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British Columbia Utilities Commission  
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By e-mail to: [commission.secretary@bcuc.com](mailto:commission.secretary@bcuc.com)

Attention: Robert J. Pellatt, Commission Secretary

Dear Sir:

**Re: British Columbia Transmission Corporation (BCTC)  
Project No. 3698395 /Order No. G-70-05  
Certificate of Public Convenience and Necessity (CPCN)  
Application Vancouver Island Transmission  
Reinforcement Project (VITR)**

Please find attached for electronic filing Mr. Karsten Holmsen, Intervenor C1's final written submission and arguments on the above project.

As required, twenty hard copies of the attachment will be delivered to the Commission.

Yours sincerely,

*Original signed by:*

Karsten Holmsen  
Intervenor C-1

Copies to: BCTC  
BCUC e-mail distribution list

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**IN THE MATTER OF THE *UTILITIES COMMISSION ACT*  
R.S.B.C. 1996, Chapter 473**

**and**

**Re: British Columbia Transmission Corporation (BCTC)  
Project No. 3698395 /Order No. G-70-05  
Certificate of Public Convenience and Necessity (CPCN)  
Application Vancouver Island Transmission  
Reinforcement Project (VITR)**

**Final Submission of  
Karsten Holmsen, R.P.F. (ret.), Intervenor C1**

**1.0.0 Introduction**

Karsten Holmsen, Intervenor C1, respectfully submits that BCTC's Final Submission and evidence presented during the BCUC hearings suggest that:

- BCTC has not seriously considered or investigated other South Delta route alternatives than Option 1 and Option 2
- Major negative issues claimed by BCTC against the use of Option 4 have been dispelled or proven exaggerated
- Most negative issues claimed by BCTC against the use of Option 5 have been dispelled or proven exaggerated
- BCTC has not appropriately considered and valued socio-economic and other attributes in the choice of a route alternative
- BCTC's does not appear to intend to negotiate in good faith in its proposal for acquiring underground right-of-way agreements with the Tsawwassen ROW property owners
- Consequently, there is a strong indication that BCTC's choice is Option 1, the 230 kV AC overhead transmission line on the existing ROW through Tsawwassen

- BCTC has made numerous misleading statements during the hearings and to the public over the past 15 months
- BCTC has not adequately considered transmission technologies which would be more environmentally acceptable
- BCTC has not engaged TFN and the public in meaningful and constructive discussions with regard to the impact and costs of the various alternatives

Assumptions that were made in the undersigned's Intervenor evidence, C1-13, have in some aspects been proven over-simplified during cross-examination and evidence provided during the hearings. However, in most cases, suggestions and proposals which were dismissed as infeasible or undesirable by BCTC have been shown during cross-examination to have reasonable technical merits and superior attributes as well as being cost competitive. The socio-economic impacts of the VITR project have not been given due consideration. BCTC has not conducted adequate due diligence and cost estimates for alternative routes and technologies. It is submitted that these suggestions and proposals therefore ought to be re-examined and appropriately assessed before a Certificate of Public Convenience and Necessity is granted.

Evidence submitted during the hearings by Sea Breeze and IRAHVOL has described the benefits of the HVDC Light™ technology over the traditional AC technology proposed by BCTC for the VITR project. HVDC Light™ is described as much more environmentally acceptable, being benign in terms of low EMF exposure, and causing no visual impact from transmission lines. This technology warrants more serious consideration by BCTC.

Also, since BCTC now in its cable bid specifications is considering cables suitable for either AC or DC transmission <sup>1</sup>, much less resistance would have been expected from Tsawwassen residents if undergrounding a classic DC transmission line were proposed for the VITR project..

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<sup>1</sup> Exhibit B2-58, pg. 7.5-2, 5.2.2, pg. 7.6-5, (a) & (b)

BCTC's revised cost estimates and attributes are still excessively biased in favour of Route Options 1 & 2.<sup>2</sup>

BCTC and its executives have consistently misled the public with regard to cost of alternatives, attributes of these alternatives, and feasibility of construction.<sup>3</sup>

## 2.0.0 VITR Alternate Tsawwassen Routes

### 2.1.0 General

BCTC states in its Final Submission that:

*“BCTC will not review the evidence regarding the majority of the alternatives considered in Exhibit B1-1. With the exception of HVDC Light™, none of the Intervenor suggested that any of the other alternatives that BCTC assessed in more detail should be pursued, and there were few IRs and virtually no cross-examination on these alternatives.”*<sup>4</sup>

While it may be considered insignificant and not worthy of attention by BCTC, specific reference is made to the evidentiary submission by Karsten Holmsen.<sup>5</sup> Constructive discussions and proposals related to the Option 4, Highway 17, and Option 5, Deltaport alternatives, were covered in the written submission, IRs, and during lengthy cross-examinations of BCTC's Panels 1, 2, 3 and 6.<sup>6</sup> Support in relation to Options 4 and 5 was also presented by the Corporation of Delta both in evidentiary submissions and during cross-examination.<sup>7</sup> TRAHVOL addressed alternative routes in numerous IRs.<sup>8 9</sup> Specific interest in

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<sup>2</sup> Exhibit B1-54, BCUC 4.203.2

<sup>3</sup> TR 8, pg. 1186, line 10, to pg. 1193, line 5

<sup>4</sup> BCTC Final Submission, pg. 10, para 28

<sup>5</sup> Exhibit C1-13, Sect. 5

<sup>6</sup> TR 8, pg 1183-1194; TR 9, pg 1201-1235; TR 16, pg. 2618-2685, pg. 2802-2814; TR 20, pg 3531-3555

<sup>7</sup> Exhibit C5-6, TR. 9, pg 1261 to TR 10, pg 1447-1452, 1457-1495

<sup>8</sup> Exhibit B1-11, TRAHVOL IRs 1.80.1, 1.80.2, 1.81.2, 1.81.4, 1.82.1, 1.152.2, 1.152.6, 1.155.2

<sup>9</sup> Exhibit B1-17, 1.81.7, 1.83.2

Options 4 and 5 was expressed by BCUC in cross-examination and information requests.<sup>10</sup> In cross-examination:

Commissioner O'Hara: *"So you believe that additional work should still be done regarding the Highway 17 and the Deltaport options?"*

Mr. Holmsen: A: *"Absolutely."*<sup>11</sup>

In addition to the references indicated, there are various other Exhibits, IRs, and Transcript references, too numerous to list, that deal with alternate route options. For that reason, it is incomprehensible to understand and accept BCTC's statement that *"none of the Intervenors suggested that any of the other alternatives that BCTC assessed in more detail should be pursued, and there were few IRs and virtually no cross-examination on these alternatives."*

### **2.2.0 Highway 17 – Route Option 4 (modified)**

In its CPCN application BCTC determined the Highway 17, Route Option 4, was undesirable because of environmental effects, First Nations interests, seismic risk and construction costs.<sup>12</sup> While there could be other viable, lower cost solutions to a Highway 17 transmission line alternative, such as using the present Pole 1 ROW for a fully overhead AC line that would not interfere with any archaeological concerns, specific proposals to minimize impact on TFN have been proposed by Karsten Holmsen.<sup>13</sup> The Holmsen alternative is described as Option 4 (modified).

