvertent contact with vegetation (e.g. fallen tree). The most likely environmental impact would be locally burned vegetation; a worst case would be the start of a forest fire. In the latter case, extreme damage to the forest, wildlife and air quality impacts due to smoke would occur. Any of these occurrences would likely be rare, though potentially devastating if a forest fire were to result.

A major fire at either the powerplant or transmission line would necessitate a plant shutdown resulting in water spills at the dam. This would not create additional environmental impacts as noted above under Plant Forced Outage.

Major Leak or Spill of Hazardous Material(s)

Only small quantities of hazardous material will be stored on site such as oils, lubricants, paints, varsol, solvents, lead/acid storage batteries, diesel fuel, hydraulic oils, and transformer insulating oils. Herbicides will also be stored as needed for vegetation management. Transport of hazardous materials to and from the site will follow all regulations. Accidents during transport could create a localized spill that would be remedied by following the Emergency Preparedness Plan, and Spill Prevention, Preparedness and Response Plan, and applicable statutory regulations.

Major components of the powerhouse will utilize oil as a lubricant and oil will be supplied using piping systems. Oil separators will be employed as appropriate. Minor components of the plant will also use oil as a lubricant. All components using oil, such as storage facilities, transformers, and equipment using oil, will have oil spill containment systems to accommodate all the oil in the event of a spill or breakage.

Transformer oil could be spilled during an oil change (performed once every15-20 years) due to a system or tanker truck hose/hose connection failure, or due to a transformer explosion. In a worst case scenario, about 1000 litres might seep into the Pend d'Oreille due to either of these events. The oil is of low viscosity and would not result in a concentrated slick, but, would create a thin sheen, likely detectable downstream to Lake Roosevelt. It is predicted that wind, evaporation and sunlight would break down this oil within 1-3 days. Due to the rapid dispersion and non-toxicity of the oil, such an oil spill should not damage riparian habitat or prove toxic to fish and wildlife, including waterfowl. Clean-up would focus on collecting isolated pockets of oil, detected in over-flights of the area, and treating any affected wildlife. There is a low probability of such an occurrence and the magnitude of the impact is predicted to be small.

<u>Specific Environmental Responsibilities – Powerplant</u>

Specific commitments and responsibilities for powerplant operation and maintenance will be accounted for in manuals and management plans.

Operations, Maintenance and Surveillance Manual

If, and as required by the British Columbia Dam Safety Regulation (B.C. Reg. 44/2000) or the Canadian Dam Association Dam Safety Guidelines, and providing a general level of environmental protection, an Operation, Maintenance and Surveillance Manual will be prepared upon completion of project construction. The Operation, Maintenance and Surveillance Manual will incorporate the directives and practices outlined in the Canadian Dam Association Dam Safety Guidelines (1999), the British Columbia Dam Safety Guidelines (1998), and the British Columbia Dam Safety Regulation. The scope of this document will include only project intake, tunnels and powerhouse, and all equipment associated with these structures. Matters relating to operation, maintenance and surveillance of the existing Waneta Dam and Generating Station are addressed in the Waneta Dam Operation, Maintenance and Surveillance Manual, last updated in March 2002.

The Project Operation, Maintenance and Surveillance Manual, as well as manufacturers' operation and maintenance instructions for specific equipment and components, will be used to address normal operation and maintenance requirements for the Project. Matters relating to potential emergency conditions and response measures are addressed in the Emergency Preparedness Plan.

Spill Prevention and Response

A Spill Prevention, Preparedness and Response Plan will be developed to address and manage spill prevention and response for the powerplant, which will include:

- Key responsibilities.
- Identification of oil and other hazardous materials held on site and subject to possible spill.
- General guidelines for the use of such materials (e.g. use of secondary containment at all times).
- Specifications for storage of such materials.
- Waste disposal requirements.
- Hazardous material handling and spill response training requirements.
- Spill response materials to be held on site, including their locations and contents.
- Immediate spill response actions to be followed, including specific actions for high risk events.
- Monitoring (water quality/soil) that is to be conducted routinely and in the event of a spill.
- Identification of off-site/external spill response resources that may be available.
- Notification procedures to be followed in the event of a spill.

Conclusions

The federal Responsible Authorities found the Proponent's responses to issues raised dealing with the potential environmental effects of accidents and malfunctions to be reasonable and not likely to cause significant adverse environmental effects.

4. CAPACITY OF RENEWABLE RESOURCES

CEAA requires a consideration of "the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future"; first referred to as sustainability by the Brundtland Commission, 1987. Sustainable development is one of the guiding principles of both federal and provincial environmental assessment. The Application reviews the sustainability of aquatic and terrestrial resources as well as project operations in light of climate change.

Sustainability of Aquatic Resources

Primary and secondary aquatic productivity are predicted to increase in the Waneta headpond due to the expected moderating effect of the Project. The increased hydraulic capacity at Waneta is also predicted to improve the stability of water levels in the Seven Mile Reservoir, leading to increased habitat productivity. Stabilization of water levels in Waneta headpond and Seven Mile Reservoir is expected to improve aquatic habitat

productivity overall by as much as 15 hectares, with resultant improvements in conditions for fisheries resources.

Below the dam, productive habitat area will decline by about 0.4 hectares due to a loss of shallow water habitat. The loss of shallow water habitat below Waneta Dam will be compensated for as part of compliance with the 'no net loss' policy under the federal *Fisheries Act*.

Operation of the new Project will change hydrology downstream of the Waneta Dam in the Pend d'Oreille and Columbia rivers. While proactive changes to the White Sturgeon Flow Augmentation Program are expected to mitigate these effects on white sturgeon, potential effects of flow changes resulting in increased predation on eggs and larvae, although there is a low likelihood of this occurring, will be addressed by an adaptive management approach that has been proposed to mitigate risks of these measures being insufficient.

Sustainability of Terrestrial Resources

During construction of the Project, terrestrial resources (flora and fauna) will be temporarily and/or permanently impacted; whereas, operation of the Project will lead to permanent, minor negative impacts. Detailed discussion of potential residual impacts is covered in Part C, Section 4 – Vegetation, and Section 5 – Wildlife and Wildlife Habitat. Forest resources will be impacted along the transmission line as trees will be permanently removed and will not be allowed to re-establish; shrubs and bushes will take their place. Wildlife species displaced by the introduction of the transmission line will utilize forested areas surrounding the corridor; whereas, smaller species that prefer early seral stages of growth will find new habitat. Small pockets of the agricultural land reserve, not currently being farmed, will be permanently removed along the transmission corridor and at the powerplant site; this will not significantly affect the usability of the remaining agricultural land reserve. Although the powerplant will be constructed on a previously disturbed site, two rare plant communities and selected rare plant occurrences will be affected. Plans exist to minimize impacts and to implement a terrestrial compensation package that promotes sustainability of terrestrial habitats and their productivity.

Sustainability of Project Operations

The Project, with an expected life of well over 100 years, is totally dependant on the environment for continued operation. Over that time period air temperatures are predicted to gradually increase which will lead to reduced summer precipitation and reduced winter snowpack (i.e. more rain during winter). By the year 2040, the result will be an earlier peak in flows by almost two months with reduced volume, a reduced summer and fall volume and increased winter volume. These changes may affect project operations as a result of shifting water availability to different months of the year. It is anticipated, however, that future changes in flow may change the powerplant's operating profile but operation of the Project will be sustained.

An added benefit of the Project is its contribution to energy through a source that will not add to the production of greenhouse gases. By capitalizing on an existing hydroelectric dam, the Project will not add to production of greenhouse gases while other energy

sources will either directly through burning of fossil fuels or indirectly by impounding other water courses.

5. CUMULATIVE ENVIRONMENTAL EFFECTS

CEAA requires assessment of "any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out". Cumulative environmental effects assessment is conducted to determine if the incremental effects (residual effects) resulting from the proposed project combined with the impacts of past activities and reasonably foreseeable future projects may result in significant adverse effects, even though the effects of each action by themselves may be considered insignificant.

5.1 Methodology

The methodology used by the Proponent to assess cumulative effects generally followed the Cumulative Effects Assessment Practitioner's Guide (CEA Agency, 1999). The Proponent evaluated the potential for residual effects on valued ecosystem components (environmental components that may be significantly affected) resulting from construction and operation together with the potential environmental effects on the same valued ecosystem components resulting from past, present or imminent future projects. This analysis included only those residual effects with the potential to interact temporally or spatially with the Project.

The temporal boundaries depend on the issue being discussed; they go back to the original construction of the Waneta Dam (1945) and forward for the life of the Waneta Generating Station, including construction and operation. As the Project is not expected to be decommissioned, effects are assessed into the future for at least an additional thirty to forty years and could be in perpetuity if repair and maintenance activities are successful.

The geographic boundaries of the aquatic environment include the Columbia River from The Hugh L. Keenleyside Dam to the Canada-U.S. border, the Kootenay River from Brilliant Dam to its confluence with the Columbia River and the Canadian section of the Pend d'Oreille River. The geographic boundaries of the terrestrial environment correspond with the study area shown in Figure 7 (Appendix 1) and the boundaries of the socio-economic environment correspond with the study area shown in Figure 8 (Appendix 1). These geographic boundaries will vary somewhat with the environmental component being considered.

Past, Present and Future Projects

Thirty-one past and present projects and activities and four planned or imminent projects with the potential to accumulate with one or more of the residual environmental effects of the Project are listed below:

- Mining activities
- Forest harvesting
- Agricultural activities

- Fish stocking activities (kokanee, walleye, rainbow trout)
- Roads and road corridors (+ major upgrade Highway 22A = new border crossing, new bridge, new highway connections)
- Teck Cominco Metals Ltd. smelter – zinc, lead, silver and gold
- Teck Cominco Metals Ltd. area activities
- Transmission lines – Waneta Dam to Selkirk substation (+ Upgrades), Waneta Dam to Boundary generating station (+ Upgrades and twinning), Seven Mile Dam to Selkirk substation (2), Selkirk to Cranbrook (+ twinning) and Selkirk to Nelway, Waneta Dam to Warfield (5), and FortisBC – West Kootenay Development (5).
- Southern Crossing Pipeline
- Box Canyon Dam
- Boundary Dam + Generating Station
- Seven Mile Generating Station + Seven Mile Unit 4 + Water Use Plan
- Waneta Generating Station + Waneta Upgrades + Switchyard replacement
- Hungry Horse Dam (variable flow flood control strategy)
- Kinbasket (+ Water Use Plan) and Arrow Lakes reservoirs; shared power generation at Mica and Revelstoke (Columbia River Non-Treaty Storage Agreement)
- Hugh L. Keenleyside Dam (+ Water Use Plan) and Arrow Lakes
- Libby Dam (variable flow flood control strategy)
- Cabinet Gorge Bypass Tunnel
- Duncan Dam (+ Water Use Plan)

Valued Ecosystem Components Assessed

Valued ecosystem components where a residual effect of the Project might act cumulatively with other projects or activities over time are listed below:

- Water quality – total gas pressure (Section 7.4)
- Downstream riverine aquatic habitat and fish resources (Section 8.4)
- Headpond aquatic habitat and fish resources (Section 8.4)
- Listed fish species (white sturgeon) (Section 8.4)
- Shallow water habitat (Section 8.4 and 9.4)
- Plant communities / invasive weeds (Section 4.4)
- Listed plant communities (Section 4.4)
- Wildlife habitat (Section 5.4)
- Wildlife (Section 5.4)
- Listed wildlife species (western skink, racer, rubber boa, Lewis's woodpecker, yellow-breasted chat) (Section 5.4)

As indicated in assessment of direct effects, potential effects of the Project on several valued ecosystem components (water quality, forest resources, agriculture resources, mineral resources) are anticipated to be fully addressed and yield no negative residual effects. Residual effects or the potential for them were anticipated for elements of other valued ecosystem components (upstream and downstream aquatic habitat and fish resources, listed aquatic species, shallow water habitat, plant communities, listed plants and plant communities, wildlife, wildlife habitat, and listed wildlife species), as specified in the sections identified in bullets above and discussed further in Section 5.2.

5.2 Discussion

Water Quality

Total Gas Pressure

The Project is anticipated to result in positive reductions in total gas pressure by reducing spill from the existing facility at Waneta. This effect will help offset cumulative sources of total gas pressure from other facilitites upstream on the Pend d'Oreille system and on the Columbia system. As elevated total gas pressure lingers for considerable time, the benefit of reduced total gas pressure from this Project is anticipated to extend for many kilometres through several dams downstream on Columbia River.

Aquatic Habitat and Fish Resources

Headpond

Other projects and activities (forestry and mining) upstream of Waneta Dam have caused the suspension of heavy metals and other contaminants in soils which have been transported downstream and settled in the Waneta headpond. The removal of these contaminated sediments during construction may affect fish residing in or passing through the headpond due to re-suspension of contaminants. It is anticipated that during operation of the Project, these contaminants will again settle and accumulate in the headpond. While sources of these sediments include previous mining projects in upstream areas, owing to the net removal of contaminated sediments from the headpond, the cumulative effect of the Project is anticipated to be neutral to positive.

Downstream

The downstream riverine aquatic habitat is expected to be slightly negatively affected by headpond contaminated sediment that will be excavated during construction. These effects, in combination with those from previous sources of contaminated sediment are expected to be short-term in nature, reversible and of limited geographic extent.

Although the Boundary Dam has the greatest influence on flows in the Pend d'Oreille, the Project will allow the operation of Seven Mile Dam to be modified resulting in changes to the flow regime in the Pend d'Oreille downstream of the Waneta Dam. Modified flows anticipated from Seven Mile Dam would result in increased fluctuations in daily water flows through the Waneta Dam to the Columbia River compared to current operations. The ability for additional flows to be passed through Waneta in combination with modified flows at Seven Mile is expected to reduce productivity of about 10 kilometres of shallow water habitat below the Waneta Dam which will be lost due to limited periods when minimum flows are reduced. Productivity losses would be reflected in both reduced benthic productivity and altered shallow water habitat suitability.

Should there be changes in operation of the Mica and Hugh L. Keenleyside dams upstream on the Columbia River, these would add to the changes at the confluence of the Pend d'Oreille. This may be more noticeable in seasons when the Hugh L. Keenleyside Dam is filling and outflows are reduced in the Columbia River. In addition, facilities on the Kootenay River, mainly the Brilliant Generating Station,

contribute to flow changes in the Columbia River in October and November. All of these potential changes in flows were included in sophisticated hydrological modeling of the confluence area.

It is anticipated that variations in flow due to other dam operations having the potential to interact cumulatively with operation of Waneta Dam will have negligible impact.

Listed Species

White Sturgeon, listed on Schedule 1 of the *Species at Risk Act*, reside in the Columbia River. While spawning activity occurs, recruitment of this species has been unsuccessful for a number of years and rigorous studies have been conducted to determine the cause of this failure. The decline of white sturgeon populations has been linked to the operation of the many dams on both the Columbia River and Pend d'Oreille. To date, no specific event or series of events have been identified as causal factors, although the Proponent has noted a correlation between modern recruitment failure and construction of three dams on the Columbia River in 1968. The initiation of load shaping at Boundary Dam passed on through Waneta and drawdown of Roosevelt Reservoir also coinciding at this time may also have contributed to low white sturgeon recruitment. The exact cause of recruitment failure remains unknown.

The Waneta Eddy at the confluence of the Pend d'Oreille and Columbia rivers is the result of mixing of Columbia River flows with those from the Pend d'Oreille River. The eddy is one of the greatest areas of concentration of white sturgeon in the Columbia River; and, the shoreline near the eddy is where white sturgeon spawning and egg incubation is known to occur. Columbia River flow, controlled by operation of various dams, has the greatest influence on water movement and currents in the eddy. Variability in the flows from the Pend d'Oreille River, as shown in the hydrological modeling of the eddy undertaken by the Proponent, have an influence on its shape and currents.

The hydrological model of the eddy also showed that changes in flow from the Pend d'Oreille affect the shoreline where white sturgeon spawning and egg incubation occurs. It is speculated that if bottom flows in the vicinity of white sturgeon spawning are reduced in July due to proposed operation of the Project, then conditions might become more favourable for egg predators.

Flows in the Pend d'Oreille are controlled mainly by the operation of Boundary Dam in the U.S. However, as a result of the Project, flows will change from current operations as Seven Mile Dam will be able to operate in hydrologic balance with Waneta Dam. Proposed operation of the Waneta Dam will alter downstream flows and hydrologic conditions in the Waneta Eddy and in the Pend d'Oreille plume where the white sturgeon spawn. It is the spawning and egg incubation period that is of concern. The Proponent commissioned a series of hydrological models of flow conditions under various operational strategies. It is their contention that these perturbations will not significantly affect white sturgeon recruitment as they believe historical flows in the Columbia River changed at the same time as commencement of the decline in white sturgeon populations. Thus, the Proponent believes that any changes in the Pend d'Oreille would be totally masked by conditions in the Columbia River. Fisheries and Oceans Canada and other review agencies expect that this may be the case, but required development of an adaptive management program to confirm that indeed it is the case, or if not that

changes would be made to mitigate these effects of the Project. Any increase in predation on white sturgeon eggs would be viewed as a potential risk to white sturgeon recovery.

Shallow Water Habitat

Shallow water habitat along 10 kilometres of the Columbia River downstream of the Project (about 0.4 hectares) will be affected due to fluctuations in water levels during operations. The Proponent intends to compensate for this loss in near-shore productivity by restoring and enhancing similar habitat upstream on the Columbia River. While compensation is expected to achieve No Net Loss within the project study area, similar productivity losses of shallow water habitat from level fluctuations downstream of the U.S. border would pose cumulative effects from the Project. As U.S. regulators have not recognized this issue, Fisheries and Oceans Canada considers these cumulative effects to not be significant.

Shallow water habitat of Seven Mile Reservoir is expected to increase due to stabilization of water levels. It is anticipated that operational changes after construction of the Project will achieve hydrological balance between the Seven Mile Reservoir and Waneta headpond. This is expected to increase productivity of about 14 hectares of shallow water habitat.

Vegetation

Plant Communities

Approximately 76 hectares of land will be permanently changed by the Project, primarily as a result of the transmission line and the removal or conversion of forest attributes, but grassland and shrubland will also be permanently altered. This includes the following areas: powerhouse, intake and tailrace area – 9.8 hectares; worksites – 15.6 hectares; transmission line electrical clearance zone – 20.3 hectares; transmission line Tree Management Zone – 30 hectares. Some of these areas have been subject to previous disturbance, whereas others support endemic grassland, shrubland and forested plant associations. Forest harvesting, agricultural activities, roads and corridors will add cumulatively to the impact of the Project on plant communities. Various existing worksites will be utilized during construction and as laydown areas. Many of these worksites were previously used for industrial projects and some are already cleared; thus, incremental impacts of this Project on plant communities will be relatively minor.

Inadvertent introduction of invasive species may occur at project sites. The extent of weed establishment and spread is predicted to be comparable to what has occurred on other industrial sites and on adjacent transmission lines.

Listed Plants and Plant Communities

Construction of the Project will result in a loss of two provincially listed plant communities and multiple occurrences of five rare plant species.

The Proponent will coordinate its efforts to control the establishment and spread of noxious weeds along the transmission line with other line owners/operators to schedule maintenance activities in order to minimize impacts on listed species and listed plant

communities. In areas with unavoidable impacts, rare plant occurrences will be transplanted prior to excavation and monitored to determine transplant effectiveness. These plant communities will be monitored and mitigated during construction to the satisfaction of provincial agencies.

Wildlife and Wildlife Habitat

Wildlife

Traffic effects (wildlife-vehicle collisions, noise and dust) on wildlife will be confined to the period of construction and localized in areas subject to increased activity (powerhouse, worksites, parking areas, and transmission corridor). It is likely that there will be additional roadkill mortality impacts on wildlife along highway and local road corridors where traffic will temporarily increase during construction. Limited incremental project impact along the transmission corridor will occur during maintenance. The effect on wildlife will be temporary and of low impact.

Mining, forestry and agriculture also affect wildlife directly through disturbance, displacement, mortality and indirectly, through loss and fragmentation of foraging, breeding and other habitat. The cumulative effects of the Project on local wildlife populations are expected to be insignificant.

Wildlife Habitat

Approximately 76 hectares of land (including 66 hectares of ungulate winter range) will be permanently changed by the Project, primarily as a result of the transmission line and the removal or conversion of forest attributes, but grassland and shrubland will also be permanently altered. This includes the following areas: powerhouse, intake and tailrace area – 9.8 hectares; worksites – 15.6 hectares; transmission line electrical clearance zone – 20.3 hectares; transmission line Tree Management Zone – 30.0 hectares. Some of these areas have been subject to previous disturbance. As noted in the discussion of direct effects, habitat impacts will be mitigated to some extent by transmission line revegetation efforts, a wildlife tree creation project, weed control measures, and various habitat enhancement and/or land acquisition options put forward in the Terrestrial Habitat Compensation Package. The new 10 kilometres Waneta transmission line will add minimally to the impacts of the existing 18 transmission lines covering roughly 50 kilometres (250 hectares) in the Pend d'Oreille Valley, as it will follow the existing BC Hydro transmission line to the Selkirk Substation.

Other activities that may also impact the same wildlife habitat types as the Project are forest harvesting, agricultural activities, roads and corridors. The impact of the Project relative to considerably larger forest harvesting operations is considered minimal. Agricultural activities occupy lands that were previously forested and may have impacted the same wildlife habitat as the Project.

Various existing worksites will also be utilized during construction and as laydown areas. Some of these were previously used for industrial projects and are already cleared; thus, the Project will not add new impacts to wildlife habitat at the previously cleared worksites. Impacts to wildlife habitat on vegetated sites are considered minor.

Inadvertent introduction of invasive species may occur at all project sites. The extent of this is predicted to be comparable to that experienced at other industrial sites and existing transmission corridors in the area.

Listed Wildlife Species

Lewis's woodpecker and the yellow-breasted chat are both listed on Schedule 1 of the *Species at Risk Act*. Lewis's woodpecker is known to breed at Worksite A. Yellow-breasted chats breed adjacent to Worksites H, I, J and transmission line areas, respectively. Impacts on Lewis's woodpeckers and their habitat are dependent on their likelihood to reoccupy site A3 for breeding, the magnitude and physical extent of impacts to their habitat, and their sensitivity to construction disturbance. Clearing of the transmission line can be scheduled to avoid the period of April to October when yellow-breasted chats are more likely to be present, thus minimizing the potential for cumulative effects to occur. Mitigation measures are discussed in Part C, Section 5 – Wildlife and Wildlife Habitat, Subsection 5.3 – Proposed Mitigation.

Socio-Economic Resources

There are no mining claims on the same location as the Project, nor will construction and operation of the Project conflict with mining activities. The Project is not located on agricultural land, nor in close proximity to agricultural activities. The forest resources that will be removed are adjacent to the existing BC Hydro transmission line and will not impact on forestry activities. While these tree removals will permanently reduce forest resources available for harvesting, the quantities involved are minimal compared with normal forest practices. Thus, there are no negative cumulative impacts on these socio-economic resources.

As the timing of construction is scheduled to begin roughly when the construction of the Brilliant Expansion Project is complete, there will be an opportunity for skilled workers to continue employment which will increase social stability.

First Nations' socio-economic interests have been affected by past and present projects. Development of dams in this region has interfered with hunting and trapping, hampered fishing activities and severely depleted fish availability. First Nations have expressed an interest in restoring anadromous fish runs in the Pend d'Oreille and Columbia River. Although installation of a fish passage structure is not a planned activity for the Project, construction will not extinguish the possibility of installing such facilities at a future time.

5.3 Issues Raised and Proponent Responses

Issues raised during the environmental assessment review relating to potential cumulative environmental effects are documented in Appendix 3 – Issues Raised and Proponent's Responses. The most significant or key issues were:

1. *Proliferation of transmission lines and their potential to increase noxious weeds and invasive species.* (See Part A, Section 4.2 – Issues Raised by Public and Government Agencies.)

   Proponent Response: See Part C, Section 4 – Vegetation, and Subsection 4.2 – Issues Raised and Proponent Responses.

2. *Unknown cumulative effect of fluctuations in water flows on white sturgeon spawning and egg incubation along the shoreline of the Columbia River downstream of the Pend d'Oreille.*

   Proponent Response: Analysis shows that flow-through of Boundary Dam releases is not expected to have negative effects on white sturgeon spawning activities, egg incubation and larval survival. Notwithstanding the analysis and conclusions, on request by Fisheries and Oceans Canada, the Proponent has proposed an adaptive management approach that will conduct research on flows and white sturgeon egg predation to verify the predictions of the environmental assessment.

5.4 Conclusion

During the environmental assessment review of the Project, the federal Responsible Authorities have considered:

- The Proponent's Application under BCEAA;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2 – Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's supplemental report (*Pre-Feasibility Assessment and Conceptual Design for Shallow Water Habitat Compensation Related to the Waneta Expansion Project,* November 2006, Revised 17 January 2007);
- The Proponent's supplemental analysis (*Analysis of the Potential for Boundary Release Flow-Through to Affect White Sturgeon Spawning/Incubation Success*, June 2007); and,
- The Proponent's Commitments, as updated and consolidated in Appendix 4.

Based on the information in this Report, provided that the Proponent conducts the mitigation indicated above and as described in the Commitments listed in Appendix 4,in particular regarding environmental work plans, environmental monitoring, sediment containment, roadkill monitoring, plant and plant community transplanting and monitoring, listed terrestrial species monitoring, terrestrial compensation program, transmission line maintenance, cooperation with other transmission line operators, site restoration, White Sturgeon Flow Augmentation Program, shallow water fish compensation program, sturgeon adaptive management program, and follow-up, the federal Responsible Authorities are satisfied that the Project is not likely to cause significant adverse cumulative environmental effects.

6. FOLLOW-UP PROGRAM(S)

<u>CEAA Requirements</u>

Under CEAA, the need for, and requirements of, a follow-up program must be considered during a comprehensive study. The purpose of a follow-up program is to verify the accuracy of the environmental assessment and determine the effectiveness of

measures taken to mitigate the potential adverse environmental effects of the Project. The environmental assessment provided the basis for determining the nature of the follow-up program and who will be responsible for implementing and reporting on its various components.

The Proponent will design and implement a focused follow-up environmental effects monitoring program in consultation with relevant regulators which will be worked out prior to the permitting stage. In addition, Fisheries and Oceans Canada will incorporate into their authorizations (if it is appropriate to issue an authorization) conditions: to ensure mitigation measures are implemented; to monitor and report on whether mitigation measures are implemented and are effective; and to verify the accuracy of the environmental assessment with respect to fish and fish habitat. The monitoring will include monitoring of construction and operational effects on *Species at Risk Act* listed species, as appropriate.

Proponent Commitments in Application

The Proponent's proposed environmental monitoring program was intended to collect data and compile information to detect potential project impacts measured against an established baseline. The Proponent has also committed to assess the accuracy of the impact assessment predictions for construction of the Project, and evaluate the effectiveness of the mitigative measures to the end of the construction period. The Proponent will submit to Fisheries and Oceans Canada and Transport Canada an outline of a follow-up report that incorporates these elements prior to initiating the report, and will complete this report within two years of completion of construction. The outcome of longer-term monitoring for the remaining elements of the construction and operation of the Project including those involving *Species at Risk Act* listed species will be reported out separately under requirements of a provincial Environmental Assessment Certificate and a *Fisheries Act* authorization, if so issued. With both environmental monitoring and follow-up programs, it is important to clearly define objectives, responsibility, methods, timing, reporting, triggers for action, and planned actions.

Specifically, the Proponent will be required to assess and report on the effectiveness of the shallow water habitat compensation program; the total gas pressure monitoring program; the proposed modifications to the White Sturgeon Flow Augmentation Program; and the white sturgeon adaptive management program.

PART F – REVIEW CONCLUSIONS

1. Basis of Conclusions

The conclusions from the review of the Project, which has been conducted pursuant to both federal and provincial environmental assessment legislation, are based on the following documents and review procedures:

- The Proponent's Application under BCEAA;
- BCEAA review procedures, as defined in the section 11 and section 13 Orders;
- The assessment collectively carried out by the multi-disciplinary advisory Working Group and technical working sub-group for aquatic/fisheries issues, comprised of federal and provincial government agencies, U.S. agencies, local governments, Ktunaxa Nation Council and the Okanagan Nation Alliance, with input from the public (as outlined in Part A, Section 4 – Participation of Public and Government Agencies, Appendix 2– Project Working Group List, and Appendix 3 – Issues Raised and Proponent's Responses);
- The Proponent's supplemental report (*Pre-Feasibility Assessment and Conceptual Design for Shallow Water Habitat Compensation Related to the Waneta Expansion Project*, November 2006, Revised 17 January 2007);
- The Proponent's supplemental analysis (*Analysis of the Potential for Boundary Release Flow-Through to Affect White Sturgeon Spawning/Incubation Success*, June 2007); and,
- The Proponent's Commitments, as updated and consolidated in Appendix 4.

2. Compliance Effects, Monitoring and Follow-up

The Proponent has developed an Environmental Management Program for the construction and operation of the Project. The Environmental Management Program includes criteria identified in the Application that will inform specific Environmental Work Plans that will be finalized prior to construction (and issuance of post- environmental assessment federal authorizations) to prevent, monitor, manage and mitigate various potential environmental impacts. As specified in Appendix 4 – Proponent's Commitments, the Proponent has made commitments to ensure monitoring of, and compliance with, the Environmental Management Program.

In addition to the Environmental Management Program, the Proponent has also made commitments to compensate for project-related aquatic, terrestrial and socio-economic adverse effects, and where appropriate, to monitor the effectiveness of this compensation. Compensation for specific aquatic impacts must meet Fisheries and Oceans Canada requirements and will be finalized prior to construction and issuance of authorizations under the *Fisheries Act*.

Post-environmental assessment, the Proponent will continue to consult and collaborate with the Ktunaxa Nation Council and Okanagan Nation Alliance. The Proponent has committed to negotiate and provide project-related benefits to the Ktunaxa Nation Council and Okanagan Nation Alliance, and the Ktunaxa Nation Council and Okanagan Nation Alliance will be afforded the opportunity to participate in aspects of the Environmental Management Program, and mitigation and compensation activities.

3. Overall Conclusions

The general conclusion of the assessment is that the Project is not likely to cause significant adverse environmental effects with the implementation of the proposed Environmental Management Program and commitments, including compliance effects monitoring and follow-up measures (see Appendix 4 – Proponent's Commitments).

3.1 Conclusions of EAO

Pursuant to the requirements of BCEAA, EAO is satisfied that:

- The process and documents generated as part of this environmental assessment review adequately identify and address the potential adverse environmental, economic, social, heritage or health effects of the Project;
- Public and First Nations consultation, and the distribution of information to the public and First Nations, have been adequate;
- Issues identified during the review process by the public, the Ktunaxa Nation Council and Okanagan Nation Alliance, federal and provincial government agencies, U.S. agencies, and local governments have been adequately addressed by the Proponent during the review of the Application and other supporting documentation; and,
- Practical means have been identified to prevent or reduce to an acceptable level any potential adverse effects.

The provincial Minister of Environment and the Minister of Energy, Mines and Petroleum Resources will consider this Report and other accompanying materials in making their decision on the Application and issuance of an Environmental Assessment Certificate to the Proponent under BCEAA.

3.2 Conclusions of Federal Responsible Authorities

Pursuant to the requirements of subsections 16(1) and 16(2) under CEAA, the Responsible Authorities have determined that, taking into consideration the federal Comprehensive Study Report and the implementation of the proposed mitigation measures, the Project is not likely to cause significant adverse environmental effects.

4. Provincial and Federal Approvals (Post-Environmental Assessment)

The "permitting stage" refers to the stage following an environmental assessment decision in which statutory authorizations may be issued by regulatory agencies. The provincial approvals required in the permitting stage for constructing and operating the Project are identified in Appendix 5 – Required Provincial Approvals. The federal approvals required in the permitting stage for constructing and operating the Project are identified in Appendix 6 – Required Federal Approvals.

Private Lands

In addition to the approvals referred to above, the Proponent will need to take steps to conclude legal agreements with private land-owners with respect to temporary access during construction and subsequent statutory right-of-way required for the project

transmission line. (See Part D, Section 2 – Communities and Economy, Subsection 2.2 – Issues Raised and Proponent Responses, and Appendix 4 – Proponent's Commitments.)

Agreements for the Beneficial Use of Water

As discussed under Part A, Section 2.1 – Proponent, the Waneta Cooperation Agreement requires:

1. Teck Cominco to cooperate with the Proponent in all aspects of project permitting, land transfer and inclusion of the Project in the renewed Canal Plant Agreement; and,
2. The Proponent to support an amendment to the Pend d'Oreille Water Reserve to allow the provincial Comptroller of Water Rights to issue a water licence to Teck Cominco for its Waneta Upgrade Project that is subordinate to any licence issued for the Waneta Hydroelectric Expansion Project.

A Release Coordination Agreement has been negotiated between the Proponent and Teck Cominco that contains provisions to allow water licensed for one facility to be used by the other facility to generate coordinated power benefits that would be shared under the Canal Plant Agreement.

APPENDICES

APPENDIX 1 – FIGURES

Figure 1 - Project Location and Area Generation Facilities

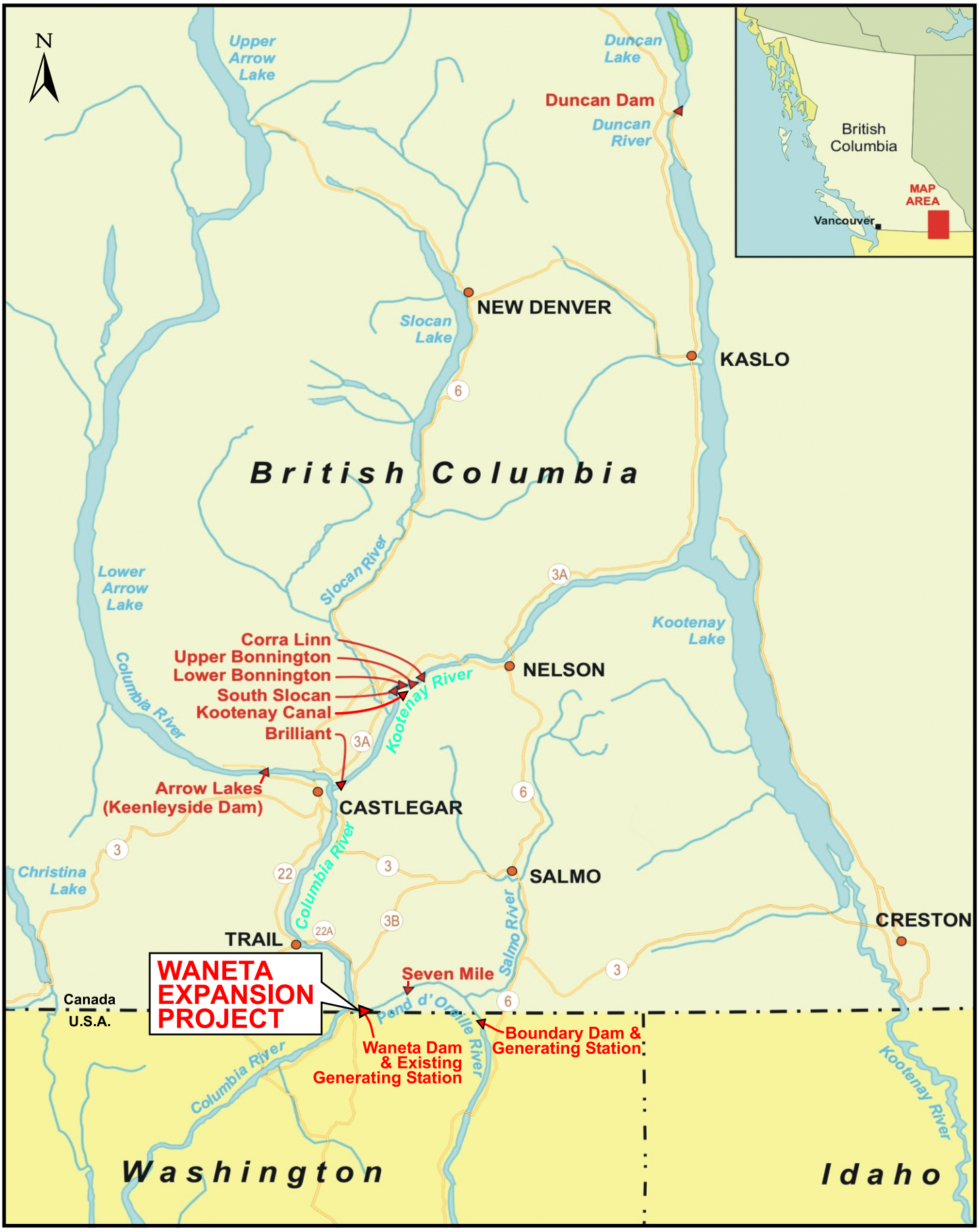


Figure 2 - Aerial View of Project Area

RENDERING OF WANETA EXPANSION PROJECT INTAKE AND POWERHOUSE
Waneta Expansion EAC Application

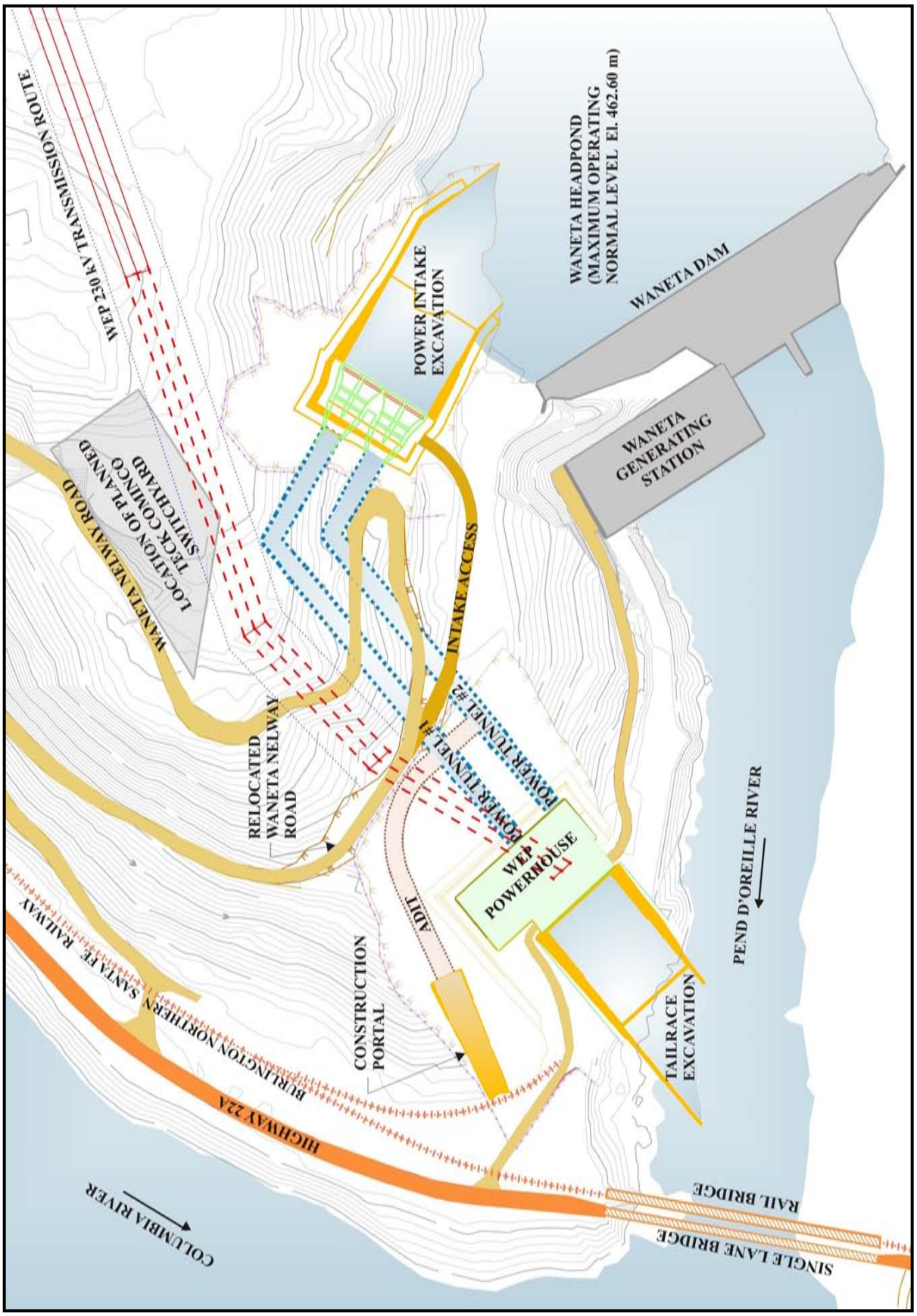


Figure 4 - Base Concept - Plan View

BASE CONCEPT – PLAN VIEW
Waneta Expansion EAC Application

Figure 5 - Base Concept Transmission Line Route Paralleling BC Hydro's Line 5L98 to Selkirk Substation

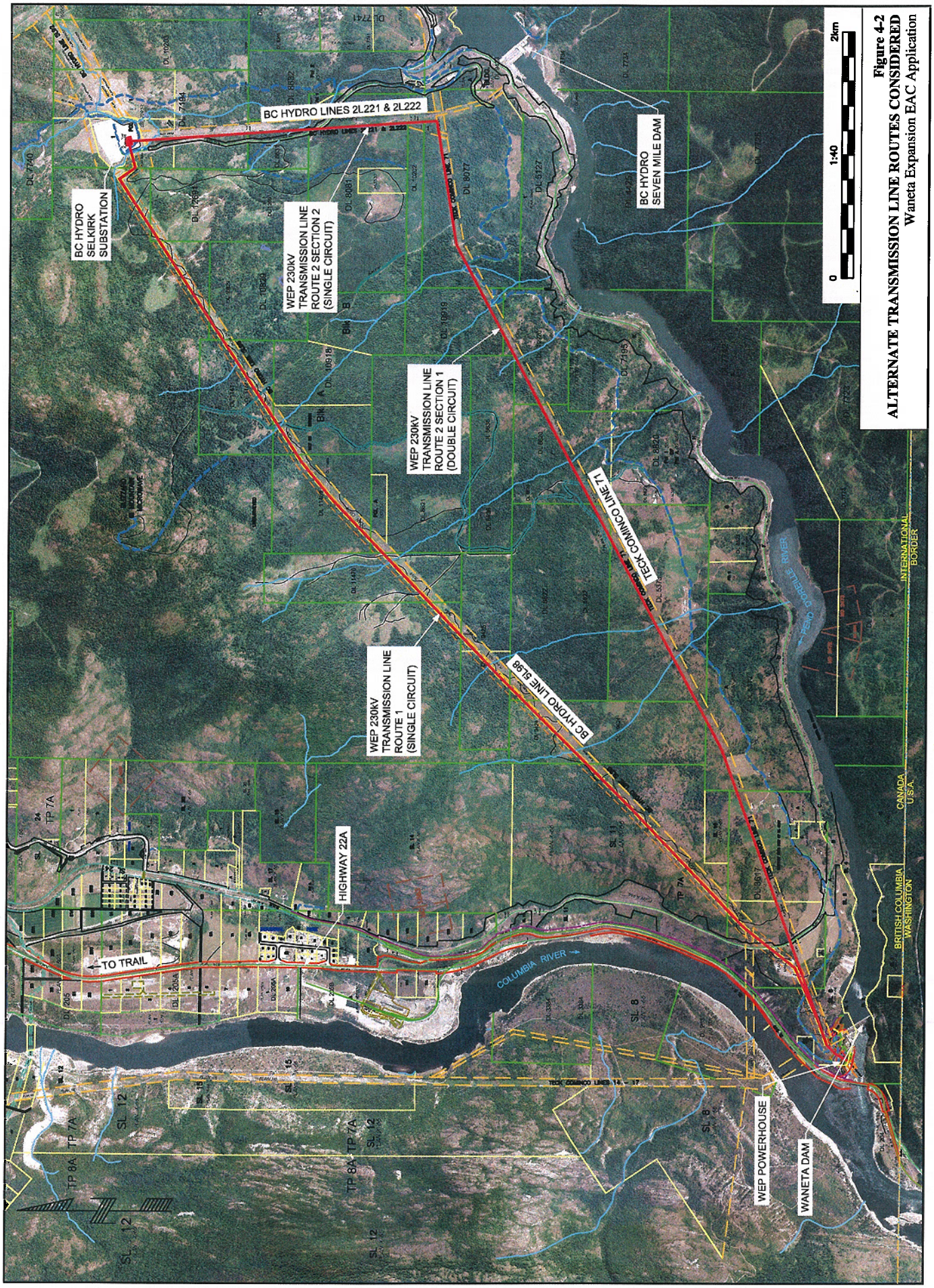
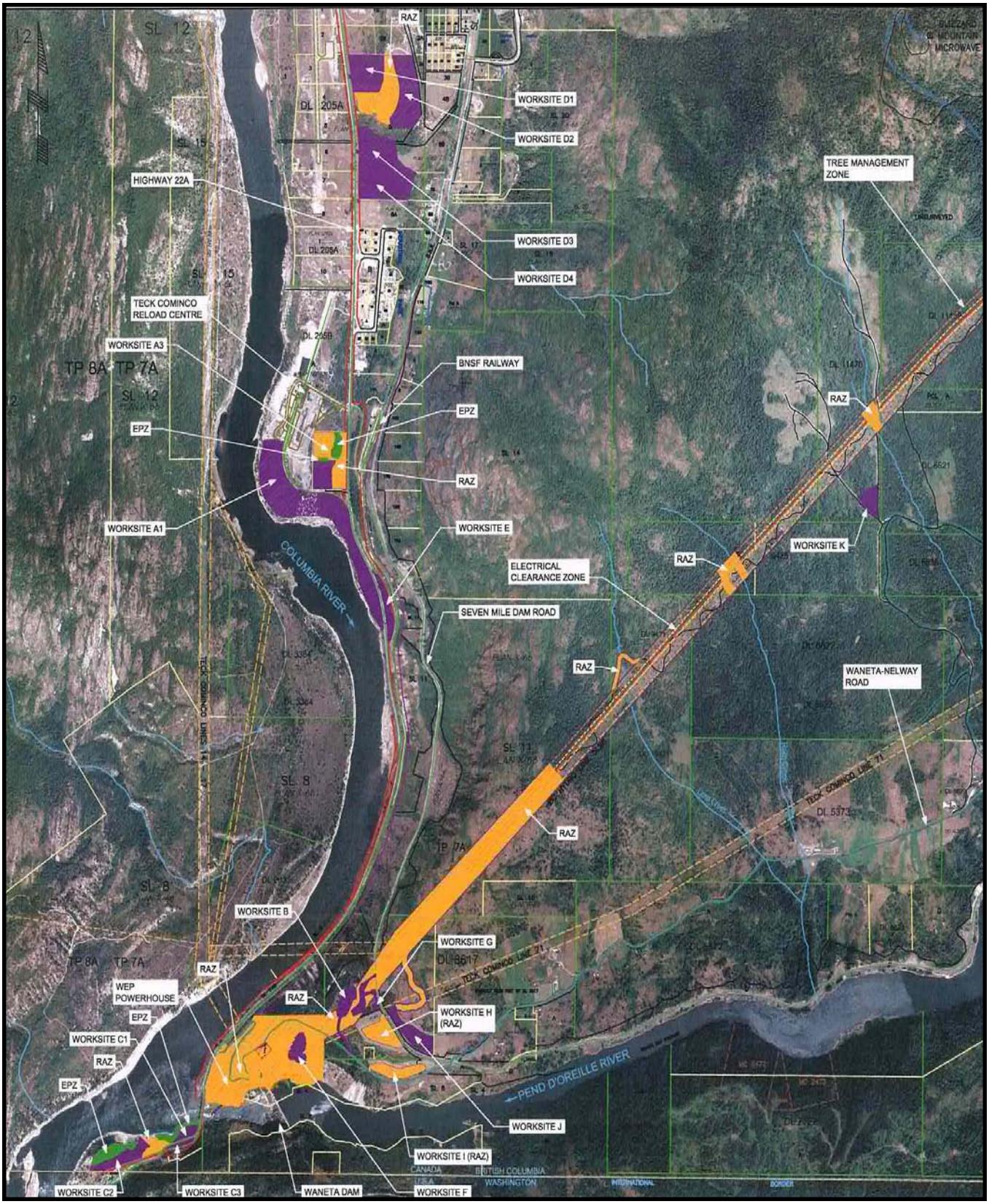
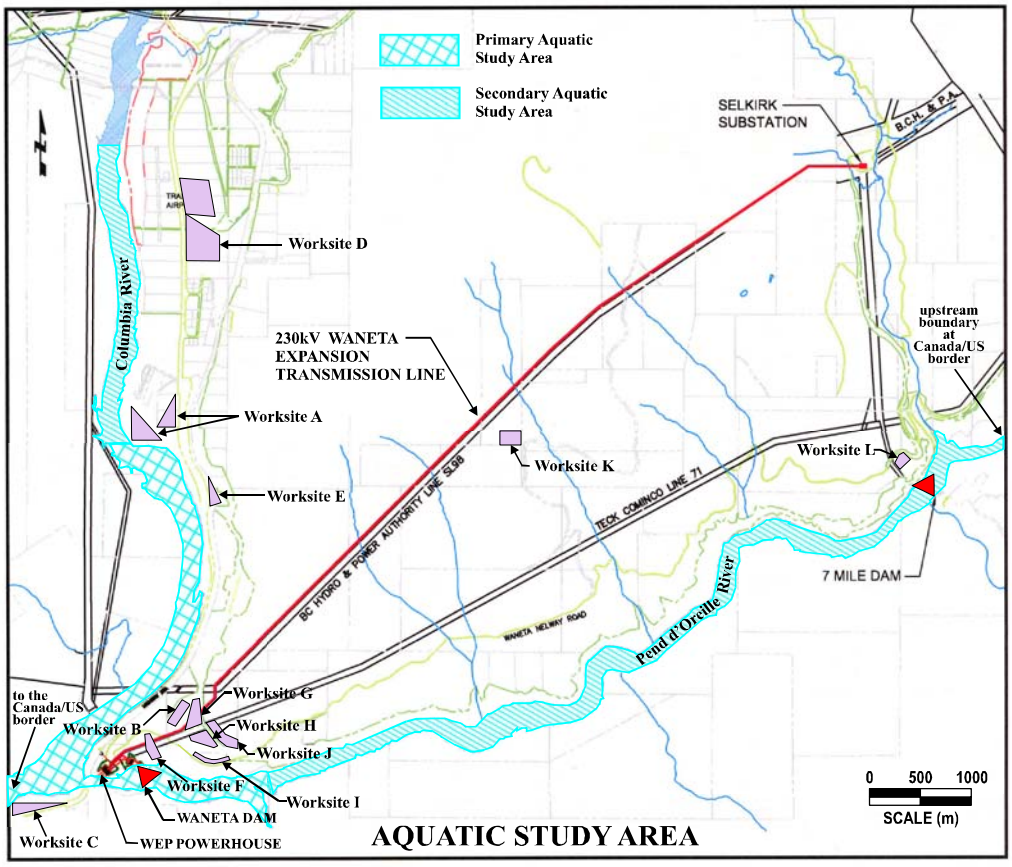
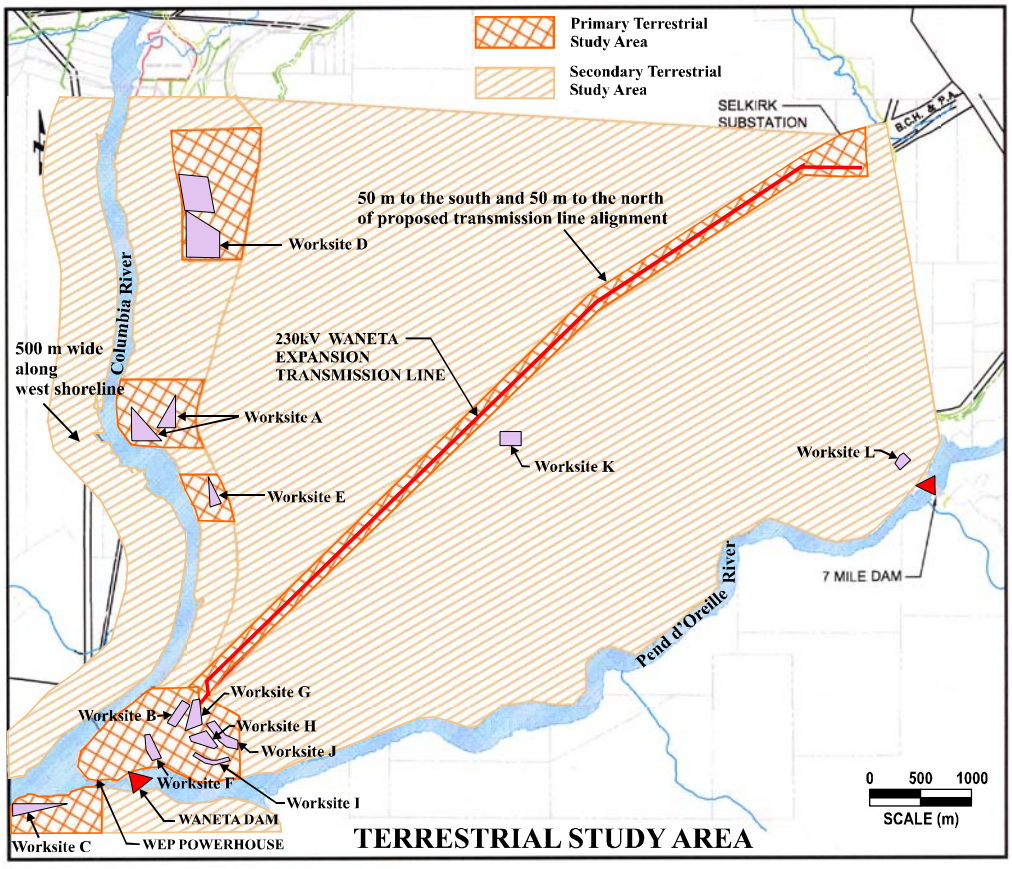


Figure 6 - Location of Project Worksites

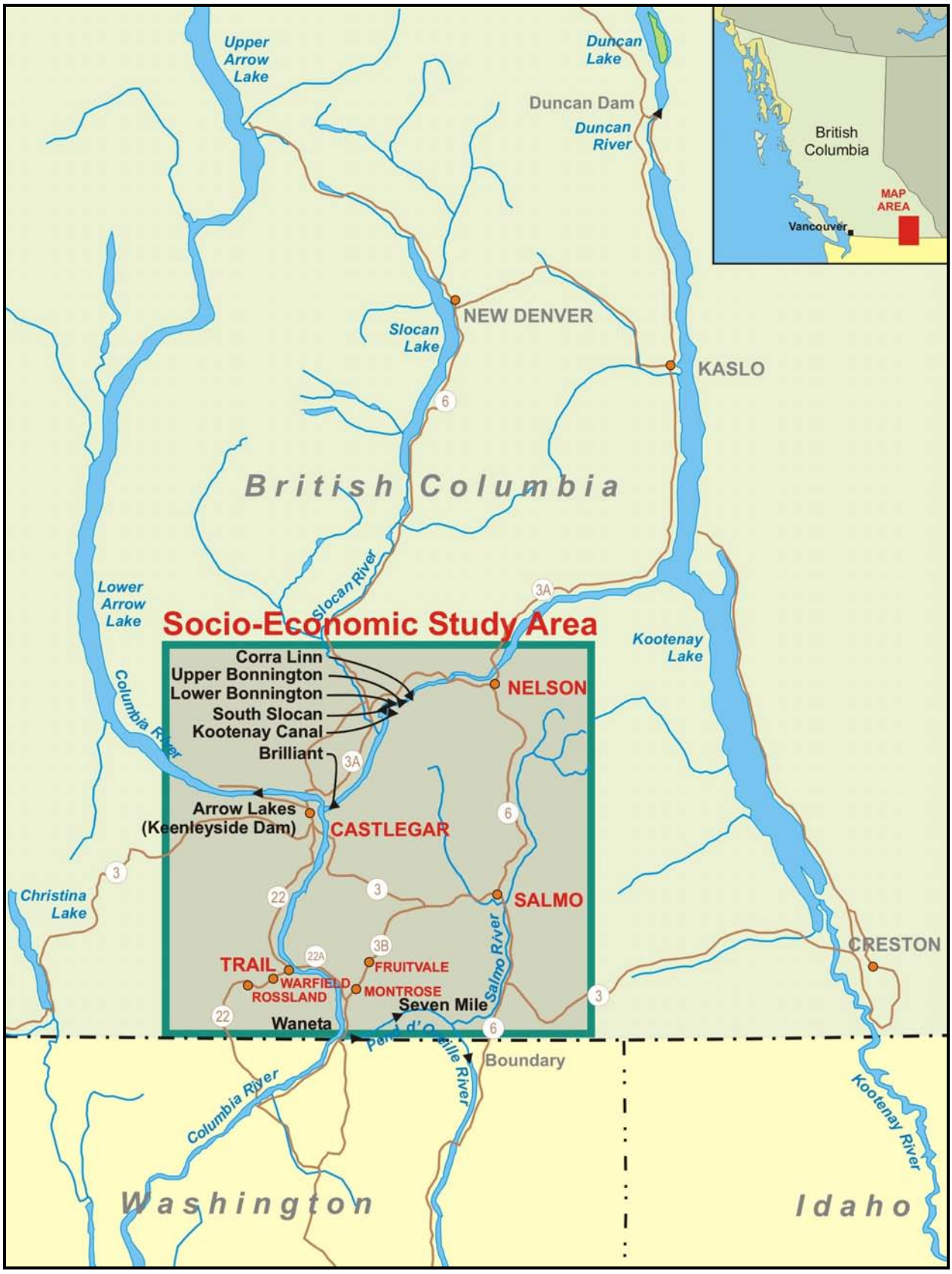






AQUATIC AND TERRESTRIAL STUDY AREAS
Waneta Expansion EAC Application

Figure 8 - Socio-economic Study Area



SOCIO-ECONOMIC STUDY AREA
Waneta Expansion EAC Application

APPENDIX 2 – PROJECT WORKING GROUP LIST

Government of British Columbia

- BC Environmental Assessment Office*
- Ministry of Environment – Environmental Stewardship Division*; Environmental Protection Division; Water Stewardship Division*
- Ministry of Agriculture and Lands – Integrated Land Management Bureau; Interior Region
- Ministry of Transportation – Southern Interior Region
- Ministry of Forests and Range – Arrow Boundary Forest District
- Ministry of Tourism, Sport and the Arts – Archaeology Branch
- Ministry of Energy, Mines and Petroleum Resources – Electricity Policy Branch
- Agricultural Land Commission
- Interior Health Authority

Government of Canada

- Canadian Environmental Assessment Agency*
- Fisheries and Oceans Canada*
- Transport Canada – Environmental Services; Navigable Waters Protection
- Environment Canada

Local Governments (British Columbia)

- Regional District of Kootenay Boundary
- City of Trail
- City of Rossland
- Village of Montrose
- Village of Fruitvale
- Village of Warfield

First Nations (Canada)

- Ktunaxa Nation Council*
- Canadian Columbia River Inter-tribal Fisheries Commission*
- Okanagan Nation Alliance*

Government of United States of America

- Environmental Protection Agency
- Federal Energy Regulatory Commission – Office of Energy Projects
- National Oceanic and Atmospheric Administration – National Marine Fisheries Service
- U.S. Fish and Wildlife Service – Upper Columbia Fish and Wildlife Office
- Bureau of Reclamation

State Governments

- State of Washington Department of Ecology
- State of Idaho Department of Environmental Quality

* Participant on technical working sub-group for aquatic/fisheries issues.

APPENDIX 3 – ISSUES RAISED AND PROPONENT'S RESPONSES

[The documents in Appendices 3-1 to 3-6 were prepared by the Proponent]

Appendix 3-1 – Response to Review Period Questions and Comments from the Public, First Nations and Agencies, August 31, 2006

Appendix 3-2 – Response to Post-Review Period Comments from Okanagan Nation Alliance, September 22, 2006

Appendix 3-3 – Response to Post-Review Period Comments from Ktunaxa Nation Council, September 22, 2006

Appendix 3-4 – Response to Questions and Comments (Round 2) from First Nations and Government Agencies, September 29, 2006

Appendix 3-5 – Response to Questions and Comments from the Ministry of Environment, Water Stewardship Division, December 1, 2006

Appendix 3-6 – Response to Questions and Comments from Environment Canada, December 4, 2006, and December 15, 2006

Appendix 3-1 – Response to Review Period Questions and Comments from the Public, First Nations and Agencies, August 31, 2006

[The following document was prepared by the Proponent]

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REVIEWER COMMENTS REFERENCE INDEX

Reviewer/Affiliation	Comments Ref. #
Public	
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First Nations	
Okanagan Nation Alliance, Jay Johnson, July 30th Letter	9 - 13
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WILDLIFE IMPACTS		
Reviewer: Trail Wildlife Society, J. Gwilliam's E-mail of July 23, 2006		
1.	We have major concerns around the proliferation of powerlines and associated increased access in the Pend d'Oreille (PDO) valley.	The effects of the extensive number of existing transmission lines, associated roads and other access routes traversing through the low to middle elevations of the Pend d' Oreille Valley are acknowledged and noted in the WEP Cumulative Effects Analysis. The WEP Transmission Base Concept attempts to minimize incremental impacts of a new line by means of construction adjacent to the existing 500 kV BC Hydro line. This alignment substantially reduces the requirements for incremental RoW clearing and for new access road/trail construction. It also makes possible the simultaneous maintenance of overlapping lines and RoWs, which should minimize incremental disturbance in the future. WEP will not result in any new publicly accessible access routes into wildlife habitat areas approaching and beyond the transmission line corridor. Nevertheless, WEPC is providing funding for terrestrial impacts compensation and will be willing to engage in multi-agency, multi-stakeholder discussions on the priorities for compensation.
2.	Right-of-way (ROW) clearing/development opens undisturbed habitat to invasion by noxious weeds. This scenario can be mitigated to a degree by winter clearing.	The existing abundance and distribution of noxious weed species in the project area and the potential for WEP to exacerbate this existing problem has been recognized and considered in the Project Environmental Management Program. For example, the OERC (EACA Appendix 9A, Section C) contains specific requirements for seasonal clearing on portions of the ROW with sensitive soils and habitat features. Transmission Line corridor clearing will only occur between mid-October to mid-April. While this exceeds the December- March winter period, it will help to minimize potential invasion by noxious weeds.
3.	This project and the associated removal of mature Douglas-fir forest will exacerbate the already alarming rate of removal of the mature forests by Atco Lumber, BC Timber Sales and on private lands on the south bank of the PDO River. It is therefore important that Waneta	The WEP cumulative effects analysis included an evaluation of actual early, mature and old forest seral stage distributions in comparison with target distributions for the ICHxw and ICHdw subzones prescribed in the Biodiversity Guidebook of the Forest Practices Code. This

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	Expansion conduct an analysis to see if the remaining mature forests in the PDO exceed the minimums under the Kootenay/Boundary Land Use Plan for the ICHxw and ICHdw. Should there be shortfall Waneta Expansion should look at acquiring mature timbered land in the area to replace the timber they will be removing.	analysis was undertaken for the Pend d'Oreille Landscape Unit as a whole and was based on January 2005 data supplied by the Ministry of Environment. Results indicate that targets for early seral (age class 0-2) representation in the ICHxw are currently exceeded, whereas targets for old seral (age class 8) representation are not met in either subzone. Target distributions for mature and old forest combined (age class 6-8) are currently being met in both subzones. The establishment of additional early seral plant communities through WEP will tend to shift thresholds for early seral representation further away from recommended targets. However, WEP will involve no clearing of age class 8 forest and only a minor amount of clearing of mature forest (see EACA Table 8-3). No consideration is currently being given to acquiring lands with mature timber. However priorities for the terrestrial compensation program will be negotiated with the Ministry of Environment in consultation with other stakeholders.
4.	It is imperative a complete wildlife assessment be completed for the entire proposed ROW. It is our understanding that, as it stands, there is a fairly substantial gap where an assessment has not been completed on private lands in the vicinity of upper Four Mile Creek.	The area that was not accessed during detailed field assessments extends from km 3.2 to km 7.2 in the Lime and Four Mile Creek drainages. For inaccessible portions of the RoW, WEPC used the most recent available air photos, orthophotos, forest cover maps, soil capability maps and various background reports and existing resource information to interpret likely impacts of transmission line construction and operation on wildlife, habitat, riparian, forestry and agricultural resource values. However, it is intended when access is obtained for Transmission Line construction, that additional site-specific assessment for habitat features of significance (e.g., bat roost, snake den, veteran wildlife trees, etc.) will be conducted to further address mitigation needs. The OERC contains numerous measures to protect the resource values on the private land. Owner's Commitment # 19 specifically commits to conducting additional rare plant surveys in all work areas including the private lands. WEPC is confident that appropriate protection measures have been proposed for all resource values, including those on the private lands not accessed during field studies. If the Trail Wildlife Society or private landowners are aware of some specific resource value on the private

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		land that has not yet been assessed on the ground, WEPC would appreciate being advised and will take such information into account in the detailed planning of WEP Transmission Line
5.	TWA would like to have an opportunity to review the draft environmental management plan (emp). It appeared that the open house that opportunities for public comment would end there. [*sic*] We find this unacceptable!	WEPC's Environmental Management Program for Construction (EMPC) is described in Section 9 of the EACA. It details the Owner's Environmental Requirements for Construction (OERC), which constitutes the environmental requirements and obligations that will be assigned by WEPC to the Contractor. The OERC contains much more detail than is usually found in traditional EMPs. The OERC has been available for the Trail Wildlife Society and others for review during the advertised EACA Public Review Period from June 8 to July 31. The Environmental Work Plans that will be developed by the contractor to implement the OERC will be living documents that will be produced and revised as conditions and construction solutions progress. Reflecting contractual obligations and tight timelines, the Owner's Consultant and Project Environmental Monitor will be responsible for reviewing these plans and ensuring compliance with the OERC. Though not involving the reviewing of Environmental Work Plans, the Trail Wildlife Society will be invited to participate on the WEP Community Impact Management Committee. Through this forum, they will have the opportunity to be kept abreast of the project and to bring forward any concerns that may arise through out the construction phase of the project.
6.	An improper implementation phase could undo any well written emp - it is therefore important that there be an independent third party environmental monitor onsite during ROW clearing and transmission line construction.	Section 9 of the EACA describes the role of the Project Environmental Monitor (PEM). The PEM will be an environmental professional independent of the contractor with a primary role of monitoring contractor compliance with the OERC and EMPC. The PEM will have the discretion to use professional judgment to determine the appropriate time spent on individual worksites. Monitoring activities related to clearing and line installation (and the associated potential for impact on communities of rare plants and listed species (Section. 9.2.3) will be a priority for the PEM.

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7.	If the plans for a terrestrial compensation program are implemented TWA would like to be part of the team that oversees the compensation program.	WEPC considers the Trail Wildlife Society to be a key stakeholder in terrestrial resources management in the Project area. WEPC will seek to have TWA involved with the Ministry of Environment in the planning and delivery of WEP program compensation activities.
TRANSMISSION LINE IMPACTS		
Reviewer: Fred Buckley, Fax of July 10, 2006 to BC MoE Water Stewardship Division		
8.	The transmission line (proposed) that will go above the BC Hydro line 5L98 will go through the watersheds of two creeks that I have water rights on and there has been no new studies done on the watersheds of Wheith Creek [sic] and Lime Creek since the BC Hydro 5L98 went in. They said they would be using the old Hydro studies.	In addition to original BC Hydro studies, a new detailed comparative route analysis was undertaken by WEPC (EACA Background Report #9) that shows greater potential for negative impacts with the route paralleling the Teck Cominco transmission line. No instream work will be required during transmission line construction, with all works confined to the location of tower sites. Any clearing and creek crossings will be completed in accordance with the procedures outlined in the OERC. As such, negative residual effects are not predicted or anticipated in the watersheds of Reith and Lime Creeks where Mr. Buckley holds water rights.

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FIRST NATIONS PROCESS INVOLVEMENT		
Reviewer: ONA, Initial Comments, J. Johnson's Letter of July 30, 2006		
9.	Questions about the impacts of increased water flows, potential fluctuation changes, erosion and what potential gas changes will have on resident species, particularly the endangered (soon-to-be-listed) White Sturgeon remain a deep concern to the Nation.	WEPC endeavored to answer and comment on specific ONA concerns as part of its EACA pre-submission and ONA-WEPC Consultation Agreement. If concerns remain, the answers to other specific white sturgeon questions in this document will hopefully address the remaining ONA concerns.
10.	Broadly speaking the ONA is pleased that CPC has ensured our early involvement in EAO based pre-application discussions, however, the Okanagan Nation remains concerned about the lack of direct involvement in previous studies and requests there be discussions about the recognition of our internal expertise in future efforts, such as monitoring. The acceptance of impact assessment studies requires that the involvement of the nation in all permitting and environmental review processes, not simply those of the EAO.	WEPC will enter into discussions with the ONA regarding their internal expertise and will undertake to inform the ONA of any opportunities to provide environmental monitoring services, which WEPC may contract directly.
11.	The ONA asks for assistance of the EAO in identifying and facilitating the inclusion of the ONA in all additional and parallel permitting processes for the WEP	This request is directed to the EAO for response.
12.	The ONA has not had direct discussions with the proponent on socio-economic impacts or potential inclusions of the Okanagan (Syilx) Nation interests in this regard.	The socio-economic effects of project construction are discussed generally in Section 6.6 and specifically with respect to First Nations in 6.8.3 and 6.8.4. As noted in Section 6.8.4 it is not anticipated that there will be significant socio-economic effects on First Nations from WEP. Pursuant to the ONA-WEPC Consultation Agreement, early drafts of these sections were provided to the ONA. In the ONA-WEPC Consultation Agreement, WEPC has committed to negotiate the provision of project related community benefits to the ONA. WEPC has continued to communicate its willingness to meet with the ONA and has begun discussions regarding community benefits.

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13.	The Nation wishes to make the goal of the review process and the subsequent recommendations and mitigation efforts to be environmental enhancement not simply mitigation.	Avoidance and/or mitigation of identified potential adverse environmental effects are a fundamental goal of project environmental planning and assessment. Where feasible, WEPC has taken steps to include mitigative prescriptions and compensation proposals that contribute to a net environmental enhancement. As summarized in Section 11.3, WEPC believes the combined environmental effects of WEP, taking into consideration air, water and land values, will be positive.
Reviewer: KNC, Preliminary Comments, B. Green's Memorandum of August 8, 2006		
14.	Page 1-24 (bottom) suggests that WEPC's consultation is in line with the spirit of the New Relationship. No evidence is provided to support this contention.	WEPC believes that: • its early involvement of First Nations in the EACA process; • the negotiation of First Nation consultation agreements; • the provision of funding for review of draft sections of the EACA; • the provision of funding for aboriginal interest and traditional use reports; and • the agreement to provide project related community benefits notwithstanding any impacts all reflect the spirit of the New Relationship, which emphasizes respect for aboriginal interests and support for First Nations' capacity development and effective participation in the process. The record of our consultations with the KNC is contained in EACA Appendix F (EACA Volume 4).
FISH AND FISH HABITAT IMPACTS		
Reviewer: KNC, Preliminary Comments, B. Green's Memorandum of August 8, 2006		
15.	There is considerably more uncertainty about some of the potential impacts of the project than indicated in the application, particularly with respect to fisheries and aquatic ecosystem impacts. Faced with this uncertainty, we believe that the proponent	WEPC does not agree with the view that "there is considerably more uncertainty" about some of the potential impacts of the project than indicated in the EACA, particularly with respect to fisheries and aquatic ecosystem impacts. Notwithstanding, we have proposed

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	needs to develop and First Nations and agencies need to review and approve, prior to final EA decisions about the project, comprehensive and formal adaptive management programs with respect to these uncertain potential impacts.	a monitoring/research program that is intended to provide greater certainty. If the results of this program or other research determines that our analysis is incorrect and our project is determined to be having unforeseen negative effects on white sturgeon, we anticipate that agencies will require that WEPC address project effects at such time.
Flow-Through Effects on Waneta Eddy White Sturgeon Habitat:		
16.	Information presented in the report (and supporting documentation) does not support with reasonable certainty the conclusion that "The effects of post-project incremental changes to flow conditions in the Waneta Eddy are not expected to result in residual positive or negative effects on white sturgeon overwintering habitat…" (page 7-33)	WEPC continues to believe that post-project incremental changes to flow conditions in the Waneta Eddy will not result in residual effects, positive or negative, on white sturgeon overwintering habitat. This view is further explained in our response to Comment Ref. #123 where we provide eight direct and indirect lines of evidence supporting our initial assessment of potential effects of the project on white sturgeon overwintering habitat.
17.	The conditions which give rise to losses of low velocity (<0.5 m/sec., near bottom) habitat within the eddy occur more frequently than indicated. However, examining the flow conditions pertaining to each of the 5 cases, it appears that the conditions which give rise to the loss of low velocity (<0.5 m/sec., near bottom) habitat area within the eddy are associated with a combination of minimum LLH flows (34 cms) and moderate (not low) Columbia River flows – generally in excess of 1,500 cms. It would be useful if the proponent could provide more detailed information on the frequency of occurrence of conditions which give rise to substantial (> 20%) losses in the amount of low velocity (< 0.5 m/sec, near bottom) habitats within the Waneta eddy during the rearing and overwintering periods. This should involve additional model runs (all at non-WSFAP LLH flows) to determine the range of Columbia River flows in which there are substantial losses of low velocity habitats within the eddy, followed by an analysis of the frequency of occurrence of these flow conditions.	Frequency of occurrence of the minimum flow of 34 m^3/s in the Pend d'Oreille River with different concurrent flows in the Columbia River is summarized in Appendix 1, Table 1-1 for post-project conditions. For comparison purposes, the same analysis is also provided for pre-project conditions. The analysis was based on data for the period 1991-1999 which includes average, dry and wet water years. The calculation of the percentage of time with flow in the Pend d'Oreille of 34 m^3/s takes into account that this flow occurs only during LLH periods. Appendix 1, Figure 1-1 shows that frequency of occurrence of the flow conditions similar to the Case 5 Post-Project LLH (i.e. Pend d'Oreille flow of 34 m^3/s and Columbia River flow between 1500 m^3/s and 1750 m^3/s) is either very similar or identical during winter months (December to February) for pre- and post-project conditions. The post-project frequency of this flow combination increases in March-April and October-November for post-project conditions but this increase is small (2% of the time in March, April and November and 4% of the time in October). In summary, the data provided in Appendix 1 supports WEPC's original assessment that those flows that result in a slight reduction of

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		low velocity (<0.5 m/s) habitat within the eddy occur infrequently pre-project and will continue to occur infrequently once WEP is in operation. This analysis when considered with the additional information provided in Comment Ref. #123 further supports WEPC's assertion that the project will not have any negative impacts on sturgeon overwintering habitat.
18.	The evidence presented regarding water velocity preferences of juvenile white sturgeon within the Waneta eddy is limited and unclear. The report (Golder, 2005) is based on a very limited set of observations (basically, one day of combined observations of juvenile white sturgeon presence and habitat conditions; and one day of observations of a juvenile white sturgeon aggregation combined with model analysis of near bottom velocity conditions) of white sturgeon juvenile distribution, all taken outside of LLH periods. • White sturgeon juveniles were found in the southern and central (low velocity) core of eddy (according to COCRIM model simulations); • The observed southern cluster was alongside of a modeled shear zone; • Velocity measurements where white sturgeon were not observed were on the periphery of the low speed core of eddy • According to the COCRIM model, weak upward velocities occurred where WS juveniles were observed; • WS juveniles consistently observed at near-bottom velocities < 0.5 m/sec;. • According to the Jiang and Fissel (2005) appendix to the report, higher near-bottom velocities occurred where no juvenile WS were observed on March 30th and 31st; • Figure 1 in the Jiang and Fissel (2005)	The referenced data involve direct observations and measurements conducted during the low temperature winter period of concern (see also Comment Ref. #123). The reviewer's statement that "Velocity measurements where white sturgeon were not observed were on the periphery of the low speed core of eddy" obscures the fact that the area where sturgeon ***were*** observed was also on the "periphery of the low speed core" as shown in Figure 3.3 of the document referenced. This figure also clearly shows that measurements were taken in a variety of locations throughout the +15m depth zone where juveniles were not recorded. The statement the reviewer quotes from the Jiang and Fissel (2005) report was a general statement. The actual measurements of velocity provided in the report are more relevant to the issue than the model results. Measurement data indicate that at locations where sturgeon were found the mean velocity was 0.27 m/s (SD=0.12; range=0.08-0.55 m/s) compared to a mean of 0.3 m/s (SD=.11; range=0.07 to 0.49) where sturgeon were not observed. These values are virtually identical and in fact, the range of values where juveniles weren't found is lower than where they were found. The reviewer's concluding statement does not take into account the findings of previous studies that shows the velocities in this area are not static as portrayed by the model but can vary substantially within very brief time periods (see Comment Ref. #123). The reviewer's assumption also ignores an equally valid hypothesis that it may be the depth that the juveniles are selecting. As video observations show, juveniles appear to use a

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	appendix indicates that juvenile white sturgeon were highly selective for the low speed core of the eddy; All of the above observations support the hypothesis that juvenile white sturgeon strongly select low velocity (< 0.5 m/sec. near bottom) habitat conditions, and therefore those reductions in the areal extent of these habitat conditions within the Waneta eddy may be deleterious to juvenile white sturgeon growth and/or survival.	variety of locations within the eddy that are within the >15m depth range in the eddy. Finally, if the KNC (CCRIFC) believes that "reductions in the aerial extent of these habitat conditions within the Waneta Eddy may be deleterious to juvenile white sturgeon growth and/or survival", it would seem appropriate they would also consider that the times when the real extent is increased by the project should provide offsetting benefits.
19.	The hypothesis that overwintering habitat is not limiting the growth and/or survival of juvenile white sturgeon is highly uncertain. We are still in the very early years of a conservation aquaculture program intended to restore historical abundances of the transboundary white sturgeon population. Abundances of juvenile and sub-adult white sturgeon will have to be much larger than currently exists to support estimated abundances of adult white sturgeon. It is therefore impossible to speculate at this time as to the extent to which deep, low velocity habitat conditions in the Waneta eddy may limit the productivity of the population. It is indeed a reasonable hypothesis, given the observed importance of these habitat conditions, that they will become limiting in the future with continued increases in the abundance of white sturgeon.	WEPC asserts that our original statement is factual and is supported by data collected since the release of the first juveniles in 2001 and by comparisons with juvenile growth rates and condition factors from other populations. The reviewer's statement that these habitats "will become limiting in the future with continued increases in the abundance of white sturgeon" if true, will likely be more a result of stocking rates of hatchery juveniles (which are determined by the Recovery Program) than any slight changes resulting from the project. In Comment Ref. #123 we provide additional support for our position that the incremental effect of the project will not result in any detectable change in uses of the eddy by white sturgeon juveniles or result in measurable changes to juvenile white sturgeon growth and/or survival.
Flow-through effects on white sturgeon spawning and egg and larval survival:		
20.	The information presented in the EACA is inadequate or inconclusive with respect to the proponent's conclusion that (page 7-42): "Flow-through of Boundary flows is overall not expected to result in negative effects on white sturgeon spawning activities, egg incubation, and larval survival" for the following reasons:	WEPC stands by our EACA analysis and conclusions that flow-though of Boundary flows is not expected to have negative effects on white sturgeon spawning activities, egg incubation and larval survival.
21.	1) Lack of relevant case study data: Only one 'spawning relevant' case is presented in Background Report #4 (Figure D-6). This shows average water column velocity conditions during the LLH period (minimum WSFAP flow of 142 cms) for a	WEPC has provided additional information in Appendix 2 that provides information on egg distribution and flow patterns in the white sturgeon spawning area. In WEPC's assessment, this data further strengthens our original position that flow-through of Boundary flows is overall, not expected to result in

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	particular combination of Columbia River (2,910 cms) and Pend d'Oreille River flows. It shows that a large area of habitat with average water column velocities > 0.8 m/sec is lost under post-project as opposed to pre-project conditions, between (and upstream of) the bridge and the confluence with the main (non-eddy) flow of the Columbia River. Additional information is presented in figures F-2 and F-3 in Background Report #4, which further demonstrates the loss of habitats with average water column velocities > 0.8 m/sec. during LLH operations. Further additional information was provided by the proponent's consultant at a meeting on July 18th. This information shows, in both cases (2 and 4), large losses of near bottom habitats with velocities > 0.4 m/sec (and indeed of near bottom habitats with velocities > 0.8 and 1.6 m/sec) within the spawning and demonstrated egg incubation area. We understand that the proponent may be providing additional detailed information on the distribution of white sturgeon eggs in relation to the area of significant daily near-bottom velocity change.	negative effects on white sturgeon spawning activities, egg incubation, and larval survival. The data in Table 2-1 show that the vast majority of eggs are deposited downstream from the area that would be subject to the greatest effects of WEP operations (i.e., the areas noted in Cases 2 and 4 and illustrated in Figures 2-1 and 2-2). We reiterate our previous statements that the static images provided by the model are a "snapshot" and that actual flow conditions in the area are very turbulent and highly dynamic. Notwithstanding our analysis and conclusions, the EACA committed to a program that would either fund monitoring to specifically examine project effects or alternatively, to provide this funding to the UCWSRI for use in ongoing or future research as to the effects of hydroelectric developments or more general studies related to identification of recruitment failure. WEPC made this offer without prejudice, recognizing that if contrary to expectations, monitoring or other research programs indicate a definite negative impact on white sturgeon spawning success, recruitment, or recovery efforts, WEPC would expect that the agencies would use their regulatory authority to require WEPC to address project effects at such time.
22.	2) Inadequate information on predators and predation: Two principal sources of information support the proponent's conclusions regarding predation impacts: (i) information on the distribution of potential predators during LLH (1 sample period) and low HLH flows (2 sample periods; reported in 'White sturgeon spawning at Waneta 2005 Investigations' (Golder 2006)); and (ii) information on maximum swimming speeds of potentially-relevant predators (reported in 'Analysis of white sturgeon spawning in relation to the Waneta Dam White Sturgeon Flow Augmentation Program' (Golder, 2005.) We note the following from our review of these reports: The very limited set of observations – only one LLH sample period during which time	WEPC would point out that the information was collected by Teck Cominco as part of the Waneta Dam Upgrade Project PAC commitment to examine the effects of the WSFAP on white sturgeon egg predation. However, WEPC feels the data are relevant to illustrate the potential magnitude of WEP effects on sturgeon egg predation. Our responses to certain of your additional comments are as follows (see Comment Ref. #128 for additional detail): : 1) Although the HLH observations were made during lower flows than would be provided during WEP operations, this should provide a conservative assessment of potential use of the area by egg predators. Species composition and relative abundance in a riverine area are strongly related to maximum flow velocities. Higher daily velocities would be expected to result in lower

