November 28, 2016

**VIA EMAIL**

Laurel Ross
Acting Commission Secretary
BC Utilities Commission
6th Floor 900 Howe Street
Vancouver, BC V6Z 2N3

BCPIAC
Public Interest Advocacy Centre

Reply to: Tannis Braithwaite
tbraithwaite@bcpiac.com
ph: 604.687.3034

Our file: 7640

**Re: FortisBC Inc. ("FBC")**
**Corra Linn Dam CPCN**

1) We make the following submissions on behalf of our clients, the British Columbia Old Age Pensioners' Organization, Disability Alliance BC, Council of Senior Citizens' Organizations of BC, and the Tenant Resource and Advisory Centre, known collectively in regulatory processes as "BCOAPO et al." The constituent groups of BCOAPO et al. represent the interests of low and fixed income energy consumers within BC and more specifically in this process, the interests of FBC's low and fixed income residential ratepayers.

## INTRODUCTION

2) On June 29, 2016, FortisBC Inc. (FBC) applied for a Certificate of Public Convenience and Necessity (CPCN) to construct and operate 14 replacement spillway gates and to upgrade the associated structures at the Corra Linn Dam.[1]

3) The BCUC subsequently established a regulatory review process that consisted of two rounds of interrogatories followed by written submissions from participating parties.[2]

## PROJECT APPROVALS

4) The Corra Linn Dam is located on British Columbia's Kootenay River and was commissioned in 1932. The purpose of the dam is two-fold: i) the generation of electrical energy from the portion of the Kootenay River flows allocated to FBC; and ii) the regulation of the level of the Kootenay Lake reservoir. The Kootenay Lake reservoir is shared with BC Hydro, which operates the 580 MW Kootenay Canal Generating Station adjacent to the Corra Linn plant. To this end, the Corra Linn

[1] Exhibit B-1
[2] Exhibit A-2

Dam consists of 5 sections: the east dam, the spillway, the middle dam, the powerhouse (3-16 MW units) & the associated headworks and the west dam.[3]

5) The focus of the Application is the 14 identical spillway gates located at the Corra Linn Dam which have been in operation since the construction of the dam. It is noted that BC Hydro's Kootenay Canal facility has no ability to spill water and that the spillway gates at the Corra Linn Dam are the only way to control the release of excess water from Kootenay Lake.[4] As a result, the Corra Linn Dam spillway gate facilities are critical to the safe operation of the reservoir and the dam as they provide a means of controlling the reservoir levels and the release of water safely when high flow conditions occur.[5]

6) The Project involves:[6]

   a) Replacement of 14 existing spillway gates to meet the seismic and flood withstand recommendations of the *British Columbia Dam Safety Regulation* (BCDSR) and *Canadian Dam Association Dam Safety Guidelines* (CDSG);

   b) Reinforcement of the existing towers and bridges to meet seismic and flood withstand recommendations of the BCDSR and CDSG;

   c) Refurbishment of the existing hoists; and

   d) Replacement of the existing embedded parts (gate guides, sill etc.).

7) The Project meets the statutory criteria and the criteria established by the BCUC for determining when a CPCN Application is required. Specifically, with an estimated cost of $62.694 M, the project exceeds the $20 M threshold established by the Commission for CPCN applications[7]. As a result, the approvals sought are appropriate to the Project.

**NEED**

8) There are two key drivers underlying the need for the project. First, since 2007, there have amendments to the CDSG and the BCDSR that apply to dams in BC and are therefore relevant to the Corra Linn Dam. The CDSG amendments added a 5th consequence classification – "Extreme" – to the previous 4-tiered system. The

[3] Exhibit B-1, page 10
[4] Exhibit B-1, page 10
[5] Exhibit B-1, page 13
[6] Exhibit B-1, page 39
[7] Exhibit B-1, page 5

amendments also updated the magnitude of the "design flood" and "design earthquake," which are used to define the severity of the events that the dam is recommended to be able to withstand.[8] The "design earthquake values" for the Corra Linn facility were determined by Wutec Geotechnical International, a specialist seismic engineering firm.[9]