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<sup>10</sup> Exhibit B1-54, BCUC 4.203.1, 4.203.2, 4.204.0, TR 14, pg. 2301, line 1 to pg. 2302, line 11

<sup>11</sup> TR 24, pg. 4501, lines 5-8

<sup>12</sup> Exhibit B1-1, pg.104, lines 2-3

<sup>13</sup> Exhibit C1-13, Sect. 5, pg. 5.3, line 6, to pg. 5.16, line 16

### 2.2.1 Deltaport Route Seismic Issues

In questioning Mr. Barrett why construction of the underground ducts can not be constructed within the Highway 17 ROW, the following response is offered:

*“..... I think you can ask the seismic panel on precise criteria, but it’s always been our assumption, and we believe a requirement, that any lines would be located off the highway embankment and on Tsawwassen First Nation property” ..... “But what I do know is that it’s our opinion that we could not use. Even if the province owns the highway, it wouldn’t make any difference. Is that we need to construct that line outside of the highway boundary. And that it would not be technically feasible to put it there, and we believe that the Ministry of Transportation would prevent us from putting it there, but we wouldn’t want to put it there anyway.”<sup>14</sup>*

Mr. Barrett uses terms such as: ***our assumptions...,we believe..., our opinion..., but we wouldn’t want to put it there anyway***, in justifying BCTC’s rejection of the suggestion to consider one of the Highway 17 options. These are BCTC’s highly scientific and technically, well researched reasons BCTC are providing as reasons for not wanting to construct the underground ducts within the Provincially owned Highway 17 ROW. There is no evidence or indication that the Ministry of Transportation has been approached or has given any opinion, only a **belief**.

In cross-examination of the seismic panel<sup>15</sup>, Mr. Williams confirmed that the investigations and conclusions for Option C (the Highway 17, Option 4) in the Golder Report were based on the following:

*“An alignment extending from a new terminal station adjacent to Highway 17 at approximately 52<sup>nd</sup> Avenue (sic Street). The*

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<sup>14</sup> TR. 16, pg. 2659, lines 2-22

<sup>15</sup> TR. 20, pg 3531, line 20 to pg. 3533, line 9

*cables would be located either in the Highway 17 road shoulders or at the toe of the embankment adjacent to it. One circuit would be installed on each side of Highway 17, and both would cross under it. Thereafter the cables would cross diagonally over the intertidal foreshore to the southern boundary of the southern AC cable corridor and continue as Option A, to Galiano Island.”*<sup>16</sup>

Mr. Barrett’s assumptions, belief, opinion, and unwillingness *to put it there* (in the embankments of Highway 17), appear to fundamentally contradict with what Golder & Associates had been requested to investigate and report on by BCTC. In subsequent lengthy discussion between Mr. Yardley and Mr. Williams, and between Mr. Yardley and Mr. Atukorala regarding geotechnical bore holes along the BC Ferries’ causeway, evidence confirmed that the soil profiles indicated the till layer rising as the causeway approaches land.<sup>17</sup> Since no bore holes were available eastward, onshore along Highway 17, it is speculative, but reasonable to assume that that the trend shown by the limited number (4) of bore holes would continue. Consequently, this indicates that the subsurface along Highway 17 may be more stable than expressed by BCTC in its description of the seismic stability of this route, and thereby warrants closer examination before being rejected as an excessive risk.

With reference to Mr. Laprade’s affidavit, the intertidal, foreshore area to the south of the BC Ferries causeway may not be as seismically unstable as indicated by BCTC.<sup>18</sup> This area has not been adequately tested by BCTC.

### **2.2.2 TFN Issues**

Being questioned by Mr. Arvay about his meetings and discussions with TFN regarding TFN’s concerns, Mr. Fralick responds:

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<sup>16</sup> Exhibit B1-1, Appendix F, pg 2, Route Option C

<sup>17</sup> TR. 20, pg. 3604, line 1 to pg. 3631, line 1

<sup>18</sup> Exhibit B5-6, Evidence of William Laprade, pg. 6, A7

*“The concerns were once again with respect to, in particular going along Highway 17, going along the DC-1 corridor and the impacts there have been in the past. They had identified at that meeting that they thought that the project was going in the existing right of way.”*<sup>19</sup>

Mr. Fulton: Q: *“Do I take it from the exchanges that you had with Mr. Arvay earlier today that you have not reached the point with the Tsawwassen First Nation where they have indicated to you under no circumstances would they permit Option 4?”*

Mr. Fralick: A: *“No, I’ve not had a discussion with them where they’ve said absolutely no.”*<sup>20</sup>

Clearly, BC Hydro and BCTC has not appropriately, and in detail, presented the Highway 17 proposals to TFN. With the apparent importance of the TFN concerns, TFN had an opportunity to register as an intervenor in the VITR CPCN process and take an active part in the proceedings, but has not chosen to do so.

With respect to Crown Corridors referred to in the AIP (Agreement in Principle), Mr. Fralick states:

*“... my understanding of the Crown Corridor is that those would be lands that would be excluded, treaty settlement land, so they would be completely provincial”.*<sup>21</sup>

Illustrations in the AIP shows that Highway 17 is excluded from the TFN land claim area.<sup>22</sup>

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<sup>19</sup> TR. 25, pg. 4748, lines 13-18

<sup>20</sup> TR. 25, pg. 4775, lines 16-23

<sup>21</sup> Exhibit B1-89, pg. 30

<sup>22</sup> Exhibit B1-89, Appendix B-2

### 2.2.3 Archaeological

BCTC expressed that one of the major constraints for considering Route Option 4 (modified) was TFN archaeological concerns.

With reference to BCTC's Archaeological Assessments, excavation for the underground power line ducting through the Tsawwassen residential area, Option 2, would affect 1.6 km of high, and 2.2 km of medium archaeological potential, for a total of 3.8 km.