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	LLH flows were approximately 35% higher than WSFAP minimum LLH flows; The HLH observations (two sample periods) were made when Waneta discharges were between 646 and 800 cms, substantially lower than the maximum HLH discharges (1,472 cms) which will occur with WEP; In short, the discharge contrast was much lower (4 to 5 fold increase observed vs. 10 fold increase with WEP) during the 2005 investigations than will occur with WEP; Nonetheless, the study did note 13 fold and 4 fold increases in sculpin CPUE between HLH and LLH observations. The study suggests that this difference might be due to higher sampling efficiency for sculpins at low flows; however, it may also be a real difference in sculpin density between HLH and LLH periods. If due to differences in sampling efficiency, the boat electrofishing observations themselves become of very limited value; Near bottom water velocities under HLH conditions would typically exclude walleye, sucker spp. And age 0 rainbow trout, whereas these species would not be excluded under LLH conditions. (Based on maximum sustained swimming speeds in table 3.8 in Golder 2005 and additional figures showing near bottom water velocities under case 2 and case 4 conditions provided at July technical working group meeting. Note that table 3.8 does not provide information on swimming speeds of sculpins). In consideration of the above, the proponent's conclusion of no '…negative effects (of WEP) on white sturgeon....egg incubation and larval survival' is, at best, highly uncertain. Indeed, the Golder (2005) report notes (pg. 30) that '…it is unlikely that the WSFAP flows would generate velocities that would hinder access into the area by potential egg predators.	overall use of the area by potential predators with weaker swimming abilities. 2) WEPC's consultant has over 10 years of boat electroshocking expertise on the Columbia River and can provide ample evidence to demonstrate the poor relationship between CPUE and abundance and why changes in CPUE alone should not be interpreted as changes in abundance (Golder Associates Ltd. 2006. Large River Fish Indexing Program – Lower Columbia River 2005 Phase 5 Investigations. Report No. 05-1480-034F: 56 p. + 6 app). Flow velocities have a very substantial effect on capture efficiency particularly for bottom dwelling species like sculpin that are very difficult to see and even more difficult to catch when sampling high flows at night. 3) More relevant data provided in the Golder report are: • sturgeon spawning in the area had occurred the day prior to the survey (i.e., there were eggs incubating in the area), • 165 fish were caught and their stomachs contents examined, • only two stomachs contained sturgeon eggs (1 stomach with 1 egg and the other with 3 eggs). 4) Although eggs are likely digested quickly and may be unrecognizable 2-3 hours after ingestion, it is highly improbable that all of the fish captured had previously been feeding on sturgeon eggs but stopped eating 2-3 hours before being captured. This provides direct empirical evidence that at the time surveyed, sturgeon eggs were a very minor component of the diet of all potential predators in the area. Even if the increased CPUE values for some species represented an actual increase in abundance in the area during the LLH period, this data would support a hypothesis that the

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		fish were in the area to feed on other prey items (e.g., the abundant local invertebrate populations) and incidentally ate a few sturgeon eggs rather than a hypothesis that suggests these fish were in the area specifically to feed on sturgeon eggs.
23.	3) Relationship to recruitment failure: The proponent suggests that (pages 7-39 and 7-40) "…it is unlikely that an increase in the rate of egg and larval predation as a result of flow regulation of the Pend d'Oreille is a major factor limiting white sturgeon recruitment." And further (page 7-36, para. 1) that recruitment failure is most likely associated with regulation of the mainstem Columbia River. No data is presented to support these hypotheses. Information required to support these hypotheses would include a recruitment time series for the Waneta – Fort Shephard sub-population and for the population as a whole and detailed sequences of flow regulation 'events' on the Columbia, Kootenay and Pend d'Oreille Rivers. As an alternative hypothesis with a moderate degree of probability we suggest that daily flow regulation of the Pend d'Oreille, during and following the peak of the spawning and egg incubation season contributes significantly to white sturgeon recruitment failure. In general, the proponent appears to rely on a 'silver bullet' (single cause) of white sturgeon recruitment failure, as opposed to an at least equally likely multiple cause, cumulative effects model.	WEPC's comment that "recruitment failure is most likely associated with regulation of the mainstem Columbia River" is a direct reference to information provided in the UCWSRI Recovery Plan (UCWSRI 2002) which states" The modern recruitment failure in the upper Columbia River white sturgeon population coincided with the construction since 1968 of three large Columbia River mainstem dams." This document further discusses in detail how these dams have impacted sturgeon populations through flow regulation. Also discussed in this document is the possible effects of peaking operations on white sturgeon and while the authors note the effects are unclear, state that "successful spawning and recruitment of white sturgeon has been observed downstream of Lower Columbia River Dams operated for peaking." The reviewer's suggestion that WEPC's analysis include "a recruitment time series for the Waneta – Fort Shepherd sub-population" presupposes this sub-population exists. WEPC understands that the genetics work upon which this assessment is based has not been peer reviewed and there is still some question as to the existence of this sub-group. Until such time as any sub-structuring of the population is verified, WEPC asserts there is little point in conducting the analysis suggested. WEPC points out that its offer of funding for monitoring/research could be used to address this issue if it is deemed of high importance to white sturgeon recovery. As indicated above and discussed further in Comment Ref. #121, WEPC understands that the only cause-effect relationship that can be reasonably determined from the examination of recruitment failure timing is the regulation of the Columbia River mainstem.
24.	4) Timing of the onset of post-freshet block-	In an average year post-freshet block-loading commences under post-project conditions in

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	loaded discharges: According to figure D-1 in Background Report 4, post-freshet load shaping commences, on average, in mid-July under pre-project conditions. Typically, 85% of spawning has occurred by this date with the result that load shaping usually has only marginal effects on spawning and egg incubation. With WEP, load-shaping will typically commence in late June, at which time only about one-half of white sturgeon spawning has usually occurred. This means that WEP will bring load-shaping, on average, from the very last part to the peak of the spawning and egg incubation period.	late June. However, the difference between flows during LLH and HLH is initially very small; full block-loading starts in mid-July (July 10). This compares to the full block-loading in an average year under pre-project conditions on July 20. Based on data collected since 1993, 77% of spawning has occurred by July 10, which indicates the main block loading effects of the project will occur well past the peak spawning and egg incubation period - (Golder Associates Ltd. 2006. White sturgeon spawning at Waneta, 2005 investigations. Report No. 05-1480-030F)
25.	In summary, we understand that the proponent will be providing additional information which may address some of the substantial sources of uncertainty described above. However, it is very likely that very significant uncertainty will remain about the impacts of the increased duration of load shaping operations (flow through of Boundary block-loaded flows) on white sturgeon egg and larval survival. The proponent should consider developing, prior to EAC approval, a detailed and formal adaptive management program with respect to the potential effects of load shaping operations on egg and larval predation. This program should include a detailed monitoring program related to predator movements in response to HLH – LLH flow changes and specific criteria relating to abandoning, continuing or modifying spawning and incubation period flow prescriptions.	Prior to and since 2001 when consideration of WEP feasibility first began in earnest, WEPC's fisheries consultants have recognized white sturgeon to be an endangered species and the Pend d'Oreille River - Columbia River confluence area to be critical white sturgeon habitat. WEP has analyzed existing Pend d'Oreille releases from Waneta and has found no probable correlation with white sturgeon egg production or larval predation. Evidence suggests that eggs have been produced and fertilized annually in the Waneta area, including low water years (2001 when flows were below prescribed WSFAP levels) and high water years (1997 record flows). Despite this range of conditions, recruitment has rarely occurred which to us, suggests the mechanism limiting recruitment is not related to Pend d'Oreille flow. A more constant change that has occurred across the range of Pend d'Oreille flows and one that would likely have a much greater effect on early larval survival is the regulation of the Columbia River mainstem, which has resulted in an average reduction of approximate 50% in annual peak flows during the June to July white sturgeon spawning period and a substantial increase in water clarity. Looking forward, WEPC has carefully modelled incremental project effects per terms of its Approved EACA Terms of Reference and again has seen no probable linkage to a significant impact of WEP on egg production and larval predation. Shaped releases

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		leaving Waneta will be generally identical to flows entering the Canadian Pend d'Oreille. Fluctuations will occur more frequently but low flows will not be lower than existing WSFAP levels (unless in natural drought years) and high flows will be a function of daily natural river flow. As conveyed through the extensive analysis and commentary that WEPC has provided (including answers under its KNC-WEPC Consultation Agreement), and additionally through this document, WEPC does not agree that "it is very likely that very significant uncertainty will remain about the impacts … on white sturgeon egg and larval surround". Uncertainties related WEPC's analysis are minor and similar to uncertainty associated with most environmental decision-making. No WEP "suspect effects" have been identified that would warrant adaptive management. WEP requires, and through its analysis has earned the right to, the same "relative certainty" of flow that is afforded in other Pend d'Oreille River environmental approvals and water licences. The funding WEPC is committing for monitoring and/or other sturgeon research is expected to provide increased confidence in WEPC's analysis. If, unexpectedly, it demonstrates that our analysis has been flawed and sturgeon may be negatively impacted by Boundary flow-through, then WEPC accepts that regulatory agencies will use their authority to modify the operations of WEP and other operations on the Canadian Pend d'Oreille as may be required.
Flow - through effects on productive aquatic habitat:		
26.	The assessment (page 7-44) is based on an assumption of a 20 day benthic and macro-invertebrate recovery time, based on the comprehensive assessment undertaken during the EA process for the Brilliant Expansion Project. However, the BEP EA documentation refers to literature-derived benthic recovery times of 21 days (periphyton) and 45 days (macro-invertebrates). The WEP assessment should be corrected by accounting for the longer	The values used in the Brilliant Expansion report, although described to represent periphyton and macroinvertebrate recovery rates, are example values over a wide range of reported recovery rates from the literature. As cited in the BEP EACA application (Volume III, Tab 7, page 54), recovery rates for macroinvertebrates ranged from 3 to 49 days as reported in a summary report of 35 investigations. Although other studies report that the recovery rates of particularly sensitive

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	macro-invertebrate recovery time.	taxa may require a full life cycle to recover, this would likely only be applicable to streams that have large varial zones and where recruitment of the invertebrate population is affected by flow variations. In the Columbia River, recovery of rewetted areas will likely be by drift and horizontal migration, so recovery rates of macroinvertebrates likely parallel those for periphyton. Based on the experience gained through modeling of the Columbia River below the Brilliant Expansion Project, the 20 day recovery period was chosen to represent a generalized recovery rate of benthos (both macroinvertebrates and periphyton). The modeling of the entire reach from the US border to HLK dam provided essentially identical values for net habitat gain projections using either the 21 day (10,626 m^2) or the 50 day (10,426 m^2) recovery rates (Volume III, Tab 7, page 66). The same baseline data set was used in the WEP effects analysis (based on the 1991-1999 hydrographs) and the WEP study area was inclusive of the area investigated using the BEP EACA investigations. Therefore, a similar result would likely occur if a 50 day period was applied to the modeling of benthic habitat in the WEP study area. The 3-D model used in the WEP habitat analysis has much more precision than the hydraulic model employed to estimate water levels in the BEP EACA studies. Consequently, WEPC believes the modeled habitat losses are realistic representations of actual habitat losses for both periphyton and benthic invertebrate communities.
27.	A very substantial deficiency in the assessment is that estimates of changes in productive shallow water habitat (pg. 7-46) are restricted to the very small area upstream of the Canada-US border. Much more significant effects can be expected in shallow water areas downstream of the border. Most importantly, these downstream effects may have consequences (food availability, stranding) for fish populations which spend part of their lives upstream of the border. These downstream effects were supposed to be analyzed in the 'Cumulative Effects Assessment' component of the EACA; however, absolutely no information is presented with respect to river cross-sections	The study area defined for intensive investigations in the approved TOR for the WEP study was north of the Canada-US border and as a result, detailed analysis of habitat gains and losses downstream of the Canada-US border are beyond the scope of the EACA. As described in Section 8 of the EACA, we would expect habitat changes in the US to parallel those identified within the study area in Canada although at a slightly reduced rate per linear downstream distance of river due to attenuation of flow variations. The linear extent of the area affected would depend upon reservoir elevations of Lake Roosevelt and would vary seasonally. These effects are the result of flow through impacts

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	downstream of the border or on the amount of shallow water habitat downstream of the border subject to de-watering due to the WEP passage of Boundary block-loaded flows.	originating in the US at Boundary Dam and do not originate as a result of WEP operations. Canadian operations will continue to re-regulate flows as part of the white sturgeon flow augmentation program (WSFAP), so some impacts originating in the US will continue to be mitigated by Canadian system operations following WEP.
28.	With respect to pool stranding risks to Umatilla and longnose dace, the application (pg. 7-49) notes that "Longnose dace and Umatilla dace were infrequent components of the total numbers of fish salvaged, with sucker species and sculpin species being the most abundant fish recorded in isolated pools." This observation merely attests to the relative abundance of these species, and not to their relative susceptibility to pool stranding.	Ongoing investigations of both interstitial and pool stranding of fish in the Columbia River indicates stranding susceptibility parallels the life stage and species abundance that use nearshore habitats, although smaller fish may have a tendency to be stranded at higher rates (Trevor Oussoren, Golder Associates Ltd. 24 August 2006, pers. comm.). Based on habitat usage, sculpin were generally thought to be more vulnerable to stranding but recently acquired data do not indicate any significant difference in stranding rates for sculpin species when compared to other species using the same habitat.
29.	The evidence presented (pg. 7-50) is not conclusive with respect to the risk of stranding for Umatilla and longnose dace. The analysis relies incorrectly on: (i) reduced shallow water abundance during the winter period (irrelevant when the incremental load-shaping impacts of WEP occur largely from mid-March through mid-July); and (ii) lack of observations of winter stranding of dace in 1993-94 and 1994-95.	Ongoing experimental investigations conducted as part of BC Hydro's ongoing assessments of pool and interstitial stranding, indicates stranding rates during the summer for all species (including dace spp.) are quite low ; this is the case even in areas where Umatilla dace are abundant (Trevor Oussoren, Golder Associates Ltd. 24 August 2006, pers. comm.) Pools with substantial in-water cover appear to have the higher stranding rates when they are cutoff from the mainstem river; these types of pools do not occur in the confluence area. The habitats and species composition investigated elsewhere in the Columbia River system are very similar to the habitats within the WEP project study area. Interstitial habitat types that have been shown to be associated with high rates of stranding during the winter period are very rare in the system and based on nearshore bank profiles, are likely rare to non-existent within the confluence area. As indicated in Comment Ref. # 109, WEPC's assessment of stranding risks to listed species would be verified through a monitoring program.
30.	Re 7.4.3.7: Combined residual impacts This section inappropriately relies on the relative	See response in Comment Ref. #27.

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	magnitudes of the areal impacts in Seven Mile reservoir and the Waneta – Columbia confluence area (only to the US border), thereby discounting the much larger consequences of flow variations downstream of the US border;	
31.	Re 7.4.3.8: Transboundary residual impacts The application proposes that "Impacts within the transboundary reach of the Columbia River (US and Canada) that will exist once WEP is constructed will not be caused by WEP powerplant operations, but rather will be the direct result of operations of US-based facilities upstream on the Pend d'Oreille River." This statement is incorrect because it is an operational decision and preference of the proponent (within regulatory parameters) to simply pass Boundary block-loaded flows rather than continue to re-regulate these flows to some degree.	WEPC stands by the EACA summary statement quoted. WEP is being proposed and designed to utilize the un-utilized energy component in the blocked flows entering Canada from Boundary Dam in the US. Except in emergencies or for unpredictable short-term situations, WEP cannot voluntarily operate in a way that ignores this energy and impairs its economics. Accordingly, except in extraordinary circumstances, the contribution of flow impacts from the Pend d'Oreille River in the transboundary region of the Columbia River will be effectively the result of operations on the Pend d'Oreille upstream in the United States.
32.	The plans for shallow water habitat compensation (page 7-75) appear generally reasonable. However: phase 1 of the 3 phase approach must be completed during the EACA review phase to provide reasonable certainty that this is a realistic compensation option. A rigorous monitoring program also needs to be proposed and approved within the EACA review period to determine the effectiveness of the proposed habitat compensation and to trigger alternate compensation activities if the preferred approach proves ineffective.	The fish compensation program will be developed to satisfy the requirements of the project Fisheries Authorization. WEPC is conducting an analysis of potential compensation sites so that sufficient detail can be provided in the Fisheries Authorization application. Development of a monitoring program can only be done once a particular option is chosen and agreed upon. The Fisheries Authorization application will contain details of both, as well as details of alternative plans in the event the proposed compensation is not effective. Based on WEPC's approved EACA TOR, and based on the approval experience of other hydro projects, WEPC disagrees that "a rigorous monitoring program needs to be proposed and approved within the EACA review period." WEPC does not expect a Fisheries Act Authorization will be issued unless there is reasonable certainty that our proposed compensation is achievable. An EACA decision can be made in the knowledge that a realistic compensation program will need to be approved by DFO before WEPC will commence in-stream construction.
33.	Subsection 4.4.7: Fish passage: "…WEPC will install fish passage facilities at Waneta on	The construction of the WEP will not negatively impact fish passage by precluding

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	a cost-shared basis." The proponent should indicate with whom they anticipate to cost share and in accordance with what principles.	the implementation of future fish passage options as described in background report BR # 6. Future fish passage up the Pend d'Oreille, in the event that anadromous fish are restored to the Upper Columbia river, is an objective that will require the participation and cooperation of numerous stakeholders to negotiate and resolve a number of biological, physical and economic issues and constraints. WEPC is committed to fully participate in all future discussions on this topic with fisheries management agencies, First Nations, hydro system owners and other stakeholders. If as a result of these discussions, there is a consensus that fish passage of anadromous fish up the Pend d'Oreille is socially desirable after considering all the biological, physical and economic considerations, which results in direction from the fisheries management agencies to establish fish passage up the Pend d'Oreille, WEPC will be pleased to contribute to establishing fish passage facilities at Waneta. It is anticipated under the conditions described above, that the owner of the existing Waneta Dam and Generating facility would have the primary responsibility for establishing fish passage. WEPC's commitment is to participate in, and cost share, those efforts. WEPC feels an appropriate principle is that costs would be shared in the same proportion as the relative benefits received from the dam. It is also expected that other stakeholders that will benefit from the establishment of fish passage, such as fisheries agencies and First Nations, will also contribute to such a project.
34.	Subsection 4.5.7.7: The application should provide some indication of the types of 'appropriate measures' that will be taken to prevent erosion of exposed soil areas on stockpile areas.	The development and implementation of measures relating to the prevention of erosion during decommissioning of Powerplant construction facilities worksites (Subsection 4.5.7.7) while final vegetation cover becomes established is the responsibility of the Contractor and will be described as part of the Erosion, Sediment and Drainage Control EWP specified by the OERC (D3). These measures will be consistent with the Site Restoration EWP for the particular worksite as required by the OERC (G). Both EWPs will be reviewed by the Owner's Consultant and

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		the PEM for compliance with the OERC.
CUMULATIVE EFFECTS ASSESSMENT		
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35.	**Re 8.4.4.2 Spawning relevant area:** The EACA proposes that 'Data collected to date do not suggest that either white sturgeon spawning activity or egg and larval survival are negatively influenced by flows from the Pend d'Oreille River.' It is our view that egg and larval mortality may contribute significantly to the recruitment failure of the white sturgeon population; the potential factors responsible for excessively high levels of egg and larval mortality are not known and may well include seasonal and daily load shaping from the Pend d'Oreille River. We generally agree with the conclusion that '…there is a high probability that in the last 30 years, all of the conditions that have been experienced post-WEP have already been experienced pre-WEP by sturgeon that spawn in the Waneta area.' However, this does not preclude the possibility that the increased frequency of low LLH discharges (either minimum 34 cms or WSFAP-mandated 143 cms) may contribute, in a cumulative impact recruitment failure model, to more difficulty in restoring recruitment.	WEPC notes that there are many factors that "may" contribute significantly to recruitment failure. However, there is no evidence to support the reviewers hypothesis that egg mortality contributes measurably to sturgeon recruitment failure or that there is "excessively high levels" of egg mortality. The further hypothesis that these levels of mortality "may well include" seasonal and daily load shaping from the Pend d'Oreille River is also unsupported. The hypothetical conjecture that the increased frequency of low LLH discharges "may" contribute, in a cumulative impact recruitment failure model, is not supported by any data or analysis that we are aware of.
36.	We also do not agree with the conclusion that "There is a reasonable certainty that the relatively subtle effects of load-shaping related to Boundary Dam flow-through….on sturgeon spawning and recruitment will never be experimentally proven by in situ investigations given the myriad of compounding variables that occur in the confluence area." In our view, demonstration of load-shaping effects on predator distribution in the egg and larval incubation area would demonstrate a probable effect of WEP on white sturgeon recruitment.	WEPC believes our conclusion is supported by the available data. We seriously question that simple measures of predator distribution in the egg and larval incubation area would provide the resolution needed to demonstrate any effect of WEP on white sturgeon recruitment. The knowledge that predators eat sturgeon eggs and larvae is well established and has occurred in the past and will continue to occur in the future, regardless of whether WEP is built or not. However there is no evidence to support the implicit conclusion that a demonstrated increase in predator numbers will have a "probable effect" on sturgeon recruitment (see Comment Ref. #22). A suggestion that we will be able to quantitatively detect a significant change in post-project egg predation rates and then link

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		this change to recruitment failure is, in our assessment, extremely improbable.
37.	We agree with the conclusion that "…it is not possible to know if the increase in the occurrence of WSFAP minimum flows will be insignificant to sturgeon reproduction (Unknown significance)." Given this uncertainty about a potential impact to an endangered species, a rigorous and carefully-developed monitoring program should be implemented to determine the significance of this potential impact.	WEPC's statement is an acknowledgment that it is virtually impossible to have absolute certainty in assessing biological cause and effect, especially when dealing with fisheries issues. We have committed to monitor project effects on white sturgeon with the goal of further confirming our predictions of no effect. We believe it will be very difficult however, to determine whether the minor changes (within existing variabilities) related to WEP will have a statistically significant effect, negative or positive, on white sturgeon recruitment. WEPC is willing to explore this topic with the Fisheries Working Group and if workable significance criteria for such a monitoring program can be established, WEPC will include details in its Fisheries Authorization application.
38.	The EACA also suggests that "Waneta was operating prior to the onset of white sturgeon recruitment failure, suggesting that its presence was not the cause of recruitment failure.' While we agree that the Waneta dam and generating station are not the sole cause of recruitment failure, we believe that Waneta load-shaping operations may contribute to recruitment failure. Therefore, we cannot agree with the conclusion of negligible significance of the cumulative effects of WEP on white sturgeon recruitment.	As stated in WEPC's response to Comment Ref. #121, it is our understanding that the only cause-effect relationship that can reasonably be detected through examination of available information on recruitment failure timing is the regulation of the Columbia River mainstem. This is supported by the UCWSRI Recovery Plan (UCWSRI 2002), which states (page 33) "The modern recruitment failure in the upper Columbia white sturgeon population coincides with the construction since 1968 of three large Columbia River mainstem dams." Regarding the reviewer's often stated belief that existing Waneta operations may contribute to recruitment failure; WEPC has not encountered any information that would support this belief and would carefully consider any data received from the KNC (CCRIFC) that provides the basis for this statement.
39.	The proponents assert that "The continued adherence by system operators to flows specified under the WSFAP meets the precautionary requirements agreed with the regulatory officials to protect white sturgeon spawning, incubation and rearing in the Waneta confluence area." This assertion is untrue – continued adherence to the WSFAP program meets the precautionary	Although more information has been obtained since inception of the WSFAP, WEPC questions how this information would be used to alter the program at this time. The program was implemented as a means to apportion water between HLH and LLH during a period of declining flows in the system. This principle still applies and even if changes were made to the program, there is presently no scientific

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	requirements agreed to with respect to the Waneta Upgrade Project, almost ten years ago, when much less was known about sturgeon spawning and egg and larval incubation. Some evidence suggests that the WSFAP minimum flows are inadequate to protect sturgeon eggs and larvae from predators. Therefore, a rigorous monitoring program is required to determine if there is an impact from increased WSFAP minimum flows and reversion to pre-project flow conditions may be necessary if an impact is demonstrated.	basis for the selection of one alternate flow regime over another. Providing more flow during LLH would require reducing flows during HLH and this could have negative effects that could cancel or outweigh any potential benefits. WEPC questions what kind of rigorous monitoring program would demonstrate any impacts from increased WSFAP minimum flows. The area has been the subject of a rigorous spawn monitoring program since 1993 and even with this database, analysis to date has been unable to detect any significant change in initiation or cessation of spawning, duration of the spawning period, or the number of spawning events as a result of the WSFAP. Of greater significance is the inability of this analysis to detect the removal of up to eight spawners annually through the broodstock collection efforts of the UCWSRI. The inability to detect the removal up to 50% of the spawning population in a given year on any spawning metrics that have been measured raises serious doubts about the detection of the much more subtle hypothetical effects that an increased frequency of low flow periods would have on egg predation during a limited portion of the spawning period
40.	**8.4.5 Water levels and productive habitat below Waneta:** The EACA asserts that 'A reach approximately 10 km. in length will likely be affected during the limited periods when minimum flows are reduced as a result of WEP operations.' No information is provided to support the conclusion of an approximate 10 km. impact zone. What is referred to as 'limited periods' is, on average (according to figure D-1, BR #4) 3 months of the year. The argument that '….these effects result from the operation of US based facilities…' is incorrect as the effects currently do not occur and will occur as the result of the proposed operation of Canadian facilities. It is therefore unacceptable to exclude these areas '…from any consideration of compensation or monitoring programs.' As indicated previously, we require assurances regarding	See WEPC's response to Comment Ref. # 27. The 10 km reach is the approximate distance from the U.S. border to the full pool level of Lake Roosevelt. Full pool is achieved during the summer period when much of the minimum flow reductions from Boundary flow-through will occur. Any effects of these flow reductions are expected to be fully attenuated by the time they reach at the river-reservoir interface area. WEPC's compensation program for shallow water habitat is to address downstream impacts in Canada as required by DFO's Policy for the Management of Fish Habitat.

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	the effectiveness of the proposed shallow water habitat compensation program in two ways, at least in part to address uncertain impacts downstream of the Canada-US border: • Through completion, review and approval of phase 1 of the proposed 3 phase approach to development of a shallow water habitat compensation program during the EACA review; and • Through completion, review and approval of a comprehensive monitoring program to determine the effectiveness of the proposed compensation program.	
OWNER'S COMMITMENTS		
Reviewer: KNC, Preliminary Comments, B. Green's Memorandum of August 8, 2006		
41.	General: The commitments should provide for an on-going role for First Nations in the environmental monitoring and contracting opportunities in two ways: (i) in the review of monitoring reports and the determination of follow-up activities; and (ii) through participation (contracting or employment) in the implementation of the monitoring programs (as part of First Nations community benefits). For example, commitments 19, 21, 23, 25, 29, 37, and 40 could all include some level of enhanced FN involvement.	WEPC takes comment (i) as meaning that the KNC would like to receive copies of the monthly reports to regulatory agencies on the contractor's environmental performance and compliance with the Owner's Environmental Requirements for Construction. Upon request WEPC will provide those reports to the KNC. Additionally, as mentioned in Comment Ref. #10, WEPC will enter into discussions with the KNC regarding their internal expertise and will undertake to inform the KNC of any opportunities to provide environmental monitoring services, which WEPC may contract directly. Additionally, First Nations involvement will be sought for a steering committee for WEPC's terrestrial compensation program, referenced in Owner's Commitment #23, that will be negotiated with the Ministry of the Environment.
42.	Re 11.1.3, clause 6: As described in our comments about the EACA assessment of potential project impacts on white sturgeon, we believe that there is substantial uncertainty with respect to certain impact hypotheses, and as such that the proponent needs to develop and commit to comprehensive and formal 'Adaptive Management' programs which will include: (i)	See response to Comment Ref. #25

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	comprehensive monitoring programs; (ii) specific, measurable criteria regarding conclusions to be drawn from the results of monitoring programs; and (iii) actions to be taken in response to different conclusions from the monitoring programs. The development of these 'AM' programs will be challenging and considerable effort needs to be invested in their development and review within the remainder of the EACA review period by the proponent, First Nations and agencies.	
43.	Owner's Commitment #3: There may well be differences of opinion with regard to the possibility of '…materially adverse effects different from the Base Concept…' As such, this commitment should describe a process for the involvement of First Nations and agencies in the preliminary determination of the possibility of such effects. KNC/CCRIFC to receive copies and opportunity to comment as well.	Per the commitment referenced, WEPC will communicate with the EAO any changes to the project that have the potential to require an EAC amendment. As part of the EAC amendment process there will be appropriate consultation with other agencies and First Nations.
44.	Owner's Commitment #6: KNC/ CCRIFC to receive copies of the compliance and audit reports.	If requested, WEPC will provide the KNC with a copy of the monthly reports that will be prepared by the Project Environmental Monitor for regulatory agencies. A specific section of the reports will deal with any contractor compliance issues.
45.	Owner's Commitment #8: This commitment needs to be strengthened by: (i) a reference to a process for professional review of the potential for the project to '…preclude the ongoing potential for future fish passage'; and (ii) specifications related to the conditional commitment to construct fish passage facilities, including principles of cost-sharing.	Background Report # 6 dealing with fish passage was written by an expert consultant with experience in the area of fish passage on the Columbia River. The specifics of WEPC's commitment for fish passage are detailed in the response to the comment further discussed in the response to comment #33.
46.	Owner's Commitment #9: Stronger language is required here. I would like to see a requirement that the Design Build contractor provide evidence to CPC that they have contacted KNC businesses and identified specific contracts that will be done. Those contractors who have secured contracts with FN businesses will be more favourably looked upon.	WEPC will encourage potential design-build contractors to communicate directly with First Nations. Credit for First Nations benefits (contracts, training, employment or other benefits) will only be provided to the potential design-build contractor in the evaluation process, if that benefit has been discussed with the First Nation and a business commitment has been made.

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47.	Owner's Commitment #13: This commitment should include a commitment to report on 'regularly scheduled compliance audits' and to twice-yearly (instead of regularly-scheduled) audits. We would also like to see some compliance auditing of the contractor's communication with the KNC/CCRIFC.	The audits referred to in Commitment #13 are part of CPC's existing EMS, which manages contractual obligations for all CPC projects, and are internal management control documents not intended for outside parties. WEPC does not foresee what agreements may be made between the KNC which may necessitate the need for compliance audits of communication.
48.	Owner's Commitment #15: Insofar as equity hiring can occur, we would like to see some mention a commitment to FN employment / training.	The equity reference in Owners Commitment #15 relates to the CHC/AHC collective labour agreement which includes provision for preferential First Nations training and employment. Owner's Commitment #10 relates to exploring further opportunities for First Nations training. These issues are discussed directly in Section 6.8.3.
49.	Owner's Commitment #18: The Ktunaxa Nation should be included in the list of entities to be consulted.	WEPC considers First Nations to be included in the "involved third parties" referenced in Owner's Commitment #18, and will consult with First Nations if monitoring reveals excessive roadkill.
50.	Owner's Commitment #19: This commitment should include a commitment to obtain required planting materials from the ?A'qam nursery.	Commitment # 19 refers to a mitigation program to salvage and transplant listed plants from work sites. As we are dealing with listed species, effectiveness is the first consideration. The ?A'qam nursery will be contacted to confirm if they have the necessary capabilities to cost-effectively provide required services.
51.	Owner's Commitment #23: Add, with involvement of the First Nations in the region.	WEPC will seek to have First Nations involved with the Ministry of Environment in the planning and delivery of WEP program compensation activities.
52.	Owner's Commitment #25: Add, 'in consultation with FN…". We want to be able to identify those species that are culturally significant.	The selection of culturally significant plants to be used in site restoration will be determined in consultation with the First Nations.
53.	Owner's Commitment #26: Replace 'local' with 'regional' as this would capture the East Kootenay region. Also, add "and First Nation businesses".	For purposes of Commitment #26 WEPC will consider the KNC and ONA to be "local", providing they each identify a contact person to work with the D-B contractor in identifying First Nation businesses able to supply goods and services to WEP.

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54.	Owner's Commitment #27: First Nations with interests in the area should be invited to have a representative on this committee.	WEPC will support local First Nations representation on the WEP Community Impact Management Committee.
55.	Owner's Commitment #29: This should include a requirement for the Design Build Contractor to also keep track on FN procurement of materials and services during the project construction.	As WEPC will be encouraging the D-B contractor to procure materials and services from First Nations, WEPC will require the D-B contractor to keep track of procurement from First Nations.
56.	Owner's Commitment #33: This commitment needs to be expanded to specify, as part of the 'Adaptive Management' approach described earlier, a commitment to revert to pre-project flow conditions if monitoring results indicate an impact from the increased duration/frequency of WSFAP flows.	Any possibility, once WEP is in operation, of having to revert to current "pre-project flow-conditions" by re-regulating Seven Mile Reservoir, would have impacts well beyond WEPC's commitment to maintaining existing WSFAP flows and would have serious economic implications for WEP. WEPC cannot agree to such "adaptive management". We do agree however, (see Comment Ref. #25) that if monitoring finds our aquatic impact assessment to be incorrect and white sturgeon are being negatively affected by Boundary flow-throughs, regulatory agencies will require specific and appropriate operational changes that may affect all Pend d'Oreille operations.
57.	Owner's Commitments #34: This commitment should not be specific to enhancing rainbow trout passage to anthropogenically blocked tributary habitat; instead, it should refer to a mutually agreed upon mechanism for enhancing rearing habitat for rainbow trout fry and parr. (It may be possible to describe a more specific compensation program depending on the results of assessments to be completed and reviewed during the EACA review period.) The commitment should also describe the criteria for determining the success or failure of the program and the alternative compensation to be implemented should the initial program prove unsuccessful.	WEPC has understood from an earlier Fisheries Working Group meeting that agencies wished to restore blocked Columbia River tributary habitat. WEPC may expand the focus of our investigations as we assess and develop compensation options leading to the submission of a compensation proposal as part of our Fisheries Authorization application. The Fisheries Working Group will be kept involved as we progress through this process. We agree that Commitment #34 can be generalized to recognize the goal of compensation that achieves no net loss of fish habitat. The development of evaluation criteria and compensation alternatives cannot be finalized until a preferred option has been selected. Such information will be included in the compensation proposal to be submitted as part of the Fisheries Authorization application.
58.	Owner's Commitment #35: This commitment should be re-worded to reflect a commitment to a formal 'Adaptive Management' program	WEPC does not believe an Adaptive Management Program is warranted. WEPC will however provide funding for use in

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	which will include monitoring to assess project related effects on white sturgeon.	monitoring project effects on white sturgeon (if such effects exist and can be measured) or for related sturgeon research. See Comment Ref. # 25.
59.	Owner's Commitments #41 and 42: Concerned First Nations should receive also receive the monitoring reports	Post-project monitoring information referenced in Commitments #41 and #42 will be provided to First Nations.
60.	Pg. 6-110 re archaeology: The proponent and/or the contractor should be required to educate sub-contractors and employees about the identification of possible archaeological materials. The proponent and/or contractor should also be required to consult with First Nations should archaeological materials be found.	Education of all workers on site relating to the identification of possible archaeological materials is an integral element of the OERC's Environmental Training and Awareness referenced in EACA Appendix 9A. Procedures with respect to the finding of archaeological materials are prescribed by the BC Archaeology Branch.

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GENERAL		
Reviewer: CEAA, L. Sullivan's Letter of August 11, 2006		
61.	It would have been helpful to federal reviewing agencies if a table of concordance with Sections 16 (1) and (2) of CEAA had been provided as an easy reference to locate these requirements in the Application. In order to facilitate completion of the Comprehensive Study Report, the Agency requests that such a table be prepared.	EACA Appendix 1D provides a Cross-Reference of CEAA Requirements to EACA Contents. This appendix includes references to each pertinent requirement of CEAA Sections 16(1) and 16(2).
62.	It was often difficult to identify the extent of the physical footprint of the site and the transmission line to get a complete understanding of the full project's effects.	The physical footprint of the project, including the powerplant site, transmission line corridor, and the worksites that will be used as lay-down areas and for temporary facilities, are shown in EACA Figures 3-3, 3-4,3-5,3-6 (a-f),3-7, 3-8, 4-1, 4-2, 4-3,4-5, 4-7 & 4-8.
63.	Volume 1 of the Application often lacked numerical analysis, particularly in the cumulative effects assessment.	The reviewer's question appears to suggest that without numerical analysis, environmental assessment may be flawed. Numerical analysis is not required for the attainment of reasonable and confident environment assessment. Not all topics are equally amenable to numerical analysis. The analysis done by WEPC to assess White Sturgeon habitat is un-equaled in any modeling that WEPC is aware of. With respect to cumulative effects assessment, by its nature, future projects are speculative and any quantification is necessarily conjecture. Pre and post data for past projects are often lacking from periods where pre cumulative effects are speculative CEAA Cumulative Effects guidelines explicitly acknowledge that where historical effects or expected future effects are not quantified, qualitative best professional judgments are to be used to provide a level of information required for reasoned conclusions and decision making. WEPC's believes that our Cumulative Effects Analysis (EACA Section 8) is extremely comprehensive, and appropriate to the projects and activities considered.
64.	Page 2-15, Paragraph 5 & Page 3-19, Paragraph 2: Not clear why the fully upgraded Waneta Generating Station 'remains a	Without the Waneta Expansion, the existing Waneta Generating Station (discharge capacity of 932 m^3/s), even when fully

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	significant bottleneck'.	upgraded, will have significantly less discharge capacity than up-stream powerplants at Seven Mile and Boundary Dam (discharge capacities of approximately 1,472 m^3/s). Shaped releases from Boundary can pass through Seven Mile without spill, but will in some cases result in unavoidable spill at Waneta. Seven Mile re-regulates the Canadian Pend d'Oreille to minimize such spill and, in doing so, reduces its own generation efficiency. This unavoidable spill and inefficiency reduces the energy value of Boundary flow releases and is the reason that Waneta is considered to be a system bottleneck.
REGIONAL DISTRICT COMMENTS		
Reviewer: Regional District of Kootenay Boundary, E. Kumar Letter of July 28, 2006		
65.	Temporary Industrial Use permits will be required for several of the proposed "work sites" identified in the Environmental Assessment Report for the Waneta Hydroelectric Expansion Project. The Intent to secure these permits should be indicated under Appendix 11A, Owner's Commitments in the Waneta Hydroelectric Expansion project EAC Application. To provide the Regional district an opportunity to require that potential negative impacts upon the community relating to the work of the design-build contractor are mitigated, the proponent should commit to ensuring that Temporary Industrial Use Permits are obtained for all uses of the work sites that do not conform to zoning requirements before the design-build contractor commences the use of the sites for those purposes.	WEPC is a Crown Agency and per Section 14 of the BC Interpretation Act is, therefore, formally exempt from being bound or affected by local government zoning, bylaws and regulations. Notwithstanding, WEPC has committed to cooperating with all levels of government to address project concerns to the extent feasible. Following discussion with the RDKB's Planning Department, WEPC will restrict the Contractor from locating a batch plant or crushing facilities on Worksites D3 and D4, which are located near a residential area, by including this requirement in the OERC. As well, the WEP Owners' Community Impact Management (Advisory) Committee will include a representative from the RDKB, as well as other members of the community, to assist in mitigating potential impacts and keep members informed on the Project.
66.	RDKB Board of Directors recommends that: Goose Flats, Echo Beach, and the camping area located south of the bridge be improved as recreation sites and dedicated as a legacy for the recreational use of the general public.	The area south of the Waneta Bridge is owned by Teck Cominco and BNSF Railway. Its current use by the public for camping/parking is not officially authorized. WEPC has the right to use these areas on a temporary basis during construction and if the D-B contractor chooses to use these areas, they will be restored as set out in the EACA.

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		WEPC will establish an information/interpretive centre immediately south of the bridge if Teck Cominco and BNSF Railway agree to such use of this specific site, and if the RDKB agrees to contribute on-going maintenance. The exact nature of this information/interpretive centre at the confluence of the two rivers, and arrangements for its establishment will be developed with the property owners and RDKB once construction of WEP begins.
ARCHAEOLOGICAL IMPACTS		
Reviewer: MTSA Archaeology Branch, J. Pike E-mail of August 14, 2006		
67.	From my perusal of the Archaeological Impact Assessment ("AIA"), I - understand that the archaeological work determined that there will be - no adverse project impacts on archaeological sites. In the absence of any identified impacts after due study, I conclude: - that Archaeology Branch interests are unaffected by the proposed - Waneta Expansion project and that there is no known archaeological **-** reason why the project should not proceed as proposed.	Comment acknowledged.
ENERGY SUPPLY OBJECTIVES		
Reviewer: Electricity Policy Branch of the Ministry of Energy, Mines and Petroleum Resources, R. McLaughlin letter of July 19, 2006		
68.	The Electricity Policy Branch of the Ministry of Energy, Mines and Petroleum Resources has reviewed the EACA for the Waneta Hydroelectric Expansion Project and does not have any concerns with the proposal.	Comment acknowledged.

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CONTAMINATED SEDIMENT		
Reviewer: BC Ministry of Environment Protection Division, K. Eichenberger Memo of July 31		
69.	In general, we are satisfied that the assessments, plans and commitments provided in the application documents meet the higher level requirements of the Environmental Protection Division.	Comment acknowledged
70.	… a condition of the Project Approval Certificate should state that the relevant Environmental Works Plans cited in the owner's commitments will be available to the appropriate agencies upon request.	As indicated in EACA, Section 9, copies of WEP Environmental Work Pans will be made available to appropriate agencies if requested. It does not therefore need to be specified in the Project Environmental Assessment Certificate.
71.	Based on the information provided in the submission, it was difficult to assess the potential impacts to the downstream aquatic environment related to the fate of sediments during construction and operation	Sediment control during both project construction and operation will be undertaken in accordance with applicable prevailing standards as specified in OERC Section D. (Water Quality Protection) and the Environmental Management Program for Operations. The velocity of flows in the tailrace below Waneta Dam and the dilution effect of the Columbia River at the Columbia Pend d'Oreille confluence will abate any aquatic habitat effect of any fugitive sediments passing through the dam.
72.	However, the Owner's Commitment #17 commits to providing a detailed contaminated materials management Environmental Work Plan in accordance with regulatory requirements to protect fish and aquatic habitat. *This EWP must be approved by the Environmental Protection Manager prior to commencement of works. In addition, the plan should contain the following:* • Include water quality in the values to be protected, particularly as it is a transboundary water course; • Include additional information or assessment related to the extent, magnitude, and fate of remaining contaminated sediments. As the sediment sampling program was	WEPC will comply with all regulatory requirements relating to removal of contaminated sediments from the forebay and will submit its detailed plans for excavation, remediation and monitoring to MOE as part of the approvals process for this specific work. The EWP describing the methodologies that will be applied will form the basis of this submission. It will include the protection of water quality and fisheries values together with information on the management of remaining sediments, as requested. WEPC will interact with the BC MoE, Land Remediation Section in Victoria as warranted in the course of planning and delivering this activity. The Contractor will be required to excavate all contaminated sediment necessary to minimize environmental impacts on fish related to the construction of the powerplant

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	conducted to assess only those sediments to be removed for construction purposes, not within the entire forebay, the extent of contaminated sediment within the forebay is unknown. Consequently, the fate of remaining sediments within the forebay is not addressed. The condition of the remaining sediments is of interest as their fate once operation begins is unclear. The EWP should assess whether additional sediment will be scoured and entrained downstream into the Pend d'Oreille and Columbia Rivers as a result of construction and operations. The proponent is urged to contact the Ministry of Environment Land Remediation Section in Victoria to confirm the various Contaminated Sites Regulations requirements and provisions that would be applicable to proposed works.	intakes. The Contractor will be required to place a layer of clean capping material over any remaining forebay sediments that could be potentially mobilized during post-construction powerplant operation. Monitoring will be conducted to confirm sediments are not mobilized.
Reviewer: Environment Canada - Interim Review Comments, B. Claus letter of August 13, 2006		
73.	Specific work plans for detailed components of the project are to be approved by the BC MoE Manager at a later date upon their completion The discharge from the upland dredgeate settling area will require an (BC) MoE permit An evaluation of the risk from remaining exposed sediment following dredging should be completed	Environment Canada's understanding and comments are consistent with those of BC MoE (see Comment Ref. #72.) Monitoring will be undertaken at the start of powerplant operations to confirm that no forebay sediments left unremoved during intake construction are mobilized by powerplant operations (see Comment Ref.#72.)
Reviewer: CEAA, L. Sullivan Letter of August 11, 2006		
74.	**Section 6.2.1.2:** This section mentions that sediment removal from the Waneta forebay has the potential to re-suspend contaminated soils and notes that this must be done carefully. The proponent needs to identify how this will be	WEPC has recognized that the disturbance of existing forebay sediments during intake construction, and subsequent powerplant operations, has the potential to re-suspend contaminants with possible adverse effects on

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	managed and the extent or magnitude of potential impact if this is not managed. In others words, provide more detail on the seriousness of this issue.	fish and fish habitat. Management of sediment removal from the Waneta forebay to avoid possible re-suspension will be undertaken in accordance with applicable prevailing standards. The sediments will be removed with a cutting-head and suction system specifically designed to avoid re-suspension during sediment excavation. The EWPs that relate to this work will be carefully reviewed with respect to constructability and compliance of proposed methodologies with the OERC which includes all the objectives, criteria and requirements relating to the work. In addition, the work will be carefully monitored during execution for compliance with the OERC. The timing of this work, flow patterns and flow velocity will be important considerations in the planning process. The work will of necessity be done during periods of low flows and a comprehensive monitoring program will be implemented for the detection of sediments that may be released from the operation. Among other measures that may be implemented to contain sediment in the event of an emergency, some or all generation at the existing powerplant could be stopped and flow could be transferred to spillways, on the other side of the river. Particular methodologies to be employed will be identified as part of the relevant EWP. EACA Background Report No. 11 provides more information on sediment removal.
TRANSPORTATION CONSIDERATIONS		
Reviewer: BC Ministry of Transportation, D. Fitzpatrick letter of July 31, 2006		
75.	**Sec. 4.5.2 - Mobilization:** * The MoT has no objection to relocation of a portion of Waneta-Nelway road, subject to continued uninterrupted public use as an alternate route during Seven Mile Dam Road closures (due to avalanche activity)	The Waneta-Nelway Road will be closed through the powerplant worksite for the duration of project construction. Per OERC Section B4.1(c), the Contractor will be required to allow public use of the closed portion during emergencies. Such emergencies would include avalanches and rock falls on Seven Mile Dam Road.
76.	**Sec. 4.5.6 - Storage of Excavated Materials:** Although currently leasing the pit area, the MoT	WEPC, who had rights from Teck Cominco to

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	is in the process of buying Columbia Gardens pit from Cominco. The MoT is interested in acquiring excavated tunnel rock and preference is to have it stored in Columbia Gardens Pit.	the Columbia Gardens Pit area, has agreed to MoT acquiring this land from Teck Cominco. WEPC will retain the right to use Columbia Gardens Pit and, at the request of MoT, will provide not less than 230,000 m^3 (bulked) of excavated rock for storage at Worksite D1 (Columbia Gardens Pit). Implications related to any incremental haulage costs and road usage may be subject to further discussion between WEPC, the D-B Contractor and MoT.
77.	**Sec. 4.5.7 - Powerplant Temporary Construction Facilities / 4.6.3 - Access Requirements:** The MoT has no objection in principle to locations proposed to access worksites, site offices, worker parking and laydown areas. Upon receipt of applications with details for access locations, permits will be issued with site specific conditions. A pre-construction survey of Hwy 22 is to be undertaken to assess post-construction impacts to Highway 22. Remediation may include re-paving due to heavy construction traffic including off-road vehicles.	OERC Section B4.1 (f) specifically addresses construction site entrances and the need for the Contractor to consult with, and obtain the necessary permits from MoT. Pre- and post-construction surveys will be done by the Contractor as required on roads it will use in the general area of the site. This is specifically intended to cover those portions of Highway 22A where the Contractor elects to use off-road vehicles for the haulage of excavated materials. We note that other heavy truck traffic uses Highway 22A to the north of its intersection with Seven Mile Dam Road.
78.	**Sec. 4.7.2 - Property Rights Acquisition:** The Ministry has identified areas through Camel Pit where placement of the transmission line would not impact future abilities to mine the pit. Prior to issuance of a permit to cross, detailed design drawings of the proposed alignment are required.	WEPC acknowledges MoT's agreement in principle to the crossing of its lands by the transmission line in the vicinity of Camel Pit subject to MoT agreement with the detailed design drawings for the line.
79.	**Sec. 6.1.2 - Potential Effects Mitigatable by Standard Management Practices Socio-economic Environment:** Minimum single lane traffic must be maintained for Waneta-Nelway Road for use as an alternate route when Seven Mile Dam Road is closed due to avalanche activity.	WEPC will require the Contractor to maintain a minimum single lane road (Waneta-Nelway Road) suitable for use by the public on any occasion when the closed portion of the

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		Waneta-Nelway Road has to be opened up for emergency use by the public.
	The Design-Build Contractor shall provide the Ministry with a Traffic Management Plan (TMP) specific to the project, identifying the impact of all project traffic to the existing street system and mitigative measures required to ensure safety to all road users. Ministry approval of the TMP is required prior to commencement of the project.	OERC Section B4.3 requires the Contractor to prepare a Traffic Management EWP (Environmental Work Plan). All of the concerns noted by MoT will be covered in that EWP. The intent of the approvals process is that Agencies review and endorse (and/or comment on) the approved objectives, criteria and requirements contained in the OERC. As described in Section 9.2.2.2 of the EACA, EWPs are intended to be adaptive plans that can be changed if site conditions or work methodologies change; the OERC will not change. EWPs by definition must meet OERC objectives, criteria and requirements. Therefore, it EWPs will not be forwarded to Agencies for review and approval; they will only be submitted for information if specifically requested. The OERC requires the Contractor to consult and work with MoT in obtaining all required permits and approvals. All arrangements for the accommodation of construction traffic, additional signage, and the like will be described in the Traffic Management EWP. Although the Traffic Management EWP required prior to mobilization on site may not address all issues relating to traffic that will be encountered during construction, it will contain all of the critical construction-related traffic flow provisions and, as such, can form a basis for pre-construction review by MoT.
	The Ministry will continue to work with the proponent to identify and address any impacts to the highway system.	The Ministry's continued involvement in working with WEPC to identify and address any impacts to the highway system is valued and appreciated.
Reviewer: CEAA, L. Sullivan Letter of August 11, 2006		
80.	Section 6.4.2 Construction Traffic, Page 6-57 and Page 6-72: As there are a number of sites where excavated materials will be deposited by heavy equipment and construction at the Waneta site will require transport of concrete, there is likely to be considerable heavy vehicle	The OERC (EACA Appendix 9A) Sections B and C include requirements to be met by the Contractor in connection with the use of area roads. In meeting these requirements, the Contractor must obtain all necessary construction-related permits and approvals

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	traffic along a number of corridors.	from BC MoT.
81.	To determine the magnitude of impact of this construction traffic, the proponent needs to estimate the number and type of construction vehicles and worker vehicles traveling these corridors per day, including the dust and vehicle emissions that may occur.	Information on traffic type and volume estimates is found in EACA Background Report No. 10. WEPC has made provisions for the protection of air quality in the OERC(EACA Appendix 9A) The comprehensive requirements for controlling dust and vehicle emissions are found in OERC Section C9, Air Quality Protection.
82.	Section 6.6.1 Traffic and Road Systems: The discussion focuses on safety issues and does not explore public health issues due to emissions. To determine the magnitude of impact of this construction traffic, the proponent needs to estimate the number and type of construction vehicles and worker vehicles traveling these corridors per day, including the dust and vehicle emissions that may occur and the potential for impacts on public health.	As with any large construction project, there will be temporary local increases in vehicle emissions. WEPC has addressed this issue as noted above and will require the Contractor to meet applicable regulatory requirements relating to vehicle emissions.
TRANSMISSION LINE IMPACTS		
Reviewer: BC Transmission Corporation, G. Holisko Letter of July 14, 2006		
83.	The transmission route proposed by Columbia power (as shown on the EAO website is the same route recommended by BC Hydro (prior to formation of BCTC) in a report dated December 2001.	WEPC confirms this observation
84.	The proposed Waneta to Selkirk 230 kV line crosses under 5L98 to the north side near Waneta then to the south again at Selkirk. The proposed 9 m overlap with 5L98 ROW is (also) acceptable.	BCTC's acceptance of WEP's proposed transmission line overlap is noted.
85.	Since the current proposal is consistent with what BC Hydro agreed to previously and does not conflict with BCTC's future planning for this corridor, BCTC does not have any concerns with the proposed route.	Comment acknowledged.
Reviewer: Regional District of Kootenay Boundary, E Kumar Letter of July 28, 2006		
86.	RDKB Board of Directors recommends that:	Double circuiting of the Teck Cominco 71L transmission line has been studied and is

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	The proponent reduces the footprint of the 230 KV transmission line to Selkirk by "double circuiting" with Teck Cominco's 71 Line as far as possible.	included as Background Report BR#9 in the EAC Application. The study concludes that although the option of double-circuiting the Teck Cominco 71L transmission line requires less overall new clearing than the Transmission Base Concept (24 ha versus 30 ha), it crosses higher value habitat areas, and has greater negative impacts on environmental and aesthetic values. As well, both construction and operational complexity is increased with the double circuiting option. These factors contributed to the selection of this option (parallel to BC Hydro's 500 kV 5L98 transmission line) as the Transmission Base Concept, despite the 6 ha incremental clearing requirement. A later review considered the construction of a new double-circuit transmission line parallel to the existing Teck Cominco 71L transmission line, followed by removal of the existing line after the new double-circuit transmission line was in service. This option proved highly undesirable because the impacted area was approximately 30 ha (the same as the Base Concept), but with greater negative environmental and aesthetic impacts as identified in the previous study.
Reviewer: Agricultural Land Commission, R. Cheetham E-Mail of August 14, 2006		
87.	I have reviewed the information relating to the new power lines Applications in terms of the ALC Act will be required. However, provided that appropriate measures are taken to control weeds I do not anticipate any major concerns with regard to either of the proposed lines.	 Discussions and applications with respect to requirements under the BC ALC Act are in progress. Section E5 of the OERC (EACA Appendix 9A) details the requirements for weed control during the construction of the transmission line. These measures plus prompt reclamation work at disturbed sites will minimize the encroachment of weeds into the transmission line ROW. WEPC has also committed (Owner's Commitment # 21) to work with other stakeholders on more regional cooperative weed control initiatives. Comment acknowledged.

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NAVIGABLE WATERS ISSUES		
Reviewer: Transport Canada, P. Doucette E-mail of July 31, 2006		
88.	**Sec. 6.5.4 - Construction Impacts** "As such recreation occurs in the area, WEPC will apply for and abide by any navigation conditions proposed by the Navigable Waters Protection Division of Transport Canada."	Any navigation conditions imposed by the Navigable Waters Protection Division of Transport Canada will be adhered to.
89.	**Sec. 7.5 - Operational Impacts** In Section 7 - there is currently no information on the impacts of operating the expansion project on recreation/tourism/navigation. Please include the following statement in a new paragraph in section 7: "As such recreation occurs in the area, WEPC will apply for and abide by any navigation conditions proposed by the Navigable Waters Protection Division of Transport Canada."	WEPC will apply for and abide with NWPA approval for navigable water impacts related to recreation/tourism/navigation in the project area. The Pend d'Oreille River below the Waneta Dam is currently closed to navigation for safety reasons and WEP operations will not change this condition. The Waneta forebay between the dam and the existing safety boom is also closed to navigation for safety reasons. WEP will not impact navigation in the Waneta Headpond.
90.	**Appendix 9A Section B: Public Safety, Traffic and Community Relations** **B2.1** (i) Any warning signs to be placed at the boat launch should be in consultation with or in accordance with the conditions as stated in the Navigable Waters Protection Act Approval issued by Transport Canada.	As a part of the OERC (EACA Appendix 9A) and in addition to the work-specific requirements of the OERC, the Contractor is required to comply with all requirements of Permits, Licences and Approvals issued in connection with the Project. This will automatically include all conditions of the NWPA Approval. See OERC Sections: A1.1(c), A2.1 (a), and A6.1 (a).
FISH AND FISH HABITAT IMPACTS		
Reviewer: Fisheries and Oceans Canada, H. Klassen Letter of July 28, 2006		
91.	**Sec. 6.3.3:** DFO agrees with WEPC that tailrace blasting should be restricted to non-spill HLH discharge periods, away from sturgeon spawning and pre-spawning periods. (see Appendix 9A C7.1 and C7.3 comments below)	WEPC has developed these construction procedures specifically to protect white sturgeon.
92.	**Appendix 9A C7.1 As per 4.5.9.2 above:** add a criterion (if not in this section, then elsewhere – C7.3?) that tailrace workpad construction, tailrace blasting, tailrace excavation, tailrace rockplug blasting, and tailrace rockplug excavation shall avoid the sturgeon pre-spawning and spawning period.	As further protection, WEPC will add a criterion to OERC Section C7.1 to the effect that tailrace workpad construction, tailrace blasting, tailrace excavation, tailrace rockplug blasting, and tailrace rockplug excavation shall not be conducted during the sturgeon pre-spawning and spawning period from

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		15 May to 31 July.
93.	**Appendix 9A C7.3 (a) (vi):** This bullet should be expanded to reflect a requirement as above in 4.5.9.2 that blasting to occur on tailrace workpads only during HLH flows in order to gain the mitigative value of turbulent flows.	A requirement will be added to OERC Section C7.2 to the effect that blasting on tailrace workpads shall only be undertaken during HLH flow periods or periods when LLH flows exceed 708 cms.
94.	***Sec. 4.5.9.2:*** Timing of installation, use and removal of rock workpads to facilitate instream blasting and channel excavation should be within confines of an appropriate work window. Further restriction of blasting activities when sturgeon are in the vicinity to periods of turbulent water would be warranted for this species. These workpads should be subject to authorization under Section 35(2) of the Fisheries Act. **Appendix 9A D4.2 (g):** As above (4.5.9.2), blasting would only be permitted during HLH flows to gain the mitigative value of turbulent flows. N.B. DFO does not expect to include killing of sturgeon within a Fisheries Act authorization.	WEPC expects that for practical construction reasons, instream works at the intake and tailrace will not be conducted during the spring and early summer freshet period, which encompasses most of the white sturgeon pre-spawning and spawning period. WEPC agrees that a work window is appropriate for the tailrace area to protect white sturgeon that reside in the downstream vicinity, and further agrees that blasting be conducted during HLH periods to reduce any potential impacts of blasting (see Comment Refs. #92 & #93). However, WEPC questions the need for a similar work window for the intake since there are no sensitive species in this area and any effects of blasting are unlikely to continue and be detectable below the dam. All potential effects of this work will be subject to the environmental protection measures of the OERC. WEPC acknowledges that a Fisheries Authorization will be required for the temporary HADD caused by workpad construction.
95.	**Appendix 9A D4.2 (g):** As above (4.5.9.2), blasting would only be permitted during HLH flows to gain the mitigative value of turbulent flows. N.B. DFO does not expect to include killing of sturgeon within a Fisheries Act authorization.	Timing of construction blasting is referenced in Comment Ref. #93. WEPC will not be requesting a *Fisheries Act* authorization that would allow the killing of sturgeon. WEPC believes our impact avoidance and mitigation measures, using proven methods, represents everything reasonably possible to reduce the potential for harm to white sturgeon.
96.	**Sec. 7.4.1 & 7.4.2:** DFO will withhold comments on flow-through effects on sturgeon until we have reviewed advice from white sturgeon recovery committee representatives (specifically BC Environment and CCRIFC) regarding the application and WEPC responses. Adaptive management may be in order to address the uncertainties reported, including scenario development, monitoring, criteria for change, and contingency mitigation.	WEPC has also received comments on this issue from BC Environment and from KNC (CCRIFC) which have been addressed elsewhere in this document. Recognizing that some uncertainty will always be present WEPC has proposed a $350,000 program that can be used either for direct monitoring of project aquatic effects or more flexibly to fund other research deemed of higher priority for sturgeon recovery by the UCWSRI.

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	(See comments on Sec 11.1.3 below).	Regardless of which option may be selected as most suitable to address the uncertainty, WEPC expects the options for studies, monitoring programs, or mitigation to be developed in consultation with the FWG and the UCWSRI. With regard to adaptive management, WEPC cannot agree to a management model that places unknown liabilities on itself and other Pend d'Oreille power producers. WEPC accepts, however, that if future monitoring indicates that our analysis of impacts was incorrect, and sturgeon are being negatively affected by project operations, agencies will use their regulatory authority to require appropriate modification to powerplant operations.
97.	**Sec. 11.1.3:** As uncertainties of effects on fish have been identified in the above, pending responses from WEPC to these and related questions from other reviewers, DFO agrees that a Follow-Up Program be designed to clarify these issues. Further to Sec 11.1.3 #6 and WEPC's commitment #35 (Appendix 11-A), and as required under CEAA for this comprehensive study, DFO requests WEPC develop details of an expansion of a follow-up program to include other issues that may be left outstanding upon review of WEPC's future responses. Potentially, the list of issues to monitor may include: a) Verification that shallow water habitat losses from proposed flow-through operations recover within the time periods modeled (use of monitoring research from Brilliant Expansion project); b) Verification that stranding/ shallow water habitat losses from proposed flow-through operations are not affecting listed species, particularly white sturgeon, Columbia mottled sculpin, and Umatilla dace. Protocol principles for this monitoring are requested;	WEPC acknowledges that follow-up programs to verify our assessments of these potential effects will be required. To that end, WEPC will prepare aquatic monitoring plans for review as a component of the Fish and Fish Habitat Mitigation and Compensation Plan: a) Verification that shallow water habitat productivity losses from proposed flow-through operations will recover within the time periods modeled. This will be accomplished through the use of information obtained in the upcoming research program related to PAC monitoring requirements for the Brilliant Expansion Project. b) Verification that stranding/ shallow water habitat losses from proposed flow-through operations are not affecting listed species populations that may be present in the area. WEPC anticipates this can be accomplished through field programs and information gathered during past and ongoing stranding experiments conducted on the Columbia River.

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	c) Verification that juvenile sturgeon usage of the eddy is not adversely affected during periods with anticipated velocity changes in the eddy (e.g. Case 4 low load hours). Conceptual plans for this monitoring are requested;	c) WEPC continues to believe juvenile usage of the eddy will not be adversely affected by the project and provides additional support for this position in Comment Ref. #123
	d) Verification that predation of white sturgeon eggs is not exacerbated by proposed flow-through operations. Conceptual plans for this monitoring is requested;	d) Additional information on potential project effects on predation of white sturgeon eggs has been provided in Appendix 2 that shows the vast majority of eggs incubate in areas outside the main influence of flow-through effects. If despite this information, the agencies still are of the opinion there is substantial uncertainty regarding project effects, WEPC can develop a conceptual monitoring plan if requested, as a component of our proposed white sturgeon monitoring program.
	e) WEPC coordinate a proposal with BC Hydro and Teck Cominco and others to design a program that would use the 3-D modeling for considering alternate flow patterns towards optimizing effectiveness of the white sturgeon flow augmentation program, firstly on a no-net-cost basis. The rationale for revisiting this is that WEPC proposes to utilize the flow augmentation program as a basis for summer flows yet recent data would suggest that it is not certain that these flows are proving beneficial.	e) WEPC does not believe it will ever be possible to prove the WSFAP is having a positive or negative effect. At present, there is no evidence to prove it is not having a beneficial effect. WEPC would be willing to participate in a process, including providing its 3-D model, with other hydro operators on the system to examine the WSFAP. However such a process must treat all operators equally and provide compensation for any loss of rights. Such a process should be conducted outside of the EACA review. WEPC is not in a position to initiate such a process as the WSFAP is the subject of the Waneta Upgrades water license, PAC and Fisheries Authorization. We suggest DFO or the CWR has the mandate and is in the best position to initiate such a process.
	f) Monitoring for demonstrating the effectiveness of fish habitat compensation measures and their maintenance (last bullet in 11.1.3 #3) should be cleaved as a separate	f) WEPC intends to conduct a monitoring study to assess the effectiveness of its fish compensation plan. We recognize that this will be a requirement of the Fisheries

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	Compliance Monitoring component of a Fisheries Act authorization rather than as a CEAA follow-up monitoring component. This subtle semantics would also be rectified in the Comprehensive Study Report.	Authorization. However our understanding of the CEAA follow-up requirements are that they include monitoring the effectiveness of any mitigation or compensation measures, which is why it was included in the EACA Approved Terms of Reference. We believe the one monitoring study will satisfy the requirements of both CEAA and the Fisheries Act. The details of the study will be addressed through the Fisheries Authorization. We will leave the semantics used in various federal documents to the respective federal agencies.
98.	It is envisaged that results from those monitoring components related to listed species could contribute to revised Recovery Planning Strategy(ies) and possible future actions for implementation by responsible parties under SARA as appropriate.	WEPC will make the results of all monitoring studies involving listed species available to the respective recovery teams and has indicated its willingness to participate in local recovery initiatives for listed species impacted by the project.
99.	**Sec. 4.8.1.4:** Unpredicted variance in flows from upstream facilities resulting in an unexpected drawing of Seven Mile Reservoir could negate a portion of the positive effects of level stabilization in that reservoir. **Sec. 7.4.3.2:** As per comments above in 4.8.1.4, some portion of the attributed benefits in Seven mile reservoir may be negated by unanticipated draughting of the reservoir in response to systemic urgencies.	While it is possible that variance in flows could result in an unexpected drawdown of Seven Mile Reservoir, the likelihood of this happening is low and would be limited to short-term effects. This is because the upstream system does not have sufficient storage to hold back water for any period of time and any water that was not passed by the turbines would eventually have to be released through spill. There is also a definite economic incentive for BC Hydro to maintain high water levels in Seven Mile Reservoir (which is why the benefits occur in the first place), so in the event of a flow reduction upstream, it is unlikely BC Hydro would continue to draft the reservoir until they ran out of water.
100.	**Sec. 7.4.3.7:** The magnitude of anticipated benefits of reservoir level stabilization may be diminished by unanticipated draughting of the reservoir in response to systemic urgencies. As fish habitat benefits resulting from anticipated reservoir stabilization would be a passive by-product of the Waneta Expansion project, DFO policy would not formally credit those benefits as compensation against habitat losses elsewhere, but rather taken into consideration.	Notwithstanding DFO's position, WEPC believes the significant habitat creation in Seven Mile Reservoir resulting from WEP's ability to process Boundary flow-through, should be credited as a benefit of the project. We believe that if the reverse was true, and WEP resulted in a decrease in reservoir habitat, DFO would require compensation.

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	Sec. 7.4.3.7: Consistent with DFO policy and previously in DFO correspondence of 3 June 2005, DFO cannot formally credit passive benefits from the project anticipated in the Seven mile Reservoir against shallow water habitat losses downstream of Waneta. However, DFO acknowledges anticipated gains in the reservoir generally and will consider them towards reducing the amount of compensation to offset fish/habitat losses from the project. Similarly, DFO policy does not formally recognize improvements in water quality (diminished leachates from old mine tailings or reduced TGP) for compensating habitat losses caused by the project	If it is assumed that if upstream habitat creation is "passive", then we would assume that downstream habitat loss from passing Boundary flow-through is also "passive".
101.	**Appendix 9A D4.2 (h) and (l):** DFO will require that the Owner's Environmental Monitor at arms length from the contractor also will be on site during these specified activities. DFO requests that WEPC will include this action in a Fish and Fish Habitat Mitigation and Compensation Plan.	Section 9.2.3 of the EACA outlines the role of the Owner's Environmental Monitor (PEM). "Blasting having potential to harm fish, property or the public; and in-stream work having potential to harm fish" are specifically identified as high risk activities to be monitored. The intent of Appendix 9A D4.2(h) is to require the contractor to have his environmental staff monitoring the described in-stream work at **all** times. They have the primary responsibility to direct the contractor's work so that it complies with the environmental standards, including the ability to stop work. Because the PEM has to eat, sleep, and has other important monitoring duties, the PEM would be directly observing only at high risk times and providing a quality control check on the contractor's environmental staff. The PEM has to be trusted to be able to manage his/her own time and use professional judgment on the level of actual observation required of these activities based on the degree of risk.
102.	**Appendix 11a Commitment 5(d):** As per Appendix 9A D4 above, DFO requests that the independent Project Environmental Monitor be onsite during instream activities on the intake workpad, tailrace workpad and rock plug excavations at these areas to provide immediate stop-work orders when appropriate.	See response to Comment Ref. #101.
103.	**Sec. 4.8.2.1**: Does WEPC intend to coordinate scheduled maintenance during lower-flow periods or periods when the Teck-Cominco plant is not undergoing maintenance such to	Canal Plant Agreement Operating Procedures set out the procedures used for scheduling annual maintenance which applies at both WEP and the Teck Cominco owned Waneta

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	avoid unnecessary spillage?	plant. The planning for both facilities will be done in consultation with BC Hydro so that the operation of the total B.C. System can be optimized. A consideration in optimizing system operations will obviously be to avoid unnecessary spilling.
104.	**Sec. 5.3.4:** Currently federal Responsible Authorities have been asking for EA Applications to indicate that under CEAA the RA's will make a final determination on the likelihood of the project causing significant adverse environmental effects. While the TOR for the Waneta Expansion may have pre-dated this convention, the RA's will be making the final determination on the significance as required under CEAA.	The role and responsibilities of the Federal Responsible Authorities as required under CEAA in this regard is acknowledged.
105.	**Sec. 6.2.1.2 & 6.3.1:** DFO will request to review workplans for the extraction, transfer, dewatering and disposal of these forebay sediments.	At DFO's request, the Environmental Work Plans for the extraction, transfer, dewatering and disposal of these forebay sediments will be provided for review. The criteria and requirements relating to EWPs are contained in the OERC (Appendix 9A of the EACA) which will be approved as part of the Owner's EACA. These EWPs will also be forwarded to BC MoE, which is the responsible regulatory agency for this work (see Comment Ref. #72).
106.	**Sec. 6.2.3.2:** see Appendix 9A D8.1. (e) below for federal criteria regarding sediment release into Columbia or Pend d'Oreille rivers.	See response to Comment Reference #117.
107.	**Sec. 7.4.3.3:** To gain a better perspective on the fish stranding risks, please provide a calculation on difference in elevation change from HLH and LLH for both pre- and post-project, and the anticipated rates of elevation change.	Section 4.8.1 6 of the EACA describes five major factors that contribute to long-term and short-term flow and water level fluctuations in the Columbia River at its International Boundary. Pend d'Oreille power operations are only one of thee factors. It is further concluded in this section of the EACA that, with WEP in operation, daily water level fluctuations at International Boundary attributable to Pend d'Oreille operations will be virtually identical to flow fluctuations delivered into Canada by Boundary Dam operations. Slight differences may only exist in the period May 16 to July 31, due to existing regulatory WSFAP requirements related to white sturgeon. Simulated daily water level fluctuations in the Columbia River at the International Boundary are shown in Figure 4-11 of the EACA for pre-

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		project conditions (top graph) and post-project conditions (bottom graph). The right axis of both graphs is in meters and demonstrates that differences in water levels between LLH and HLH for post-project conditions will be within the range of current pre-project water level differences experienced for much of an average year. Anticipated rates of flow change during post-project up-ramping and down-ramping should not differ appreciably from existing operations because the new units will be brought on and off-line in sequence resulting in a protracted rather than abrupt change,
108.	**Sec. 7.4.3.4:** Productive habitats: In calculation of the biological effects downstream of Waneta from passing flow-through of Boundary releases, DFO notes (from review of series "H" figures in Background Report 4) that as some of these dewaterings occur on downward limbs of annual "hydrographs" (e.g. 1995 November), that their effects of dessicating previously established habitats would linger beyond the occurrence of the dewatering as the productivity of this habitat would be diminished by the dewatering and take a period to recover. Whereas some of those occurrences modeled on rising limbs of "hydrographs" (e.g. 1994 May) would have little effect in that those "dried" areas had not previously been established with periphyton/invertebrates. According to model (Background Report 4, "H" Series), the largest effect in recent years would have been just over 4 ha upstream of the U.S. border rather than the 1 or 2 ha reported in the application.	The model used to predict the time interval needed for complete recovery used 10 days, a value very similar to the 10.5 days for the recovery midpoint used for completing similar projections for the Brilliant Expansion Project using a logistic curve. These values approximate 20 and 21 days respectively for full recovery. Analytically, this procedure produces essentially the same value as the procedure used for the Brilliant Expansion Project. Habitat that is dewatered for over one day is likely to have the periphyton community desiccate and all invertebrates that have not migrated are likely to expire. Consequently the projections produced in the document are conservative. Dewatered habitat has no value while wetted habitat only has value after 10 days. As these recovery values were used for all seasons, the recovery rates are likely much less than this value during the period of maximum productivity in the spring and summer. In reality all wetted habitat has some value and recovers rapidly as this process occurs in natural systems following spring low flow periods and in an unregulated system, affects a much larger portion of the stream each year. Habitat availability for periphyton, macroinvertebrates, and ultimately fish production follows an annual cycle. The net benefit or loss of regulated flows is the integrated productivity of the varial zone habitat over the course of a year. These average values are what were reported after being weighted for a recovery period

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		following the most recent inundation. Additional information on decrease in productive habitat area for post-project conditions is summarized in Table 3.1 of Appendix 3 for the average year in the period 1991-1999 as well as for each year in this period. Similar analysis is also presented in Table 3.2 of Appendix 3 for the period October-November to illustrate differences in productive habitat area on downward limbs of annual hydrograph on the Columbia River. Table 3.2 shows that only 5 days in October and November of the 1991-1999 periods (or less than 1% of time) decrease in productive habitat area would be over 4 hectares. It should also be noted that the biggest decrease in productive habitat (2 days in November 1992) represents only 8% of the productive habitat area. The average annual decrease in habitat ranges from as little as .01 hectares to .62 hectares over the simulation period with an average decrease of 0.34 hectares. During the October and November periods only, the average decrease in available habitat ranged from 0 to 1.45 hectares with an average decrease over all years of simulation of 0.47 hectares even though during 2 days of the 9 year simulation, the weighted habitat loss exceeded 5 hectares. See Comment Ref. #26 for additional discussion.
109.	**Sec. 7.4.3.6:** The "H" figures in Background report 4 would suggest up to about 4 ha of productive shallow water habitats may be affected, not just 1 ha - Are listed Columbia Mottled Sculpin at risk of stranding here?	As discussed in Comment Ref. #108, habitat losses are based on seasonal averages and not daily maximums. Columbia mottled sculpin occur in the Columbia River above the affected area although they have never been documented to occur in the study area. Most of the varial zone habitat is relatively steep and not subject to interstitial or pool stranding events that are typically observed in some limited areas upstream of the project near Genelle and Norn's Creek fan. Consequently the risk of stranding of this species is expected to be very low. This assessment would be verified through a monitoring program, the details of which will be provided as a component of the Fish and Fish Habitat Mitigation and Compensation Plan.