9) The Corra Linn Dam is licensed and regulated by the *Water Sustainability Act* and FBC, as the owner, is required to meet the requirements specified within the BCDSR. In 2011, the BCDSR was amended to incorporate the new "Extreme" consequence classification and also required owners to undertake more frequent dam safety reviews. In 2012, FBC contracted with Knight Piesold (KP) to undertake a Dam Safety Review to determine if the Corra Linn dam met the requirements of the BCDSR. The safety review concluded that the consequence classification be updated from "Very High" to "Extreme." This finding was subsequently confirmed by KP in 2015.

10) As a follow-up, FBC requested that KP perform a Dam Stability Study, which focused on the structure of the Corra Linn Dam itself and concluded that the dam is expected to perform satisfactorily.[10] FBC also retained the services of HMI Construction (HMI) to perform a Gate Withstand Study to assess the seismic withstand capability of the spillway gates, towers, bridges and hoists given the "Extreme" classification. HMI's key conclusions were that: i) the gates require either replacement or significant refurbishment; and ii) the towers and bridges require reinforcement.[11]

11) The second driver is that the Corra Linn Dam spillway gates are approaching end of life. The recommended design life of a new gate is 100 years assuming appropriate repairs and rehabilitation projects are performed over the service life. In the case of the Corra Linn facility, the current gates have been in-service for 84 years. Routine maintenance has been appropriate but minimal because the dam was not constructed with a means of isolating the spillway gates, which limits access to the gates.[12] Also, FBC has confirmed that there have been no major refurbishments or upgrades to the gates since their initial installation.[13]

12) In early 2016, various inspections were performed to assess the condition of three of the gates. These inspections indicated that the gates were in fair to poor condition.

[8] Exhibit B-1, pages 15-17
[9] BCOAPO 4.1
[10] Exhibit B-1, page 21 and BCOAPO 3.1
[11] ExhibitB-1, pages 21-22
[12] Exhibit B-1, page 23
[13] BCOAPO 2.1

As a result, the gates are considered to be approaching end of life unless significant rehabilitation is performed. During the interrogatory process, FBC confirmed that while the three gates inspected visually appeared to be in worse condition than the other gates with respect to corrosion, the level of corrosion on all 14 gates is similar.[14] FBC has also explained that since all three gates are of similar vintage and design—and all are operated under identical conditions—additional inspections would not affect the alternative selected and therefore would have given rise to additional costs with little incremental benefit.[15]

13) FBC was unable, due to the design of the current dam, to inspect the embedded (i.e. underwater) parts of the gates. However, the results from the inspection of the embedded parts of the gates at a similar plant (in terms of gate size, design, age, etc.) found that there was heavy corrosion in most areas in contact with the water.[16] FBC has noted that while there are differences between the proxy gate inspected and the Corra Linn gates, there are sufficient similarities to allow meaningful comparisons to be made.[17]

14) Overall, FBC has satisfactorily addressed the issue of need. While issues about the condition of the current spillway gates are of some relevance in this regard, the more critical driver is the fact that the current spillway gates do not meet the requirements of the BCDSR. In this regard, FBC has involved qualified third parties in its assessment and demonstrated that the spillway gates are currently inadequate to meet the updated BCDSR requirements.[18]

15) The current condition of the spillway gates is relevant and particularly important when considering the alternatives to addressing this need as the "current condition" will directly affect the extent of the work required under a "Refurbishment" alternative[19].

## ALTERNATIVES CONSIDERED/RECOMMENDED ALTERNATIVE

16) In the Application, FBC identified and evaluated 4 alternatives:[20]

a) Alternative 1: Do Nothing;

b) Alternative 2: Deferral;

[14] CEC 21.1
[15] BCOAPO 5.1
[16] Exhibit B-1, pages 23-24
[17] CEC 8.2
[18] Including Wutec, KP and HMI
[19] BCOAPO 11.1
[20] Exhibit B-1, page 26-27

c) Alternative 3: Gate Refurbishment; and

d) Alternative 4: Gate Replacement.