*“The proposed excavation for the underground cable ductbanks along the existing right-of-way between the Tsawwassen Terminal and English Bluff Terminal will result in significant ground disturbance, with potential impacts on archaeological sites along this section of the VITR corridor.”*<sup>23</sup>

Under the proposed Option 4 (modified) the affected distance along the embankment of Highway 17 would only total 1.2 km of high archaeological potential.<sup>24</sup> However, an estimated 90 to 218 m of shell midden, referred to as DgRs-2, a significant archaeological site would be impacted.<sup>25</sup>

Underground ducting along Highway 17, Option 4 (modified), compared to Option 2, will require only one third of the distance to be monitored for archaeological artifacts and human remains during duct excavations. If deemed necessary, the archaeological concerns can be mitigated through Horizontal Direct Drilling (HDD) through the critical 218 metres through the DgRs-2 area.

Mr. Fralick could not confirm during cross-examination that any serious and constructive discussions had been held with TFN with respect to all attributes, impacts and potential mitigations available for the various route alternatives.

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<sup>23</sup> Exhibit B1-57, pg. 48, Segment 2 – Tsawwassen, and Fig. 10, pg. 51

<sup>24</sup> Exhibit B1-57, Fig. 2, pg. 9, and Exhibit C1-13, Fig. 5-7, pg. 5.8

<sup>25</sup> Exhibit B1-57, pg. 8, Impact Assessment

TFN expresses resentment about the imposition on their lands and rights in the past from construction of Highway 17, the BC Hydro Pole 1 DC ROW, the BC Ferries and Deltaport facilities.<sup>26</sup> This is a fact, and is being recognized in the AIP. However, recognition should also be given to the benefits some of these developments have provided to TFN. Most housing and commercial developments within TFN would likely not have been possible without Highway 17 and the BC Ferries.

A major constraint to the development of the TFN lands on the north side of Highway 17 is the BC Hydro Pole 1 DC ROW. The decommissioning and removal of this line would free up about 5 hectares of prime highway frontage property on the existing TFN lands and a similar size area along the highway within the land claim portion to the east. In a value context, 1.9 ha of potential real estate development on BC Hydro land at English Bluff is given an estimated value of \$ 8 million.<sup>27</sup> In the case of TFN, the value of 10 hectares of prime highway frontage land freed up for development would have a substantial value, far exceeding any costs estimated by BCTC for compensation and accommodation to TFN for construction of the Highway 17, Option 4, alternative.

In questioning Mr. Fralick, BC Hydro Senior Aboriginal Relations Coordinator, on this issue, the following exchange was made:<sup>28</sup>

Mr. Holmsen: Q: *“Would you not agree that it would be very beneficial for TFN to have Pole 1 right of way released when this facility gets zero rated in 2007?”*

Mr. Fralick: A: *“I’m not aware of any proposal to remove the DC-1 line, and so I’ve had no discussion with respect to the removal of DC – of the DC-1.”*

Mr. Holmsen: Q: *“But you agree it would benefit the TFN if it were removed, am I correct?”*

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<sup>26</sup> Exhibit E-59, pg. 1, para 6

<sup>27</sup> Exhibit C1-13, pg.??

<sup>28</sup> TR. 25, pg. 4737, line 8 to pg. 4738, line 7

Mr. Fralick: A: *“No, I don’t think I identify, you know, what the particular benefit to them would be. What I have identified is that they do identify that there is a dis-benefit to it being there. So I believe that, you know, their concern was with respect to the construction and they do believe that the DC-1 does cause an impact on them. I think they would like to see the DC-1 no longer there.”*

Mr. Holmsen: Q: *“Now you’re saying you believe it’s a dis-benefit for them to have it there – if it – if it was removed, wouldn’t it be a benefit? I mean, what’s the difference?”*

Mr. Fralick: A: *“I believe that they would be – it would remove something which is a dis-benefit, so I – I believe that – that, yes, they would see value in having DC-1 removed.”*

Mr. Holmsen: Q: *“So we agree.”*

Obviously there has been no constructive exchange of ideas between BC Hydro/BCTC and TFN or proposed alternatives for mitigation or means of accommodation and compensation. The suggested, very important interaction between TFN, BC Hydro, BCTC, the Corporation of Delta, and representatives from the community, which may have resulted in a better mutual understanding of the various parties’ concerns, was never acted upon.<sup>29</sup>

Since the concern is, or should be, a balanced impact on the ratepayers and the affected communities, redundant facilities should not be retained just because *“they are there”*. It has been established that the Pole 1 DC line will not be required after Stage 1 of VITR, or an equivalent power supply to Vancouver Island, is in service. Pole 2 can continue in service using one of the Pole 1 cables as a metallic return. The metallic land return line is separate and independent from the Pole 1 overhead facilities and would not be affected by the decommissioning and removal of Pole 1.

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<sup>29</sup> Exhibit C1-13, pg. 5.34, lines 8-17

## 2.2.4 Highway 17 Ownership

BCTC, in its response to an IR from Karsten Holmsen regarding the ownership status of Highway 17, responded:

*“Highway 17 is either on First Nations Reserve or land claimed by the Tsawwassen First Nation. BCTC would have to acquire land because the Highway 17 corridor is not land within provincial jurisdiction.”*<sup>30</sup>

Upon inquiry with the Provincial Government it was confirmed that the province owns Highway 17.<sup>31</sup>

With respect to Crown Corridors referred to in the AIP, Mr. Fralick states:

*“... my understanding of the Crown Corridor is that those would be lands that would be excluded, treaty settlement land, so they would be completely provincial”.*<sup>32</sup>

Illustrations in the AIP shows that Highway 17 is excluded from the existing TFN and TFN land claim area.<sup>33</sup>

Still, after having been presented with this evidence, BCTC states in its Final Submission that:

*“BCTC would have to acquire a right-of-way on the Highway 17 corridor because the land is not within provincial jurisdiction, .....”*<sup>34</sup>

It should be clear from this evidence that Highway 17 is provincially owned and controlled, and any construction and installation of

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<sup>30</sup> Exhibit B1-17, Karsten Holmsen 1.51.11

<sup>31</sup> Exhibit C1-34

<sup>32</sup> Exhibit B1-89, pg. 30

<sup>33</sup> Exhibit B1-89, Appendix B-5

<sup>34</sup> BCTC Final Submission, April 4, 2006, pg. 55, para 159, 3<sup>rd</sup> sentence

transmission cables within that ROW would not be subject to payments to TFN for compensation, accommodation, or ROW acquisition.