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110.	**Sec. 7.7.1:** DFO appreciates WEPC's commitment to develop a fish habitat compensation package. The concept is presented as a three-phase planning process with no details on candidate systems or compensation designs that can currently be assessed. As such DFO is currently unable to determine whether contemplated compensation would meet No Net Loss. To assist in this assessment DFO requests WEPC submit a habitat balance sheet of a preferred candidate plan with a conceptual design that demonstrates it to be biologically sound, reasonable and based on practical and proven techniques. The analysis should consider cooperation rather than competition for sites contemplated under recent discussions between MOT and MOE.	A habitat balance sheet demonstrating how the no net loss objective will be met, will be included as part of the compensation proposal which will form part of the Fisheries Authorization application. WEPC continues work on developing the compensation proposal for shallow water habitat and will keep DFO and other interested stakeholders apprised of our progress. Discussions have been initiated with the Ministry of Transportation on a cooperative approach to improving fish passage under Highway 22A.
111.	**Sec. 7.7.3:** DFO understands that the WEPC's commitment for funding levels for a sturgeon monitoring program is still subject to review by UCWSRI representatives.	The funding being offered in the EACA is for monitoring and not for compensation. WEPC believes the funding amount is sufficient to monitor predicted project effects.
112.	**Sec. 9.2.3:** As per previous CPC projects, DFO reserves the right of rejection of the Project Environmental Monitor and requests advance review of candidate's qualifications demonstrating their experience and training in aquatic biology. DFO notes the arm's length employment relationship proposed between the contractor and the PEM.	While we do not agree that DFO has "a right of rejection", WEPC is willing to provide DFO an opportunity to review the qualifications of the PEM as has been done in the past. WEPC is confident that the qualifications and criteria for selection of the PEM, and the credentials of the nominated candidate(s) will be satisfactory to DFO.
113.	**Appendix 9A A5.2(c):** Indicates that the contractor would make this reporting, but it does not specify when the reporting would be done. If something repetitive or with potentially significant risks is occurring/ has occurred, DFO would appreciate immediate notification of the incidents rather than waiting for a monthly report to hear of the incident. Depending on the seriousness or nature of the incident, there may be a role for DFO in ensuring its mitigation.	As required by the BC Spill Reporting Regulation, all reportable spills will be reported immediately to the Provincial Emergency Program (PEP). PEP conducts appropriate federal/provincial coordination. In addition, incidents involving fish kills or unauthorized HADD will be reported to DFO at the time of the incident. The OERC (F12.1.5(b) requires the Contractor to report spills to the Owner and to Authorities Having Jurisdiction immediately following their discovery, and to implement the required spill response. The OERC, (F12.1.5(g) requires the Contractor to provide written spill reports on spills to the Owner and to Authorities Having Jurisdiction not more than 2 working days

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		following the discovery of a spill.
114.	**Appendix 9 A D3.2 (e)**: indicates that…"no obstruction or debris shall be placed in any watercourse." In addition, DFO requests that the contractor not remove any existing debris such as LOD/LWD in any watercourse.	As well as not adding debris, WEPC will also require that the contractor not remove LOD/LWD from any watercourse.
115.	**Appendix 9A D4.2 (f):** The project should be bid on use of tailrace workpads as a minimum protection, and not just a suggested option.	WEPC agrees that the use of rockfill workpads for tailrace excavation and tailrace rock plug removal should be a mandatory requirement and will revise the OERC accordingly. The use of rockfill workpads for intake excavation and intake rock plug removal will remain as a suggestion due to other constraints associated with instream work at the intake.
116.	**Appendix 9A D4.3**: DFO anticipates that inclusion of instream components of drilling and blasting Work Plans would be attached to a Fisheries Act authorization, and as such request their development to DFO's satisfaction.	The OERC objectives, criteria and requirements for instream drilling and blasting are being presented at this time for approval as part of the EACA. They will also be incorporated into the Fisheries Act Authorization application for further DFO consideration. Any additional requirements that DFO would like to see should be identified at this time. However the actual contractor work plans are unlikely to be completed at the time the Fisheries Act Authorization application needs to be submitted. WEPC will therefore, provide the work plans to DFO when they are completed and prior to the commencement of the work.
117.	**Appendix 9A D8.1 (e):** The federal government CCME guidelines apply to end-of-pipe discharges prior to dilution. Monitoring stations would be appropriate as close to these points as is safely possible. These statements should be included as criteria for D8. **Appendix 9A D3.2 /3.3/3.4:** In addition to the guidelines indicated in D1, DFO requests that the Canadian Council of Ministers of Environment (CCME) guidelines also be referenced among the Water Quality criteria to be met particularly in relation to sediment release from any component of the project and not just from discharge from retention ponds.	WEPC has set Project-Specific Water Quality Criteria (OERC D2.1) to simplify effective water quality management and monitoring during WEP construction. The noted criteria rely on the use of Turbidity as the means of determining the level of total suspended sediments in water. Furthermore, the criteria selected apply to the receiving waters and not to end-of-pipe or equivalent 'shoreline' outlets. In this context, "receiving waters" means those waters outside the Dilution Zone [OERC A1.3 (bb)] with the DZ referring to an area extending 100 m downstream from a discharge point and occupying not more than 50% of the stream width [OERC A1.3(g)]. The criteria given in OERC D2.1 (b) for end-of-pipe or equivalent discharges are intended to be used as indicators in the overall water

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		quality control and monitoring process. The WEP Project Specific Water Quality Criteria for Turbidity [OERC D2.1 (b)] have been revised to be consistent with the BC Approved Water Quality Guidelines referenced in OERC D1 (a) (ii) for the Table 2 Aquatic Life water use category. That is, to a maximum increase of 8 NTU when background is between 8 and 80 NTU and 10% when background is ≥ 80 NTU. For practical and safety reasons, monitoring of receiving waters will be done at River Monitoring Points D1 and D2 [OERC D8.1.1 (a)] due to the very turbulent nature of the Lower Pend d'Oreille River and its confluence area. OERC D8.1 (f) provides the requirements for monitoring at all site discharge points whether end-of-pipe or ditch outlet or other outlet. [Note that a wording error occurred in D8.1 (f) (ii) and the wording will be corrected to read: 'For other outlets, drainage ditches and the like …]. Monitoring stations will be located as close to discharge points as is safely possible. Since the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME Guidelines) refer to the BC Guidelines (Canadian Guideline Note r) and the BC Guidelines are already referenced in OERC D1 Objectives, it is planned to add the Canadian Water Quality Guidelines to the list of Additional Requirements in Section A7 of the OERC. WEPC believes that the Water Quality Management Objectives stated in OERC D1 are suitably applicable to the Lower Pend d'Oreille River and the Lower Columbia River.
118.	**Appendix 9A F12.1.2:** Add a requirement that equipment operating on workpads or on rock plug removal must be bio-guarded with bio-degradable lubricants and hydraulic fluids. Re-fuelling of this equipment must be on land.	The OERC F11.1 (a) requires the use of biodegradable hydraulic oil on all equipment performing in-water construction work. Since the workpads would be placed into the in-water work area, this includes equipment working on the intake and tailrace workpads. While biodegradable hydraulic oil is readily available, biodegradable engine and gearbox oils for construction equipment are not available. Hydraulic oil represents by far the

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		largest quantity and the greatest risk to the environment with large reservoir tanks, extensive hard and flexible piping and often many fittings. By comparison, systems that use engine and gearbox oils are closed systems and use relatively small volumes of oil. The risk of these systems leaking or rupturing and causing a spill is absolutely minimal. For these reasons we do not agree with DFO's request that a requirement to use biodegradable lubricants be added to the OERC. We consider that the many equipment operating and spills prevention provisions already included in the OERC appropriately minimize the risk of spills to the environment. With respect to the refueling on land of equipment working on workpads and plug removal, there are (as found on other projects) circumstances that may make this an impractical requirement depending on the equipment and methods used by the Contractor and for application within the tight confines of the Waneta site. Sections F11 and F12 of the OERC include provisions for such refueling. In order to improve these requirements, WEPC will add requirements to OERC F11.3.3 to the effect that the fuel truck/tank be located as far as possible from the workpad but within eye contact of the equipment being refueled, that the fuel operator stay with the fuel nozzle while refueling, and that an attendant be on standby at the truck/tank during refueling to turn off the flow of fuel if a spill incident occurs. Consistent with these additional requirements and the existing criteria and requirements of the OERC, the Contractor will be required to address the specifics of refueling at such locations in the Spill Prevention, Preparedness and Response EWP that will be prepared by the Contractor's EM and reviewed by the Owner's Consultant and the PEM and if requested, a copy will be provided to DFO.
119.	**Appendix 11a Commitment 34:** The actual fish habitat compensation project would be subject to DFO and BC Ministry of Environment satisfaction, in consultation with First Nations, following review of an analysis of potential sites	The fish compensation program will be developed to satisfy the requirements of the project Fisheries Authorization. As such, the program details will be provided in the application for the Fisheries Authorization for

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	to be conducted in summer 2006. The subsequent monitoring program would also include maintenance of the compensation for as appropriate for the life of the project.	approval by DFO. WEPC expects to involve the BC Ministry of Environment in the development of the compensation program and that provincial approvals under the *Water Act* may be required. WEPC is conducting an analysis of potential compensation sites so that sufficient detail can be provided in the Fisheries Authorization application. WEPC is aware that the compensation benefits must be maintained for duration of the HADD being authorized
120.	(Appendix 11a Commitment 35): Subject to factors discussed above	Comment acknowledged.
Reviewer: MoE, Kootenay Region, C. Spence Letter of July 31, 2006		
121.	A number of statements in the EACA imply that a "silver bullet" impact is solely responsible for upper Columbia white sturgeon recruitment failure. This fails to recognize the role of cumulative effects on sturgeon survivals. The initiation of block loading on the Pend d'Oreille system could well have impacted white sturgeon survivals immediately following the development of Boundary Dam, but simply not at a high enough level to cause complete recruitment failure. Thus, our comments reflect the role of all possible impacts and their potential contribution to recruitment failure through cumulative effects	As discussed in Comment Ref. #23, WEPC understands that the only cause-effect relationship that can reasonably be detected through examination of available information on recruitment failure timing is the regulation of the Columbia River mainstem. This is supported by the UCWSRI Recovery Plan (UCWSRI 2002), which states (page 33) "The modern recruitment failure in the upper Columbia white sturgeon population coincides with the construction since 1968 of three large Columbia River mainstem dams." These dams resulted in a significant alteration to the natural Columbia River hydrograph (the system which contributes over 70% of the mean annual flow at the border). The Pend d'Oreille River has very limited upstream storage capacity and exhibits a much more natural hydrograph pattern than the Columbia River. As a result, in nearly all years since hydroelectric development began on the Pend d'Oreille system, there have been periods of flow in the Waneta area during the white sturgeon spawning period that were unchanged (system in free flow) by daily flow modifications. If recruitment failure was due to a cumulative process impacted by daily flow fluctuations, it seems reasonable to expect that some of the unaltered flow periods would have resulted in conditions suitable for successful recruitment. Since this is not the case, a more reasonable hypothesis is that the large changes in the Columbia River hydrograph completely negate any

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		potentially favorable flow conditions that originate in the Pend d'Oreille River.
122.	**Sec. 7.4.1 - potential impacts to white sturgeon habitat in Waneta Eddy resulting from flow-through effects of releases from Boundary Dam:** The EACA indicates that under circumstances of high Pend d'Oreille and low Columbia flows, a 28% reduction can occur in the amount low velocity habitats used by white sturgeon, using the criteria of <0.5 m/sec at 0.5 m above substrate. Finer scale velocity isopleth mapping was requested, as well as an indication of the frequency and duration of these events. More detailed isopleth mapping information has since been provided, but we did not receive further information on frequency and duration in time to allow comment in this memo.	As indicated in our response to Comment Ref. # 21, additional information on flow-through effects on eddy and spawning area habitats has been provided in Appendix 2.
123.	Concerns remain over possible impacts to overwintering white sturgeon: • there is a notable difference between the direct observations of habitat use at 0.5 m/sec noted above, and the <0.7 m/sec modeled velocity where pre- and post-project differences in habitat availability become essentially the same • Appendix A of this report, showing modeled velocities throughout the entire eddy plotted with actual white sturgeon juvenile locations, suggests a high degree of habitat selection for the low speed core of eddy. • observations of juvenile distributions and habitats within the eddy described in the Golder Associates Ltd. (2005a) report were not made during LLH periods (the flows of concern for this issue). • these were based on only 2 days of observations in late March during Pend d'Oreille and Columbia temperatures of approximately 6.5 and 5.0°C, respectively • This limited data set does not cover an	WEPC continues to believe that the project will not result in negative impacts to overwintering juvenile white sturgeon. This assertion is supported by data collected since the release of the first juveniles in 2001 and comparisons with juvenile growth rates and condition factors from other populations. WEPC provides the following reasons why we do not believe the incremental effect of the project will result in any detectable change in uses of the eddy by white sturgeon juveniles or result in measurable changes to juvenile white sturgeon growth and/or survival. 1)The concern focuses on a relatively small increase in velocity of up to 0.7m/s. This is only 0.15m/s faster than the maximum 0.55 m/s velocity documented for juvenile sturgeon use in the eddy and is well within the observed range of velocities reportedly used by juveniles in other populations 2)As indicated Comment Ref. #17, the flow conditions which produce the incursion of the slightly higher flows into a portion of the deep water area occur only during a part of the day and only for a small part of the year. Given the highly dynamic

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	adequate range of dates or temperatures to describe potential impacts at other times and during colder temperatures when the fish are metabolically less active. • Parsley et al. (1993) found young of the year and older juvenile white sturgeon juveniles in habitats with near bottom water velocities of <0.6 and <0.8 m/s, respectively, but these observations were undertaken during April-September. Temperatures colder than those described in either of these studies are likely to occur during the periods of incremental winter block loading expected during post-project operations. Availability of habitats with velocities at least as low as 0.5 m/sec may become critical during such periods.	and variable nature of the eddy under steady state conditions, it is difficult to envision that these slight changes will have detectable effects on suitability or use of deep-water habitats, much less on survival. 3)Winter does represent a critical time for riverine fish species but is most critical in systems where water temperatures are very low (less than 0.5 ^{o}C and often with ice cover) and occur over extended time periods (generally several months). During this time, fish metabolic rates are significantly reduced and this affects their ability to move in response to flow changes or to forage successfully. In situations when a fish is forced to expend more energy than it has available in fat/tissue resources or can consume during the winter period, this can influence survival. In the Columbia River, mean daily water temperatures rarely drop below 3^{o}C and then only briefly (usually for less than a few weeks), typically in late January to early February. In some years, temperatures do not decline below 4 ^{o}C. This is very near the 5 – 6^{o}C temperatures recorded during the survey in question, and as a result, we contend the survey is representative of "winter" conditions in the Columbia River system. These relatively high winter temperatures and short duration of low temperature periods means that primary and secondary food production continues over the winter and since fish have a higher metabolic activity at these temperatures, they can continue to feed and grow over the winter period. There is documentation that juvenile white sturgeon in Waneta Eddy actively feed during the winter with the dominant prey species being *Mysis relicta*, a freshwater shrimp entrained from upstream reservoirs. Video documentation of winter aggregations of white sturgeon show the sturgeon are in contact with the bottom and aligned into the current. In this configuration, they are able to use their pectoral fins to rapidly move up or down in the water column with a minimum of effort and can also

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		maintain position on the bottom with minimal energy expenditure. Therefore, the most likely effect of the post-project incursion of slightly higher flow velocities into the core of the eddy is that mysids and other drifting invertebrates would be carried directly into the eddy core. 4) The model output represents a "snapshot" in time and does not capture the highly dynamic nature of the eddy. This is illustrated by Figure 4-1 in Appendix 4 (excerpted from Hildebrand, L. and D. Fissel. 1997). Measurement of low velocity habitat in Waneta Eddy (Columbia River). R.L. & L. Report No. 534a-F: 19 p. + 3 app), which shows near bottom (0.9 m above the river bed) flow velocities measured at a fixed location in the deepest part (i.e., at 22 m depth) near the central core of the eddy, The flows were measured over periods of high (708 cms) and low (34 cms) Waneta discharges during a constant Columbia River discharge of 2550 cms. Actual near bottom velocities ranged from 0.2 to 0.8 m/s and frequently varied by over 0.3 m/s and occasionally up to 0.5 m/s over a 15 minute period. This same figure illustrates that velocities are lower and much more stable at minimum flows of 34 cms. The results of the study showed that the reduction of flows from Waneta Dam from 708 cms to 34 cms resulted in an approximate 90% increase in the area of low velocity (<0.5 m/s) near-bottom habitat. The study concluded that extension of the low flow period following Waneta Upgrades would not reduce the availability of overwintering habitat in Waneta Eddy. The tests also showed that flow reductions result in an overall increase in the size of the eddy and a decrease in overall flow velocities. These findings were accepted by the agencies at that time and as a result, there was no requirement to conduct additional studies or develop monitoring plans to verify effects of the Upgrade Project on white sturgeon overwintering habitat. On this basis, WEPC questions why this is being raised as an issue for WEP. Our analysis

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		suggests that for the majority of Columbia River flows, any increase in periods of minimum flow that result from flow-through operations of WEP should result in overall benefits to juvenile white sturgeon that would more than offset any slight reduction habitat area that may occur during the limited periods of high Pend d'Oreille and low Columbia flows (see Comment Ref. #27). 5)A hypothesis that assumes these habitats will become limiting in the future with continued increases in white sturgeon abundance does not consider that as fish grow, their swimming speed and tolerance for an increased range of flow conditions increases. There is ample evidence to indicate that even though sub-adult and adult white sturgeon will share the same habitats as young juveniles, they are also capable of using and do use a much wider range of habitats outside the eddy core, even in the winter period. This would suggest that as the population expands and juveniles grow, one would expect to see an increase in use of habitats that are presently under-utilized, not because they are less suitable and fish are forced to use these areas, but because presently there are no fish of a size capable of effectively occupying these areas. 6)The reviewer's hypothesis seems based on the premise that all of the juvenile sturgeon currently in the system and those introduced into the system in the future will continue to use the same habitat throughout their lives. This assumption is not supported by available information. For example, video footage taken in the winter period indicates a much lower use of the core area of the eddy by adults than would be expected based on the estimated population size in the lower portion of the Keenleyside Reach. The population in the lower river (Kootenay River to the U.S. Border) was estimated at 566 fish (95% CI 159-974) Golder Associates Ltd. 2005.Upper Columbia River: White Sturgeon

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		Population Dynamics and Analysis. Report No. 041480072D. However, the estimated maximum number of adults ever recorded during videography surveys in Waneta Eddy in the winter period was 14 on 1 November 2004 (Golder Associates Ltd. 2005. Upper Columbia River juvenile white sturgeon monitoring: Phase 3 investigations, August 2004 – February 2005. Report No. 04-1480-051D). This suggests that as sturgeon grow, they are capable of using other habitats during the winter and do not necessarily compete with younger juveniles for wintering areas. 7)Waneta Eddy is one of the smaller (in terms of physical area) high use areas used by white sturgeon and as such, supports only a small proportion of the total white sturgeon population (adults and stocked juveniles) in the TransBoundary Reach. This is based on video records obtained from Waneta Eddy on five occasions during the winter period. The maximum number of juveniles recorded during these surveys was approximately 700 fish on 24 February 2005. From 2001-2005 there have been approximately 48,000 juveniles released into the Columbia River in Canada (Golder Associates Ltd. 2006. Upper Columbia River juvenile white sturgeon monitoring: Phase 4 investigations, 2005 – 2006. Report No. 05-1480-058D). Even allowing for known mortality rates of juveniles, the number using Waneta Eddy represents a very small fraction of the total released population (1.5%). A suggestion that the small WEP related changes expected in the eddy would in some manner jeopardize future recovery efforts seems to place an inappropriate weighting on what represents a very small proportion of the total deep water, low velocity habitat available in the TransBoundary Reach. 8)All of the data provided to date was based on velocities either modeled or measured at 0.5m above bottom. Flow velocities decrease with increased depth

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		and with increased proximity to the river bottom as demonstrated by logarithmic boundary layer flow profiles obtained from fluid mechanics textbooks and validated through extensive experimental data obtained in laboratories and in the natural river, lake and ocean bottom boundary layers (Dave Fissel, ASL, pers. comm., 9 August 2006). This logarithmic function was used to calculate flow speeds closer to the river bed, in order to identify the velocities that would actually be experienced by a sturgeon resting on the bottom. A velocity of 0.7 m/s at 0.5 m off-bottom would be: • 0.40 m/s at 0.05 m off-bottom (the approximate height of an age-1 sturgeon); • 0.49 m/s at 0.1 cm off-bottom (the approximate height of an age-5 sturgeon); and • 0.58 m/s at 0.2 cm off-bottom (the approximate height of a sub-adult sturgeon.
124.	Within this section, the EACA suggests "…available data on growth does not suggest local population is food limited…" and "…there is no evidence to suggest the amount of overwintering habitat in Waneta Eddy is currently limiting…" Annual studies of juvenile sturgeon behaviour, growth and survival are ongoing but are as yet inconclusive regarding whether or not eddy habitat is likely to become limiting. The EACA fails to recognize that little or no sturgeon recruitment has taken place for 30 years, and that habitats are only now beginning to be filled with juveniles. As these numbers continue to increase, either through hatchery supplementation or through wild recruitment in the future, food and space may well become limited. Under such circumstances, a reduction of available habitat in Waneta could impact the population's recovery.	WEPC's response is provided in Comment Ref. #123.

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125.	**Sec. 7.4.2 - possible impacts to white sturgeon spawning habitat confluence resulting from flow-through effects of releases from Boundary Dam:** Recently provided isopleth maps of modeled water velocities suggest the potential for slightly greater velocities in the spawning area during high load hour flows. However, this will be accompanied by the incremental addition of low load hour flows under WSFAP operating protocols. The net effect of this combination on spawning habitat for white sturgeon would be difficult to predict but could very easily have negative consequences. For example, in recent lab work studying white sturgeon early life stage behaviour, larvae appear to be disturbed by flow fluctuations and more apt to move out of cover and into the water column (S. McAdam, Ministry of Environment, pers. comm.). This would be expected to lead to additional predation and potential displacement to less suitable habitats further downstream.	In WEPC's view, an equally valid possible consequence is that the project could have beneficial effects by providing higher post-project flows during the day when visual predators would be more effective at foraging for eggs. With regards to the recent lab findings referenced, WEPC respectfully points out that this data is experimental, preliminary lab based, and has not been subject to any review. We would appreciate the opportunity to review this work and evaluate it's applicability to assessing project effects on a river-scale level.
126.	At our request, WEPC completed further analysis of substrate mat surveys for the period of 2000-2005. During those studies, approximately 95% of eggs on average were collected at sites from Columbia-Pend d'Oreille confluence and downstream, where the Columbia mainstem dominates flow patterns. However, data from 1998 were not included in this analysis, and in that year 57% of eggs were collected in the Pend d'Oreille upstream of the confluence (Golder Associates Ltd. 2002). This suggests that the Pend d'Oreille upstream of the Columbia can be extensively used as spawning habitat in some years. It is in this area that greatest possible impact is likely to occur due to increased load following and additional days of low water velocities under WSFAP protection flows.	WEPC has provided additional information on egg distribution in the spawning area in Appendix 2. As indicated in the text provided in this Appendix, the 1998 data was excluded from the analysis because spawn monitoring programs conducted in previous years (1993 - 1996 and 1998) were more experimental in nature and designed primarily to identify the numbers of spawning events. In addition, high flows in 1997 eroded large portions of the bank along which the mats were deployed, substantially changing the bank configuration and removing the landmarks that served as the basis for establishing the earlier mat sites. As a result, the locations of the sets in 1998 were best guesses and their actual locations may have differed substantially from their previous locations. Since 2000, the program has used GPS to identify mat sites and mat deployments have been fully standardized. For these reasons, the 2000-2005 data represent the best data set for analysis of egg deposition patterns.
127.	The role of predation in white sturgeon egg and larval survivals is an important consideration in	See Comment Reference #128 below.

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	evaluating potential operational impacts resulting from flow-through effects from Boundary Dam. Golder Associates Ltd. (2005b) provided a review of the WSFAP which included a review of the program's potential effectiveness in reducing the impacts of predators. The results suggested WSFAP flows would not be effective as a means of providing velocities effective in limiting predator access to eggs. Thus, increased frequency of WSFAP flows under post-project operations remains a concern.	
128.	The results of preliminary white sturgeon egg predation studies (Golder Associates Ltd. 2006) were briefly mentioned in the EACA and this work has implications to the project. In this research, 165 fish were examined and four identifiable white sturgeon eggs were found. Although this may not appear to support egg and larval predation as a significant impact, it is important to note that this report indicates that white sturgeon eggs would likely have been digested to an unrecognizable state within 2 hours after ingestion. As well, given that sucker spp. were the only species to have been identified as egg predators in this study, it warrants mention that the abundance of this species appears to be higher during in the Waneta are during sturgeon spawning than at other times of the year. The report indicated that catch-rates of sucker spp. within key white sturgeon spawning habitats were more than three fold higher than the level encountered in the same general area during an earlier study conducted during low flows in late August.	Information provided in the same report indicates that sturgeon spawning in the area had been confirmed the day prior to the survey (see Comment Ref. #22). Therefore, there were sturgeon eggs incubating in the area sampled for egg predators and the numbers of eggs available for consumption should have been near maximum densities. Of the 165 fish caught whose stomachs contents were examined, only two contained sturgeon eggs (1 fish with 1 egg and the other with 3 eggs). Although eggs can be digested quite quickly and may not be unrecognizable 2-3 hours after ingestion, it is highly improbable that all of the fish captured had previously been feeding on sturgeon eggs but stopped eating 2-3 hours before being captured. The referenced study provides direct empirical evidence that at the time surveyed, sturgeon eggs were a very minor component of the diet of all potential predators in the area. Even if the increased CPUE values for some species represented an actual increase in abundance in the area during the LLH period (and for the reasons provided in the following paragraph this may not be the case), this data would more likely suggest that these fish were in the area to feed on other prey items (e.g., the abundant local invertebrate populations) and incidentally ate a few sturgeon eggs as opposed to suggesting these fish were in the area specifically to feed on sturgeon eggs. The results of BC Hydro's Lower Columbia River Large River Fish Indexing Program provide amply evidence to demonstrate the poor relationship between CPUE and abundance and why changes in CPUE alone should not be interpreted as changes in

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		abundance. Flow velocities have a very substantial effect on capture efficiency particularly for bottom dwelling species like sculpin that are very difficult to see and even more difficult to catch when sampling high velocity flows at night.
129.	**Summary Statements:** The complexity of flow patterns in the sturgeon spawning area make them difficult to model and predict, as discussed by Golder Associates Ltd. (2005) in the recent analysis of WSFAP. Combining this with a range of poorly understood potential impacts to spawning success suggests the need for a cautious, carefully monitored and flexible approach to project implementation. Given the fact that the nature of white sturgeon recruitment failure remains poorly defined, the widest possible range of options needs to be available to allow recovery. As an extreme, this may require maintenance of status quo flows, but it could also include operations that provide additional benefits to WEPC (e.g. modifications to the WSFAP).	WEPC has acknowledged there is some uncertainty in assessing the effects of project related changes in velocity characteristics in the spawning area, and will provide funding for a monitoring/research program to help increase certainty and confidence in WEPC's analysis.
130.	**Recommendations:** Concerns relating to EACA Sections 7.4.1 and 7.4.2 can likely be arranged through appropriate monitoring and operational safeguards. These would inform SARA-related requirements, and ensure adequate protection for white sturgeon if and when impacts occur as a result of project operations. We recommend that WEPC design and implement a long term monitoring Program within sturgeon habitats potentially impacted by the project. Subject to review and acceptance by the agencies and First Nations, this work would address the comments noted above, begin prior to project implementation, and continue after operations begin. The principle objective would be to determine if a deleterious impact occurs to white sturgeon	WEPC recognizes the concerns expressed in the comments and has offered to conduct a monitoring/research program to deal with project and associated effects on white sturgeon. However, we believe it will be very difficult, if not impossible, to determine whether the minor project related impacts are having a statistically significant effect on White Sturgeon recruitment. WEPC expects that the research/monitoring program would be developed and managed in consultation with the agencies, First Nations and the UCWSRI. It is expected that the results of the studies would be used to guide future recovery planning efforts. If the studies show that the project is having a significant adverse effect on white sturgeon, the WEPC expects that agencies will use their regulatory authority to require modifications to project operations. Further details of the monitoring program can be discussed and developed at future

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	as a result of incremental, post-project flows This program should be planned and approved to allow the work to be included as a condition of EA certification.	Fisheries Working Group meetings and WEPC will provide a more detailed monitoring proposal in its Fisheries Authorization application.
131.	Pre-project monitoring might be used to some degree to assess the potential impacts of post-project flows, simply through opportunistic study at times when pre- and post-project operations mirror one another. If further investigations are required to inform impact assessments following project completion, we recommend limited allowance of Boundary flow-through operations as required, to determine appropriate mitigation and compensation options. If impacts to white sturgeon and their habitats are indicated through the process noted above, WEPC, in cooperation with other Canadian Pend d'Oreille River dam operators, should be expected to employ to pre-project flows during the periods of impact or undertake suitable alternative actions to negate this impact.	WEPC has committed to commence the studies upon the initiation of project construction and to continue monitoring for a seven-year period. This will allow additional pre-WEP operations data to be collected, as well as post-operational data. If the studies show that the project is having a significant adverse effect on sturgeon, WEPC expects that agencies will use their regulatory authority to require appropriate modifications to project operations.
White Sturgeon Monitoring and Project Implementation:		
132.	The key issue with respect to white sturgeon is that a decision is required on permanent generation facilities and related flow changes.	WEPC appreciates that any decision on the project will need to be made in the absence of complete certainty as to risks to white sturgeon and their Critical Habitats. WEPC shares in that risk in terms of how results of future studies may indicate project impacts on white sturgeon and require changes to future operations. To reduce this uncertainty and inherent risk, we have conducted a substantial amount of analysis and research and based on the best available information, have concluded there is no evidence to indicate the project will have measurable negative effects on white sturgeon. As a result, all potential project effects have been considered and addressed. If in the future, monitoring or other research indicates our assessment is incorrect, we anticipate the regulatory agencies may require operational changes to meet SARA or Fisheries Act requirements. This is a risk that WEPC accepts. We feel it is unreasonable to require mitigation for "potential" but unproven effects or require that we interpret what the potential

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		implications of SARA might be with regards to the species and Critical Habitat. We feel a more reasonable approach would be to rely on the monitoring/research program to verify our predicted impacts and if our assessments prove incorrect, base any future mitigation on best available information at that time.
133.	Substantial uncertainty remains in the assessment of the risk to white sturgeon individuals and related Critical Habitat	This is addressed in Comment Ref. #132.
134.	The WEP EA process must ensure potential project effects on white sturgeon are considered and mitigated, based on the best available information, to demonstrate due diligence in the absence of certainty regarding potential implications of SARA	WEPC has considered all potential project effects on white sturgeon and this assessment was based on the best available information. Since WEPC cannot reasonably be expected to anticipate what the "potential" implications of SARA might be, we are unclear as to what "due diligence" might mean in regards to our project or what mitigation might be required if found to be warranted in the future. See also Comment Ref. #132.
White Sturgeon Flow Augmentation Program:		
135.	A coordinated approach is required to address the variation in the timing of white sturgeon protection flows from BC Hydro's 7 Mile facility and the WSFAP at Waneta	Flows in the Canadian section of the Pend d'Oreille River are coordinated by BC Hydro under the Canal Plant Agreement (CPA). Under the CPA, BC Hydro is delegated the responsibility to manage the flows through Waneta and the Waneta Expansion facilities in order to optimize system generation. Any restrictions on flows as a result of various license conditions (such as the WSFAP), are incorporated into CPA Operating Procedures which BC Hydro must abide by in their management of the system. See Comment Refs. #158 & #159.
136.	WEPC commit to initiating/chairing a future discussion on this, including Canadian power producers, agencies and First Nations. This process would recommend a range of no net cost options for sturgeon protection flows. These would best be implemented experimentally as part of the monitoring and assessment process.	WEPC does not believe it will ever be possible to prove the WSFAP is having a positive or negative effect. At present, there is no evidence to prove it is not having a beneficial effect. However WEPC would be willing to participate in a process with other hydro operators on the system to examine the WSFAP. Such a process must treat all operators equally and provide compensation for any loss of rights. WEPC is not in a position to initiate such a process as the

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		WSFAP is the subject of the Waneta Upgrades water license, PAC and Fisheries Authorization. We suggest DFO or the CWR has the mandate and is in the best position to initiate such a process.
137.	**Section 7.7.3:** The EACA recommends provision of a research package totaling $350,000 over 7 years to assist the Upper Columbia White Sturgeon Recovery Initiative Technical Working Group (TWG) in investigations of sturgeon habitat in the project area, or for other investigations related to recruitment failure. This offer was made with the understanding that this would constitute the only direct monitoring of white sturgeon under the project. While this funding would be extremely helpful, it is more important to ensure the project does not result in long term impacts to white sturgeon and related Critical Habitat associated with the tailrace, eddy and confluence area located downstream from the project. This can best be accomplished through the monitoring program.	WEPC continues to believe the best interests of white sturgeon would be met through collaboration with the Upper Columbia White Sturgeon Recovery Initiative Technical Working Group (TWG). The $350,000 white sturgeon research package is intended to be used for research on issues related to project changes on white sturgeon habitat in the confluence area. WEPC looks to the agency Fisheries Working Group and UCWSRI for guidance in developing the specifics of the studies. Because we believe it will be nearly impossible to design a study that would be able to discern subtle project-related effects from other effects, it is anticipated that the WEPC research would be coordinated with other research efforts on sturgeon in this area. The proposed research funding includes some flexibility in the event the agencies in the future feel some other related topic has a higher priority so that scarce funds are not wasted on low priority issues. If in the final assessment of the agencies, a monitoring program will be required, WEPC would commit to developing a monitoring program that would be focused solely on project related incremental effects, would have clear criteria for success or failure, and would have defined timelines. The details of such a monitoring program can be specified in the Fisheries Authorization application.
138.	**Sections 7.4.3.4 and 7.4.3.6:** The EACA treatment of shallow water and stranding impacts does not appear to recognize the SARA Schedule 1 (Special Concern) listing of Columbia mottled sculpin (*Cottus hubbsi*), CDC Blue Listing of shorthead sculpin (*Cottus confuses*), and Red Listing of Umatilla dace (*Rhinichthys umatillus*). Observations suggest these species should receive shallow water impact monitoring	Our assessment provided in the EACA indicates a low risk to these species from project operations. However, in view of their listed status, WEPC will commit to develop a monitoring program to verify predicted impacts on these species.

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	following project implementation	
139.	**Section 7.7.1:** We strongly support this cooperation with respect to development and implementation of a shallow water compensation package to address downstream impacts to shallow water habitats and recommend continuation of such an approach as compensation works progress DFO has suggested that the broader contract would best be completed by December, to allow them an opportunity for review of a preferred candidate compensation project prior to concluding the EA	As presented in the EACA and referenced frequently in this document, WEPC is continuing to work on development of a Fish Compensation Plan as determined necessary by DFO as compensation for shallow water habitat impacts below Waneta Dam. WEPC will share information on compensation options and will welcome suggestions from the BC MoE. WEPC believes that it will be difficult to complete it's detailed compensation option analysis and consultations prior to the end of the EACA review phase, but expects it will be completed well before a project Fisheries Act Authorization is required (see Comment Ref. #32).
140.	Although Columbia River tributary fish passage improvements were specifically mentioned in the EACA, other options should also be considered, such as the potential to re-contour the Kootenay oxbow or other mainstem habitats in the Columbia. DFO has recommended submission of a conceptual design and balance sheet for a preferred candidate plan that demonstrates biological and technical soundness, as well as adhering to the criteria of their No Net Loss policy. We support this request.	WEPC will examine a range of options that have the potential to provide the required habitat gains before selecting a preferred option. The compensation plan submitted to DFO will include a habitat balance sheet that demonstrates how the no net loss objective will be achieved.
141.	Along with monitoring of habitats improved or made available by the compensation works noted above, as committed to in the EACA, a monitoring program should be developed to assess impacts to shallow water habitats affected by the project. Such monitoring would not be tied to the compensation but would provide useful background to inform the 7 Mile Water Use Plan and verify that flow-through operations are not adversely impacting SARA-listed species. This was discussed at the July18, 2006 FWG meeting and the suggestion was made that WEPC undertake pre-and post-development assessments. Protocols for this monitoring should provided by	WEPC will develop a shallow water habitat monitoring proposal incorporating the concepts identified in the comment for inclusion in the Fisheries Authorization application. The aim of post-project monitoring will be to confirm the predicted project impact on shallow water habitat and listed species using this habitat. This monitoring will be unrelated to the fisheries compensation program.

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	WEPC, based on the following general concepts provided by the FWG: 1. water level monitoring of habitats located downstream of the project, as well as the Waneta bar; 2. assessment of impacts via application of 1° and 2° productivity recovery information from Brilliant Expansion impact monitoring; and, 3. fish monitoring in connection with flow changes, with consideration of stranding and listed species.	
Reviewer: CEAA, L. Sullivan Letter of August 11, 2006		
142.	**Section 7.4.4 Impact Analysis:** The proponent suggests that there will a reduction in water level fluctuations in Waneta headpond. What are the predicted changes in water levels?	As stated in the Background Report #4, re-regulation of Boundary flows coming to the Canadian Pend d'Oreille is provided by Seven Mile Reservoir since it contains approximately 8 times as much storage as the Waneta forebay, and suffers only 1/3 the head loss of Waneta for a given amount of re-regulation. With Waneta Expansion project in operation, the need for re-regulation will be substantially reduced and any re-regulation (such as re-regulation needed to provide WSFAP flows during the May-July period) will be provided by Seven Mile reservoir, with Waneta forebay being held at or near maximum operating level. WEPC acknowledges that, as in any power system, there can be system conditions that may require Waneta forebay to be drafted temporarily (sudden changes in discharge at the upstream plants, sudden increase in unregulated flows from tributaries such as the Salmo River etc.) but these situations are rare, completely random and cannot be predicted**.**
143.	Page 7-56, Paragraph 2: How does the proponent reconcile the point that the headpond fluctuations will go down while the downstream flow fluctuations increase? This seems inconsistent.	As noted in Comment Ref. #142, the need for re-regulation in the Canadian Pend d'Oreille will be substantially reduced with Waneta Expansion Project in operation and flows from Boundary will be simply passed downstream of Seven Mile and Waneta. A constant Waneta Headpond (i.e. reduced Headpond fluctuations) will mean that changes in flow into the Headpond will result in corresponding

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		changes in outflow from the Headpond at Waneta Dam, which will be apparent as flow fluctuations below the Dam.
144.	Page 7-59: How frequent will fly-over inspections be?	Flyover inspections of the transmission line will be scheduled annually, unless ground-based maintenance work has occurred over the entire length of right-of-way sometime during the year.
145.	Page 7-60, Last Sentence: Need to clarify what the proponent plans to do for maintenance activities rather than imply that 'it depends'.	Maintenance activities are described in the section "Impacting Activities" starting on page 7-58. Scheduled maintenance activities are periodic events with the degree of activity varying from year to year as described in the EACA.
TOTAL DISSOLVED GAS PRESSURE		
Reviewer: Environment Canada - Interim Review Comments, B. Claus letter of August 13, 2006		
146.	***System coordination to reduce TGP*** - We observe from the proponent's documentation that the operation of the expansion project should reduce the dissolved gas leaving the Pend d'Oreille system. However, after talking to several dam operators on the Pend d'Oreille system, one finds that there is almost no cooperation or coordination of the dams' operation. Downstream of Hungry Horse, each operator must manage their facility in reaction to the upstream project. This often leads to perhaps - unnecessary forced spills and associated high dissolved gas levels. It would seem that with even modest coordination of the system, flows and power generation could be better optimized with flood control and the reduction of excessive dissolved gas production. The environmental assessment process may be an opportune time to broach this subject with the proponent and other operators.	Coordination of the hydro system on the Canadian portion of the Pend d'Oreille River is done by BC Hydro under the Canal Plant Agreement, which will include WEP operations. Their coordination of the system to optimize system generation leads to minimization of spill under normal circumstances. Although formal coordination of the systems across the US/Canada Boundary is not in place, the systems are operated in concert to avoid spills and maximize power production. See also Comment Refs. #158 & #159.
147.	***Synchronous condenser operation*** - We request that the proponent confirm that turbines will not produce excess dissolved gas during non-generation operations, such as synchronous condenser operation.	WEPC is not aware of any non-generation operations that could result in gas supersaturation. Synchronous condense capability is not being planned for WEP. A monitoring program to assess the accuracy of the predicted project effects on TGP has been committed to in Owner's Commitment # 36.
148.	***WEP Powerplant's potential to entrain gas*** -	TGP will be reduced by reduction of spill and

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	Environment Canada recommends that: the proponent should explain how TGP might be possibly increased from WEP, and what mitigation measures will be undertaken to ensure that the project will not increase TGP levels compared to pre-project values.	rerouting normal spill through the powerplant. TGP can be produced during generation by entrainment of air into the generation facility during no load operations or during generation. Neither of these sources is anticipated during the operation of WEP. Monitoring of TGP above and below the current Waneta Power plant, the Brilliant Power Plant and the Arrow Lakes Generation Station have not indicated TGP being added to the downstream flows during generation. TGP does increase, albeit at a relatively low level for short periods, during synchronous condense operations at Seven Mile Dam, but synchronous condense operations are not planned for WEP.
149.	***Effect of Seven Mile spillway in stripping TGP*** - Environment Canada recommends that: the proponent should determine whether WEP may induce changes in the operation of Seven Mile that would result in increased TGP passing through Waneta. If increased TGP levels were to be passed through to Waneta, then the proponent should determine whether these increased TGP levels could conceivably negate the TGP benefit of WEP and result in a net increase of TGP downstream of Waneta	The model used for estimation of TGP in the forebay of Waneta Dam used a stripping function for spillway operations at Seven-Mile Dam and used the current hydraulic capacity with Unit 4 operational at Seven-Mile. Modeled predictions assumed Seven-Mile operations would most efficiently used water provided by Boundary Dam based on the 1991-1999 flow record. All TGP predictions provided in the EACA have included reduced stripping at Seven Mile and therefore have addressed this concern of Environment Canada.
150.	***Review by expert in the physics of dissolved gas production*** - DFO, in its capacity as a Responsible Authority, may wish to have the proponent's application reviewed by an independent expert in the physics of dissolved gas production.	The basic model used for estimates of pre and post project TGP production were part of the broader TGP and Fish report produced for the CRIEMP which consists of both agencies and industry (including Environment Canada). The report and equations used for TGP production has been distributed to members of that group and to interested members of the international Transboundary Gas Group which is made up of international industry, First Nations, and regulatory agencies with broad expertise in TGP and its impact on aquatic life. However, WEPC welcomes any independent expert review that DFO wishes to conduct. The reviewers should note that the model is not a physical model, but a mass balance model where gas production equations were derived from empirical data using regression equations similar to those applied to facilities throughout the Columbia River system by other organizations in the US

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		and Canada.
PROVISIONS FOR ANADROMOUS FISH PASSAGE		
Reviewer: Regional District of Kootenay Boundary, E. Kumar Letter of July 28,2006		
151.	RDKB Board of Directors recommends that: The proponent commits to providing passage for salmon stocks in case they are ever re-established in the Upper Columbia	See Response to Comment Ref. #33
Reviewer: CEAA, L. Sullivan Letter of August 11, 2006		
152.	Section 7.6.2 Future Fish Passage, Page 8-32, Appendix 8A, pg 17: NOTE: Personal experience with capturing chinook and coho smolts suggests that trap and haul may not be an effective means of facilitating fish passage for all species as capture mortality rates are high with these two species. In addition, a means of capture must be able to capture a large number of smolts to be effective as smolt/adult survival rates are <2-3%. Not sure how this experience matches with the statement that a fish passage structure is not biologically justified. While this is not part of the scope of this review, further investigation of the biological impacts of trap and haul seems warranted.	Trap and haul was determined by an independent expert in fish passage design to be best option for passage of these species at the Waneta site. WEPC would expect that if in the future salmon are re-introduced into the upper Columbia River, the final method(s) selected to pass adults and smolts at Waneta would be based on the best information and technology available at that time. For this reason, WEPC agrees that a detailed examination of passage options is outside the scope of this review.
WATER MANAGEMENT ISSUES		
Reviewer: Ministry of Environment, Water Stewardship Division, C. Morgan, July 31, 2006 Letter		
153.	In Section 1 of the EAC application, the *Waneta Cooperation Agreement* and the *Waneta Release Coordination Agreement* are discussed. The intentions of Waneta Expansion Power Corporation and Teck Cominco Metals Ltd., are to coordinate their respective operations of the proposed Waneta Expansion Powerplant and the existing Powerplant. The proponent's letter of January 06, 2006 assured me that these agreements would be provided for the Comptroller's approval; however, the proponent has not provided these documents to date. The Comptroller's review of these agreements during consideration of an extension of water rights authorization is an	The Waneta Release Coordination Agreement sets out the terms for Tech Cominco Metals Ltd. and WEPC to coordinate the operation of the Waneta Expansion Plant and the Waneta Plant with the intent of making optimal use of water diversion rights. WEPC understands that the Agreement requires the Comptroller's review and approval and this Agreement has now been provided to the Comptroller's Office on August 23, 2006 ins support of the *Water Act* process. Excerpts of the Waneta Cooperation Agreement that would most likely pertain to the Comptroller's interests have also been provided to the Comptroller's Office on the same date.

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	integral component of this project.	
154.	Any water licenses which may issue for this project would be in the name of the EAC holder. However, in order for the EAC holder to be eligible to hold a water license, they must obtain land ownership. The proponent currently has an Option to Purchase registered against the lands required for the powerhouse. Should the project receive an EAC, the proponent would be required to exercise its Option to Purchase and obtain title to the land.	When the Project receives its EAC, WEPC will exercise its Option to Purchase and obtain title to the land required for the powerhouse and provide evidence of this transaction to the Comptroller.
155.	In Section 9 of the application, the Owners Environmental Requirements for Construction ("OERC") does not appear to address or mitigate any potential adverse affects during transmission line construction on downstream water rights holders. Specific measures to address water quality and quantity issues for water licensees should be included in the OERC.	No in-stream work will be required during transmission line construction as all works will be confined to the location of tower sites. Any clearing and creek crossings will be completed in accordance with the procedures outlined in the OERC. As such, no negative residual effects are expected on downstream water licence holders. The relevant contractor requirements are outlined in the following sections of the OERC: Section C, Page 14, item (x); Section C, Page 19, C4.4, items (a), (b) and (c); Section G, Page 15, G2.6.7, item (b)
156.	The project involves a transmission line across crown and private land. The request for *Land Act* tenure to the Crown land crossed is being reviewed concurrently with this EAC application. If the project is approved, we anticipate that the proponent will negotiate in good faith with the affected private land owners to determine fair and reasonable compensation.	WEPC has had initial negotiations with potentially affected landowners and anticipates advancing and concluding these negotiations once the EAC is obtained and it is determined that WEP can proceed. WEPC will seek to reach an agreement with the private landowners on fair and reasonable compensation for accessing the proposed WEP transmission corridor to confirm the environmental assessment of this area and to allow construction and maintenance of the transmission line.
Reviewer: BC Hydro, C. Matheson Letter of July 14, 2006		
157.	BC Hydro does not expect that the proposed Waneta Expansion water license would adversely affect BC Hydro's water license or property rights in or around the Pend d'Oreille basin	WEPC concurs that the requested WEP water licence will not adversely affect any BC Hydro rights.
158.	BC Hydro notes that it currently coordinates the	Comment acknowledged.

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	operation of its Seven Mile Plant and Teck Cominco's Waneta Plant (via the Canal Plant Agreement) and anticipates it will coordinate the operation of the Waneta Expansion facility, provided that agreement is reached between BC Hydro and WEPC on the commercial terms related to inclusion of the Waneta Expansion in the Canal plant Agreement.	
159.	As the entity that coordinates the operation of these facilities, we support a combined Waneta and Waneta Expansion facility that is capable of operating in hydraulic balance with the upstream projects.	Comment acknowledged.
Reviewer: Environment Canada - Interim Review Comments, B. Claus Aug. 13, 2006 Letter		
160.	**International River Improvements Act:** Environment Canada's staff is recommending that the project does not require an IRIA license and hence Environment Canada does not expect to have a CEAA *Law List Regulation* trigger for this project.	Comment acknowledged.
161.	**Water Issues and Boards of Control:** ***International Joint Commission Waneta Order -*** The IJC issued an order for Waneta Dam on July 25, 1952 which, among other conditions, stipulates the maximum allowable elevation of upstream pondage at Cedar Creek, Washington. Environment Canada requests that: The proponent should acknowledge - and commit to uphold - the IJC Order for Waneta Dam	WEP will not change the maximum elevation of the pondage upstream of Waneta Dam. The Project will not change the height of the existing dam which determines the potential height of this pondage. WEPC acknowledges the IJC Order. WEP, and the subsequent coordinated operation with Teck Cominco's facility will not impair Teck Cominco's ability to uphold the IJC Order.
162.	***The Skagit River Valley Treaty Implementation Act*** - The proponent should understand that the *Skagit River Valley Treaty* imposes constraints on the operation of the Pend d'Oreille above Seven Mile Dam. Environment Canada anticipates that the proponent is aware of and has considered how these constraints impact the project.	All constraints on the operation of the Pend d'Oreille above Seven Mile Dam are accounted for by BC Hydro in their role as system manager. The Skagit River Valley Treaty will not impact the flow-through of Boundary releases that will occur following completion of WEP.
163.	***Scope of the Comprehensive Study Review*** -	WEPC has prepared the EACA in accordance

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	We understand that the scope of the CEAA review will extend downstream only as far as the Canada-US boundary. As any exacerbation or improvement of the total dissolved gas content of the stream will impact the water quality of the Columbia River and Lake Roosevelt in Washington, it would seem prudent to include the upstream end of the Columbia River in Washington and affected US parties in the study scope. This cross-boundary impact acknowledgement can be seen in the ongoing FERC process for Seattle City Light's Boundary Dam, where Canadian interests are participating on the various study groups. The review should be aware that the US has set "Total Maximum Daily Loads" (TMDL) for temperature and dissolved gas on the Columbia, and the State of Washington is drafting a dissolved gas TMDL for their portion of the Pend Oreille.	with its Approved Terms of Reference for WEP, which requires only a general qualitative assessment of impacts on the U.S. section of the Columbia River. As stated in Section 7.4.3.8 of the EACA, any impacts within the transboundary reach of the Columbia River will not be caused by WEP powerplant operations, but rather will be the direct result of operations of U.S.-based facilities upstream on the Pend d'Oreille River. WEP will serve to improve dissolved gas levels at the downstream border which will contribute to US compliance of TMDL. It should be noted that U.S. agencies receiving copies of WEPC's EACA have expressed no environmental impact concerns, or have indicated support for WEP (see Comment Ref. #195).
TERRESTRIAL HABITAT AND RESOURCE IMPACTS		
Reviewer: Ministry of Forests, S. Jablanczy, DAB Tenures Officer fax of August 02, 2006		
164.	**Salient points:** Negligible Effect on Timber **Land Base:** No Old Growth Management Area (OGMA) affected Proponent should contact MoF for necessary cutting authority and advice regarding disposal of Fir Beetle attacked trees	 Comment acknowledged. Comment acknowledged. WEPC and/or its assigned contractor(s) will contact MoFR for necessary cutting authority and advice regarding disposal of Fir Beetle attacked trees.
165.	**Agency Referral - ILMB/Arrow Boundary Forest District /MoE:** Forest Health - R. Mazzocchi: Will any timber be slashed and left on site? If not, no concerns. If any Douglas Fir or Pine will be felled and left, bark beetle prevention is required. Can address at the OLIC stage.	 As described in OERC (C.2.1 (p)), any felled trees that cannot be removed (primarily Douglas fir along Sections 1 & 2 of the corridor which are sparsely treed with sensitive soils, and where no skid trails will be established) will be cut into <1.2 m lengths and stacked upright in a manner that maximizes their exposure to sunlight.

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	Tenures - S. Jablanczy: Atco Lumber will likely need to discuss with us?/CPC?	Residual material will be inspected to ensure that treatment is sufficient to deter beetle attack and appropriate follow-up will be undertaken, if necessary. The OERC (C3.2.2 (g)) requires the contractor to leave Douglas-fir branches, twigs and needles in TL locations (in quantities to be determined) as a single season winter food source for ungulates. The OERC (F5 and F6) provides requirements relating to disposal of cleared materials. Cleared vegetation, along with unmarketable timber and waste wood from construction, will be included in OERC F5.1(c).
	Compensation for loss of a few Ha.'s of *chart* area. Likely no measurable impact expected to *UWR* noted in the report. Also no OGMA's affected. [additional comments on fax illegible]	WEPC will seek clarification of this comment and provide a subsequent response if required.
WILDLIFE IMPACTS		
Reviewer: BC Ministry of Environment Ecosystems Section, A. Soobotin E-mail of July 26, 2006		
166.	We are supportive of the mitigative measures and the compensation commitments being proposed.	Comment acknowledged.
167.	It has been our experience that road access needs for transmission line installation in certain situations differ and are incremental to road access needs for ROW clearing. Does the amount of road access related disturbance identified in the assessment report serve both ROW clearing and the transmission line installation needs?	Planned structure sites for the new line are close to existing access trails on Teck Cominco's 230 kV Line and BC Hydro's 500 kV Line. It is estimated that construction of a minimum of 1,150 m of new single-season access trails will be required to serve both RoW clearing and transmission line installation needs. The placement of individual structures will be established during detailed line design after the project is underway. Precise structure site placement is likely to be influenced by the findings of pre-construction confirmatory environmental investigations related to habitat use by SARA species on Sections 1 and 2 of the corridor. Nevertheless initial estimates are considered to address both clearing and installation needs and, given the proximity to existing access roads, significant increases in trail construction allowances are not expected. Note that access trail estimates above do not

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		include "skid trails" that will be used for ROW clearing. These are not established trails, but are created as the clearing occurs and will represent an expected temporary impact of an additional 2.7 ha.
168.	For transmission line maintenance it is stated that trees and taller shrubs will be cut and that the intent is to establish lower growing vegetation which is beneficial to wildlife. However, the assessment report also acknowledges herbicide use. Accordingly, one can infer that herbicide use might be restricted to treatments of invasive plants but the report fails to explicitly state that. Is that the intent?	The specific intent of herbicide use during the pre-construction, construction and decommissioning phases of the project is to minimize the further establishment and spread of invasive species (e.g., spotted knapweed) currently present at significant densities along access roads, trails and RoWs. The objective of transmission line vegetation management during operations is to prevent vegetation from getting too close to the energized line (where it can interfere with the operation of the line) at a minimum cost and with a minimum impact on the environment. This is generally achieved by fostering a vegetative community under the line that is low or slow growing, while simultaneously providing food and cover values for wildlife. This can in most places be achieved through periodic mechanical trimming or removal of higher growing species and will not require herbicides. However the height of acceptable vegetation will vary with topography and transmission line sag, and therefore the use of herbicides at some time in the future cannot be completely ruled out in specific locations.
Reviewer: CEAA, L. Sullivan, Letter of August 11, 2006		
169.	Page 6-15, Worksite A3: If this site is important to Lewis' woodpecker (special concern on Schedule 1, SARA), then the proponent needs to ensure the plans for using this site for excavated material include appropriate mitigation measures for this species. Need to consult with Canadian Wildlife Service.	As indicated in Section 6.4.7.2, Lewis' Woodpeckers attempted to breed at Worksite A3 in 2004, but were not successful. In accordance with prescribed mitigation in Appendix 8B, Worksite A3 has since been monitored for Lewis' woodpecker breeding activity. In the 2005 and 2006 breeding seasons, this species was not detected and did not re-occupy Worksite A3. An EPZ has been established to protect the previously used nest trees and a nearby stand of maturing ponderosa pine that provides future recruitment nesting habitat. Other measures to protect Lewis' woodpecker at Worksite A3 include retaining tree and

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		shrub cover on a portion of the site to conserve existing foraging habitat, and conducting road upgrade work outside the bird breeding season to reduce disturbance. As described in OERC (C2.2.2 and C2.2.3), two RAZs have been designated at Worksite A3. Use of RAZ 2 for storage of excavated material and RAZ 3 for laydown will be permitted only if the capacity of other worksites is exceeded.
170.	Page 6-33, Paragraph 3: If headpond is important to yellow-breasted chats (endangered on Schedule 1, SARA), then the proponent needs to consult with Canadian Wildlife Service to ensure appropriate mitigation measures are applied.	As indicated in Section 6.4.1, a male yellow-breasted chat was detected twice in 2005 feeding across from the forebay in the headpond area. During subsequent follow-up, no additional foraging or nesting activity was detected in this treed area, which has low habitat suitability for chats. Further inventory and monitoring conducted during 2005 and 2006 (Machmer and Ogle 2006 and Machmer, unpublished data) has confirmed chat breeding activity exclusively in shrub-dominated habitats located (a) adjacent to the Waneta headpond across from Cedar Creek mouth, and (b) in upland areas adjacent to and south of the proposed transmission line. CWS has been consulted regarding protection of this species and its critical habitat. Proposed mitigation (Appendix 8B) includes: (a) scheduling of transmission line clearing and installation outside of the bird breeding season, (b) avoidance of travel through sections 1 and 2 of the corridor supporting chat habitat, (c) retention of all low-growing vegetation (<3m height) and trimming of tall-growing vegetation (>3m height) at 1.3m height in the transmission line ECZ, (d) monitoring and mapping active breeding territories and highly suitable habitat in project areas, (e) development of a variance to standard vegetation clearing practice in occupied and highly suitable chat habitat to retain existing shrub density and structure, (e) placement of structure sites to minimize impacts to occupied and highly suitable habitat, and (f) supplemental planting of selected low-growing shrub species of value to chats in degraded areas.

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171.	Page 6-49, Impact Analysis: There is mention that blasting may affect wildlife and resident fish. There is no indication of how much blasting will be required, how long it will be necessary or the timing of blasting.	The volumes of rock that would be blasted for construction of the powerplant Base Concept are provided in Section 4 of the EACA. The actual timing and frequency of this work will depend on the detailed requirements of the Project Concept (which may differ somewhat from the Base Concept) and the contractor's schedule. The protection of sturgeon during blasting is addressed in Comment Refs .# 92, 93, 94, 95,101,102, & 106 . No specific wildlife issues associated with blasting inside the powerplant worksite have been identified.
EFFECTS OF THE ENVIRONMENT ON THE PROJECT		
Reviewer: CEAA, L. Sullivan, Letter of August 11, 2006		
172.	**Sections 3.1.1.3 to 3.1.5.3 and 11.2.3.2 and Page 4-76 (Last Paragraph):** The Agency requests that the proponent provide a consolidated discussion of this issue or at least provide a detailed listing of where the discussion exists in the Application as the itemization above may not contain all the relevant sections in the Application. Issues that need to be covered are seismicity, flooding, climate change, extreme weather events, contaminated sediments and metals, groundwater seepage and TGP.	Given the extensive Table of Contents provided in the EACA Volume I, WEPC is surprised by this CEEA comment and the suggestion that some further consolidated discussion are provided. The effects of the environment on the project "that need to be covered" are in fact covered in the EACA, to the extent that they actually affect the project: *Seismicity* is covered in 3.1.1.3. Headpond slope stability is covered in 3.1.1.4. Flooding is accounted for in 9.5.1.1 *Floods*, and 3.1.3.6 *Flood Flows*. *Climate Change* is covered in Section 11.2.3.2, *Climate Change.* Extreme weather events are accounted for in 9.5.1 *Extreme Weather Events* Contaminated sediments & metals are covered in 3.1.5, *Baseline Chemistry* and 6.2.1 *Contaminated Sediment Management* and 6.2. *Contaminated Soils Management* Groundwater seepage is accounted for in 3.1.3.6 *Groundwater Resources* , and 4.4.2.5 *Subsurface findings Relevant to Design*, and 6.4.13 Transmission Line Temporary Facilities Finally, though WEPC is not sure how TGP may be an affect on the project, TGP is presented and discussed in 7.3.3 *Diversion*

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		Effects on Spill and Total Dissolved Gas Pressure
Reviewer: Environment Canada - Interim Review Comments, B. Claus letter of August 13, 2006		
173.	**Climate & Hydrology:** The Meteorological Service informs that the Assessment report addresses these areas to their satisfaction. They also inform that there is always some uncertainty in descriptions of the present climate and in predictions of the future climate. In the specific context of this project, these uncertainties are manageable and should have little direct impact. The hydrology of the Pend d'Oreille and the Columbia Rivers is already highly influenced by flow regulation. Routing excess water through turbines rather than over a spillway at the Waneta dam is unlikely to result in quantifiable incremental degradation (from a hydrological perspective) of this heavily impacted river system.	Comment acknowledged
ACCIDENTS & MALFUNCTIONS		
Reviewer: Environment Canada - Interim Review Comments, B. Claus letter of August 13, 2006		
174.	**Need for Due Diligence to Prevent Discharges or Deposits:** The proponent should be aware that subsection 36(3) of the *Fisheries Act,* administered by Environment Canada, prohibits the discharge of deleterious substances to waters frequented by fish, or to a place where those substances might enter such waters. Therefore, the proponent must ensure that, at all times during the project, deleterious substances are prevented from entering into fish-bearing waters or any tributaries. Similarly, the proponent should be aware that the *Migratory Birds Convention Act* prohibits the deposition of substances harmful to migratory birds in water or areas frequented by migratory birds.	WEPC is aware that subsection 36(3) of the Fisheries Act, administered by Environment Canada, prohibits the discharge of deleterious substances to waters frequented by fish, or to a place where those substances might enter such waters. The provisions of the WEP OERC (EACA Appendix 9A) are intended to ensure that, at all times during the project, deleterious substances are prevented from entering into fish-bearing waters or any tributaries. WEPC is aware that the Migratory Birds Convention Act prohibits the deposition of substances harmful to migratory birds in water or areas frequented by migratory birds.

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	Due diligence is required at all times to prevent such discharges or deposits, and adherence to the proposed courses of action suggested in this environmental review does not relieve the proponent of the requirement to comply with the *Fisheries Act* or the *Migratory Bird Regulations*.	WEPC is committed to compliance with to the applicable provisions of both the *Fisheries Act* and the Migratory Bird Regulations. WEPC believes that it is taking all reasonable steps by specifying environmental protection requirements to the contractor (the OERC), by Owner's Consultant review of work plans, and by undertaking monitoring.
CUMULATIVE EFFECTS		
Reviewer: CEAA, L. Sullivan, Letter of August 11, 2006		
175.	Page 8-19, Waneta Dam and Generating Station: This entire discussion is extremely speculative. On what information is the proponent basing its statement that 'the valley bottom likely supported very dry open forest … "	The assumption that "prior to flooding, the valley bottom [in the vicinity of the Waneta Dam] likely supported very dry open forest and shrubland/grassland-dominated plant communities not unlike the remnant patches currently found within [vegetated portions of] the powerplant area" is based on available vegetation and soil information and photos presented in Vold et al. (1980), as well as a review of various impact assessment reports associated with the construction of the Seven Mile Dam and Generating Station. Sampling of vegetation communities conducted in the lower elevations of the Pend d'Oreille Valley for this assessment and for additional studies (Machmer and Steeger 1992; Machmer et al. 2005) indicates that these areas are currently comprised of dry open forest and shrubland/grassland-dominated plant communities. In the absence of empirical vegetation data pre-dating the construction of the Waneta Dam, it is logical to assume that areas disturbed by the construction of the Waneta Dam and Generating Station would have supported vegetation communities comparable to those currently found in adjacent undisturbed portions of the lower valley.
176.	Page 8-21, Last Paragraph: Where empirical data is provided in the cumulative effects assessment, the proponent is requested to present it in a table to assist reviewing agencies	The empirical data presented in the Cumulative Effects Assessment is organized to enable assessment of specific impact progressions on various aspects of the

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	assess the information and ready it for preparation of the CSR.	receiving environment. If and when CEAA provides more information on the tabular organization they seek, WEPC is prepared to assist in its preparation.
177.	Page 8-24, Paragraph 4: What does 'designated' mean? Is there any possibility of extrapolating effects?	"Designated" in this context refers to the mapped delineation of a 4,950 ha area of suitable ungulate winter range based on available biophysical attributes, local knowledge and monitoring of collared ungulate habitat use at that time. In Section 8.3.3, an attempt has been made to extrapolate, and whenever possible, quantify effects of past projects and activities on this mapped area of ungulate winter range.
178.	Page 8-25 Mining Activities: The closer to WEP, the more likely these are direct effects of WEP on wildlife.	It is acknowledged that the closer past mining and exploration activities were to WEP, the greater the potential for these past effects to accumulate with the direct effects of WEP.
179.	Page 8-26 Roads and Road Corridors: Why is it beyond the scope of this analysis to quantify the impacts on winter range?	Rather than stating quantification is "beyond the scope of this analysis", Section 8-26 should more appropriately have said that precise quantification of this cumulative effect is impractical. The CEA study area is characterized by an extensive network of primary, secondary, forestry and other roads. To accurately quantify the impacts of roads on all ungulate winter ranges within the CEA area would require an extensive GIS-based analysis. Considering only the WEP project area, the Seven Mile Dam to Selkirk Substation Road has directly impacted 80 ha of ungulate winter range and a network of secondary, forestry, powerline access and private roads has impacted additional winter range. A rough estimate of the total hectares of winter range directly impacted by all roads within the WEP project area is approximately 350 ha.
180.	Page 8-67, Last Paragraph: The proponent's opinion that there are no data to indicate that WEP operations will have a negative cumulative impact on white sturgeon is yet to be proven. There is equally no data to the contrary.	We can only base our assessment of cumulative of impacts to white sturgeon on available information. There is a substantial amount of data available on white sturgeon uses of the area and the effects of flow changes on these uses and none of these data support a conclusion of significant harm to the species. We reiterate that throughout

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		the review process, no "data" has been obtained to support the negative effects postulated by some reviewers.
181.	Page 8-68, 3rd Paragraph: monitoring of impacts of the location and alignment of the WEP tailrace will be required as part of the follow-up program under CEAA.	Comment acknowledged.
182.	Page 8-70, first Paragraph: These research activities are outside the scope of the CEAA review.	The research in question is pertinent to Provincial resource responsibilities.
183.	Page 8-75, Waneta Expansion … Levels and Habitat below Waneta: Not sure if Fisheries and Oceans would agree that these changes in shoreline habitat are solely the result of US-based facilities. The proponent will need to confirm with DFO.	WEPC has never stated that changes in shoreline habitat are "solely the result of US based facilities", but rather the result of Boundary flow releases which can be modeled and predicted. WEPC's response to DFO comments appear elsewhere in this document.
184.	Page 8-76, 2nd Paragraph: The proponent will need to confirm the extent of compensation for shallow water habitat with DFO.	WEPC has made a commitment to provide compensation for shallow water habitat effects which are subject to discussion and will be specified in WEPC's Fisheries Act Authorization.
185.	Page 8-88, First Paragraph: Cumulative effects may result due to residual effects that remain after all technically and economically feasible mitigation measures have been applied; therefore, no further mitigation can be applied to 'abate' cumulative effects.	This comment erroneously implies that one cannot mitigate identified cumulative effects. In fact, while cumulative effects indeed may result from direct residual project effects that remain after all technically and economically feasible mitigation measures have been applied to that direct effect, the ability of that direct residual effect to accumulate adversely in the system may be mitigatable and /or offset by actions manifested elsewhere in the system. Seeking such solutions is a key objective of Cumulative Effects Assessment.
186.	Page 8-10, Page 8-16, Page 8-22, and Page 8-42: The proponent refers to 'uncertain significance', 'very significant' and 'Unknown' with respect to loss of a provincially listed plant community and road construction respectively. The term significance is a legal term under CEAA and should not be used in these contexts, particularly as these mean either refer the project to a review panel or reject the project. It is assumed that the proponent intended to mean 'difficult to predict' and 'large	The use of defined terminology by WEPC is not intended to, and need not, fetter the ability of CEAA regulators to utilize in their Comprehensive Study Review the same terms defined as appropriate for CEAA. WEPC's impact significance criteria are presented in Table 5-3 on EACA page 5-19. WEPC's step 3 (per Bullet 3 on Page 8-44)

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	scale', rather than the legal meaning within CEAA. Page 8-44, bullet 3: Significance analysis does not look just at 'those of significance' as the purpose is to see if an accumulated effect might lead to a significant impact.	refers to WEPC's meaning of Significance and not that of CEAA. Rather, this treatment of significance provides the basis for determining the level, extent, and type of environmental mitigation and management warranted by and to be applied by WEPC to the potential impact(s) identified. As such, the evaluation of impact significance is an integral and essential requirement of any project impact assessment.
187.	Page 8-23, Significance …: Advice should be sought from a professional Forester before a statement of Unknown significance is made. This should be further investigated.	The seral stage distribution targets in the Biodiversity Guidebook were developed by a panel of biologists and foresters based on landscape ecology principles and a number of assumptions regarding fire and disturbance regimes and forest regeneration and succession in different biogeoclimatic subzones of the province. Given that Forest Practices Code targets for old seral are currently not being met in either the ICHxw or ICHdw subzones of the Pend d'Oreille landscape unit, but that the province's Ministry of Forests Small Business Enterprise Program and various licensees have been permitted to continue with forest development on crown lands in the landscape unit, it is unclear how WEPC should interpret the importance of these provincial guidelines, or the significance of exceeding them. Consultation with government foresters from the MOE and MOF has not provided clarification on this matter.
188.	Page 8-82, Significance …: The proponent contends that WEP will clearly demonstrate a net positive environmental benefit and that this should be taken into consideration in greenhouse gas offsets. This is a very bold statement, yet to be proven.	This CEAA comment does not reflect what WEPC has stated on page 8-82 in referencing sustainable development. On page 8-82 of the EACA; WEPC states, "If WEP were to be analyzed and credited according to the all-inclusive eco-system approach underlying sustainable development, it is predicted that WEP would clearly demonstrate a net positive environmental benefit to the Pacific Northwest."
189.	Appendix 8B: Not sure what the symbol 'n/a' means. Is it not assessed, not applicable, not available? In the column 'Significance of Cumulative Potential', the proponent states in 10 places that this is significant without any explanation.	The abbreviation "n/a" as used in Appendix 8B and elsewhere in our EACA means "not applicable". As per Comment Ref. #186, WEPC's use of significance as used in the EACA is different from "Significance" as legally defined by

COMMENT REF.#	REVIEW PERIOD COMMENT	WEPC RESPONSE
	If the Responsible Authorities use this assessment of significance, the project could not proceed.	CEAA. Appendix 8B is intended to be read in conjunction with EACA Section 8.3 in which it is referenced, following the reading of Section 8.2 ,which sets the stage for its analysis. WEPC's criteria for significance are presented and discussed in Sections 8.2.2 and 8.2.3 of the EACA, The explanation of the analyses applied to the factors in Appendix 8B is presented in the EACA (page 8-9) as Section 8.3.1 and is repeated here. *8.3.1 Scoping of Cumulative Construction Effects* *The derivation and identification of the Project construction impacts selected for cumulative effects assessment entailed the following steps:* ➢ *Noting those direct project impacts analyzed in Section 6 which may result in either unmitigated or partially mitigated residual impacts of any magnitude (summarized below in 8.3.1.1).* ➢ *Determining the significance of the residual impact to either the ecosystem or the social receiving environment (reference Appendix 8B);* ➢ *Ascertain the potential of the residual impact to accumulate in the environment (reference Appendix 8B)* ➢ *Selecting those of significance and with the potential to accumulate for cumulative effects analysis (see 8.3.1.2 below)* ➢ *Analysis of the cumulative contribution of the specific project effects relative to those of past, ongoing and/or future projects (see 8.3.2, 8.3.3 and 8.3.4)* Bullet 4 in the above list and the referenced Section 8.3.1.2 pertain directly to the column, *Significance of Cumulative Potential*. In that column, WEPC 's analysts have applied the criteria provided in Section 8.2.3 (Page 8-6 and 8-7) and indicate the significance of cumulative potential for each as follows:

COMMENT REF.#	REVIEW PERIOD COMMENT	WEPC RESPONSE
		a) *n/a* (not applicable) is used in column when no negative residual affect will result from anticipated WEP direct impacts following the mitigation and management prescribed b) *Not measurable* is used when the cumulative potential of a direct residual impact of low significance in its own right is judged to be not detectable by accepted techniques and practices. c) *No Population Effect* is inserted where direct residual effect of low significance where direct residual effects are judged to be locally confined. d) *Yes* is used to indicate which of the items having a likelihood of producing negative direct residual impact are analyzed to have a potential to accumulate in the environment and merit further cumulative analysis which was presented in Sections 8.3.2, 8.3.3, and 8.3.4. It is recognized that the Responsible Authorities will apply their own assessment of significance in preparing their Comprehensive Study Report. Within such analysis, WEPC anticipates that items noted as significant for purposes of our technical analysis will not be found to be Significant when evaluated per CEAA's legal definition. WEPC is willing to meet with CEAA officials to further discuss our use of the terms we have used and to discuss any differences to assist them in preparing the Comprehensive Study Report.
190.	Appendix 8C: In the column 'Significance of Cumulative Potential', the proponent states in 6 places that this is significant without any explanation. If the Responsible Authorities use this assessment of significance, the project could not proceed.	See responses to Comment Ref.'s #186 and 189.
FOLLOW-UP PROGRAM		
Reviewer: CEAA, L. Sullivan, Letter of August 11, 2006		
191.	There is little information on the follow-up program. The proponent is asked to provide more detail on how this will be executed and	The need for and intent of the WEP follow-up program is introduced in Section 8.6.3. Details of the respective elements are described in Section 11.1.3 and reflected in

COMMENT REF.#	REVIEW PERIOD COMMENT	WEPC RESPONSE
	what it may entail. The definition of a follow-up program under CEAA is: "a program for verifying the accuracy of the environmental assessment of a project, and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project." The purpose of a follow-up program is: To facilitate better overall project management by considering follow-up program framework at the earliest stages of project planning. To provide information on environmental effects and mitigation resulting from project implementation that can be used to improve and/or support future EAs including cumulative effects assessments. To aid in the detection of unanticipated environmental effects. To support or verify predictions made concerning the likelihood of "no significant environmental effects".	the Actions listed in the Owners Commitments (Appendix 11A) with respect to both construction and operations. The means of delivery for these are provided in detail in Section 9 Project Environmental Management Program, and Appendix 9A Owners Environmental Requirements for Construction

COMMENT REF.#	REVIEW PERIOD COMMENTS	WEPC RESPONSE
FERC LICENSING		
Reviewer: Federal Energy Regulatory Commission (US), J. Hill letter of July 26, 2006		
192.	Your assessment states that Boundary Dam has a significant effect on flow in the Pend d'Oreille River, and that a high level of coordination is necessary between the storage operators. We understand that this coordination is currently taking place. However, you may wish to participate in the re-licensing process for the Boundary Dam Project to keep informed of changes in the project.	CPC, as project manager for WEPC, is participating in the Boundary Dam re-licensing process. CPC has identified to the project team, the operational linkages between Boundary and Waneta, and the fact that Boundary releases will in general flow back to the United States without re-regulation once WEP is operational. We note that the current scope of Boundary aquatic studies and analysis does not extend through Waneta and back into the United States, but ends in Seven Mile Reservoir. Though there will be some negative shallow water effects below Waneta Dam from Boundary flow-throughs, WEPC's analysis indicates no significant post-project effects on white sturgeon. This analysis is being reviewed by Canadian Regulatory Agencies. FERC will wish to keep apprised of the progress of this review. Coordination of the Canadian portion of the system is the responsibility of BC Hydro. BC Hydro is also participating in the FERC re-licensing process.
Reviewer: US Fish and Wildlife Service, R. Donaldson E-mail of July 31, 2006		
193.	The U.S. Fish and Wildlife Service (Service) has no comment on the proposed action at this time. However, we would like to be included on any subsequent notifications via e-mail as the environmental review of the Waneta Expansion Project continues	Comment acknowledged.
194.	The Service previously participated in a Federal Energy Regulatory Commission (Commission) action regarding the Waneta hydroelectric project, regarding the effects of the action on Cedar Creek, Washington. Do you anticipate any action by the Commission on for the expansion project?	The FERC license for the Waneta Reservoir in Washington at the mouth of Cedar Creek is held by Teck Cominco, owners of the Waneta Dam and generating station. WEPC's expansion facility will not impact the FERC licensed portion of the reservoir in Washington as described in the EACA and therefore we do not anticipate any action by FERC. FERC has also commented on the EACA and did not identify in their response, the need for any Commission action.

COMMENT REF.#	REVIEW PERIOD COMMENTS	WEPC RESPONSE
Reviewer: Washington State Department of Ecology, J. Parodi E-mail of August 28, 2006		
195.	The Washington Department of Ecology's main interest in this project is on the potential effects on total dissolved gas pressure (TGP) levels downstream in the Columbia River. TGP levels downstream should decrease once the new plant comes on line. Ecology supports this project because of the probable reduction in TGP downstream. Although this effect will probably be modest based on Waneta Expansion Project alone, the combined effects of the WEP and future gas abatement measures taken at Box Canyon and Boundary Dams in Washington will likely be significant. The application states that a TGP monitoring program will be developed to improve the existing model and to define changes in downstream TGP levels once the Waneta Expansion Project is built and operating. Ecology would like to see the monitoring data and would also appreciate receiving a copy of the monitoring program plan, as they become available.	Comments acknowledged. WEPC will keep US stakeholders up-dated on TGP monitoring plans and results through its participation in the Transboundary Gas Group, of which Washington State Department of Ecology is a member.

Table 1-1

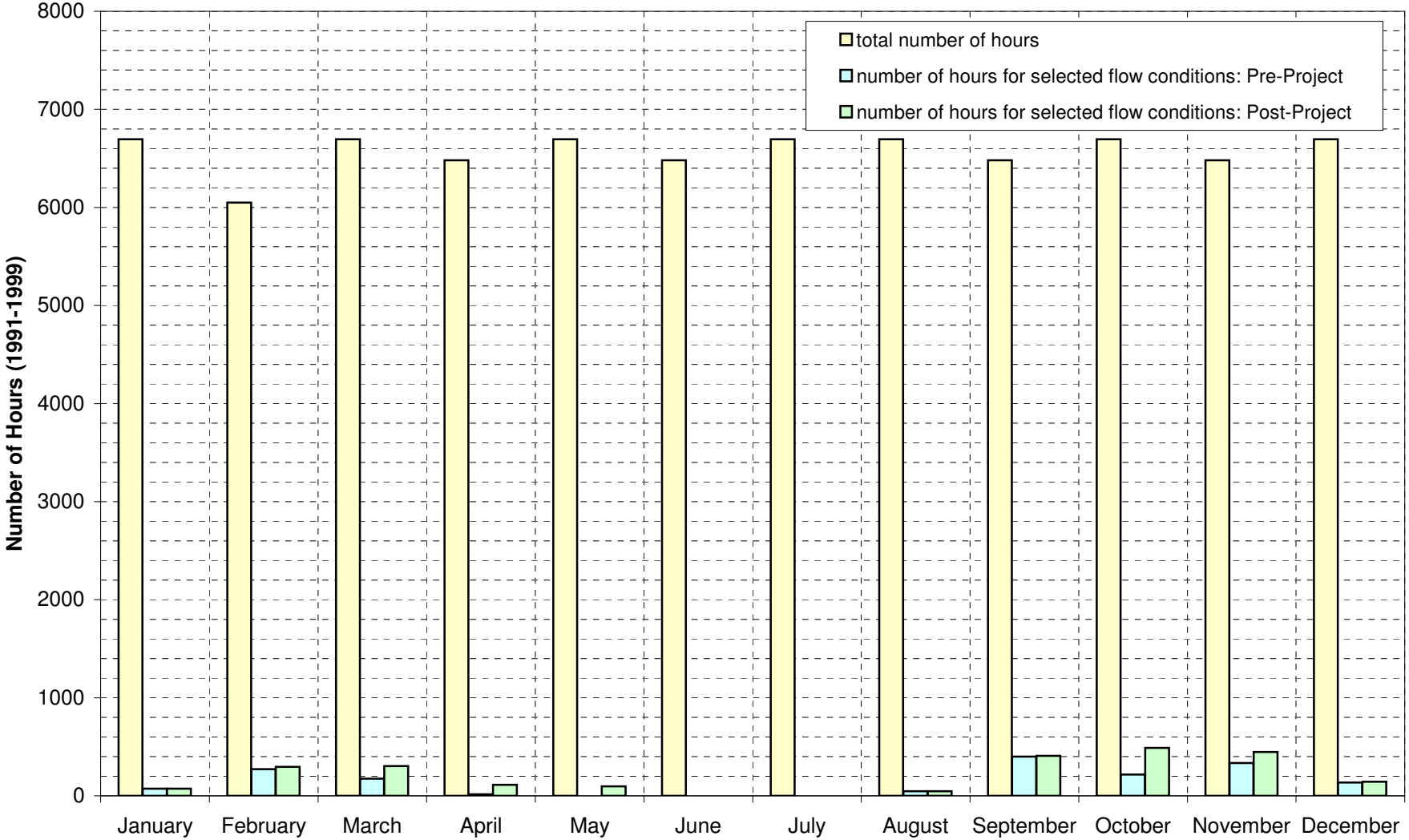
Frequency and Duration of the Pend d'Oreille Flows of 34 m^3/s for Pre-Project and Post-Project Conditions
(based on simulated flows for the period 1991-1999)

	Percent of Time in Month with Pend d'Oreille Flow of 34 m^3/s:													
	Columbia River Flow less than 1500 m^3/s		Columbia River Flow between 1500 m^3/s and 1750 m^3/s		Columbia River Flow between 1750 m^3/s and 2000 m^3/s		Columbia River Flow between 2000 m^3/s and 2500 m^3/s		Columbia River Flow between 2500 m^3/s and 3000 m^3/s		Columbia River Flow more than 3000 m^3/s		Total Percentage of Time with Pend d'Oreille Flow of 34 m^3/s:	
Month	Pre-Project	Post-Project	Pre-Project	Post-Project	Pre-Project	Post-Project	Pre-Project	Post-Project	Pre-Project	Post-Project	Pre-Project	Post-Project	Pre-Project	Post-Project
January	5%	5%	1%	1%	4%	4%	10%	12%	3%	5%	3%	6%	25%	33%
February	5%	6%	4%	5%	2%	3%	5%	7%	5%	7%	3%	4%	25%	31%
March	9%	13%	3%	5%	1%	3%	3%	5%	1%	2%	0%	0%	18%	28%
April	11%	20%	0%	2%	0%	0%	0%	2%	0%	0%	0%	0%	12%	24%
May	2%	3%	0%	1%	0%	2%	0%	2%	0%	0%	0%	0%	2%	9%
June[1]	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
July[1]	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
August	1%	1%	1%	1%	3%	3%	11%	11%	6%	6%	11%	12%	31%	33%
September	7%	7%	6%	6%	4%	4%	11%	11%	4%	4%	0%	0%	33%	33%
October	7%	13%	3%	7%	3%	4%	4%	6%	1%	2%	0%	0%	18%	33%
November	4%	10%	5%	7%	6%	9%	4%	7%	0%	1%	0%	0%	20%	33%
December	1%	1%	2%	2%	9%	10%	11%	13%	3%	5%	1%	1%	26%	31%

Notes:
1 - Pend d'Oreille River flow downstream of Waneta is always higher than 34 m^3/s in June and July

Figure 1-1

Duration of Pend d'Oreille Flow of 34 m^3/s (Concurrent with Columbia Flow between 1500 m^3/s and 1750 m^3/s)



APPENDIX 2

Flow Patterns and Egg Distribution in the White Sturgeon Spawning Area

Summary Notes on:

- Potential Egg Predators in the Waneta Area,
- Distribution of Eggs in White Sturgeon Spawning Area, and
- Pre- and Post-WEP Modeled Flow Velocities

Potential Egg Predators and Swimming Speeds

In the 2005 Large River Indexing study (a BC Hydro study designed to monitor changes in the status of fish species within the Columbia River) conducted on the section of the Columbia River in which the Waneta white sturgeon spawning area is located, the top five fish (in order of abundance by percent composition of total catch) were: sculpins [predominantly torrent (*Cottus rhotheus*) and prickly (*Cottus asper*) sculpins], adult rainbow trout (*Oncorhynchus mykiss*), walleye (*Sander vitreum*), suckers (mainly largescale sucker), and immature rainbow trout (Golder 2006).

Fish can swim using three main methods: sustained, burst, or prolonged swimming. Sustained swimming is primarily aerobic and can be maintained for at least 200 minutes without fatiguing (Beamish 1978). Burst swimming is primarily anaerobic and is used to attain high speeds for short periods of time (generally less than 20 seconds) (Beamish 1978). Prolonged swimming is a mixture of sustained and burst methods and velocities. Swimming performance can vary with a number of factors including the size of the fish, the motivation for swimming, and the water temperature.

A database reviewing the literature pertaining to fisheries biology is maintained at www.fishbase.org. Studies testing and reporting sustained and burst swimming speeds for rainbow trout were found at this website. For clarity, the original citations are noted here as well as the acknowledgement that the citations were found though Fishbase. The peer-reviewed literature, the grey literature of the U.S. federal services and digital thesis archives were searched for the remaining species to obtain information about their sustained swim speeds. Literature searches did not reveal any information on the sustained maximum swimming speed of either the torrent sculpin or the prickly sculpin. There is very little known about sculpin species in general, though it is known that most adult sculpin tend to have a localized territory and that they predominantly feed on aquatic invertebrates, but will also feed on their own young, the young of other species of fish, and on fish eggs (Scott and Crossman 1973; Hendricks 1997). The available information obtained from this review is presented in Table 2-1.

Three year old rainbow trout found in the lower section of the Columbia River ranged from 375 to 464 mm fork length (FL). The Fishbase data did not reference many studies on rainbow trout this large. For rainbow trout 300 mm total length (TL), the sustained swimming speeds ranged from 0.32 m/s to 1.56 m/s (Webb 1971 as cited in Table 3.8 of Fishbase). Burst speed of adult rainbow trout has been recorded as high as 3.5 m/s (Bainbridge 1960 as cited on Fishbase) and

sustained swimming speeds for adult rainbow 588 mm FL were up to 2.11 m/s (Bainbridge 1960 as cited on Fishbase). Immature rainbow trout caught in the lower section of the Columbia River had a modal range of 81 to 170 mm FL for the age-0 cohort and 181 to 340 mm FL for the age-1 cohort. Within the range of sizes for the age-0 cohort, the maximum sustained swimming speed ranged from 0.32 to 0.40 m/s and the burst speed was up to 2.2 m/s (Bainbridge 1958, 1960). Within the range of sizes for the age-1 cohort, the maximum sustained swimming speed overlapped those measured for the adult rainbow trout.

Table 2-1: Summary of maximum sustained swimming speed ranges and burst speeds for the five most abundant potential white sturgeon egg predators found in the lower section of the Lower Columbia River.

Species	Abundance Ranking in Lower Columbia River[a]	Modal Range of Fork Length (mm)	Range of Max. Sustained Swim Speed (m/s)	Maximum Burst Speed (m/s)
Sculpins	1	Not recorded	Not known	Not known
Adult rainbow trout	2	375 - 464 (age-3)	0.32 - 1.56	3.2 - 3.5
Walleye	3	301 - 310	0.41 - 0.44	1.6 - 2.6
Sucker (mainly *Catostomus macrocheilus*)	4	Not recorded	0.57 (for ~400 mm fish)	Not known
Immature rainbow trout	5	81 - 170 (age-0); 181 - 340 (age-1)	0.32 - 0.40 (age-0); 0.32 - 1.56 (age-1)	1.0 - 2.2 (age-0); 3.2 - 3.5 (age-1)

[a] In order of rank abundance by percent composition of total catch. Includes fish observed and identified to species; does not include recaptured fish (Golder 2006).

Walleye caught as part of the indexing project in the lower Columbia River had a modal fork length from 301 to 310 mm. Walleye are relatively poor swimmers and their maximum sustained swimming speed (MSSS) has been shown (Peake et al. 2000) to vary with fork length and temperature as per the relationship,

MSSS (m/s) = 0.124 + 0.68 * Fork Length (m) + 0.0052 * Temperature (°C).

For walleye throughout the modal range found in the lower Columbia River, this translates to a mean sustained swimming speed of ~ 0.4 m/s (Table 3.8). Water temperatures recorded in the 2003 spawning season reached 20° C by the end of July (Golder 2004). Temperatures this high would mean that sustained speeds up to 0.44 m/s could potentially be achieved by walleye. Walleye have been shown to attain burst speeds from 1.6 to 2.6 m/s (Peake et al. 2000).

Largescale sucker have a MSSS of 0.57 m/s at 16°C and 0.51 m/s at 10°C (Kolok et al. 1993). Research by Kolok et al. was the only citation found for swimming speeds of largescale sucker and they did not measure the potential burst speed of the species.

White Sturgeon Egg Distribution Patterns

Data from white sturgeon spawning studies conducted at Waneta from 2000-2005 were examined to determine egg distribution patterns in the spawning area. This period was selected as representative of the best information available on egg distribution patterns for the following reasons:

1. The present standardized mat program was first implemented in 2000 and since then mat locations, configuration of the mats, and set times have been consistent. The only exceptions to this are for mid-channel sets that can only be deployed under certain flow conditions.

2. Spawn monitoring programs conducted in previous years (1993-1996 and 1998) were experimental in nature and designed to identify numbers of spawning events. The identification of the egg deposition area or the relative distribution of eggs was not a specific objective, and therefore egg mat locations and the amount of time each mat set was deployed varied annually. This variability has a direct affect on the number of eggs captured at each mat site that in turn, influences the proportion of the total egg catch recorded at that site.

3. The locations of the mats provided on Figures 2-1 to 2-2 are approximate since the exact location of the mat after it is deployed will depend on the flow conditions where and when it was set and the location where the mat comes to rest on the river bottom. Since 2000 however, these estimated locations are considerably more precise and in most cases, are considered by the personnel conducting the survey program to represent the location of the mat within a range of 20m of the locations designated on the attached figures. In earlier years, actual locations of mats were much more variable and mats were frequently moved in response to flow changes or the availability of suitable on-shore anchor points for the shore-lines. To avoid an undue number of mat locations, if a mat was reset in the nearby vicinity of the previous location (generally within 50 -70 m), it was given the same site designation. Even more variability in site locations occurred between years due to high flows that eroded landmarks, the reliance on determining previous mat sites using outdated aerial photos, and changes in crew personnel.

A summary of egg collections during spawn monitoring surveys conducted over the 2000-2005 period is provided in Table 2-2. These data show that on average over 94% of eggs have been collected at or downstream from SM56C4. In all years, the lowest numbers of eggs were collected from SM56C1. Low numbers of eggs also were collected at SM56C3. The catch of eggs at sites SM56C4, SM56D, and SM56D1 combined, represented approximately 81% of the total catch for all years combined and on an annual basis, ranged from 65% to 85% of the total catch.

Table 2-2: Total annual catch of white sturgeon eggs and proportion of the catch by individual egg mats deployed in the white sturgeon spawning area at Waneta, 2000 to 2005

STUDY	Egg Mat Site Designation									**ALL SITES**	
YEAR	SM56C1	SM56C3	SM56C4	SM56D	SM56D1	SM56E1	SM56E1.5	SM56M1	SM56M2	**No. Eggs**	**%**
2000	0.0%	2.9%	61.3%	0.4%	23.5%	6.6%	5.3%			**243**	**100.0%**
2001	1.5%	4.8%	46.8%	7.9%	10.6%	9.4%	5.6%	13.1%	0.3%	**605**	**100.0%**
2002	0.3%	5.0%	32.3%	24.4%	16.0%	11.6%	10.5%			**1271**	**100.0%**
2003	2.0%	6.5%	71.2%	10.0%	3.3%	3.2%	3.1%	0.8%		**3730**	**100.0%**
2004	0.7%	7.4%	58.3%	19.0%	7.5%	4.1%	0.9%	2.1%		**2032**	**100.0%**
2005	0.8%	0.7%	51.4%	22.3%	9.0%	5.3%	3.2%	7.5%		**4856**	**100.0%**
ALL	**1.1%**	**4.1%**	**56.3%**	**17.3%**	**8.1%**	**5.3%**	**3.7%**	**4.0%**	**0.0%**	**12737**	**100.0%**

Pre- and Post Project Flow Velocities in the Egg Deposition Area

To illustrate the effects of WEP operations on near-bottom flow velocities in Waneta spawning and egg deposition area, the velocities were modeled and plotted for two of the flow Cases provided in the EACA:

1. Case 2 (Figure 2-1) representing Boundary flow-through effects at a low Columbia flow (Figure 2-1) for Pre-Project (Columbia Q= 1418 cms, Pend d'Oreille Q=932 cms), Post-Project LLH minimum flow (Columbia Q= 1418 cms, Pend d'Oreille Q=34 cms), and Post-Project HLH maximum flow (Columbia Q= 1418 cms, Pend d'Oreille Q=1742 cms).

2. Case 4 (Figure 2-2) representing Boundary flow-through effects a high Columbia flow (Figure 2-2) for Pre-Project (Columbia Q= 2910 cms, Pend d'Oreille Q=932 cms), Post-Project LLH minimum WSFAP flow (Columbia Q= 2910 cms, Pend d'Oreille Q=142 cms), and Post-Project HLH maximum flow (Columbia Q= 2910 cms, Pend d'Oreille Q=1742 cms).

The estimated modeled velocity ranges for each Case and flow set are provided below in Table 2-3. Note that these velocities are rough estimates based on the modeled locations of the velocity strata (which represent a "snapshot" and therefore do not incorporate the variability in the system) and the mat location as plotted on the modeled output (which will also vary slightly between sets).

The range of predicted near-bottom velocities at most mat sites is similar for post-project and pre-project maximum and minimum flow conditions for both cases. For Case 4, post-project maximum velocities are predicted to be higher at five of the mat sites; conversely, reductions in velocity from pre-project maximum flows to post-project minimum WSFAP flows are only predicted at two sites. In terms of sturgeon egg predation, this may suggest the potential benefits of the increased HLH velocities during portions of the day may outweigh any potential negative effects from the increased frequency of minimum WSFAP flows.

Table 2-3: Egg mat locations and modeled near-bottom (0.5m off bottom) velocities at each of the egg mat sites for the Case 2 and Case 4 flow conditions.