17) The Application also identified 4 technical criteria and one financial criterion that were used to evaluate the alternatives. The technical criteria were:

a) Ability to Withstand the Design Flood and Design Earthquake Events;

b) Ability of the Spillway Gates to Remain Operational Post-Earthquake;

c) Minimize Project Risks; and

d) Reliability of Gates and Associated Equipment.

18) The financial criterion was that the alternative selected should minimize life-cycle capital, operating and maintenance costs.[21]

19) In terms of the technical criteria, it was deemed that only Alternatives (3) and (4) were satisfactory as the first two alternatives addressed did not meet the BCDSR or did not address the current (fair to poor) condition of the facilities and therefore did not meet any of the technical criteria.[22] In terms of the remaining two alternatives, Alternative (3) was considered to meet three of the four criteria, while Alternative (4) met all four criteria, such that both alternatives were feasible.[23] Alternative (3) was not considered to be the alternative that "minimized project risks." Also, FBC has noted that while Alternative (3) is considered to achieve the fourth technical criterion (reliability), there is a potential for latent defects to remain following rehabilitation.[24].

20) In terms of the financial criterion, Alternative (4) was found to have a higher initial capital cost than Alternative (3). However, when the fact that the refurbished gates in Alternative (3) would need to be replaced sooner than the new gates installed in Alternative (4) is taken into consideration, the overall present value of the incremental revenue requirement is lower under Alternative (4).[25]

[21] Exhibit B-1, page 25
[22] Exhibit B-1, pages 28-30
[23] Exhibit B-1, pages 30-33
[24] BCOAPO 7.1
[25] Exhibit B-1, pages 34-37

21) As a result, based on both FBC's technical and financial criteria, Alternative (4) is recommended as the preferred approach for the Project – i.e. Gate Replacement.[26]

22) During the IR process a number of other alternatives were raised by parties and considered by FBC to be inadequate including:

a) Extending the Project schedule beyond the planned December 2020 in-service date – inadequate on the grounds that there would not be any cost savings.[27]

b) Replacing some gates and decommissioning others – inadequate on the grounds that all 14 gates are required to safely pass the design flood of the Possible Maximum Flood. Furthermore, since the gates do not meet the BCDSR, even if they were closed or decommissioned they would need to be refurbished or replaced in some fashion.[28]

c) Fully replace the spillway section with a modern design – inadequate on the grounds that it would be significantly more costly.[29]

d) Replace some of the gates and refurbish others – inadequate on the grounds that for the refurbished gates, the disadvantages noted with Alternative (3) remain.[30]

e) The introduction of sectionalized gates – inadequate on the grounds that there would be very limited operational benefits but additional capital, operations and maintenance costs.[31]

23) In its financial comparison of Alternatives (3) and (4), FBC assumed that under Alternative (3), new gates would be installed in 2032 (when the existing facility was 100 years old). This gave rise to a present value incremental revenue requirement of $105.8 M as compared to $85 M for Alternative (4).[32] However, FBC also redid the Alternative (3) analysis assuming the refurbished gates would last 25 years (as suggested by HMI) which reduced the PV of the alternative to $95.9 M – still higher than the cost of Alternative (4).[33]

---

[26] Exhibit B-1, pages 37-38
[27] BCUC 3.3 and BCOAPO 15.1
[28] BCUC 4.4
[29] BCUC 4.5
[30] CEC 9.2
[31] Gabana 17
[32] Exhibit B-1, page 36
[33] Exhibit B-1, page 37 and BCUC 4.2.2

24) In developing the capital cost estimates for Alternatives (3) and (4), FBC was unable to estimate the contingency allowance required using the Monte Carlo or other risk modelling techniques due to the lack of historical data on similar projects.[34] As a result, the total contingency allowance for each Alternative was based on 15% of project costs.[35] This approach results in Alternative (4) having a higher total contingency allowance than Alternative (3) by virtue of the fact that its project costs are higher.[36]

25) This result is at odds with the fact that FBC considers the project risks to be the highest under Alternative (3). When asked to explain the inconsistency, FBC's explanation simply re-iterated the methodology used to determine the contingency allowances which gave rise to the questionable results in the first place. [37] However, any revision to the contingency allowances used in order to address this issue would only serve to improve the financial attractiveness of Alternative (4) relative to Alternative (3) and, therefore, would not affect the recommendation to proceed with Alternative (4).