### **2.2.5 Summary of Highway 17, Option 4 (modified)**

Most negative aspects expressed by BCTC for the Highway 17 route option resulting in its dismissal of this route alternative as undesirable or unacceptable for reasons of high cost, TFN issues, and seismic issues, have been contradicted, or reduced in importance. Most of the attributes and advantages to Option 4 (modified) as expressed in the Intervenor Evidentiary Submission still hold true.<sup>35</sup>

The evidence with respect to ownership of Highway 17; cable duct construction within the Highway ROW; the TFN issues, and the archaeological concerns, all indicate that construction of VITR is feasible along Highway 17, at little or no additional costs. Impact on any TFN archaeological sites can be minimized and mitigated by horizontal direct drilling, if required.

Many of the additional estimated costs included by BCTC in the February 1, 2006, IR response<sup>36</sup>, such as TFN accommodation and compensation, and additional ROW acquisition, would not be required or justified. Foreshore areas on the south side of the BC Ferries' causeway is, according to marine charts, already designated a cable area. Therefore, cost indicated<sup>37</sup> for ROW acquisition in this area should not be included. The value and benefits to TFN of the decommissioning of Pole 1 would far outweigh any inconvenience that might be imposed on TFN during construction of VITR along Highway 17.

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<sup>35</sup> Exhibit C1-13, pg. 5.15, line 17 to pg. 5.16, line 16

<sup>36</sup> Exhibit B1-54, BCUC 4.203.2. Comparison of Suggested Route Alternatives

<sup>37</sup> B1-1, pg. 101, Table 4-3; Exhibit B-17, Karsten Holmsen 1.31.12

### **2.3.0 Deltaport Route, Option 5 (modified)**

In its CPCN application BCTC determined that the Deltaport Route, Option 5, was infeasible due to high cost and unacceptable seismic and anchor damage risks.<sup>38</sup> In an IR from BCUC to provide updated cost estimates for Option 5 (modified), as proposed in Exhibit C1-13, BCTC summarily dismissed this alternative as infeasible, and that BCTC was unable to make a reasonable estimate of these costs.<sup>39</sup>

A distinction should be made between what BCTC refers to as its Option 5, and Option 5 (modified), as proposed in Karsten Holmsen evidentiary submission.<sup>40</sup> There are significant differences between these two options in location and concept which appear not to have been adequately considered by BCTC.

Option 5, as indicated by BCTC, postulates that the cables must go underground along the dyke north from the Canoe Pass Terminal before crossing the Strait of Georgia, a location of increased seismic risk. In an IR response, BCTC states that a routing closer to Deltaport creates unacceptable conditions with respect to anchor damage risks and crossing of existing cables.<sup>41</sup>

In addition, because of TFN land claims covering the area to the south and north of Deltaport Way, concern for this issue was also expressed.

### **2.3.1 Seismic and Geophysical Issues**

BCTC dismisses the Deltaport route alternative for reasons of “*unacceptable seismic risks*”, but apparently did not heed the advice of its own consultants, Golder and Associates:

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<sup>38</sup> Exhibit B1-1, pg.104, lines 3-4; Exhibit B1-17, Karsten Holmsen 1.31.41

<sup>39</sup> Exhibit B1-54, BCUC 4.203.2

<sup>40</sup> Exhibit C1-13, Sect. 5

<sup>41</sup> Exhibit B1-11, TRAHVOL 1.83.3

*“While BCTC’s geophysical consultants did not advise BCTC that routes north of Deltaport were infeasible, BCTC believes that its conclusion is justified.”*<sup>42</sup>

Option 5, as described and depicted by BCTC, would follow the dyke underground northwestward along the shoreline from the Canoe Pass terminal to cross the Strait of Georgia north of the existing Pole 2, DC submarine cables.<sup>43</sup>

*“The onshore cable segment of this route is described as impacted by seismic performance of the dyke running parallel to the shoreline in potentially liquefiable soils.”*<sup>44</sup>

Questioning the validity of the Option 5 (BCTC) routing along the dyke versus the Option 5 (modified) routing entering the intertidal area directly at the Canoe Pass Terminal, Mr. Williams was asked the following question:

Mr. Holmsen: Q: *“Now, if you did not follow the dyke but went straight out from the Canoe Pass terminal, would that not reduce some of the problems that may be encountered by going along the dyke?”*

Mr. Williams: A: *“Yes.”*<sup>45</sup>

In discussion with BCTC’s geophysical panel, reference was made by Mr. Holmsen to the apparent differences between the submarine topographic features in the Deltaport, Option 5 (modified) area, and the southern, Option 2 (Option A) and Option 4 (Option C) areas. On the referenced maps the foreshore area of Option A and C indicated a wider band of steeper slopes than in the Option 5 (modified) area (immediately to the south of Golder’s Option D), and the submarine

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<sup>42</sup> BCTC Final Submission, April 5, 2006, pg. 60, para 174, 3<sup>rd</sup> sentence

<sup>43</sup> Exhibit B1-1, pg. 101, Fig. 4-4, and pg. 104, lines 2-4

<sup>44</sup> Exhibit B1-1, Appendix F, pg. 54, D, bullet 6

<sup>45</sup> TR. 20, pg. 3537, line 19, to pg. 3538, line 7

topography also appeared to be more broken and gullied where the southern cable crossings were proposed.<sup>46</sup>

Mr. Holmsen: Q: *Now, if we continue on that topic, and for Options B and C, those areas would be steeper than D, would they not?"*

Mr. Atukorala: A: *"I would say the steepest would be for Option B, and the flattest would be Option A, and route Option D will be somewhere in between the two."*

Therefore, while the first stage of VITR may be placed in the southernmost less steep foreshore area than the Deltaport option, the second stage would have to be placed to the north of Option A, in the steepest, Option B, area, which is determined as steeper than the Deltaport foreslope.

With respect to the "*Roberts Bank failure complex area*", the Golder report makes the following observation:

*"This feature has been postulated to be a slide area, but is controversial and not conclusive at this time. Much of the drilling and testing along the Coal Terminal Causeway was directed to obtain a better understanding of the geology and soil conditions in this area of the delta."*<sup>47</sup>

The slide risks within the Robert Banks failure complex area is also referred to in the Golder report as "*speculative.*"<sup>48</sup> The approximate return period for Option D (Option 5) is estimated as 1 in 50 years.<sup>49</sup> This rating includes the risk of the underground ducting along the dyke. Absent the necessity of the construction along the dyke, the overall risk would consequently be lower.