Egg Mat Location (see Figure 2-1) proceeding D/S from dam	CASE 2			CASE 4		
	Pre-project Maximum COL= 1418cms PdO = 932 cms	Post-project Maximum COL= 1418 cms PdO=1472 cms	Post-project Minimum COL= 1418 cms PdO =34 cms	Pre-project Maximum COL=2910 cms PdO = 932 cms	Post-project Maximum COL=2910 cms PdO=1472 cms	Post-project WSFAP Minimum COL=2910 cms PdO =142 cms
SM56C1	0-0.4 m/s	0-0.8 m/s	0-0.4 m/s	0-0.4 m/s	0-0.8 m/s	0-0.4 m/s
SM56C3	0.4-0.8 m/s	0.8-1.6 m/s	0-0.4 m/s	0.4-1.6 m/s	0.8-1.6 m/s	0-0.4 m/s
SM56M1	0.8-1.6 m/s	1.6-3.2 m/s	0.8-1.6 m/s	0.8-1.6 m/s	1.6-3.2 m/s	0.8-1.6 m/s
SM56C4	1.6-3.2 m/s	0.4-1.6 m/s	0.8-1.6 m/s	1.6-3.2 m/s	1.6-3.2 m/s	0.8-3.2 m/s
SM56D	0.4-0.8 m/s	0.4-1.6 m/s	0.4-0.8 m/s	0.4-1.6 m/s	0.4-1.6 m/s	0.4-1.6 m/s
SM56D1	0.8-1.6 m/s	0.8-1.6 m/s	0.8-1.6 m/s	0.8-3.2 m/s	0.8-3.2 m/s	0.8-1.6 m/s
SM56E1	0.8-1.6 m/s	0.8-1.6 m/s	0.8-1.6 m/s	0.8-1.6 m/s	0.8-3.2 m/s	0.8-1.6 m/s
SM56E1.5	0.8-1.6 m/s	0.8-1.6 m/s	0.8-1.6 m/s	0.8-1.6 m/s	0.8-3.2 m/s	0.8-1.6 m/s

Summary

Based on the sustained swimming speed data provided, it is unlikely that the near-bottom velocities under either pre- or post-project conditions will exclude egg predators from the area in the vicinity of the two upstream mat locations (SM56C1 and SM56C3). Based on their burst speeds, predators also may be able to access portions of the downstream egg deposition area (below SM56C4) under either pre- or post-project conditions.

As is shown for Case 4 (Figure 2-2) during pre-project flows most predators can access incubating white sturgeon eggs throughout most of the upper portion of the egg deposition area (i.e., from the bridge crossing to SM56C3 using either sustained or burst swimming speeds. The main difference between pre-project flow and post-project LLH (WSFAP) flow is the elimination of the 0.4 to 1.6 m/s velocities strata in the upper portion of the egg incubation area. However, under post-project HLH flow conditions, the proportion of this part of the incubation area with flows from 1.6 to 3.2 m/s increases substantially (and these high flows are maintained throughout the majority of the egg incubation area) compared to the pre-project condition.

During white sturgeon spawning studies from 2000-2005, the majority (approximately 94%) of the white sturgeon eggs were captured on mats located at and/or downstream from the SM56C4 location. In this portion of the egg incubation area, the main effect of post-project minimum flows is the reduction in the 1.6 to 3.2 m/s velocity area. Flows of 0.8 to 1.6 m/s would still be maintained throughout this area (with localized areas of 1.6 to 3.2 m/s) and these velocities would be sufficient to prevent most predators from using sustained swimming to feed in the area.

Some predators could access the area using burst speeds, but these velocities would likely substantially reduce their efficiency in locating and eating sturgeon eggs. This potential effect could be offset by the increased post-project HLH flows that will increase the area of 1.6 to 3.2 m/s velocities in the upper portion of the egg deposition area.

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Webb, P.W., 1971. The swimming energetics of trout I. Thrust and power output at cruising speeds. Journal of Experimental Biology.55:489-520.

Figure 2-1: Near-bottom flow speeds modeled in the Waneta white sturgeon spawning area for Case 2 pre- and post-WEP flow conditions.

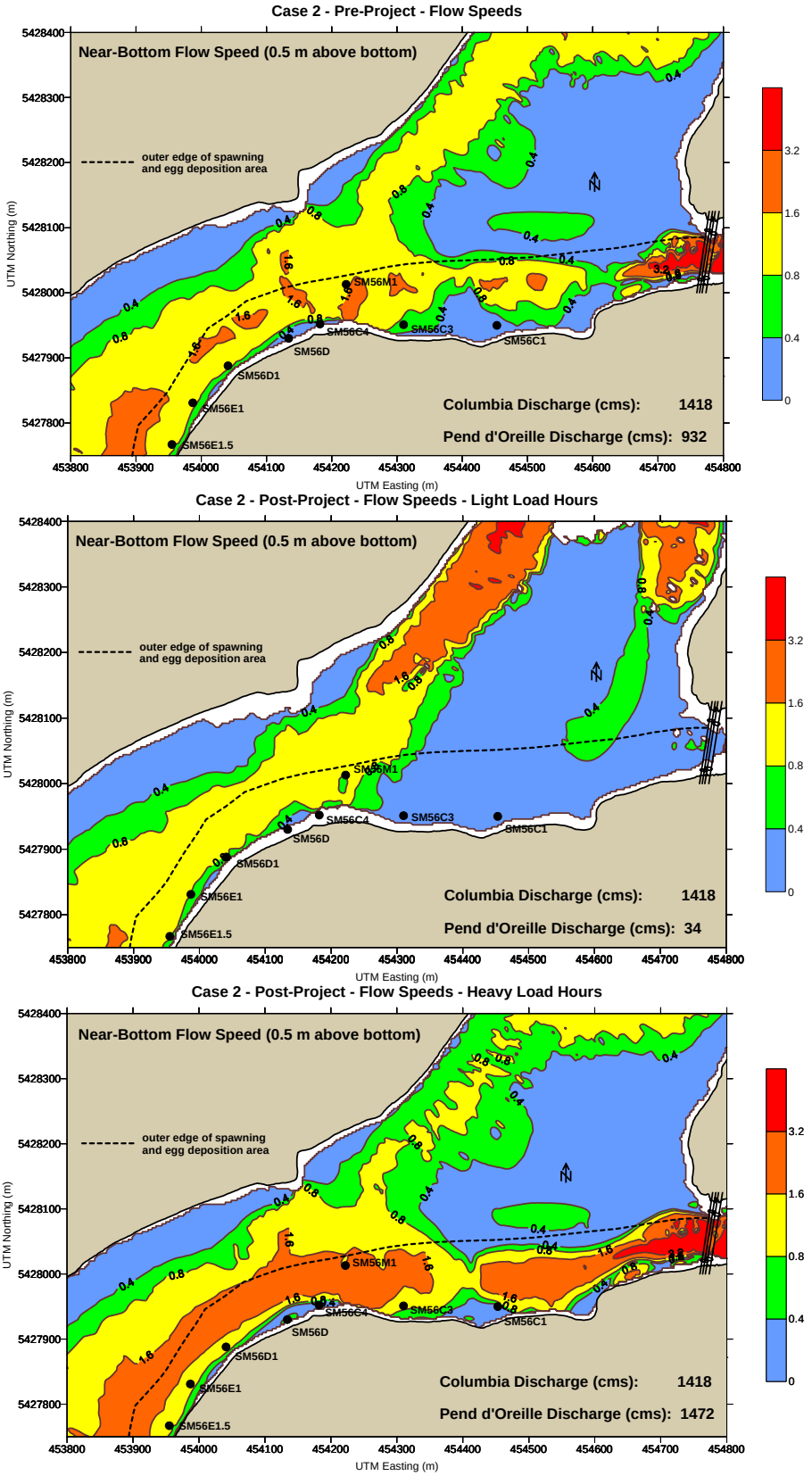

Figure 2-2: Near-bottom flow speeds modeled in the Waneta white sturgeon spawning area for Case 4 pre- and post-WEP flow conditions.

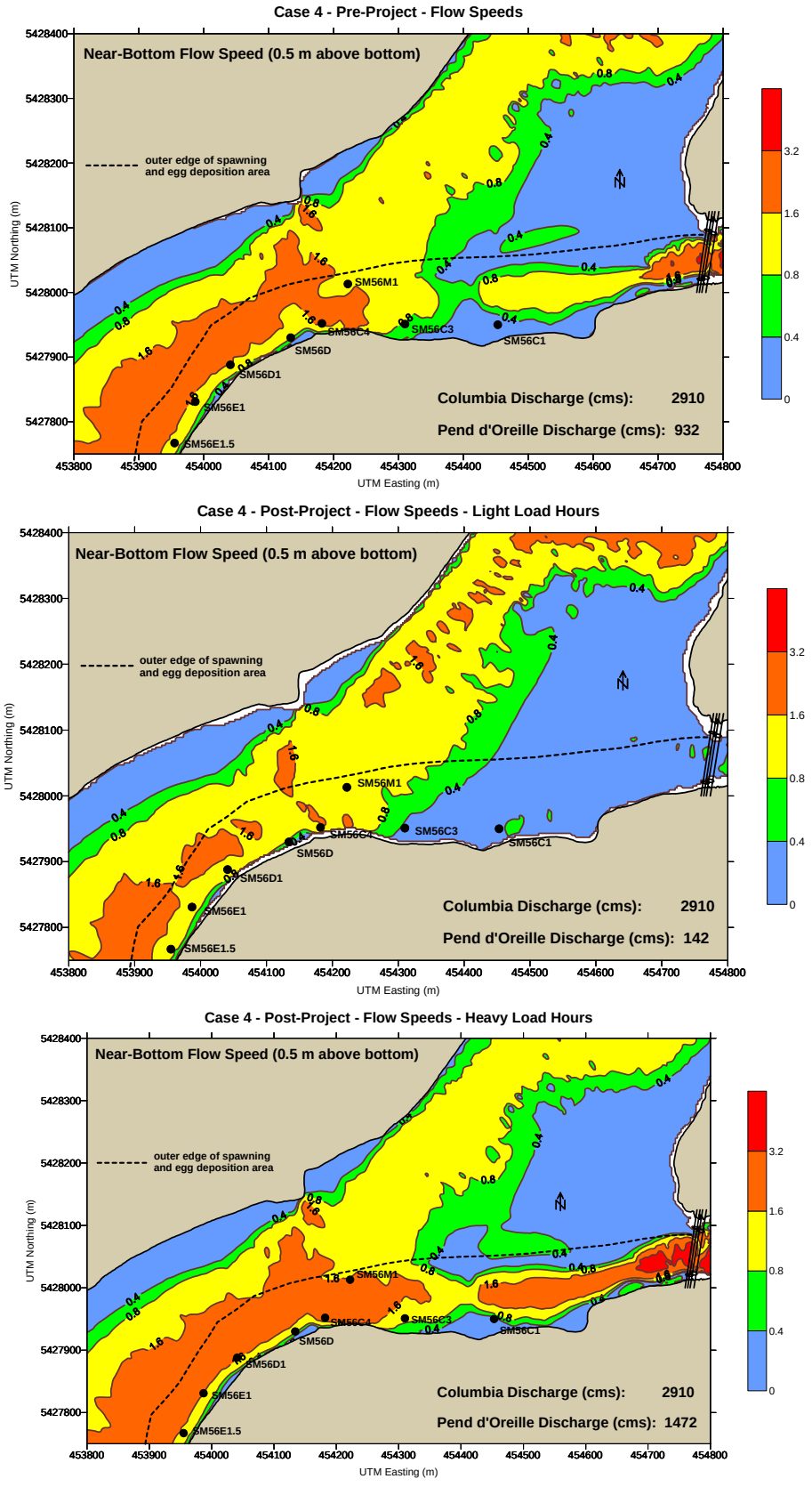

Table 3-1

Changes in Productive Habitat Area Below Waneta Dam

	No. of Days with Decrease in Productive Habitat Area for Post-Project Conditions:										
Year	> 0.5 hectares	> 1.0 hectares	> 1.5 hectares	> 2.0 hectares	> 2.5 hectares	> 3.0 hectares	> 3.5 hectares	> 4.0 hectares	> 4.5 hectares	> 5.0 hectares	Average Decrease (hectares)
Avg 1991-99	101	39	4	0	0	0	0	0	0	0	0.34
1991	145	102	70	39	13	1	1	0	0	0	0.62
1992	65	51	27	17	13	8	7	5	2	0	0.26
1993	70	23	10	5	1	0	0	0	0	0	0.18
1994	24	6	5	0	0	0	0	0	0	0	0.01
1995	92	64	50	25	23	20	7	6	3	2	0.46
1996	103	64	35	26	23	13	13	11	0	0	0.46
1997	79	38	30	28	28	25	25	20	16	0	0.45
1998	82	29	19	8	6	1	0	0	0	0	0.23
1999	83	65	46	33	20	7	5	2	0	0	0.41

Table 3-2

Changes in Productive Habitat Area Below Waneta Dam

October-November

	No. of Days with Decrease in Productive Habitat Area for Post-Project Conditions:										
Year	> 0.5 hectares	> 1.0 hectares	> 1.5 hectares	> 2.0 hectares	> 2.5 hectares	> 3.0 hectares	> 3.5 hectares	> 4.0 hectares	> 4.5 hectares	> 5.0 hectares	Average Decrease (hectares)
Avg 1991-99	20	14	0	0	0	0	0	0	0	0	0.47
1991	28	18	12	0	0	0	0	0	0	0	0.69
1992	44	38	19	15	13	8	7	5	2	0	1.45
1993	24	6	2	1	0	0	0	0	0	0	0.40
1994	7	0	0	0	0	0	0	0	0	0	0.04
1995	26	20	17	13	13	12	0	0	0	0	0.95
1996	0	0	0	0	0	0	0	0	0	0	0
1997	3	1	0	0	0	0	0	0	0	0	0.08
1998	0	0	0	0	0	0	0	0	0	0	0
1999	17	17	15	14	13	2	0	0	0	0	0.77

APPENDIX 4

Near Bottom Flow Velocities in Waneta Eddy

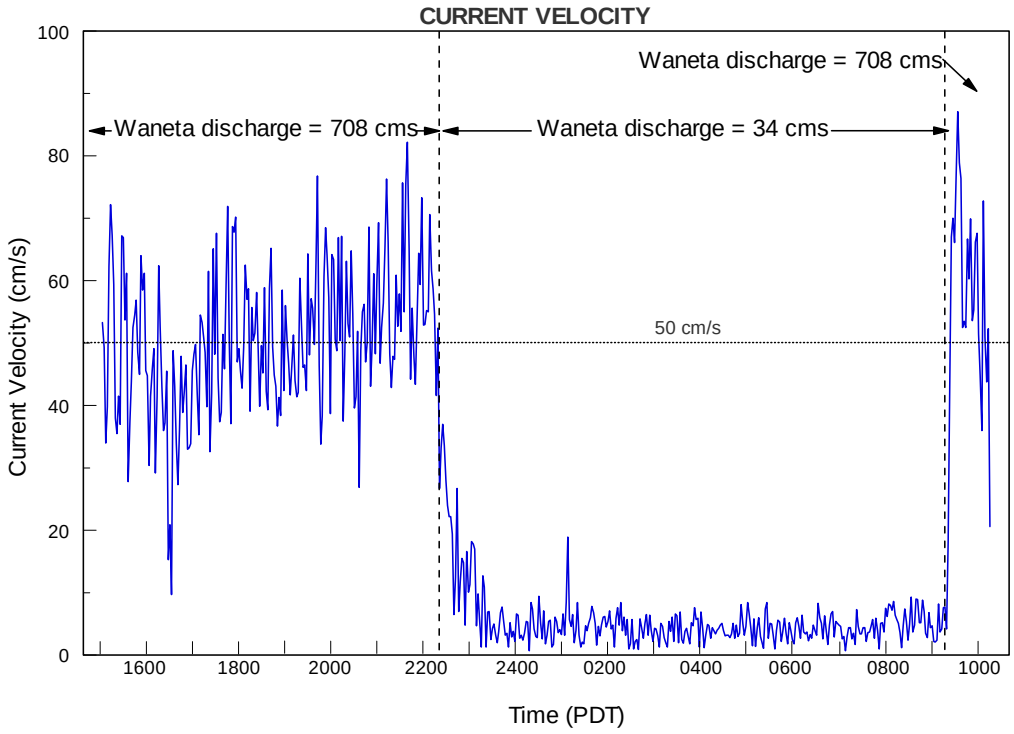

Figure 4-1 Continuous measurements of near-bottom current velocity at Station MB in the central deep (22m) portion of Waneta Eddy, 5 and 6 October 1996.

Appendix 3-2 – Response to Post-Review Period Comments from Okanagan Nation Alliance, Received September 22, 2006

[The following document was prepared by the Proponent]

Reviewer Reference: ONA Letter of August 18, 2006, Received from BCEAO on August 31, 2006

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
General		
a.	The Approved Terms of Reference for Environmental Assessment Certificate Application (2004) document commits to provide a full assessment of cumulative environmental effects of the Project's identified residual effects. This is to be considered in combination with the residual effects of other projects in the cumulative effects study area. The ONA would like to see these monitoring and assessment requirements implemented to derive Best Management Practices and methodology to detect adverse effects and mitigate risk to fisheries abundance and aquatic resources (and where possible enhance habitat).	WEPC believes the EACA fulfills the requirement of the Approved Terms of Reference to provide a full assessment of cumulative environmental effects. WEPC's commitments include provision for post-project monitoring of our project's effects, but it is not anticipated that we would monitor the effects of other future projects.
b.	The proponent should focus on net environmental 'gain' rather than simply a 'no net loss' policy as a more advantageous goal for the project.	Avoidance and mitigation of identified potential adverse environmental effects are a fundamental goal of project environmental planning and assessment. Where feasible, WEPC has taken steps to include mitigative prescriptions and compensation proposals that contribute to a net environmental enhancement. As summarized in Section 11.3, WEPC believes the combined environmental effects of WEP, taking into consideration air, water and land values, will be positive.
Fish Passage		
c.	The Waneta's 62-meter maximum head on the project limit the feasibility or biological benefit of using a fish ladder. There are few fish ladders above 35 meters due to the extreme expense and complications associated with the construction (R2 Consultants Inc. 2005). The ONA would like to ensure WEPC is providing the resources and technology to surpass these limitations and implement a reliable, biologically sound fish passage. Until this is accomplished another method of passage is required. R2 Consultants Inc. proposed a trap and haul program be implemented. This involves trucking the fish to locations upstream of the project in a biologically sound manner. Limitations to this	WEPC is not proposing to implement fish passage facilities as part of project construction as it is not warranted by the fish species and site conditions present at the current time. As indicated in Comment Ref #33, the construction of the WEP will not preclude the implementation of future fish passage options as described in EACA Background Report # 6 in the event that anadromous fish return to the upper Columbia. WEPC is committed to fully participate in all future discussions on this topic with fisheries management agencies, First Nations, hydro system owners and other stakeholders. If in the future, the fisheries management agencies direct the establishment of fish passage up the Pend d'Oreille, WEPC

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
	approach include fish injury and mortality, unnatural migration travel, frequency and reliability of implementation. These factors instigate questions on the sustainability of this option.	will be pleased to contribute to establishing fish passage facilities at Waneta. It is anticipated under the conditions described above, that the owner of the existing Waneta Dam and Generating facility would have the primary responsibility for establishing fish passage. As stated in Comment Ref. #152, trap and haul was determined by an independent expert in fish passage design to be the best option for passage of salmon species that historically migrated upstream to the Waneta site. WEPC would expect that if in the future salmon are re-introduced into the upper Columbia River, the final method(s) selected to pass adults and smolts at Waneta would be based on the best information and technology available at that time. For this reason, WEPC suggests that evaluations on the sustainability of this or other passage options are premature at this time. As indicated previously in this response, WEPC's commitment is to participate in any future discussions on the sustainability of various passage options in the event salmon return to the area and a decision is made to provide passage at Waneta Dam.
d.	R2 Consultants (2005) proposed the installation of louvers across the intakes and a collector on the right bank of the existing Waneta Generation Station as a downstream fish passage facility option. Monitoring to reduce fish loss and ensure the Best Management Practices option is instituted should occur prior, during and post construction. Behavioural and experimental technologies should be incorporated into the analysis.	See Comment Ref "c" above. Fish passage is not being implemented at this time but appropriate monitoring will be included if fish passage is decided upon in the future.
Reservoir Volume and Drawdown Fluctuations		
e.	Unnatural flow variability associated with the stranding of fish, fish eggs and a decrease in periphyton and macro-invertebrate productivity is a concern. Although the expansion proposes to reduce the need to re-regulate flows entering Canada from Boundary Dam and Seven Mile Reservoir and provide an increase in productive habitat in Seven Mile Reservoir reference area, it forecasts a loss in the productive habitat in the reference area below Waneta Dam.	As indicated in Comment Ref #29, experimental investigations conducted as part of BC Hydro's ongoing assessments of pool and interstitial stranding, indicates stranding rates during the summer for all fish species are quite low (Trevor Oussoren, Golder Associates Ltd. 24 August 2006, pers. comm.) Interstitial habitat types that have been shown to be associated with high rates of stranding during the winter period are very rare in the system and based on nearshore bank profiles, are likely rare to non-existent within the confluence area. As indicated in Comment Ref. # 109, WEPC's assessment of

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
		stranding risks to listed species would be verified through a monitoring program. WEPC believes the significant habitat creation in Seven Mile Reservoir resulting from WEP's ability to process Boundary flow-through, should be credited as a benefit of the project. Notwithstanding, WEPC will develop a program to satisfy the requirements of the project Fisheries Authorization for compensation related to project effects on predicted losses of shallow-water habitats between Waneta Dam and the Canada-US Border. WEPC is conducting an analysis of potential compensation sites so that sufficient detail can be provided in the Fisheries Authorization application.
f.	Flow Regulation should be adapted to ensure the stranding of fish, and fish eggs do not occur.	Flow variations that may appear post-project below Waneta will be a flow-through of flow variations entering Canada from Boundary Dam but will be minimized due to the convergence with the Columbia River. However some residual minor stranding associated with the shallow water habitat impact is inevitable as described in Sect. 7.4.3.6. This is the reason for the shallow water habitat compensation that is being proposed.
g.	Flow Regimes should ensure all aquatic habitats are monitored and ecosystem health is maintained.	WEPC has committed to development of monitoring programs to examine predicted project impacts on listed species and shallow water habitats. These were the only incremental effects of the project identified in the EACA that had the potential to result in negative effects on ecosystem health.
h.	Additional research and flow modeling is required to incorporate effects from climate variability and extreme weather events in predicting flow regulation outcomes.	The Meteorological Service and Environment Canada inform that the EACA addresses these areas to their satisfaction. They also recognize that there is always some uncertainty in descriptions of the present climate and in predictions of the future climate. In the specific context of this project, these uncertainties are manageable and should have little direct impact.
i.	Although post expansion changes in low velocity habitat throughout the year are small, these infrequent changes are not expected to negatively influence white sturgeon's use of the eddy, additional monitoring and analysis is required.	For the reasons provided in Comment Ref. #123, WEPC agrees with the view that the post expansion changes are small and are not expected to negatively influence white sturgeon use of the eddy. Notwithstanding, we have proposed a monitoring/research program that is intended to provide greater certainty.
j.	A planned response to adjust flow regimes	WEPC's analysis does not indicate the project

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
	should be drafted to ensure the white sturgeon population incurs no adverse effects.	will have any adverse effects on white sturgeon. Therefore, WEPC cannot reasonably be expected to develop a "planned response to adjust flow regimes" in the absence of any data to indicate what flow regimes should be adjusted. In addition, flows in the Canadian section of the Pend d'Oreille River are coordinated by BC Hydro under the Canal Plant Agreement (CPA). Under the CPA, BC Hydro is delegated the responsibility to manage the flows through Waneta and the Waneta Expansion facilities in order to optimize system generation. Any restrictions on flows as a result of various license conditions (such as the WSFAP), are incorporated into CPA Operating Procedures which BC Hydro must abide by in their management of the system.
Total Dissolved Gas Pressure:		
k.	The impacts of total dissolved gas pressure (TGP) are a concern. The Seven Mile spillway was designed to reduce the incidence of gas supersaturation (Ministry of Supply Services 1991). Historical reports indicate TGP assessments did not determine the efficiency of the Seven Mile spillway in reducing dissolved gas levels entering Waneta reservoir (Ministry of Supply Services 1991). The Waneta Hydroelectric Expansion Project (2004) report found the database on TGP production at Waneta Dam to be insufficient to allow accurate predictions of WEP benefits to TGP reduction.	The model used to assess impacts of BC Hydro's Seven Mile operation incorporates a gas stripping function based empirically on monitoring data obtained over spill periods at Seven Mile Dam. This model was used to estimate TGP impacts from Seven Mile and all other facilities in a broadly distributed report prepared for the CRIEMP program. The equations used and dissolved gas levels entering Waneta Reservoir for the analysis presented in the EACA were predicted from this model which has been widely reviewed. EACA Background Report #5 incorporates the most recent 2004 monitoring data that were used to further develop the TGP production model at Waneta spillways. The report states: "The relative benefits of reducing TGP discharge by diverting flow through the powerplants with the new proposed expansion project are supported by this analysis." Consequently, we believe the analysis presented meets the standards for predicting TGP reduction effects from WEP. The analysis presented used a model based on a monitoring data base similar to that used in the Brilliant Expansion Project and the environmental analysis for the Arrow Lakes Generating Station.
l.	Likewise the amount and location of TGP data sets used to extrapolate future outcomes is not adequate to clearly assess impacts post expansion in the 2006 model. Additional monitoring and continuous automated datasets	As explained in Comment Ref "k", the current data set is adequate to predict the general impact of TGP on aquatic life as a result of WEP. Owner's Commitment #36 in the EACA states

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
	are required to verify that the new powerplant does not result in increased TGP. Unanticipated air entrainment is one factor to be assessed. Similarly, the existing TGP model needs to be recalibrated to account for potential changes in TGP formation because of the new tailrace location of the WEP.	that a TGP monitoring program will be conducted once WEP becomes operational to verify the WEP does not increase TGP and to obtain data to recalibrate the existing TGP production model. This will also ensure unanticipated air entrainment does not produced excessive levels of TGP.
Habitat Availability and Suitability		
m.	The Waneta Hydroelectric Expansion Project Approved Terms of Reference for Environmental Assessment Certificate Application 2004 requested a thorough assessment of the changes to aquatic habitat availability and suitability encompassing the Waneta Dam to the U.S. border, the Confluence, and the Columbia River upstream to the Fort Shepherd Eddy. Multiple sites historical datasets duration and frequency is inadequate to meet the initial goal. Baseline parameters capturing adequate water quality data to depict aquatic health within these areas are required pre-project. The number of measurements should reflect the annual and seasonal variation in all areas.	WEPC is uncertain as to the issue being raised in this comment. WEPC has conducted extensive modeling, field studies, and analysis that in our opinion, provides a thorough assessment of incremental project changes to aquatic habitat availability and suitability in the Project's TOR-approved primary aquatic study area. Baseline water quality data in the areas mentioned are monitored through the Columbia River Integrated Monitoring Program (CRIEMP) and provide an adequate baseline against which potential post-project project effects can be determined.
Waneta Reservoir Habitat Potential		
n.	No stocking of the Waneta reservoir has been attempted because of its very high flushing rate and low productivity (Ministry of Supply Services Canada 1991). The Waneta reservoir is oligotrophic due to the low phosphorus and nitrogen content. The low productivity, poor access and very low numbers of sport fish in the reservoir limit recreational potential. Temperature in the reservoir is well mixed, isothermal with high summer water temperatures. Temperatures up to 25 degrees have been measured below the dam. Elevated water temperatures are a limitation to potential fisheries habitat.	WEPC agrees with these statements. The elevated water temperatures do limit fisheries potential of the Waneta headpond and is a main factor limiting use of the headpond by species like rainbow trout.
Sedimentation (Contaminated Sediments):		
o.	The containment of metal-contaminated sediments within the work area is a concern. Monitoring and data assessment within the Waneta Hydroelectric Expansion Project EAC found all sediment sample concentrations exceeded the CCME criteria and BC Sediment Quality guidelines for arsenic, cadmium, lead	This concern is addressed in Comment Ref. #72. WEPC will comply with all regulatory requirements relating to removal of contaminated sediments from the forebay and will submit its detailed plans for excavation, remediation and monitoring to MOE as part of the approvals process for this specific work. WEPC will interact with the BC MoE, Land

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
	and zinc. One sample exceeded the CCME criteria and BC sediment quality guideline limits for mercury. Sediment sample sites were located in the Forebay as shown in Figure 3-2 Project Setting – Environment, Environmental Assessment Certificate Application Waneta Hydroelectric Expansion Project (2006). The potential for increased levels of suspended sediment to enter the Waneta headpond, the Pend d'Oreille River downstream of the Waneta Dam, and the Columbia River downstream of the Confluence (Waneta Expansion Power Corporation 2004) is an area of concern.	Remediation Section in Victoria as warranted in the course of planning and delivering this activity. The Contractor will be required to excavate all contaminated sediment necessary to minimize environmental impacts on fish related to the construction of the powerplant intakes. The Contractor will be required to place a layer of clean capping material over any remaining forebay sediments that could be potentially mobilized during post-construction powerplant operation. Monitoring will be conducted to confirm sediments are not mobilized.
p.	The potential for re-suspension of headpond sediments in the intake excavation area and the presence of heavy metals in these sediments is also a concern.	As discussed in Comment Ref. #74, WEPC has recognized that the disturbance of existing forebay sediments during intake construction, and subsequent powerplant operations, has the potential to re-suspend contaminants with possible adverse effects on fish and fish habitat. To address this concern, management of sediment removal from the Waneta forebay to avoid possible re-suspension will be undertaken in accordance with applicable prevailing standards. The sediments will be removed with a cutting-head and suction system specifically designed to avoid re-suspension during sediment excavation. EACA Background Report No. 11 provides more information on sediment removal.
q.	The proposed risk based approach by WEPC (2004), of sediment suspension on the downstream environment, is required. Likewise, specific procedures for removal, handling and disposal of potentially contaminated sediments should be implemented. The Waneta Expansion Power Corporation's commitment to adhere to Golder Associates (2005) recommendations to meet the aquatic component of the Remediation Plan for the metals-contaminated sediments in the Waneta forebay will aid in mitigating risk.	This comment relates to work already described in the EACA. See also Comment Ref #74 and Comment Ref "o" above.
Habitat Conservation and Restoration		
r.	A commitment to assess habitat throughout the construction phases and long-term cumulative effects of the project is required. Funds should be allocated to support conservation and restoration projects.	WEPC's commitments to monitor the effects, both direct and cumulative, of WEP construction on existing aquatic habitat are described in detail in the OERC (Appendix 9A of the EACA). Commitments to assess effects of project operations on potentially affected aquatic

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
		habitats are provided through a) the monitoring component of the shallow water compensation program and b) the monitoring/research program offered to investigate project related changes on white sturgeon habitats. If the agencies choose to use the funding offered for the latter program for research, then this would be a direct allocation to conservation and restoration of white sturgeon. A program to support terrestrial conservation and restoration programs is described in Section 6.9.2.
Explosives		
s.	The use of explosives within the project area should be selected to ensure no additional risks are presented to aquatic resources during blasting. Emergency measures methods should be established prior to blasting based on aquatic risk response procedures.	WEPC believes our impact avoidance and mitigation measures, using proven methods, represents everything reasonably possible to reduce the potential for harm to aquatic resources in the construction area during blasting. For example, the protection of sturgeon during blasting is addressed in Comment Ref # 92, 93, 94, 95,101,102, & 106 of the main response document. Section 9.2.3 of the EACA outlines the role of the Project Environmental Monitor (PEM). "Blasting having potential to harm fish, property or the public; and in-stream work having potential to harm fish" are specifically identified as high risk activities to be monitored. The intent of Appendix 9A D4.2(h) is to require the contractor to have his environmental staff monitoring the described in-stream work at **all** times. Procedures to address accidents and malfunctions that could affect aquatic and other resources are described in EACA Section 9.4.
Special Precautions for Listed Species		
t.	Additional precautions including Best Management Practices methodology to mitigate the risk to SARA identified species and habitat. COSEWIC species that are not yet listed under SARA should also be included. It is understood that white sturgeon are expected to be listed in the Kootenay Columbia water systems in the near future. Associated project plans should be circulated that illustrates how the project will address this likely possibility.	Our assessment provided in the EACA indicates a low risk to all listed species (both Provincially and Federally listed) from project operations. However, WEPC has committed funding for white sturgeon monitoring or research related to predicted project effects. Our analysis of potential effects of the project on white sturgeon was based on the assumption this species would be listed and therefore, WEPC feels it has addressed this possibility.

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
Valued Ecosystem Components		
u.	Valued Ecosystem Components are recognized as having additional sensitivity to activity in and surrounding their habitat. Additional monitoring during construction is required to mitigate risk.	WEPC considers that for all components of construction, the OERC objectives, criteria, and requirements will be sufficient to mitigate effects on VEC's to acceptable levels. In our opinion, monitoring programs proposed will be sufficient to identify if the processes implemented through the OERC are effective at avoiding or mitigating potential impacts.
v.	Emergency procedures response plans should be established to ensure adequate precautions are taken in times of unforeseen circumstances.	As above, the OERC provides the overall procedures for dealing with environmental emergencies and addressing any emergencies in the most appropriate way. Monitoring of terrestrial resources in active construction areas is included, with provision for immediate reporting of incidents that could cause harm.
w.	Post construction monitoring of cumulative effects should be incorporated into the monitoring outline. Funds should be allocated to ensure data is captured and analyzed post construction.	WEPC has proposed a series of post-project monitoring programs as outlined in Section 11.1.3 of the EACA. The Response to Review Period Questions and Comments provides further information on certain of the Owner's project impact monitoring commitments. Post-project monitoring by its nature will capture cumulative effects. Direct effects in most cases will be determined from comparison to baseline conditions. The monitoring referenced in WEPC's EACA and Response Document will be funded by WEPC.
Future ONA Participation		
x.	The Okanagan Nation Alliance has the professional fisheries and aquatics capacity to be involved in monitoring and evaluating different components of the project. The ONA would like to explore these opportunities with the proponent. It is also imperative that the Nation continues to be involved in any post-EAO approval processes and that CPC facilitates this requirement.	As stated in Comment Ref #10**,** WEPC will enter into discussions with the ONA regarding their internal expertise and will undertake to inform the ONA of any opportunities to provide environmental monitoring services, which WEPC may contract directly.

Appendix 3-3 – Response to Post-Review Period Comments from Ktunaxa Nation Council, Received September 22, 2006

[The following document was prepared by the Proponent]

Reviewer Reference: Ktunaxa Nation Council –
B. Green Letter of September 12, 2006

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
EACA Section Reference: 3.3.1 – First Nations Traditional Use and Resource Use		
a.	The anthropological perspective "Plateau Culture" could be used for people that had permanent structures and settled in an area because a resource could sustain the people for extended periods. There is a question as to how long the salmon in the Columbia River System could sustain an economy of a group to allow them to settle permanently in an area as is the way of coastal first nations. The Ktunaxa are better described as a Mountain Culture going where the resources were, hunting, fishing, and gathering roots taking on a more nomadic life style.	The term "Plateau Culture Area" in EACA Section 3.3.1 refers anthropologically to the patterns and lifestyle of the peoples historically occupying and utilizing the project area. Use of the classification system that identifies a "Culture Area" is consistent with standards adopted by North American anthropologists. The "Plateau Area" has been recognized as a distinct Culture Area since the early 1900s, as is discussed in Volume 12 of the Smithsonian Institution's Handbook of North American Indians. The distinguishing features of the Plateau include a reliance on a diverse subsistence base and riverine (linear) settlement patterns. These features are consistent with ethnographic descriptions of the individual tribes classified as Plateau, including the Kutenai, as set out in the Handbook.
b.	The word 'regalia' should be substituted for 'costume' in the description of the winter dances.	The fashion of dress is specific to the individual and is often representative of a private spiritual power. It is therefore, in our opinion, most respectfully described as a costume, and not regalia, which would suggest a greater uniformity and formality.
c.	The section quotes only Bouchard and Kennedy, other materials that need to be referenced are Turney/High, Olga Johnson and Claude Schaeffer among others.	EACA Background Report #7 (prepared by Bouchard and Kennedy) is a review of known and available background information, which includes numerous references to Turney/High, Olga Johnson, Claude Schaeffer and many others.
d.	The recording of 10 archaeology sites in the area shows that insufficient archaeological research has been done in the area.	The 10 archaeological sites in the general area are the only archaeological sites on record. In addition, WEPC's archaeological investigations and field reconnaissance did not locate any additional sites in the specific project area. There have, in fact, been several detailed archaeological studies in the immediate vicinity of the Waneta project but none have found [any] sites as outlined in EACA Background Report #8. The absence of archaeological sites in this area could be attributed a number of factors including low historical use by First Nations;

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
		sites destroyed by past development and/or natural forces.
e.	Furthermore, most of the hydro (and other) development occurred in the area before the Heritage Conservation Act came into force. Archaeology is only done when it may affect someone's development and not as research projects to answer questions and gather useful information.	This is correct. The first such Act came into force in 1960. However, there has been a considerable amount of archaeology carried out other than in the context of proposed or ongoing development. Nevertheless, no pure research archaeology has been carried out in the Waneta Project area.
EACA Section Reference: 3.3.3 – First Nations Interests		
f.	Water is essential for life making this resource valuable for survival and should be a benefit to the people and wildlife of the area and not only certain developments.	Comment acknowledged.
g.	Ktunaxa or other First Nations are not in an area for one specific resource but for other things such as berry picking, gathering medicines, fishing and hunting. The Columbia River was an important travel corridor for the Ktunaxa and other First Nations.	WEPC has recognized that the Ktunaxa may have traditionally exploited more than one resource in an area and would travel between resource areas. However, WEPC has received no specific evidence of the Columbia corridor adjacent to Waneta being used by the Ktunaxa.
EACA Section Reference: 6.7 – Effects on Archaeology Resources		
h.	Have any archaeological investigations been completed in the reservoir area when the water was at the lowest?	Yes, there was a comprehensive archaeological impact assessment project carried out within the Waneta pondage in conjunction with studies carried out in response to a proposed raising of the Waneta Dam a few years ago. At that time, the pondage was drawn down to normal pre-Waneta Dam levels in order to expose the original shorelines. This was done to accommodate the archaeological examination of these now inundated areas. WEP will not further impact the Waneta reservoir level.
EACA Section Reference: 6.8.1 - Impact Analysis		
i.	When the Waneta Dam was first built was Aboriginal Title and Rights considered or an archaeological study done? I think not, the construction of the dam could have destroyed archaeology sites and traditional use sites.	WEPC was not involved in building Waneta Dam in the 1950s and has no direct knowledge of whether aboriginal title and rights were considered or if any archaeological investigations were undertaken at that time.
j.	All dams have some affects on the fisheries and will continue as long as the dams are there (where are the salmon?).	Salmon were not present at Waneta Dam when it was originally built. Construction of WEP will not preclude installing fish passage at Waneta

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
		should salmon some day return.
k.	As mentioned before when dealing with traditional harvesting and use of plants or wildlife and current use we can not be site- or resource-specific; First Nations traditional use is following the resources (no boundaries). The resource may be plentiful in one area one year and sparse the next so a group may have to travel to other places. There are certain conditions that affect First Nations, including the abundances of various fish and wildlife populations, in turn affected by factors like weather and dams.	During the course of consultation with First Nations, no evidence was presented regarding specific resource use in the project area. However, as outlined in EACA Section 6.8.1, WEPC has concluded that the protective and mitigative measures presented will ensure there are no uncompensated residual effects of the project on any resources identified as being of general traditional interest to First Nations.
Fish Entrainment Mortality		
l.	Non sport fish are species just as important to the eco-system as sport fish and should not be written off because fisherman don't fish them. The study suggests bigger rainbow trout will survive the entrainment, what does this do for the age structure of the population?	The issue of fish entrainment was addressed in Section 7.3.2 of the EACA and the conclusion of the analysis provided was that for a given total flow, post-project fish entrainment mortality would be lower than pre-project entrainment mortality due to reallocation of the flows through the new powerhouse. Rainbow trout was used as an example to illustrate that the project would not result in an incremental increase in entrainment mortality. The species that would be most affected by entrainment are introduced exotics and entrainment of these species may have benefits as a food source to downstream fish species such as white sturgeon. On the basis of this information, the Fisheries Working Group, which consisted of representatives from the provincial and federal agencies and First Nations (including CCRIFC, the technical representatives of the KNC), reached consensus that entrainment from the project was not an issue that would require compensation. Information provided in EACA Background Report #1 indicates that Waneta headpond does not support a self-reproducing resident population of rainbow trout. Rainbow trout that are present in the headpond are either entrained from Seven Mile Reservoir or are members of the stocked population in Cedar Creek. In most years, these fish must leave the headpond in the summer since water temperatures at that time can exceed the upper lethal temperature limit for the species. Therefore, the age structure of the population that resides in the headpond on a seasonal

COMMENT REF. #	POST-REVIEW PERIOD COMMENT	WEPC RESPONSE
		basis is determined by summer water temperatures, which will not be affected by the WEP.
m.	Is there an age gap that could be detrimental to the survival of the rainbow?	See Comment Ref ”l” above.
n.	If only the older ones are surviving what is replacing the dead fish?	See Comment Ref ”l” above.

Appendix 3-4 – Response to Questions and Comments (Round 2) From First Nations and Government Agencies, September 29, 2006

[The following document was prepared by the Proponent]

WANETA HYDROELECTRIC EXPANSION PROJECT
Environmental Assessment Certificate Application

Response to Questions and Comments (Round 2)

From First Nations and Government Agencies

Waneta Expansion Power Corporation

September 29, 2006

Comment Ref #	WEPC August 31 Responses	Comment from	2nd Round Comments Received	WEPC 2nd Round Responses
Fish & Fish Habitat Impacts				
15	WEPC does not agree with the view that "there is considerably more uncertainty" about some of the potential impacts of the project than indicated in the EACA, particularly with respect to fisheries and aquatic ecosystem impacts. Notwithstanding, we have proposed a monitoring/research program that is intended to provide greater certainty. If the results of this program or other research determines that our analysis is incorrect and our project is determined to be having unforeseen negative effects on white sturgeon, we anticipate that agencies will require that WEPC address project effects at such time.	**KNC 9/18/06**	The EAC Application is confusing in this respect. Section 7.7.3 indicates that "…monitoring is unlikely to be effective in this case" and goes on to propose simply a contribution of $50,000 per year over 7 years for white sturgeon research. On the other hand, Appendix 11A (Owner's Commitments) indicates that "WEPC will undertake monitoring to confirm no Project-related effects on white sturgeon…."	Section 7.7.3 clearly states that WEPC's preferred approach for addressing uncertainties related to potential project effects on white sturgeon is to direct funding to research. That section also outlines the reasons why prescriptive monitoring is unlikely to be effective. The referenced commitment (Owner's Commitment #35) simply acknowledges that this research based approach might not be accepted and if this were the case, WEPC would commit to the development of a more traditional monitoring program that would focus on assessing the accuracy of our predictions of incremental project effects.
			In order to understand this commitment, We would like to see a detailed description of the proposed monitoring program, combined with a commitment as to the actions which would be taken by WEPC if the monitoring fails to confirm no Project-related effects.	As a decision has not yet been made as to which option will be selected, WEPC, does not see the value in developing detailed descriptions of monitoring programs that may not be required. If monitoring is the option ultimately selected, then WEPC will seek guidance from the UCWSRI Technical Working Group, Agencies and First Nations in development of a monitoring program.
		ONA 9/18/06	• <u>Amount of monitoring pre construction to determine possible impacts and post construction commitment to documenting aquatic protection</u>	As discussed in the above response, WEPC questions the value of providing detailed monitoring plans until such time as it is determined that monitoring is the approach required.

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			The ONA does not feel the WEPC response to reference 15 is adequate. "We have proposed a monitoring/research program that is intended to provide greater certainty. If the results of this program or other research determines that our analysis is incorrect and our project is determined to be having unforeseen negative effects on white sturgeon, we anticipate that agencies will require that WEPC address project effects at such time (WEPC, 2006)." The response does not confirm commitment to ensure the maintenance or enhancement of fisheries population or aquatic habitat. The ONA would like more details on the proposed monitoring and follow-up program. A copy of the expected monitoring outcomes and deliverables will help clarify this point. The ONA would like to see a preventative environmental action plan that uses precautionary limits to ensure fisheries populations and aquatic habitat are not impacted. The onus to detect procedures that could cause negative effects to the white sturgeon population should be completed by the contractor. The project should self regulate and report findings to regulating agencies and First Nations	WEPC believes that if the project receives the required regulatory approvals, then fisheries populations and aquatic habitat would not be negatively impacted and the concerns expressed by the ONA will be addressed in accordance to the laws and regulatory requirements in effect at that time.
16	In summary, the data provided in Appendix 1 supports WEPC's original assessment that those flows that result in a slight reduction of low velocity (<0.5 m./sec.) habitat within	**KNC 9/18/06**	Unfortunately, WEPC failed to undertake one-half of the required analysis. We requested that "This should involve additional model runs (all at non-WSFAP LLH flows) to determine the range of	WEPC believes that the analysis undertaken specifically in response to this issue plus the additional information and analysis completed for the EACA is sufficient to allow a reasonable

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	the eddy occur infrequently pre-project and will continue to occur infrequently once WEP is in operation.		Columbia River flows in which there are substantial losses of low velocity habitats within the eddy,…" We do not know, for example, there is a significant reduction in low velocity habitat area within the eddy at Columbia River flows between 2,000 and 2,500 m^3/sec, or indeed above this range. We note that, in November, for example, and considering the flow range between 1,500 and 2,500 m^3/sec., post-project frequency of minimum PDO discharge combined with these Columbia River flows is increased from 15% of the time to 23% of the time. *We ask that WEPC conduct the requested additional flow modeling to determine the range of Columbia River flows in which there are substantial losses of low velocity habitats within the eddy.*	assessment of impacts on reductions of low velocity habitats in Waneta Eddy. The size of the low velocity habitat area at the Columbia River flow of 2550 m^3/s (i.e. within the range requested in the Comment Ref. #16) and two Pend d'Oreille flows, 34 m^3/s and 708 m^3/s, was determined during a field survey conducted on 5 and 6 October 1996 as part of the assessment of flow impacts of Waneta Upgrades on low velocity habitats in Waneta Eddy. Data collected during this study (R. L. & L. 1997. Measurement of Low Velocity Habitat in Waneta Eddy: Columbia River) found that that the area of low velocity near-bottom habitat increased substantially (92%) when discharges from Waneta were reduced from 708 m^3/s to 34 m^3/s. As we have noted previously, the decrease in low velocity habitat in the Case 2 and Case 5 examples arises during low Columbia flows and reflects a jet of water overtopping the upstream bar and entering the core of the eddy. Higher Columbia flows provide greater depths in the eddy and in all cases examined, this greater depth results in higher areas of deep water low velocity habitat during flow reductions in the Pend d'Oreille River.

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18	The referenced data involve direct observations and measurements conducted during the low temperature winter period of concern (see also Comment Ref. #123). The reviewer's statement that "Velocity measurements where white sturgeon were not observed were on the periphery of the low speed core of eddy" obscures the fact that the area where sturgeon ***were*** observed was also on the "periphery of the low speed core" as shown in Figure 3.3 of the document referenced. This figure also clearly shows that measurements were taken in a variety of locations throughout the +15m depth zone where juveniles were not recorded. The statement the reviewer quotes from the Jiang and Fissel (2005) report was a general statement. The actual measurements of velocity provided in the report are more relevant to the issue than the model results. Measurement data indicate that at locations where sturgeon were found the mean velocity was 0.27 m/s (SD=0.12; range=0.08-0.55 m/s) compared to a mean of 0.3 m/s (SD=.11; range=0.07 to 0.49) where	**KNC 9/18/06**	A recent report (Golder 2006[1]) provides additional evidence regarding the apparent preferences of juvenile white sturgeon for low velocity (<0.5 m^3/sec) and deeper (in some cases > 15 m. depth) habitats. Indeed, the report notes the preference of juvenile WS for the hollows between dunes, possibly because of low velocity conditions between dunes in comparison to the tops of dunes. The figure actually shows a highly-clustered distribution of velocity observations, suggesting the possibility of inadvertent sampling bias (perhaps for low velocity conditions). The figure definitely does not show a random or stratified random sampling pattern which would be required to draw the proponent's conclusion that juvenile white sturgeon do not prefer low velocity (<0.5 m./sec.) conditions. For the reasons described above, we do not agree that the actual velocity observations are more relevant. The proponent does not provide any summary or analysis of the high frequency velocity variability within the low speed core of the eddy, nor suggest how We are to interpret time-averaged velocity data provided by the proponent.	General points for consideration are as follows: WEPC has received numerous comments from reviewers on the considerable data we have provided to address concerns related to potential changes in low velocity habitats used by white sturgeon. Many of the responses have focused on data or opinions to support that sturgeon use low velocity habitats. It was never WEPC's intention to suggest that juvenile sturgeon do not exhibit a high use for low velocity habitats and we recognize that Waneta Eddy provides this type of habitat. Our purpose was to provide a level of comfort that the likelihood of the project having a measurable effect on sturgeon use of the eddy was very low. We attempted to do this through a multiple lines of evidence approach similar to what is often used in other risk analysis where hard data is limited but decisions are required. In summary, we provided the following: • empirical and biological data that indicated the 0.5 m/s value used to assess project effects was conservative; • data to illustrate that the incremental frequency of

[1] Golder Associates Ltd. 2006. Upper Columbia River Juvenile White Sturgeon Monitoring: Phase 3 Investigations, August 2004 – February 2005. Report prepared for BC Hydro, Castlegar, B.C. Golder Report No. 04-1480-051F: 67 p. and 7 app.

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	sturgeon were not observed. These values are virtually identical and in fact, the range of values where juveniles weren't found is lower than where they were found. The reviewer's concluding statement does not take into account the findings of previous studies that shows the velocities in this area are not static as portrayed by the model but can vary substantially within very brief time periods (see Comment Ref. #123). The reviewer's assumption also ignores an equally valid hypothesis that it may be the depth that the juveniles are selecting. As video observations show, juveniles appear to use a variety of locations within the eddy that are within the >15m depth range in the eddy. Finally, if the KNC (CCRIFC) believes that "reductions in the aerial extent of these habitat conditions within the Waneta Eddy may be deleterious to juvenile white sturgeon growth and/or survival", it would seem appropriate they would also consider that the times when the real extent is increased by the project should provide offsetting benefits.		Without going into detailed reviews of the proponent's responses, it appears abundantly clear from a wide range of information sources that white sturgeon juveniles appear to prefer deep, low velocity habitat. It is also clear from video observations that the distribution of overwintering white sturgeon juveniles within the Waneta eddy is highly aggregated, even within deep (> 15 m.) low velocity (< 0.5 m./sec.) areas. Only a small proportion of the available deep, low velocity area appears to be used at any one time. This suggests that overwintering juvenile white sturgeon may be responding to other habitat variables such as food distribution.	occurrence of flows with the potential to reduce low velocity area was low; • biological assessments, based on available behavioral and population data, that support the likely effects of the predicted changes will be minor; and • information that shows the overall impacts of the project on low velocity habitat will be beneficial (see also Comment Ref. # 16 and 123). With regard to the latter point, WEPC would like to point out that throughout the review process, any evidence we have provided or any equally valid counter hypothesis we have suggested that indicates there are potential positive or offsetting effects of the project have for the most part, been ignored. WEPC believes that taken alone, the individual lines of evidence provided could be argued as insufficient to assess risk. When considered as a whole however, we believe the data support our assessment of low risks of the project to low velocity habitats in Waneta Eddy. WEPC stands by its assessment of this risk as described in the EACA and subsequent responses and does not see a resolution will be achieved by further debating the issue in

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				this format. However, if requested, WEPC is willing to discuss this issue in greater detail with the WEP Fisheries Technical Working Group.
19	"WEPC asserts that our original statement is factual and is supported by data collected since the release of the first juveniles in 2001 and by comparisons with juvenile growth rates and condition factors from other populations."	**KNC 9/18/06**	We agree that deep, low velocity overwintering habitat conditions are unlikely to be limiting, under current conditions, to the growth and survival of juvenile white sturgeon. However, a recent report[2] indicates: (i) that stocked juvenile white sturgeon are beginning to distribute themselves to other deep, low velocity areas as their numbers increase; and (ii) that the Waneta eddy remains a highly preferred overwintering habitat area, with 58 of 125 gillnet captures (46%) occurring in the Waneta eddy, and gillnet CPUE being 4 times higher in the Waneta eddy than the mean CPUE in other deep, low velocity areas sampled, and 3.6 times higher than the highest CPUE observed in any other deep, low velocity area.	See response provided in Comment Ref #18. We note the reviewer's frequent use of data that was collected and analysed by our fisheries consultant. This data was considered in our impact assessment analysis but like any data, some components, particularly those that involve fish behavior or responses to environmental stimuli are open to interpretation. WEPC questions how the data provided in Item i) contradicts our initial position (as described in detail in Items #5 & 6 of Comment Ref. #123), which essentially states that as the sturgeon age, they will seek other habitats with greater variability in physical attributes. We note that the reviewer's use of the term "low velocity" in this context does not mean <0.5m/s since actual near-bottom flow measurements in these areas were not conducted, and the term is used as a relative comparison to adjacent mainstem habitats. Regarding Item ii), as discussed in Comment Ref. #18, WEPC does not question the high use of the eddy by juvenile white sturgeon.

[2] ibid

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	"The reviewer's statement that these habitats 'will become limiting in the future with continued increases in the abundance of white sturgeon' if true, will likely be more a result of hatchery juveniles (which are determined by the Recovery Program) than any slight changes resulting from the project."		The proponents statement appears to ignore the fact that the stocking rates of hatchery juveniles are designed (by the Recovery Program), and are probably necessary to achieve a long term population recovery goal. The possibility that WEPC may impair overwintering habitat conditions is not likely to support any reasonable population recovery goal.	We are fully aware that stocking rates are selected by the recovery program and we are also aware these rates are (hopefully) intended to overstock rather than understock juveniles. If this objective is met, the logical outcome would be that habitats would become limiting as the numbers stocked exceeded the carrying capacity of the system. WEPC's intent was to point out that there are other activities currently ongoing that have a greater potential to elicit the same type of effect as the reviewer postulates would occur from WEP. We also note that given the reasonable probability that this will occur in the future as a result of stocking, there is a risk to WEPC that this effect could erroneously be attributed to the project.
21	"The data in Table 2-1 show that the vast majority of eggs are deposited downstream from the area that would be subject to the greatest effects of WEP operations (i.e., the areas noted in Cases 2 and 4 and illustrated in Figures 2-1 and 2-2).	**KNC 9/18/06**	Figure 2-1 in the appendix shows that the distribution of egg sampling mats is highly-biased to lower velocity, river margin areas. We believe the proponent's consultants would agree about the challenges associated with deploying and recovering egg mats from more central parts of the Pend d'Oreille River plume. Therefore, it is difficult to reach conclusions about the distribution of eggs within the areas most significantly affected by near bottom velocity reductions associated with night-time minimum WSFAP flows. However, we note that egg mat site SM56C4, which has	As we have pointed out in the past, the actual locations of the mats as shown on the figure vary in depth and location depending on a wide variety of factors. In some cases the mats are actually located substantially further off-shore than indicated on the map. We would encourage the reviewer to discuss this issue with our consultant to obtain a better understanding of the "bias" referred to. We question the validity of any analysis of project effects at the level of detail attempted in this response. Again we note

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			collected 56% of the total number of eggs collected between 2000 and 2005, appears to be at the margin of PDO- and Columbia-dominated flow conditions. We also note that this site is perhaps the most sensitive to velocity reductions due to reductions to 34 cms or 142 cms (WSFAP) Waneta discharges. In case 2, according to Table 2-3 in Appendix 2, near-bottom velocities are reduced by approximately ½ between pre-project (932 cms, <3.2 m/sec.) and post-project (34 cms, <1.6 m/sec) minimum flow conditions. Furthermore, according to figure 2-1, site SM56C4 actually appears to be above the water surface under 34 cms discharge conditions.	the figures provide a static snap-shot of a highly dynamic area and the locations of the mats are general and vary with discharges. Consequently, any attempts to quantify project changes will have large variances associated with any conclusion. For this reason, WEPC has not attempted to use this same approach to "quantify" the benefits of the higher daily flows that will result from the project, other than to state they may have offsetting effects. We do note, however, that this equally valid interpretation of general effects has never been discounted by any of the reviewers.
	"…the EACA committed to a program that would either fund monitoring to specifically examine project effects…"		We note again that no details are provided with respect to the monitoring proposed or required to specifically examine project effects. Therefore, it is difficult to determine the adequacy of the proponent's offer of $50,000 per year for 7 years.	See our response to Comment Ref. #15.
	"WEPC made this offer without prejudice, recognizing that if contrary to expectations, monitoring or other research programs indicate a definite negative impact on white sturgeon spawning success, recruitment, or recovery efforts, WEPC would expect that the agencies would use their regulatory authority to require WEPC to address project effects at such		The most likely 'regulatory authority' that would be exercised if monitoring or research programs indicate a definite negative impact are the critical habitat and allowable harm provisions of the federal Species at Risk Act. Both of these provide for consideration of social and economic factors in regulatory determinations. WEPC could be in a position to argue undue economic harm should low discharges be determined to be detrimental to white	Any negative impact to the Waneta Eddy or confluence area would fit the definition of a HADD which would require a Fisheries Authorization. WEPC is not seeking, and DFO has indicated it will not issue a Section 35(2) Authorization with respect to harmful alteration of sturgeon critical habitat (i.e. the Waneta Eddy and confluence areas). Economic factors are not specific criteria in the decision making process for the issuance of Fisheries

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	time."		sturgeon egg and larval incubation success. *Will WEPC specifically waive their right to oppose increased restrictions on LLH minimum flows based on economic harm, should monitoring or research programs indicate a definite negative impact on white sturgeon spawning success, recruitment or recovery efforts?*	Authorizations.
22	"2 – Flow velocities have a very substantial effect on capture efficiency for bottom dwelling species like sculpin that are very difficult to see and even more difficult to catch when sampling high flows at night."	**KNC 9/18/06**	We agree that, in general with boat electrofishing, there is a poor relationship between CPUE and abundance. This leads to the conclusion that the boat electrofishing results provide a poor indication of the relative abundance of bottom predators in the egg and larval incubation area. In the summary of Appendix 2, WEPC proposes that "Based on their burst swimming speeds, predators also may be able to access portions of the downstream egg deposition area (below SM56C4) under either pre- or post-project conditions." In case 2, and specifically for site SM56C4 and based on MSSS, pre-project velocities would exclude adult and age 1 rainbow trout, but rainbow trout would not be excluded under post-project LLH flows. (Walleye and sucker would be excluded	We concur with the reviewer's conclusion with regard to the relationship with boat electrofishing CPUE and abundance. Where the method does have value is in the capture of large numbers of fish that can be examined to obtain direct evidence of feeding habits. This was shown by the capture of 165 fish from the sturgeon egg incubation area and the documentation of only 3 sturgeon eggs in all stomachs combined. A key component of the original statement referenced was that predators also may be able to access "portions" of the downstream egg deposition area. This comment is accurate and was meant to illustrate that even under pre-project conditions, a portion of the incubating eggs are potentially vulnerable to predation. WEPC would point out that the conditions described by Case 2 typically occur prior to the sturgeon spawning period and

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			under both pre- and post-project conditions; unknown effects on sculpin spp.) In upstream areas like SM56C3, walleye, suckers and age 0 rainbow trout would likely be excluded by pre-project flows but not by post-project LLH flows (unknown effects on sculpin spp.) We agree with WEPC's observations (3 and 4) that potential egg predators are unlikely to be in the area specifically to feed on sturgeon eggs; however, We disagree with the implication that incidental predation on white sturgeon eggs is necessarily inconsequential for white sturgeon egg or larval survival and subsequent recruitment.	these conditions would only occur in June and July in low flow years. Case 4 is considered to be a more representative depiction of project effects during the latter part of the sturgeon spawning period. WEPC acknowledges the reviewer's agreement with observations 3) and 4). On that basis and based on the available information on egg predation rates we provided, WEPC does not see any evidence to support that incidental predation on white sturgeon eggs as may be affected by the project (either positively through higher HLH flows or negatively through more frequent LLH WSFAP flows) is necessarily consequential for white sturgeon egg or larval survival and subsequent recruitment. As indicated previously, WEPC stands by it's assessment of this risk as described in the EACA and subsequent responses and does not see a resolution will be achieved by further debating the issue in this format. However, if requested, WEPC is willing to discuss this issue in greater detail with the WEP Fisheries Technical Working Group.
23	"The modern recruitment failure in the upper Columbia River white sturgeon population coincided with the construction since 1968 of three large	**KNC 9/18/06**	We note that coincidence is not necessarily indicative of causation (although Columbia River flow regulation and associated effects are probably some of the principal causes	WEPC notes that although the cause(s) of recruitment failure is still unproven, our position is based on a most likely hypothesis approach (i.e., the most

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	Columbia River mainstem dams."		of white sturgeon recruitment failure);	obvious reason is most likely the real reason).
			also that 1968 approximately coincides with the commencement of Boundary dam load-shaping and consequential downstream flow variability (particularly prior to completion of the Seven Mile Dam).	WEPC appreciates the potential implications of this coincidence but as stated in past discussions and correspondence, has not encountered any evidence to indicate any other causal links to recruitment failure. Regarding the point referenced, it would seem reasonable that if recruitment failure was related to the onset of Boundary block loading, that following re-regulation by Seven Mile Dam, some recruitment should have occurred. In addition, as we have pointed out in previous submissions, regulation of the Pend d'Oreille River has resulted in minor changes to the hydrograph (relative to the Columbia River) and that the main changes occur in the latter part of the spawning period. Most significantly, in every year since regulation, there have been flows in the system for a portion of the spawning period that are within the range of pre-Boundary flow conditions when recruitment was occurring. None of this information has been challenged or refuted during this review which leads to our equally valid conclusion that in this case coincidence is even less indicative of causation.
	"Until such time as any sub-structuring of the population is		We agree; therefore, we cannot draw conclusions with respect to the relative	The reviewers point was initially based on the premise that the population was sub-structured and some preliminary analysis

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	verified, WEPC asserts there is little point in conducting the analysis suggested."		contributions of PDO and Columbia River flow regulation to recruitment failure as the proponent suggests.	had suggested that recruitment failure for the lower population may have occurred later than that for the Keenleyside sub-population. Now the point seems to be that that our analysis is flawed until sub-structuring is proven. This ignores the very real possibility there is no sub-structuring of the population.
24	"Based on data collected since 1993, 77% of spawning has occurred by July 10, which indicates the main block loading effects of the project will occur well past the peak spawning and egg incubation period."	**KNC 9/18/06**	Additional information has subsequently been provided by the proponent (graph entitled 'Flows from Waneta (Simulated) based on Flows from Boundary (Actual) Pre-project and Post-Project – 1991-99 Avg with 8-16 blocking (post-freshet period). This additional information indicates: (i) on average, daily load shaping would start on June 26th under post-project conditions and on July 13th under pre-project conditions; and (ii) (as indicated by the proponent), daily shaping to WSFAP minimums would commence on July 10th under post-project conditions and on July 20th under pre-project conditions. Assuming a 10 day egg and larval incubation period, the data presented do not support WEPC's contention that even main block loading will occur well past the peak spawning *and egg incubation period.* On average, fully half of annual the eggs deposited could be expected to be exposed to WSFAP minimum flows under the post project condition.	The additional information provided by WEPC showed post-freshet block-loading under Pre-Project and Post-Project conditions. However, WEPC re-emphasizes that Post-Project flows are a result of Boundary flow-through at all times, modified only as required to provide WSFAP flow protection. Additional graphical information can be made available to aid the KNC in their understanding of this reality. At the water temperatures generally occurring at this time, incubation to hatch would be more like 5-6 days. Half of the eggs deposited are not expected to be exposed under post-project conditions.

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25	"Despite this range of conditions, recruitment has rarely occurred which to us suggests the mechanism limiting recruitment is not related to Pend d'Oreille flow."	**KNC 9/18/06**	This statement indicates WEPC's view that there is only one mechanism limiting recruitment, and discounts the possibility of several interacting and cumulating mechanisms. As indicated by WEPC, recruitment to the juvenile population has indeed occurred (albeit rarely), as evidenced by 5 wild sturgeon captured in juvenile sampling in 2004[3]. These small numbers of captured wild juveniles, by rough estimation, are indicative of pre-2001, 2001 or 2 and 2003 brood productions of 100 to 200 wild fish.	WEPC is unsure as to how this information was derived or of its relevance to the assessment of project effects.
	"No WEP "suspect effects" have been identified that would warrant adaptive management."		This data suggests that exact determination of the ages of these fish followed by an analysis of PDO and Columbia River flow conditions pertaining in the brood years might be instructive with respect to the relative effects of PDO and Columbia River flow conditions on white sturgeon juvenile recruitment.	WEPC notes that given the available state of knowledge on white sturgeon ageing, it is difficult if not impossible to provide an "exact determination" of the ages of these fish. That said, we understand that some very preliminary analysis of ages of these wild fish by members of the TWG suggest they originated years with very high flow in both the Pend d'Oreille and Columbia Rivers (such as the record high flow year in 1997) or from years with high sustained flows in the Columbia River the summer period. None of these analyses has suggested any relationship of recruitment with daily flow variability in the Pend d'Oreille River.

[3] ibid

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	"The funding WEPC is committing for monitoring and/or other sturgeon research is expected to provide increased confidence in WEPC's analysis. If….sturgeon may be negatively impacted by Boundary flow-through, then WEPC accepts that regulatory agencies will use their authority to modify the operations of WEP and other operations on the Canadian Pend d'Oreille as may be required."		Given our preceding comments, we believe there is significant uncertainty about the potential effects of increased duration and magnitude and earlier inception of post-freshet load shaping (including WSFAP minimum flows) on predation on white sturgeon eggs and larval. WEPC is essentially proposing an adaptive management program, with the onus on researchers and subsequently regulators to prove an impact and then enforce appropriate flow restrictions. This is not a precautionary approach considering the (now confirmed) endangered status of this white sturgeon population. In our view (as proposed in our proposed	The precautionary approach refers to not proceeding with actions where there is a risk of serious or irreversible harm if there is a great degree of scientific uncertainty associated with the impacts of the action. Given that there is no significant successful recruitment of under current conditions, it is hard to understand how proceeding as proposed by WEPC will result in lower surgeon recruitment rates than already is the case. The sturgeon hatchery program is designed to compensate for the lack of natural recruitment. If in the future, a way is found to achieve successful sturgeon recruitment and flows associated WEP operations are found to inhibit this recruitment, then changes can be made to the flow management (i.e. WEP operations are not irreversible). Therefore WEPC believes its commitments are completely consistent with the precautionary approach as is appropriate to the endangered status of white sturgeon. The reviewer is essentially proposing an adaptive management program where every project change is assumed to be detrimental and which puts the onus on WEPC to definitively prove that it is not before the change can be made. As noted below, the studies suggested by the reviewer as a means to assess the changes of interest have a very high likelihood of providing inconclusive or

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			wording of Owner's Commitment #35), the onus should be on WEPC to adhere to pre-project flow conditions (no load shaping until daily average PDO discharge falls below 932 cms; no load-shaping beyond that possible with 932 cms discharge capacity) until the proponent demonstrates, at the 90% probability level, that: (i) the abundance and/or distribution of potential egg predators within the egg deposition zone is not affected by LLH v. HLH discharges; and (ii) the predator distribution and abundance is not changed between the sturgeon egg and larval incubation period and the remainder of the year.	false positive results. Based on information obtained by our consultant during 15 years of research on the Columbia River, WEPC feels there is an absolute certainty that the abundance and/or distribution of egg predators as measured by any methods we can use to sample them, will change from hour to hour and day to day even under steady state conditions. As a result, WEPC considers that a 90% level of confidence is totally unreasonable for this metric.
27		**KNC 9/18/06**	We agree with WEPC's general argument of 'parallelism' in habitat changes. However, this does not give us any information on which We can base a determination of the relative magnitudes of the Canadian (predicted) and US (unpredicted) habitat changes. *We again request information (e.g. representative river cross-sections) which would allow a determination of the relative magnitudes of the Canadian and US shallow water habitat changes.* This is important for the determination of appropriate habitat compensation objectives and targets.	The requested information (representative cross-sections) is quantitative data which is beyond the scope of the Approved Terms of Reference for the project. Habitat compensation is a requirement to comply with DFO policy which applies to habitat losses within Canada.
28		**KNC**	We appreciate the additional information provided and concur with the proponent's	Comment acknowledged.

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		9/18/06	conclusions.	
29		**KNC 9/18/06**	We appreciate the additional information provided and concur with the proponent's conclusions.	Comment acknowledged.
30	"WEP is being proposed and designed to utilize the un-utilized energy component in the blocked flows entering Canada from Boundary Dam in the US…..Accordingly, except in extraordinary circumstances, the contribution of flow impacts from the Pend d'Oreille River in the transboundary region of the Columbia River will be effectively the result of operations on the Pend d'Oreille upstream in the United States.	**KNC 9/18/06**	The proponent accurately describes their flow management proposal and the underlying economic factors. This means that the incremental flow variability is a proposal of the proponent as opposed to an unavoidable consequence of upstream dam operations.	WEPC does not agree with the KNC's view on this issue. The EACA describes anticipated system operations which are the result of a great number of factors and decisions by other parties, the primary one being the flow release pattern of upstream facilities.
32	"The fish compensation program will be developed to satisfy the requirements of the project Fisheries Authorization. WEPC is conducting an analysis of potential compensation sites so that sufficient detail can be provided in the Fisheries Authorization application."	**KNC 9/18/06**	We were advised by a DFO representative during the Sept. 5th meeting that details on the fish compensation program will be required to complete Canadian Environmental Assessment Act comprehensive study requirements. Based on the unproven effectiveness of the Brilliant Expansion Project fish habitat compensation program, and considerable experience with ineffective habitat compensation programs, the Ktunaxa Nation cannot support WEPC in the absence of compensation feasibility information which would indicate a high probability of success of any shallow water habitat impact compensation program.	WEPC will provide a conceptual design for shallow water habitat compensation.

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33		**KNC 9/18/06**	We appreciate the additional information and clarification provided and generally concur with the proponent's analysis, although not with the suggestion that First Nations should be expected to contribute to passage restoration for anadromous salmon.	Comment acknowledged.
34		**KNC 9/18/06**	We appreciate the additional information provided and concur with the proponent's conclusions	Comment acknowledged.
Cumulative Effects Assessment				
35	WEPC notes that there are many factors that "may" contribute significantly to recruitment failure. However, there is no evidence to support the reviewers hypothesis that egg mortality contributes measurably to sturgeon recruitment failure or that there is "excessively high levels" of egg mortality. The further hypothesis that these levels of mortality "may well include" seasonal and daily load shaping from the Pend d'Oreille River is also unsupported. The hypothetical conjecture that the increased frequency of low LLH discharges "may" contribute, in a cumulative impact recruitment failure model, is not supported by any data or analysis that we are aware of.	**KNC 9/18/06**	Available information strongly indicates that the factor or factors causing white sturgeon population recruitment failure occur between spawning (successful) and age 1 (estimated 34% survival in year 1 and 77%+ survival in subsequent years.) Therefore, recruitment failure is likely related to factors affecting the success of egg and larval incubation and/or subsequent subyearling survival. The Upper Columbia white sturgeon Technical Working Group has been unable to further refine the life history period in which recruitment failure occurs. Therefore, factors effecting egg and larval survival remain highly probable causes of recruitment failure.	WEPC concurs that the recruitment bottleneck likely occurs in the early life history stage of white sturgeon. However, based on the following, it is our view the bottleneck most likely occurs at the early larval stage and is not related to egg predation as influenced by block loading patterns of Boundary Dam. Since the initiation of block loading in the Pend d'Oreille system in the late 1960s, there have been significant periods of time in virtually every spawning season where the system has not been subject to daily flow regulation. During these periods, flows in the egg incubation area have been within the range experienced during pre-Boundary conditions, when based on the reviewer's implication, suitable recruitment occurred due to increased protection of eggs from predation. The absence of any

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				appreciable recruitment from spawning events during those flow events that were not affected by Boundary load factoring (and which likely encompassed the majority of spawning events that have occurred in the system since the late 1960s) indicates the recruitment bottleneck is not related to flow effects on egg predation. In our view, the only way that daily flow fluctuations could be linked to recruitment failure due to flow effects on egg predation, is to assume that all of the pre-Boundary recruitment occurred during the latter part of the spawning period (i.e., the portion of the spawning period affected by post-Boundary block loading). This is unsupported by any data we are aware of and also would contradict basic adaptive survival mechanisms that are gained from the distribution of spawning events over a two month time frame. Further, water temperatures often exceed favourable developmental ranges during the latter portion of the spawning period and flow in the Pend d'Oreille is naturally declining. These factors would suggest that if successful recruitment had any seasonal relationship, it would likely favor earlier spawning when flows and temperatures were near optimal. Based on this and other supporting data WEPC has provided in the EACA and previous correspondence, we continue to believe the recruitment bottleneck is related to post-hatch larval survival, which to our understanding occurs in the

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				mainstem Columbia River where the most significant changes to flows and water clarity over the entire sturgeon spawning period have occurred.
36	"A suggestion that we will be able to quantitatively detect a significant change in post-project egg predation rates and then link this change to recruitment failure is, in our assessment, extremely improbable."	**KNC 9/18/06**	We agree that it will not be possible to quantitatively detect a significant change in post-project egg and/or larval predation rates. However, as proposed in our amended version of Owner's Commitment #35, it should be possible to determine if there is a reasonable probability that egg or larval predation rates may be increased by the increased frequency and magnitude, and earlier inception of post-freshet load flow shaping.	Comment acknowledged. The development of specific monitoring or research programs would be best developed through discussions with the WEP FWG and the UCWSRI Recovery team as proposed for our research or monitoring program. We note, however, that a 90% probability level as suggested in Comment Ref #25, is not what we would consider a "reasonable" probability based on biological systems and indirect effects assessments.
40	"The 10 km reach is the approximate distance from the U.S. border to the full pool level of Lake Roosevelt. Full pool is achieved during the summer period when much of the minimum flow reductions from Boundary flow-through will occur."	**KNC 9/18/06**	According to figure H-1 in the Background Report ('Pre- and Post- Project Modeled Flows…'), the reduction in productive habitat area on the Canadian side of the border occurs on average (1991 – 1999 reference period) from mid-February through July and again from mid-October through November. In the absence of any information on the rate of attenuation of daily flow changes, we assume that the length of the affected reach in the US is longer than 10 km. in the spring and fall, outside of the full pool period for Lake Roosevelt.	Comment acknowledged.

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Owner's Commitments				
45	"Background Report #6 dealing with fish passage was written by an expert consultant with experience in the area of fish passage on the Columbia River."	**KNC 9/18/06**	We appreciate the analysis undertaken with respect to future fish passage in relation to the Base Concept. Our request is that the analysis should be revisited only if the Project Concept differs significantly from the Base Concept.	Comment acknowledged.
56	"Any possibility, once WEP is in operation, of having to revert to current 'pre-project flow conditions' by re-regulating Seven Mile Reservoir, would have impacts well beyond WEPC's commitment to maintaining existing WSFAP flows and would have serious economic implications for WEP....We do agree however, (see Comment Ref. #25)….regulatory agencies will require specific and appropriate operational changes that may affect all Pend d'Oreille operations."	**KNC 9/18/06**	See our comments on Ref. #21. The proponents argument precisely underscores our concern that they will argue serious economic harm should regulators, based on scientifically defensible information, seek to reduce spawning and incubation period flow variability pursuant to the 'Critical Habitat' provisions of the federal Species at Risk Act. This is why we have requested that the proponents specifically waive their right to argue economic harm in the event that monitoring information or research results indicate a need to reduce flow variability.	As stated elsewhere, any negative impact to the Waneta Eddy or confluence area would fit the definition of a HADD which would require a Fisheries Authorization. WEPC is not seeking, and DFO has indicated it will not issue a Section 35(2) Authorization with respect to harmful alteration of sturgeon critical habitat (i.e. the Waneta Eddy and confluence areas). Economic factors are not specific criteria in the decision making process for the issuance of Fisheries Authorizations.
57	"The development of evaluation criteria and compensation alternatives cannot be finalized until a preferred option has been selected. Such information will be included in the compensation proposal to be submitted as part of the Fisheries Authorization application."	**KNC 9/18/06**	See our comment on WEPC response #32. We understand that the information is required for the CEAA Comprehensive Study conclusions, and not just for the Fisheries Act Authorization.	WEPC will provide a conceptual design for shallow water habitat compensation.

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58	Owner's Commitment #35.	**KNC 9/18/06**	Suggested rewording of Owner's Commitment #35. *Until a monitoring program demonstrates that predation on white sturgeon eggs and larvae is unlikely (at the 90% probability level) to be increased by the increased magnitude and earlier inception of daily flow shaping which WEP enables, WEP will be operated without daily block loading or flow shaping from June 15th until daily average flows fall below 932 cms.* *The monitoring program will include 3D telemetric tracking of potential egg predators to determine if the abundances of predators within the egg and larval incubation area is increased: (i) during LLH hours in comparison to HLH hours; (ii) at 932 cms WAN discharge in comparison to 1,472 cms WAN discharge; and (iii) during the incubation period in comparison to before and/or after this period.* *The monitoring program may be undertaken in part prior to the commencement of WEP operations.*	The proposed re-wording is not consistent with, nor justified by, the extensive analysis of potential project effects on this resource that has been conducted for the EACA. WEPC believes that the suggested rewording is unreasonable and unacceptable.
60	Education of all workers on site relating to the identification of possible archaeological materials is an integral element of the OERC's Environmental Training and Awareness referenced in EACA Appendix 9A.	**KNC 9/18/06**	BC Archaeology Branch procedures are inadequate with respect to consultation with First Nations, which is why We requested a specific commitment by WEPC to consult with First Nations should archaeological materials be found.	In addition to meeting Archaeology Branch requirements, WEPC will consult with First Nations should archaeological materials be found during the course of project construction.

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	Procedures with respect to the finding of archaeological materials are prescribed by the BC Archaeology Branch.			
Contaminated Sediment				
71	Sediment control during both project construction and operation will be undertaken in accordance with applicable prevailing standards as specified in OERC Section D. (Water Quality Protection) and the Environmental Management Program for Operations. The velocity of flows in the tailrace below Waneta Dam and the dilution effect of the Columbia River at the Columbia Pend d'Oreille confluence will abate any aquatic habitat effect of any fugitive sediments passing through the dam.	**ONA 9/18/06**	• <u>Sedimentation and aquatic protection during construction (Reference 71)</u> Reference 71 on page III-4 WEPC addresses sedimentation questions. The ONA questions the WEPC response that "the velocity of flows in the tailrace below Waneta Dam and the dilution effect of the Columbia River at the Columbia Pend d'Oreille confluence will abate any aquatic habitat effect of any fugitive sediments passing through the dam". Due to the content of the sediment cores and the location, additional monitoring and contingency plans should be provided to address this scenario.	The only known sediments that could potentially be of concern to aquatic life are the contaminated sediment identified in the forebay area. These sediments will be removed in advance of the main intake construction activity. Contaminated sediment removal will be closely monitored in accordance with the criteria and requirements of the OERC. The downstream water quality monitoring program will be on-going for the duration of construction after sediment removal, a period of around 3 to 31/2 years. The water quality criteria for the Project supported by the required monitoring will provide a very clear indication of the potential for damage to aquatic life by any re-suspended metal contaminants. WEPC is confident that, with the controls in place through the OERC, construction will be completed without harm to aquatic life. Water quality monitoring will continue through the commissioning phase of the Project (when the turbines are first operated) and during that time the success of the overall contaminated

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			An outline on how the project will implement and abide by the standards specified in OERC Section D should be provided.	sediment removal and/or blanketing work will be assessed. Construction water quality monitoring will continue during this phase and the same water quality criteria and requirements will apply as for other construction activities. The methodology for implementing and abiding by the standards specified in OERC Section D are contained in Section D itself and specifically in Section D8, Water Quality Monitoring. Further details relating to this methodology and requirements relating to enforcement of the OERC are covered in OERC Section A and are further described in Section 9 of the EACA.
72	WEPC will comply with all regulatory requirements relating to removal of contaminated sediments from the forebay and will submit its detailed plans for excavation, remediation and monitoring to MOE as part of the approvals process for this specific work. The EWP describing the methodologies that will be applied will form the basis of this submission. It will include the protection of water quality and fisheries values together with information on the management of remaining sediments, as requested. WEPC will interact with the BC MoE, Land Remediation Section in Victoria as warranted in the course of planning and delivering this	**ONA 9/18/06**	• <u>Sedimentation and aquatic protection during construction (Reference 72)</u> Although the extent and magnitude of the contaminated sediments both in the construction zone and the forebay (Reference 72) were not monitored ONA would like the WEPC to change the commitment from: "The Contractor will be required to excavate all contaminated sediment necessary to minimize environmental impacts on fish related to the construction of the power plant intakes." To: "The Contractor will be required to excavate all contaminated sediment	WEPC notes that protection of fish and aquatic habitat is already explicitly included in EACA Commitment #17.

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	activity. The Contractor will be required to excavate all contaminated sediment necessary to minimize environmental impacts on fish related to the construction of the powerplant intakes. The Contractor will be required to place a layer of clean capping material over any remaining forebay sediments that could be potentially mobilized during post-construction powerplant operation. Monitoring will be conducted to confirm sediments are not mobilized.		necessary to ensure no environmental impacts to fish and aquatic habitat are related to the construction of the power plant intakes." In addition to this, the WEPC commitment to monitor to confirm sediments are not mobilized should include the confirmation that sediments are not impacting fish and aquatic habitats during construction or post construction.	See Comment Ref # 71 above.
73	Environment Canada's understanding and comments are consistent with those of BC MoE (see Comment Ref. #72., above) Monitoring will be undertaken at the start of powerplant operations to confirm that no forebay sediments left unremoved during intake construction are mobilized by powerplant operations (see Comment Ref.#72.)	**ONA 9/18/06**	• <u>Sedimentation and aquatic protection during construction (Reference 73)</u> The ONA supports Environment Canada's request for an evaluation of the risk from remaining exposed sediment following dredging to be completed. In addition to WEPC's commitment to conduct monitoring at the start of powerplant operations, the WEPC should conduct monitoring post construction at representative hazard locations and time periods when potential scouring of sediment in the forebay could occur. This will aid in confirming the capping is fulfilling the requirement to protect sedimentation from impacting aquatic habitat.	Any risk from remaining exposed sediment following completion of dredging will be dependent upon any re-suspension during operations. As noted in WEPC's original response, WEPC will undertake post-construction monitoring to determine if remaining sediments are being mobilized and address it in the highly unlikely event it occurs. Existing powerplant operations at Waneta do not mobilize the exposed sediments that currently exist.

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74	WEPC has recognized that the disturbance of existing forebay sediments during intake construction, and subsequent powerplant operations, has the potential to re-suspend contaminants with possible adverse effects on fish and fish habitat. Management of sediment removal from the Waneta forebay to avoid possible re-suspension will be undertaken in accordance with applicable prevailing standards. The sediments will be removed with a cutting-head and suction system specifically designed to avoid re-suspension during sediment excavation. The EWPs that relate to this work will be carefully reviewed with respect to constructability and compliance of proposed methodologies with the OERC which includes all the objectives, criteria and requirements relating to the work. In addition, the work will be carefully monitored during execution for compliance with the OERC. The timing of this work, flow patterns and flow velocity will be important considerations in the planning process. The work will of necessity be done during periods of low flows and a comprehensive monitoring program will be implemented for the detection of sediments that may be released from	**ONA 9/18/06**	• <u>Sedimentation and aquatic protection during construction (Reference 74):</u> The WEPC's commitment to provide details of the methodology to be employed to ensure that there are no possible adverse impacts to fish and aquatic habitat from the disturbance of forebay sediments in the EMP is of interest to the ONA. Please include the ONA on the list of recipients of this information.	The ONA will be included on the list of recipients of this information.