26) Overall, the possible alternatives have been adequately identified. FBC's evaluation criteria are reasonable and the recommended approach (Alternative 4) represents a fair application of these criteria.

## PROJECT EXECUTION/DELIVERY

27) The Project schedule calls for the contracting model to be established and actual Contractor selection to be completed by July 2017, after which the detailed engineering design would start. Procurement would commence in August of 2017, with the actual site work be completed over the period August 2018 through December 2020. This would be followed by roughly two months for demobilization to remove all temporary structures and clean-up the site.[38]

28) At this point in time FBC has not determined its preferred contracting approach/model. However, it is actively considering adopting an Early Contractor Involvement (ECI) model as opposed to the more traditional Design Build tender.[39]

---

[34] Exhibit B-1, page 60 and BCUC 3.1
[35] BCUC 3.2.1
[36] CEC 12.1.1, .lines 18-19. Note: The 15% is applied to a total project cost value that includes a Construction Contingency for Contractor's Know Risks.
[37] CEC 12.1.1 and
[38] Exhibit B-1, pages 44-48
[39] Exhibit B-1, page 35

29) Under the ECI model, FBC would engage the construction contractor at an early stage prior to finalizing the scope of work and the contract price. This would be followed by an "Open Book Phase" during which the project scope, deliverables, costs and risks are jointly developed by FBC and the contractor. Project risks are then assigned (between FBC and contractor), tenders are let for the subcontracted work (roughly 70% of total costs), and a fixed contract price is established for the contractor's portion of the work.[40]

30) FBC notes that while it has not previously used the ECI model,[41] the model has been used elsewhere Canada including by BC Hydro for its gate replacement program in 2009.[42] FBC also indicates that the ECI model is best suited to projects that are one of a kind and those with unique characteristics, as it allows the owner to engage the construction contractor early and leverage the contractor's experience in the determination of project's scope and costs.[43]

31) FBC acknowledges that there are disadvantages to the ECI model, primarily in terms of increased commit/demand for the owner's (i.e. FBC's) resources during the Open Book Phase. FBC plans on mitigating this impact through the use of a third-party contracted Owner's Engineer who would assist with this process.[44] The Owner's Engineer would also assist in validating the portion of the contract price not competitively tendered.[45]

32) FBC has contracted the services of Brancom Project Consultants to assist it in determining the preferred contracting approach and expects to make a decision by November 2016. It is noted that Brancom was also used by BC Hydro to develop the ECI process used for its spillway gate replacement.[46]

33) Should the determination be made that the ECI model will be used, FBC is contemplating using HMI as the ECI contractor. However, FBC plans on also engaging Brancom to advise the Company on the suitability of HMI as the ECI contractor.[47] FBC notes that it could use a different contractor under the ECI model and that there are three or four other contractors that could be interested.[48]

---

[40] BCUC 2.3
[41] CEC 13.3
[42] BCUC 2.3 and CEC 24.1
[43] BCUC 2.3 (page 19) and CEC 24.1
[44] CEC 25.1
[45] BCUC 2.3.6
[46] BCUC 10.2
[47] BCUC 10.2
[48] CEC 26.1 and 26.1.1

34) Finally, FBC notes that should the ECI model be adopted and an ECI contractor be selected, the Company still retains the option of tendering the main construction contract following the Open Book Phase should a satisfactory agreement not be reached. However, such an eventuality would likely impact both the Project's schedule and cost.[49]

35) While the ECI model is new to FBC, the Company is taking reasonable measures to assess not only suitability of using the ECI model for the Project, but also the suitability of HMI as the ECI contractor.