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<sup>46</sup> Exhibit B1-1, Appendix F, Figure 1-1, Exhibit C1-13, pg. 4.2, lines 5-18

<sup>47</sup> Exhibit B1-1, Appendix F, pg. 30, Sect. 7.2

<sup>48</sup> Exhibit B1-1, Appendix F, pg. 53-54, Table 10-2

<sup>49</sup> Exhibit B1-1, Appendix F, Table 10-5,

In discussions with Mr. Atukorala regarding the speculative, inconclusive and controversial assessment of the Deltaport area resulting in the estimated 1 in 50 years return period, the following interchange was recorded:

Mr. Holmsen: Q: *“You also agree , I presume, that when you have little or no information you would use the higher seismic risk to be more conservative or be on the safe side”*

Mr. Atukorala: A: *“That is correct.”*

Mr. Holmsen: Q: *“Thank you. So do you not also then agree that a more detailed seismic and geotechnical survey of the Deltaport route alternative will be required to determine with certainty if this route is an area of acceptable (transcript error – should read *unacceptable*) seismic risk and therefore infeasible?”*

M. Atukorala: A: *“Yes, I believe I agree with that statement.  
.....”*<sup>50</sup>

It is acknowledged that the evidence provided indicates the seismic risk and danger of submarine slides would decrease with distance away from the Fraser River outflow.<sup>51</sup> However, since it also has been determined that the 1 in 50 return period for Deltaport was set at this level to be on the safe side because of lack of data, it remains to be established whether the actual risk at Deltaport is unacceptable for a submarine cable project estimated to have a 60-year life.

### 2.3.2 TFN Concerns

BCTC has expressed concern about TFN interests along the Deltaport route:

*“BCTC also identified Option 5 as having an impact on native lands in Tsawwassen. A portion of Option 5 crosses land under negotiation for proposed TFN treaty settlement lands. It would*

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<sup>50</sup> TR. 20, pg. 3543, lines 4-17

<sup>51</sup> TR. 20, pg. 3544, lines 21-25

*also impact terrestrial and archaeological values during the construction of the land portion of the transmission line from ARN.”*<sup>52</sup>

Illustrations in the AIP shows that the Deltaport road and rail ROW, and the Canoe Pass Terminal site are excluded from the TFN land claim area.<sup>53</sup> As proposed for Option 5 (modified), the VITR AC line would be combined on the same poles or towers structures on the existing ROW with the DC Pole 2 line and would therefore require no change to the existing BC Hydro ROW.<sup>54</sup>

Mr. Fralick: *“The land which is currently being contemplated for the Treaty settlement land, I believe, does not include the actual terminal site”.*<sup>55</sup>

### **2.3.3 Archaeological Concerns**

Contrary to what has been stated by BCTC, since this is an overhead line on an existing ROW, the only archaeological concern on the Deltaport route option could be the construction of the new cable terminal next to the Canoe Pass DC terminal.

*“During the AIA component of the Deltaport project, 51 auger probes were conducted. No archaeological remains were identified in the process; however, six of the auger tests yielded organic materials at their lowest levels.”*<sup>56</sup>

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<sup>52</sup> BCTC Final Submission, April 5, 2006, pg. 60, para 175

<sup>53</sup> Exhibit B1-89, Appendix B-2

<sup>54</sup> Exhibit C1-13, Sect. 5, pg. 5.19, lines 3-4

<sup>55</sup> TR 25, pg. 4718, lines 13-15

<sup>56</sup> Exhibit B1-57, pg. 27, middle of page

### 2.3.4 Option 5 (modified) Transmission Line Technical Issues

A number of technical issues related to Option 5 (modified) were discussed during the exchanges with the BCTC Panels 1 and 2.

Mr. Holmsen: Q: “..... Why does BCTC consider Option 5, the modified infeasible, when Pole 1 – or Pole 2, in general in the same location, was feasible 30 years ago and has been in operations since that time?”

Mr. Barrett: A: “The primary reasons we believe that any route north of the Deltaport is infeasible is due to two risks. One is geophysical risk, and that can come either from a seismic event or a static slope failure in the – in the Fraser Delta. .... The second risk, and that is especially the case in any route that passes close to the Deltaport, is the risk of anchor damage from ships in and around the Deltaport. .... And also if we take that route we would have to develop a new cable terminal on Galiano Island. We would not be able to cross the existing cables, ....., and then widen the existing right-of-way from that new cable terminal to the proposed right-of-way.”<sup>57</sup>

It appears from the cross-examination that Mr. Barrett had not fully understood the routing, or had a misconception about the proposed Option 5 (modified) as presented in Exhibit C1-13. The proposed cables in this location would not need to cross any existing submarine cables.<sup>58</sup>

In the following exchange, Mr. Barrett may have “*mis-spoke*” in his reference to Taylor Bay in connection with Option 5 (modified), which was not a proposal to use the Taylor Bay terminal.

Mr. Holmsen: Q: “..... But if Pole 1 was taken out, could you not then come in without crossing the lines and use the GNO terminal?”

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<sup>57</sup> TR 9, pg.1202, line 15 to pg. 1204, line 1

<sup>58</sup> Exhibit C1-13, pg. 5.17, Fig. 5-15 and pg. 5.22, Fig. 5-21

Mr. Barrett: A: *“The GNO terminal?”*

Mr. Holmsen: Q: *“Yeah, that’s the Galiano.”*

Mr. Barrett: A: *“Okay. All of the DC cables are north of the existing AC cable terminal at Taylor Bay. In order to use our existing cable terminal station at Taylor Bay we’d have to take out all of those cables.”*<sup>59</sup>

Referring to the illustration in Exhibit C1-13<sup>60</sup>, and suggesting that the existing Pole 1, three-conductor towers on Galiano Island could be used during the first stage of the VITR project if Pole 1 was decommissioned, Mr. Barrett’s responded:

*“It is very unlikely we could reuse the existing towers. A DC tower is designed for two conductors and an AC tower is designed for three, and those --- so what you’re saying is possible.”*<sup>61</sup>

Referring to the same illustration and three-conductor DC towers, with the VITR Project Engineering and Cost Panel, Mr. MacPhail was positive and forthright in his answers.