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	the operation. Among other measures that may be implemented to contain sediment in the event of an emergency, some or all generation at the existing powerplant could be stopped and flow could be transferred to spillways, on the other side of the river. Particular methodologies to be employed will be identified as part of the relevant EWP. EACA Background Report # 11 provides more information on sediment removal.			
Transportation Considerations				
75	The Waneta-Nelway Road will be closed through the powerplant worksite for the duration of project construction. Per OERC Section B4.1(c), the Contractor will be required to allow public use of the closed portion during emergencies. Such emergencies would include avalanches and rock falls on Seven Mile Dam Road.	**MoT 9/21/06**	Adequate	Comment acknowledged.
76	WEPC, who had rights from Teck Cominco to the Columbia Gardens Pit area, has agreed to MoT acquiring this land from Teck Cominco. WEPC will retain the right to use Columbia Gardens Pit and, at the request of MoT, will provide not less	**MoT 9/21/06**	We would appreciate meeting with WEPC and the D-C contractor to clarify and come to terms regarding potential hauling costs and road usage prior to exporting of excavated materials off the work site.	WEPC will arrange for this to occur at an appropriate time.

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	than 230,000 m^3 (bulked) of excavated rock for storage at Worksite D1 (Columbia Gardens Pit). Implications related to any incremental haulage costs and road usage may be subject to further discussion between WEPC, the D-B Contractor and MoT.			
77	OERC Section B4.1 (f) specifically addresses construction site entrances and the need for the Contractor to consult with, and obtain the necessary permits from MoT. Pre- and post-construction surveys will be done by the Contractor as required on roads it will use in the general area of the site. This is specifically intended to cover those portions of Highway 22A where the Contractor elects to use off-road vehicles for the haulage of excavated materials. We note that other heavy truck traffic uses Highway 22A to the north of its intersection with Seven Mile Dam Road.	**MoT 9/21/06**	We would appreciate meeting with WEPC and the D-C contractor to clarify and come to terms regarding potential hauling costs and road usage prior to exporting of excavated materials off the work site.	WEPC will arrange for this to occur at an appropriate time.
78	WEPC acknowledges MoT's agreement in principle to the crossing of its lands by the transmission line in the vicinity of Camel Pit subject to MoT agreement with the detailed design drawings for the line.	**MoT 9/21/06**	Adequate	Comment acknowledged.

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79	WEPC will require the Contractor to maintain a minimum single lane road (Waneta-Nelway Road) suitable for use by the public on any occasion when the closed portion of the Waneta-Nelway Road has to be opened up for emergency use by the public. OERC Section B4.3 requires the Contractor to prepare a Traffic Management EWP (Environmental Work Plan). All of the concerns noted by MoT will be covered in that EWP. The intent of the approvals process is that Agencies review and endorse (and/or comment on) the approved objectives, criteria and requirements contained in the OERC. As described in Section 9.2.2.2 of the EACA, EWPs are intended to be adaptive plans that can be changed if site conditions or work methodologies change; the OERC will not change. EWPs by definition must meet OERC objectives, criteria and requirements. Therefore, it EWPs will not be forwarded to Agencies for review and approval; they will only be submitted for information if specifically requested. The OERC requires the Contractor to consult and work with MoT in obtaining all required permits and	**MoT 9/21/06**	Adequate	Comment acknowledged.

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	approvals. All arrangements for the accommodation of construction traffic, additional signage, and the like will be described in the Traffic Management EWP. Although the Traffic Management EWP required prior to mobilization on site may not address all issues relating to traffic that will be encountered during construction, it will contain all of the critical construction-related traffic flow provisions and, as such, can form a basis for pre-construction review by MoT. The Ministry's continued involvement in working with WEPC to identify and address any impacts to the highway system is valued and appreciated.			
Fish & Fish Habitat Impacts				
97	WEPC acknowledges that follow-up programs to verify our assessments of these potential effects will be required. To that end, WEPC will prepare aquatic monitoring plans for review as a component of the Fish and Fish Habitat Mitigation and Compensation Plan: a) Verification that shallow water habitat productivity losses from proposed flow-through operations will recover within the time periods modeled.	**ONA 9/18/06**	• <u>Importance of follow-up monitoring to assess the aquatic habitat effects from the Project (Reference 97)</u> ONA requests a Follow-Up program to clarify the uncertainties on effects to fish populations. The ONA would like to see a focus on indigenous aquatic species population response and habitat availability to the Project. This work should be in addition to WEPC's commitment # 35 (Appendix 11-A). A follow-up program is a crucial part of the Project's commitment under CEAA to conduct a comprehensive	Other than the uncertainty related to potential project effects on sturgeon habitats and potential stranding related effects, WEPC's analysis does not indicate other indigenous populations will be negatively affected by the project. The uncertainty related to sturgeon will be addressed either through contribution to a

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	This will be accomplished through the use of information obtained in the upcoming research program related to PAC monitoring requirements for the Brilliant Expansion Project. b) Verification that stranding/ shallow water habitat losses from proposed flow-through operations are not affecting listed species populations that may be present in the area. WEPC anticipates this can be accomplished through field programs and information gathered during past and ongoing stranding experiments conducted on the Columbia River. c) WEPC continues to believe juvenile usage of the eddy will not be adversely affected by the project and provides additional support for this position in Comment Ref. #123 d) Additional information on potential project effects on predation of white sturgeon eggs has been provided in Appendix 2 that shows the vast majority of eggs incubate in areas outside the main		study on the effects to aquatic life. ONA is particularly interested in the WEPC's commitment to conduct field programs and continue to gather information on fish stranding and aquatic habitat impacts from water level draw down. The information obtained from this monitoring should be presented as to best mitigate negative impacts to fisheries populations and aquatic habitat through alterations by hydroelectric power generation operations.	research program or development of a monitoring program. WEPC can provide the ONA with a copy of post-project monitoring reports on fish stranding. Practices to best mitigate fish stranding are dealt with by CPC and other hydro facility operators through the Columbia Operations Fisheries Advisory Committee (COFAC). The ONA should contact the COFAC chairperson if it wishes to get involved in these issues.

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	influence of flow-through effects. If despite this information, the agencies still are of the opinion there is substantial uncertainty regarding project effects, WEPC can develop a conceptual monitoring plan if requested, as a component of our proposed white sturgeon monitoring program. e) WEPC does not believe it will ever be possible to prove the WSFAP is having a positive or negative effect. At present, there is no evidence to prove it is not having a beneficial effect. WEPC would be willing to participate in a process, including providing its 3-D model, with other hydro operators on the system to examine the WSFAP. However such a process must treat all operators equally and provide compensation for any loss of rights. Such a process should be conducted outside of the EACA review. WEPC is not in a position to initiate such a process as the WSFAP is the subject of the Waneta Upgrades water license, PAC and Fisheries Authorization. We suggest			

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	DFO or the CWR has the mandate and is in the best position to initiate such a process. WEPC intends to conduct a monitoring study to assess the effectiveness of its fish compensation plan. We recognize that this will be a requirement of the Fisheries Authorization. However our understanding of the CEAA follow-up requirements are that they include monitoring the effectiveness of any mitigation or compensation measures, which is why it was included in the EACA Approved Terms of Reference. We believe the one monitoring study will satisfy the requirements of both CEAA and the Fisheries Act. The details of the study will be addressed through the Fisheries Authorization. We will leave the semantics used in various federal documents to the respective federal agencies.			
98	WEPC will make the results of all monitoring studies involving listed species available to the respective recovery teams and has indicated its willingness to participate in local recovery initiatives for listed species impacted by the project.	**ONA 9/18/06**	• Interest in the information from listed species monitoring (Reference 98) The ONA would like to receive the results of all monitoring studies involving listed species.	The ONA will be included on the list of recipients for theses materials.

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121	WEPC understands that the only cause-effect relationship that can reasonably be detected through examination of available information on recruitment failure timing is the regulation of the Columbia River mainstem. This is supported by the UCWSRI Recovery Plan (UCWSRI 2002), which states (page 33) "The modern recruitment failure in the upper Columbia white sturgeon population coincides with the construction since 1968 of three large Columbia River mainstem dams." These dams resulted in a significant alteration to the natural Columbia River hydrograph (the system which contributes over 70% of the mean annual flow at the border). The Pend d'Oreille River has very limited upstream storage capacity and exhibits a much more natural hydrograph pattern than the Columbia River. As a result, in nearly all years since hydroelectric development began on the Pend d'Oreille system, there have been periods of flow in the Waneta area during the white sturgeon spawning period that were unchanged (system in free flow) by daily flow modifications. If recruitment failure was due to a cumulative process impacted by daily flow fluctuations, it seems reasonable to expect that some of the unaltered flow	**MoE 9/19/06**	The proponent suggests that white sturgeon recruitment failure is 100% attributable to modifications to Columbia mainstem flows. Although there is certainly good evidence suggesting Columbia flows are a key issue, the concept of Pend D'Oreille flows contributing to the problem remains valid. A key point that has not been well discussed within or subsequent to the EACA is the timing of Boundary Dam completion on the Pend D'Oreille, which occurred in 1968 at approximately the same time as the Hugh L. Keenleyside Dam was completed on the Columbia. Commencement of operation of both dams coincides with the start of white sturgeon recruitment failure. When Keenleyside Dam was first operated, only a moderate impact to the Columbia hydrograph was realized; the greater impact followed with the completion of Mica Dam a few years later. Examining the timing of recruitment failure, it would not be unreasonable to assume at least partial contribution due to modified Pend d'Oreille flows, with the final impact resulting from the completion of Mica Dam. The proponent points to the fact that the Pend d'Oreille has experienced periods of free flow during the white sturgeon spawning and incubation period since the dams were installed, and that recruitment failure still occurred. However, closer examination reveals that, while recruitment is negligible, it does still occur from time to time. When this does occur (e.g. 1997), it	WEPC appreciates that the coincidental occurrence of the two potential changes may serve to confound issues of causation (see also Comment Ref #35). In past discussions and responses, WEPC has provided what we consider to be reasoned and supported arguments as to our position on the cause of recruitment failure. We respect MoE's position that this is an issue that cannot be resolved at this time and therefore, introduces uncertainty into our prediction of project effects on white sturgeon. WEPC anticipated this uncertainty and this was the basis for our white sturgeon research/monitoring proposal. See Comment Ref #25.

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	periods would have resulted in conditions suitable for successful recruitment. Since this is not the case, a more reasonable hypothesis is that the large changes in the Columbia River hydrograph completely negate any potentially favorable flow conditions that originate in the Pend d'Oreille River.		appears to coincide with years of high system-wide discharge, when the Pend d'Oreille provides free flows to sturgeon spawning habitats at the Columbia-Pend d'Oreille confluence. The contribution of Pend d'Oreille vs. Columbia to this situation can be debated, but this again points to evidence of potential impact, and furthers concerns of uncertainty.	
123	WEPC continues to believe that the project will not result in negative impacts to overwintering juvenile white sturgeon. This assertion is supported by data collected since the release of the first juveniles in 2001 and comparisons with juvenile growth rates and condition factors from other populations. WEPC provides the following reasons why we do not believe the incremental effect of the project will result in any detectable change in uses of the eddy by white sturgeon juveniles or result in measurable changes to juvenile white sturgeon growth and/or survival. 1) The concern focuses on a relatively small increase in velocity of up to 0.7m/s. This is only 0.15m/s faster than the maximum 0.55 m/s velocity documented for juvenile sturgeon use in the eddy and is well within the observed range of velocities reportedly used by	**ONA 9/19/06**	• <u>Monitoring and modeling</u> ONA has concern about Reference 123. There is still some question on the observations of juvenile distributions and habitats within the eddy during LLH periods. Additional information is required to ensure conclusions represent LLH period risk to white sturgeon. • <u>Overwintering</u> The ONA continues to have questions regarding the WEPC's assertion that the project will not have any negative impacts on sturgeon overwintering habitat (WEPC Ref 123). The amount of pre project data and the focus on pre 1999 datasets create concerns about information gaps. The ONA does not agree with the capped number of funding allocated to confirm no Project-related effects on the white sturgeon population. This refers to Owner's Commitment #35 to contribute $50 000 per year to the UCWSRI study program for a	This issue is addressed in detail in Comment Ref. # 16, 18, and 19. If indeed these questions are not addressed in the above responses, WEPC requests that the ONA provide more specific questions that we will attempt to answer. WEPC is prepared to hear and discuss this matter with the Fisheries Working Group.

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	juveniles in other populations 2) As indicated Comment Ref. #17, the flow conditions which produce the incursion of the slightly higher flows into a portion of the deep water area occur only during a part of the day and only for a small part of the year. Given the highly dynamic and variable nature of the eddy under steady state conditions, it is difficult to envision that these slight changes will have detectable effects on suitability or use of deep-water habitats, much less on survival. 3) Winter does represent a critical time for riverine fish species but is most critical in systems where water temperatures are very low (less than 0.5 ^{o}C and often with ice cover) and occur over extended time periods (generally several months). During this time, fish metabolic rates are significantly reduced and this affects their ability to move in response to flow changes or to forage successfully. In situations when a fish is forced to expend more energy than it has available in fat/tissue resources or can consume during the winter period, this can influence survival. In the Columbia River,		period of 7 years to further the understanding of the effects of flow and other environmental factors on white sturgeon recruitment. Additional funding should be provided to enable adequate monitoring to confirm certainty of no net loss within the study area. Adequate funding is required to collect data on sturgeon responses (locations and age classes) to fluctuations in flow and habitat alteration in the Columbia River due to the Project. If monitoring concludes that project construction and operations have negative impacts on the habitat or population, management are required to alter operations to remove these impacts. A commitment should be made to restore altered habitat characteristics. Until monitoring confirms that the Project will not result in net loss of sturgeon population or habitat the operations should be restricted to a cautionary limit to maintain flow rates as outlined in Attachment 1. (Taken from Bill Green's Draft Comments, see KNC Comment Ref #58).	Harmful alteration of fish habitat requires a Fisheries Authorization. If monitoring indicates the project is resulting in any unanticipated and unauthorized harmful alteration of fish habitat, WEPC will work with DFO and others as appropriate to address those impacts. WEPC believes the comments are an incorrect application of the precautionary principle as indicated in Comment Ref # 25. The project will not result in any incremental loss to the sturgeon population as natural recruitment is already virtually non-existent and there will be no irreversible loss of sturgeon habitat. As indicated in Comment Ref #25, WEPC believes the 90% probability level is unrealistic and unachievable. The program as suggested has many potential sources of error and will result in

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	mean daily water temperatures rarely drop below 3°C and then only briefly (usually for less than a few weeks), typically in late January to early February. In some years, temperatures do not decline below 4 °C. This is very near the 5 – 6°C temperatures recorded during the survey in question, and as a result, we contend the survey is representative of "winter" conditions in the Columbia River system. These relatively high winter temperatures and short duration of low temperature periods means that primary and secondary food production continues over the winter and since fish have a higher metabolic activity at these temperatures, they can continue to feed and grow over the winter period. There is documentation that juvenile white sturgeon in Waneta Eddy actively feed during the winter with the dominant prey species being *Mysis relicta*, a freshwater shrimp entrained from upstream reservoirs. Video documentation of winter aggregations of white sturgeon show the sturgeon are in contact with the bottom and aligned into the current. In this configuration, they are able to use their pectoral fins to rapidly	**MoE 9/19/06**	An eight point response is provided by the proponent to refute our concerns regarding impacts to overwintering white sturgeon in Waneta Eddy. Some of these points are valid and well taken, but others are either not entirely accurate or are not relevant to the question. Point by point, addressing the bullet numbers in the proponent's response, we note the following:	finding that will still be subject to interpretation. First, movements of fish occur for a variety of reasons and the documentation of movement in itself is insufficient to develop the required linkage between predator presence and actual predation on sturgeon eggs. The area provides an abundance of other prey items that could account for the presence of predators. Also, there is no indication to suggest what level of change in abundance constitutes an effect or non-effect on egg predation. WEPC stands by its assessment of this risk as described in the EACA and subsequent responses and does not see a resolution will be achieved by further debating the issue in this format. However, if requested, WEPC is willing to discuss this issue in greater detail with the WEP Fisheries Technical Working Group. As indicated in Comment Ref # 16, 18, and 19 our intention was to provide diverse lines of evidence that all pointed to a similar conclusion of low risk. This is a reasonable method of impact assessment that is commonly used and accepted to examine impacts that cannot be proven in advance of the proposed change. While individual points and the nuances of the data can continue to be debated,

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	move up or down in the water column with a minimum of effort and can also maintain position on the bottom with minimal energy expenditure. Therefore, the most likely effect of the post-project incursion of slightly higher flow velocities into the core of the eddy is that mysids and other drifting invertebrates would be carried directly into the eddy core. 4) The model output represents a "snapshot" in time and does not capture the highly dynamic nature of the eddy. This is illustrated by Figure 4-1 in Appendix 4 (excerpted from Hildebrand, L. and D. Fissel. 1997). Measurement of low velocity habitat in Waneta Eddy (Columbia River). R.L. & L. Report No. 534a-F: 19 p. + 3 app), which shows near bottom (0.9 m above the river bed) flow velocities measured at a fixed location in the deepest part (i.e., at 22 m depth) near the central core of the eddy, The flows were measured over periods of high (708 cms) and low (34 cms) Waneta discharges during a constant Columbia River discharge of 2550 cms. Actual near bottom velocities ranged from 0.2 to 0.8 m/s and		1) A difference of 0.15 m/s is in the order of a 30% change, and thus does not appear "relatively small". The mean and variability around the mean all go up by this amount. Also, as we pointed earlier, the observed range of velocities in other populations noted in the proponent's response occurred at different times of the year. 2) This point has been discussed before. Although it is reasonable to assume these fish would be tolerant of velocity variations to some degree, the project will increase the duration and amount of variability. It may not take lengthy	WEPC believes it has provided a very thorough analysis of this issue and stands by our findings of predicted low effects that are unlikely to be measurable. In the event this conclusion is not accepted, we would expect this could be incorporated as a research objective of the UCWSRI that could be examined as part of the proposed research program or addressed directly through a monitoring program designed to examine this specific incremental project effect. With regard to your point by point response we only offer further information for accuracy or in instances where you specifically request clarification. We would be willing to continue discussions of these points in future meetings of the WEP FWG or the UCWSRI. This is the maximum difference and only affects a very small portion of the deep water habitat area.

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	frequently varied by over 0.3 m/s and occasionally up to 0.5 m/s over a 15 minute period. This same figure illustrates that velocities are lower and much more stable at minimum flows of 34 cms. The results of the study showed that the reduction of flows from Waneta Dam from 708 cms to 34 cms resulted in an approximate 90% increase in the area of low velocity (<0.5 m/s) near-bottom habitat. The study concluded that extension of the low flow period following Waneta Upgrades would not reduce the availability of overwintering habitat in Waneta Eddy. The tests also showed that flow reductions result in an overall increase in the size of the eddy and a decrease in overall flow velocities. These findings were accepted by the agencies at that time and as a result, there was no requirement to conduct additional studies or develop monitoring plans to verify effects of the Upgrade Project on white sturgeon overwintering habitat. On this basis, WEPC questions why this is being raised as an issue for WEP. Our analysis suggests that for the majority of Columbia River flows, any increase in periods of minimum flow that result from flow-through		periods of unsuitable conditions to result in some fish leaving the eddy. 3) Knowing the temperatures during the Parsley et al. (1993) observations would assist in informing this discussion. Also, as pointed out earlier, the proponent has a great deal of confidence in only 2 days of observations of white sturgeon behaviour during the shoulder of the winter season. The proponent suggests growth of juveniles will occur at 5-6ºC, but this is not supported by empirical evidence from aquaculture work which indicates that fish will only just maintain their size in non-moving water, regardless of food availability (D. Koller and M. McDonald, Kootenay Sturgeon Conservation Hatchery, pers. comm.). If the fish are exposed to increased higher water velocities at these temperatures, the effects are unknown but could be negative. 4) It would have been useful to have access to relevant Upgrade Project decisions or agreements earlier in the process, to inform the debate and potentially save time and discussion. It is difficult to interpret this point because the observations discussed by the proponent are for Columbia flows of 2550 m3/s, which considerably higher than the 1648 m3/s flagged as the flow of concern in Case 5 of BR #4 in the EACA. As well,	As indicated in the response to Comment Ref # 16, the reduction observed in Case 5 occurs during a low Columbia flow when Pend d'Oreille flows have the greatest influence on eddy habitat conditions. At high Columbia flows, modeling conducted by ASL clearly shows the eddy conditions are driven mainly by Columbia discharge. As Columbia flows increase, depths in the eddy also increase and as is discussed in our response to Comment Ref #7, increased eddy depth results in

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	operations of WEP should result in overall benefits to juvenile white sturgeon that would more than offset any slight reduction habitat area that may occur during the limited periods of high Pend d'Oreille and low Columbia flows (see Comment Ref. #27). 5)A hypothesis that assumes these habitats will become limiting in the future with continued increases in white sturgeon abundance does not consider that as fish grow, their swimming speed and tolerance for an increased range of flow conditions increases. There is ample evidence to indicate that even though sub-adult and adult white sturgeon will share the same habitats as young juveniles, they are also capable of using and do use a much wider range of habitats outside the eddy core, even in the winter period. This would suggest that as the population expands and juveniles grow, one would expect to see an increase in use of habitats that are presently under-utilized, not because they are less suitable and fish are forced to use these areas, but because presently there are no fish of a size capable of effectively		this discussion is very confusing because it appears to contradict the Case 5 modeling in BR #4. This report suggested that low-moderate Columbia flows could produce up to 28% reduction in low velocity eddy habitat during LLH, yet the comments here suggest a 90% increase. Is this because of the difference in Columbia flows? Clarification is required. 5) and 6) The point that is missed in this comment is that sturgeon growth is far from uniform across the population. Some fish grow very quickly while others, for reasons that are unclear, grow very slowly. We see 30+ year old fish that are only in the order of 120 cm in length, and can expect to see a great range of sizes and growth rates among the various younger age classes of hatchery fish now being stocked in the system. Thus, it is not unreasonable to assume that we will see the slower growing juveniles using the same kinds of habitats for many years.	decreased velocities. The effects on the eddy during winter conditions resulting from differences between pre-Project and post-Project LLH flows, is illustrated by Figure 2-2 in Appendix 2 (Case 4: Columbia flow of 2910 m^3/s) of WEPC's August 31st response document. This Columbia flow is similar to the 2550 m^3/s flow examined for the Upgrade project. Figure 2-2 shows an increase in the total low velocity area between pre-project HLH flows and the post-project LLH discharge of 142 m^3/s (the minimum WSFAP flow). At a typical winter minimum flow of 34 m^3/s m, the low velocity area would be even greater as suggested by the Upgrade modeling results. WEPC's point was simply that not all fish would continue to use the same habitat.

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	occupying these areas. 6) The reviewer's hypothesis seems based on the premise that all of the juvenile sturgeon currently in the system and those introduced into the system in the future will continue to use the same habitat throughout their lives. This assumption is not supported by available information. For example, video footage taken in the winter period indicates a much lower use of the core area of the eddy by adults than would be expected based on the estimated population size in the lower portion of the Keenleyside Reach. The population in the lower river (Kootenay River to the U.S. Border) was estimated at 566 fish (95% CI 159-974) Golder Associates Ltd. 2005.Upper Columbia River: White Sturgeon Population Dynamics and Analysis. Report No. 041480072D. However, the estimated maximum number of adults ever recorded during videography surveys in Waneta Eddy in the winter period was 14 on 1 November 2004 (Golder Associates Ltd. 2005. Upper Columbia River juvenile white sturgeon monitoring: Phase 3 investigations, August 2004 – February 2005. Report No. 04-		7) This comment requires additional work to be of any value because the numbers provided do not account for any of the very substantial mortality of hatchery fish stocked in the Upper Columbia. As well, the number of fish observed is simply a sample not necessarily the entire population in the eddy, unless the technicians were certain they covered 100% of the available habitat and there was no movement of fish. 8) The value of this comment is unclear because it is not relevant to any of the reported or published data on sturgeon habitat use. To be meaningful, analyses should focus on water velocities measured at the same distance from the substrate as those in published information on white sturgeon habitat use (e.g. Parsley et al., 1993; Golder Associates, 2005).	WEPC acknowledges the estimates were crude but maintains they provide a reasonable indication of the overall importance of the Waneta Eddy to the sturgeon population in the Transboundary Reach. Our consultant indicates that since there are identifiable reference points on the bottom of Waneta Eddy, the crews can be reasonably certain of the level of coverage and definitely can confirm there was no movement of the large group of fish during the survey. The comment was provided to illustrate that the actual velocities as measured during our survey (Golder Associates, 2005) and as modeled by ASL were higher than the actual velocities where the fish were located. WEPC agrees the data are not comparable to published information where we do not know the height above bottom the velocity measurement was taken.

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	1480-051D). This suggests that as sturgeon grow, they are capable of using other habitats during the winter and do not necessarily compete with younger juveniles for wintering areas. 7) Waneta Eddy is one of the smaller (in terms of physical area) high use areas used by white sturgeon and as such, supports only a small proportion of the total white sturgeon population (adults and stocked juveniles) in the TransBoundary Reach. This is based on video records obtained from Waneta Eddy on five occasions during the winter period. The maximum number of juveniles recorded during these surveys was approximately 700 fish on 24 February 2005. From 2001-2005 there have been approximately 48,000 juveniles released into the Columbia River in Canada (Golder Associates Ltd. 2006. Upper Columbia River juvenile white sturgeon monitoring: Phase 4 investigations, 2005 – 2006. Report No. 05-1480-058D). Even allowing for known mortality rates of juveniles, the number using Waneta Eddy represents a very small fraction of the total released population			

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	(1.5%). A suggestion that the small WEP related changes expected in the eddy would in some manner jeopardize future recovery efforts seems to place an inappropriate weighting on what represents a very small proportion of the total deep water, low velocity habitat available in the TransBoundary Reach.			
125	In WEPC's view, an equally valid possible consequence is that the project could have beneficial effects by providing higher post-project flows during the day when visual predators would be more effective at foraging for eggs. With regards to the recent lab findings referenced, WEPC respectfully points out that this data is experimental, preliminary lab based, and has not been subject to any review. We would appreciate the opportunity to review this work and evaluate it's applicability to assessing project effects on a river-scale level.	**MoE 9/19/06**	The point is made that there is an equally valid consequence to the one provided in our earlier comments. This simply adds to the concern over uncertainty, and does little to support the proponent's conclusion of no impact. Regarding the Ph.D. work being undertaken by Steve McAdam, the lab was only just completed and so the best we can do for now is to encourage the proponent to discuss with Steve at the earliest opportunity. The data are indeed preliminary and not yet reviewed, but these are tangible, empirical findings as part of a Ph.D. and thus worthy of at least some consideration.	As originally expressed, WEPC will be pleased to review and consider the preliminary Ph.D. data if and when it is provided to us in a reviewable form. Respectfully, we believe this would be more helpful to the current documented assessment process than a general discussion.

NEW COMMENTS RECEIVED NOT IDENTIFIED WITH SPECIFIC COMMENT REF

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New (i)	**ONA 9/18/06**	• Reporting impacts and alterations to work plans: On page 11-3 of the Waneta Hydroelectric Expansion Project EAC Application – May 2006 WEPC commits to providing monthly environmental reports to agencies and other key stakeholders that request copies. The activities that require Environmental Work Plans to be submitted are outlined on page 11-3. Fish populations and aquatic habitat protection should be added to this list. The OERC commitment to produce Environmental Work Plans should include planned actions to ensure enhancement and no net loss occurs. The ONA would like copies of these reports.	The OERC and associated Environmental Work Plans deal strictly with appropriate construction practices and obligations. They do not deal with fish habitat compensation (enhancement). The fish compensation plan will be implemented by WEPC as a separate project and will include consultation with the ONA and KNC. Upon request, WEPC will provide to the ONA the monthly reports that will be provided for information to regulatory agencies.
New (ii)	**ONA 9/18/06**	• Sedimentation and aquatic protection during construction: The exposure to contaminated sediments to aquatic organisms is a concern. Post project monitoring is requested to evaluate the potential effects of contaminants on the aquatic organisms and the transboundary reach population of sturgeon. The ONA would like to see an increase in benthic invertebrate and periphyton data capture and assessment as a method of determining aquatic ecosystem health. Shoreline sample sites should include areas with potential impacts from contaminated sediments during construction and post construction. This data will aid in assessing changes to aquatic ecosystem health from pre construction phases to	As stated in WEPC's letter to the ONA of September 22, 2006, WEPC has recognized that the disturbance of existing forebay sediments during intake construction, and subsequent powerplant operations, has the potential to re-suspend contaminants. To address this concern, management of sediment removal from the Waneta forebay to avoid possible re-suspension will be undertaken in accordance with applicable prevailing standards and proven methods. WEPC notes that contaminated sediments from upstream sources move down the Pend d'Oreille system and into the Columbia River every year and will continue to do so regardless of WEP. WEP construction will result in the removal of a substantial amount of these contaminated sediments from

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		post construction.	the aquatic system (sediments that would be mobilized during future high flow events and transported downstream into the Columbia River) and would treat and dispose of these sediments in accordance with regulations. In addition, WEP operations would increase the stability of Seven Mile Reservoir which will reduce the leaching of contaminants from tailings deposits in the area. These actions are expected to result in net environmental benefits. Given these benefits and the existing commitments to comply with prevailing control standards during sediment removal, WEPC does not agree that additional monitoring is required.
New (iii)	**ONA 9/18/06**	• <u>Future ONA Participation:</u> The Okanagan Nation Alliance has the professional fisheries and aquatics capacity to be involved in monitoring and evaluating different components of the project. The ONA would like to explore these opportunities with the proponent.	As stated in WEPC's letter to the ONA of September 22, 2006, WEPC will enter into discussions with the ONA regarding their internal expertise and will undertake to inform the ONA of any opportunities to provide environmental monitoring services, which WEPC may contract directly.
New (iv)	**ONA 9/18/06**	It is also imperative that the Nation continues to be involved in any post-EAO approval processes and that CPC facilitates this requirement.	WEPC will involve the ONA in any post-EACA environmental approvals it may seek that, as a condition of approval, require public and First Nations consultation.
New (v)	**ONA 9/18/06**	A key component to the Waneta Hydroelectric Expansion Project Approved Terms of Reference for Environmental Assessment Certificate Application (2004) is the commitment to: Characterize residual adverse environmental effects in terms of magnitude, frequency, duration, geographic extent, reversibility and ecological context. The Approved Terms of Reference for Environmental Assessment Certificate Application (2004) document also commits to provide a full assessment of cumulative	As stated in WEPC's letter to the ONA of September 22, 2006, WEPC believes the EACA fulfills the requirement of the Approved Terms of Reference to provide a full assessment of

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		environmental effects of the Project's identified residual effects. This is to be considered in combination with the residual effects of other projects in the cumulative effects study area. The Okanagan Nation Alliance would like to see these monitoring and assessment requirements implemented to derive Best Management Practices and methodology to detect adverse effects and mitigate risk to fisheries abundance and aquatic resources (and where possible enhance habitat). The proponent should focus on net environmental 'gain' rather than simply a 'no net loss' policy as a more advantageous goal for the project.	cumulative environmental effects. WEPC's commitments include provision for post-project monitoring of our project's effects, but it is not anticipated that we would monitor the effects of other future projects WEPC has taken steps to include mitigative prescriptions and compensation proposals, where feasible, that contribute to a net environmental enhancement. As summarized in Section 11.3, WEPC believes the combined environmental effects of WEP, taking into consideration air, water and land values, will be positive.
New (vi)	**ONA 9/18/06**	The Okanagan Nation Alliance is concerned that the Waneta Hydroelectric Expansion Project will contribute to the reduction of fisheries abundance and aquatic resources within the Pend d'Oreille and Columbia River.	WEPC is not clear on the basis for the ONA's concern. As indicated in the EACA, fish productivity in the Seven Mile Reservoir is expected to increase with no change to the Waneta reservoir. Reduced TGP levels in the downstream environment are also expected to be a benefit. There is not expected to be any significant impact to the Columbia River fishery. In addition, WEPC will be implementing a fish compensation program to address identified residual impacts. Therefore, the overall impact of the project should be beneficial to fish productivity.
New (vii)	**ONA 9/18/06**	• <u>Pre-construction monitoring deadline too tight:</u> The deadline to complete the final pre-construction monitoring is quickly approaching. This monitoring is necessary to meet the requirements of the pre-construction assessment. The ONA is concerned that this short time frame is not realistic to fill the data gaps and complete the analysis.	WEPC is not clear which pre-construction monitoring is being referred to in this comment. The required pre-project studies were all completed some time ago and are reported in the EACA. In addition, WEPC has commenced additional pre-project monitoring of yellow-breasted chat nesting, Lewis' Woodpecker nesting and area road-kill as committed to in the

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			EACA.
New (viii)	**ONA 9/18/06**	• Commitment to protect aquatic habitat in the case of natural extreme weather events: Changes to natural flows due to extreme weather events should be considered and flow regimes altered to ensure variability does not negatively impact white sturgeon habitat and aquatic habitat. One socio-economic benefit of dam construction in the Columbia Basin was to control flows to protect communities from extreme weather events resulting in residential flooding. The ONA requests that the WEPC apply real time hydrometric modeling to adapt flows to ensure extreme weather events do not have an adverse impact on fisheries and aquatic habitat. This request meets the Upper Columbia White Sturgeon Recovery Initiative (2006) request to apply water management techniques and habitat conservation/ restoration to ensure the survival of Columbia River sturgeon population.	Extreme high flow events are generally expected to be beneficial to white sturgeon. The WSFAP is designed to address low flow events. WEP does not have the ability to address significant weather-related flow variability. Flow management on the Canadian portion of the Pend d'Oreille River is the responsibility of BC Hydro under the Canal Plant Agreement. BC Hydro, in conjunction with the US Army Corps of Engineers, uses real time hydrometric modeling in their management of the system, with flood control being the top priority
New (ix)	**ONA 9/18/06**	• Commitment to ensure the fisheries habitat compensation adheres to DFO's specifications from the Habitat Compensation Plan: ONA is interested in the outcomes of the WEPC's study to assess the effectiveness of its fish habitat compensation plan to meet the requirements outlined in the Kemess North – Habitat Compensation Plan and 2006 Fisheries Field Program letter distributed on Tuesday September 6, 2006. The ONA would like to continue to be informed of the progress and outcomes of this assessment. Likewise, the ONA would like to have a copy of the details of	The ONA will be consulted in the development of the fish compensation program monitoring program. Results of the eventual effectiveness monitoring program will also be provided to the ONA. WEPC understands the ONA will also be consulted by DFO on

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		WEPC's commitment to prepare aquatic monitoring plans for review as a component of the Fish and Fish Habitat Mitigation and Compensation Plan.	documents prepared as part of the Fisheries Authorization process including the details of other aquatic monitoring plans.
New (x)	**MoE 9/19/06**	In general, we continue to support the assertion that considerable uncertainty remains around the potential impacts of this project on white sturgeon habitat. The proponent disagrees, and further review of existing data and related analyses around the risks posed by the project are unlikely to resolve this difference of opinion. This could be addressed by an extensive monitoring program specifically designed to assess uncertainties around white sturgeon impacts. One approach to address this is to address risks to white sturgeon is to simply operate the completed facilities such that no load shaping occurs beyond the status quo, until such time as reasonable evidence of no impact is provided. This has been described in detail by the Ktunaxa Nation Council (KNC) in their September 18, 2006 memorandum to the EAO and CEAA. Such an approach could be undertaken to address one or both of the periods of concern (spawning and overwintering). This approach presents the least risk to white sturgeon and requires further discussion among the Fisheries Working Group. Another approach that warrants discussion is to allow WEPC to build and run the project as proposed, while white sturgeon concerns at the project and population level are addressed through monitoring and research. This approach relies heavily on application of the Species at Risk Act (Allowable Harm Assessment), because this would be our only mechanism to modify system-wide operations should impacts become evident. Owner's Commitment #35 in the EACA would also require substantial revision, based on the following discussion. To assist in understanding project impacts and, at the same	WEPC believes that the referenced approach is unreasonable and that it does not provide any greater material benefit to sturgeon recovery than WEPC's proposed funding for monitoring and research. WEPC would be willing to discuss this approach with the Fisheries Working Group.

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		time, ensure the best possible use of funding directed toward white sturgeon, a flexible arrangement would be developed. Funding exit arrangements could be included, recognizing the potential over time for re-establishment of recruitment through mechanisms as yet undefined. As well, funding could be discontinued at such time as establishment of proof of no impact is developed and accepted by the agencies and First Nations. This approach supports WEPC's interest in providing funds toward the development of recruitment failure in the broadest sense (i.e. not simply related to project impacts). The option also recognizes that white sturgeon recruitment currently fails completely in most years. Thus, any incremental impacts from the project are moot until such time as recruitment failure can be addressed on a broad scale. This will require work both inside and outside the immediate project impact zone. In summary, suggested elements of this option would be: • Assume block loaded flows will proceed as proposed in the EACA. • Provide a fixed level of funding to address monitoring and project-related Allowable Harm Assessment information needs. • Provide a fixed level of funding for recruitment failure research not necessarily directly related to project impacts. • Assume funding for research and monitoring will be required for either: o the life of the project; or	

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		o until no impact is demonstrated; or o until self-sustaining recruitment is re-established. • If it becomes evident that a demonstrated impact cannot be resolved or addressed without habitat work or artificial production, then the funds will be directed to that end. • Apply the results of Allowable Harm Assessments to require adjustments to project flows, in concert with other Canadian power producers on the system. • Determine the base funding level through an assessment of long term research and monitoring needs. • Adjust funding annually to reflect increasing costs associated with biological consulting services, equipment and supplies related to such work. As noted above, an appropriate level of funding can be determined through a prediction of the required work. The following represent some of the more likely possibilities: • White sturgeon Vemco VRAP telemetry and video surveys of juveniles in Waneta Eddy to assess effects of load shaping on winter behaviour. • Additional ADCP monitoring of Waneta Eddy to assess habitat conditions concurrent with juvenile telemetry and video surveys. • White sturgeon VRAP telemetry, egg mat and larval drift monitoring to assess impacts to adult spawning cues and habitat selection related to post-project block loading. • Predator VRAP telemetry, density and diet studies	

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		related to egg predation resulting from post-project block loading. • Lab and in-situ studies of early life stage habit use, and availability and impacts to such habitats in and downstream from the project area. • Studies and analyses to assist in the development of Allowable Harm Assessments addressing Critical Habitat downstream of the project. • Studies and analyses to assist in understanding the environmental variables leading to recruitment failure, and developing approaches to remediate these impacts. • Implementation of remediation methodologies once their value is demonstrated. • Conservation aquaculture work, when and if the sturgeon TWG determines that on-going hatchery intervention is the only option available to maintain this population.	
New (xi)	**MoE 9/19/06**	Considering the points noted above, the contribution of $350,000 over 7 years described in Owner's Commitment #35 in the EACA is inappropriate in terms of the amount and duration of funding. To further this concept, discussions with WEPC are required to scope the work and determine the funds required to deliver.	WEPC is prepared to hear and discuss, with the Fisheries Working Group, why the funding it has proposed for monitoring and research may be inadequate.
New (xii)	**MoE-EP 9/19/06**	I do not have any particular concerns at this time with respect to the proponent's responses. At such time that the more detailed component plans are developed for specific aspect such as contaminated materials management, sediment control etc., we will have further opportunity to ensure that our initial comments, concerns are adequately addressed.	Comment acknowledged.

Comment Ref #	Comment from	New Comments Received	WEPC Response
New (xiii)	**RDKB 9/19/06**	The Planning and Development Committee has passed a resolution indicating that the proponent's response is considered to be adequate, but the proponent should be asked to take a more primary role in establishing themselves a leader in the provision of passage for anadromous fish.	WEPC neither owns, nor has control over, existing barriers to anadromous fish passage on either the Columbia or Pend d'Oreille rivers. Also see EACA Owner's Commitment #8.
New (xiv)	**RDKB 9/19/06**	The proponent's responses indicating that: 1. The contractor will be restricted from locating batch plants and rock crushers on worksites D3 and D4; 2. The Community Impact Management Committee will include representation from the RDKB; and 3. WEPC will establish an information/interpretive centre immediately south of the bridge if Teck Cominco and BNSF railway agree to such use of the site and the RDKB agrees to contribute to on-going maintenance; should be included on the list of Owner's Commitments regarding the project.	The list of Owner's Commitments regarding the project presented in EACA Section 11 is a summary of the key items contained within the text of the EACA which WEPC as the proponent states that it will do. It is provided to enable the reader to readily find the major commitments arising form the environmental assessment analyses. Commitments of the proponent derived elsewhere – including from agency commentary exchange – will be honored by WEPC.

Appendix 3-5 – Response to Questions and Comments from the Ministry of Environment, Water Stewardship Division, December 1, 2006

[The following document was prepared by the Proponent]

WANETA EXPANSION POWER CORPORATION

P.O. Box 9131, Stn Prov Govt
3rd Floor, 844 Courtney Street
Victoria, BC V8W 9B5
Telephone: (250) 953-5179 Fax: (250) 356-2819

December 1, 2006

Mr. Chris Morgan
Water Resource Specialist
Water Stewardship Division
Ministry of Environment
PO Box 9340 Stn Prov Govt
Victoria, BC V8W 9M1

Dear Mr. Morgan:

Re: Waneta Hydroelectric Expansion Project (WEP)

I am writing in response to your September 19, 2006 letter to Brian Murphy of BCEAO, in which you identified two outstanding matters requiring further information from WEPC. These relate to coordinated operations between WEPC and TCML, and to potential project effects on water licensees whose sources will be crossed by WEP's transmission line.

Your concern with respect to coordinated power operations at Waneta arose from your interpretation of the Release Coordination Agreement, a copy of which WEPC provided to you on August 23, 2006. You required the consent of both TCML and WEPC to "having their water rights sharing agreement authorized under the *Water Act.*" We are pleased to provide a copy of the joint letter by TCML and WEPC dated November 8, 2006 (previously sent to you by e-mail from Bruce Duncan on that date) that confirms the parties' intent to coordinate the operation of the Waneta Plant and the Waneta Expansion pursuant to the Release Coordination Agreement and to seek issuance of required authorizations under the *Water Act*. We believe this letter addresses your concern.

Your second concern relates to water licensees that may be potentially affected by transmission line access, clearing, construction or maintenance. Their licences are outlined in the following table taken from Table 3-10 of the EACA.

Stream Name	Licence No.	Licensee	Quantity and Units	Crossing by Existing Transmission Lines
Lime Creek	C044602	Fred & Janice Buckley	500 GD	Line 71 and Circuit 5L98
Reith Creek	C044601	Fred & Janice Buckley	1000 GD	Line 71 and Circuit 5L98
Four Mile Creek	C042851	Gary & Betty Crakes	500 GD	Line 71 and Circuit 5L98
Seven Mile Creek	C044714	Ministry of Environment	1000 GD 2.75 AF	Line 71 and Circuit 5L98
Nine Mile Creek	C104170	Bruce Ewasiuk	500 GD	No crossing

None of the above streams are designated as a community watershed as defined in the Forest Practices Code and the *Water Act.*

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With respect to protecting these licensees, WEPC has established general requirements in the Owner's Environmental Requirements for Construction (OERC) for the construction of the WEP transmission line, including clearing, structure sites, access roads and trails.

Where construction must pass through or over creeks and their associated riparian areas, the OERC establishes Restricted Activity Zones (RAZs) at creek crossings (as shown on OERC Figures 9A-7, 9A-8 and 9A-9) and provides limitations on Contractor activities within these zones. The Contractor will be required to optimize transmission line design to avoid creeks and associated riparian areas and, where clearing and access necessitate work in or passage through RAZs, to avoid or minimize potential adverse effects. Where stringing of conductors is required through RAZs and over other riparian areas, the Contractor shall take effective measures to avoid the disturbance of streambeds and stream banks and to minimize the disturbance of riparian vegetation, per Section C2.1(w) of the OERC.

The Contractor's on-site activities will be closely monitored during construction as described in Section 9 of the EACA and as required by OERC Section A2.2(b)(x) to ensure water sources are protected.

To further address your concern, the following requirements have now been added to the OERC specific to protection of licensed water sources, reflecting relevant items from the "Conditions for Linear Development" prepared by the Nelson Water Stewardship Office:

> OERC Section B5, Community Relations, Section B5.1(e)
>
> Upon being advised of a concern relating to the effects of construction activity on licensed water sources, the Contractor shall work diligently and in consultation with the Owner to expeditiously resolve all identified issues relating to its activities.
>
> OERC Section B5, Community Relations, Section B5.1(f)
>
> Not less than four (4) weeks in advance of Transmission Line construction, the Contractor shall notify in writing all water licence holders whose licensed water sources may be affected by construction activity of the commencement of Transmission Line construction. A copy of all such notifications shall be provided to the Owner.
>
> OERC Section D2, Water Quality Protection, Section D2.2(f)
>
> In the event that Transmission Line construction results in damage to existing licensed water sources and their associated water-taking systems, the Contractor shall promptly repair damage caused to water sources and water-taking systems.

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OERC Section D2, Water Quality Protection, Section D2.2(g)

Immediately prior to commencing work in the vicinity of licensed water sources and as frequently thereafter as required by changing conditions, the Contractor shall take and test representative samples of source waters and shall obtain benchmark water quality information including as a minimum pH, Turbidity, and Oil and Grease parameters. The Contractor shall also assess and document the quantity of water available at potentially affected water-taking intakes in and downstream of the Transmission Line work area. Copies of all water source and water-taking system test results and assessments shall be submitted to the Owner. In the event that the quantity and/or quality of water at existing licensed water-taking intakes falls below pre-construction benchmark values directly as a result of Transmission Line construction activity, the Contractor shall on request provide affected licensees with potable water until such time as the quantity and quality of water at the water-taking intakes and in affected water-taking systems is restored.

OERC Section F12, Spill Contingency, Section F12.1.4(k)

In the event of a spill affecting or potentially affecting licensed water sources, the Contractor shall immediately take measures to effectively prevent the spilled substance from entering water-taking systems and notify affected water licence holders forthwith. The Contractor shall take water samples from affected water-taking systems and test these samples during the course of spill cleanup operations until such time as the test results show that the quality of water in the water-taking system has been restored. Copies of the results of all such testing shall be provided to affected water licence holders and to the Owner.

Per WEPC's commitment, requirements relating to transmission line maintenance activities, including vegetation control and use of access roads, trails and creek crossings, will be developed as part of WEPC's Vegetation Management Requirements that will be followed by the contracted O&M Operator.

WEPC believes the above measures provide sufficient assurance that water licensees will not be adversely affected by construction or operation and maintenance activities related to the WEP transmission line.

Yours truly,

T. Bowsher

for W. E. Freeman
Vice President

cc: Brian Murphy, Project Assessment Director, BCEAO

Appendix 3-6 – Response to Questions and Comments from Environment Canada, December 4, 2006 and December 15, 2006

[The following documents were prepared by the Proponent]

WANETA EXPANSION POWER CORPORATION

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December 4, 2006

Environment Canada
201 - 401 Burrard Street
Vancouver, B.C. V6C 3S5

Via Fax: (604) 666-7294

Attention: Berni Claus, P.Eng.
Senior Project Engineer

Dear Mr. Claus:

Re: Waneta Expansion Project - Response to Post-Review Period Comments

WEPC received and has considered Environment Canada's comments related to accidents and malfunctions and terrestrial wildlife submitted to the BCEAO in your e-mail of November 21st and Dr. Christine Bishop's letter of November 27th.

We are pleased to provide our responses in the format used to respond to Review Period Questions and Comments from agencies and First Nations.

Yours truly,

for Bill Freeman
Vice President

cc: Dr. Christine Bishop, Science and Technology Branch, Environment Canada
Brian Murphy, BC Environmental Assessment Office
Linda Sullivan, Canadian Environmental Assessment Agency

Attachment

COMMENT REF. #	POST-REVIEW PERIOD EC COMMENT	WEPC RESPONSE
ACCIDENTS AND MALFUNCTIONS		
Reviewer: Berni Claus, E-mail to BCEAO of November 21, 2006		
1.	EC requests an interim review of the documentation addressing the WEPC review and approval of submitted ERPs from contractors.	It is understood that this comment relates to the review and approval of WEPC's process for reviewing and accepting Contractor's Environmental Work Plans (EWPs), including those for emergency response. The process is described in Section 9 of the EACA. EC's review of this section will in fact constitute the requested interim review. The Contractor will be contractually obligated to prepare emergency response components of its EWPs in accordance with industry standards as specified in the Owner's Environmental Requirements for Construction (OERC). Criteria and requirements for responses to accidents and environmental emergencies during construction are addressed in the OERC. WEPC's review and approval of submitted EWP's by the Owner's Consultant will be undertaken with respect to compliance with the noted criteria and requirements, and for compliance with all applicable Permits, Licences and Approvals.
2.	On page 9-3 of the application it states in the case of a major incident during construction or during operation that WEPC will be notified and oversee the incident response. The definition of 'major' was not presented in the application.	"Major" incidents are currently defined in CPC's EMS as *incidents that* • *Involve corrective action that requires off-site or third party resources;* • *Involve a breach of regulatory requirement; or* • *Are likely to create significant public concern.* Note the definitions of major and minor are strictly internal to CPC's EMS. Any spill that would trigger a regulatory response is considered a major incident.
3.	EC requests a clear outline of who will be the manager of a spill incident, and triggers for change with clear protocols for enacting any changes in such management.	The primary responsibility for the management of spill incidents will be undertaken by the D-B Contractor during construction and the O & M Contractor during operations. As a due diligence measure, WEPC will monitor spill response through the Project Environmental Monitor and CPC environmental staff during the

COMMENT REF. #	POST-REVIEW PERIOD EC COMMENT	WEPC RESPONSE
		construction and operations phases respectively. If it is felt that the response is inadequate, WEPC may request the contractor to take additional measures, however this does not constitute a change in responsibility for spill management.
4.	Appendix 9-A, Section D, pg 4: Please clarify wording on referenced legislation. The Fisheries Act has no applicable Regulation and amount triggers. Please re-state clearly the legislation and authority to which the referenced regulation is linked.	The wording of OERC Section D2.4(b) is being revised to read: "Spills of hazardous substances over the amount specified for the spilled substance in the BC Spill Reporting Regulation, or where there is any potential introduction of deleterious substances to the aquatic environment as defined in Section 34 of the Fisheries Act, shall be immediately reported to the Provincial Emergency Program, (800) 663-3456, and secondly to Environment Canada Emergencies, (604) 666-6100."
5.	For both the construction and operational ERP, documentation on training of identified responders and frequency of exercising the plan are part of due diligence by responsible parties and should be available if requested for review.	OERC Sections A4 and F12 address these comments. In particular, refer to Section A.4(h) to (k) inclusive in relation to training and retention of records; also refer to Section F12.1.4(h) in relation to periodic drills.
6.	All developed and approved ERPs should have specific response protocols for identified spill scenarios.	The requirements of OERC Section F12 provide for the development of the necessary response protocols/procedures and for the incorporation of these procedures into the Spill Prevention, Preparedness and Response EWP.
7.	It is recommended that sensitive habitats that could be impacted in the event of a spill or release are identified, and specific response strategies outlined. A special focus is recommended for any identified at risk habitat which supports listed or endangered species, with a specific response strategy for protection of these endangered species.	In order to clarify requirements relating to the comment, a new section has been added to OERC Section F12.1.4, Spill Response, as F12.1.4(b), as follows: "For spill response purposes on land, the Contractor shall identify habitat of Listed Species that could be affected by a spill and shall develop specific response strategies for spills in such areas that provide for the protection of the Listed Species."
8.	With respect to the risk assessment process, all installations (temporary and permanent) require identification of CEPA Environmental Emergency (E2) listed chemicals which will be in storage as well as planned quantities. Depending on quantity and site(s), a specific ERP or sections of existing ERP may be required to address the particular chemical.	The Canadian Environmental Protection Act will be added to OERC Section A6.1(b), Contractor's Compliance, as specifically referenced Applicable Law which must be followed by the Contractor.

COMMENT REF. #	POST-REVIEW PERIOD EC COMMENT	WEPC RESPONSE
9.	Construction phase ERP and operational phase ERP should address all common components of emergency preparedness and responses to accidental releases of hazardous materials.	For construction, OERC requirements relating to the Spill Prevention, Preparedness and Response EWP provide for the inclusion of emergency preparedness for, and responses to accidental releases of hazardous materials. Chemicals requiring an ERP under CEPA are not anticipated to be used at the project site during the operations phase. In the event that some are held at site, a specific ERP will be developed as required by CEPA. The O&M contractor will have its own generic spill response plan. A Local Operating Order will be developed to detail specific responses to deal with high risk situations, primarily spills to the river. But would include the CEPA ERP requirements if such chemicals are held on-site.
10.	A paper copy of the ERP for both construction and operations should be available at all petroleum and hazardous substance storage facilities. Operators, managers and named personnel should be aware of their roles in the plan. The scope of the plan can be in proportion to the risk presented by the facility. For relatively small storage areas, simple posted response instructions may be adequate. For larger facilities, a dedicated section of the emergency response plan specific to the site is recommended.	The environmental awareness and training requirements of the OERC are intended to ensure worker awareness of hazards and spill response procedures. Rather than provide a full copy of the Spill Prevention, Preparedness and Response EWP at all storage facilities, WEPC proposes to require the Contractor to clearly post the "Response" component of the EWP at all storage facilities, and will add this requirement to OERC Section F12.1.4. The O&M contractor's spill response plan will be available in the oil storage room once the plant is operational. This will include a specific ERP if CEPA listed chemical are stored there.
11.	It is recommended that all storage and handling of petroleum products and allied petroleum products be in accordance with the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (2003).	The necessary revisions will be made to OERC Section A.7(a).
12.	… (in) the application, acronyms used for environmental systems (EMPO and EMPC) were not listed in the 'list of acronyms'	The noted acronyms (EMPO and EMPC) are in fact included in the May 2006 final review edition of the EACA.
13.	…..for ease of access and use of ERPs (during any emergency) EC recommends to re title or reposition all plans which will house emergency response plans to a clearly labeled 'Emergency Response Plan'.	For construction, the "Response" component of the Spill Prevention, Preparedness and Response EWP that will be posted as in the response to EC Comment Ref. #10, above, will be provided with a cover sheet having the title: Emergency Response Procedures.

COMMENT REF. #	POST-REVIEW PERIOD EC COMMENT	WEPC RESPONSE
		An Emergency Preparedness Plan (EPP) will be developed for the plant when it becomes operational. This is primarily focused on dam safety issues, but will include an environmental emergency section so that all emergency response plans are kept together. The contractor Spill Response Plan and LOO for specific high risk spills will all be tied into the EPP.
TERRESTRIAL WILDLIFE		
Reviewer: Christine Bishop, Letter to BCEAO of November 27, 2006		
14.	Regarding western yellow-breasted chats, the population at Waneta has expanded from one nest found in 2004 (the first breeding record for this species in BC outside the south Okanagan and Similkameen valleys), to three territories occupied in 2005 and 6 territories and four nests found in 2006. I have visited this site and also have knowledge of the breeding population of this species in B.C. while studying them intensively in the south Okanagan during 2001-2006. In the south Okanagan valley, where the habitat where chats occur is a more dense riparian thicket type habitat than at Waneta, and presumably likely to be more productive for food and predator protection, I have found that chat territories are an average of 0.25 to 1 ha in size. This is consistent with territory size in chat populations in other locations such as Indiana and Kentucky. I have also found that in the south Okanagan valley this species thrives in dense, wild rose thickets (during 2002-2006: on average: % rose = 26.8- 40.3%; % total shrub less than 10 m = 42.3- 53.2% with average shrub height of 1.74- 1.95 m), and on average territories are located 148 to 369 m from roads. We also find that chats are semi-colonial and therefore the steady increase in the number of breeding pairs attracted in close proximity to each other at the Waneta site is not surprising and even though the area of habitat that is suitable for chats at Waneta is relatively small, I would predict that it is likely to attract several more pairs in the future.	Since the first yellow-breasted chat nest was detected at Waneta in 2004, a total of seven territories (with six active nests) have been documented in the Waneta Expansion Project (WEP) area (Machmer et al. 2005; Machmer and Ogle 2006; Machmer, in prep.). Territory assessments in 2005 and 2006 indicate that chats are using shrub-dominated habitats on south to west-facing aspects below 700 m elevation and within 1.2 km of the Waneta Reservoir. Vegetation in breeding areas ranges from 1.5 to 7 m height and is dominated by species such as ocean spray, saskatoon, rose *sp*., snowberry, mallow ninebark, willow and beaked hazelnut. Two of the seven chat territories are located on or adjacent to existing powerline right of ways (i.e., the 230 kV Teck Cominco L71 Line and the 500 kV BC Hydro 5L98 Line, respectively) and chats are expected to continue breeding in suitable habitats adjacent to the new transmission corridor.
15.	Scheduling of construction should not conflict with the nesting and fledging and moulting period of chats. They will return from migration	ROW clearing for the transmission line is scheduled from November to March in areas of the corridor where chat activity is known or likely

COMMENT REF. #	POST-REVIEW PERIOD EC COMMENT	WEPC RESPONSE
	in the first week of May and leave the area by mid Sept. each year.	based on habitat suitability (i.e., Sections 1 & 2 of the TL corridor; see EACA Section 6.4.11). Transmission line access trail construction and structure site placement are scheduled from mid-October to mid-April on Sections 1 & 2 of the TL corridor, to avoid any disturbance to breeding chats (section 6.4.10). Powerhouse construction activities are not expected to interfere with chat breeding activity, given that chats have not been documented in this area and suitable habitat is lacking.
16.	The location of chat nests is within 20m of the power line presently at the site. Design of the roads necessary during construction and for maintenance thereafter should be sensitive to the breeding cycle of this species and roads should avoid current nesting locations.	One confirmed breeding territory (active in 2005 and again in 2006) is located adjacent to the 500 kV BC Hydro 5L98 Line. This territory was successful in 2006, despite being located within 20 m of the access road. The latter road is also planned for use during the construction and maintenance of the Waneta Expansion Project. As long as use of access roads adjacent to breeding areas is avoided during the chat breeding period (as recommended in the scheduling for transmission line construction from mid-April to mid-October; see sections 6.4.10 & 6.4.11), no incremental direct disturbance impacts to chats are expected. Major operation and maintenance activities are scheduled to exclude the period from late April to mid-August (along Sections 1 & 2 of the new line, where chats are known or likely to occur; see EACA Section 7.5.2). To minimize direct disturbance impacts to chats, work scheduling for major activities will be extended to exclude the period from end of April to end of August. As recommended in the EACA, monitoring of chat territory occupancy and mapping of active and highly suitable breeding habitat is being conducted annually in the project area. Using this information, the design of new access trails, pullouts, structure sites and new infrastructure will be delineated to avoid known or highly suitable chat habitat to the greatest extent practicable (see EACA Section 6.4.10).
17.	The degree of construction proposed for this site next to chat nesting territories is unprecedented, and I would recommend a need to monitor the chat population at the site during and after construction for up to five years to evaluate whether breeding pairs will	WEPC has initiated and is committed to undertaking chat breeding activity and reproductive success surveys annually within the project area prior to and during construction. Occupied and highly suitable breeding habitats will be mapped and new access trails, pullouts, structure sites and new infrastructure will be

COMMENT REF. #	POST-REVIEW PERIOD EC COMMENT	WEPC RESPONSE
	return to the area during and after construction.	delineated to avoid known or highly suitable chat breeding habitat to the greatest possible extent (see revised Appendix 11A). As committed to in Appendix 11A of the EACA, annual surveys for chat breeding activity and reproductive success will be continued over the first few years of operation to further identify chat breeding activity. The results will be evaluated to identify effectiveness of chat protection measures. To achieve this end, it is expected that monitoring will continue through at least one vegetation management cycle.
18.	Vegetation management in the area should consider the need to maintain the habitat as it is or enhance the density of low thickets of shrubs	The need to maintain and/or enhance dense shrub habitat in areas used or highly suitable for chats during project construction and operation is acknowledged. As indicated in EACA Section 7.5.2 for Sections 1 & 2 of the transmission corridor, (1) the existing density, height and structure of vegetation in electrical clearance zones (ECZs) will be maintained to the greatest extent possible, (2) some ≥3 m tall shrubs suitable for chat perching will be retained in ECZs, (3) cattle will not be permitted on that portion of the land owned by WEPC from May 1st to August 30th, and (4) ongoing vegetation reclamation and management activities may entail supplemental planting of low-growing shrubs of value to chats in degraded areas, such that the potential for weed encroachment and need for herbicide use is minimized. Similarly, during construction of the transmission line (see EACA Section 6.4.11), where clearing in chat-occupied or highly suitable habitat cannot be avoided, special mitigation measures will be implemented. These will attempt to retain within the ECZ, the existing density, height and structure of low-growing shrub species (i.e., those that do not exceed 3 m height during all phases of their life cycle). If low tower height precludes retention of low shrub vegetation in an occupied territory, then the feasibility of increasing tower height and/or planting supplemental low-growing shrubs will be considered.
19.	Regarding the presence of the four reptile and amphibian species of special concern, I understand that there has been some inventory in the Waneta expansion project environs and	Presence/absence surveys for herptiles were conducted in the project area during 2004 (Machmer et al. 2005) and findings from concurrent listed herptile inventories in the Pend

COMMENT REF. #	POST-REVIEW PERIOD EC COMMENT	WEPC RESPONSE
	that two snake dens have been identified. Because western skink and western toad are relatively limited in their home range size, and have limited capability to disperse and re-colonize sites, they are highly susceptible to habitat fragmentation. Snakes are more vagile, particularly racers, but they don't tend to forage more than a few kilometers from den sites and access to den sites from summer foraging territories are important. These aspects of reptile and amphibian life history make them particularly sensitive to impacts by road traffic and the fragmentation of habitats by roads. In surveys at Waneta, road kills of snakes have been reported even given the low level of traffic occurring near the site before construction begins.	d'Oreille Valley (conducted by the Columbia Basin Fish & Wildlife Compensation Program from 2004-2005) were also summarized and mapped in the EACA. Findings indicate that occurrences of racer, rubber boa and western skink species were found scattered through the project area, making it difficult to isolate specific breeding locations. Western toads were not found during 2004 inventories or concurrent CBFWCP 2004-2005 surveys, but a few records exist for the valley. No snake dens were found during surveys, however two dens are known: (1) one within Beaver Creek Provincial Park on the west side of Highway 22A and (2) a second above the Waneta-Nelway Road at Four Mile Creek. Snakes denning at the latter sites would have some potential to cross project area roads when moving to foraging areas. Follow-up roadkill monitoring data gathered periodically from May to October 2006 indicates some roadkill mortality of listed herptiles (4 racers and one western toad) on project area roads. Roadkill occurrences had a scattered distribution (on Highway 22A, Columbia Gardens Rd, Seven Mile Rd and Lower Waneta-Nelway Rd), making it difficult to identify "hotspots" (i.e., movement corridors and/or nearby breeding sites) where mitigation efforts could be focused. As indicated in Appendix 11A, WEPC will continue to monitor roadkill (with emphasis on herptiles) prior to and during construction. If monitoring reveals high levels of roadkill from project-related traffic, WEPC will consult with regulatory agencies, MoT and third parties on effective mitigation and cost share agreed upon mitigation measures with appropriate provincial agencies.
20.	It is necessary to document all snake den sites prior to construction and to situate new road constructions in areas that do not bisect den sites from typical foraging habitat for racers and rubber boas.	Development of the WEP relies heavily on existing access roads, rather than new road construction. An estimated 1,150 m of new single season access trails will be constructed to access the new transmission line. WEP herptile surveys in accessible portions of the project area and CBFWCP herptile surveys in the Pend d'Oreille Valley have not uncovered snake dens. Once access is permitted, line

COMMENT REF. #	POST-REVIEW PERIOD EC COMMENT	WEPC RESPONSE
		segments not yet surveyed where road-building is planned will also be evaluated for herptile activity and potential snake denning. Two den sites (Beaver Creek Provincial Park and Four Mile Creek) are known in the project area and new road construction is not planned in the vicinity of either site.
21.	Monitoring road kills pre and post construction will quantify the degree of impact of any roads that have been built for construction and future maintenance. There is a precedent for this type of work in the expansion of highway 69 in Ontario and pre and post monitoring impacts on snakes. I can provide contacts for you regarding design and findings of this work.	The monitoring underway and committed to in Appendix 11A is designed to (1) establish benchmark levels of roadkill and traffic for existing project area roads, with emphasis on herptiles, (2) determine if increased project-related traffic is associated with significant increases in roadkill, and if so, (3) propose mitigation measures to minimize roadkill impacts. Additional background pertaining to the successful monitoring, interpretation and mitigation of herptile roadkill would be helpful. Post-construction traffic will not be significantly greater than currently exists and there will not be any new permanent roads. Therefore post-construction monitoring is not required.
22.	I would recommend a detailed determination of breeding sites for western toad and home ranges for skinks. The skink has small and specific habitat requirements including breeding sites, basking locations and foraging areas. These sites need to be preserved intact during and after construction. Similarly, western toads will certainly have a breeding location near to where they have been sighted in Waneta inventories and these sites need to be identified and monitored during construction.	No western toads were found during 2004 inventories and concurrent CBFWCP surveys, but there are isolated records for the valley from Waneta Reservoir (Machmer and Steeger 1994), Lomand Lake near Nelway (J. Gwilliam , CBFWCP, unpublished data) and lower Waneta-Nelway Road (Machmer 2006, in prep.). Suitable breeding habitat for toads in the project area occurs along the margins of the Waneta Reservoir, in permanent and intermittent tributary creeks that cross the transmission line (e.g., Lime, Reith, Four Mile, Myres, Seven Mile and Nine Mile Creeks), in a few locally occurring wetlands (Boilard Marsh, Nine Mile Wetland) and in other seepage zones and roadside ditches, such as the seep below Site L. These sites were evaluated during project area surveys and are discussed in sections 3.2.3, 3.2.4, and portions of 6.4, as they apply to habitat use, suitability and potential impacts on herptiles. Given the lack of western toad records for the project area, a more detailed determination and evaluation of breeding sites for western toad is

COMMENT REF. #	POST-REVIEW PERIOD EC COMMENT	WEPC RESPONSE
		not considered warranted at this time. Western Skinks were found scattered along open rocky grassland and shrubland sites within the powerplant and transmission line areas, as well as at and adjacent to Sites F and L. Both juveniles and adults were found as early as mid-April and it is assumed that because of their small home ranges, skinks are breeding in these areas and remain there year-round. As discussed in relation to specific construction activities (sections 6.4.1, 6.4.4.2, 6.4.10, 6.4.11), there is some potential for habitat impacts and direct disturbance to skinks at these sites. To minimize potential impacts, the scheduling of transmission line access road construction and transmission line ROW clearing is confined to periods when these animals are inactive (mid-October to mid-April and November to March, respectively). Within areas subject to excavation or fill deposition (i.e., powerhouse areas and at Worksite F), an environmental monitor will be required to monitor for herptiles, and to collect and/or shepherd away individuals and move them to suitable habitat outside the footprint of fenced work areas (sections 6.4.1 and 6.4.4.2).

WANETA EXPANSION POWER CORPORATION

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December 15, 2006

Environment Canada
201 - 401 Burrard Street
Vancouver, BC V6C 3S5

Via E-Mail

Attention: Berni Claus, P.Eng.
Senior Project Engineer

Dear Mr. Claus:

Re: Waneta Expansion Project - Response to CWS/STB December 8th Comments

Conveyed herewith are WEPC's responses to Environment Canada's further comments sent by you to the BCEAO on December 8th. Our response follows each comment, which references our original Comment Ref. from December 4, 2006.

EC Comment re Comment Ref 17: "*WEPC commits to monitoring chats 'over the first few years of operation'. The EC comment recommended monitoring for up to 5 years.*

At this time, it would be worthwhile to confirm an exact time period for post monitoring because both the recommendation and the WEPC response are somewhat vague. The recommendation from EC would be monitoring annually until construction, during construction and for 5 years post construction monitoring which should account for most shrub vegetation re growth and re colonisation of the site if it was abandoned during construction."

WEPC Response:
WEPC has committed to review the results of the Chat monitoring after five years in EACA Section 7.5.2. Implicit in this statement is that the monitoring will take place for a minimum of five years after construction of the transmission line.

EC Comment re Comment Ref 18: "*WEPC states that some >=3m tall trees will be retained in the Electrical Clearance Zone (ECZs). Our recommendation is that a minimum of 10 trees of >= 3 m per acre be maintained in areas of suitable chat habitat. If this is not possible from an electrical safety standards perspective, then the proponent must work with Environment Canada's Canadian Wildlife Service to identify acceptable mitigation measures.*"

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WEPC Response:
WEPC will attempt to retain a target of 10 trees measuring >=3 m height per acre within portions of the electrical clearance zone that are currently known or suitable as chat breeding habitat. Where this is not possible due to line clearances and/or a lack of existing trees of appropriate spacing, emphasis will be placed on the retention and supplementary planting of endemic low-growing shrubs (i.e., shrub species such as oceanspray, saskatoon, snowberry, mallow ninebark, rose spp., etc.) that are abundant in occupied chat territories at Waneta. Chat habitat projects will be a priority for the terrestrial compensation program described in Section 6.9.2 and WEPC would be pleased to work with CWS to identify acceptable projects.

EC Comment re Comment Ref 18 (cont'd): "*WEPC states that cattle will not be permitted on that portion of land during 1 May to 30 Aug. The problem with cattle at the site at any time is that the cattle will trample and eat and fragment shrub habitat important for chats. Cattle should not be present in areas currently suitable as chat habitat.*"

WEPC Response:
No previously occupied or suitable chat habitat is present on WEPC-owned lands. Notwithstanding, WEPC has already committed to excluding cattle from WEPC-owned lands having chat-suitable habitat. This will require fencing, and hence will permit year-round exclusion of cattle from these lands, as is being requested. Dealing with cattle use of other lands in concert with the respective landowners will be considered as part of the terrestrial compensation program.

EC Comment re Comment Ref 18 (cont'd): "*Where clearing of vegetation in chat-occupied or highly suitable habitat for chats during construction of the transmission line is predicted this should mean that there is a clear commitment by WEPC to increase tower the tower height to avoid such clearing and/or planting of supplemental low-growing shrubs suitable as chat habitat. At present the WEPC indicated these measures will only 'be considered' and this should change to a solid commitment to replace that which is lost or change tower height to avoid vegetation loss.*"

WEPC Response:
WEPC commits to minimizing the necessary clearing of vegetation in chat-occupied and suitable habitat along the transmission line through strategic corridor alignment, tower placement and increasing tower height where this is technically and reasonably practical. There is however one point along the existing BC Hydro 5L98 line transmission line where the new line will have to cross under the existing line. This junction point is in the vicinity of the 2006 chat "Highliner" territory. Using site-specific information on chat habitat use, WEPC will attempt to optimize the crossing point and alignment in order to minimize chat habitat impacts in this area. WEPC also commits to restoring any impacted areas in suitable chat habitat by planting supplemental low-growing shrubs. As mentioned above, chat habitat projects will also be a priority for the terrestrial compensation program.

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EC Comment re Comment Ref 19: *"How does WEPC define 'high levels of roadkill' that would warrant consultation with regulatory agencies, MoT and third parties? Our recommendation is that if roadkill occurrences of individual species exceed a doubling of the number of roadkill of listed species found during annual surveys during the pre-construction phase, then this would constitute a need for consultation. The WEPC should not wait to initiate consultation until the entire period of May to October in the year of construction has passed, but should initiate consultations as soon as the number of roadkills PER species has occurred. It should not be the responsibility of regulatory agencies, MoT and third parties to cost share an agreed upon mitigative measure. This cost should be borne by the WEPC."*

WEPC Response:
Roadkill surveys will be conducted annually prior to and during construction. As such, an index of listed species roadkill mortality during construction will be tracked on a monthly basis and compared to the monthly levels during the pre-construction phase. If listed species roadkills exceed a doubling of pre-construction values, WEPC will initiate consultation with the appropriate agencies to develop and implement effective mitigation in a timely manner.

If roadkill mortality of listed species doubles within the project area and that increase could be clearly attributed to increased traffic associated with the WEP, then WEPC would commit to covering reasonable costs associated with developing and implementing mitigation measures. This commitment relies on the assumption that "roadkill hotspots" (i.e., problem areas where mitigation can be effectively targeted) can be identified.

As previously indicated, WEPC will also strive to minimize incremental increases in roadkill mortality by having the contractor promote awareness of listed species and the need for driver caution, and encourage workers to carpool.

EC Comment re Comment Ref 20: *"There is a need to conduct snake den surveys in April of the year preceding initiation of construction. If surveys were not conducted in April in any of the preceding years, then these surveys should be completed this coming April prior to construction."*

WEPC Response:
Presence/not detected surveys for snakes were conducted during May and June of 2004 (Machmer et al. 2005). These surveys covered the transmission corridor, powerplant, excavated rock disposal and other work sites. During the surveys, features such as rocky outcrops with cracks/fissures suitable for snake denning (especially if accompanied by shed skins) were noted as being relatively abundant in the project area, but no active snake dens were confirmed. In late April of 2004 and 2005, two dens previously active at Beaver Creek Provincial Park and Four Mile Creek were monitored weekly, but snake use was not confirmed. Supplementary wildlife and vegetation surveys (including presence/not detected surveys for snakes) were conducted at

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additional candidate work/deposition areas (e.g., Worksites F and L) in early May of 2005, but no listed snake activity or dens were confirmed.

Systematic snake den surveys have not been conducted throughout project areas in April, but given the terrain (dry, sandy and rocky soils with abundant rock outcrops, cracks and fissures) that covers substantial portions of the project area, it would be difficult to comprehensively survey all sites. WEPC will commit funding for five days of snake den surveys in April in the year proceeding construction, focusing specifically on portions of the primary study area with high den potential based on previous herptile surveys.

EC Comment re Comment Ref 21: *"Documentation of the number of vehicles that do occur on the roads post-construction would support the statement by the WEPC that traffic will not be significantly greater than currently exists. Accordingly, Environment Canada recommends a monitoring program to measure traffic volume, roadkill occurrences (birds, reptiles, and amphibians), and to commit consulting with relevant agencies and mitigate impacts in this regard. The monitoring program should last at least 2 years post construction."*

WEPC Response:
The assertion that WEP-related traffic will not be significantly greater post-construction than at present is based on realistic workforce projections for maintenance and operation of the new facilities as it is essentially an unmanned facility. Other non-project related factors will influence traffic volume and roadkill rates to a much greater degree than the project possibly could.

EC Comment re Comment Ref 22: *"Removing (collecting or shepherding) skinks from habitats impacted during construction is not an adequate method to remove threats to skinks. Skinks maintain small home ranges and high site fidelity to those areas as do most reptiles. Removal of reptiles to alternate habitats results in wandering by the individuals back the original home range (which may have been destroyed by construction) and can result in increased mortality of reptiles during migration back to their home range. Where skinks occur, rather than moving them, setbacks should be provided to protect the home range of individuals."*

WEPC Response:

The mitigation measure of collecting and shepherding western skinks was proposed specifically for those powerplant areas subject to excavation and for Worksite F, subject to dredged sediment deposition. In these specific areas, some mortality of skinks may be unavoidable (due to the spatial constraints for the positioning of the plant and infrastructure at the site).

Hence collecting individuals active aboveground from April to October and moving them to safe areas with suitable habitat was deemed preferable to doing nothing in the way of mitigation at these specific sites.

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As previously indicated, the excavation footprint will be minimized to the extent possible and fenced to prevent animals from venturing in. To address unavoidable impacts (including those that might occur to skinks), WEPC has committed to a $350,000 terrestrial compensation program intended to fund inventory, habitat enhancement and stewardship efforts for listed species.

It is noted that during the spring/summer of 2006, construction of a new switchyard was commenced by others on their private land, which includes Worksite F. That ongoing construction involves substantial site excavation, re-contouring, concrete work, infrastructure development and associated disturbances. Photos taken recently in this area are attached. As a result of the new work, the character of Worksite F (which WEPC plans to use for forebay sediment placement and re-vegetation) has been and is being significantly altered from that surveyed in preparing our EACA. Accordingly, it is WEPC's intention to conduct a further baseline review of this area prior to its use by our project.

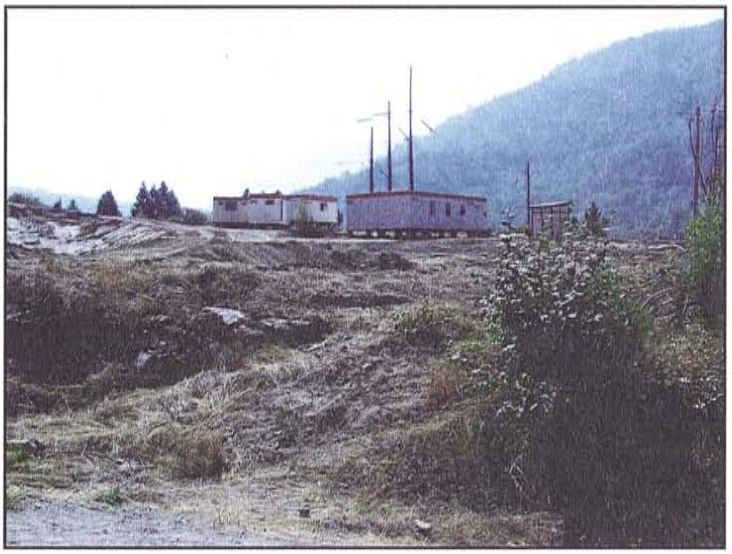
We trust these responses will enable Environment Canada's Science Technology Branch to conclude that WEP will have no significant impacts for the species discussed.

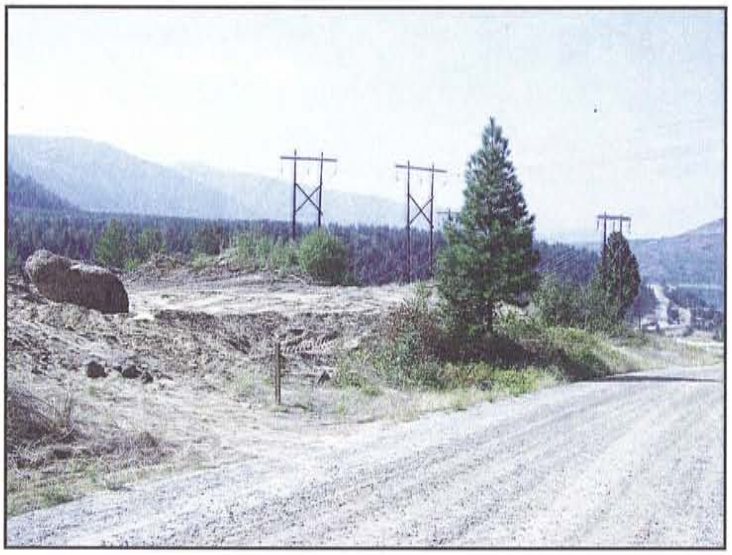
Yours truly,

Bill Freeman
Vice President

cc: Dr. Christine Bishop, Science and Technology Branch, Environment Canada
Linda Sullivan, Canadian Environmental Assessment Agency
Brian Murphy, BC Environmental Assessment Office

Recent Photos of New Work by Others in WEP's Planned Worksite F





APPENDIX 4 – PROPONENT'S COMMITMENTS

[The documents in Appendices 4-1 and 4-2 were prepared by the Proponent]

Appendix 4-1 – Owner's Commitments, Revised, September 28, 2007 (Waneta Hydroelectric Expansion Project, Environmental Assessment Certificate Application, Volume 1, Section 11, Appendix 11A).

Appendix 4-2 – Owner's Environmental Requirements for Construction, Sections A-G, Revision 2, January 15, 2007 (Waneta Hydroelectric Expansion Project, Environmental Assessment Certificate Application, Volume 1, Section 9, Appendix 9A).

Appendix 4-1 – Owner's Commitments, Revised, September 28, 2007 (Waneta Hydroelectric Expansion Project, Environmental Assessment Certificate Application, Volume 1, Section 11, Appendix 11A).

[The following document was prepared by the Proponent]

OWNER'S COMMITMENTS
Revised, September 28, 2007

OWNER'S COMMITMENTS -- GENERAL	
1.	During the Application Review Stage of the WEP Environmental Assessment Certificate Application, WEPC will initiate further communications and consultation to explain the environmental impact assessment that has been completed, the mitigation and compensation that will be provided, and to respond to and record final public, stakeholder, First Nation and government agency questions. Commitments of the proponent arising and documented during the EACA Review stage will be honored by WEPC.
2.	WEPC will contractually require its Design-Build Contractor to design and construct, and its O&M Operator to operate, the Project Concept in accordance with the requirements of the Project Environmental Assessment Certificate and any subsequent amendments.
3.	If the design of the Project Concept to be constructed could have materially adverse effects different from the Base Concept analyzed in this EACA, WEPC will submit such information and any additional mitigative measures for review by applicable agencies and possible EAC amendment.
4.	All permits licences and approvals (PLAs) required for WEP construction and/or operation will be acquired and WEPC will require its Design-Build Contractor and its O&M Operator to adhere to those PLAs.
5.	With regard to regulatory and other environmental management responsibilities assigned to the Design-Build Contractor: (a) The Design-Build Contractor will be required to design and construct the Project Concept in accordance with a detailed statement of WEPC's Environmental Requirements for Construction (OERC) and which OERC will require compliance with the requirements of the EAC; (b) The Design-Build Contractor, as required by the OERC, will retain an Environmental Manager, and as necessary supporting staff, and prepare environmental work plans (EWPs) for the review and acceptance by WEPC; (c) The Design-Build Contractor's Environmental Manager, as required by the OERC, will be required to provide environmental monitoring of the Design-Build Contractor's Work for conformance with the OERC; (d) An independent Project Environmental Monitor retained by WEPC (directly or through its Owner's Consultant) will monitor generally the performance of the Environmental Manager, will audit the performance of both the Environmental Manager and the Design-Build Contractor, and will provide scheduled reporting to regulatory agencies.
6.	With regard to any regulatory and other environmental management responsibilities assigned to O&M Operators, WEPC will monitor and conduct routine audits of the O&M Operator's compliance.

7.	If monitoring indicates the project is resulting in any unanticipated and unauthorized harmful alteration, disruption or destruction of fish habitat (HADD), WEPC will work with DFO and others as appropriate to address those impacts.
8.	WEPC will enter into negotiations with private property owners for permanent Statutory Right-of-Ways over private lands for the construction and maintenance of the WEP transmission line, and for temporary access across private lands during construction.
First Nations Relations	
9.	The WEP final Project Concept to be constructed will not preclude the ongoing potential for future fish passage or fish resource use of concern to First Nations.
10.	WEPC will encourage the Design-Build Contractor to explore opportunities for purchasing goods and services from ONA and KNC businesses. The strength of the Design-Build Contractor's commitments to explore such opportunities will be one of the many factors taken into account in the evaluation and selection of the Design-Build Contractor.
11.	WEPC will work with the KNC and the ONA to identify and assist ONA and KNC candidates willing to receive special training to qualify them for on-site positions and willing to relocate to the project area if new entrant positions can be available under the collective labour agreement.
12.	WEPC will identify KNC and the ONA internal expertise in environmental management and will inform the ONA and KNC of any opportunities to provide environmental monitoring services, which WEPC may contract directly.
13.	WEPC will negotiate and provide project-related community benefits with the ONA and KNC.
14.	WEPC will continue pre- and post-project information sharing and project consultation, including: • The regular reports prepared by the Project Environmental Monitor for regulatory agencies upon request will be provided to the KNC and ONA; • Copies of WEP Environmental Work Plans will be made available to appropriate agencies and to the ONA and KNC for their information, if requested; • WEPC will review, consider and respond to any concerns raised by the KNC or the ONA with respect to the adequacy or provisions of any Environmental Work Plans, or arising from regular environmental monitoring reports; • The ONA and KNC will be consulted in the development of the fish compensation program and monitoring program; • The KNC and ONA will be included on the list of recipients for the results of monitoring involving listed species; • The KNC and ONA will be included on the list of recipients for information regarding details of the methodology employed to ensure there are no possible adverse impacts to fish and aquatic habitat from disturbance of the forebay sediments; WEPC will involve the ONA and KNC in any post-EACA environmental approvals it may seek, which as a condition of approval, require public and/or First Nations consultation.