36) As well as the increased requirement for owner resources, the ECI model also shifts some of the construction risks from the contractor to the owner (i.e. FBC). However, under the traditional Design Build approach, the contractor can be expected to incorporate a "cost" for such risks into its fixed bid price. As a result, while the Company is exposed to more cost risk under the ECI model, under the Design Build model the Company pays for all risk allowances made by the contractor regardless of whether or not they transpire,[50]

37) FBC has assumed that the cost of Project is the same regardless of the contracting approach.[51] However, one might expect that the Open Book Process will allow for a better assessment, costing and allocation of risks, such that the expected total cost to be incurred by FBC will be less under the ECI model. However, this depends on the effectiveness and transparency of the Open Book Process, as well as the effectiveness of the Owner's Engineer in fulfilling his/her assigned roles during the process.

## COST/RATE IMPACT

38) The projected capital cost of the Project is $62.694 M in "as spent dollars," or $53.548 M in 2015$.[52] As noted above, FBC indicates that the total cost of the Project is not affected by the choice of contracting model. However, for purposes of developing the details underlying the cost estimate, FBC has assumed the DCI model. This assumption affects the assignment of the contingency costs between the owner (FBC) and contractor.[53]

39) The cost estimate presented in the Application was developed by HMI to meet the requirements of an AACE Class 3 level of project definition and design consistent

[49] BCUC 11.1 & 10.2 and BCOAPO 14.1
[50] BCOAPO 10.1 and 10.2
[51] BCUC 2.7
[52] Exhibit B-1, page 59
[53] CEC 15.1 and 15.2

with the BCUC's CPCN Guidelines.[54] However, it is not a median (P50) cost estimate, as insufficient historical data was available to undertake the risk modelling necessary to develop such an estimate.[55] Rather to determine the contingency allowance, a "risk register" was established for risk elements that could be identified, drawing on HMI's experience with similar spillway gate work along with a probability of the risk occurring and the associated financial impact. The risks were then assigned to either the contractor or the owner (FBC). The contingency allowances for known contractor and owner risks were then determined by multiplying the probability of each risk's occurrence by its financial impact. FBC also relied on HMI in determining the probability of the risk occurring and the financial impact.[56]

40) The contractor's risk contingency is included in the total project costs along with other contractor costs and the owner's costs and a 15% contingency allowance applied to the total projects cost to determine the total project contingency to be held by the owner. The result is that the unknown risk contingency, which is held by the owner, is the difference between the total project contingency and the known owner risk costs.[57]

41) The 15% value for the total project contingency allowance was determined by FBC based on values suggested in various industry references.[58] It does not appear that FBC sought HMI's advice as to the appropriateness of the 15% and there is no indication as to why this was not done – given HMI's past experience in estimating project contingencies.[59]

42) Clearly the selection of the 15% value for the total project contingency allowance is critical to establishment of the $62.694 M capital cost estimate for the Project. As a result, it is important that the Project Reporting clearly identify not only changes in project costs but what risk category (known vs. unknown risk) to which the change is attributable.[60]

43) The Application indicates that the Project will have revenue requirement impacts starting in 2018 and that the total impact will be 1.49% in 2022.[61] Project costs will not start to enter rate base until 2020 (after the current PBR term). However, there

[54] Exhibit B-1, pages 56-58
[55] Exhibit B-1, page 60 and BCUC 3.1
[56] Exhibit B-1, pages 60-61
[57] Exhibit B-1, page 61 and BCUC 3.2 & 3.2.1
[58] BCUC 3.2.1 and BCOAPO 14.1
[59] CEC 18.1
[60] BCUC 8.3 and BCOAPO 16.1
[61] BCUC 6.1

will be slight reduction in 2018 and 2019 revenue requirements mainly due to capital cost allowances.[62]

44) FBC also notes that no major maintenance work has been planned for the Corra Linn facility over the next five years[63] and that the Project is not expected to have a material impact on the facility's future O&M costs.[64]. Also, the only material capital spending planned for the facility over the same period is unrelated to the spillway gates.[65] As such the Project will not generate any offsetting capital or O&M savings based on current plans.