Mr. Holmsen: Q: *“..... If Pole 1 were decommissioned, please tell me, could this tower be used for the three-conductor 230 KV proposed VITR system?”*

Mr. MacPhail: A: *“Yes, it could.”*<sup>62</sup>

In contrast to Mr. Barrett’s response that Galiano Terminal (GNO) could not accommodate the proposed Option 5 (modified) 230 kV AC lines and terminal equipment, MacPhail offered the following confirmation after examining a picture of the cable entrance location at GNO:<sup>63</sup>

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<sup>59</sup> TR 9, pg. 1204, lines 7-16

<sup>60</sup> Exhibit C1-13, pg. 5.22, Fig. 5-20

<sup>61</sup> TR 9, pg 1208, lines 5-8

<sup>62</sup> TR. 16, pg. 2679, lines 2-5

<sup>63</sup> Exhibit C1-13, pg. 5.21, Fig. 5-19

Mr. Holmsen: Q: *“Thank you. Please explain to me then, Mr. MacPhail, in the event Pole 1 was decommissioned, and the three cables removed, could the chaseway be constructed to accommodate the entry point for the three submarine 230 kV cables in this place?”*

Mr. MacPhail: A: *“Yes, it appears they could be.”*<sup>64</sup>

Upon examining a picture of the DC terminal facilities at Cooks Cove (GNO), Mr. MacPhail offered the following comments:<sup>65</sup>

Mr. Holmsen: Q: *“..... In the background of this picture you can see the GNO DC terminal installation. Again if Pole 1 were decommissioned and the related equipment removed from the terminal facilities, could the basic facility accommodate the new 230 kV terminal together with existing remaining Pole 2 facilities?”*

Mr. MacPhail: A: *“It appears as if it could. There may be some geotechnical studies that would be necessary just to make sure that the site is up to modern standards. It appears as if there is enough room.”*

Mr. Holmsen: Q: *“That will not be major?”*

Mr. MacPhail: A: *“No.”*<sup>66</sup>

This exchange confirms that if Pole 1 is decommissioned, it would indeed be technically feasible, at a reasonable cost, to accommodate the Stage 1 of VITR at GNO. It also confirms that a significant cost saving and/or cost deferral could be realized by using the existing Pole 1 towers and ROW on Galiano for the VITR Stage 1 conductors.

If required, one Pole 1 DC cable could be retained and placed in a spare chaseway conduit with the 230 kV circuit providing metallic return for Pole 2.

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<sup>64</sup> TR. 16, pg. 2678, lines 15-21

<sup>65</sup> Exhibit C1-13, pg. 5.22, Fig. 5-20

<sup>66</sup> TR.. 16, pg. 2679, line 17 to pg. 2680, line3

In a similar exchange with Mr. Barnett about combining the new 230 kV Stage 1 VITR with the Pole 2 DC line on the same structures in a section between ARN and CPT (Canoe Pass Terminal), Mr. Barnett was more cautious in outright acceptance of the concept, but indicated it was a possibility. A suggestion of adding intermediate poles, if required, was accepted as feasible. The Intervenor's analysis that this could constitute a considerable capital cost savings for the Stage 1 of the VITR project was accepted by Mr. Barnett as correct.<sup>67</sup>

### 2.3.5 Anchorage Cable Damage

BCTC claims potential high risk of anchorage cable damage from the proximity to the Romeo anchorage site to be a major reason for rejecting Option 5 (modified) as infeasible. This claim is not supported by BCTC's own consultants.

Proposed Option 5 (modified) cable location would be located over 1,000 metres to the northwest of the Romeo anchorage site.<sup>68</sup> In fact, the Romeo anchorage area is closer to the present Pole 1 DC Cable #3 than it is to the proposed Option 5 (modified) cables. The Robert Allan Ltd. assessment of Non-Natural Marine Hazards, commissioned by BCTC, discounts the potential damage from anchor dragging and dredging-in:

*“Vessels use this anchorage temporarily and are required to have a pilot on-board at all times. For these reasons, it is highly unlikely that any vessel in this anchorage would drag anchor into the cable area. Should dragging begin, the situation would be controlled before the ship moved far enough to pose any threat to the cables.”*<sup>69</sup>

*“Dredging-in is used occasionally by vessels using Deltaport/Westshore Terminals, but only in depths of 20-30*

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<sup>67</sup> TR. 16, pg. 2660, line 4, to pg. 2683, line 10

<sup>68</sup> Exhibit B1-66, pg. 3, Fig. 2.0

<sup>69</sup> Exhibit B1-66, pg. 8, sect. 3.1.1, 1<sup>st</sup> para

*metres within the “cut”, which is well clear of the cable area, about 2.5 km to the southeast. Therefore, the probability of a cable being damaged from dredging-in is negligibly small.”*<sup>70</sup>

### **2.3.6 Option 5 (modified) Cost Estimates**

The relative comparative cost estimates between the alternatives presented in Exhibit C1-13 are still valid.<sup>71</sup> As a result of the evidence provided during cross examination, further cost savings appear to be achievable by efficient use of present structures, such as towers in Delta and on Galiano Island and terminal facilities at GNO (Galiano Terminal). If other benefits, such as proposed cost recoveries, and socio-economic aspects and favourable attributes were taken into consideration, the Deltaport Option 5 (modified) would rank close to Highway 17 Option 4 (modified) as the overall best alternative for the VITR project.

### **2.3.7 Summary of Deltaport, Option 5 (modified)**

Aside from the seismic risk issue, which may have been rated too conservatively by BCTC because of lack of information, other negative aspects expressed by BCTC for the Deltaport route resulting in its dismissal of this route alternative as infeasible, have been contradicted, or reduced in importance. Most of the attributes and advantages to Option 5 (modified) as expressed in the Intervenor Evidentiary Submission still hold true.<sup>72</sup>

One of the strongest points in favour of the Deltaport option is to consolidate this new proposed major transmission facility within a corridor through Delta which contains existing transmission lines, heavy container truck transport, and unit train container and coal railway transport.

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<sup>70</sup> Exhibit B1-66, pg. 9, sect. 3.2.1, 2<sup>nd</sup> para

<sup>71</sup> Exhibit C1-13, pg. 5.42, Table 5-3, and pg. 5.43, Table 5-4

<sup>72</sup> Exhibit C1-13, pg. 5.24, line 23 to pg. 5.25, line 27

### 3.0.0 Cost Estimates - General

Various iterations of project cost estimates, and alternative route cost comparisons have been presented by BCTC in the CPCN application and subsequent revisions. While the two first BCTC estimates indicated less than a \$1 million difference in construction costs between Option 2 and Option 4,<sup>73</sup> a final, more detailed estimate provided as a response to a BCUC IR, includes additional potential costs for Option 4 related to TFN that had not been incorporated in the initial estimates.<sup>74</sup> All the BCTC project cost estimates and attribute ratings display a strong bias against Option 4 by excluding similar potential cost items from Option 2. As an example, additional ROW costs for acquiring underground rights through Tsawwassen is not included in BCTC's Option 2, cost estimate.

Mr. Barrett: A: *“Yes. Any project estimate should include the costs for acquiring the land rights you need for that project.”*<sup>75</sup>

Apparently, this principle was not applied in the cost estimate for Option 2.

The Intervenor's evidentiary submission also included alternative route cost comparisons,<sup>76</sup> including detailed comparisons of attributes for each proposed route.<sup>77</sup> These estimates also indicated that capital costs for Option 2 and Option 4 were comparable. However, when socio-economic aspects and other attributes are included, both route options 4 and 5 appear to be better alternatives than Option 2.