OWNER'S COMMITMENTS -- SPECIFIC TO CONSTRUCTION	
15.	Specific project commitments pertaining to construction assignments, including but not limited to the acquisition of pertinent construction PLAs, the preparation of Environment Work Plans (EWPs), and the delivery of pertinent construction environmental management and mitigation, will be delegated by WEPC to individual Contractors(s) and provided in an OERC.
16.	WEPC will conduct regularly scheduled compliance audits on the Contractor. Scope of audits will include: a) compliance with environmental legislation; b) compliance with conditions of PLAs (including the EAC); c) compliance with environmental provisions of the contract including the OERC ; and d) compliance with approved EWPs.
17.	WEPC will use all reasonable efforts to have the project constructed under labour conditions which achieve the objectives of the collective labour agreement that presently exists between the Columbia Hydro Constructors (CHC) and the Allied Hydro Council (AHC) and, to the extent permitted by applicable law, to maximize the employment benefits associated with the Waneta Expansion Project to communities in the local area and the Columbia Basin.
18.	The labour conditions for the Project will, to the extent permitted by applicable law, provide for preferential employment of local area people and will establish targets for local area equity hiring and training.
Aquatic Environment	
19.	WEPC will require the Design-Build Contractor to construct the Project without modification of river flows except for safety and/or environmental reasons associated with specific construction activities.
20.	Contaminated forebay sediments will be removed prior to excavation of the WEP intake approach. WEPC will prepare, or require its contractors to prepare, a detailed Contaminated Materials Management EWP for the removal and management of contaminated material from the headpond, in accordance with regulatory requirements to protect fish and aquatic habitat. This work will be monitored throughout. During powerplant commissioning and initial powerplant operation, WEPC will undertake monitoring to verify that remaining sediments are not being mobilized. If unexpectedly mobilization of contaminated sediment occurs, WEPC will take whatever measures may be required to prevent or mitigate adverse effects.
Terrestrial Environment	
21.	To minimize the potential for wildlife disturbance and roadkill mortality, prior to and during construction, roadkill (with emphasis on herptiles) will be monitored. If monitoring reveals excessive roadkill from project related traffic, WEPC will consult with regulatory agencies, MoT and involved third parties – including First Nations - on appropriate mitigative actions. WEPC will cost share agreed upon mitigation measures with appropriate provincial agencies.

22.	Prior to start of construction, occurrences of listed plant communities in work areas will be surveyed, marked and fenced during the flowering season. To compensate for any material loss of listed plant communities in project Worksites where disturbance is unavoidable, WEPC will establish a program to experimentally transplant listed plants, directly or indirectly, from areas of unavoidable disturbance to a suitable nearby location.
23.	WEPC will monitor use by Lewis' woodpecker at Worksite A3 and, if warranted, will identify another potentially suitable nearby breeding site that will be enhanced to provide comparable habitat.
24.	In cooperation with other stakeholders, WEPC will develop and/or co-fund cooperative weed control initiatives in areas potentially impacted by project facilities.
25.	Subject to the likelihood and timing of expected Project impacts, specific mitigation activities to reduce WEP construction effects on sensitive species (including ground squirrels, Lewis's woodpecker and ospreys) will be developed in consultation with regulatory agencies.
26.	WEPC will provide $50,000 per year over 7 years (to a total of $350,000) for a Terrestrial Compensation Program to compensate for non-mitigatable terrestrial effects. Suggested optional activities are: (a) Participation in listed plant community and species inventory. (b) Participation in local recovery planning and initiatives for listed animal species impacted by WEP. (c) Participation in a wildlife tree creation project to create additional valuable wildlife trees over and above those provided as mitigation for transmission line construction. (d) Enhancement of terrestrial habitats at or near the WEP site. (e) Habitat protection through land acquisition or other means of valuable habitat conservation. WEPC will seek to have Trail Wildlife Association and First Nations involved in the Terrestrial Compensation Program Steering Committee and to participate in the planning and delivery of WEP program compensation activities.
27.	To minimize potential cumulative impacts on listed species known to be in the area, WEPC will seek the cooperation of other area line operators to schedule their planned transmission line maintenance concurrently with WEP transmission line construction.
28.	Vegetation to be used in site restoration plantings will include plants occurring in the project site area of cultural significance to First Nations and will be chosen in consultation with the First Nations.
29.	WEPC will make information available during all phases of project development to enable local individuals and businesses – including those of the KNC and ONA - to avail themselves of Project-related opportunities.

30.	WEPC will establish a Community Impact Management Committee (CIMC) to review socio-economic impacts, monitor information to help WEPC to meet its objectives, oversee implementation of management measures to address any unforeseen adverse socio-economic project impacts, and provide reports to inform the residents of the region. With respect to CIMC membership: • The CIMC will include a representative from the RDKB, as well as other members of the community; • ONA and KNC will be invited to participate on the CIMC; • The Trail Wildlife Association will be invited to participate on the CIMC.
31.	To monitor project effects on the various elements of the socio-economic environment, WEPC will retain a Socio-economic Monitor who will report to the Community Impact Management Committee.
32.	WEPC will require the Design-Build Contractor to keep track and report on local and First Nations procurement of materials and services during project construction.
33.	WEPC will require the Design-Build Contractor to communicate with local recreational clubs and equipment outlets and post notices in local newspapers to draw attention to increased traffic on Highway 22A during construction.
OWNER'S COMMITMENTS -- SPECIFIC TO OPERATIONS	
34.	WEPC will prepare and implement for WEP an Operations, Maintenance and Surveillance Plan and an Emergency Preparedness Plan (EPP) per requirements of and in accordance with B.C. Dam Safety Regulations.
35.	WEPC will prepare for and respond to Accidents and Malfunctions in accordance with all applicable law, requirements of regulatory agencies, and good industry practice.
36.	WEPC will make the results of monitoring studies involving listed species available to the respective recovery teams and has indicated its willingness to participate in local recovery initiatives for listed species impacted by the project.
37.	If Teck Cominco agrees to make the site available for such use, and if the RDKB agrees to contribute to on-going maintenance, WEPC will establish an information/interpretive centre immediately south of the Waneta bridge.
Aquatic Environment	
38.	WEPC will work cooperatively and coordinate the operation of WEP with the operation of the existing Waneta plant to put in place an enhancement of the existing White Sturgeon Flow Augmentation Program, as identified as WSFAP-PPE in the EACA Supplemental Analysis, or otherwise agreed. WEPC will also participate in any future sturgeon flow discussions initiated with other Pend d'Oreille water licensees, and cooperate in the implementation of any mutually agreed upon changes, or such changes that may be ordered by the Comptroller of Water Rights.

39.	A shallow water fish compensation program will be developed to satisfy the requirements of the project Fisheries Authorization. Program details will be developed and provided in the application for the Fisheries Authorization for approval by DFO. The compensation plan to be submitted will include a habitat balance sheet that demonstrates how the no net loss objective will be achieved. The shallow water habitat monitoring proposal will incorporate the concepts identified below, for inclusion in the Fisheries Authorization application: • Water level monitoring of habitats located downstream of the project, as well as the Waneta bar; • Verification of predicted changes to shallow water habitat productivity through application of the Brilliant Expansion Productive Habitat model which will be based on primary (periphyton) and secondary (benthic invertebrates) recovery data from the Columbia River; and, • Monitoring of fish stranding in connection with flow changes, with special consideration for listed species such as Umatilla dace (Rhinichthys umatillus), Columbia mottled sculpin (Cottus hubbsi), and shorthead sculpin (Cottus confusus).
40.	WEPC will undertake monitoring that may be required to increase the certainty that no Project-related effects will occur to white sturgeon related to flow characteristics associated with passing Boundary flow-through, by implementing a spawning season program to confirm model near-bottom velocity predictions related to actual flows, and by implementing a six year study of the incidence of pre-and post-project egg predation during white sturgeon spawning and incubation. The Terms of Reference for the monitoring will be sent to DFO for approval in consultation with the UCWSRI Technical Working Group and may include a pilot year if it is agreed that there is a need to validate the methodology. If warranted based on statistically significant monitoring results or further scientific research relating to Pend d'Oreille flows and white sturgeon recruitment, WEPC will negotiate and implement specific changes to flow augmentation as required.
41.	A TGP monitoring program will be conducted once WEP becomes operational to verify that WEP does not increase TGP and to obtain data to recalibrate the existing TGP production model, and will keep U.S. stakeholders updated on plans and results through its participation in the Transboundary Gas Group.
Terrestrial Environment	
42.	Vegetation Management Requirements will be developed that incorporate site- and species-specific guidelines into an overall treatment prescription to provide direction to the O&M Operator for the maintenance of the new transmission line.
43.	Vegetation management in chat-occupied and chat-suitable breeding areas will be subject to a special prescription (including exclusion of cattle from chat habitat on WEPC owned lands) until such time that it may be determined and agreed by agencies that chats are no longer using the area, or that special prescriptions are offering no positive benefits for chats.
44.	Annual surveys for chat breeding activity and reproductive success will be continued over the first few years of operation to further identify chat breeding activity. The results will be evaluated to identify effectiveness of chat protection measures.

45.	WEPC will maintain an inventory of listed plant species and communities on the transmission line ROW and will make the data available to the O&M Operator to allow it to implement the provisions of the Vegetation Management Requirements.
46.	WEPC will share monitoring information on listed plant and animal species with other line owners/operators and will seek to coordinate the scheduling of maintenance activities with those owners/operators to minimize cumulative impacts on listed species and their habitats.
47.	Systematic monitoring using visual inspection and photo-monitoring techniques will be conducted to determine the success of the re-vegetation program and the transplanted listed plants.
48.	WEPC will conduct annual inspections during the first three years after the snow melts and take remedial action as required to repair any material erosion or prevent a potential wash out of transmission line access roads. After the first three years, access road condition will be monitored as part of the regular transmission line inspection program.
49.	Wood pole disposal practices of the O&M Operator will be reviewed to verify that they conform to standard industry practices and Environment Canada guidelines for disposal of industrial treated wood.
Follow-up Program	
50.	WEPC will assess the accuracy of the impact assessment predictions for construction of the Project, and evaluate the effectiveness of the mitigative measures to the end of the construction period. WEPC will submit to Fisheries and Oceans Canada and Transport Canada an outline of a follow-up report that incorporates these elements prior to initiating the report, and will complete this report within two years of completion of construction. The outcome of longer-term monitoring for the remaining elements of the construction and operation of the Project including those involving SARA listed species will be reported out separately.
Additional Commitments	
51.	WEPC will include a requirement for measures that exclude sturgeon from the draft tube when a unit is shut down as a power plant design criteria. WEPC will review the proposed measures with DFO as part of the project design review process.

Appendix 4-2 – Owner's Environmental Requirements for Construction, Sections A-G, Revision 2, January 15, 2007 (Waneta Hydroelectric Expansion Project, Environmental Assessment Certificate Application, Volume 1, Section 9, Appendix 9A).

[The following document was prepared by the Proponent]

The Proponent has developed Environmental Management Programs for construction and operation and has set out the details of these programs in the Application. The Proponent has also made commitments to ensure monitoring of, and compliance with these Environmental Management Programs.

The Project Environmental Management Program for Construction covering both the powerplant and the transmission line incorporates the specific and general commitments made in the Application and in the responses to comments on the Application. The Environmental Management Program for Construction puts responsibilities on the Proponent and, through construction contracts, on the Contractor, and includes accidents and malfunctions provisions. As part of its Environmental Management Program for Construction and as described in the Application, the Proponent has clearly established roles and responsibilities and lines of communication involving both the Proponent and the Contractor, and has set out monitoring and reporting protocols. The Environmental Management Program for Construction has at its core a detailed Owner's Environmental Requirements for Construction which reflects commitments and undertakings made by the Proponent and specifies the standard industry management practices that will be applied to avoid or mitigate the majority of potential adverse construction effects on the environment. In addition, the Owner's Environmental Requirements for Construction includes special management measures created to avoid or mitigate those specific potential adverse effects that are outside the scope of standard practices due to environmental issues peculiar to the Site.

The Owner's Environmental Requirements for Construction sets out comprehensive objectives, criteria and requirements that the Contractor will be required to follow in the construction of the Project. The Owner's Environmental Requirements for Construction requires the Contractor to carefully plan, schedule and perform construction activities in a manner that will not result in adverse effects on the environment greater than those described in the Application. A key element of the Owner's Environmental Requirements for Construction is the requirement for the Contractor to develop Environmental Work Plans to describe the means and methods that the Contractor will use during construction to meet the requirements of Permits, Licences and Approvals and to meet the objectives, criteria and requirements of the Owner's Environmental Requirements for Construction.

The Project Environmental Management Program for Operations incorporates the specific and general commitments made in the Application and in the responses to comments on the Application for the operation and maintenance of the Project. The Environmental Management Program for Operations puts responsibilities on the Proponent and, through operation and maintenance contracts, on the Operations and Maintenance Operators. The Environmental Management Program for Operations will incorporate, in specific environmental plans, the mitigation and protection measures developed in the Application for Operations and Maintenance Operators. Powerplant

Operations and Maintenance Operators procedures will address accidents and malfunctions and include site environmental management and public safety management. Transmission line Operations and Maintenance Operators procedures will also address associated accidents and malfunctions and include vegetation management, access road maintenance and treated pole replacement and disposal.

Both the Environmental Management Program for Construction and the Environmental Management Program for Operations will be under the jurisdiction of the Proponent and the Proponent has established detailed Quality Assurance monitoring and auditing procedures for implementation in the respective phases of the Project.

OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION A - GENERAL

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OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION A – GENERAL

A1. INTRODUCTION

A1.1 Overview

(a) The Owner is committed to having the Contractor perform the work required to construct the Waneta Expansion Project in an environmentally sensitive manner and with due regard to the protection of the environment and leaving the lands used during construction in an environmentally acceptable state.

(b) These Owner's Environmental Requirements for Construction are the elements of the Owner's Project Environmental Management Program that are assigned to the Contractor, and include requirements for:

(i) Division of the Project Site into Worksites that include Environmental Protection Zones and Restricted Activity Zones.

(ii) An Environmental Manager engaged by the Contractor to be responsible for preparing and administering the Contractor's environmental management plan.

(iii) The Contractor's environmental management plan includes environmental work and task plans which form the basis for the protection of the environment during the construction of the Waneta Expansion Project.

(iv) Restoration of the lands used for the construction of the Project.

(c) These Owner's Environmental Requirements for Construction, together with the applicable requirements of Permits, Licences and Approvals for the Project provide the requirements for the protection of the environment during construction of the Project.

(d) The Environmental Assessment Certificate issued for the Project includes terms, conditions and provisions relating to the design, location, construction and operation of the Project.

(e) Where EWPs or other documents are required by the OERC to be submitted to the Owner for review and acceptance, or where the OERC refers to environmental or other monitoring performed by the Owner, the Owner may do so directly or through the services of the Owner's Consultant.

A1.2 Objectives

(a) It is the objective of the Owner to protect and safeguard environmentally sensitive areas within the vicinity of the Project and the Contractor shall take all means and measures required to achieve this objective in the performance of the work.

(b) The Contractor shall meet the following overall environmental management objectives for the Project:

(i) Adverse environmental effects resulting from the design, construction and operation of the Project shall be no greater than those described in the application for the Environmental Assessment Certificate;

(ii) The Contract shall be completed with due regard for the protection of the environment; and

(iii) Work to protect the environment shall be managed in an effective and efficient way.

A1.3 Definitions

Where used in the Owner's Environmental Requirements for Construction, the following terms, whether capitalized or not, shall have the meanings ascribed to them unless the context otherwise expressly requires:

(a) "Applicable Law" means all applicable statutes, regulations, orders and legal requirements of Authorities Having Jurisdiction regarding protection of the environment.

(b) "Authorities Having Jurisdiction" means regulatory agencies, boards and other authorities who, pursuant to Applicable Law, have authority or jurisdiction over the Project with regard to protection of the environment.

(c) "BNSF" means the Burlington Northern Santa Fe Railway, which is the entity that owns the railway track and the associated rights of way that pass through or are immediately adjacent to the Site.

(d) "Clearing" when used in the context of Site Preparation and/or the removal of vegetation means the removal of trees, shrubs and brush to ground level or to a prescribed height above ground level.

(e) "Danger Trees" or "Hazard Trees" means trees that present or are likely to present a safety hazard to workers, or trees in the Tree Management Zone that pose a threat to the security of the transmission line.

(f) "DFO" means Fisheries and Oceans Canada (formerly the Federal Department of Fisheries and Oceans)

(g) "Dilution Zone" means an area extending 100 m downstream from a discharge point and occupying not more than 50 percent of the stream width.

(h) "EAC" means the Environmental Assessment Certificate issued for the Project, including any amendments that may be issued.

(i) "EACA" means the application for the EAC, including any amendments that may be submitted.

(j) "Electrical Clearance Zone" and "ECZ" mean a zone beneath the transmission line that is subject to specific clearing requirements for electrical safety and transmission line security.

(k) "Environmental Protection Zone" and "EPZ" mean an environmentally sensitive zone in or adjacent to a construction work area or support facilities area that must be protected by the Contractor.

(l) "Environmental Work Plan" means a plan prepared by the Contractor that sets out the methods, procedures and work that the Contractor will use to meet the specified environmental requirements.

(m) "Equipment Operating Fluids" means all petroleum-based and vegetable-based products used in the operation of equipment and vehicles, including gasoline, kerosene, diesel fuel, lubricating and hydraulic oils, grease, de-greasers and engine coolant.

(n) "Equipment" includes all vehicles, plant, equipment (including hand-held equipment), machinery and ancillary facilities used in the construction of the Project or which forms part of the permanent works for the Project.

(o) "EWP" means Environmental Work Plan.

(p) "Growing Season" means the period from April 1st to October 31st.

(q) "Grubbing" when used in the context of Site Preparation means the removal of stumps and large root systems.

(r) "KFIR" means the Kettle Falls International Railway, which is part of Omnitrax, and which is the entity that has a lease to operate the railway track that passes through or is immediately adjacent to the Site.

(s) "Liquids" means hazardous liquids that may harm the environment if spilled or otherwise released into the environment; or that may adversely affect the health of persons or Wildlife, and includes all Equipment Operating Fluids.

(t) "Listed" or "Listed Species" when used in the context of wildlife and vegetation means all wildlife and vegetation species identified by Applicable Law on lists as species endangered, threatened or of "special concern" federally (COSEWIC lists and SARA Schedules), or "red" or "blue" listed provincially (BC Conservation Data Centre). "Listed Species of plants" includes listed plants and communities of listed plants.

(u) "OERC" means the Owner's Environmental Requirements for Construction.

(v) "Owner's Consultant" means the consulting firm retained by the Owner to administer the Contract on behalf of the Owner.

(w) "Owner's Requirements" means the general technical requirements for the design and construction of the Project, and which include the OERC.

(x) "Permits, Licences and Approvals" means the permits, licences and approvals issued for the Project, including any required authorizations under the *Fisheries Act*.

(y) "PLAs" means Permits, Licences and Approvals.

(z) "Project Specific Water Quality Criteria" means the water quality criteria for Receiving Waters given in the table in Section D2.1.

(aa) "Railway Lands" means the BNSF rights of way that pass though or are immediately adjacent to the Site.

(bb) "Receiving Waters" means those waters outside the Dilution Zone.

(cc) "Restricted Activity Zone" and "RAZ" mean an area in which construction-related activities are restricted for environmental reasons or to protect the safety of persons and property.

(dd) "River Monitoring Points" means the locations for river water quality monitoring as given in the table in Section D8.1.1.

(ee) "Site" and "Project Site" means all of the lands used for construction of the Project as designated on the OERC Drawings.

(ff) "Site Preparation" refers to those activities of clearing, grubbing and stripping that are associated with the preparation of Worksites for construction and construction support activities.

(gg) "Site Boundaries" means the boundaries of a Worksite within which the Contractor shall contain the Work.

(hh) "Spur Roads" means new access roads and trails from existing access roads to Transmission Line structure sites and to other Transmission Line locations that must be accessed by equipment, including trails for clearing activities.

(ii) "Stop Work Order" means an order directed to the Contractor to cease those construction activities specified in the order.

(jj) "Stripping" when used in the context of Site Preparation means the removal of surface soils to a depth of 300 mm.

(kk) "Surface Blast" and "Surface Blasting" means the use of explosives on the surface of the ground or in open excavations, and also includes underground blasting where flyrock could be released that may cause injury to persons or damage to property on the surface.

(ll) "Teck Cominco" means Teck Cominco Metals Ltd.

(mm) "Temporary Work Areas" means Worksites or those areas within Worksites used for temporary construction facilities, support areas and other temporary uses during construction, including site office areas, parking areas, carpenter's shops, rebar fabrication yards, staging areas, storage areas, warehouse areas, workshops, Equipment servicing areas, aggregate processing areas, concrete production areas, and the like.

(nn) "Timing Window" means the only period within which construction activities may be undertaken in an environmentally sensitive area, as designated by an Authority Having Jurisdiction or as specified in the OERC.

(oo) "Transmission Line" means the WEP transmission line and its associated ECZ and TMZ.

(pp) "Tree Management Zone" and "TMZ" mean the zone outside of, and contiguous with, the ECZ where trees could threaten the security of the transmission line because they are overly high or pose an unacceptable risk of toppling due to their location and their root, lean and trunk structures.

(qq) "Waneta Bridge" means the Highway 22A bridge over the Pend d'Oreille River.

(rr) "Waneta Headpond" means the body of water impounded by the Waneta Dam and includes the forebay immediately upstream of the dam.

(ss) "Waneta Interface Protocol" means the agreement between WEPC and Teck Cominco that establishes the protocols for the interfaces between the construction and operation of the Project and the Waneta Dam.

(tt) "Watercourse", "watercourse", "creek", "stream", "ephemeral stream", "streambed" and "waterbody" may be used interchangeably and apply to all watercourses and bodies of water without limitation, including all rivers, canals, ditches, lakes, ponds, and wetlands.

(uu) "WEP" means the Waneta Expansion Project.

(vv) "Wildlife" means all wildlife, including all mammals, fish, birds, bats, herptiles, butterflies, moths and dragonflies.

(ww) "Work" means all activities involved in and associated with the design, construction and commissioning of the Project.

(xx) "Worksite" means an area of the Site designated as such on the OERC Drawings.

(yy) "Worksite Isolation" means the isolation by appropriate means of a Worksite or an area within a Worksite from the surrounding natural environment, or the isolation of EPZs or RAZs that lie within the boundaries of a Worksite.

A1.4 OERC Drawings

(a) The OERC Drawings are comprised of the following:

(i) **Figure 9A-1** – Project Area Overview;

(ii) **Figure 9A-2** – Powerplant Worksite;

(iii) **Figure 9A-3** – Powerplant Worksite and Worksites C1 and C2;

(iv) **Figure 9A-4** – Worksites A1, A3 and E;

(v) **Figure 9A-5** – Worksites D1, D2, D3 and D4;

(vi) **Figure 9A-6** – Worksites B, F, G, H, I and J;

(vii) **Figure 9A-7** – Transmission Line Worksite – Western Section;

(viii) **Figure 9A-8** – Transmission Line Worksite – Mid Section; and

(ix) **Figure 9A-9** – Transmission Line Worksite – Eastern Section.

A1.5 Background Information and Work by Others

A1.5.1 Public Safety

(a) Pedestrians, cyclists, rollerbladers and other members of the public use Highway 22A for recreational purposes. The Owner will communicate with local recreational clubs and equipment outlets and post notices in local newspapers to draw attention to the increased traffic on Highway 22A during construction. These communications will be used to discourage recreational activities along Highway 22A and to suggest alternative routes.

(b) In the interests of public safety, the Owner will request that the Ministry of Environment close the following areas to fishing and public access during periods of Surface Blasting:

(i) The Columbia River between the US Border and the crossing of transmission line 5L98;

(ii) The Pend d'Oreille River between Waneta Dam and the confluence with the Columbia River; and

(iii) The Waneta Headpond.

A1.5.2 Use of Worksites

(a) Temporary Work Areas can only be established in the Worksites shown on the OERC Drawings.

(b) All RAZS are subject to the RAZ limitations and restrictions specified in Section C2.

(c) Portions of Worksites A1 and A3 have been identified as potential areas from which fine aggregate may be recovered if the material meets the Owner's Requirements.

(d) The Base Concept assumes that the Contractor will set up aggregate processing and concrete batch plant facilities at Worksite A1, however these plants may be set up at other locations either on or off the Site. Subject to agreement between the Owner and MoT and at the Owner's sole discretion, aggregate processing could be carried out at Worksite D1 or D2; this area may also be suitable for a concrete batching plant. At the discretion of the Contractor, concrete may also be batched offsite and transported to the Site in conventional concrete truck mixers.

(e) In those areas where Site Boundaries are used to identify the interface between a Worksite and an environmentally sensitive area, the Owner will provide guidance to the Contractor by identifying in the field the straight-line transition points of the Site Boundary interface. In a similar fashion, the Owner will identify in the field boundary straight-line transition points of EPZ and RAZ boundaries.

A1.5.3 Terrestrial Resources

(a) Major draw, creek, creek bed and riparian areas affected by the Project have been included in RAZs and are generally shown on the OERC Drawings. Constraints associated with these RAZs are provided in Section C2, Worksite Isolation. Ephemeral creeks and associated riparian areas exist outside areas identified as RAZs, principally along the Transmission Line corridor, and these areas are most sensitive in the spring and in the early summer months. In most cases, these ephemeral creeks and riparian areas are crossed by existing access roads.

(b) Certain areas of the Site provide valuable habitat to certain Listed Species of Wildlife. The Owner will identify in the field to the Contractor prior to the commencement of construction valuable Wildlife habitat areas known to the Owner that may potentially be affected by construction.

(c) White-tailed deer overwinter in the Pend d'Oreille valley and are abundant throughout the Project area. Browsing is heavy at some areas of the Site, particularly in the middle elevations on benches above the Powerplant Worksite and along the Transmission Line. Mule deer, elk and moose also overwinter in Project areas and may be encountered along roads and in Transmission Line areas.

(d) Listed Species of birds use habitats on and adjacent to the Site and fly over the Site and area roads and are particularly sensitive to disturbance.

(e) Listed Species of bats live and roost in and adjacent to Site areas; some of these areas will be active during construction. Roost sites of Listed Species of bats known to the Owner that may be affected by the Work will be identified by the Owner to the Contractor in the field.

(f) Listed Species of butterflies are known to occur along the Transmission Line, near Worksites F and D, and in the vicinity of Project area roads.

(g) Listed Species of herptiles are known to frequent areas of the Site and area highways and access roads. Particularly sensitive areas include, but are not limited to, Highway 22A in the vicinity of Beaver Creek, Columbia Gardens Road, the Waneta-Nelway Road extending to the Seven Mile Dam Road, the Seven Mile Dam Road west and east of its intersection with the Waneta-Nelway Road and the Waneta-Nelway Road in the vicinity of the Four Mile Creek crossing, and all adjoining Site access roads.

(h) Listed Species of fish inhabit the Columbia River and the Lower Pend d'Oreille River in and adjacent to active Site areas.

(i) Listed Species of plants have been found on the Powerplant Worksite, and at Worksites D and F. Listed Species of plants may also exist on Site in areas other than the Powerplant Worksite. Prior to the commencement of construction the Owner will identify to the

Contractor in the field the locations of all Listed Species of plants known to the Owner on Site.

(j) Listed Species of birds known to the Owner are those listed birds identified in Section 3 of the EACA, namely:

(i) Great Blue Heron (*Ardea herodias*);

(ii) Lewis' Woodpecker (*Melanerpes lewis*);

(iii) Western Grebe (*Aechmophorus occidentalis*); and

(iv) Yellow-breasted Chat (*Icteria virens*).

(k) Listed Species of bats known to the Owner are those listed bats identified in Section 3 of the EACA, namely:

(i) Townsend's big-eared bat (*Corynorhinus townsendii*).

(l) Listed Species of butterflies known to the Owner are those listed butterflies identified in Section 3 of the EACA, namely:

(i) Immaculate Green Hairstreak (*Callophrys affinis*);

(ii) Eastern Tailed Blue (*Cupido comyntas*);

(iii) Monarch (*Danaus plexippus*);

(iv) Silver-spotted Skipper (*Epargeyreus clarus*);

(v) Colon Checkerspot (*Euphydryas colon*);

(vi) Arrowhead Blue (*Glaucopsyche piasus*);

(vii) Checkered Skipper (*Pyrgus communis*); and

(viii) California Hairstreak (*Satyrium californicum*).

(m) Listed Species of herptiles known to the Owner are those listed herptiles identified in Section 3 of the EACA, namely:

(i) Rubber Boa (*Charina bottae*);

(ii) Racer (*Coluber constrictor*); and

(iii) Western Skink (*Eumeces skiltonianus*).

(n) Listed Species of fish known to the Owner are those listed fish identified in Section 3 of the EACA, namely:

(i) White Sturgeon (*Acipenser transmontanus*);

(ii) Umatilla Dace (*Rhinichthys umatilla*);

(iii) Bull Trout (*Salvelinus confluentus*);

(iv) Columbia Mottled Sculpin (*Cottus bairdii hubbsi*); and

(v) Shorthead Sculpin (*Cottus confuses*).

(o) Listed Species of plants known to the Owner are those listed plants and communities of listed plants identified in Section 3 of the EACA, namely:

(i) Pink fairies (*Clarkia pulchella*);

(ii) Common Clarkia (*Clarkia rhomboidea*);

(iii) Porcupine grass (*Hesperostipa spartea*);

(iv) Spanish clover (*Lotus unifoliolatus*); and

(v) Narrow-leaved skullcap (*Scutellaria angustifolia*).

(p) Noxious and nuisance weeds based on Provincial and Regional weed lists identified on Site and/or in the Project area are:

(i) Burdock (*Arctium spp.*);

(ii) Canada thistle (*Cirsium arvense*);

(iii) Common tansy (*Tanacetum vulgare*);

(iv) Common teasel (*Dipsacus sylvestris*);

(v) Curled dock (*Rumex crispis*);

(vi) Dalmatian toadflax (*Linaria dalmatica*);

(vii) Diffuse knapweed (*Centaurea diffusa*);

(viii) Hoary alyssum (*Berteroa incana*);

(ix) Hound's tongue (*Cynoglossum officinale*);

(x) Orange hawkweed (*Hieracium aurantiacum*);

(xi) Plumeless thistle (*Carduus acanthoides*);

(xii) Purple loosestrife (*Lythrum salicaria*);

(xiii) Scotch thistle (*Onopordum acanthium*);

(xiv) Spotted knapweed (*Centaurea maculosa*);

(xv) St. John's Wort (*Hypericum perforatum*);

(xvi) Sulphur cinquefoil (*Potentilla recta*); and

(xvii) Yellow hawkweed (*Hieracium pratense*).

(q) Prior to Transmission Line clearing and construction of Spur Roads, existing roads and trails serving the existing transmission line corridors used for Transmission Line construction will be sprayed by the Owner in cooperation with BC Hydro, BC Transmission Corporation, Teck Cominco and/or others to control noxious and nuisance weeds. Depending on the level of subsequent weed invasion, this program may be repeated by the Owner or others in the spring of subsequent years when Transmission Line construction is in progress.

A2. CONTRACTOR'S ENVIRONMENTAL OBLIGATIONS

A2.1 General

(a) The Contractor shall perform the Work in a manner that meets all objectives and criteria of the OERC and shall comply with all provisions and requirements of the OERC, which is comprised of the following:

(i) Section A – General;

(ii) Section B – Public Safety, Traffic and Community Relations;

(iii) Section C – Worksites Preparation and Use;

(iv) Section D – Water Quality Management;

(v) Section E – Protection of Terrestrial Resources;

(vi) Section F – Waste and Hazardous Materials Management;

(vii) Section G – Site Restoration; and

(viii) The OERC Drawings.

(b) In addition to the PLAs to be obtained by the Owner, the Contractor shall obtain all other PLAs required to complete the Work and shall upon receipt promptly provide copies to the Owner.

(c) The Contractor shall not commence any part of the Work until all necessary PLAs for that part of the Work have been received by the Contractor in writing and submitted by the Contractor to the Owner.

(d) The Contractor shall perform the Work, shall take all reasonable and necessary measures and precautions, and shall provide all suitable equipment and facilities, as required so that construction activities have no adverse effects on the environment in excess of those allowed by Applicable Law, by the PLAs, or the Authorities Having Jurisdiction.

(e) The Contractor shall be responsible for providing and administering environmental inspection, supervision and monitoring of all effects of the Work on the environment and for all environmental monitoring required in support of the Work, all in accordance with the OERC.

(f) The Contractor shall not alter, damage, destroy, remove or clear trees, timber or shrubs, or disturb flora, fauna or watercourses, or pollute the environment to any extent greater than is reasonably necessary for the proper performance of the Work, and then only in strict accordance with the requirements of Applicable Law, the PLAs, the Authorities Having Jurisdiction, and the Contract.

(g) The Contractor shall perform the Contract in a manner that does not impede, inhibit or prevent the Owner from fully complying with and meeting all of the commitments and assurances given in Section 11 of the EACA.

(h) The Contractor shall plan and schedule all construction activities to minimize adverse effects on the environment to the greatest extent practicable.

(i) If there is any conflict between or among any provision of the EAC; the OERC; any standard, guideline or any other document referenced in the OERC; or in the event of any conflict between or among any provision of any of the foregoing and any provision or requirement of any Applicable Law, any Permits, Licences and Approvals, or any requirement of any Authority Having Jurisdiction, the provision that requires and results in the greatest environmental protection and the least environmental impact, as determined by the Owner, shall take precedence and govern.

A2.2 Environmental Staffing

(a) The Contractor shall retain full time on Site for the duration of the Work a resident Environmental Manager (the "EM") who is acceptable to the Owner. The Contractor shall demonstrate through submission of appropriate documentation and references to the Owner's satisfaction that the EM has at least the following minimum qualifications and experience:

(i) Relevant professional accreditations and/or training.

(ii) At least 5 years experience in environmental supervision and inspection of major civil engineering projects with large excavations, disposal of large volumes of excavated materials, concrete work, grading and drainage construction, in the prevention and control of slope erosion and drainage sedimentation, in comparable construction projects, and in the environmental aspects of clearing, grubbing, stripping and subsequent revegetation.

(b) Without limitation, the roles, duties, responsibilities and obligations of the EM shall include:

(i) Being fully aware of construction activities in progress at all times;

(ii) Issuing Stop Work Orders in the event that a construction activity is having, or potentially will have, an adverse effect on the environment and/or the activity is not in compliance with the PLAs and/or the OERC;

(iii) Requiring full compliance by the Contractor with all provisions of the Contract related to protection of the environment, including the OERC, the PLAs, Applicable Law, and the requirements of Authorities Having Jurisdiction;

(iv) Environmental inspection, monitoring and reporting during construction;

(v) The environmental content of all work plans, and reviewing and submitting environmental submittals required by the OERC;

(vi) Liaising with the Contractor, the Owner and Authorities Having Jurisdiction on all environmental matters and requirements;

(vii) Providing environmental awareness training and orientation to all construction personnel with respect to environmentally sound work procedures and practices, including awareness and understanding of the appropriate sections of the OERC;

(viii) Participating in pre-construction planning meetings with the Contractor to identify any potential environmental concerns and to recommend and develop appropriate mitigation measures for incorporation by the Contractor into the construction work plans and procedures;

(ix) Managing responses to Environmental Incidents;

(x) Conducting routine regular and random inspections of construction activities and practices; and

(xi) Preparing and submitting weekly reports (the "Environmental Weekly Report") to the Owner. These reports shall identify and document all environmental incidents and any violations of, or non-compliance with, the OERC and the PLAs, and the corrective actions taken or to be taken by the Contractor.

(c) The EM shall have a sufficient staff of Environmental Monitoring Technicians to enable the EM to carry out all of the responsibilities, duties, inspection and monitoring functions required by PLAs and the OERC in a timely and effective manner. All personnel used by the EM shall have sufficient relevant accreditations, experience and training for the tasks and duties assigned to them.

(d) If the EM does not have the requisite and demonstrated qualifications and field experience in the finding, identifying, monitoring and assessing of Listed Species and their habitats, then the Contractor shall retain a qualified biologist who has such requisite and demonstrated qualifications and field experience and who shall report to the EM.

(e) In all matters under the OERC relating to Listed Species, the EM (if the EM has the requisite and demonstrated qualifications and field experience in Listed Species) or a qualified biologist retained by the Contractor and reporting to the EM shall be responsible for:

(i) Determining whether Listed Species are present on, or using, the Worksites that will be used by the Contractor;

(ii) Determining and identifying to the Contractor on a site-specific basis the activity, breeding and/or nesting seasons of any Listed Species present, and identifying and delineating their habitats;

(iii) Determining acceptable levels and times of approach for construction activities and specific pieces of Equipment to the habitats of Listed Species;

(iv) Developing strategies acceptable to the Owner and to Agencies Having Jurisdiction for the avoidance and mitigation of potential adverse effects on Listed Species, and implementing those strategies through the applicable EWPs;

(v) Assisting the Contractor in the design of appropriate mitigation measures; and

(vi) Guiding the Contractor in the establishment of replacement habitat and/or the relocation of existing habitat where applicable.

(f) The findings and the results of monitoring and assessments of/by the EM or a qualified biologist retained by the Contractor and reporting to the EM shall be included in the Environmental Weekly Report.

A2.3 Environmental Monitoring and Reporting

(a) The EM shall prepare the Environmental Weekly Report in a form and with content acceptable to the Owner, and shall submit it weekly to the Owner's Project Environmental Monitor.

(b) The Environmental Weekly Report shall, for the week covered by the report, include the following information as a minimum:

(i) A summary of construction activities;

(ii) Details of any orders or directions given by the EM to suspend construction activities for the protection of the environment or to prevent non-compliance with the PLAs and the OERC, including steps taken to notify the Owner and, where required by Applicable Law or Authorities Having Jurisdiction, the applicable Authorities Having Jurisdiction;

(iii) A record of any and all environmental incidents and/or non-compliances with the PLAs and the OERC, including measures taken to mitigate the effects of such incidents and/or non-compliances, the current status of the incidents and/or non-compliances, and as applicable a description of the measures that will be taken to prevent future occurrences;

(iv) A summary of environmental monitoring personnel and equipment on Site, including days and shifts worked by such environmental personnel;

(v) A summary of the results of environmental sampling and testing undertaken and of test results received;

(vi) A summary of the resolution status of outstanding environmental non-compliance findings identified by the Owner or Project Environmental Monitor;

(vii) A summary risk assessment of the ongoing and future construction activities, with reference to the applicable work plans that contain or will contain the mitigation measures that will be implemented to achieve compliance with the OERC;

(viii) A listing and schedule for completion of work plans being updated/revised;

(ix) All other reporting required by the PLAs and the OERC; and

(x) Any new issues and concerns of the EM regarding compliance with the PLAs and the OERC.

A3. WORK AND TASK PLANS

A3.1 Environmental Work Plans

(a) The Contractor shall prepare and submit the EWPs specified in the OERC to the Owner for review and concurrence. Where design calculations are required to develop an EWP the design calculations shall be submitted with the EWP. Wherever possible, EWPs shall be in the form of drawings with text and detail boxes. Each EWP shall be thoroughly checked and signed by the EM prior to submission.

(b) Work covered by an EWP shall not commence until the EWP has received the written concurrence of the Owner. Mobilization to Site shall not commence until those EWPs specified in the OERC to be provided prior to mobilization have received the written

concurrence of the Owner. EWPs required prior to mobilization shall cover those activities that are required to complete mobilization and project start-up activities. The Contractor shall subsequently revise these EWPs to include expanded construction activities as construction planning proceeds.

(c) Each EWP shall show the methodologies that will be applied to avoid and/or mitigate all potential adverse environmental effects of the component of the Work covered by the EWP and clearly demonstrate how that part of the Work will be completed in accordance with PLAs and the OERC and applicable design codes.

(d) All EWPs shall be coordinated together and shall be consistent.

(e) The Owner's concurrence with an EWP will only be valid as long as the actual and/or anticipated conditions upon which the plan and its adoption were based continue to be applicable.

(f) EWPs shall be updated and revised as required by changing Site and environmental conditions and changes in Contractor procedures and methods of construction. All updated and revised EWPs shall be submitted to the Owner for review.

(g) The EWPs required by the OERC include as a minimum the following:

OERC Section B – Public Safety, Traffic and Community Relations

Public Safety Management EWP

Traffic Management EWP

Communications EWP

OERC Section C – Worksites Preparation and Use

Worksite Isolation EWP

Noise Control EWP

Air Quality Protection EWP

Site Preparation EWP

Excavation EWP

Excavated Materials Relocation EWP

OERC Section D – Water Quality Management

Water Quality Protection EWP

Erosion, Sediment and Drainage Control EWP

Grouting EWP

OERC Section E – Protection of Terrestrial Resources

Wildlife Protection and Monitoring EWP

Noxious and Nuisance Weed Control EWP

OERC Section F – Waste and Hazardous Materials Management

Contaminated Materials Management EWP

Spill Prevention, Preparedness and Response EWP

OERC Section G – Site Restoration

Site Restoration EWP

A3.2 Task Plans

(a) In addition to any task plans prepared by the Contractor to facilitate the execution of the Work, the EM shall require the Contractor to develop task specific plans ("Task Plans") when the EM or the Owner considers them necessary for a specific task to be executed in a manner that meets all of the requirements of an associated EWP and the OERC. Work shall not commence until the required Task Plan has been reviewed and approved by the EM.

(b) Task Plans shall contain sufficient detail of how the work will be performed in the field to make workers fully aware of the specific environmental protection measures required.

(c) Individual Task Plans may be requested for review by the Owner during the Owner's review of EWPs, or may be required to be identified in the EWP as a condition of acceptance of the EWP as Task Plans to be subsequently prepared by the Contractor and reviewed by the EM and the Owner prior to the commencement of a specific task.

A4. ENVIRONMENTAL TRAINING AND AWARENESS

A4.1 Requirements

(a) All staff and all workers on Site, including the staff and workers of all Subcontractors, shall be trained in environmental awareness and compliance with the environmental requirements of the Project, to a level of training commensurate with the part of the Work to be undertaken by that individual.

(b) The Contractor, through the EM, shall provide formal Project orientation and environmental awareness training on a regular basis for all workers engaged in Work on

Site. The Contractor shall not allow workers or staff members to commence work on the Site until they have satisfactorily completed their Project orientation and environmental awareness training.

(c) The EM shall prepare an attendance sheet for each Project orientation and environmental awareness training session that identifies the topics covered in that session and the names of all attendees.

(d) Project orientation and environmental awareness training shall include:

(i) An overview of applicable environmental legislation and of the OERC and the implications of terms and conditions of all PLAs with respect to planned construction activities;

(ii) A description of significant environmental issues relating to the design, construction and operation of the Project;

(iii) A review of basic ecological and environmental principles, processes, and interrelationships relevant to the Project;

(iv) Awareness of area sensitivities, including those related to Listed Species, and awareness of environmentally appropriate construction procedures and impact avoidance measures;

(v) A review of the requirements of the OERC and the responsibilities and obligations of each individual for environmental protection;

(vi) A review of the water quality protection and erosion, sediment and drainage control measures to be applied in the execution of the Work;

(vii) Identification of noxious weed species in the Project area and a review of weed control measures to be implemented during construction;

(viii) Archaeological awareness training relevant to the recognition of archaeological features and finds that may be encountered on Site; and

(ix) A review of Environmental Incident and spill response plans, including a review of the location and effective use of emergency response equipment.

(e) The Contractor shall submit the content of its proposed Project-specific environmental orientation and environmental awareness training program to the Owner for review.

(f) The EM shall conduct detailed briefings of workers on Site immediately before the commencement of any work in or about the Waneta Headpond, the Pend d'Oreille River, and other potentially sensitive areas, including EPZs and RAZs. The purpose of these briefings shall be to advise and ensure that supervisors, superintendents and workers understand the specific requirements of the OERC for work in these areas, including required mitigative measures, and that they understand their individual environmental

responsibilities and obligations. Briefings shall also be held during any construction activity if any conditions affecting that activity adversely change the potential for damage to the environment.

(g) The Contractor shall provide minutes of its briefing and toolbox meetings to all attendees and shall require each attendee to sign an attendance list which shall be attached to the minutes. The Contractor shall keep records of its briefing and toolbox meeting minutes.

(h) The Contractor shall ensure that all persons required to lead responses to spill emergencies (spill response team leaders/coordinators) are fully aware of the hazards associated with all hazardous substances stored and/or used on Site as described on Material Safety Data Sheets and are trained and equipped to safely handle and respond to all such hazards in the event of a spill.

(i) The Contractor shall ensure all workers performing any part of the Work at Site and whether employed directly by the Contractor, its Subcontractors or anyone engaged by or through them, attend the aforesaid orientation and training meetings and detailed briefings.

(j) In addition to other training required in the execution of the Work, the Contractor shall provide training for appropriate construction staff and personnel in:

(i) Response to Environmental Incidents and spills;

(ii) Water quality monitoring; and

(iii) Field recognition of excavated materials containing sulphide mineralization and/or evidence of hydrothermal alteration.

(k) The Contractor shall keep records of its training activities and shall retain copies of staff and worker relevant qualifications for review by the Owner.

A5. ENVIRONMENTAL INCIDENT REPORTING

A5.1 Objectives

(a) To properly and fully report environmental incidents as required by Applicable Law, PLAs, the OERC and the Owner's Environmental Incident Reporting Protocol (the "Reporting Protocol").

A5.2 Requirements

(a) The Contractor shall report all Environmental Incidents to the Owner in accordance with the Reporting Protocol.

(b) Under the Reporting Protocol an "Environmental Incident" is defined as an event that could, or does, result in significant harm or damage to the environment, or otherwise contravenes a regulatory requirement, or a requirement of PLA or the OERC.

(c) The Contractor shall report to Authorities Having Jurisdiction all Environmental Incidents that are required by Applicable Law to be reported to those agencies.

(d) The Contractor shall keep records of all contacts and communications with regulatory agencies, the public or other stakeholders regarding environmental issues that may arise in the course of the Work and shall immediately report all such contact and communication to the Owner.

A6. ENVIRONMENTAL COMPLIANCE

A6.1 Contractor's Compliance

(a) In the performance of the Work the Contractor, any and all Subcontractors, and everyone engaged by or through them in connection with the Work, shall comply strictly with:

(i) The terms and conditions of all PLAs;

(ii) The requirements and provisions of the OERC; and

(iii) All Applicable Law and environmental requirements of Authorities Having Jurisdiction.

(b) In complying with All Applicable Law and environmental requirements of Authorities Having Jurisdiction, the Contractor shall comply with the following statutes and regulations under those statutes, among other Applicable Law:

(i) BC *Commercial Transport Act*;

(ii) BC *Environmental Management Act*, including in particular:

- Approved Water Quality Guidelines (Criteria);
- Hazardous Waste Regulation (BC Reg. 63/88) (formerly Special Waste Regulation, updated by BC Reg. 319/2004);
- Open Burning Smoke Control Regulation (BC Reg. 145/93);
- Special Waste Legislation Guide;
- Spill Reporting Regulation (BC Reg.250/98);

(iii) BC *Fire Services Act*, including in particular:

- BC Fire Code Regulation (BC Reg. 318/2003);

(iv) BC *Fisheries Act*;

(v) BC *Forest Act*;

(vi) BC *Forest Practices and Range Act*;

(vii) BC *Forest Practices Code of British Columbia Act*;

(viii) BC *Health Act*, including in particular:

- Sewerage System Regulation (BC Reg. 326/2004);

(ix) BC *Heritage Conservation Act*;

(x) BC *Motor Vehicle Act*;

(xi) BC *Transportation Act*;

(xii) BC *Transportation of Dangerous Goods Act*, including in particular:

- Transport of Dangerous Goods Regulations (BC Reg. 205/85);

(xiii) BC *Trespass Act*;

(xiv) BC *Water Act*;

(xv) BC *Weed Control Act*;

(xvi) BC *Wildlife Act*;

(xvii) BC *Workers Compensation Act*, including in particular:

- Occupational Health and Safety Regulation (BC Reg. 296/97), Part 5, Chemical and Biological Substances - Workplace Hazardous Materials Information System (WHMIS);

- Occupational Health and Safety Regulation (BC Reg. 296/97), Part 7, Noise, Vibration, Radiation and Temperature;

(xviii) Federal *Canadian Environmental Protection Act*;

(xix) Federal *Explosives Act*;

(xx) Federal *Fisheries Act*, including in particular:

- The *Fisheries Act* Authorization issued by Fisheries and Oceans Canada (DFO) for the Project;
- Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters – Fisheries and Oceans Canada;

(xxi) Federal *Hazardous Materials Information Review Act*;

(xxii) Federal *Hazardous Products Act*;

(xxiii) Federal *Migratory Birds Convention Act*;

(xxiv) Federal *Species at Risk Act*;

(xxv) Federal *Transportation of Dangerous Goods Act*, including in particular:

- Transport of Dangerous Goods Regulations (SOR/201-286);

(xxvi) Local municipal Bylaws.

(c) The Contractor shall comply with the terms and conditions of the Waneta Interface Protocol.

(d) If, at any time, the Contractor fails to comply fully with the OERC, after notice to the Contractor the Owner at the Contractor's cost may take such measures as the Owner requires to achieve full compliance with the OERC, including engaging others at the Contractor's cost to monitor and achieve such compliance.

(e) The Contractor shall take immediate action to rectify environmental compliance problems identified by the Owner and the Authorities Having Jurisdiction.

(f) Upon receipt of a Stop Work Order, whether issued by the EM or the Owner, the Contractor shall cease work immediately on the activity that is having, or potentially will have, an adverse effect on the environment beyond that allowed by the OERC. The Contractor shall then be responsible for advising the Owner of the remedial actions that will be taken in the completion of the activity that resulted in the Stop Work Order. The Contractor shall take whatever actions are necessary to expeditiously address the cause of the Stop Work Order and shall, without detriment to other environmental protection requirements, divert from other on-going construction operations whatever equipment and resources are required for this purpose. Work on an activity that resulted in the issuance of a Stop Work Order by the Owner shall not resume without the written concurrence of the Owner.

A6.2 Owner's Environmental Quality Assurance

(a) The Owner will, through its Environmental Management Program, monitor and audit the Contractor's compliance with the requirements of the PLAs and the OERC. The Contractor shall cooperate with the Owner to facilitate such monitoring and shall provide such assistance and access as may be required by the Owner.

(b) Notwithstanding the environmental auditing and monitoring by the Owner, the Contractor shall be solely responsible for complying strictly with the requirements of the PLAs and the OERC, and shall bear sole responsibility for any direct or indirect damage to the environment that occurs as a result of failure to comply with PLAs, the OERC, and/or the directions of the Owner and the Authorities Having Jurisdiction.

A7. ADDITIONAL REQUIREMENTS

(a) In addition to complying with the OERC, all standards, guidelines and other documents referenced in the OERC, all Applicable Law, all PLAs, and all requirements of all Authorities Having Jurisdiction, the Contractor shall comply with applicable requirements in the following:

(i) CAN/CSA-Z731- 95 - Emergency Planning for Industry.

(ii) Guidelines for Industry Emergency Plans, BC Ministry of Environment 2002.

(iii) BC Ministry of Transportation (MoT) Standard Specifications for Highway Construction.

(iv) BC Supplement to TAC Geometric Design Guide.

(v) BC Air Quality Objectives and Guidelines.

(vi) Dust Palliative and Application Guide, as published by United States Department of Agriculture Forest Service, Technology and Development Program, November 1999.

(vii) Ambient Water Quality Objectives for the Lower Columbia River, Birchbank to the US Border, BC Ministry of Environment, May 2000.

(viii) Bear-People Conflict Reduction Plan (BC MoE 2002)

(ix) Land Development Guidelines for the Protection of Aquatic Habitat produced by the Habitat Management Division of the Department of Fisheries and Oceans Canada and the Integrated Management Branch of the BC Ministry of Environment, Land and Parks.

(x) Freshwater Intake End-of-Pipe Fish Screen Guideline, DFO.

(xi) Fish-stream Crossing Guidebook under the BC Forest Practices Code.

(xii) CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (2005).

(xiii) Environmental Standards & Guidelines for Fuel Handling, Transportation and Storage – BC Ministry of Environment, Land and Parks / Ministry of Forests publication dated December 1995.

(xiv) Steeger, C. and W. Spalding. 2004. Wildlife Tree and Log Creation for the Rover/Connor Creek Compensation Program. FortisBC and Rover/Connor Compensation Committee. 13pp.

(xv) Canadian Water Quality Guidelines for the Protection of Aquatic Life – Canadian Council of Ministers of the Environment, 2005 update.

OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION B – PUBLIC SAFETY, TRAFFIC AND COMMUNITY RELATIONS

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OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION B – PUBLIC SAFETY, TRAFFIC AND COMMUNITY RELATIONS

B1. OBJECTIVES

(a) The objectives are that the Work will be performed and completed with minimal adverse affect on the environment and that adequate measures will be taken to:

(i) Protect public safety;

(ii) Manage Project related traffic to minimize effects on public traffic;

(iii) Manage the Work so that it does not impact railway operations;

(iv) Provide a forum for community groups to be informed about the progress of the Work and raise issues where the performance of the Work may be deemed to have adverse community impacts; and

(v) Communicate with the public to keep them informed about the progress of the Work and to advise them of those parts of the Work that could have a direct impact on members of the public.

B2. PUBLIC SAFETY

B2.1 Requirements

(a) The Contractor shall advise local and regional RCMP, fire, rescue and ambulance services personnel of the layout of the Site and Site access points.

(b) The Contractor shall take measures as appropriate to prevent access through any part of the Site to the river for kayaking, fishing and other activities.

(c) The Contractor shall, in consultation with the Owner and the Community Impact Management Committee, warn pedestrians, cyclists and rollerbladers and other

recreational users of public roads of Project-related traffic and encourage them to use alternative routes by:

(i) Designing, fabricating, installing and maintaining signs on Highway 22A for the duration of the Work; and

(ii) Advertising construction activities periodically through print and radio.

(d) The Contractor shall be responsible for public safety in all areas of the Site and all areas affected by the Work, and shall cooperate and coordinate with Teck Cominco and FortisBC in their efforts to manage public safety and control of access to the Waneta Dam and associated facilities.

(e) The Contractor shall erect fences, post signs and control Site access points to warn the public of construction activities and to exclude members of the public and unauthorized personnel from Worksites. As a minimum requirement, fencing and signage shall meet the requirements of the BC *Trespass Act.* The Contractor shall immediately cause to be removed from Site any member of the public who is not authorized to be on Site.

(f) If any members of the public gain unauthorized or accidental access into any part of the Site and are injured, or if any members of the public are injured by the Contractor's operations, the Contractor's Site safety personnel shall respond to the emergency and provide whatever care can be given. Local RCMP, fire, rescue and ambulance services shall be called as appropriate in responding to such emergencies.

(g) The Contractor shall design and schedule its in-water and near-water drilling, blasting and excavation program in accordance with and subject to the Waneta Interface Protocol.

(h) The Contractor shall manage, handle, transport, store and use explosives in connection with the Work in compliance with Applicable Law. The Contractor shall include details of its explosives management, handling, transport, storage and use as part of its Excavation EWP.

(i) The Contractor shall erect signs to warn road users of blasting activities at the Powerplant Worksite, to warn of traffic delays while blasting is in progress, and to ban the use of 2-way radios within a zone to be delineated by the Contractor's blasting consultant. The Contractor shall also erect similar signs at the Four Mile Creek boat launch on the Pend d'Oreille River, at the boat launch on the Columbia River about 3 km upstream of the Powerplant Worksite and at the Beaver Creek boat launch to warn boaters of blasting activities.

(j) If areas of the Site are closed to fishing and public access by the Ministry of Environment, the Contractor shall in consultation with and as directed by the Owner post signs at boat launches that provide access to those areas, warning the public of the closure to fishing and public access.

(k) Immediately prior to and during Surface Blasts, the Contractor shall use traffic lights and/or traffic control personnel to halt highway traffic at a safe distance from the blasts and shall communicate with boaters and fishers on the Pend d'Oreille and Columbia Rivers sufficiently in advance to allow them to safely leave areas potentially affected by Surface Blasting.

(l) The Contractor shall have and use a pre-blast and all-clear warning system and shall communicate that system to all potentially affected persons, including by posting details of its blast warning system at a clearly visible location near the entrances to all Worksites where Surface Blasting is performed.

(m) The Contractor shall advise local residents and property owners who may be affected by blasting operations, the Regional District of Kootenay Boundary ("RDKB"), and the Canadian and U.S. Customs officials at the Waneta border crossing, of the Contractor's proposed blasting schedule.

(n) The Contractor shall promptly respond to any complaints from local resident and property owners in connection with its blasting operations and shall immediately report such complaints to the Owner.

(o) Prior to blasting, the Contractor shall ensure that all persons in the area that may be affected by a Surface Blast are moved to a safe distance from that blast.

(p) The Contractor shall only perform Surface Blasting during daylight hours, and in any event shall prohibit Surface Blasting between the hours of 7:00 p.m. and 7:00 a.m.

B2.2 Environmental Work Plans

(a) The Contractor shall prepare a Public Safety Management EWP and shall submit this EWP to the Owner for review prior to mobilization on Site. Mobilization on Site will not be allowed until the Contractor's Public Safety Management EWP has the written concurrence of the Owner.

(b) The Public Safety Management EWP shall be coordinated with the Traffic Management EWP and describe the measures that will be taken by the Contractor to meet all requirements specified in Section B2.1, and also include a description of measures for:

(i) Preventing unauthorized access to the Waneta Dam and associated facilities through the Site during the Work.

(ii) Protecting public safety during the performance of the Work, including during blasting, hauling of excavated materials, and the use of public roads and highways by construction and worker traffic.

B3. FIRE SAFETY

B3.1 Requirements

(a) The Contractor shall prepare a Fire Safety Plan in accordance with all Applicable Law and requirements of Authorities Having Jurisdiction, and shall submit the plan to the Owner for review. Mobilization on Site will not be allowed until the Contractor's Fire Safety Plan has the written concurrence of the Owner.

(b) The Contractor shall provide all fire fighting personnel and equipment as may be required by Authorities Having Jurisdiction to be available on or at Site, and that is adequate to protect all vegetation, buildings, materials, Equipment and personnel against fire caused or arising as a result of the Contractor's presence on Site.

B4. TRAFFIC

B4.1 Requirements for Highways and Roads

(a) The Contractor shall comply with all load restrictions imposed by MoT on the Waneta Bridge.

(b) The Contractor shall ensure that Teck Cominco and FortisBC have unrestricted access at all times (unless otherwise expressly agreed in writing with Teck Cominco and FortisBC) to all existing facilities of the Waneta Dam, generating station and switchyard(s), and transmission lines, all in accordance with the Waneta Interface Protocol.

(c) The Contractor shall take measures to prevent the public from using:

(i) The Waneta-Nelway Road through the Powerplant Worksite, which road will, except for emergencies, be closed to the public from its intersection with Highway 22A to a point just east of the entrance to Worksite B for the duration of the Work; and

(ii) The portion of the Trans Canada Trail located on the Waneta-Nelway Road between the Seven Mile Dam Road and Highway 22A, which portion will be re-routed by the Contractor for the duration of the Work.

(d) The Contractor shall locate the Powerplant permanent access at the existing entrance from Highway 22A to the existing Waneta Dam.

(e) The Contractor shall locate the intake permanent access road from the existing entrance on the Waneta-Nelway Road to the intake structure, approximately following the route of the existing roadway to the Waneta forebay.

(f) The actual locations and design of the temporary entrances to Worksites shall be established by the Contractor in consultation with and subject to the approval of MoT. All entrances shall be designed and constructed in accordance with MoT Standard Specifications for Highway Construction and the BC Supplement to TAC Geometric Design Guide, and shall be provided with the required signage and traffic control.

(g) For Transmission Line construction the Contractor shall use only the existing access roads to the Transmission Line right of way, and where roadways exist within the Transmission Line right of way the Contractor shall use only those existing access roads. Spur Roads shall only be constructed to gain access to Transmission Line structure sites and other work areas that are not serviced by an existing road.

(h) The Contractor shall minimize the effects of construction on other users of public roads by controlling all entrances to Worksites and the crossing of, and use of those roads.

(i) The Contractor shall encourage car-pooling among its workforce to minimize the volume of Project-related daily traffic on area highways.

(j) If the Contractor utilizes Worksites to the south of the Waneta Bridge, then the Contractor shall consult with MoT and initiate whatever measures are required by MoT to minimize potential conflicts between worker and construction traffic and public traffic, paying particular attention to night-time interactions between all persons using the bridge.

(k) The Contractor shall consult with MoT and with other Authorities Having Jurisdiction regarding the use of roads and highways by construction truck traffic and its commuting workforce, and shall implement, or reimburse MoT for implementing, the measures required by MoT and other Authorities Having Jurisdiction to protect public safety.

(l) The Contractor shall keep workers aware of area road and travel conditions relating to construction and shall take all measures required to achieve compliance with speed limits on all roads and highways and the use of caution by all Equipment and private worker

vehicle operators, particularly with respect to school zones, pedestrian crossings, playgrounds, parks, bus stops, pavement conditions, and the like.

(m) The Contractor shall apply for and comply with all PLAs required for the movement of over-weight and over-size loads, and for transportation of goods falling under the jurisdiction of the *Transportation of Dangerous Goods Act.*

(n) The Contractor shall erect and maintain all required highway signage to warn of construction activity including Site entrances, slow-moving vehicles, traffic control, construction zone speed limits, and the like, as required for public safety.

(o) Equipment using or crossing any public road shall be cleaned as necessary to prevent soil, sediment-laden water and other debris from being deposited on the road. Excavated materials and other loose construction materials shall be contained and covered to prevent loss of material when hauled on public roads.

(p) The Contractor shall keep all public roads used by construction Equipment in a clean condition, including by washing as necessary. Turbid washwater shall be controlled and disposed of in accordance with the Contractor's Erosion, Sediment and Drainage Control EWP.

(q) The Contractor shall not allow tracked Equipment to travel on or cross any public road without first obtaining any approvals that may be required from MoT and, in any event, without protecting the pavement surface against damage and repairing any damage that does occur.

(r) The Contractor shall be responsible for all damage caused by the Contractor's operations to public and private roads for which the Contractor or Owner may be liable to MoT or the property owners, and the Contractor shall make good all such damage to the satisfaction of MoT and the applicable property owners. The Contractor shall perform a pre-construction and post-construction survey of the condition of the roads it will use in the general area of the Site.

B4.2 Requirements for Interaction with Railway Operations

(a) The Contractor shall comply with the terms and conditions of the agreements that the Owner has with BNSF and KFIR with respect to the use of the Railway Lands and railway crossings at the Site.

(b) The Contractor shall negotiate and agree railway crossing procedures with KFIR and shall abide by these procedures at all times.

(c) The location and design of new rail crossings and upgrades to existing rail crossings used in the performance of the Work, including signage and signalling for all such crossings, shall be subject to prior review and approval by KFIR and BNSF. All rail crossings, signage and signalling shall be designed, constructed and maintained to KFIR and BNSF standards. Prior to submitting any designs of crossings, signage or signalling to KFIR and BNSF, the Contractor shall submit them to the Owner for the Owner's concurrence. The Contractor shall revise the crossing designs as required to obtain BNSF and KFIR approval.

(d) In performing the Work, the Contractor shall cooperate with KFIR and BNSF and shall not adversely affect their operations. The Contractor shall make itself fully aware of the KFIR operating schedule and be aware that trains stand near the Powerplant Worksite while awaiting Canadian and U.S. Customs approval to cross the border, southbound.

(e) To prevent Equipment and persons from accessing the track except at approved rail crossings within a Worksite, the Contractor shall place within a Worksite, along both sides of the railway tracks, precast concrete roadside barriers that are 690 mm high and meet MoT Specification Section 941, at a distance of 4.6 m from the track centreline.

(f) The Contractor shall not conduct Surface Blasting while a train, whether stationary or in motion, could be affected by Surface Blasting. The operators of stationary trains that could be affected by Surface Blasting shall be warned personally of upcoming Surface Blasts sufficiently in advance to allow them to move the train away from the area that could be affected by the Surface Blast. Surface Blasting shall not take place until after that train has been moved to a safe location.

(g) The Contractor shall walk the railway track immediately following each Surface Blast which could result in flyrock potentially reaching the railway track, to check for flyrock on, and damage to, the track. The Contractor shall immediately remove all flyrock or other debris from the track, and immediately notify KFIR and the Owner if any damage to the track is observed or suspected.

B4.3 Environmental Work Plans

(a) The Contractor shall prepare a Traffic Management EWP and shall submit this EWP to the Owner for review prior to mobilization on Site. Mobilization on Site will not be allowed until the Contractor's Traffic Management EWP has the written concurrence of the Owner.

(b) The Traffic Management EWP shall be coordinated with the Public Safety Management EWP. The Traffic Management EWP shall describe the measures that will be taken by the Contractor to meet all requirements specified in Sections B4.1 and B4.2, above. The Traffic Management EWP shall also:

(i) Describe the flow patterns for construction traffic;

(ii) Describe how construction traffic will interact with public and railway traffic;

(iii) Provide a schedule for heavy Equipment and over-sized loads moves;

(iv) Show as applicable on a Traffic Management EWP drawing:

- Locations of all worker car parking areas;
- Private roads that will be used in the execution of the Work;
- Locations of all stream crossings; and
- Locations of all noxious and nuisance weed decontamination facilities.

B5. COMMUNITY RELATIONS

B5.1 Requirements

(a) The Contractor shall coordinate with the Owner all communication with area residents, local businesses, schools, and the like, as appropriate with respect to potential impacts of the Work on the public and related concerns of the public.

(b) The Contractor shall cooperate fully with, participate in and provide adequate resources to fully support the Owner's Community Impact Management Committee, including:

(i) Requiring appropriate senior authorized representatives of the Contractor to attend meetings of the committee;

(ii) Advising the members of the committee of the progress of the Work;

(iii) Advising the members of the committee of construction activities and of construction events that have the potential to directly affect the public;

(iv) Hearing and responding to public concerns in connection with the Work; and

(v) Making commitments to the public to address and alleviate their concerns.

(c) The Contractor shall take active measures to promote and publicize participation in the Project by First Nations and regional businesses to promote local economic development.

(d) The Contractor shall make all reasonable efforts to maintain a good working relationship with the public in connection with the Work.

(e) Upon being advised of a concern relating to the effects of construction activity on licensed water sources, the Contractor shall work diligently and in consultation with the Owner to expeditiously resolve all identified issues relating to its activities.

(f) Not less than four (4) weeks in advance of Transmission Line construction, the Contractor shall notify in writing all water licence holders whose licensed water sources may be affected by construction activity of the commencement of Transmission Line construction. A copy of all such notifications shall be provided to the Owner.

B6. COMMUNICATIONS

B6.1 Requirements

(a) The Contractor shall have a comprehensive communications program that:

(i) consolidates all Contractor requirements for communication with all Authorities Having Jurisdiction, KFIR, FortisBC, Teck Cominco, other private entities, and the public;

(ii) clearly lays out the Contractor's responsibilities for public and institutional liaison and information exchange;

(iii) is consistent with the Owner's own communications program; and

(iv) requires coordination of all Contractor communications of a general nature with the public through the Owner.

(b) The Contractor shall attend meetings scheduled by the Owner with the Authorities Having Jurisdiction to discuss and review documentation submitted by the Owner to them in relation to PLAs specified in the Contract to be obtained by the Owner.

B6.2 Environmental Work Plans

(a) The Contractor shall prepare a Communications EWP and shall submit this EWP to the Owner for review prior to mobilization on Site. Mobilization on Site will not be allowed until the Contractor's Communications EWP has the written concurrence of the Owner.

(b) The Communications EWP shall describe the measures that will be taken by the Contractor to meet all requirements specified in Section B6.1, and also include the following:

(i) Public communications, and information requirements, with regard to publicizing blasting as may be necessary to supplement the requirements of the Excavation EWP and Traffic Management EWP to ensure full private and public awareness of all blasting activities and safety issues related to blasting, including blasting schedules, delays, traffic delays and precautions to be taken when passing through blasting zones, consultation with KFIR regarding blasting schedules and coordination of train schedules with blasting activities, consultation with KFIR regarding track safety, and notifications to Navigation Canada regarding coordination of blasting with scheduled and active aircraft traffic.

(ii) Information requirements for local emergency services, such as the RCMP and fire, rescue and ambulance services, regarding Site layout, access to different parts of the Site and construction activities.

(iii) Appropriate and adequate publicity through local media and by sufficient adequate signage to inform the public of closures and restricted public access for fishing, kayaking and other recreational activities at or near Worksites or locations that may be affected by construction activities.

(iv) Procedures to keep the public notified of construction activities and their timing through local media, including any planned changes in traffic patterns caused by the Work.

(v) Procedures to address regulatory notifications to fishers and boaters, including, if required by Authorities Having Jurisdiction, the issuance of a "Notice to Mariners" and a "Notice to Fishers".

(vi) Measures, based on and consistent with the Contractor's construction schedule, to keep the Owner, MoT, MoT's Communication Centre, the Community Impact Management Committee, the RCMP, emergency services, the operator of the Waneta Dam, transit operators, and affected municipalities, property owners, contractors and businesses, informed about specific incidents affecting traffic, and

proposed changes to traffic control procedures which may be requested by the Contractor.

OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION C – WORKSITES PREPARATION AND USE

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SECTION C – WORKSITES PREPARATION AND USE

C1. OBJECTIVES

(a) The objectives for the preparation and use of Worksites during construction of the WEP are to complete the Work:

(i) In a manner that respects existing land, vegetation and wildlife values in the Project area and has due regard for the protection of those values; and

(ii) Without causing any adverse environmental effects resulting from the design and construction of the Project greater than those described in the EACA.

C2. WORKSITE ISOLATION

C2.1 General Requirements

(a) Worksite Isolation shall be achieved by the use of:

(i) Site Boundaries that are set out around the perimeter of Worksites;

(ii) Environmental Protection Zones (EPZs) within Worksites; and

(iii) Restricted Activity Zones (RAZs) within Worksites.

(b) Site Boundaries and EPZ boundaries shall have the same significance and effect.

(c) Environmentally sensitive areas within Site Boundaries where work must be undertaken or through which access is required are designated as Restricted Activity Zones (RAZs). RAZs serve to limit the nature and scheduling of work activities in order to protect sensitive habitats and Listed Species. RAZs have been numerically identified on the OERC Drawings for the Base Concept. The Contractor shall comply with the limitations and restrictions relating to activities within RAZs as specified herein.

(d) The Contractor shall confine all Work inside the Worksites shown on the OERC Drawings except for the use of public and private roads and highways as allowed by Applicable Law.

(e) The Contractor shall comply with the designated EPZs within Site Boundaries. The locations of EPZs are shown on the OERC Drawings.

(f) Prior to the commencement of Site Preparation at any Worksite and consistent with the requirements of the Project Concept and Section E, Protection of Terrestrial Resources, the Contractor shall, in consultation with the Owner:

(i) Create EPZs by reducing the size of the Powerplant Worksite RAZs shown on OERC Drawing Figure 9A-2 to exclude from those RAZs all areas not required for construction and convert them to EPZs;

(ii) Identify and protect Listed Species of plants that are to remain and designate their immediate habitat area as EPZs prior to the commencement of construction;

(iii) Identify and protect the habitat of Listed Species of Wildlife within RAZs to the greatest reasonable extent, creating EPZs where practicable; and

(iv) Stake, flag, identify and fence all Site Boundaries and the boundaries of all EPZs and RAZs so that all boundaries are absolutely clear and understood by its workforce.

(g) The Contractor shall limit and restrict construction activities, the scheduling of construction activities, and worker access in RAZs as required by the OERC.

(h) The Contractor shall not perform any part of the Work or operate any equipment beyond Site Boundaries or in EPZs, and no member of the Contractor's workforce shall venture beyond Site Boundaries or enter an EPZ, except:

(i) The EM, qualified biologists retained by the Contractor who report to the EM, and BC Land Surveyors may enter those areas for the purpose of carrying out any necessary study, monitoring and survey work assigned to them;

(ii) To respond to an Environmental Incident, a fire, or a life-threatening emergency;

(iii) To perform work that is part of a specific EWP that has received the written concurrence of the Owner; or

(iv) As expressly permitted by the OERC.

(i) Except as required for clearing activities, structure site access, and Transmission Line conductor stringing, the Contractor shall use, not deviate from and not extend the

established existing transmission line access roads. Spur Roads from existing roads to Transmission Line structure sites and for access to clearing and line stringing sites shall be minimum width single lane access roads and the Contractor shall stay on these roads when moving to and from work areas. The locations of traffic passing bays required on Spur Roads shall be identified in the Traffic Management EWP and these bays shall not be used as Laydown Areas.

(j) In setting out Worksites, access roads and Spur Roads, the Contractor shall delineate the areas to be used in a manner that avoids to the greatest extent practicable encroachment on known and/or highly suitable nesting habitat for Listed Species of birds.

(k) In the event of an apparent conflict or disagreement, specific requirements for a RAZ shall take precedence over the general requirements listed in this Section C2.1.

(l) The Contractor shall provide the maximum practical ground clearance over RAZ and all other riparian areas, consistent with Transmission Line electrical and structural design requirements and parameters.

(m) The Transmission Line RAZs shown on the OERC Drawings are based on the preliminary TMZ boundaries. The boundaries of these RAZs shall be extended during construction to include the final TMZ, which will be established based on topography and tree height.

(n) Existing creek crossing in RAZs shall only be improved by the Contractor to the extent required for its own use of the crossing.

(o) The operation of equipment in a RAZ shall be kept to an absolute minimum. Equipment operation in RAZs shall be in accordance with imposed RAZ limitations and restrictions and, as applicable, shall only take place during the specified Timing Window.

(p) The Contractor shall hand fall trees in all Transmission Line RAZs and Transmission Line riparian areas. Timber that is not removed from Site shall be cut into lengths not exceeding 1.2 m where the tree drops and cut lengths shall be left upright in a manner that maximizes their exposure to sunlight as a means of preventing bark beetle infestation. The EM or a qualified biologist retained by the Contractor and reporting to the EM shall inspect cut timber left in this manner and shall determine the success of this treatment in preventing bark beetle infestation and, if this treatment is not successful, shall propose and implement alternative treatment.

(q) When clearing the ECZ in RAZs, the density and structure of existing low growing shrubbery shall be maintained to the greatest extent possible.

(r) When working in RAZs, the Contractor shall maintain Wildlife movement corridors to the greatest practicable extent and shall minimize disturbance of Listed Species of Wildlife and other Wildlife using habitat within and adjacent to the RAZs.

(s) The EM shall identify and flag trees for removal in RAZs and riparian areas based on criteria related to ECZ requirements, safety, and wildlife habitat value. The removal of all such identified trees shall be conducted under the supervision of the EM or a suitably qualified delegate of the EM.

(t) Felling and clearing within RAZs and riparian areas shall be restricted to the minimum required for worksite access, structure construction, the ECZ, and/or for access roads and Spur Roads, construction of watercourse crossings, and to meet safety requirements.

(u) Wherever possible, all trees felled near streambeds shall be felled away from the streambed. When a leaning tree must be felled into the streambed, prior to being limbed it shall be removed without damage to the streambed.

(v) The removal of cut timber from RAZ and other riparian areas shall be done in a manner that minimizes vegetation and ground disturbance.

(w) When stringing transmission line conductors through RAZs and over other riparian areas, the Contractor shall take effective measures to avoid the disturbance of streambeds and stream banks and to minimize the disturbance of riparian vegetation.

(x) The Contractor shall on a regular and routine basis make its workforce fully aware of the specific requirements, limitations and restrictions of the Worksite Isolation EWP as part of its environmental training and awareness program.

C2.2 RAZ Specific Requirements

C2.2.1 RAZ No. 1

(a) The only activities allowed in RAZ No. 1 are:

(i) The development and construction of a site entrance and an access road to Worksite C2;

(ii) The use, maintenance and subsequent decommissioning and restoration of the access road to Worksite C2; and

(iii) Site restoration.

(b) When working in RAZ No. 1, the Contractor shall impose a 20 km/hr speed limit and take whatever measures are required to prevent the Contractor's staff and workers using the road passing through the RAZ from driving recklessly particularly at night, dawn and dusk when there is greatest potential to collide with Wildlife.

(c) When working in RAZ No. 1, the Contractor shall not:

(i) Disturb areas of the RAZ beyond the requirements for the construction of the site entrance and the access road;

(ii) Clear more vegetation to improve visibility at the worksite entrance than is necessary;

(iii) Place any stockpiles in the RAZ; and

(iv) Deviate from the access road where it passes through the RAZ, and shall not otherwise venture into the RAZ except for required site restoration activities.

C2.2.2 RAZ No. 2

(a) The only activities allowed in RAZ No. 2 are:

(i) The placement of excavated materials from Powerplant construction, but only if all other areas designated for excavated materials reuse/storage have already been utilized to the fullest extent that they reasonably can be utilized;

(ii) Site Preparation; and

(iii) Site restoration.

(b) When working in and/or using RAZ No. 2, the Contractor shall retain as much tree and shrub cover as reasonably possible to the north of the central access road through RAZ No. 2 (north access to Worksite A3) in addition to that identified by the EPZ.

(c) When working in and/or using RAZ No. 2, the Contractor shall not:

(i) Enter the RAZ except under the provisions of the Worksite Isolation EWP having the written concurrence of the Owner; and

(ii) Use the north access to Worksite A3 to access the Worksite A3 area covered by RAZ No. 3.

C2.2.3 RAZ Nos. 3, 10 and 11

(a) The only activities allowed in RAZ Nos. 3, 10 and 11 are:

(i) The development, use and maintenance of Laydown Areas, but only if all other areas designated as Laydown Areas have already been utilized to the extent that the Contractor can reasonably utilize them and only under the provisions of the Worksite Isolation EWP having the written concurrence of the Owner;

(ii) Site Preparation; and

(iii) Site restoration.

(b) When working in and/or using RAZ Nos. 3, 10 and 11, the Contractor shall:

(i) Give preference to Worksite A3 (RAZ No. 3) over Worksite H (RAZ No. 10) and Worksite I (RAZ No. 11); and

(ii) Give preference to Worksite H over Worksite I.

(c) When working in and/or using RAZ Nos. 3, 10 and 11, the Contractor shall not conduct activities with the potential to significantly affect, as determined by the EM or a qualified biologist retained by the Contractor and reporting to the EM, Listed Species of birds flying over the Worksite and/or using adjacent areas.

C2.2.4 RAZ No. 4

(a) The only activities allowed in RAZ No. 4 are:

(i) The construction, use and maintenance of a road to access Worksite D2 from Worksite D1 as required for the development and use of Worksite D2;

(ii) Site Preparation; and

(iii) Site restoration.

C2.2.5 RAZ Nos. 5 and 6

(a) The only activities allowed in RAZ Nos. 5 and 6 are:

(i) The siting and construction of the Project Concept Powerplant and Transmission Line and their associated access, work and support areas;

(ii) The development and use of Worksite F;

(iii) Site Preparation; and

(iv) Site restoration.

(b) When working in and/or using RAZ Nos. 5 and 6, the Contractor shall:

(i) Only undertake vegetation clearing activities in the period from mid-October to mid-April inclusive;

(ii) Minimize tree removal and retain the existing density and structure of low growing shrubs to the extent possible consistent with access and work area requirements; and

(iii) As required by Section E2, during the period of mid-April to mid-October inclusive, take practical and reasonable measures in areas where herptiles are active to avoid equipment running over herptiles on the surface of work areas, access roads and Spur Roads.

(c) When working in and/or using RAZ Nos. 5 and 6, the Contractor shall not:

(i) Commence clearing activities on the Powerplant Worksite until Listed Species of plants have been identified, transplanted and/or retained in EPZs as required by Section E3; and

(ii) Commence construction on the Powerplant Worksite until the existing bird nest boxes have been identified and relocated as required by Section E2.

C2.2.6 RAZ Nos. 7, 8 and 9

(a) The only activities allowed in RAZ Nos. 7, 8 and 9 are:

(i) Transmission Line Construction;

(ii) Maintenance and use of existing access roads;

(iii) Development, use and maintenance of required Spur Roads;

(iv) The development and use of Worksite G as a Laydown Area;

(v) Site Preparation; and

(vi) Site restoration.

(b) When working in and/or using RAZ Nos. 7, 8 and 9, the Contractor shall:

(i) Use areas within RAZ Nos. 7, 8 and 9 in strict conformance with the Worksite Isolation EWP having the written concurrence of the Owner;

(ii) Minimize the number of Transmission Line structures within RAZ Nos. 7, 8 and 9;

(iii) Minimize tree removal and retain the existing density, height and structure of low growing shrubs to the greatest extent possible;

(iv) As required by Section E3, minimize clearing and maximize residual vegetation height when planning the alignment and conductor height of the Transmission Line and selecting Transmission Line structure sites with the target, where technically and reasonably practical, of retaining ten (10) chat habitat shrubs ≥ 3 m in height per acre within portions of the ECZ with suitable chat breeding habitat;

(v) Minimize disturbance of Listed Species;

(vi) With the exception of developing and using Worksite G as a Laydown Area, only undertake Site Preparation and Transmission Line construction in RAZ Nos. 7, 8 and 9 from mid-October to mid-April inclusive;

(vii) As required by Section E2, during the period of mid-April to mid-October inclusive, take practical and reasonable measures in areas where herptiles are active to avoid equipment running over herptiles on the surface of work areas, access roads and Spur Roads; and

(viii) Restore structure sites and Spur Roads in RAZ Nos. 7, 8 and 9 as soon as possible following structure erection.

(c) When working in and/or using RAZ No. 7, 8 and 9, the Contractor shall not use RAZ No. 9 for access to Transmission Line areas east of RAZ No. 9 from mid-April to mid-October inclusive.

C2.2.7 RAZ Nos. 12 and 17

(a) The only activities allowed in RAZ Nos. 12 and 17 are:

(i) Use and maintenance of the existing access roads;

(ii) Site Preparation; and

(iii) Site restoration.

(b) When working in and/or using RAZ Nos. 12 and 17, the Contractor shall:

(i) Only use access roads for through passage to adjoining Transmission Line areas; and

(ii) Only improve the existing access roads and the creek crossing in RAZ No. 12 as required for its own uses.

C2.2.8 RAZ Nos. 13

(a) The only activities allowed in RAZ No. 13 are:

(i) Through passage on the existing access road;

(ii) Development, use and maintenance of required Spur Roads for clearing purposes;

(iii) Maintenance of the existing access road and creek and draw crossings;

(iv) Clearing of the ECZ;

(v) Trimming/felling trees in the TMZ;

(vi) Stringing of Transmission Line conductors;

(vii) Required Site Preparation; and

(viii) Site restoration.

(b) When working in and/or using RAZ No. 13, the Contractor shall only use the existing access road for through passage to the adjoining Transmission Line areas.

(c) When working in and/or using RAZ No. 13, the Contractor shall not locate a Transmission Line structure in RAZ No. 13.

C2.2.9 RAZ No. 14

(a) The only activities allowed in RAZ No. 14 are:

(i) Use of the existing access road to travel through the RAZ;

(ii) Development, use and maintenance of required Spur Roads for clearing purposes;

(iii) Maintenance of the existing access road and creek crossing;

(iv) Clearing of the ECZ;

(v) Trimming/felling trees in the TMZ;

(vi) Stringing of Transmission Line conductors;

(vii) Required Site Preparation; and

(viii) Site restoration.

(b) When working in and/or using RAZ No. 14, the Contractor shall only use the existing access road for travel through RAZ No. 14 to the adjoining Transmission Line areas.

(c) The Contractor shall not locate a Transmission Line structure within RAZ No. 14.

C2.2.10 RAZ No. 15

(a) The only activities allowed in RAZ No. 15 are:

(i) Use of the existing access roads to travel through the RAZ;

(ii) Development, use and maintenance of required Spur Roads for clearing purposes;

(iii) Maintenance of the existing access roads and creek crossings;

(iv) Clearing of the ECZ;

(v) Trimming/felling trees in the TMZ;

(vi) Stringing of Transmission Line conductors;

(vii) Required Site Preparation; and

(viii) Site restoration.

(b) The Contractor shall not locate a Transmission Line structure within RAZ No. 15.

C2.2.11 RAZ No. 16

(a) The only activities allowed in RAZ No. 16 are:

(i) Use of existing access roads;

(ii) Development, use and maintenance of required Spur Roads for clearing purposes;

(iii) Maintenance of the existing access roads and draw crossings;

(iv) Clearing of the ECZ;

(v) Trimming/felling trees in the TMZ;

(vi) Required Transmission Line structure construction;

(vii) Stringing of Transmission Line conductors;

(viii) Required Site Preparation; and

(ix) Site restoration.