## CONSULTATION

45) FBC notes that since the permanent works for the Project are entirely contained in the existing generating facility, and since work will be carried out so as to not affect river flows, public consultation was limited. The Regional District of Central Kootenay was identified as the only local stakeholder and the Project was discussed with representatives in the later part of 2015. No issues of continuing concern have been identified.[66]

46) FBC has also discussed the Project with a number of First Nations during its normal course of business. While FBC did not initially foresee any potential land disturbances from the Project that may be of interest to First Nations, it has subsequently determined that there will be a small amount of ground disturbance required to develop the access road and lay down area. However, the exact location is yet to be determined.[67] Once the access routes and staging areas are determined, FBC plans to notify all 12 First Nations identified as having an interest in the Corra Linn area.[68]

47) BCOAPO submits that as part of FBC's Reporting Requirements, the BCUC should direct FBC, once it has determined the access route and staging area location, to confirm with the BCUC it has notified the identified First Nations and to subsequently report any issues that are raised by the First Nations and how they are being addressed and mitigated.

[62] BCUC 6.2
[63] BCUC 4.3
[64] BCUC 1.3
[65] BCUC 4.3
[66] Exhibit B-1, page 65
[67] BCUC 5.1
[68] BCUC 5.2

## REPORTING

48) In its initial Application, FBC proposed a quarterly reporting process.[69] However, during the interrogatory process, the BCUC staff requested comment[70] on an alternative approach that would involve semi-annual progress reports with the additional requirement to provide, within 30 days of identification, notice to the Commission of expected cost variances that are expected to increase costs by more than $500,000 over the Project costs baseline.

49) FortisBC indicated it was supportive of semi-annual reports but suggested that the additional reports be limited to material changes that delayed the Project by more than 6 months or increased costs by greater than 10% of the Total Project Capital Cost. This view was reiterated in the Company's Final Submission.[71]

50) BCOAPO notes that 10% represents a cost variance of over $6 M, which is more than 10-times the materiality limit suggested in the Commission Staff's question. Furthermore it is not much less than the Total Project Contingency of $7.328 M.

51) BCOAPO has no particular difficulty with a move to semi-annual reporting, but is of the view that the additional reporting requirements threshold should be lower than six months or 10%. As an alternative, BCOAPO suggests that the additional reporting requirement threshold be expected cost variances that are expected to increase costs by more than $2 million over the Project costs baseline. Also, it should be made clear that the level of variance reporting in the semi-annual report is $500,000 as proposed by FBC. [72]

52) FBC has also indicated that it has no concerns with filing a letter with the Commission, from the Owner's Engineer, stating that the Owner's Engineer has reviewed: a) the contractor's Project costs and finds them to be fair market value; b) the scope/work package documents associated with the contractor's Project costs and finds them to be consistent with industry best practice in general and consistent with the objective of minimizing the overall project cost; and c) the design specifications and scope/work package documents and finds them to be consistent with industry best practice in general and consistent with the objective of minimizing the overall cost from change orders.[73] BCOAPO supports such a requirement given the key role of the Owner's Engineer in the Open Book Process.

---

[69] Appendix 2-P
[70] BCUC 8.1
[71] Page 33
[72] BCUC 8.3 and BCOAPO 16.1
[73] Final Submission, pages 32-33

53) Based on the comments made in the previous sections, BCOAPO submits that FortisBC's reporting requirements should also include:

a) The submission (in confidence if required), after completion of the Open Book Process, of a finalized Risk Register that sets out the risks assigned to the contractor vs the owner.

b) Notification to the BCUC once FBC has determined the access route and staging area location, along with subsequent confirmation that it has notified the identified First Nations and indication of any issues that are raised by the First Nations and how they are being addressed and mitigated.

c) An assessment, within six months of the completion of the Project, as to the effectiveness of the ECI contracting model along with any recommendation as to how the model could be improved if applies to future projects.

All of which is respectfully submitted.
**BC Public Interest Advocacy Centre**

Kate Feeney
Staff Lawyer

c. FortisBC Inc.
Registered Intervenors