It is submitted that BCTC has not given due consideration and fair assessment of cost and attributes to all viable route alternatives.

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<sup>73</sup> Exhibit B1-1, Table 4-3, pg. 101 (orig. 07-07-05 & 31-08-05 rev.)

<sup>74</sup> Exhibit B1-54, BCUC 4.203.

<sup>75</sup> TR. 17, pg. 2679, lines 13-15

<sup>76</sup> Exhibit C1-13, pg. 5.41, line 5-8, pg. 5.42 Table 5-3, pg. 5.43 Table 5-4

<sup>77</sup> Exhibit C1-13, Sect 5, pg. 5.34, line 30, to pg. 5.41, Table 5-2

#### 4.0.0 East Ladner Bypass

Because of the seismic vulnerability of the Arnott Substation, it was stated by BCTC that it had looked at permanently connecting the VITR directly to Ingledow (ING). It was also stated that the cost of bypassing ARN would be very small.<sup>78</sup>

*“In case of damage to Arnott Substation during a seismic event, it will be by-passed and connection made directly to Ingledow Substation.”*<sup>79</sup>

A proposal was brought forward in Exhibit C1-13 to incorporate VITR with the proposed South Fraser Perimeter Road which will extend the current industrial rail/road corridor from Roberts Bank through Delta past East Ladner.<sup>80</sup> There are four 230 kV circuits connecting ING to ARN: 2L10 (585A), 2L57 (585A), 2L6 (2000A), and 2L63 (2000A). The 2L63, 2000A circuit is the southernmost circuit and would be suitable for direct connection to VITR.

The BCTC Engineering Panel was asked about the feasibility to connect the 230 kV directly to one of the ING – ARN circuits, bypassing ARN to the east of Ladner. While BCTC confirmed this as a physical possibility, concern was expressed with regard to new right of way corridor and length of line.<sup>81</sup>

While it would require about 700 metres of additional overhead line, the system would be entirely within the industrial corridor and bypass the residential area of East Ladner.<sup>82</sup> Incorporated with the proposed new road right of way, the additional area required for the overhead line should not be a significant cost problem. Part of the new area required would in some instances be within the same farm ownership which is covered by the existing 53.43 metres, existing 1L17/1L18 ROW. These

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<sup>78</sup> TR. 10, pg. 1589, line 10, to pg. 1590, line 21

<sup>79</sup> Exhibit B1-39, Attachment 1, pg. 5, second para, last sentence

<sup>80</sup> Exhibit C1-13, Sect. 5, pg. 5.25, line 29, to pg. 5.31, line 21

<sup>81</sup> TR. 16, pg 2683, line 11, to pg. 2685, line 11

<sup>82</sup> C1-13, Sect. 5, pg. 5.27, Fig. 5-23

owners would likely be agreeable to an exchange of these rights to be able to remove the old wooden structures.

### **5.0.0 Exchange of Overhead for Underground ROW Rights**

BCTC initial proposal for VITR was Option 1, the overhead lines through Tsawwassen. Strong local opposition to this proposed option resulted in BCTC bringing forward Option 2, placing the cables underground through Tsawwassen, as its recommended alternative. With the recommendation for Option 2, BCTC requires additional ROW agreements for underground rights. BCTC indicated it expected these underground rights to be exchanged for the present overhead rights, at no additional costs.<sup>83</sup> However, the overhead rights would still be retained for an indefinite period to cover the need for the remaining overhead 138kV (1L18) circuit to supply the Gulf Islands.<sup>84</sup> No timeline or guarantee would be given by BCTC as to when the remaining overhead structures would be removed and when or if the overhead ROW encumbrance would be cleared from the owners titles.<sup>85</sup>

Clearly, BCTC did not put forward a realistic proposal by expecting the Tsawwassen ROW residents to accept such an unfair, uncertain, and open ended scheme. BCTC has an intelligent team of engineers and planning experts. It is very difficult to accept that such a proposal was sincere.

In its Final Submission, BCTC has made it clear that unless the residents accept the proposed exchange of overhead for underground rights, BCTC seeks an Order from BCUC to construct the overhead alternative, Option 1.<sup>86</sup> This request would be made if BCTC does not obtain at least 51% (at least 52 property owners) acceptance by the property owners to relinquish their underground ROW property rights.

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<sup>83</sup> B1-1, pg. 109, lines 14-17

<sup>84</sup> B1-1, pg. 52, lines 26-28

<sup>85</sup> TR. 8, pg. 1181, line 17, to pg. 1183, line 22

<sup>86</sup> BCTC Final Submission, pg. 2, 3 a) b) c)

In the event the Commission grants BCTC its request for 90 days to obtain underground right-of-way agreements with the property owners, it is respectfully requested that the Commission directs BCTC/BC Hydro to include *all* property owners (140 +) along the Tsawwassen ROW in these negotiations, not only the private owners affected by the first stage of underground duct construction. All ROW property owners will be affected by the outcome of such negotiation and are entitled to be part of these negotiations.

In accordance with the *Expropriation Act*,<sup>87</sup> BC Hydro has the right to expropriate. However, any valuation for expropriation compensation will be on the basis of appraisal value for “*highest and best use*”, plus any related costs or damages. Highest and best use for the Tsawwassen ROW may be the value of high voltage power transmission over the next 60 years, or residential subdivisions, whichever is greater. In either case, the value would be expected to be in the tens of millions of dollars.<sup>88</sup>

BCTC/BC Hydro expects to obtain the underground rights to the entire 53.34 m (175 feet) wide ROW.<sup>89</sup> Less than one half the ROW width, or 20 m, would be required for the two underground ducts which are proposed to be installed 10 m apart. However, by retaining the full 53.34 m wide ROW, BCTC will be able to accommodate two additional underground high voltage circuits within the ROW if additional transmission capacity beyond the two proposed 230 kV circuits is required in the future. Mr. Barrett, responding to Mr. Yardley:

*“I think you pointed out that we have said in the IR responses that at this time we’re not offering to reduce those rights of way. We would prefer to leave the corridor as it is so that major structures aren’t built on it, and that **there’d be possibly some future use.**”*<sup>90</sup> (bold emphasis by Intervenor).

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<sup>87</sup> Exhibit B1-70, pg. 8, Sect. (3) (d)

<sup>88</sup> Exhibit C4-4, pg 2

<sup>89</sup> TR. 17, pg. 2905, lines 21-23

<sup>90</sup> TR 9, pg.1374, lines 1-6

If BCHydro/BCTC is given the underground rights to the full ROW width, the property owners effectively relinquish their rights to, and the control of their entire back yards in perpetuity.