(a) The Contractor shall not:

(i) Locate Transmission Line structures in riparian areas within RAZ No. 16; or

(ii) Locate a Transmission Line structure between the ends of the existing access roads in RAZ No. 16.

C2.2.12 RAZ No. 18

(a) The only activities allowed in RAZ No. 18 are:

(i) Clearing of the ECZ;

(ii) Trimming/felling trees in the TMZ;

(iii) Stringing of Transmission Line conductors;

(iv) Required Site Preparation; and

(v) Site restoration.

(b) The Contractor shall not locate Transmission Line structures within RAZ No. 18.

C2.2.13 RAZ No. 19

(a) The only activities allowed in RAZ No. 19 are:

(i) Required Site Preparation;

(ii) The construction, use and maintenance of the Powerplant Intake access road;

(iii) Transmission Line construction;

(iv) Site restoration.

(b) When working in and/or using RAZ No. 19, the Contractor shall only construct and use the Powerplant Intake access road in accordance with the Worksite Isolation EWP and/or Traffic Management EWP having the written concurrence of the Owner.

C2.2.14 RAZ No. 20

(a) The only activities allowed in RAZ No. 20 are:

(i) The placement of excavated materials from Powerplant construction;

(ii) The development, use and maintenance of Laydown Areas;

(iii) Site Preparation; and

(iv) Site restoration.

(b) The Contractor shall not locate an aggregate processing facility or a concrete batching plant within RAZ No. 20.

C2.3 Environmental Work Plans

(a) Using the OERC Drawings as a guide, the Contractor shall develop a Worksite Isolation EWP which shall be used to establish Site Boundaries, EPZs and RAZs consistent with the Project Concept. The Worksite Isolation EWP shall comply with the criteria and requirements of applicable PLAs and the OERC. The Contractor shall submit its Worksite Isolation EWP to the Owner for review.

(b) Prior to mobilization, the Contractor shall submit to the Owner for review a Worksite Isolation EWP covering as a minimum those Site areas affected by the mobilization of equipment and construction materials on Site. The Contractor shall not mobilize equipment and construction materials on Site until this Worksite Isolation EWP has received the written concurrence of the Owner.

(c) The Worksite Isolation EWP shall describe the measures that will be taken by the Contractor to meet all requirements specified in Sections C2.1 and C2.2. The Worksite Isolation EWP shall also provide:

(i) All security, safety and installed environmental protection fencing;

(ii) The layout of all work areas both on land and in water areas including: Laydown Areas, parking areas, site office facilities, worker facilities, workshops, staging areas, storage areas, servicing areas, aggregate processing and concrete batch plant areas, excavated materials disposal areas, and all general infrastructure and associated facilities; and

(iii) The location of fire and rescue facilities and mustering areas.

(d) Construction shall not proceed in any area of the Site until the Worksite Isolation EWP relating to that area has received the written concurrence of the Owner.

C3. SITE PREPARATION

C3.1 General Requirements

(a) Site Preparation includes Clearing, Grubbing and Stripping. The Contractor shall treat Clearing, Grubbing and Stripping as distinct and separate operations.

(b) Without limiting the duties and responsibilities of the EM, the EM shall be responsible for guiding crews engaged in Clearing activities to ensure that the requirements and intent of Clearing requirements are met.

(c) Except for survey and area delineation purposes on foot, the Contractor shall not enter RAZs and ephemeral creek and associated riparian areas prior to receiving the Owner's written concurrence with the applicable Worksite Isolation EWP or Site Preparation EWP. Construction equipment for site preparation activities shall only be used in these environmentally sensitive areas in accordance with procedures set out in the established Site Preparation EWP.

(d) The Contractor shall not disturb vegetation to be retained or vegetation located beyond the designated clearing limits in the Site Preparation EWP. If vegetation beyond the designated clearing limits is damaged or removed, the disturbed area shall be immediately re-seeded or re-planted to establish appropriate native groundcover and prevent the establishment of noxious weeds.

(e) Except as required to satisfy RAZ limitations and restrictions, Clearing shall not be undertaken during the bird nesting season. The bird nesting season shall be determined by the EM or a qualified biologist retained by the Contractor and reporting to the EM and shall be incorporated into the Site Preparation EWP.

(f) Clearing shall be minimized and undertaken only where required to facilitate construction.

(g) The Contractor shall minimize ground disturbance in all Clearing operations and shall avoid ground disturbance to the greatest reasonable extent in RAZs and in all riparian areas.

(h) The Contractor shall not fell timber into a watercourse except in situations where safety considerations clearly dictate a necessity for such action. Any trees or large pieces of woody debris that accidentally fall into a watercourse shall be removed in a manner that minimizes the disturbance of the watercourse and adjacent riparian areas.

(i) The EM or a suitably qualified person shall be present during the removal of any trees or large woody debris from watercourses.

(j) Trees identified as Hazard Trees and trees that will become Hazard Trees within 10 years based on projected growth shall be removed or topped. Hazard Trees located outside any area designated for clearing shall be removed or topped under the direct supervision of the EM or a suitably qualified person and as part of the Site Preparation EWP.

(k) Where Hazard Trees cannot be safely topped they shall be removed. Hazard Trees that can be safely topped and have value as wildlife trees shall be topped so as to retain as much of their residual height as safely possible. On a site-specific basis, the EM or a qualified biologist retained by the Contractor and reporting to the EM shall determine the density and distribution of wildlife trees that will remain upon completion of construction. Refer to Section G2.1(i) for requirements relating to the creation of wildlife tree habitat.

(l) All removed trees and the waste from topped trees shall be disposed of in accordance with Section F5, Waste Wood, Timber and Woody Debris.

(m) Stream banks disturbed during clearing shall have appropriate erosion control measures implemented immediately to prevent the discharge of sediments into the watercourse.

(n) Equipment operators engaged in Site Preparation activities shall have experience in tree removal and vegetation clearing in environmentally sensitive forest settings typical of the Project area. The Contractor shall provide the experience records of its Site Preparation Equipment operators for review by the Owner if requested.

(o) Logs shall not be skidded or yarded across watercourses and streambeds. Existing woody debris in watercourses and streambeds shall not be removed except as required to construct a crossing. Slash and soil materials shall not be deposited in watercourses and streambeds.

(p) Combustible cleared vegetation may be disposed of by open burning subject to the requirements of Section F6, Burning of Waste. Requirements relating to the disposal of timber, slash and woody debris are provided in Section F5, Waste Wood, Timber and Woody Debris.

(q) Grubbing and Stripping shall be separate operations that precede excavation and shall be undertaken prior to general overburden excavation activities.

(r) Grubbing shall be minimized and where possible root systems shall be left in place as a measure to maintain ground stability and control erosion. Grubbing shall only be undertaken where required for excavation purposes.

(s) Stripping shall be minimized as a precaution against erosion. Necessary stripping shall be timed to minimize the exposure of stripped areas to erosion.

(t) Areas to be excavated for construction or otherwise prepared for construction support activities shall be stripped of surface soils to a depth of not less than 300 mm.

(u) Stripped surface soils shall be stockpiled on the sites from which they are stripped and wherever possible shall be subsequently used for the restoration of those sites. Refer to Section G, Site Restoration, for related requirements.

(v) The location of all stockpiles to be made during site preparation shall be shown on the Contractor's Site Preparation EWP and shall be subject to review by the Owner.

(w) The Contractor shall not place stockpiles of stripped materials in areas adjacent to watercourses, riparian areas or other environmentally sensitive areas and shall not place stockpiles in areas where natural drainage or storm water runoff could cause erosion. The Contractor shall ensure that all stockpiles are stable. The Contractor shall protect stockpiles against erosion. The Contractor shall prevent the growth of noxious and nuisance weeds on stockpiles in accordance with Section E5.

(x) All stream crossings shall be designed and constructed in accordance with Applicable Law and applicable codes and guidelines.

(y) Refer to Section C10, Archaeological and Heritage Finds, for related requirements

C3.2 Site Specific Requirements

C3.2.1 Powerplant and Associated Worksites

(a) Clearing shall be required in the designated construction areas of the powerhouse, the adit and the intake; access road areas; site office and worker parking areas; Laydown Areas and staging areas; workshop and equipment maintenance areas; aggregate processing and concrete batch plant areas; and excavated materials disposal areas. Required Clearing shall be performed by cutting vegetation at the ground surface. Where the root systems of large trees have to be removed, these trees may be cut off above ground level as necessary to facilitate their subsequent removal.

(b) Surface soils recovered from the Powerplant worksite shall be stockpiled in a suitable nearby location for subsequent reuse in restoring disturbed Powerplant worksite areas. With the concurrence of the Owner surface soils recovered from the Powerplant worksite may be used in the restoration of other construction facilities site areas subject to a *Soil Relocation Agreement* under the requirements of the *Environmental Management Act.*

C3.2.2 Transmission Line and Associated Worksites

(a) The Contractor shall use small crews to complete Transmission Line Clearing. Preference shall be given to hand felling in all Transmission Line Clearing.

(b) During Site Preparation activities, including skidding of cut timber and removing cleared vegetation, and other than in the use of existing access roads and Transmission Line structure site Spur Roads and in the development of worksites, the Contractor shall use Equipment that will minimize damage, including by having a ground contact pressure in its unloaded condition of not more than 50 kPa.

(c) Clearing on existing access roads and for new access roads, including Spur Roads, for the Transmission Line and its structure sites shall be done at the same time and as part of Clearing for the Transmission Line ECZ.

(d) No clearing shall be undertaken along access roads and Spur Roads except as required to clear the roadway to the minimum width required by the Contractor for access and for safety. Notwithstanding the width the Contractor may require and except as required for the clearing of Danger Trees, the maximum cleared width shall not extend more than 0.5 m from the edges of the shoulders of the road or 0.5 m from the edges of ditches if ditches are required.

(e) The Contractor shall strive to retain the density, height and structure of existing shrubbery in the ECZ to the greatest reasonable extent.

(f) No shrubbery shall be cut outside the ECZ except as required to meet TMZ, access road and Spur Road clearing requirements.

(g) The Contractor shall leave Douglas-fir fine branches, twigs and needles cut during Site Preparation as a winter food source for ungulates in quantities sufficient for a single season only and at locations to be determined by the EM or a qualified biologist retained by the Contractor and reporting to the EM.

(h) Except as specifically required where the Transmission Line crosses under the BC Hydro 5L98 transmission line, the Contractor shall clear all trees in the ECZ, except for conifers less than 1 m in height, by cutting the trees off at ground level and shall trim shrubs greater than 3 m in height in the ECZ to 1.3 m high above the ground surface.

C3.3 Environmental Work Plans

(a) The Contractor shall prepare a Site Preparation EWP and shall submit this EWP to the Owner for review. The Site Preparation EWP may be submitted as a number of site-

specific integrated and coordinated work plans. The Contractor's schedule(s) for clearing, grubbing and stripping shall be included in its Site Preparation EWP.

(b) The Site Preparation EWP shall describe the measures that will be taken by the Contractor to meet all requirements specified in Sections C3.1 and C3.2 and the relevant requirements of Section E3. The Site Preparation EWP shall also:

(i) Have detailed Clearing, Grubbing and Stripping plan components;

(ii) Indicate separately and clearly which areas covered by the plan are to be cleared, grubbed and stripped;

(iii) Show all planned skid trails and the planned locations of all cleared timber and other site preparation staging areas, as applicable;

(iv) Provide a complete schedule for Clearing, Grubbing and Stripping activities;

(v) Show locations where cleared vegetation will be chipped, the locations of chipped materials stockpiles and the planned uses for those materials;

(vi) Show the location of all planned burn piles; and

(vii) Show the location of all planned stockpiles of stripped surface soils.

(c) Site preparation activities shall not commence until the Site Preparation EWP covering the planned work has received the written concurrence of the Owner.

C4. PERMANENT AND TEMPORARY ACCESS ROADS

C4.1 General Requirements

(a) Temporary site entrances and access roads will be required to gain access to the Worksites. The Contractor shall leave some of these entrances and access roads in place on completion of the Work, as specified in the OERC and/or in the Owner's Requirements.

(b) The Contractor shall not proceed with the modification of an existing Site entrance or the construction of a new Site entrance until after it has received the applicable permits and approvals from MoT. The Contractor shall forward copies of all such permits and approvals to the Owner.

(c) The Contractor shall show all Site entrances on its Worksite Isolation EWP.

(d) The Contractor shall design and construct all Site entrances and permanent and temporary access roads, including Spur Roads, required for the execution of the Work and for the completed Project in accordance with the OERC and the Owner's Requirements.

(e) The Contractor shall install ditches and apply effective erosion, sediment and drainage controls in the vicinity of, and associated with, all access roads.

(f) The Contractor shall design all erosion, sediment and drainage measures including culverts associated with permanent and temporary roads and shall incorporate all such measures into its Erosion, Sediment and Drainage Control EWP. The Contractor shall submit data and calculations to support its design of drainage systems to the Owner for review as part of its Erosion, Sediment and Drainage Control EWP.

(g) The Contractor shall maintain all existing road culverts and culvert drainage areas consistent with final site grading. Existing culverts shall be upgraded if the design flows cannot be accommodated. New culverts shall be installed across permanent access roads as required to accommodate site drainage. Temporary culverts shall be installed across temporary access roads as required to maintain drainage and/or control erosion.

(h) The Contractor shall maintain all Site access roads, which includes Spur Roads, for the duration of Work which utilizes such roads. All necessary road maintenance work shall be performed by the Contractor to maintain roads in a fully serviceable condition, including but not be limited to:

(i) Road maintenance as required to maintain efficient road surface drainage and the prevention of potholes and depressions;

(ii) Timely removal of deposited soil and debris;

(iii) Controlling of dust; and

(iv) Snow removal and sanding in winter.

(i) The Contractor shall not use salt and other chemical ice melters to remove snow and ice without the prior written concurrence of the Owner.

(j) The Contractor shall remove all temporary access roads on completion of the Work and restore affected areas in accordance with the site restoration requirements of Section G, Site Restoration.

C4.2 Requirements for Private Roads

(a) The Contractor shall undertake comprehensive pre-construction and post-construction condition surveys of all private roads that could be adversely affected by construction traffic.

(b) The Contractor shall monitor the effects of construction traffic on private roads.

(c) The Contractor shall maintain all private roads affected by construction traffic and shall keep them such that their condition at any time during construction is no worse than their pre-construction condition.

(d) The Contractor's maintenance program for existing private roads shall be subject to the review and written concurrence of the Owner.

(e) Based on the results of post-construction condition surveys, the Contractor shall repair all private roads damaged by construction activity and leave them in a condition no worse than their condition at the start of construction.

(f) The Contractor's pre-construction and post-construction condition surveys of private roads shall be submitted to the Owner.

C4.3 Requirements for Powerplant and Associated Worksites

(a) The main access road to the Powerhouse shall be located at the existing entrance from Highway 22A to the existing Waneta generating station.

(b) The main permanent access road to the intake structure shall follow approximately the route of the existing roadway to the intake forebay area and shall use the existing entrance location on the Waneta-Nelway Road.

(c) The Contractor shall design, install and maintain, all in accordance with Section A7(a)(iii), a temporary traffic turnaround for use by westbound traffic on the Waneta-Nelway Road at a point immediately to the east of the entrance to Worksite B. The temporary traffic turnaround shall be subject to approval by MoT.

(d) The Contractor shall maintain the closed portion of the Waneta-Nelway Road in a safe and serviceable condition, fit for use by construction traffic, vehicles operated by the Owner and emergency response vehicles.

C4.4 Requirements for Transmission Line and Associated Worksites

(a) Spur Roads shall be minimum width single lane access roads and the Contractor shall stay on these roads when travelling to and from structure sites.

(b) New access roads and Spur Roads shall be constructed in a manner that maintains surface drainage patterns and, where possible, avoids watercourses and streambeds.

(c) Bridge structures over creeks and ephemeral streams shall only be constructed during low flow conditions and those crossings not necessary for future Transmission Line maintenance shall be removed immediately after the completion of construction and/or prior to April 1st in advance of the freshet.

C4.5 Environmental Work Plans

(a) The Contractor shall describe the measures that will be taken by the Contractor to meet all requirements specified in Sections C4.1 to C4.4, inclusive, in the Traffic Management EWP required by Section B4.3.

C5. PARKING, LAYDOWN AND WORK AREAS

C5.1 Parking Area Requirements

(a) Parking areas on Site for private vehicles used for personal transportation by the Contractor's staff and Site workforce shall be confined to the identified Worksites.

(b) Parking areas shall be prepared and developed in the same manner as Laydown Areas.

(c) The Contractor shall develop areas required for parking and shall provide site entrances, access roads, and level parking areas as required for the use of its workforce and by the Owner. Parking spaces for the use of the Owner and CHC shall be provided adjacent to the site offices established for these parties.

(d) There shall be no parking along the shoulders of the Waneta-Nelway Road, the Seven Mile Dam Road and Highway 22A, including all portions of the Waneta-Nelway Road closed for the duration of construction.

C5.2 Laydown and Work Area Requirements

(a) Laydown Areas include Worksites A1, A3, B, C1, C2, C3, D1, D2, D3, D4, E, F, G, H, I, J, K and L as shown on the OERC Drawings. Materials storage, workshops, site office facilities, equipment and worker parking, equipment and vehicle servicing and the like shall be restricted to these sites.

(b) The Contractor shall develop and maintain all Laydown Areas and work areas required for the Work.

(c) Erosion, sediment and drainage controls shall be installed prior to the start of construction as appropriate to site drainage conditions to prevent erosion and to control sediment in Laydown Area and work area runoff water.

(d) The Contractor shall provide and maintain positive drainage in and around all Laydown Areas and work areas and shall show all drainage provisions on its Erosion, Sediment and Drainage Control EWP.

(e) Surface soils in all used portions of Laydown Areas and work areas, except as approved by the Owner in gravel pit areas, shall be removed to a depth of 300 mm and stockpiled on the site from which it was removed for future use in restoration.

(f) Rockfill from excavations or excavated sand and gravel shall be used to level areas as necessary and free-draining Granular Base meeting the gradation requirements of the Owner's Requirements for road construction shall be placed and maintained as a working surface in all areas subject to traffic and Equipment movement.

(g) Where required in Laydown Areas and work areas, Granular Base shall be placed to a minimum thickness of 150 mm.

(h) In developing Worksite C1, the Contractor shall place a line of connected precast concrete roadside barriers that are 690 mm high and meet MoT Specification Section 941 along the Highway 22A shoulder from the Waneta Bridge to the entrance to Worksite C1 to separate Contractor activities on Worksite C1 from highway traffic, as typically shown on the OERC Drawings.

(i) Installation of temporary security fencing for Laydown Areas shall be at the discretion of the Contractor. All temporary fencing shall be removed on completion of the Work.

(j) Powerplant permanent fencing shall be installed as quickly as possible during the course of construction. Temporary fencing shall be installed around all Powerplant work areas

pending the installation of permanent fencing to prevent public access and access by unauthorized persons.

C5.3 Aggregate and Concrete Plant Requirements

(a) If the Contractor elects to establish aggregate processing and concrete batching plants on Site then these plants shall be set up in a suitable Laydown Area.

(b) The Contractor shall obtain all necessary approvals and permits associated with the setting up, operating, dismantling and removing of aggregate processing and concrete batching plants. Copies of all such approvals and permits shall be submitted to the Owner for review before commencement of operating such facilities.

(c) The Contractor shall decommission and remove all aggregate processing and concrete batching plants and their entire attendant infrastructure including rock and aggregate storage piles and bins, retention ponds, piping, workpads and pavements, and foundations from the Site on completion of all concrete work and shall restore all areas affected by such plants in accordance with Section G, Site Restoration.

C6. EXCAVATING AND EXCAVATED MATERIALS RELOCATION

C6.1 Criteria

(a) Tailrace workpad construction, tailrace excavation and tailrace rock plug excavation shall not be conducted during the sturgeon pre-spawning and spawning period from 15 May to 31 July.

C6.2 Requirements

(a) Rockfill workpads shall be used in the Pend d'Oreille River for tailrace and tailrace rock plug excavation.

(b) Prior to commencing any excavation work, all drainage channels including creeks and creek beds, natural draws, gullies and ditches entering the area to be excavated shall be diverted around the excavation area. The Contractor shall prevent surface water from entering excavations and shall control groundwater seepage to minimize erosion and water-borne sediment.

(c) The Contractor shall meet the receiving waters criteria of Section D2.1 during all in- and near-water excavation work.

(d) Excavated materials not required by the Contractor for Site development, for concrete aggregate or other construction uses shall be relocated to the identified excavated materials storage/reuse areas in accordance with the OERC.

(e) Additional requirements relating to the placement, compaction and grading of excavated materials placed at Worksites A1, A3, D1, D2, D3 and D4, as applicable, are provided in the Owner's Requirements.

(f) Sand and gravel overburden from excavations required for the Powerplant meeting the gradation requirements of the Owner's Requirements may be used in the development of Laydown Areas, Site access roads and the like. All remaining overburden material shall be placed in Worksite A1 up to its available capacity.

(g) Rock from excavations for the Powerplant which is not stockpiled for use by the Contractor as a source of coarse aggregate for concrete or for other construction uses shall, if acceptable based on Section C6.1(i), be stockpiled at Worksite D1 for subsequent processing and use by MoT. If the amount of excavated rock that is surplus to construction requirements exceeds the capacity of Worksite D1 the balance of the excavated rock shall be stockpiled at Worksite D2.

(h) During excavation, environmentally acceptable, clean, fines free excavated rock shall stockpiled for subsequent use in erosion control and for use to facilitate in water drilling, blasting and excavation of the intake and tailrace.

(i) Only excavated non-potentially acid generating (NPAG) rock as defined in Section F10 shall be placed in Worksite D1. Subject to the need of first setting aside whatever excavated rock is required for use as concrete aggregate and other construction uses, a total of not less than 230,000 m^3 (bulked volume) of excavated NPAG rock shall be placed in Worksite D1.

(j) Excavated materials placed at Worksites A1 and A3 shall be capped with material that will provide a long-term stable foundation for the placement of the previously stripped material.

(k) Excavations shall have safe side slopes and shall be properly shored and fenced to protect construction workers and the public.

(l) The finished surface elevation of the filled portion of Worksite A1 shall be no higher than 0.3 m below the underside ballast of the rail spur line Teck Cominco Reload Centre.

(m) The finished surface elevation of the filled portion of Worksite A3 shall be no higher than 0.3m below the adjacent shoulder of the pavement on Highway 22A.

(n) The finished surface elevation of Worksites D3 and D4 shall be uniform across both worksites and shall not be higher than El. 432.7 without the written permission of the Owner. Although zoned Industrial, Worksites D3 and D4 are presently used for agricultural purposes and excavated materials placed at these worksites shall be compatible with their continued use for this purpose.

(o) The finished elevation of Worksites C1, C3 and E shall be no higher than the 0.3 m below the adjacent shoulder of the pavement on Highway 22A.

(p) If Worksite C2 is used for the placement of excavated materials, placed materials shall be graded to blend with and be 0.3 m below existing site contours.

(q) Worksite B shall not be used for the disposal of excavated materials.

(r) All developing and final fills and all stockpiles shall be protected against erosion.

(s) Refer to Section C7, Drilling and Blasting, to Section C3, Site Preparation, and to Section G, Site Restoration, for related requirements.

C6.3 Environmental Work Plans

(a) The Contractor shall prepare an Excavation EWP and an Excavated Materials Relocation EWP and shall submit these plans to the Owner for review.

(b) The Excavation EWP relating to in-water work may be submitted separately.

(c) The Contractor shall describe the measures that will be taken by the Contractor to meet the criteria of Section C6.1 and all requirements specified in Section C6.2 in the Excavation EWP and the Excavated Materials Relocation EWP, as applicable.

(d) In addition to meeting the requirements of Section C6.3(c), the Excavation EWP shall also provide:

(i) Specific details of how the Contractor intends to excavate overburden and rock for the Powerplant;

(ii) Details of specific safety measures that will be implemented for surface and underground excavation;

(iii) Details of all equipment to be used in excavation;

(iv) The name and credentials of the Contractor's blasting consultant;

(v) A detailed drilling and blasting plan (Refer to Section C7.3(a));

(vi) A schedule and procedures for the required pre-blast and post-blast surveys;

(vii) A detailed excavation schedule; and

(viii) All supporting design details and associated calculations.

(e) Excavation shall not commence until the Excavation EWP relating to the planned work has received the written concurrence of the Owner.

(f) The Erosion, Sediment and Drainage Control EWP covering excavation shall provide specific details of how sediment resulting from excavation activities will be controlled.

(g) In addition to meeting the requirements of Section C6.3(c), the Excavated Materials Relocation EWP shall also provide:

(i) Details of specific safety measures that will be implemented;

(ii) Details of equipment to be used in the haulage of excavated materials;

(iii) Methods to be applied to prevent the loss of materials, including sediment-laden water, during haulage; and

(iv) All supporting design details and associated calculations.

(h) Excavated materials relocation shall not commence until the Excavated Materials Relocation EWP relating to the planned work has received the written concurrence of the Owner.

C7. DRILLING AND BLASTING

C7.1 Criteria

(a) The peak particle velocity at adjacent existing structures shall not exceed 50 mm/s measured at the nearest surface on the structures to the blast.

(b) Tailrace blasting and tailrace rock plug blasting shall not be conducted during the sturgeon pre-spawning and spawning period from 15 May to 31 July.

(c) All blasting for in-river tailrace excavation including rock plug removal shall be undertaken in HLH flow periods or when LLH flows exceed 708 m^3/s in the Pend d'Oreille River downstream of the Waneta Dam.

C7.2 Requirements

(a) Prior to blasting, the Contractor shall obtain a complete written, photographic and descriptive pre-blast condition survey of all structures (including all buildings, residences and wells) within 500 m of the nearest proposed blast and on all other structures which may be affected by blasting. The Contractor shall submit a copy of the pre-blast condition survey to the Owner for review in support of its Excavation EWP.

(b) The Contractor shall closely monitor blasting operations with particular reference to nearby existing structures and effects on fish.

(c) The Contractor shall take all necessary measures to protect completed work from the effects of in-water blasting.

(d) Within two (2) weeks of the completion of blasting, the Contractor shall carry out a post-blast condition survey of all structures covered in the pre-blast survey. A written post-blast condition survey shall be submitted to the Owner for review and concurrence.

(e) The Contractor shall minimize dust emissions when drilling on land and shall minimize in-water sediment when drilling in water to meet the requirements of Section D2, Water Quality Protection, and Section D3, Erosion, Sediment and Drainage Control.

(f) The Contractor shall follow the principles and procedures set out in the DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters.

(g) The Contractor shall design and schedule its in-water and near-water drilling, blasting and excavation program in accordance with the Waneta Interface Protocol adopted by the Owner, Teck Cominco and FortisBC.

(h) The Contractor shall have a contingency plan for emergency repairs of any damage caused by blasting where required to restore public and worker safety, roads, railway tracks, the dam and generating facilities, and transmission lines.

(i) The Contractor shall make a commitment to repair and restore to original condition any structure or thing damaged as a result of blasting and shall complete such repair and restoration work in a timely manner.

(j) Refer to Section B, Public Safety, Traffic and Community Relations, for related requirements.

C7.3 Environmental Work Plans

(a) The drilling and blasting component of the Excavation EWP shall address all blasting that will be performed during the performance of the Work and shall include:

(i) A description of the measures that will be taken by the Contractor to meet the criteria of Section C7.1 and all requirements specified in Section C7.2.

(ii) Measures and procedures for the safe handling and secure storage of explosives in accordance with the Federal *Explosives Act* and all other Applicable Laws;

(iii) A description of the safety precautions and environmental protection measures to be followed for all blasting operations during the course of construction;

(iv) A description of the controlled blasting techniques as specified in the Owner's Requirements to be used for all rock excavation, including limiting the size of the blast, orientation of blast direction, and the deployment of blast mats or the installation of protective screening, all as required to fully protect all existing facilities and infrastructure from any damage;

(v) A schedule for drilling and blasting activities;

(vi) Measures and procedures to be used in the protection of fish during in- and near-water blasting;

(vii) Precautions to be taken to protect EPZs when blasting in the vicinity of EPZs;

(viii) Specific procedures to be followed for in-water and near-water blasting;

(ix) Procedures to be followed for the inspections to be performed following each blast to identify any damage caused by the blast;

(x) A list with the correct names, fax numbers and telephone numbers of everyone required to be notified by the Contractor prior to each blast, and the minimum notice time required by each such person, and the procedure that shall be applied to keep this list up-to-date; and

(xi) The notification procedures to be used to notify all persons required to be notified when scheduled blasts are delayed.

(b) The Contractor shall not begin on-land or in-water blasting at the Site until the Excavation EWP and the Excavated Materials Relocation EWP relating to that Work have received the written concurrence of the Owner.

C8. NOISE CONTROL

C8.1 Requirements

(a) Noise generated by construction activities shall be minimized and controlled to meet the requirements of the BC *Workers Compensation Act*, Occupational Health and Safety Regulation, Part 7.

(b) The Contractor shall, in scheduling and carrying out work activities, minimize disturbance to local area residents and Wildlife caused by the generation of noise from construction activities.

(c) The Contractor shall promptly take measures to address and rectify situations where noise levels are unacceptable or the subject of public complaints.

(d) The Contractor shall monitor noise levels on Site and in representative areas that may be affected by construction noise and shall include the results of this monitoring in its Environmental Weekly Report.

C8.2 Environmental Work Plans

(a) The Contractor shall prepare a Noise Control EWP and shall submit this EWP to the Owner for review prior to the mobilization of equipment on Site. Mobilization on Site shall not commence until the Noise Control EWP has received the written concurrence of the Owner

(b) The Noise Control EWP shall describe the measures that will be taken by the Contractor to meet the requirements of Section C8.1.

C9. AIR QUALITY PROTECTION

C9.1 Requirements

(a) The Contractor shall minimize and control all fugitive dust arising from the performance of the Work, including but not limited to that arising from such activities as equipment movement, clearing, development of and work within the Site, and stockpiling of soils, excavated rock or other construction materials.

(b) If the level of dust generated at the Site is considered to be unacceptable by the Owner or any Authorities Having Jurisdiction, the Contractor shall control dust at its source to

contain and limit the release of particles to levels acceptable to the Owner or the Authority Having Jurisdiction, as applicable.

(c) The Contractor shall only use chemical dust palliatives such as water-absorbing Magnesium Chloride as part of a dust control program expressly addressed in an Air Quality Protection EWP that has the written concurrence by the Owner. The Contractor shall use water as a dust palliative in all other dust control.

(d) The Contractor shall use water sprays, as necessary, to control cement and fly ash dust during truck loading and unloading operations.

(e) The Contractor shall prevent dust nuisance and hazards on public highways and roads affected by the Work. Paved roads and highways used during construction shall be wet swept periodically as necessary to keep the paved roads and highways free and clear at all times of dust, mud and other materials deposited by and from equipment. Water from wet sweeping shall be diverted and controlled as necessary to ensure that the water quality criteria and requirements of Section D2 are met at all times.

(f) Application and handling of any dust palliative, with the exception of water, shall comply with the requirements and guidelines of Section A7(a) (v) and (vi).

(g) The Contractor shall control all evaporative emissions to meet the objectives of Section A7(a)(v).

(h) The Contractor shall control all exhaust emissions. Equipment exhaust systems shall function in a manner to control exhaust emissions to meet regulatory requirements and the objectives of Section A7(a)(v).

(i) Prior to commencing construction and operation of any Equipment with point-source air emissions (such as exhaust vents or stacks) the Contractor shall obtain all necessary PLAs from all applicable Authorities Having Jurisdiction and shall retain these PLAs for inspection by the Owner if requested.

(j) The Contractor shall minimize fugitive particular matter levels caused by dust, open burning smoke, equipment exhausts and other equipment emissions and shall promptly take measures to address and rectify situations where these levels are unacceptable or the subject of public complaints.

(k) The Contractor shall monitor fugitive particulate matter levels and equipment emissions.

C9.2 Environmental Work Plans

(a) The Contractor shall prepare an Air Quality Protection EWP and shall submit this EWP to the Owner for review prior to the mobilization of equipment on Site. Mobilization on Site shall not commence until the Air Quality Protection EWP has received the written concurrence of the Owner.

(b) The Air Quality Protection EWP shall describe the measures that will be taken by the Contractor to meet the requirements of Section C9.1.

C10. ARCHAEOLOGICAL AND HERITAGE FINDS

(a) In the event that any item(s) of particular archaeological, heritage, historical, cultural or scientific interest (a find) is found on the Site, such item(s) shall remain the property of the land owner on whose land the item(s) were found.

(b) The Contractor shall, on making or being advised of a find, immediately cease operations in the Discovery Site, minimize activities which create ground disturbance in and adjacent to the Discovery Site, and notify the Owner of the find. The Owner will notify the land owner and First Nations representatives.

(c) In the event of a find, the Contractor shall notify the Archaeology Branch of the BC Ministry of Tourism, Sport and the Arts (Archaeology Branch) and shall follow the direction of the Archaeology Branch with respect to dealing with the find.

(d) Work shall not resume within 30 m of the Discovery Site of a find, or such other distance as may be established in consultation with the Archaeology Branch, until approval to resume work has been received from the Archaeology Branch and from the Owner.

(e) The Contractor shall ensure that its employees and subcontractors do not collect artefacts or vandalise Discovery Sites in and around the Site.

(f) The Contractor shall co-operate with the Owner to expedite the evaluation of any Discovery Site by Authorities Having Jurisdiction and the subsequent release of the Discovery Site for the continuation of the Work.

C11. MINERALS FINDS

C11.1 Requirements

(a) Certain areas of the Site are known to have been a source of placer minerals, principally gold. Several specific areas of the Site are subject to active Placer Claims that are in good standing. The Contractor shall respect the rights of the claim holder to minerals and mineral-rich ore discovered within any claim.

(b) The Contractor shall be responsible for the actions of employees and subcontractors with respect to the discovery, collection and disposal of minerals and mineral-rich ore discovered on the Site.

(c) The Contractor shall immediately advise the Owner of the discovery of any recoverable minerals or mineral-rich ore on any portion of the Site whether or not that portion is part of a Placer Claim.

(d) All minerals or mineral-rich ore recovered on Site by the Contractor shall be securely kept by the Contractor on behalf of the Owner pending a decision by the Owner on its final disposition. The Owner will be solely responsible for the final disposition of discovered minerals and mineral-rich ore.

OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION D – WATER QUALITY MANAGEMENT

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SECTION D – WATER QUALITY MANAGEMENT

D1. OBJECTIVES

(a) The objectives for water quality management during construction of the Project shall be to complete the Work:

(i) Without causing any exceedances of the water quality objective parameters in the Lower Columbia River based on the Ambient Water Quality Objectives for the Lower Columbia River, Birchbank to the US Border, BC Ministry of Environment, May 2000 (the "Lower Columbia Water Quality Objectives");

(ii) Without causing any exceedances (outside of adequately protected in-water work areas) in the Pend d'Oreille and Columbia Rivers of the water quality guideline parameters for releases of sediment and turbidity based on the British Columbia Approved Water Quality Guidelines (Criteria), BC Ministry of Environment 1998 Edition, August 2001 Update (the "BC Water Quality Criteria"); and

(iii) Without causing any exceedances of the Project Specific Water Quality Criteria.

D2. WATER QUALITY PROTECTION

D2.1 Criteria

(a) Turbidity in Nephelometric Turbidity Units (NTU) shall be used for managing levels of suspended solids in water for Project water quality monitoring and control purposes.

(b) The following table sets out the End-of-Pipe Discharge – Water Quality Indicators and the Project Specific Water Quality Criteria.

PARAMETER	End-of-Pipe Discharge – Water Quality Indicators	Receiving Waters – Project Specific Water Quality Criteria
pH	6.5 – 8.5	< 1 pH unit change from Columbia River background if below 6.5 or above 8.5
Ammonia	≤ 5 mg/L	
Turbidity	120 NTU with review of applied controls if measured values exceed 80 NTU	1. Maximum increase of 8 NTU above background when the Columbia River background is between 8 and 80 NTU 2. Increase of ≤ 10% above background when Columbia River background ≥ 80 NTU
Oil and Grease	≤ 15 ppm	Not detectable by sight or smell
Toxicity	100 percent - 96 hr. LC_{50}.	

(c) For water quality parameters other than the Project Specific Water Quality Criteria the water quality criteria shall be:

(i) For those parameters included in the Lower Columbia Objectives, the criteria given in the Lower Columbia Water Quality Objectives for those parameters; and

(ii) For parameters other than those included in the Lower Columbia Water Quality Objectives, the criteria given in the BC Water Quality Criteria for those parameters.

(d) In the event of a conflict the Project Specific Water Quality Criteria shall take precedence over criteria provided in the Lower Columbia Water Quality Objectives and the BC Water Quality Criteria.

(e) The Project Specific Water Quality Criteria shall be met by the Contractor at all times. If the "End-of-Pipe Discharge – Water Quality Indicators" are approached or exceeded at any discharge point, the Contractor shall demonstrate, through increased water sampling frequency in the relevant Receiving Waters, that the Project Specific Water Quality Criteria are met. If they are not met, the Contractor shall immediately shut down the discharge and take all necessary measures to meet the Project Specific Water Quality Criteria before resuming discharge from that discharge point.

D2.2 General Requirements

(a) The Contractor shall make itself fully aware of water levels, water flows and weather conditions in and affecting all areas of the Work and shall allow for all effects that any such conditions may have on the Work.

(b) Except for safety and/or environmental reasons and/or as part of an adopted EWP associated with specific construction activities, the Contractor shall not modify Pend d'Oreille River flows during the course of construction.

(c) No treated timber shall be used in or near water.

(d) No wheeled or tracked equipment shall be operated in water except in accordance with an adopted EWP.

(e) The Contractor shall monitor water quality in accordance with the requirements of Section D8.

(f) In the event that Transmission Line construction results in damage to existing licensed water sources and/or their associated water-taking systems, the Contractor shall promptly repair damage caused to such water sources and water-taking systems.

(g) Immediately prior to commencing work in the vicinity of licensed water sources and as frequently thereafter as required by changing conditions, the Contractor shall take and test representative samples of source waters and shall obtain benchmark water quality information including as a minimum pH, Turbidity, and Oil and Grease parameters. The Contractor shall also assess and document the quantity of water available at potentially affected water-taking intakes in and downstream of the Transmission Line work area. Copies of all water source and water-taking system test results and assessments shall be submitted promptly to the Owner. In the event that the quantity and/or quality of water at existing licensed water-taking intakes falls below pre-construction benchmark values directly as a result of Transmission Line construction activity, the Contractor shall on request provide affected licensees with potable water until such time as the quantity and quality of water at the water-taking intakes and in affected water-taking systems is restored.

D2.3 Effluent Release Requirements

(a) The Contractor shall ensure that effluent from settlement ponds, retention ponds and water treatment basins, including concrete truck washing basins, shall have a pH within the range specified in the Project Specific Water Quality Criteria. The Contractor shall take whatever measures are necessary to maintain effluent pH levels within the range specified.

(b) High pH effluent may be treated with by application of CO_2 gas, dry ice (solid CO_2), suitable pool chemical (e.g., pH Down), or other acid buffers. The Contractor shall identify in its Water Quality Protection EWP the mitigation measures and monitoring procedures it intends to use to address pH levels outside the range specified in the Project Specific Water Quality Criteria.

(c) The Contractor shall treat effluent from contaminated intake sediment slurry dewatering as required and shall meet the Project Specific Water Quality Criteria of Section D2.1(b) and the criteria of Section D2.1(c). The Contractor shall monitor, sample and test slurry dewatering effluent and relevant Receiving Waters as required to ensure that only

environmentally acceptable effluent is released to the environment. The Water Quality Protection EWP shall specifically address contaminated intake sediment slurry dewatering procedures and effluent treatment and shall include details of all required monitoring, sampling and testing.

(d) Seepage water potentially contaminated with products of ANFO that does not meet the Project Specific Water Quality Criteria shall not be discharged to a watercourse. Collected seepage water with Ammonia levels in excess of the Project Specific Water Quality Criteria for Ammonia shall be treated to reduce Ammonia levels before being released or shall be removed from Site for disposal at an approved waste disposal facility. Procedures for monitoring and treating or removing seepage water with unacceptable levels of Ammonia shall be addressed in the Water Quality Protection EWP.

D2.4 Spill Handling Requirements

(a) A release of sediment-laden water that results in an exceedance of the Project Specific Water Quality Criteria for turbidity in Receiving Waters shall be treated as a spill to the environment. All spills shall be dealt with and reported as required under the provisions of Section A5, Environmental Incident Reporting, and Section F10.1.5, Spill Reporting.

(b) Spills of hazardous substances over the amount specified for the spilled substance in the BC Spill Reporting Regulation, or where there is any potential introduction of deleterious substances to the aquatic environment as defined in Section 34 of the *Fisheries Act*, shall be immediately reported to the Provincial Emergency Program, (800) 663-3456, and secondly to Environment Canada Emergencies, (604) 666-6100.

(c) Accidental spills chemical or fuel which may enter a waterbody or the groundwater shall be cleaned up immediately by the Contractor and reported as required by Clause A5, Environmental Incident Reporting, and Section F10.1.5, Spill Reporting.

(d) In the event of a release of any oil, grease or fuel substances either directly or indirectly into water, in discharged effluent, runoff or wash-off water, the Contractor shall immediately stop the release and take measures as described in its Spill Prevention, Preparedness and Response EWP.

D2.5 Correction of Non-Compliances

(a) Where water quality monitoring or other monitoring indicates non-compliance or impending non-compliance with the water quality criteria of Section D2.1, the Contractor shall immediately stop the construction activities causing or potentially causing non-compliance. The Contractor shall then take steps to correct the non-compliance and to modify its operations as required to achieve and maintain compliance. The Contractor shall subsequently and without delay revise the Water Quality Protection EWP and any related EWPs as required to include the corrective actions and the new or revised mitigative measures that will be implemented.

(b) The Owner will not allow work to resume on a construction activity that has resulted in non-compliance or impending non-compliance with the water quality criteria of Section D2.1 until the Site operations of the Contractor have been reviewed and procedures acceptable to the Owner for continuing work on the particular activity have been established.

D2.6 Environmental Work Plans

(a) The Contractor shall prepare a Water Quality Protection EWP and shall submit this EWP to the Owner for review.

(b) In advance of mobilization, the Contractor shall submit to the Owner for review a Water Quality Protection EWP covering activities relating to the mobilization of Equipment and construction materials on Site. Mobilization and other Project start-up activities will not be allowed until this Water Quality Protection EWP has received the written concurrence of the Owner.

(c) The Water Quality Protection EWP cover all construction activities affecting water quality and shall include the Columbia River, the Pend d'Oreille River, the Waneta headpond and all tributary streams thereto that could be adversely affected by the Work.

(d) The Water Quality Protection EWP shall include a monitoring component as required by Section D8 and shall describe the measures that will be taken by the Contractor to meet all the criteria and requirements specified in Sections D2.1 to D2.5, inclusive, and shall include a schedule for all principal activities relating to the EWP.

(e) The Water Quality Protection EWP shall be coordinated with the Erosion, Sediment and Drainage Control EWP required by Section D3.

D3. EROSION, SEDIMENT AND DRAINAGE CONTROL

D3.1 Criteria

(a) Drainage control facilities including ditches, settling ponds, retention ponds and other facilities required to accommodate storm runoff shall be designed, constructed and maintained so that they can handle the runoff from a 20-year return period, 30 minute duration storm without erosion.

(b) Concrete truck and cementitious grouting equipment washing areas and retention ponds shall be located at least 30 m from the wetted perimeter of any watercourse.

(c) Truck washing and steam cleaning areas for the removal of dirt, grease, oil and the like shall be located at least 30 m away from the wetted perimeter of any watercourse and from drainage facilities.

D3.2 General Requirements

(a) For the duration of the Work the Contractor shall control erosion, sediment and drainage on the Site.

(b) The Contractor shall design, supply, install and maintain for the duration of the Work all erosion, sediment and drainage control measures, including silt fences, check dams, in-water silt curtains and sediment retention/settlement/treatment pond systems, as required by the Work and by Site conditions to meet the Project Specific Water Quality Criteria.

(c) The Contractor shall at all times be responsible for ensuring that the Work is carried out in accordance with the Erosion, Sediment and Drainage Control EWP.

(d) The Contractor shall not disturb watercourses except as shown on design drawings that have received the written concurrence of the Owner.

(e) Except as shown on design drawings that have received the written concurrence of the Owner, no obstruction or debris shall be placed in any watercourse. In the event that any material is inadvertently placed within the normal high water wetted perimeter of a watercourse, the Contractor shall immediately remove the material, contain sediment in accordance with water quality criteria and requirements of PLAs and the OERC, and restore the affected area.

(f) Except as required for in-water and shoreline excavation that is part of design drawings that have received the written concurrence of the Owner, the Contractor shall not remove any existing large woody debris from any watercourse.

(g) The Contractor shall prepare and submit all required permit applications associated with erosion, sediment and drainage control works as required by MoE and other Agencies Having Jurisdiction. The Contractor shall not proceed with the installation of any such works until after receiving the applicable permits and shall forward copies of all permits received to the Owner.

(h) Erosion, sediment and drainage control measures shall address regulatory requirements and shall conform to the Land Development Guidelines for the Protection of Aquatic Habitat.

(i) Truck washing and steam cleaning areas for the removal of dirt, grease, oil and the like shall conform to the requirements of Section F, Waste and Hazardous Materials Management.

(j) The Contractor shall place granular base as an erosion and sediment control measure and to provide required firm working and traffic surfaces in all laydown, work and other areas which are, or become, prone to disturbance by construction traffic and equipment operation.

(k) The Contractor shall have appropriate equipment available and materials in sufficient supply readily available and at strategic locations on Site for emergency use in the provision and maintenance of erosion, sediment and drainage control as required. Materials typically

required include clean rock, granular material, tarps, polyethylene sheeting, geotextile, geomembrane and silt fencing.

(l) Erosion, sediment and drainage control shall be key elements of the Contractor's orientation and environmental training and awareness exercises required by Section A4, Environmental Training and Awareness.

(m) The Contractor shall include as part of the Erosion, Sediment and Drainage Control EWP the measures required to decommission, dismantle and remove from Site all erosion, sediment and drainage control measures and facilities not required as part of the Facility.

(n) All materials used during in-water work and near-water work shall be free of contaminants and free of particle sizes that could result in increased sediment loading and/or contamination in rivers and watercourses.

(o) Clay materials shall not be used in or adjacent to a river or other watercourse.

(p) Rock materials for in-water and near-water use shall be essentially free of sand, silt and clay fractions. The Contractor shall process all materials intended for in-water and near-water use as necessary to remove fine particles including unacceptable levels of dust.

(q) All contaminated and turbid water shall be treated as work area run-off and shall be directed to settling/filtering/treatment facilities for treatment as required to meet the criteria and requirements of PLAs and the OERC.

D3.3 Erosion Control Requirements

(a) The Contractor shall place emphasis on the prevention of erosion as the key element in the controlling of sediment on Site.

(b) All Work shall be undertaken in a manner that avoids or absolutely minimizes erosion and the release of sediment into any watercourse.

(c) The Contractor shall design, construct and maintain all temporary erosion control measures so that all measures are in good working condition at all times. Erosion control measures shall be capable of continuous operation during working and non-working hours. The Contractor shall inspect all measures daily during inclement weather conditions and shall take any measures required ensure proper functioning of the measures.

(d) To control erosion, the Contractor shall:

(i) Minimize the area of soils disturbed and the length of time soils are exposed to erosion;

(ii) Endeavour at all times to intercept water flowing from adjoining off Site areas or drainage channels into Site areas and to divert that water around work areas to minimizing the potential for erosion;

(iii) Prevent channel erosion on steep interceptor and drainage ditches by lining ditches with filter fabric, clean rock, polyethylene, and the like, and combinations thereof, and/or by the use of check dams;

(iv) Construct drainage crossings in the dry or by using appropriate measures to temporarily divert the flow during construction of the crossing;

(v) Incorporate all permanent soil erosion control features required for the long-term protection of water quality in watercourses in all areas affected by the Work at the earliest practicable time; and

(vi) Immediately correct any deficiencies observed in erosion control measures.

(e) The Contractor shall ensure that suitable mulches, erosion mats, geotextiles, tarps, polyethylene sheeting and/or other applicable erosion control surface protection systems are available to meet all needs of the Work and are used to cover temporarily exposed surfaces and stockpiles of erodible materials. All such erosion control coverings shall be sufficiently anchored to prevent displacement by winds and shall be examined and maintained on a regular basis.

(f) The Contractor shall ensure that all erodible materials on exposed surfaces and in stockpiles are properly protected without delay following stripping or following creation of stockpiles.

D3.4 Sediment Control Requirements

(a) The Contractor shall design, construct and maintain all temporary sediment control measures and facilities. Sediment control measures and facilities shall be inspected daily and the Contractor shall ensure that all measures are in good working condition. Sediment control measures shall be capable of continuous operation during working and non-working hours.

(b) All in-water excavation work shall be scheduled for the time of year when the flows and velocities are the lowest in the immediate area of the Work.

(c) Silt curtains shall be used to isolate in-water and near water work to control sediment in those locations where flow velocities are low enough to allow the successful deployment of silt curtains and where silt curtains will be effective in controlling sediment.

(d) Where flow velocities are too high or too turbulent for the successful deployment of silt curtains and/or where silt curtains will be ineffective in controlling sediment due to the high velocities or turbulent flow, the Contractor shall take whatever measures are necessary to control sediment. Such measures may include the use of clean rockfill to construct workpads and isolation berms.

(e) If floating silt curtains are used, they shall be maintained to ensure that sediment-laden water is contained within the curtains and water flowing though the curtain is filtered. Booms supporting silt curtains shall have sufficient floatation so that the silt curtains are adequately supported in all weather conditions and silt laden water cannot flow over the top of the curtains.

(f) Silt curtain filter fabric supported on rock berms, or other effective techniques may be used in shallow water where floating silt curtains are otherwise impractical.

(g) Silt curtain removal shall be undertaken in a manner that prevents the release of sediment contained within the curtain to the watercourse. Secondary silt curtains shall be used as required to allow the removal of silt curtains that are laden with sediment without releasing the contained sediment.

(h) All silt curtain installation, operation, maintenance and removal shall be undertaken in a manner that maintains compliance with the Project Specific Water Quality Criteria and the OERC.

(i) The Contractor shall immediately correct any deficiencies observed in sediment control measures and facilities.

(j) Turbid water in pump discharges for small volume and/or discontinuous water discharges may be passed through filter bags or equivalent as the primary sediment retention system for sediment in pump water discharges. The use of filter bags or equivalent is intended to facilitate the collection and removal of pump discharges sediment from small work areas. Filtered and uncontaminated water meeting point of discharge requirements may be discharged to vegetated areas and allowed to drain and soak away through the natural vegetation provided that this does not cause erosion or siltation of vegetated areas to the detriment of plant growth. The location of all such discharge areas shall be included in the Erosion, Sediment and Drainage Control EWP.

(k) The Contractor shall construct new roads and access routes and maintain existing roads and access routes in a manner that ensures that potholes and puddles will not form and that water will not pond on the roadway surface. The Contractor shall not allow sediment-laden ponded water on roads to splash into environmentally sensitive areas.

(l) The Contractor shall restrict vehicles and equipment to designated access roads, routes and work area.

D3.5 Drainage Control Requirements

(a) Drainage control facilities shall be designed using the Land Development Guidelines for the Protection of Aquatic Habitat.

(b) Except where interceptor ditches or berms are required to divert runoff away from specific work areas or to a retention pond, original drainage patterns shall be maintained wherever possible during the execution of the Work.

(c) Interceptor ditches or berms shall be constructed to divert water entering the Site away from erosion prone areas. Berms shall be constructed of clean, non-erodible granular material.

(d) Drainage control measures such as diversion ditches, rockfill berms, check dams, straw bale barriers, drop structures and lined drainage channels shall be used in erosion-prone drainage and runoff areas as required by Site conditions.

D3.6 Settling/Retention Pond Requirements

(a) Retention pond effluent shall not be released to the receiving environment until it has been tested for designated parameters, including Turbidity and pH, and approved for release by the EM. Refer to Section D8.1.1(f) and OERC Section F, Waste and Hazardous Materials Management, for related requirements.

(b) Settling/retention, treatment and/or filtering techniques shall be used to control suspended solids in all Site discharge water and runoff and to contain work area sediment releases as necessary to meet the Project Specific Water Quality Criteria and requirements of PLAs and the OERC.

(c) The Contractor shall design, construct, maintain and operate retention and water treatment ponds as necessary to prevent the release of entrained sediments in Site discharge and runoff water and to contain, cleanup and/or treat contaminated water and water otherwise not meeting discharge criteria. Water for retention and/or treatment includes but is not limited to excavation seepage water, aggregate processing wash water, and concrete plant and concrete truck mixer wash water.

(d) Retention and water treatment ponds shall be designed and constructed on a site-specific and purpose-specific basis, all in accordance with the criteria and requirements of PLAs and the OERC.

(e) The Contractor shall submit design calculations and drawings relating to its design of all retention and water treatment works to the Owner for review with the Erosion, Sediment and Drainage Control EWP.

D3.7 Monitoring Requirements

(a) The Contractor shall monitor all erosion, sediment and drainage control installations and shall forthwith correct all deficiencies observed and/or brought to its attention by the Owner.

(b) During periods of inclement weather, the Contractor shall ensure that erosion, sediment and drainage control installations are monitored and maintained as required throughout each

shift, and shall perform all required monitoring and maintenance during regular work stoppage periods, such as evenings, nights and weekends.

D3.8 Environmental Work Plans

(a) The Contractor shall prepare an Erosion, Sediment and Drainage Control EWP and shall submit this plan to the Owner for review.

(b) In advance of mobilization, the Contractor shall submit to the Owner for review an Erosion, Sediment and Drainage Control EWP covering activities relating to the mobilization of Equipment and construction materials on Site and other Project start-up activities. Mobilization on Site will not be allowed until this Erosion, Sediment and Drainage Control EWP has received the written concurrence of the Owner.

(c) The Erosion, Sediment and Drainage Control EWP shall describe the measures that will be taken by the Contractor to meet all the criteria and requirements specified in Sections D3.1 to D3.7, inclusive, and shall include a schedule for all principal activities relating to the EWP.

(d) Materials selection data, design data and calculations for all measures to control erosion, sediment and drainage shall be submitted for review by the Owner as part of the Erosion, Sediment and Drainage Control EWP.

(e) The Erosion, Sediment and Drainage Control EWP shall be coordinated with the Water Quality Protection EWP required by Section D2.

D4. DRILLING AND BLASTING

D4.1 Criteria

(a) Blast overpressures in the Waneta Headpond and in the Pend d'Oreille River shall not exceed the criteria given in the DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters.

D4.2 Requirements

(a) The Contractor shall not begin blasting on land or in water at the Site until the Excavation EWP and Excavated Materials Relocation EWP relating to that part of the Work has received the concurrence of the Owner in writing.

(b) The Contractor shall, throughout its in- and near-water drilling and blasting operations comply with all applicable terms and conditions of the DFO Fisheries Act Authorization for the Work.

(c) ANFO explosive may only be used in dry drill holes above the water table.

(d) If ANFO is used for excavating rock in any excavation, seepage water in that excavation shall be collected and pumped to a settling / water treatment pond and shall be monitored and treated as required before being released.

(e) The Contractor shall minimize dust emissions when drilling on land and shall minimize in-water sediment when drilling in water and shall meet the water quality criteria and requirements of PLAs and the OERC during drilling and blasting operations.

(f) Silt curtains are not expected to provide a practical means of controlling in-water sediment during drilling, blasting and excavation operations in the Waneta Headpond and in the Pend d'Oreille River downstream of the Waneta Dam. Other means of in-water sediment control, such as the construction of workpads and isolation berms using clean rockfill, shall be used. Blasting under the cover of a rockfill workpad may additionally aid in mitigating potential adverse effects of blasting on fish

(g) In-water rockfill workpad placement and in-water, near-water and/or over-water drilling, blasting and excavation shall only be undertaken during daylight hours.

(h) The EM or a qualified designate of the EM shall be on Site during all in-water rockfill workpad placement and during in-water, near-water and/or over-water drilling, blasting and excavation.

(i) Rockfill workpad placement and in-water and/or over-water drilling, blasting and excavation in the intake and approach channel area shall only be undertaken during a period of suitably low generating station flows since the area of this Work is adjacent to and/or encroaches on flows to the existing generating station.

(j) Rockfill workpad placement and in-water and/or over-water drilling, blasting and excavation in the tailrace area shall only be undertaken during a period of suitably low Pend d'Oreille River flows since the area of this Work is directly in the river downstream of the existing spillway and generating station.

(k) The Contractor shall take all necessary measures to disperse and exclude fish from the blast overpressure zone and to meet the criteria of Section D4.1.

(l) The Contractor shall retain the services of a qualified professional to monitor for adverse effects on fish during its in-water, near-water and/or over-water blasting operations. The Contractor shall take reasonable steps to confirm the dispersal of fish from the blast overpressure zone and shall monitor fisheries waters affected by blasting for blast overpressure using appropriate methods such hydrophones and seismic monitoring systems.

(m) The Contractor shall suspend in-water blasting in the event blast overpressure exceeds the criteria given in Section D4.1 and shall not resume blasting until effective measures to

reduce blast overpressures have been taken. A blast overpressure exceedance shall be reported as an Environmental Incident.

D4.3 Environmental Work Plans

(a) The Contractor shall submit its drilling and blasting program and procedures as part of the Excavation EWP to the Owner for review. The Contractor shall describe in the EWP all of the measures that will be taken to meet the criteria and requirements of Sections D4.1 and D4.2.

(b) In-water rockfill pad construction, in-water, near-water and/or over-water drilling, blasting and excavation shall not commence until the Excavation EWP covering that work has received the concurrence of the Owner in writing.

D5. AGGREGATE PROCESSING WASHWATER

D5.1 Requirements

(a) Washwater from aggregate processing shall be collected in retention ponds and, to the extent possible, shall be recycled through the aggregate processing facility.

(b) The Contractor shall design and develop an aggregate washwater collection system with watertight retention ponds, as required, for the collection and clarifying of aggregate processing washwater to meet all requirements of the Work. If the retention pond is formed in an excavated pit, the pit shall be lined with an appropriate liner that will prevent leakage from the pond, which liner as a minimum shall be a geomembrane liner not less than 1 mm thick and acceptable to the Owner. The aggregate washwater retention pond shall have a system for discharging clarified washwater no longer required for aggregate washing. Refer to OERC Section F, Waste and Hazardous Materials Management, for related criteria and requirements.

(c) The aggregate washwater retention ponds shall be designed in accordance with regulatory requirements. Retention pond designs shall be incorporated into the Erosion, Sediment and Drainage Control EWP together with notes covering procedures to be applied in the use of these facilities. Design calculations for the sizing of the ponds shall be submitted with the EWP.

(d) The aggregate washwater retention pond(s) shall be protected by fencing. Signs shall be posted to identify the ponds and their purpose.

(e) The aggregate washwater retention ponds and supporting facilities shall be dismantled and removed in their entirety upon completion of the Work. Any geomembrane liners used shall be completely removed and shall be disposed of as construction waste.

D6. CONCRETING AND GROUTING

D6.1 Requirements

(a) The Contractor shall conduct all concreting and grouting operations in a manner that ensures compliance with the water quality criteria and requirements of PLAs and the OERC.

(b) Except as may be required for underwater concrete or grout placement, the Contractor shall isolate fresh concrete and grout from all watercourses for at least 48 hours after placement.

(c) Underwater concrete and grout placement shall only be undertaken as part of an EWP having the written concurrence of the Owner. In the event of underwater concrete or grout placement, the Contractor shall take effective measures to exclude fish from local in-water zones that may have pH levels temporarily above those of the Project Specific Water Quality Criteria.

(d) During any concrete pour or grouting operation within 15 m of a watercourse, or in work areas immediately above the wetted perimeter of a watercourse, the Contractor shall ensure that carbon dioxide cylinders and suitable application devices (e.g., weighted soaker hoses) are available on Site and ready for use to adjust the pH and neutralize any concrete or grout leachate that is inadvertently discharged into a watercourse.

(e) The Contractor shall prevent the spillage of cementitious grout materials within the wetted perimeter of a watercourse and into any watercourse.

(f) The Contractor shall prevent the spillage of individual chemical grout components within the wetted perimeter of a watercourse and into any watercourse.

(g) The Contractor shall treat the escape into the environment of individual grout components or uncured mixed grout as a spill and shall address all such spills as required by Section F12, Spill Contingency.

(h) The Contractor shall securely store on Site and use suitable equipment and materials for the mitigation of concrete and cementitious grout spills into or in areas adjacent to watercourses or into any watercourse. For example, cylinders of gaseous carbon dioxide shall be kept on Site and shall be used, as required, in the event of concrete, concrete leachate and grout discharges into any watercourse.

(i) The Contractor shall provide to the Owner for review:

  (i) A description of the locations for grouting;

  (ii) Details of its drilling and grouting program and the Equipment to be used;

  (iii) The types of grout to be used and the grouting procedures;

(iv) Specific grout loss, spill prevention, spill preparedness measures and spill responses relevant to the grouts to be used; and

(v) Specific excess/unused grout and grout component disposal procedures.

D6.2 Environmental Work Plans

(a) The Contractor shall prepare a Grouting EWP for its grouting operations and shall submit this EWP to the Owner for review in advance of any grouting work on Site. Grouting shall not commence until the Grouting EWP relating to the planned grouting work has received the written concurrence of the Owner.

(b) The Grouting EWP shall describe all of the measures that will be taken to meet the requirements of Section D6.1 and shall also include:

(i) A drilling and grouting schedule; and

(ii) All supporting design details and associated calculations.

D7. TRUCK AND EQUIPMENT WASHING

D7.1 Requirements

(a) No equipment shall be washed or steam cleaned for the removal of collected dirt, grease, oil and other contaminants in work areas or near open water or watercourses or within the wetted perimeter of a watercourse.

(b) The Contractor shall only wash or steam clean equipment in a washing bay in an equipment servicing area that is designed and operated in accordance with the Spill Prevention, Preparedness and Response EWP.

(c) Wastewater and washings from an equipment washing bay shall be collected and treated prior to discharge and/or shall be removed to a licensed disposal facility.

(d) All effluent from an equipment washing bay discharged on Site shall meet the water quality criteria and requirements of PLAs and the OERC.

D8. WATER QUALITY MONITORING

D8.1 Requirements

D8.1.1 Monitoring Locations

(a) The Contractor shall monitor water quality at the following River Monitoring Points:

Upstream (U) and Downstream (D) River Monitoring Points

River Monitoring Point No.	River Monitoring Point Location	
	River Location (Station)	Offset at Station
U1	Columbia River: 100 – 250 m upstream of the north boundary of Worksite A1 as shown on the OERC Drawings	Approximately at the one-third point of the river width, on the west side of the river
U2	Columbia River: 0 – 300 m downstream of the BCH 5L98 Transmission Line crossing	Approximately at the one-third point of the river width, on the east side of the river
U3	Pend d'Oreille River (Waneta headpond): 200 – 250 m upstream of the upstream face of the Waneta Dam, measured perpendicular to the dam	20 – 30 m south of the north shoreline at normal low water level
U4	Pend d'Oreille River (Waneta headpond): 400 – 600 m upstream of the upstream face of the Waneta Dam (mid-dam)	At mid-river
D1	Columbia River: 200 – 300 m upstream of the US Border	30 – 50 m from the east shoreline at normal low water level along width of river
D2	Columbia River: 200 – 300 m upstream of the US Border	80 – 100 m from the west shoreline at normal low water level along width of river

(b) With the written agreement of the Owner, the Contractor may adjust River Monitoring Point locations provided that the Owner considers that the proposed relocations will provide equivalent data to the specified locations.

(c) All River Monitoring Points shall be identified by marker buoys or equivalent readily visible from the adjacent shoreline.

(d) Turbidity and pH shall be determined at a depth of 1.0 m below the water surface.

(e) The Project Specific Water Quality Criteria shall be met in the Receiving Waters immediately adjacent to the Dilution Zone unless turbulent water conditions preclude safe and/or effective in-water monitoring, in which case, the Project Specific Water Quality criteria shall be met at River Monitoring Points D1 and D2.

(f) The Contractor shall monitor the turbidity and pH in all Site drainage and discharge waters resulting from, or affected by, construction activity as frequently as required to demonstrate that the water quality criteria and requirements are being met. Monitoring of discharges shall be made at the following discharge point:

(i) For any piped outlets discharging directly into a watercourse or into a soak-away pit or trench the monitoring point shall be at the end of the discharge pipe (end-of-pipe);

(ii) For other outlets, drainage ditches and the like the monitoring point shall be at the shoreline of the watercourse into which the waters are discharged.

D8.1.2 Monitoring

(a) Throughout the Work the Contractor shall monitor all facilities and measures installed by the Contractor to protect water quality and shall maintain these facilities and measures in a fully effective state of repair.

(b) For River Monitoring Points, the upstream turbidity and pH monitoring results shall be used to establish on-going background turbidity and pH levels for reference purposes. The downstream turbidity and pH monitoring results shall be used to determine on-going downstream turbidity and pH levels and to identify any potential adverse turbidity and pH effects of the Work on downstream water quality.

(c) The Contractor shall obtain turbidity and pH levels at the River Monitoring Points as often as required throughout the Work to provide effective and representative data for the control of work-generated in-water sediment and pH and to demonstrate compliance with PLAs and the OERC.

(d) As a minimum, the Contractor shall determine turbidity and pH levels at all River Monitoring Points and at all active points of discharge once per day shift.

(e) Water quality sampling and testing for parameters other than turbidity, pH, oil and grease, and Ammonia that are potentially affected by construction activity shall be conducted as often as required to ensure that the water quality criteria and requirements of PLAs and the OERC are met throughout the Work. The sampling and testing program, including frequency and depth of sampling, shall be fully described in the Water Quality Protection EWP.

(f) The Contractor shall submit a summary table of its water quality monitoring test results to the Owner with the Environmental Weekly Report covering the week of the report. If requested by the Owner, individual turbidity and other test results shall be submitted immediately upon completion of testing.

(g) All workers on Site shall be made aware of the water quality protection requirements and installed protective measures relating to the Work and shall inform their work supervisors of all observed in-water sediment and oil and grease conditions that could potentially affect water quality.

(h) Monitoring for oil and grease shall be undertaken throughout the Work as often as required to ensure compliance with PLAs and the OERC. As a minimum requirement, sampling and testing of discharge waters for oil and grease shall be conducted weekly during active construction.

(i) Sampling and testing for Ammonia shall be conducted prior to the release of seepage water collected from excavations where Ammonium Nitrate Fuel Oil (ANFO) explosive is being used.

D8.1.3 Monitoring Equipment and Instrumentation

(a) The Contractor shall supply and maintain three (3) portable turbidity meters, Hach Instruments Portable Turbidity Meter, Cole-Parmer Catalogue No. EW-99511-00, or equivalent acceptable to the Owner, for the determination of turbidity levels in water samples. The Contractor shall provide one (1) additional such turbidity meter to the Owner and shall ensure that it is fully serviceable at all times.

(b) The Contractor shall maintain all portable turbidity meters in a proper state of repair and calibration. Calibrations for each meter shall be carried out not less than once per week using standard manufacturer-supplied solutions. Confirmation of calibration and calibration result shall be included in the weekly monitoring reports.

D8.2 Environmental Work Plans

(a) The Contractor's Water Quality Protection EWP required by Section D2 shall include a description of all of the measures that will be taken to meet the requirements of Section D8.1 and shall include a schedule for planned monitoring activities.

OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION E – PROTECTION OF TERRESTRIAL RESOURCES

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OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION E – PROTECTION OF TERRESTRIAL RESOURCES

E1. OBJECTIVES

(a) The objectives for the protection of terrestrial resources during construction of the WEP are to complete the Work:

(i) In a manner that respects existing land, vegetation and Wildlife values in the area of the Project, having due regard to the protection of those values; and

(ii) Without causing adverse environmental effects greater than those described in the EACA.

E2. PROTECTION OF WILDLIFE

E2.1 Requirements

E2.1.1 General

(a) Prior to the commencement of construction in any area of the Site, the Contractor shall:

(i) Identify and mark as necessary areas where herptiles are known to be active on Site and/or local roads and Site access roads; and

(ii) Identify and mark bat roost trees and bird nest boxes on Site that will or may potentially be threatened by construction.

(b) The Contractor shall take measures to prevent its personnel from harassing or feeding Wildlife, carrying or discharging firearms, and hunting or fishing on Site.

(c) The Contractor shall take measures to protect the habitat and activities of Listed Species of Wildlife, and to avoid injury to and killing of Wildlife on Worksites by:

(i) Identifying particularly sensitive access road and Worksite areas;

(ii) Identifying and protecting Wildlife movement corridors to the greatest extent practicable;

(iii) Providing worker training, awareness and vigilance;

(iv) Providing additional road signage and/or reductions in speed limits;

(v) Promoting carpooling and minimizing worker traffic; and

(vi) Limiting the use by workers of areas where Wildlife are determined to be particularly active.

(vii) Shepherding of any detected Wildlife away from access roads prior to Equipment access and away from active construction areas.

(d) The Contractor shall monitor the effectiveness of its Wildlife avoidance and mitigation measures and shall make whatever modifications to these measures are required to minimize adverse effects.

(e) All collisions between Equipment and Listed Species of Wildlife in the Project area shall be reported immediately to the EM. Upon being notified, the EM shall report all such accidents to the Owner and as required by any Applicable Law to Authorities Having Jurisdiction.

(f) In the event of a collision between Equipment and Wildlife, the EM or a qualified biologist retained by the Contractor and reporting to the EM, shall initiate the following measures:

(i) Wildlife rescue for Listed Species;

(ii) Collection and disposal of the carcass(es); and

(iii) Report the collision as an Environmental Incident.

(g) All food waste on Site shall be stored in closed containers in securely fenced or otherwise securely enclosed areas or in bear-proof containers pending disposal off Site.

(h) Nuisance Wildlife shall be reported to the EM and the Owner. If it is necessary to arrange the removal or transfer of beavers, bears or other Wildlife from the Site, the Contractor shall contact the Conservation Officer Service prior to taking action, and shall follow the course of action recommended by the Conservation Officer.

(i) If, in the opinion of the EM or the Project Environmental Monitor, there is excessive disturbance to Listed Species of Wildlife, the EM or a qualified biologist retained by the

Contractor and reporting to the EM shall assess the impacts and recommend mitigation measures which the Contractor shall implement.

(j) The Contractor shall ensure that its staff and workforce are sufficiently trained in bear awareness and avoidance commensurate with the work being undertaken. Bear awareness and avoidance training shall be addressed as a part of orientation and environmental training and awareness.

(k) To the greatest extent practicable and consistent with safety requirements, the Contractor shall retain larger Wildlife trees and live trees and shrubs along the margins of Worksites C1, C2 and C3, Worksites A1 and A3, and along Highway 22A.

E2.1.2 Herptiles

(a) The EM or a qualified biologist retained by the Contractor and reporting to the EM shall provide advice on specific risks and areas of risk to Listed Species of herptiles based on the actual project design and planned activities, along with specific mitigation measures to be implemented by the Contractor to prevent injury or death to Listed Species of herptiles. A copy of such advice shall be provided to the Owner. The recommended mitigation measures shall be included in the Wildlife Protection and Monitoring EWP, and may include such measures as the installation, maintenance and monitoring of drift fences to keep herptiles out of construction and traffic areas and the relocation of herptiles discovered on Site.

(b) During the period of mid-April to mid-October inclusive, and with particular reference to Listed Species of herptiles, the Contractor shall have qualified personnel monitor herptile activity affected by construction and identify areas of high herptile activity where avoidance and mitigation measures are required to prevent injury to and killing of Listed Species of herptiles. Personnel used to monitor for Listed Species of herptiles shall be trained in herptile identification and appropriate aspects of herptile biology so as to know when and where to monitor effectively.

(c) If the monitoring reveals more than two (2) mortalities per year of Listed Species of herptiles caused by construction activities in the same part of a Worksite, then the Wildlife Protection and Monitoring EWP shall be revised to include such additional measures as necessary to prevent further mortalities.

(d) Except in extraordinary circumstances the Contractor shall not use the Waneta-Nelway Road in the vicinity of Four Mile Creek during the period of herptile migration.

E2.1.3 Birds

(a) Prior to and during construction the EM or a qualified biologist retained by the Contractor and reporting to the EM, shall find, identify and delineate habitat and breeding areas of Listed Species of birds and the Contractor shall take effective measure to avoid and/or mitigate adverse effects on Listed Species of birds particularly during the nesting season. Avoidance and mitigation measures to be taken by the Contractor shall be included in the Wildlife Protection and Monitoring EWP.

(b) The Contractor shall make every reasonable effort not to disturb nesting Listed Species of birds and shall undertake bird habitat avoidance and/or mitigation measures recommended by the EM or a qualified biologist retained by the Contractor and reporting to the EM, including acceptable working distances from habitat in active use by birds and noise levels limitations. The Contractor shall establish EPZs around occupied nests of Listed Species of birds identified during construction for the remaining period of the nesting season.

(c) The Contractor shall relocate bird nest boxes within the immediate area of Powerplant construction and/or that may be directly affected by Transmission Line construction to a nearby location not directly affected by construction activity.

E2.1.4 Bats

(a) The Contractor shall protect all marked bat roosts within Site Boundaries not directly affected by construction as EPZs.

E2.2 Environmental Work Plans

(a) The Contractor shall develop and implement a Wildlife Protection and Monitoring EWP for the period of construction. The Wildlife Protection and Monitoring EWP shall be submitted to the Owner for review in advance of Site Preparation. Site Preparation shall not commence until the Contractor's Wildlife Protection and Monitoring EWP has received the written concurrence of the Owner.

(b) The Wildlife Protection and Monitoring EWP shall describe the measures that will be taken by the Contractor to meet all requirements specified in Section E2.1. The Wildlife Protection and Monitoring EWP shall also provide:

(i) For the Contractor to work with the Owner in the finding, identifying, monitoring and assessing of Listed Species and to work to avoid adverse effects on those Listed Species;

(ii) For the Contractor to work with the Owner in the protection of Listed Species and to take the measures recommended by the EM or a qualified biologist retained by the Contractor and reporting to the EM for avoidance and/or mitigation of adverse effects on Listed Species;

(iii) For the Contractor to work with the Owner in the establishment and/or relocation of habitat such as wildlife trees, rock piles and coarse woody debris;

(iv) A detailed description of the monitoring program for Listed Species and a commitment to keep the Owner fully advised on the progress of monitoring and the findings of the program and any resulting assessments; and

(v) A detailed schedule for monitoring activities.

E3. PROTECTION OF VEGETATION

E3.1 Requirements

(a) Prior to the commencement of construction in any area of the Site, the Contractor in cooperation with the Owner shall have the EM or a qualified biologist retained by the Contractor and reporting to the EM:

(i) Identify and mark Listed Species of plants and communities of Listed Species of plants in areas potentially affected by construction; and

(ii) Identify, delineate and mark valuable Wildlife habitat as necessary for the protection of those habitats from construction effects and/or for the minimizing of damage to those habitats.

(b) Working on a site specific basis suited to the Contractor's operations, the Contractor shall not disturb any part of the Site until after the EM has confirmed in writing to the Owner that Listed Species of plants and valuable Wildlife habitats have been identified and marked on that part of the Site as necessary to meet the needs of the Work and the requirements of the OERC.

(c) The Contractor shall control the use and operation of Equipment and shall protect from the Work all vegetation growing outside Site Boundaries and in EPZs within Site Boundaries.

(d) Vegetation in Restricted Activity Zones (RAZs) shall be protected consistent with RAZ specific requirements.

(e) The Contractor shall be responsible for all damage to vegetation outside Site Boundaries, in EPZs and beyond allowable limits in RAZs arising from the performance of the Work, and shall restore all damaged areas to the satisfaction of the Owner.

(f) Clearing shall not commence until the Contractor's Noxious and Nuisance Weed Control EWP required by Section E5 has received the written concurrence of the Owner.

(g) No clearing shall be undertaken along access roads in RAZs except as required to clear the roadway to the minimum width required by the Contractor for access and for safety. Clearing shall not extend more than 0.5 m from the edges of the shoulders of the road or 0.5 m from the edges of ditches if ditches are required except as required for the clearing of Danger Trees.

(h) Danger Trees in the Transmission Line shall be hand-felled and removed with minimum disturbance to surrounding vegetation.

(i) The Contractor shall limit the clearing of vegetation within Site Boundaries to the minimum requirements for its access, laydown and work area needs.

(j) The Contractor shall protect Listed Species of plants threatened by construction by establishing EPZs.

(k) If, in the opinion of the EM or a qualified biologist retained by the Contractor and reporting to the EM, the potential for damage to Listed Species of plants is unavoidable, then affected plants shall be transplanted in the fall of the year.

(l) Transplanted Listed Species of plants shall be relocated to terrestrial areas that are comparable to those from which they were removed. Soil disturbance shall be minimized to the greatest possible extent and weeds shall be pulled by hand in the vicinity of transplanted plants.

(m) The Contractor shall tend, water and monitor transplanted Listed Species of plants as required to promote successful establishment.

(n) The EM or a qualified biologist retained by the Contractor and reporting to the EM shall directly supervise the establishment and fencing of EPZ associated with Listed Species of plants and shall also directly supervise transplanting and subsequent plant tending and watering.

(o) In addition to identified EPZs and RAZs, riparian areas exist along the Transmission Line corridor and these areas may include seasonally active streams. In consultation with the Owner, the Contractor shall add EPZs and/or RAZs to address work requirements in

riparian areas not initially identified as RAZs and shall, as a minimum, treat all riparian areas encountered in the course of construction with the same level of care as that required in identified RAZs.

(p) The Contractor shall minimize ground disturbance in all clearing operations and shall avoid ground disturbance to the greatest reasonable extent in RAZs and in all riparian areas.

(q) The Transmission Line shall be designed to maintain the density, height and structure of existing shrubbery to the greatest reasonable extent.

(r) When clearing the ECZ on Transmission Line Sections 3 to 6 inclusive, the Contractor shall cut off at ground level all deciduous trees and all conifers exceeding 1 m in height shall be cut off at 1 m height. Tall growing shrubs exceeding 3 m in height in the ECZ shall be trimmed to breast height (typically 1.3 m high above the ground surface).

(s) Except as required to satisfy RAZ specific requirements and access road and Spur Road requirements, all low growing vegetation (i.e., vegetation not exceeding 3 m height during all life phases and all conifers less than 1 m in height) shall be retained in the Transmission Line ECZ.

(t) The Contractor shall minimize clearing and maximize residual vegetation height when planning the alignment and conductor height of the Transmission Line and selecting Transmission Line structure sites in Sections 1 and 2 of the Transmission Line.

(u) All Site Preparation activities (clearing, grubbing and stripping) shall be conducted in strict accordance with the Contractor's Site Preparation EWP required by Section C6, Site Preparation.

E4. BIOCIDE USE

E4.1 Requirements

(a) The Contractor shall not use insecticides, herbicides or other biocides on Site with the exception of household insecticides and the use of herbicides to control noxious and nuisance weeds when used as part of the Contractor's Noxious and Nuisance Weed Control EWP required by Section E5.

E5. NOXIOUS AND NUISANCE WEED CONTROL

E5.1 Criteria

(a) The Contractor shall not allow noxious and nuisance weeds to become established on areas disturbed by construction activity. Noxious and nuisance weed control activities shall be taken to prevent weeds from reaching the seed head formation growth stage.

E5.2 Requirements

(a) The Contractor shall identify Project areas at high risk for the spread of noxious and nuisance weeds.

(b) Prompt site-specific seeding shall be a key element in the controlling of noxious and nuisance weeds in areas disturbed by construction activity Areas where initial seeding has not taken shall be re-seeded at the earliest opportunity and tended to promote rapid establishment of vegetation cover.

(c) In concert with the Owner-initiated weed treatment program, the Contractor shall control noxious and nuisance weeds in all areas of the Site for the duration of construction and site restoration activities.

(d) The Contractor shall monitor the effectiveness of its noxious and nuisance weed control measures and take whatever actions are required to control weeds on Site in accordance with Section E5.1.

(e) The Contractor shall make a specific annual inspection of the Site for noxious and nuisance weed invasion for the duration of the Work after initial weed growth and prior to seed-head formation and, based on the results of that inspection, shall initiate control measures appropriate to the scale and nature of weed invasion discovered.

(f) Recognizing the site-specific presence of Listed Species of plants on the Powerplant Worksite, along the Transmission Line corridor and along the existing BC Hydro 5L98 transmission line, the Contractor shall conduct its weed control activities in a manner that avoids adverse effects on Listed Species of plants and shall monitor for adverse effects on such plants.

(g) Noxious and nuisance weed control shall comply with the BC Weed Control Act.

(h) The Contractor shall provide detailed information on all herbicides to be used on Site and on the procedures to be implemented for the safe handling and secure storage of those herbicides in accordance with Applicable Law.

(i) The Contractor shall develop site-specific methods for control of noxious and nuisance weeds in consultation with other stakeholders and that recognize the need to protect Listed Species of plants. The Contractor shall provide details of its standard and area-specific weed control measures and a schedule for weed control activities.

(j) The Contractor shall provide details the Equipment to be used in weed control and how that Equipment will be used.

(k) Equipment shall be thoroughly steam-cleaned of seeds originating off Site prior to entering work areas along the Transmission Line. Once decontaminated, Equipment shall be strictly confined to existing access roads, Spur Roads, structure sites, ECZ and TMZ areas.

(l) The Contractor shall select appropriate sites for its Equipment cleaning facilities and shall design such facilities complete with all required environmental protection measures and operating procedures.

E5.3 Environmental Work Plans

(a) The Contractor shall develop and implement a Noxious and Nuisance Weed Control EWP for the period of construction and for the Site restoration maintenance period. The Noxious and Nuisance Weed Control EWP shall be submitted to the Owner for review in advance of clearing activities.

(b) The Noxious and Nuisance Weed EWP shall describe the measures that will be taken by the Contractor to meet all the criteria and requirements specified in Sections E5.1 and E5.2. The Noxious and Nuisance Weed Control EWP shall also provide:

(i) A commitment to work with the Owner and area stakeholders in noxious and nuisance weed control and to work in concert with the Owner's weed control program;

(ii) A commitment to reseed disturbed areas, area by area, as quickly as possible following completion of construction; and

(iii) All supporting design details and associated calculations.

OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION F – WASTE AND HAZARDOUS MATERIALS MANAGEMENT

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SECTION F – WASTE AND HAZARDOUS MATERIALS MANAGEMENT

F1. OBJECTIVES

(a) The objectives for waste and hazardous materials management on Site are to use environmentally acceptable waste and hazardous materials management and construction practices to:

(i) Prevent the contamination of the environment by construction wastes and/or hazardous materials used in construction;

(ii) Minimize health risks;

(iii) Minimize the potential for creating problem wildlife;

(iv) Minimize the production of waste;

(v) Reuse waste construction materials to the greatest reasonable extent;

(vi) Recycle solid and liquid waste construction materials that are not reusable to the extent that recycling facilities are locally available;

(vii) Reuse and/or recycle Site vegetation waste from clearing activities to the greatest reasonable extent; and

(viii) Effectively respond to spill of hazardous materials.

F2. WASTE MANAGEMENT

F2.1 Requirements

(a) The Contractor shall use good housekeeping practices to:

(i) Minimize the potential for creating health risks and wildlife problems;

(ii) Minimize the production of waste;

(iii) Reuse waste construction materials to the greatest reasonable extent;

(iv) Recycle solid and Liquid waste construction materials that are not reusable to the extent that recycling facilities are locally available; and

(v) Reuse and/or recycle Site vegetation waste from clearing activities to the greatest reasonable extent.

(b) Prior to commencing any construction activities on Site, the Contractor shall secure all PLAs required under the *Environmental Management Act* and as required by all other Authorities Having Jurisdiction for operation and/or use of all ancillary and temporary facilities required by the Contractor to perform the Work. The Contractor shall provide copies of all such PLAs to the Owner.

(c) The Contractor shall identify and use an approved local landfill site for the disposal of domestic and construction garbage, and shall advise the Owner of the landfill site location.

(d) The Contractor shall use appropriate and secure containers for the temporary storage of waste materials destined for disposal off-Site.

(e) Waste containers shall be large enough to contain all of the wastes generated between collection periods. The containers shall be constructed such that spilled Liquids are contained and access by insects and wildlife is prevented. Storage areas and containers shall be maintained in a sanitary condition and shall be covered to prevent spreading of wastes by water, wind or animals.

(f) Throughout construction, the Contractor shall maintain all waste receptacles and structures in a state of good repair.

(g) The Contractor shall regularly collect and dispose of all waste material generated during construction.

(h) The Contractor shall take all necessary precautions to prevent loss of waste materials during transport on Site access roads and on public highways and roads, and shall immediately cleanup all waste materials lost during transportation.

(i) Excavated materials, unless found to be contaminated, shall not be treated as waste and shall be subject to an Excavated Materials Relocation EWP.

(j) Animal-proof containers and/or storage areas shall be used for all exterior collection and temporary storage of domestic garbage. Interior domestic garbage containers in office facilities, lunchrooms, workshops and the like must be securely isolated from wildlife. Domestic garbage shall not be discarded in work areas but shall be placed in an animal-proof container or in an interior container secure from wildlife.

(k) Commonly recyclable items such as beverage containers, office waste paper and cardboard shall be recycled.

(l) Construction garbage shall not contain any items of domestic garbage, including beverage and food wastes, beverage containers, food containers and wrappings. Domestic and construction garbage and construction debris shall not contain any hazardous substances.

(m) Metal wastes shall be removed from the Site and where facilities exist shall be recycled.

(n) Uncontaminated excavated rockfill and granular materials used in the preparation of work areas and access routes not forming part of the completed Work shall be removed for disposal as excavated materials.

(o) Uncontaminated sediment collected on Site in sediment retention ponds, settlement ponds, and the like shall be disposed of in an excavated materials fill area.

(p) The handling and disposal of collected sediment contaminated by environmentally harmful substances as defined by Applicable Law and rockfill and granular materials that become contaminated in the course of construction shall be subject to the requirements of Section F8.

F3. SANITARY SEWAGE

F3.1 Requirements

(a) All Site sewage handling and disposal systems shall comply with the BC *Health Act* and the Sewerage System Regulation, BC Reg. 326/2004. The Contractor shall obtain all required permits and shall submit copies of such permits to the Owner.

F4. CONCRETE AND CEMENTITIOUS GROUT WASTES

F4.1 Requirements

(a) Basins for the disposal of surplus uncured concrete and basins for concrete truck washing shall be located at least 30 m away from the wetted perimeter of any watercourse.

(b) The Contractor shall develop basins as required for the initial disposal of surplus uncured concrete (concrete disposal basins) and shall deposit all surplus concrete in these basins. Concrete truck mixers and other concrete mixing and placing equipment shall not be washed into the surplus concrete disposal basins.

(c) The Contractor shall develop basins as required for the collection and temporary storage of washings from concrete truck mixers and other concrete and cementitious grout mixing and placing equipment (concrete truck washing basins).

(d) The concrete truck washing basins shall be lined with an appropriate liner that will prevent leakage from the washing basin, which liner as a minimum shall be a geomembrane liner not less than 1 mm thick and acceptable to the Owner, or other containment system acceptable to the Owner. The Contractor shall design concrete truck washing basins with holding and effluent treatment basins and discharge arrangements, to meet the requirements of the Work and in accordance with regulatory requirements. Basin locations, designs and supporting calculations shall be incorporated into the Erosion, Sediment and Drainage Control EWP together with notes covering procedures to be applied in the use of these facilities. Refer to OERC Section D for related effluent requirements.

(e) Concrete pumps, cementitious grout batching, mixing and pumping equipment and accessories may be cleaned and washed of cementitious materials on location provided the equipment is more than 15 m from the wetted perimeter of a watercourse and provided all necessary measures are taken to collect and retain all removed concrete and all washings. Removed concrete and washings shall be disposed of in the designated disposal basins. Procedures for these activities shall be included in the Erosion, Sediment and Drainage Control EWP

(f) Unless otherwise approved by the Owner, the Contractor shall periodically remove the hardened surplus concrete from the basin in pieces not exceeding 500 mm in nominal size and dispose of these pieces in the lower fill levels in the Worksite A1 or A3 excavated materials fills.

(g) Concrete spilled on Site during concrete placement operations and concrete removed from equipment on Site shall be promptly and completely removed to the concrete disposal basins.

(h) Equipment operating fluids (e.g., fuel, oil, grease and coolant) shall be prevented from entering concrete disposal basins and the concrete truck washing basins. Any release of these operating fluids to and/or in the vicinity of these basins and during on-location Equipment cleaning shall be treated as a spill.

(i) Uncontaminated sand and gravel and hardened concrete residue in the concrete truck washing basins shall be removed as required to maintain the operating capacity of the basins. Removed solids shall be disposed of in a concrete disposal basin.

(j) Geomembrane liners shall be completely removed from the concrete truck washing basins on completion of the Work and shall be disposed of as construction waste.

F5. WASTE WOOD, TIMBER AND WOODY DEBRIS

F5.1 Requirements

(a) The Contractor shall be responsible for obtaining and complying with Applicable Law and all PLAs related to the cutting, decking and removal of merchantable timber from the Site, and paying all stumpage and other fees associated therewith. The Contractor shall be responsible for obtaining timber marks for removal of trees.

(b) Marketable wood from timber cutting on Site shall be commercially harvested or constructively used on Site.

(c) Cleared vegetation, unmarketable timber and waste wood from construction which cannot be reused or otherwise recycled may be burned on Site, subject to Applicable Law. Alternatively, unmarketable timber and waste wood shall be disposed of off-site at an approved municipal waste disposal site or in another equally environmentally acceptable manner.

(d) The Contractor shall constructively reuse cleared materials to the greatest extent practicable. Stockpiled cleared materials and chipped material shall be stored so as not to create a fire hazard.

(e) The Contractor shall use environmentally responsible practices in the handling and disposal of waste wood treated with preservatives. Waste wood treated with preservatives shall be disposed of in accordance with Applicable Law at an approved landfill facility.

F6. BURNING OF WASTE

F6.1 Criteria

(a) Burning sites shall not be located within 50 m of any watercourse, wetland, EPZ, drainage area, riparian area or other environmentally sensitive area.

(b) Burn site locations shall not be established closer than 10 m to standing timber.

F6.2 Requirements

(a) The Contractor shall not burn waste construction materials and refuse unless authorized to do so under an air discharge permit from the relevant Authorities Having Jurisdiction.

(b) The Contractor shall not burn rubber, plastic materials, oils or similar substances that produce airborne contaminants harmful to the natural atmospheric environment. None of these substances shall be used as fire accelerants.

(c) Sites for all open burning shall be in a safe location having the surface stripped to mineral soil. Selected sites and burning operations shall be subject to:

(i) The requirements of the BC *Forest Act*;

(ii) The Open Burning Smoke Control Regulation, BC Reg 145/9 under the BC *Environmental Management Act*;

(iii) Monitoring by the Contractor as determined by the EM using suitably qualified personnel; and

(iv) Review by the Owner as part of the Site Preparation EWP.

(d) Burning sites in the transmission line corridor shall be located at structure sites or in other suitable previously disturbed areas.

(e) Burning shall not be undertaken on occasions when or at locations where the combination of burning site location and wind direction will result in smoke encroaching on local residences or farm buildings.

(f) The Contractor shall prevent fire from spreading to vegetation on Site.

(g) The Contractor shall prevent heat and smoke damage to all vegetation beyond Site Boundaries and in EPZs, RAZs and in riparian areas within Site boundaries.

F7. HAZARDOUS SUBSTANCES AND MATERIALS

F7.1 Criteria

(a) Liquids and other hazardous substances shall not be stored within 30 m of a watercourse or streambed, within a watercourse flood plain, or where there is a potential for any spilled Liquid or other hazardous substance to enter a watercourse or groundwater.

(b) Liquids stored on-Site shall be stored in designated Liquid storage areas and shall have secondary containment of not less than 125 percent of the total capacity of the containers in storage.

(c) The Contractor shall ensure that any aboveground Liquid storage facility with a capacity greater than 4,000 L or any underground Liquid storage facility is designed and sealed by a qualified Professional Engineer.

F7.2 Requirements

F7.2.1 Material Safety Data Sheets

(a) The Contractor shall require its manufacturers and suppliers to provide current Material Safety Data Sheets (MSDS) for all products, Liquids, materials and substances supplied to the Project and shall comply with all requirements of the Workplace Hazardous Materials Information System (WHMIS) Regulations.

(b) MSDS sheets shall be available on Site before products, Liquids, materials or substances are brought to the Site. MSDS shall be readily available to all workers on Site.

(c) The Contractor shall keep at least one full set of MSDS on Site and shall update all sets kept each time new MSDS are received.

(d) The Contractor shall promptly provide to the Owner copies of all MSDS relating to all hazardous products, Liquids, materials and substances brought to the Site.

F7.2.2 Transportation, Storage and Use

(a) Hazardous materials management shall comply with WCB Occupational Health and Safety Regulations.

(b) The Contractor shall make itself fully aware of all Federal and Provincial legislation and restrictions on the transportation, storage and use of products, Liquids, materials and substances considered harmful to the environment or to persons and shall comply with Applicable Law and applicable guidelines.

(c) Paints and thinners shall be treated in the same way as equipment operating fluids.

(d) The Contractor shall maintain a log of all hazardous products, Liquids, materials and substances brought to the Site other than Equipment operating fluids and shall account for the disposition of all such products, materials and substances throughout the Work and at the completion of the Work. The Contractor's Hazardous Products, Materials and Substances Log shall be updated and submitted monthly to the Owner.

(e) As much as practicable, the Contractor shall store hazardous materials off Site and deliver such materials to Site on an as-required basis.

(f) The Contractor shall use equipment and containers that are capable of safely transporting Liquids and other hazardous substances in compliance with Section 7.33.1 of the Federal Transport of Dangerous Goods Regulations for bulk containers, and Sections 7.21 and 7.23 of the same regulations for materials in packages or small containers, for transportation on Site roads as well as on public roads.

(g) The transportation of fuel tanks, fuel trailers, fuel tanks on skids, and non-commercial fuel trucks shall comply with all the requirements of the BC *Motor Vehicle Act* and the BC Fire Code, for transportation on Site roads as well as on public roads.

(h) In the transportation, storage and/or dispensing of operating equipment fluids, the Contractor shall comply with the requirements outlined in Environmental Standards & Guidelines for Fuel Handling, Transportation and Storage, BC MoE/MoF (December, 1995).

(i) Liquids stored inside secure buildings and similar facilities with impermeable floors shall be stored on spill trays capable of containing all leaks and spills.

(j) Protection against seepage from outside Liquid storage areas shall be provided by the use of berms and suitable impermeable liners or another containment system acceptable to the Owner. Liners for Liquid containment shall comprise an appropriate one-piece liner that will prevent leakage from the containment area, which liner as a minimum shall be a geomembrane liner not less than 1 mm thick and acceptable to the Owner.

(k) All secondary containment enclosures shall be designed so that stored Liquids cannot leak from the enclosure and shall provide for containment and separation of precipitation and recovery of lost Liquids.

(l) Liquid storage enclosures shall be regularly checked for precipitation and spilled substance and maintained in a clean and serviceable condition.

(m) All Liquid storage tanks with a nominal capacity in excess of 205 L must be locked and secured when not in use. Automatic shut-off nozzles shall be installed on all Equipment operating fluid dispensing units used with storage tanks having a nominal capacity in excess of 205 L.

(n) All Liquid storage containers with a nominal capacity of less than 205 L, used as a Liquid cache or to transport Liquids on Site shall be secured during transport and/or carried by hand in a manner that prevents upset and spillage of contents. Liquid storage containers in a cache or permanently or semi-permanently carried in service trucks shall have the required secondary containment.

(o) An impermeable cover shall be placed over the top of all Liquid caches to minimize the collection and accumulation of precipitation in the containment structure.

(p) Small Liquid storage containers shall have secure sealed and/or lockable outlets and shall employ spigots or pumps appropriate to their use and size. All outlets shall be securely sealed or padlocked and/or small containers shall be placed in a secured large container when not in use.

(q) Liquid storage tanks shall be drained within one week of completion of construction or within one month of the commencement of a prolonged shutdown period.

(r) The Contractor shall clean-up and remove all Liquid storage facilities without delay upon the completion of construction.

(s) Treated wood transmission line structure poles shall be stored on blocks at least 300 mm off the ground in an area protected as required for Liquid storage areas in Section F7.2.2(j).

F7.2.3 Storage and Disposal of Hazardous Wastes

(a) Hazardous solid and Liquid wastes and contaminated wastes temporarily stored on Site shall be stored in sealed containers within a secure containment area.

(b) Temporary storage facilities on Site for hazardous and contaminated wastes shall have containment meeting the criteria of Section F7.1 and the requirements of Section F7.2.2.

(c) Hazardous and contaminated wastes temporarily stored on Site shall be properly labelled according to WHMIS regulations.

(d) Hazardous and contaminated wastes shall be disposed of at a hazardous waste facility, all in accordance with the Hazardous Waste Regulation, BC Reg. 63/88 under the BC *Environmental Management Act.*

(e) The Contractor shall use licensed disposal agents and haulers for the disposal of hazardous and contaminated wastes.

(f) The Contractor shall provide the Owner with copies of all documentation relating to the disposal of hazardous and contaminated wastes within two (2) working days following disposal.

(g) The temporary storage and disposal of hazardous and contaminated wastes shall be in accordance with procedures set out in the Contractor's Contaminated Materials Management EWP required by Section F8.3.

F8. ON-SITE MATERIALS CONTAMINATED BY CONTRACTOR

F8.1 Criteria

(a) The criteria of Section F7.1 shall apply to on-Site materials contaminated by the Contractor.

F8.2 Requirements

(a) The requirements of Section F7.2 shall apply to on-Site materials contaminated by the Contractor, as applicable.

(b) Upon the discovery of contaminated soil or materials not covered by a Contaminated Materials Management EWP, the Contractor shall either revise an existing EWP to incorporate the newly discovered contaminated soil or material and submit the revised EWP to the Owner for review, or develop and submit a Contaminated Materials Management EWP specific to the newly discovered contaminated soil or material.

(c) Except as subject to the provisions of Section F12, soil or other materials contaminated as a result of the Contractor's activities shall be cleaned up and disposed of by the Contractor in a manner acceptable to the Owner and in accordance with the OERC. Depending on the extent and nature of the contamination caused by the Contractor, the Owner may require the Contractor to develop a revision to the Contaminated Materials Management EWP or a Contaminated Materials Management EWP specific to that contamination.

(d) Site soils contaminated by equipment operating fluids may be remediated on Site subject to the Contractor developing and implementing a site remediation specific Contaminated Materials Management EWP for review by the Owner. Alternatively, contaminated Site soils and other contaminated wastes shall be disposed of in accordance with Section F7.2.3, Storage and Disposal of Hazardous Wastes.

(e) As part of a Contaminated Materials Management EWP, the Contractor shall develop a plan(s) for the deposition on Site, relocation and/or remediation of removed and/or processed contaminated materials and shall submit this plan, including details of the statistical methods, if any, to be applied in the disposal of removed contaminated materials and all related data gathered or to be gathered, as part of its EWP.

(f) The Contractor shall undertake whatever further investigation of hazardous and/or contaminated materials and wastes are required to correctly and completely segregate and delineate areas and depths affected by contamination, including all required step-out sampling and laboratory testing.

(g) The Contractor shall take all necessary measures to isolate areas affected by contaminated materials and prevent the spread of contamination.

(h) The Contractor shall develop appropriate procedures for the safe excavation, temporary storage and processing, and final disposition of contaminated materials.

(i) Facilities for the temporary containment and/or processing of removed contaminated materials and contaminated wastes and details of the procedures to be followed shall be designed, signed and sealed by a qualified and experienced Professional Engineer.

(j) The Contractor shall undertake all additional sampling and testing required to fully characterize hazardous and/or contaminated wastes and materials in temporary storage and/or after processing.

(k) Where contaminated materials meeting Industrial Lands standards are approved for disposal within excavated materials storage fills the location and depth of the contaminated materials shall be documented by the Contractor and provided to the Owner.

F8.3 Environmental Work Plans

(a) Except as subject to the provisions of Section F12, the Contractor shall, prior to temporarily storing and/or removing hazardous and/or contaminated materials and wastes, develop a Contaminated Materials Management EWP for review by the Owner.

(b) The Contaminated Materials Management EWP shall describe all of the measures that will be taken to meet the criteria and requirements of Sections F8.1 and F8.2, and shall include a schedule covering all aspects of the work required.

(c) Removal of any contaminated soil or other material shall not commence until after the Owner has reviewed the relevant Contaminated Materials Management EWP and concurred with the EWP in writing.

(d) The Contractor shall submit its designs for Liquid storage containment facilities with the Spill Prevention, Preparedness and Response EWP or, if relevant only to the handling of contaminated materials and wastes, as part of the applicable Contaminated Materials Management EWP.

F9. EXISTING CONTAMINATED MATERIALS ON SITE

F9.1 General

(a) Surface soils in the Project area have become contaminated over a long period of time as a result of smelter and associated operations in the Trail area. The nature of this contamination is generally well understood and practices to address this surface contamination (site specific surface soil stripping, stockpiling and subsequent replacement) have been included in the OERC.

(b) Contaminated materials which have been identified on Site and that must be removed by the Contractor are as follows:

(i) Sediments contaminated with heavy metals in the Waneta Headpond that must be removed for the construction of the intakes;

(ii) Soil and debris contaminated above Industrial Lands standards, small piles of ash and slag on the ground and associated surface soils with high metals content covering an estimated surface area of approximately 500 m^2, that must be removed for the construction of the intakes; and

(iii) Rail track bed materials and underlying soils on a portion of the spur line leading into the existing Waneta generating station that have local metals content higher than Industrial Lands standards and some contamination by spilled sulphur, that must be removed for the construction of the powerhouse and tailrace.

F9.2 Criteria

(a) The criteria of Section F8.1 shall apply to the removal and disposal of existing contaminated materials on-Site, as applicable.

F9.3 Requirements

(a) The requirements of Section F8.2 shall apply to the removal and disposal of existing contaminated materials on-Site, as applicable.

(b) The Contractor shall remove sediments contaminated with heavy metals from the Waneta Headpond as required to meet the underwater excavation and intake flow requirements of the Project Concept and shall describe in detail the procedures and equipment that will be used in this operation in a Contaminated Materials Management EWP. The subject Contaminated Materials Management EWP shall be submitted to the Owner for review.

Intake sediment removal shall not commence until the EWP has received the written concurrence of the Owner.

(c) Worksite F shall be used as a staging area for intake sediment dredgeate slurry dewatering and treatment. Surface soils at Worksite F may be used in the creation of berms for dewatering cells. All areas of Worksite F that will come into contact with dredgeate slurry and untreated slurry dewatering effluent shall be lined with an impermeable liner as required for Liquid storage areas, as required by Section F7.2.2(j)

(d) The Contractor shall design the sediment slurry dewatering facility with all required containment, sediment and water treatment facilities and shall submit its designs and all associated calculations prepared, signed and sealed by a qualified and experienced Professional Engineer as part of its Contaminated Materials Management EWP.

(e) The Contractor shall make disposition arrangements for removed and/or processed contaminated materials, including any relocation agreements required.

(f) In consultation with the Owner, the Contractor shall obtain and test representative samples of dewatered sediment and dewatering effluent as required to establish the level of contamination and for the determination of appropriate disposal methods.

(g) The final disposition of dewatered intake sediments will depend on the level of contamination remaining in the dewatered sediment. The following options include:

(i) If the level of contamination of dewatered intake sediments is below allowable limits for Industrial Lands then the dewatered intake sediments shall be reused at Worksite F.

(ii) If the level of contamination exceeds allowable limits for Industrial Lands but is such that site management strategies using statistical methods can be applied then the sediments shall be managed at Worksite F.

(iii) If the level of contamination is such that site management strategies cannot be applied then the dewatered sediments shall be disposed of at a disposal facility licensed to receive the material.

The Contractor shall cooperate with and assist the Owner in the development of procedures for the final disposition of dewatered intake sediments.

(h) The Contractor shall manage and treat effluent from dredgeate slurry dewatering in accordance with Section D, Water Quality.

(i) Upon completion of intake sediment removal and dredgeate slurry dewatering, the Contractor shall dismantle all intake sediment management facilities at Worksite F and restore the site in accordance with Section G, Site Restoration.

(j) The Contractor shall remove and dispose of soil and debris contaminated above Industrial Lands standards, generally comprising small piles of ash and slag on the ground and associated surface soils with high metals content prior to intake construction Site Preparation, all in accordance with the required Contaminated Materials Management EWP.

(k) The Contractor shall remove and dispose of rail track bed materials and underlying soils on a portion of the spur line leading into the existing Waneta generating station that have local metals content higher than Industrial Lands standards and some contamination by spilled sulphur prior to Site Preparation for the construction of the powerhouse and tailrace, all in accordance with the required Contaminated Materials Management EWP.

F9.4 Environmental Work Plans

(a) The Contractor shall prepare Contaminated Materials Management EWPs for the removal and disposal of existing contaminated materials on Site and shall submit these EWPs to the Owner for review.

(b) The Contaminated Materials Management EWPs required by Section F9 shall describe all of the measures that will be taken to meet the criteria and requirements of Sections F9.2 and F9.3, and shall include a schedule covering all aspects of the work required.

(c) Removal of any contaminated soil or material shall not commence until after the Owner has reviewed the relevant Contaminated Materials Management EWP and concurred with the EWP in writing.

F10. METAL LEACHING AND ACID ROCK DRAINAGE

F10.1 Criteria

(a) Based on the Draft Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (Price, 1997), the acid rock drainage screening criteria for the Project are as set out in the following table:

Potential for ARD	Initial Screening Criteria	Comments
Likely	NPR<1	Likely acid generating unless sulphide minerals are non-reactive.
Possible (uncertain)	1<NPR<2	Possibly acid generating if NP is insufficiently reactive or is depleted at a rate faster than sulphides.
Low	2<NPR<4	Not potentially acid generating unless significant preferential exposure of sulphides along fracture planes, or extremely reactive sulphides in combination with insufficient reactive NP.
None	NPR>4	Non-acid generating

(b) Excavated rock shall be considered non-potentially acid generating (NPAG) if representative ABA test results show NPR $\geq$ 4 and sulphide content (SS) < 0.3% by weight and Rock Paste pH > 5.5 and will require no further testing or environmental mitigation.

(c) Where the criteria given in Section (b), above, are not met the excavated rock shall be considered to be potentially acid generating (PAG).

F10.2 Requirements

(a) The identification of excavated rock with metal leaching (ML) and acid rock drainage (ARD) generating potential shall be based on:

(i) Visual identification followed by laboratory testing; and/or

(ii) Laboratory testing of randomly taken samples.

(b) Excavated rock shall be considered not to have acid generating potential if a visual examination shows no evidence of sulphide mineralization and/or evidence of hydrothermal alteration (i.e. no signs of potential for acid-generation).

(c) Acid Base Accounting (ABA) testing using the Sobek Procedure by a qualified testing laboratory acceptable to the Owner shall be used to determine the acid generating potential of excavated rock suspected on visual examination of being potentially acid generating.

(d) The potential for excavated rock to generate acid shall be evaluated by determining the ratio of neutralizing minerals present in the rock (neutralization potential ratio, NPR), expressed as neutralization potential (NP), to the amount of sulphide minerals present in

the rock, expressed as the maximum acid potential (AP) present in the rock, that is, NPR = NP/AP.

(e) Prior to the commencement of rock excavation, the Contractor shall design and implement a training program for appropriate construction staff for the field recognition of excavated rock containing sulphide mineralization and/or evidence of hydrothermal alteration (i.e. signs of potentially acid-generating rock).

(f) The Contractor shall have a program for the periodic random sampling and testing of excavated rock materials, as required to provide reasonable assurance that excavated rock materials are not prone to ML or ARD.

(g) Excavated rock that has been determined to be PAG shall be disposed of on Site in the most economic and environmentally acceptable manner following the principles and procedures set out in the Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia, BC Ministry of Energy and Mines.

(h) The Contractor shall keep records of all monitoring, sampling and testing associated with potentially acid generating rock and its disposal.

F10.3 Environmental Work Plans

F10.3.1 ML/ARD Rock Monitoring EWP

(a) The Contractor shall design and implement an ML/ARD Rock Monitoring EWP for the field recognition of rock having the potential to be acid generating. The ML/ARD Rock Monitoring EWP shall describe all of the measures that will be implemented by the Contractor to meet the criteria and requirements of Sections F10.1 and F10.2. The ML/ARD Rock Monitoring EWP shall be submitted to the Owner for review.

(b) Rock excavation shall not commence until the ML/ARD Rock Monitoring EWP has received the Owner's concurrence in writing.

F10.3.2 Acid Rock Disposal EWP

(a) In the event that rock determined to be PAG is encountered in excavation, the Contractor shall develop an Acid Rock Disposal EWP and shall submit this EWP to the Owner for review.

(b) Excavation of PAG rock shall not commence until the EWP has received the Owner's concurrence in writing.

F11. EQUIPMENT SERVICING AND OPERATING FLUIDS

F11.1 General

(a) The Contractor shall use biodegradable hydraulic fluids in all equipment performing in-water construction work.

F11.2 Criteria

(a) Throughout construction and except as specified below, the Contractor shall perform Equipment maintenance and refuelling only in a designated area located at least 30 m away from the Waneta headpond, the Pend d'Oreille River, the Columbia River and other watercourses.

F11.3 Requirements

F11.3.1 Equipment Operation

(a) All equipment shall be in good operating condition, appropriately serviced to prevent leakage of equipment operating fluids and shall meet applicable statutory requirements for serviceability and exhaust emissions.

(b) Exhaust systems shall function in a manner to control exhaust noise and emissions to meet regulatory requirements.

(c) The Contractor shall inspect daily all equipment used on the Site to ensure that it is in good operating condition, with no leaks of equipment operating fluids. All leaks found and any leaks developing during the operation of equipment shall be repaired immediately.

(d) No wheeled or tracked equipment shall be operated in water except in accordance with an EWP having the written concurrence of the Owner.

(e) Equipment working in dewatered work areas, on or in water, or within the wetted perimeter of a watercourse shall be leak-free and prior to entering the work area shall be steam cleaned to remove oil, grease, soils and other contaminants and serviced as necessary to prevent deposition or loss of equipment operating fluids and any other contaminants. Equipment developing such leaks shall be removed immediately from the work area and repaired.

(f) Stationary equipment shall be equipped with drip trays to contain any fuel, oil, coolant or grease which may drip or be spilled from the equipment. Drip trays for concrete pumps,

grout pumps and grout reservoirs shall be capable of containing all accidental spills/leakage during operation and during hose connection and disconnection.

(g) The Contractor shall remove from site of any piece of equipment that cannot be operated without continued dripping or leaking of equipment operating fluids or excessive exhaust emissions.

F11.3.2 Equipment Maintenance

(a) The Contractor shall develop and use equipment servicing and refuelling areas as required to meet all the needs of the Work.

(b) The equipment servicing and refuelling areas shall be lined to provide secondary containment for all operating and cleaning fluids lost during servicing and refuelling. Liners for service and refuelling area containment shall comprise an appropriate one-piece liner that will prevent leakage from the containment area, which liner as a minimum shall be a geomembrane liner not less than 1 mm thick and acceptable to the Owner.

(c) Drip/spill trays and/or other fluid collection containers shall be used to collect all drained and used fluids and prevent on-ground spillage.

(d) No equipment shall be serviced in any area other than the designated equipment servicing areas except in special cases where the planned service work is covered by the Spill Prevention, Preparedness and Response EWP or a revision to the EWP. Any EWP revisions to cover servicing equipment outside the designated servicing area shall be accompanied by a full and complete description of the procedures to be used and of the measures the Contractor will take to contain equipment operating fluids and prevent contamination of the environment.

(e) No equipment shall be washed or steam cleaned in work areas or near open water or watercourses or within the wetted perimeter of a watercourse. The Contractor shall only wash or steam clean equipment in a washing bay in the equipment servicing area.

(f) Equipment may be cleaned of uncontaminated dust and mud that inhibits the safe operation of the equipment at its worksite location provided such cleaning does not result in non-compliance with sediment control criteria and requirements of the OERC.

(g) Equipment operating fluids shall not be dumped on the ground in the servicing and refuelling areas.

(h) Refuse generated during the servicing of equipment (e.g., air and oil filters, hydraulic fluids, petroleum products) shall be collected and disposed of in accordance with applicable regulations and guidelines.

F11.3.3 Refuelling and Oil/Coolant Top-up

(a) Motorized mobile Equipment that is readily moveable shall when practicable be refuelled in the service/refuelling area(s) developed for that purpose.

(b) Equipment that is not readily moveable may have equipment operating fluids replenished (topped up) at their work location in accordance with and subject to the Spill Prevention, Preparedness and Response EWP. Such top-up of operating equipment fluids shall be in strict compliance with the procedures in the EWP and shall be no nearer to open water or watercourses than absolutely necessary.

(c) When refuelling Equipment on in-water workpads the fuel truck or tank shall be located off the workpad and as far as reasonably possible from the workpad. The refuelling operator shall stay with the fuel delivery nozzle and shall be in direct line of sight communication with an attendant trained in refuelling on duty at the refuelling truck or tank. The attendant shall immediately turn off the flow of fuel if a spill incident occurs.

(d) Crews refuelling equipment and/or topping up other operating fluids on Site shall have a sufficient supply of absorbent material and drip trays to meet all needs in preventing and/or containing all spills during refuelling operations and shall prevent and/or contain all spills.

F11.3.4 Waste Equipment Operating Fluids

(a) Operating fluid wastes from vehicles and construction equipment shall be collected in drums with leak-tight lids and removed from Site for recycling or disposal as hazardous waste. Where facilities exist fluid wastes shall be recycled.

F12. SPILL CONTINGENCY

F12.1 Requirements

F12.1.1 Spill Prevention

(a) The requirements of the Spill Prevention, Preparedness and Response EWP shall be reviewed in detail as a part of the environmental orientation program.

(b) The requirements of the Spill Prevention, Preparedness and Response EWP shall be reviewed at weekly work-group toolbox meetings and at TWP review meetings as relevant to then current work and tasks.

(c) Drainage control and/or spill containment measures shall be put in place as required by site drainage features to protect open water and watercourses from spilled substances in the event of a spill.

(d) The Contractor shall design and implement a containment and treatment system for runoff and stormwater from equipment service and fuelling areas in accordance with good engineering principles and include these designs in the Spill Prevention, Preparedness and Response EWP.

(e) Drip and spill trays and other fluid collection pans shall be constructed of metal or rigid moulded plastic. Drip and spill trays and fluid collection pans shall be effectively of one-piece construction, have no leaks or punctures and shall not be readily deformable.

(f) Stationary equipment shall only be operated within the wetted perimeter of any watercourse, in streambeds, in dewatered areas or in excavations and other areas where a spill of operating fluids could readily find its way to a watercourse or the groundwater in accordance with a Spill Prevention, Preparedness and response EWP having the written concurrence of the Owner.

F12.1.2 Preparedness for Spills On or Near Water

(a) Absorbent booms shall be kept readily available is suitable locations to allow for rapid deployment in the event of a spill in water or on land that may flow or seep into the Waneta headpond, the Pend d'Oreille River or any other watercourse.

(b) During all in-water work absorbent booms shall be installed around the work areas to contain any spills within the in-water work areas.

(c) The Contractor shall design all required absorbent boom spill containment systems.

(d) The Contractor shall maintain adequate supplies of boom materials and components on site to meet all spill requirements that may arise during the execution of the Work.

(e) Absorbent booms shall be of sufficient length to encircle a potential spill and of a sufficient diameter and design to be effective in containing spills. Absorbent booms shall be immediately deployed to contain the spilled substance in the event of a spill.

F12.1.3 Preparedness for Spills on Land

(a) The Contractor shall supply, install, maintain and effectively locate on Site spill kits in sufficient numbers and of appropriate types to meet all spill requirements of the Work. Spill kits shall be maintained with a full complement of spill response materials.

(b) As appropriate to the spillable substances stored and used on Site, the following spill kits or equivalents are acceptable to the Owner:

(i) New Pig 95-Gallon MRO Overpak Spill Kit No. KIT 202;

(ii) New Pig 95-Gallon Oil-Only Overpak Spill Kit No. KIT 402; and/or

(iii) New Pig 95-Gallon Overpak HAZ-MAT Spill Kit No. KIT 302.

(c) All pickups and service trucks used on Site shall have spill kits (vehicle spill kits). Vehicle spill kits shall include a sufficient supply of spill response materials to allow for an effective first response to a leak and/or spill of equipment operating fluid. Vehicle spill kits shall include a minimum of one 20 L pail with fitted lid for collection of used spill containment and cleanup materials prior to disposal.

(d) Absorbent pads and other spill containment and absorbing materials shall be on hand in all work areas, at equipment storage or parking areas and at all Liquid storage and refuelling locations as a first-response means of containing and soaking up any spilled substance.

(e) Empty open-head drums with sealable lids shall be provided on site for storage of spillable substances and for disposal of used absorbents, soil contaminated by operating fluids, etc prior to disposal.

(f) The Contractor shall supply, maintain and effectively locate on Site a sufficient number of open-head drums to meet all spill response and disposal requirements encountered during the execution of the Work.

(g) Absorbent booms, skimmers, socks, mats and the like to meet all spill requirements of the Work shall be supplied, install and maintained by the Contractor as required by, and for the duration of the Work. Supplies selected by the Contractor to suit applications on the Site shall be materials as supplied by New Pig, or equivalent acceptable to the Owner.

F12.1.4 Spill Response

(a) The Contractor shall contain and clean up all spills whether resulting from its actions or from its inaction, or from the actions or inactions of any Subcontractors or others engaged by or through the Contractor.

(b) For spill response purposes on land, the Contractor shall identify habitat of Listed Species that could be affected by a spill and shall develop specific response strategies for spills in such areas that provide for the protection of the Listed Species.

(c) Spills or leaks of sewage shall be immediately contained and cleaned up.

(d) All workers on Site shall have a responsibility and training to prevent spills and to immediately respond to spills upon discovery.

(e) In the event of a spill or leak of a hazardous substance, workers involved in tasks directly affected by the spill or leak shall as appropriate stop work on the affected task or tasks and, consistent with their qualifications, stop the occurrence and work to contain and clean up the spill or leak.

(f) Upon discovery, equipment operating fluids found leaking or otherwise spilled onto the ground surface shall be immediately removed with all the surface soils contaminated by the leak or spill and placed into a disposal drum. Similar leaks or spills onto intact rock surfaces shall be contained and cleaned up using absorbent materials and other appropriate means immediately upon discovery.

(g) Spills shall be contained as close as practically possible to the spill source and shall be cleaned up forthwith.

(h) The Contractor shall designate Spill Response Teams formed from suitably qualified and trained members of its Site workforce. The Contractor shall structure its workforce such that one response team is on the Site at all times equipment other than stationary equipment is being operated and/or when Liquid storage facilities are being replenished and/or when other hazardous substances are being shipped on or off Site.

(i) The Contractor shall demonstrate to the Owner by periodic drills at intervals of not less than 6 months over the duration of the Work that it has an effective training program in place to meet the requirements of the Spill Prevention, Preparedness and Response EWP, and of the role that each member of the Spill Response Teams must play in the event of a spill emergency.

(j) The Contractor shall clearly post the "Response" component of its Spill Prevention, Preparedness and Response EWP at all storage facilities containing Liquids and other hazardous substances.

(k) In the event of a spill affecting or potentially affecting licensed water sources, the Contractor shall immediately take measures to effectively prevent the spilled substance from entering water-taking systems and notify affected water licence holders forthwith. The Contractor shall take water samples from affected water-taking systems during the course of spill cleanup operations and test these samples until such time as the test results show that the quality of water in the water-taking system has been restored. Copies of the results of all such testing shall be provided to affected water licence holders and to the Owner.

(l) All testing required by the Contractor and the Owner in connection with a spill to the environment resulting from action or inaction on the part of the Contractor shall be undertaken by the Contractor.

F12.1.5 Spill Reporting

(a) As a minimum requirement, spill reporting shall follow the Environmental Incident Reporting Protocol.

(b) The Contractor shall report all spills to the Owner and, as applicable, to Authorities Having Jurisdiction in accordance with the requirements given herein and in Section D2.4 immediately following the discovery of the spill and implementation of the spill response required by the Spill Prevention, Preparedness and Response EWP.

(c) Statutory spill reporting requirements are outlined in the BC Spill Reporting Regulation. The Contractor shall report Reportable Spills as defined by the BC Spill Reporting Regulation and the BC Special Waste Legislation Guide to the Provincial Emergency Program.

(d) The Contractor shall report to the Owner all spills of Liquids into water and all spills of Liquids on land that seep or are likely to seep into a watercourse, streambed or into the groundwater, including Equipment Operating Fluids seeping or dripping from Equipment.

(e) The Contractor shall report to the Owner all spills on land equal to or greater than 5 L.

(f) Small equipment operating fluid leaks and spills onto exposed soil or rock surfaces that are immediately cleaned up and/or removed with all contaminated surface soils need not be reported by the Contractor provided that:

(i) In accordance with the requirements given herein, the amount and type of spill does not have to be reported;

(ii) The leak or spill is not the result of carelessness and the occurrence can be considered accidental;

(iii) The occurrence is not a repetitive occurrence caused by a single piece of equipment or a specific operating procedure;

(iv) The leak or spill is not within 15 m of the wetted perimeter of a watercourse or streambed and is not in a dewatered area or an excavations or other area where the contaminant could readily mix with water or reach a watercourse or groundwater;

(v) The surface area affected by the leak or spill is less than 1 m^2 and the leaked or spilled fluid does not penetrate more than 300 mm depth; and

(vi) Complete cleanup occurs immediately upon the discovery of the leak or spill.

(g) Written spill reports on all spills that have to be reported as specified herein shall be provided to the Owner and as applicable to Authorities Having Jurisdiction not more than 2 working days after the discovery of a spill. The Contractor shall provide a summary of all reported spills with its Environmental Weekly Report for the week of the report.

F12.2 Environmental Work Plans

(a) The Contractor shall prepare a Spill Prevention, Preparedness and Response EWP and shall submit this EWP to the Owner for review prior to mobilization. The Spill Prevention, Preparedness and Response EWP shall be consistent with Emergency Planning for Industry (CAN/CSA-Z731-95) and with the BC Guidelines for Industry Emergency Plans, other pertinent guidelines and current good management practices.

(b) The Spill Prevention, Preparedness and Response EWP shall set out specifically how the Contractor plans to execute the Work in compliance with the spill contingency planning requirements of PLAs and the OERC. The EWP shall provide a detailed description of the procedures, equipment, materials and resources the Contractor will put in place to prevent spill and to be fully prepared for a spill. The EWP shall also provide detailed spill response procedures that will be implemented in the event of a spill.

(c) The Spill Prevention, Preparedness and Response EWP shall provide a full description of the measures that will be taken to meet the criteria and requirements of Sections D2.4, F11.2, F11.3, and F12.1. The Spill Prevention, Preparedness and Response EWP shall also:

  (i) Provide details of the responsibilities of all persons directly involved in the execution of the EWP; and

  (ii) Be coordinated with the Water Quality Management EWP and the Erosion, Sediment and Drainage Control EWP.

(d) Mobilization to Site will not be allowed until the Contractor's Spill Prevention, Preparedness and Response EWP has received the written concurrence of the Owner.

(e) The Contractor shall diligently follow the procedures and actions detailed in the Spill Prevention, Preparedness and Response EWP and shall make every reasonable effort at all times throughout the Work to meet the intent of the EWP by preventing spills and providing in the event of a spill, the best response within the shortest possible time.

OWNER'S ENVIRONMENTAL REQUIREMENTS FOR CONSTRUCTION

SECTION G – SITE RESTORATION

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G1. OBJECTIVES

G1.1 Worksite General Restoration Objectives

(a) The overall site restoration objectives for the WEP are to complete the Work:

(i) In a manner that respects the existing land, vegetation, wildlife and habitat values in the Project area and the ethno-historic values of First Nations, and has due regard for the protection of those values;

(ii) Without causing any adverse environmental effects greater than, or in addition to, those described in the EACA and any supplements to the EACA; and

(iii) In a manner that seeks to restore disturbed areas remaining after installation of new facilities and infrastructure to make them no less productive than they were before construction.

(b) An objective of the Owner is to procure all plantings required for the Project from a company or nursery located in the Columbia Basin capable of producing indigenous tree and shrub species.

(c) The general site restoration objectives to be applied to meet the overall site restoration objectives are to:

(i) Achieve self maintaining condition as soon as practicable;

(ii) Reseed as soon as practicable with indigenous grass or legume seeds to maintain desirable area ecosystems and prevent invasive weeds from becoming established;

(iii) Plant a mixture of tree seedlings, saplings and, where appropriate small trees, (e.g., ponderosa pine, Douglas-fir, black cottonwood, trembling aspen and paper birch) that are suited to site-specific conditions and area ecosystems, where tree planting is required;

(iv) Plant a mixture of native shrubs (e.g., Tall Oregon-grape, Snowberry, Choke Cherry, Beaked Hazelnut, Saskatoon, Mock-orange, Ocean-Spray, Redstem Ceanothus, Snowbrush, Red-Osier Dogwood, Smooth Sumac, Rose spp., Blue

Elderberry, and Birch-leaved Spirea), which are important to First Nations and Wildlife as suited to site-specific conditions and area ecosystems where shrub planting is required;

(v) Where appropriate, create habitat complexity to promote wildlife use by:

- Planting trees, shrubs and grasses to mimic and/or enhance pre-existing conditions;
- Judiciously placing boulders, small rock piles, and irregular rock lining at the foot of slopes for use by small mammals and herptiles;
- Establishing boxes for bird nesting and bat roosting in areas where they are likely to be used; and
- Creating wildlife trees and placing sparse large woody debris in or near pre-construction wooded areas;

G1.2 Worksite Specific Restoration Objectives

(a) Worksite specific site restoration objectives apply only to those worksites that are used in the course of the construction of the Project.

G1.2.2 Powerplant Worksite

(a) The Powerplant worksite specific objective, not including Worksite F, is to establish a mosaic of open forest, shrubland and grassland plant communities that stabilize slopes, prevent erosion, minimize weed encroachment and provide habitat for locally occurring wildlife guilds. The seeding, planting and habitat enhancement components of this objective are to:

(i) Re-seed all areas with a native seed mix;

(ii) Achieve a target tree density of 175 stems per hectare planting a mixture of ponderosa pine (50%), Douglas-fir (30%), trembling aspen (10%) and black cottonwood (10%) seedlings and saplings in dispersed patches;

(iii) Achieve a target shrub density of 1,625 stems per hectare planting a mixture of native shrubs in a semi-clumped distribution;

(iv) Create habitat complexity and cover for herptiles and small mammals by placing boulders, rock piles and rock linings along the foot of slopes near the Powerplant;

(v) Create habitat for use by herptiles and small mammals by placing large woody debris (aiming at 2-3 large hollow or semi-hollow pieces per hectare) in openings once the herbaceous layer is well established; and

(vi) If opportunities exist at wooded edges, create scattered wildlife trees and/or establish nest boxes for cavity-nesting species (e.g., ducks, swallows, woodpeckers) and bat boxes suitable for local roosting bats.

G1.2.3 Worksites A1 and A3

(a) The Worksites A1 and A3 specific objective is to establish river and roadside buffer zones with a mixed open forest/shrubland community that will minimize erosion, discourage additional noxious weed invasion and provide cover, breeding and foraging substrate for wildlife. The seeding, planting and habitat enhancement components of this objective are:

(i) Re-seed with a native seed mix to;

(ii) Achieve a target tree density of 150 stems per hectare planting a mixture of ponderosa pine (40%), Douglas-fir (40%), trembling aspen (10%) and black cottonwood (10%) seedlings and saplings;

(iii) Achieve a target shrub density of 1,650 stems per hectare planting a mixture of native shrubs in a dispersed slightly clumped distribution;

(iv) Create scattered wildlife trees for cavity-nesting ducks, woodpeckers, swallows and other wildlife tree users on the west-facing side of Worksite A1; and

(v) Create habitat for use by herptiles and small mammals by placing large woody debris (aiming at 2 large hollow or semi-hollow pieces per hectare) in openings within Worksites A1 and A3 once the herbaceous layer is well established.

G1.2.4 Worksite B

(a) Worksite B is to be left in a condition suitable for its continued use as a gravel pit. For disturbed roadside areas on the access road to Worksite B, the objective is to establish a herb-dominated plant community to stabilise slopes and minimize the potential for weed encroachment using a native seed mix.

G1.2.5 Worksites C1, C2 and C3

(a) Worksite C1 may subsequently be used by the Owner as an information or interpretive centre. The Worksite C1 specific objective is to establish a herb-dominated site with dispersed tree and shrub cover that provides a vegetated buffer between the river and the highway, and some cover for wildlife. The seeding, planting and habitat enhancement components of this objective are to:

(i) Re-seed with native seed mix;

(ii) Achieve a target tree density of 75 stems per hectare planting a mixture of ponderosa pine (40%), Douglas-fir (40%) and black cottonwood (20%) seedlings and saplings in a clumped pattern to; and

(iii) Achieve a target shrub density of 200 stems per hectare planting a mixture of native shrubs in a clumped distribution.

(b) The Worksite C2 specific objective is to establish a mosaic of herb-dominated openings with occasional patches of trees and shrubs that provide a buffer between the highway and river. The seeding, planting and habitat enhancement components of this objective are to:

(i) Re-seed with a native seed mix;

(ii) Achieve a target tree density of 150 stems per hectare planting a mixture of ponderosa pine (40%), Douglas-fir (50%) and black cottonwood (10%) seedlings and saplings in a clumped pattern that provides connectivity corridors linking the highway with the river, as well as cover, breeding and foraging opportunities for wildlife;

(iii) Achieve a target shrub density of density of 1,650 stems per hectare planting a mixture of native shrubs in a clumped distribution;

(iv) Create scattered wildlife trees and/or establish nest/bat boxes along the river margin facing west; and

(v) Create habitat for use by herptiles and small mammals by placing large woody debris (aiming at 2-3 large hollow or semi-hollow pieces per hectare) in openings once the herbaceous layer is well established.

(c) The Worksite C3 specific objective is to re-establish a herb-dominated community by re-seeding with a native seed mix.

G1.2.6 Worksites D1, D2, D3 and D4

(a) Worksite D1 and D2 are actively used by MoT forming part of the Columbia Gardens Pit. There is no plan to restore these worksites but only to leave them in a clean, tidy and serviceable condition.

(b) The Worksites D3 and D4 specific objective is to re-establish a herbaceous layer dominated by forage legumes such as alfalfa and clover, while minimizing the potential for invasive weed encroachment.

G1.2.7 Worksite E

(a) The Worksite E specific objective is to re-establish a herb-dominated layer and provide some cover and breeding/foraging habitat for wildlife with patches of shrubs and sparse coniferous and deciduous trees along the eastern boundary. The seeding, planting and habitat enhancement components of this objective are to:

(i) Re-seed with a native seed mix;

(ii) Achieve a target tree density of 125 stems per hectare along the eastern boundary of the site, away from the road, planting an equal mixture of ponderosa pine, Douglas-fir, black cottonwood and trembling aspen;

(iii) Achieve a target shrub density of 1,500 stems per hectare planting a mixture of native shrubs in a clumped pattern; and

(iv) Create habitat for use by small mammals along the eastern margin of the worksite by placing a few scattered large boulders with smaller rock piles.

G1.2.8 Worksite F

(a) The Worksite F specific objective is to re-establish a mixed grassland and low/tall shrubland community to stabilise slopes, minimize erosion, discourage additional noxious weed invasion and to provide open and brushy habitats suitable for herptiles, as well as breeding, foraging and roosting opportunities for birds, mammals, and invertebrates. The seeding, planting and habitat enhancement components of this objective are to:

(i) Re-seed with a native seed mix;

(ii) Achieve a target tree density of 75 stems per hectare along the southern margin of Worksite F planting linear patches of mixed ponderosa pine (40%), Douglas-fir (40%) and black cottonwood (20%) seedlings and saplings to stabilize the slope and provide some connectivity between the intake area and the existing stands of Douglas-fir east of Worksite F;

(iii) Achieve a target shrub density of 1,500 stems per hectare planting a mixture of native shrubs in a semi-clumped pattern;

(iv) Create scattered wildlife trees in the forested stands east of Site F and establish nest boxes suitable for cavity-nesting species (e.g., swallows) along the transmission line; and

(v) Create habitat for use by herptiles and small mammals by placing large woody debris (aiming at 2-3 large hollow or semi-hollow pieces per hectare) and/or small rock piles in open parts of Worksite F once the herbaceous layer is well established.

G1.2.9 Worksite G

(a) The Worksite G specific objective is to re-establish a mixed open forest and tall shrub plant community that provides cover and breeding, foraging and roosting opportunities for wildlife. The seeding, planting and habitat enhancement components of this objective are to:

(i) Re-seed with a native seed mix;

(ii) Achieve a target tree density of 150 stems per hectare planting a mixture of Douglas-fir and trembling aspen in a clumped pattern;

(iii) Achieve a target shrub density of 1,500 stems per hectare planting a mixture of native forage shrub species; and

(iv) Where opportunities exist, create wildlife trees and/or install bird nest and bat roost boxes on existing trees.

G1.2.10 Worksites H, I and J

(a) There are two options for Worksites H, I and J specific objective depending on the final disposition of those worksite areas as determined by the Owner. The Option 1 objective is to restore the worksites for agricultural uses and the Option 2 objective is to provide enhanced habitat suitable for Wildlife species known to use the area.

(b) The Option 1 objective is to re-establish the herb-dominated cover and plant shrub hedgerows. The seeding and planting components of this objective are to:

(i) Re-seed with an alfalfa-dominant seed mix; and

(ii) Increase Wildlife habitat complexity by planting hedgerows of mixed native shrubs in a clumped pattern along the margins of the sites.

(c) The Option 2 objective is to enhance habitat suitability for listed yellow-breasted chats, herptiles, butterflies and other wildlife guilds by restoring a native mixed tall shrub community. The seeding, planting and habitat enhancement components of this objective are to:

(i) Re-seed with a native seed mix;

(ii) Achieve a target shrub density of 1,725 stems per hectare planting a mixture of native shrubs in a semi-clumped pattern;

(iii) Achieve a target tree density of 75 stems per hectare in a supplemental plantings of individual dispersed trembling aspen, willow and paper birch seedlings and saplings; and

(iv) Create habitat for use by herptiles and small mammals by placing large woody debris (aiming at 2-3 large hollow or semi-hollow pieces per hectare) and/or small rock piles in open parts of the worksites once the herbaceous layer is well established.

G1.2.11 Worksite K

(a) Worksite K will be reforested with an appropriate mix of tree seedlings by ATCO Lumber Co. Ltd. based on their stand silvicultural prescription.

G1.2.12 Worksite L

(a) The Worksite L specific objective is to re-establish a herb-dominated community with added habitat enhancements suitable for Wildlife known to use the area. The seeding, planting and habitat enhancement components of this objective are to:

(i) Re-seeding with a native seed mix;

(ii) Create habitat marmots, other small mammals and herptiles by placing a few boulders and smaller rock piles on the west side of the site once the herbaceous layer is well established;

(iii) Achieve a target shrub density of 1,500 stems per hectare planting a mixture of native shrubs in a semi-clumped distribution; and

(iv) Establish nest and bat boxes in surrounding stands of live trees.

G1.2.13 Transmission Line Structure Sites

(a) The specific objective for the restoration of Transmission Line structure sites is to establish a dense herbaceous ground cover using native seed mixes to prevent weed invasion and control erosion.

G1.2.14 Transmission Line Access Roads

(a) The specific objectives for the restoration of Transmission Line Spur Roads to structure sites are to:

(i) Maintain the road alignment for future use in Transmission Line maintenance;

(ii) Establish dense herbaceous ground cover using native seed mixes to prevent weed invasion, control erosion and provide foraging habitat for Wildlife; and

(iii) Provide erosion controls in areas prone to erosion to minimize roadway erosion.

(b) The specific objectives for the restoration of Transmission Line Spur Roads other than those serving structure sites are to:

(i) Minimize further ground disturbance except as necessary for required seeding and planting;

(ii) Establish herbaceous ground cover using native seed mixes to prevent weed invasion and provide foraging habitat for Wildlife; and

(iii) On an area-specific basis, re-establish cleared shrubbery by supplemental planting of low-growing native shrubs.

G2. SITE RESTORATION

G2.1 General Requirements

(a) The Contractor shall diligently strive to meet the objectives of Section G1.

(b) At a sufficient time in advance of site restoration, the Contractor shall order from a nursery or nurseries located in the Columbia Basin acceptable to the Owner, a sufficient number of tree and shrub seedling, sapling and small tree plants to meet the site restoration needs of the Work.

(c) The Contractor shall clean all areas used in the course of construction of domestic and construction garbage, construction debris, and all other construction waste and left-over materials. All temporary structures and foundations placed to facilitate construction and, except as accepted by the Owner, all placed pavements, granular base materials, concrete road barriers, temporary fences and the like shall be removed from Worksites.

(d) In the course of site cleanup operations, any soils, base materials and rockfill discovered to be contaminated shall be addressed in accordance with the Spill Prevention, Preparedness and Response EWP and/or by a Contaminated Materials Management EWP to be developed by the Contractor and subject to review by the Owner.

(e) Following cleaning of construction and other worksite areas used by the Contractor, the Contractor shall restore the Site on an areas-specific basis as required herein.

(f) The Contractor shall restore all site drainage features and facilities, confirming their adequacy, and/or shall design and install new drainage facilities, including but not limited to ditches, swales, culverts and creek crossings. The Contractor shall submit designs and design calculations for all site restoration drainage facilities on Site with its Site Restoration EWP for review by the Owner.

(g) The Contractor shall uniformly replace stripped surface soil on the surface of all filled or otherwise graded areas designated for re-vegetation.

(h) Lands owned by BNSF Railway shall not be planted with trees and shrubs.

(i) Wildlife tree habitat shall be developed by the Contractor using a qualified arborist with experience in wildlife tree creation. Wildlife tree creation shall be under the direct supervision of the EM or a qualified biologist retained by the Contractor and reporting to the EM. Examples of wildlife tree creation techniques are provided in the reference given in Section A7(a)(xv). The Contractor's procedures for wildlife tree creation shall be included in the Site Restoration EWP.

G2.2 Finish Grading Requirements

(a) The finished surface elevations and slope grades in the Powerplant Worksite shall be determined based on the Project Concept and in consultation with the Owner.

(b) The finished surfaces of all Worksites, restored access roads and Spur Roads, and Transmission Line structure sites shall be graded and restored to blend with existing perimeter contours and to utilize existing drainage features, unless otherwise specified in the OERC or shown on the OERC Drawings. All restored areas shall be graded to have positive drainage. The Contractor shall submit its grading designs as part of its Site Restoration EWP.

(c) For all worksites used, the worksite areas shall be graded to the following finished surface elevations after the spreading of stripped surface soils:

(i) The filled portion of Worksite A1 shall be no higher than the underside ballast of the rail spur line Teck Cominco Reload Centre.

(ii) The filled portion of Worksite A3 shall be no higher than the adjacent shoulder of the pavement on Highway 22A.

(iii) Worksites D3 and D4 shall be uniform across both worksites and shall not be higher than El. 433 without the written permission of the Owner.

(iv) Worksites C1, C3 and E shall be no higher than the adjacent shoulder of the pavement on Highway 22A.

(v) If Worksite C2 is used for the placement of excavated materials, the surface shall be graded to blend in with the adjacent contours and drainage features.

(d) At Worksites D1 and D2, no side slopes of stored rock shall be steeper than 1.5 H : 1 V. The height of the rockfill pile at Worksite D2, if used, shall be such that it has a minimal effect on area viewscapes.

(e) The finished surfaces at Worksites G, H, I, J, K and L shall be restored to the elevations and shapes that existed prior to construction.

G2.3 Soil Preparation Requirements

(a) All Site areas with surface soils replaced, all disturbed areas and all areas otherwise identified for seeding and planting shall be thoroughly loosened and prepared prior to seeding.

(b) Soil loosening (decompaction) following finish-grading in preparation for seeding and planting shall, as allowed by soil depth, comprise thorough cross-ripping to not less than 600 mm depth, followed by thorough tine harrowing to not less than 300 mm depth, followed by thorough surface disc harrowing.

(c) For slopes steeper than 3H:1V, following ripping and tine harrowing as specified in (b), above, slope surfaces may be tracked using a track-mounted machine having a ground contact pressure of not more than 50 kPa as an aid in controlling erosion and retaining seed. Care shall be taken not to over compact the surface soils.

(d) Required soil loosening in areas that have been cleared but have not been grubbed as a precaution to minimize erosion shall be loosened only to the extent necessary for the success of the required seeding and planting.

(e) Soil preparation prior to seeding shall include the application of a general fertilizer after tine harrowing and prior to disc harrowing and/or, in specific areas to be identified by the Owner, the application of other soil enrichment substances, such as bio-solids, prior to harrowing. The general fertilizer shall be a slow release 10 Nitrogen:10 Phosphorous:10 Potassium (10:10:10) fertilizer uniformly applied at the rate of 400 kg per hectare or such

other fertilizer and application rate as the Owner determines to be appropriate in specific areas of the Site.

(f) The Owner at its sole discretion will consider alternative soil loosening techniques and soil preparation options meeting the intent of the specified site restoration requirements and the site restoration objectives.

G2.4 Seed Mix and Planting Requirements

(a) The Contractor shall supply the following seed mixes and shall use them in restoring the worksites and other areas indicated. Based on species availability at the time of restoration, the Owner at its sole discretion will consider alternative seed mixes suited to the ecosystems at specific areas for restoration. Seed mix composition is given as a percentage by dry weight.

Seed Mixes and Areas of Application

Mix Type	Seed Mix	Area of Application
1	35% Bluebunch Wheatgrass (*Pseudoroegneria spicata*) 30% Idaho fescue (*Festuca idahoensis*) 15% Slender wheatgrass (*Elymus trachycaulus*) 10% Junegrass (*Koeleria macrantha*) 5% Annual ryegrass (*Lolium multiflorum*) 5% Lupines (*Lupinus polyphyllus*)	Powerplant Worksite; Waneta-Nelway Road; Worksites A1, A3, B, E, F,
2	30% Slender wheatgrass (*Elymus trachycaulus*) 20% Bluebunch Wheatgrass (*Pseudoroegneria spicata*) 20% Idaho fescue (*Festuca idahoensis*) 20% Junegrass (*Koeleria macrantha*) 5% Annual ryegrass (*Lolium multiflorum*) 5% Lupines (*Lupinus polyphyllus*)	Worksites C1, C2, C3, G and L. Worksites H, I and J under Option 2. Transmission Line structure sites and Spur Roads
3	An agronomic seed mix meeting the requirements of the property owner and/or user at the time of site restoration.	Worksites D3 and D4. Worksites H, I and J under Option 1.

(b) Grass/legume seeding shall be undertaken as soon as possible after completion of construction activities in any area.

(c) Tree and shrub planting shall be undertaken in the spring or fall of the year when the ground is workable without excessive disturbance during planting activities. Tree and shrub planting shall follow grass/legume seeding and new herbaceous ground cover shall be established before trees and shrubs are planted.

(d) All areas of the Site with stripped surface soils replaced and/or otherwise prepared for seeding shall be seeded with the specified grass/legume seed mixes.

(e) Broadcast and drill seeding shall be preceded by the application of the specified seeding fertilizer. Following broadcast and drill seeding, areas seeded shall be lightly chain harrowed to set the seed.

(f) Hydroseeding shall include the application of the specified seeding fertilizer, mulch and tackifier.

(g) As required based on soil fertility, seeding fertilizer shall be 18:18:18 fertilizer applied at the rate of 300 kg per hectare, for dry or liquid application as appropriate.

(h) Hydroseeding mulch shall be Ecofibre wood fibre mulch as supplied by TerraLink Horticulture Inc. applied at the rate of 2500 kg per hectare, or equivalent acceptable to the Owner.

(i) Hydroseeding tackifier shall be TerraLink Guar J-3000 applied at the rate of 50 kg per hectare, or equivalent acceptable to the Owner.

(j) Broadcast and drill seeding shall be at the rate of 35 kg of the specified seed mix per hectare. Hydroseeding shall be at the rate of 70 kg of the specified seed mix per hectare. The Owner at its sole discretion will consider alternative seeding rates based on requirements at specific worksites and work areas.

(k) No trees shall be planted within any Transmission Line TMZs and no trees or shrubs shall be planted within 5 m of the edge of any road or highway. In these areas the arrangement of plants within clumps of plants shall be such that trees are replaced by low-growing shrubs.

(l) The growth of grasses, legumes and weeds shall be prevented within a radius of 300 mm of each newly planted tree and shrub.

G2.5 Maintenance Requirements

(a) All seeded and planted areas shall be watered and weeded if required to promote establishment and prevent weed invasion. The Contractor's Site Restoration EWP shall provide detailed measures that the Contractor will undertake to establish self maintaining vegetation.

(b) All seeded and planted areas shall be maintained until those areas are in a self-maintaining condition, including by protecting trees and shrubs during their early growth stages from Wildlife browsing.

(c) Seeded areas and/or tree and shrub plantings that have not taken shall be re-seeded and/or replanted as required to achieve a self-maintaining condition.

G2.6 Specific Site Restoration Requirements

G2.6.1 Waneta-Nelway Road

(a) The traffic turnaround constructed by the Contractor immediately east of the entrance to Worksite B shall be removed and the roadway shall be restored in accordance with Section A7(a)(iii).

(b) Stripped soil from outside the road shoulders shall be replaced up to the road shoulders and the areas adjoining the road shoulders shall be graded to match existing contours and drainage features. Graded areas outside the road shoulders shall be prepared as specified herein.

(c) The Contractor shall remove road base and sub-base materials in areas weakened and/or rutted by heavy construction traffic down to subgrade level. The subgrade in these areas shall be repaired and subgrade drainage restored to the satisfaction of the Owner. New sub-base and base materials shall be placed and compacted. The type of base and sub-base materials used shall be consistent with materials already existing on adjacent portions of the road and shall be in accordance with, and meet the requirements of Section A7(a)(iii) as to overall design, material type, layer thickness and degree of compaction. All road repair and maintenance work shall be in accordance with Section A7(a)(iii).

(d) Road restoration designs, design calculations and procedures shall be included as part of the Site Restoration EWP covering restoration of the Waneta-Nelway Road.

G2.6.2 Worksite A1

(a) The area of Worksite A1 used for the deposition of excavated rock and/or sand and gravel materials shall be levelled to a consistent elevation throughout and graded at the perimeter to blend uniformly with existing perimeter contours with no slopes steeper than 2H:1V.

(b) To the extent that surplus stripped surface soil may be available from the Powerplant Worksite, surplus stripped surface soil not required in the restoration of other disturbed Site areas shall be placed in a uniform layer 150 mm (-50 mm / +150 mm) thick on the final grade surface of soil-filled areas of the filled area of Worksite A1.

(c) Surplus stripped surface soil imported to Worksite A1 shall be placed in a uniformly wide band on the surface of areas filled with excavated rock and/or sand and gravel on the Columbia River side of the filled area to provide a river buffer zone adjacent to the river on filled areas of Worksite A1. The Contractor shall establish the surface soil placement band width and location in consultation with the Owner and include all details in the Site Restoration EWP.

(d) For all areas of Worksite A1 adjacent to Highway 22A disturbed by construction, a roadside buffer zone 100 m (± 10 m) wide and as permitted by the Columbia River top of bank shall be provided alongside Highway 22A.

G2.6.3 Worksite B

(a) The Contractor shall leave Worksite B in a uniformly graded condition with no piles of material or other obstacles.

(b) Areas along the access road to Worksite B disturbed by the Contractor shall be uniformly graded to blend with existing contours. All disturbed areas shall be loosened to a depth of not less than 300 mm and prepared as specified herein.

G2.6.4 Worksites C1, C2 and C3

(a) The Contractor shall cooperate with the Owner in the restoration of Worksite C1 to prepare the worksite in such a way that, if subsequently required by the Owner, it can be used as a public information/interpretive centre.

(b) The site entrance to Worksite C1 from Highway 22A developed for construction shall be retained and the concrete road barriers placed alongside the highway shall be left in place. An access road and a parking/turnaround area sufficient to safely accommodate and manoeuvre 4 recreational vehicles and 6 cars shall be left in place.

(c) The Contractor shall remove the access road(s) within Worksite C2 and shall leave only the main access ramp to Highway 22A for site restoration and restoration maintenance purposes. At the completion of site restoration maintenance, access to Worksite C2 shall be effectively blocked to vehicle entry.

(d) The Contractor shall remove the highway entrance to Worksite C3 and access roads within Worksite C3.

G2.6.5 Worksites D1 and D2

(a) Worksites D1 and D2 shall be left in a clean and tidy condition. Access roads within the Worksites D1/D2 area shall be left in well graded, clean and serviceable condition.

G2.6.6 Worksite K

(a) All areas with surface soil replaced and all other disturbed areas shall be prepared as specified herein and left for reforestation by Atco Lumber Co. Ltd.

G2.6.7 Transmission Line Access Roads

(a) The Contractor shall leave BC Hydro access roads and the existing roads of area property owners used in the construction of the Transmission Line in a well-graded, clean, and serviceable condition upon completion of the Work.

(b) The Contractor shall ensure that all stream crossings, ephemeral creeks and drainage channels are restored and fully functional and shall install new drainage measures as required by site conditions and the prevention of erosion during the site restoration maintenance period.

(c) Spur Roads to structure sites shall be decommissioned, prepared and seeded and left in an accessible condition for future line maintenance purposes.

(d) Spur Roads other than those serving structure sites shall be decommissioned, prepared, seeded and planted as required to meet the objectives of Section G1.

G2.7 Environmental Work Plans

(a) For all worksite areas specifically identified herein that have been used by the Contractor and for all other areas disturbed in the course of construction, the Contractor shall prepare a Site Restoration EWP. The Site Restoration EWP may comprise area-specific Site Restoration EWPs for each of the used and/or otherwise disturbed areas. The Contractor shall submit its Site Restoration EWP(s) to the Owner for review in advance of the restoration covered by the EWP.

(b) In developing its Site Restoration EWP(s), the Contractor shall, in consultation with the EM and/or a qualified land restoration expert, clearly show how it plans to complete the restoration of the Site in a manner consistent with the objectives of Section G1.

(c) The Site Restoration EWP shall, as applicable, describe the measures that will be taken by the Contractor to meet in the objectives of Sections G1 and the requirements of Sections G2.1 to G2.6, inclusive. The Site Restoration EWP shall also provide:

(i) An acknowledgement of the objectives of Section G1 and a commitment to work with the Owner on the restoration of the Site by striving to meet those objectives;

(ii) A detailed schedule covering all aspects of site restoration; and

(iii) All supporting design details and associated calculations.

(d) Restoration shall not begin on any Site area until the Site Restoration EWP for that Site area has received the written concurrence of the Owner.

APPENDIX 5 – REQUIRED PROVINCIAL APPROVALS (POST-ENVIRONMENTAL ASSESSMENT)

In accordance with the order issued under section 10(1)(c) of BCEAA on June 12, 2003, no provincial authorizations, permits, tenures or licences may be issued under any provincial statutes until the Project has received an Environmental Assessment Certificate from provincial Ministers. In addition, the issuance of an Environmental Assessment Certificate does not guarantee that the necessary permits and authorizations will be granted, as the Project must comply with the requirements of the appropriate provincial regulatory statutes. At the conclusion of the environmental assessment process, if an Environmental Assessment Certificate is issued for the Project, the following provincial licences, permits and approvals will be required.

Land Tenure, Land Use and Water Use

Applicable approvals associated with land tenure, land use and water use, include:

Water Licence under the *Water Act*

- Agency: Ministry of Environment, Water Stewardship Division, Management and Standards Branch, Victoria, BC.
- Purpose: Use of provincially regulated water.
- Status: Proponent has made application for a water licence to the Comptroller of Water Rights.

Expansion of Water Rights Authorization under the *Water Act*

- Agency: Ministry of Environment, Water Stewardship Division, Management and Standards Branch, Victoria, BC.
- Purpose: To authorize an extension of water rights licensed to Teck Cominco to enable use of the water in the Project. This will allow the Proponent and Teck Cominco to coordinate and maximize the beneficial use of water.
- Status: This sharing of water as set out in the Release Coordination Agreement will require authorization from the Comptroller of Water Rights.

Approval of Works In and About a Stream under Section 9 of the *Water Act*

- Agency: Ministry of Environment, Water Stewardship Division, Management and Standards Branch, Victoria, BC.
- Purpose: Excavation of intake channel and tailrace for new powerhouse.
- Status: Issuance will be addressed in the Water Licence application decision.

Crown Land Tenure under the *Land Act*

- Agency: Ministry of Agriculture and Lands, Integrated Land Management Bureau, Regional Client Services – Southern Interior Region, Cranbrook, BC.
- Purpose: Required for use, occupancy and/or alteration of provincial Crown lands for portions of the project transmission line statutory right-of-way.
- Status: Proponent has made application for this tenure.

Approvals under Land-Use/Zoning Bylaws

- Agency: Regional District of Kootenay Boundary (Area 'A'), Trail, BC.
- Purpose: To ensure compatibility of land use with Official Community Plan.

- Status: The Proponent is a Crown Agency and is, therefore, formally exempt from being bound or affected by local government zoning, bylaws and regulations. Notwithstanding, the Proponent has committed to cooperating with all levels of government to address project concerns to the extent feasible. The Waneta Dam and adjacent areas are zoned within a category that is compatible with power generation facilities.

Approval to use agricultural land under the *Agricultural Land Commission Act*

- Agency: Agricultural Land Commission, Burnaby, BC.
- Purpose: Exclusion of lands from the Agricultural Land Reserve or approval of non-conforming use of Agricultural Land Reserve lands.
- Status: Applications have been made by the Proponent to the Agricultural Land Commission for all uses of Agricultural Land Reserve lands associated with the Project.

Facility Siting and Construction

Permit or Approval under the Waste Discharge Regulation of the *Environmental Management Act*

- Agency: Ministry of Environment, Environmental Protection Division, Regional Operations – Kootenay/Okanagan, Nelson, BC.
- Purpose: Regulation of air emissions from concrete batch plant.
- Status: Ministry of Environment continues to move toward a self-regulatory approach to waste management regulation. Best management practices codes for an array of industrial sectors are in preparation. Until such time as these are in place, applications for waste management permits are still required.

Requirements under the Contaminated Sites Regulation of the *Environmental Management Act*

- Agency: Ministry of Environment, Environmental Protection Division, Land Remediation Section, Victoria, BC.
- Purpose: Requirements and provisions of the Contaminated Sites Regulation.
- Status: The Proponent has committed, prior to construction, to submitting detailed work, remediation and monitoring plans to Ministry of Environment, Environmental Protection Division, relating to the removal of contaminated sediments from the forebay of the Waneta Dam, and complying with all regulatory requirements.

Letter of Approval/Exemption under the *Heritage Conservation Act*

- Agency: Ministry of Tourism, Sport and the Arts, Archaeology Branch, Permitting and Assessment Section, Victoria, BC.
- Purpose: Protection of provincial archaeological and heritage resources, which may be located on or in proximity to the project site.
- Status: Archaeology Branch has concurred that the Project will not adversely affect archaeological resources subject to the provisions of the Act.

Forest Use (Cutting) Permit under the *Forest and Range Practices Act*

- Agency: Ministry of Forests and Range, Arrow Boundary District, Castlegar, BC.
- Purpose: Cutting and clearing of forested land.
- Status: Proponent will file application as required.

Highway Use Authorizations under the *Transportation Act*

- Agency: Ministry of Transportation, Nelson, BC.
- Purpose: Changes to highway access; transportation of oversize loads; etc.
- Status: Authorizations will be obtained as required.

Leave to Construct under the *Water Act*

- Agency: Ministry of Environment, Comptroller of Water Rights, Victoria, BC.
- Purpose: Prior to initiating project construction, an application to the Comptroller of Water Rights for "Leave to Construct" will be required.
- Status: The application will require the provision of engineering drawings and acceptance of these by the Comptroller for the portion of the Project for which the application is being submitted.

Building Permits under the *Local Government Act*

- Agency: Regional District of Kootenay Boundary (Area 'A'), Trail, BC.
- Purpose: Construction of land-side facilities that conform to bylaw and other requirements, such as those related to the Sewerage System Regulation under the *Health Act*, and *Drinking Water Protection Act*.
- Status: Provincial projects are exempt from local government permit requirements. Nevertheless, the Proponent has indicated that the standard of construction to be employed will conform to those of the Regional District.

Approval for Fuel Storage under the *Local Government Act*

- Agency: Office of the Fire Commissioner, Ministry of Public Safety and Solicitor General, Cranbrook, BC.
- Purpose: Approval of adherence to fuel storage safety standards.
- Status: Appropriate applications will be filed as and when required within the project development cycle.

Facility Operations and Maintenance

Leave to Commence Diversion under the *Water Act*

- Agency: Ministry of Environment, Water Stewardship Division, Management and Standards Branch, Victoria, BC.
- Purpose: When the Project has been completed and prior to beginning operations, an application to the Comptroller of Water Rights for "Leave to Commence" will be required.
- Status: This application will require assurances from the Proponent's (Owner's) Engineer that the Project has been built in accordance with the approved design.

Pesticide Use Authorization under the *Integrated Pest Management Act*

- Agency: Ministry of Environment, Environmental Protection Division, Integrated Pest Management Program, Victoria, BC.
- Purpose: Handling, use and application of herbicides to control vegetation on the project transmission line statutory right-of-way under the *Integrated Pest Management Act* and Regulation.
- Status: If pesticides are to be applied to under 20 hectares per annum, an annual licence is required for registration purposes, with adherence to prescribed practices and standards. If pesticides are to be applied to over 20 hectares per

annum, a Pest Management Plan is required, including public consultation on the Plan, with adherence to specified practices and standards.

Fire Marshall (Commissioner) Approval

- Agency: Office of the Fire Commissioner, Ministry of Public Safety and Solicitor General, Cranbrook, BC.
- Purpose: Approval of fire safety and risk.
- Status: These will be applied for as and when required within the project development cycle.

Private Land Tenures

In addition to the above noted approvals, the Proponent will need to take steps to conclude legal agreements with private land-owners with respect to temporary access during construction and subsequent statutory right-of-way required for the project transmission line.

APPENDIX 6 – REQUIRED FEDERAL RESPONSIBLE AUTHORITY APPROVALS (POST-ENVIRONMENTAL ASSESSMENT)

At the conclusion of the environmental assessment process the federal Minister of Environment will issue an environmental assessment decision statement. If the Minister's decision statement indicates that, in the opinion of the Minister, the Project is not likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures, the following federal approvals, authorizations, licences and permits will be required.

Facility Siting and Construction

Approval under Section 5(1) of the *Navigable Waters Protection Act*

- Agency: Transport Canada, Navigable Waters Protection, Vancouver, BC.
- Purpose: Approval for construction of works in, on, over, under, through, or across any navigable water.
- Status: Historically, sections of the lower Pend d'Oreille River between the U.S. border and the confluence with the Columbia River were considered non-navigable. However, due to the changes in the river brought about by the placement of the existing Waneta and Seven Mile dams, Transport Canada has determined that this historical status is no longer valid and has advised that an approval under the Act is required for the Project.

Authorization under Section 35(2) of the *Fisheries Act*

- Agency: Fisheries and Oceans Canada, Environmental Assessment and Major Projects, Vancouver, BC.
- Purpose: Authorization for the harmful alteration, disruption or destruction of fish habitat.
- Status: The Proponent must satisfy information requirements and obtain the authorization prior to construction.

Authorization under Section 32 of the *Fisheries Act*

- Agency: Fisheries and Oceans Canada, Major Projects Review Unit, Vancouver, BC.
- Purpose: Authorization for the killing of fish by means other than fishing, from entrainment of fish through the project powerplant.
- Status: The Proponent must satisfy information requirements and obtain the authorization prior to construction.

Authorization under the *Explosives Act* and Regulations

- Agency: Natural Resources Canada, Explosives Branch, Explosives Regulatory Division, Vancouver, BC.
- Purpose: Use and storage of explosives.
- Status: Application will be filed as required.

Facility Operations and Maintenance

Licence or Exception under the *International River Improvements Act*

- Agency: Environment Canada.

- Purpose: Potential alteration of water flows at the Canada-U.S. boundary.
- Status: The Project is excepted from the application of the *International River Improvements Act* since there will be no significant incremental flow and level effects at the border resulting from the operation of the Project. The Proponent has informed the federal Minister of the Environment of the case for exception and has provided the required documentation.

Permit, Exception or Exemption under the *Species at Risk Act*

- Agency: Fisheries and Oceans Canada, and Environment Canada.
- Purpose: If monitoring shows that the Project is unavoidably affecting a listed species or any part of its critical habitat or the residences of its individuals, the Proponent could apply for a permit under section 73 of the Act authorizing the activity, or under section 83 of the Act, an exception or exemption for permitted activities.
- Status: Any future application is subject to the findings of project-related monitoring.

Except for possible action(s) under the *Species at Risk Act*, the above relates to those federal statutory and regulatory approvals in the Law List Regulations under CEAA that require environmental assessments under CEAA if they enable a project to be carried out. There may be additional federal permit requirements for the Project that are not listed above.

53.0 Reference: Exhibit B-1, Chapter 7
Aboriginal Consultation

In 2003, the British Columbia Environmental Assessment Office ("EAO") issued an environmental assessment certificate for the Waneta Hydroelectric Expansion Project. The Assessment Report prepared by the EAO describes the First Nations setting and discusses the potential effects of the project on asserted aboriginal rights and title.

1.53.2 Please confirm whether or not the documents related to the EA certificate decision were considered in assessing the strength of asserted aboriginal claims in the vicinity of the Waneta dam.

RESPONSE:

The referenced documents are being considered in BC Hydro's strength of claim analysis.

53.0 Reference: Exhibit B-1, Chapter 7
Aboriginal Consultation

In 2003, the British Columbia Environmental Assessment Office ("EAO") issued an environmental assessment certificate for the Waneta Hydroelectric Expansion Project. The Assessment Report prepared by the EAO describes the First Nations setting and discusses the potential effects of the project on asserted aboriginal rights and title.

1.53.3 Based on the documents related to the EA decision and evidence filed, provide BC Hydro's preliminary assessment of the strength of the aboriginal claims in the vicinity of the Waneta dam. Based on this assessment, what is BC Hydro's opinion on the scope or content of the Crown's duty to consult?

RESPONSE:

BC Hydro is not currently in a position to update the information provided in Chapter 7 of the Filing. As set out in Chapter 7, BC Hydro will update its evidence with respect to the state of consultation with aboriginal groups at the time it files the definitive agreements with the BCUC.

53.0 Reference: Exhibit B-1, Chapter 7
Aboriginal Consultation

In 2003, the British Columbia Environmental Assessment Office ("EAO") issued an environmental assessment certificate for the Waneta Hydroelectric Expansion Project. The Assessment Report prepared by the EAO describes the First Nations setting and discusses the potential effects of the project on asserted aboriginal rights and title.

1.53.4 Please outline the process and associated timelines for consulting First Nations about the proposed Waneta Transaction Application.

RESPONSE:

Please refer to the response to BCUC IR 1.53.5.

53.0 Reference: Exhibit B-1, Chapter 7
Aboriginal Consultation

In 2003, the British Columbia Environmental Assessment Office ("EAO") issued an environmental assessment certificate for the Waneta Hydroelectric Expansion Project. The Assessment Report prepared by the EAO describes the First Nations setting and discusses the potential effects of the project on asserted aboriginal rights and title.

1.53.5 Has BC Hydro notified the affected First Nations of the current regulatory timetable and their right to intervene in this hearing process? If so, please advise as to the timing, nature and method of notification.

RESPONSE:

BC Hydro provided a second Notice to all the aboriginal groups listed in schedule 7-2 in the form attached. The second Notice does provide the BCUC's current regulatory timetable and advises of each First Nations' right to intervene in the BCUC process. The Notices were provided in the manner and form discussed with each First Nation at the time they were provided with the first Notice.

The Ktunaxa Nation Council (KNC), the Okanagan Nation Alliance (ONA), the Upper Nicola First Nation (UNFN) and the Shuswap First Nation have sought meetings with BC Hydro in response to the Notices. A meeting was held in Cranbrook with the KNC on July 23, 2009, with the SFN on August 6, 2009 and the ONA on August 10, 2009. BC Hydro continues to attempt to arrange a meeting with the UNFN.

The need for further consultation, if any, is currently being assessed.

Second Notice

The First Nations of the Okanagan Nation Alliance
The First Nations of the Ktunaxa-Kinbasket Tribal Council
A group of Aboriginal people located near Vallican, B.C. who filed a claim on behalf of the Sinixt Nation

Waneta Dam

Further to our notice dated June 17, 2009, BC Hydro and Power Authority (BC Hydro) would like to confirm that the Master Term Sheet dated June 17, 2009 between BC Hydro and Teck Metals Ltd. relating to the acquisition of an interest in the Waneta Dam was provided to the British Columbia Utilities Commission (BCUC) as an appendix to a filing made on July 6, 2009.

Upon receipt of the application, the BCUC established the following procedural schedule in connection with its review of the filing:

- August 5, 2009 Deadline for Intervention with the BCUC;
- August 12, 2009 Date by which interveners and interested parties should file written submissions concerning the issues they wish to raise in the proceeding and any procedural suggestions they have; and
- August 17, 2009 Procedural Conference to be held at 12th Floor 1125 Howe Street Vancouver, B.C.

The full text of the BCUC's Procedural Order is available on the BCUC's website (www.BCUC.com) or we will provide you with a copy upon request.

We remain prepared to receive directly from you any comments or concerns that you believe should be taken into account in connection with this transaction prior to definitive agreements being executed. However, if you prefer to bring forward any issues, concerns or comments you may have to the BCUC, we will provide you with a copy of our filing with them upon request.

If you have any questions, please do not hesitate to contact Ms. Roxanne Scott at 604-296-2820.

Sincerely,

Keith Vorland
Senior Manager, Consultation and Negotiations
Aboriginal Relations and Negotiations

53.0 Reference: Exhibit B-1, Chapter 7
Aboriginal Consultation

In 2003, the British Columbia Environmental Assessment Office ("EAO") issued an environmental assessment certificate for the Waneta Hydroelectric Expansion Project. The Assessment Report prepared by the EAO describes the First Nations setting and discusses the potential effects of the project on asserted aboriginal rights and title.

1.53.6 Have any of the affected First Nations advised that they are not able to work within the current regulatory schedule set by the Commission or the balance of the regulatory schedule proposed by BC Hydro in the application?

RESPONSE:

No.

53.0 Reference: Exhibit B-1, Chapter 7
Aboriginal Consultation

In 2003, the British Columbia Environmental Assessment Office ("EAO") issued an environmental assessment certificate for the Waneta Hydroelectric Expansion Project. The Assessment Report prepared by the EAO describes the First Nations setting and discusses the potential effects of the project on asserted aboriginal rights and title.

1.53.7 Does BC Hydro anticipate that further consultation or accommodation efforts to maintain the honour of the Crown may be required with affected First Nations after either the close of the evidentiary phase of the this hearing process or the release of the Commission's decision. Please explain. If so, what, if any, further regulatory or ministerial approval(s) will be required by BC Hydro after the release of the Commission's decision? For the purpose of this request, please assume the decision approves the application and is released in December 2009?

RESPONSE:

Not at this time. BC Hydro remains open to undertake any consultation that subsequent events make necessary before making a final decision to close the transaction. BC Hydro does not anticipate that there will be any further regulatory or ministerial approvals after the release of the BCUC's decision on the assumption that it is released in December 2009. Based on information currently available to it, BC Hydro believes that the consultation process can be concluded in time that the BCUC can be provided with all information relevant to the consultation process prior to making its final decision.