Since there is no reference in BCTC's Final Submission with respect to expropriation for underground rights, this issue no longer seems to be considered. The cost of expropriation and delay in project implementation through such a process, would render Option 2 a much less favourable option in terms of public convenience and necessity than Option 4, the Highway 17, alternative..

It is respectfully submitted that BCTC, in its proposal for requesting additional ROW encumbrance on the Tsawwassen residents' properties without offering or providing compensation or guarantees, expects that such a proposal will be rejected outright by the residents, thereby allowing BCTC to return to its initial, and favoured Option 1, overhead construction on the existing Tsawwassen ROW.

In other words, by its unreasonable underground ROW proposal to the residents, it appears BCTC has no serious intention of constructing Option 2, nor has BCTC put any true effort into investigating other alternative options.

## **6.0.0 Property Values**

Mr. Dybvig's assessment and report on the potential impact on property values is highly theoretical and unrealistic.

*"BCTC believes that the proposed routing and design along the existing ROW will have neutral to positive impacts for property owners along the existing ROW"* <sup>91</sup>

Mr. Dybvig's assessment and report, aside from being highly theoretical, is also based on outdated sales information as old as 30-40

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<sup>91</sup> Exhibit B1-1, pg. 124, Table 5-3

years, primarily based on visual impact and proximity.<sup>92</sup> Furthermore, he did not contact any local real estate professionals to test the reliability of his own theories.<sup>93</sup>

The impact of property values from the existing lines is negatively indicated in the range of 12%.<sup>94</sup> The potential impact of the VITR proposal is indicated by the BC Assessment reduced 2006 assessment value of the affected properties, to be respectively 15% for properties on, and 12% for properties directly adjacent to the BC Hydro ROW in Tsawwassen.<sup>95</sup>

A severe impact on property values will result in significant claims by the owners for compensation for these losses, whether overhead or underground transmission lines are installed. Damages for value losses, and consequent claims for "*Injurious Affection*", may differ for properties offered for sale pre-project construction, during project construction, and generally for future losses in value caused by the presence of the new lines. Under Option 2, the underground proposal, which will only affect the ROW encumbered properties, the total assessment value (2006), would according to BC Assessment, be reduced by 15 % compared to Tsawwassen properties not affected by the power line. This would indicate a potential claim value of \$ 7-8 million.

Option 1, the overhead line alternative will affect a larger area of adjacent properties in Tsawwassen. While the impact, according to Mr. Dybvig, will decrease with distance, the much taller poles and vertical line configuration will have a much greater impact on properties on and adjacent to the ROW. Potential value loss claims could conservatively be estimated at twice that of Option 2, or upward of \$15 million.

There is a very limited availability of developable lands outside the ALR in South Delta. Release of the present BC Hydro ROW through

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<sup>92</sup> TR 25, pg 4703, lines 6-14

<sup>93</sup> TR. 24, pg. 4575, lines 5-12

<sup>94</sup> Exhibit C1-13, Sect. 1, pg. 1.1, line 36

<sup>95</sup> Exhibit C1-25

Tsawwassen could, over both short and long term, have a positive impact on land use and development in the community. The proposed new transmission lines, whether overhead or underground, will eliminate any private or Corporation of Delta redevelopment of the properties covered by the ROW encumbrance. The reduced value of these and adjacent properties will continue to have a significant impact on the overall property tax structure within Delta as long as the ROW easement encumbrance is in place. In addition, presence of transmission lines and the constraint on development will have an overall negative socio-economic impact on the Delta community.

### **7.0.0 EMF and Health Issues**

Much evidence has been heard during these hearings related to potential health hazards associated with living in the vicinity of high voltage power lines, particularly with respect to exposure from high EMF levels. Mr. Richard Gallagher, the EMF expert engaged by BCTC to participate at the Tsawwassen Community Information Session on May 31, 2005, also appeared as an expert witness at the WKPL & Sumas 2 hearings. Mr. Gallagher stated at these venues and hearings that the very high EMF levels above 2-4 mG have been linked with leukemia in children.<sup>96 97</sup> Mr. Gallagher's qualification as a highly qualified and experienced expert in the field was confirmed by BCTC's EMF expert witness, Ms. Erdreich<sup>98</sup>. Evidence has been presented by TRAHVOL expert witness and other Intervenors, confirming these statements and levels.<sup>99</sup>

In context with the 2-4 milliGauss EMF threshold level for potential negative health effects indicated by Mr. Gallagher and in evidence provided by Ms. Havas, the actual EMF exposure level consistently exceeds 20 mG in homes and 50 mG in yards along the ROW. This condition is of legitimate concerns to the residents.

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<sup>96</sup> Exhibit B1-57, Attachment 4, pg. 57, lines 20-26, pg. 58, lines 1-14

<sup>97</sup> Exhibit C1-23, pg. 4, lines 4-14; Exhibit C1-37, pg. 2, para 47115

<sup>98</sup> TR. 28, pg. 5377, lines 19-21

<sup>99</sup> TR. 27, pg 5116, lines 9-25; Exhibit C5-2, pg. 4, last para, and pg. 5, para 1-3

The point that needs to be understood and appreciated is that the ambient exposure in Tsawwassen homes away from the high voltage transmission lines is less than 1.0 milliGauss, while the EMF level, as indicated, is consistently in the range of 20 to 50 milliGauss in the homes along the ROW<sup>100</sup>. These are unusual and exceptionally high ambient EMF levels for residential living areas.

*A June 2000 report by the National Institute and Health Science, EMF RAPID Project found 50% of homes tested in the USA had an EMF level of 0.6 mG or less. Only 1% of homes has an EMF level above 6.6 mG. Homes with an EMF level above 6 mG are considered rare in most studies.*<sup>101</sup>

In an IR response to Karsten Holmsen, BCTC states:

*“BCTC does not agree with the assertion that “much stricter EMF guidelines and lower acceptable levels of exposure are being established in many parts of the world.”*<sup>102</sup>

Anyone reviewing accessible EMF studies and information on the Internet will learn that many countries and jurisdictions in various parts of the World have accepted stricter guidelines which strongly contradict BCTC’s statement.<sup>103</sup>

In context of what has been shown in evidence in these proceedings as potential EMF threshold levels for childhood and other cancers, the present and proposed EMF exposures to residents along the Tsawwassen ROW are unacceptable.

BCTC has provided calculated details of EMF radiation levels from the present and projected power line installations through Tsawwassen.<sup>104</sup> These levels are quoted by BCTC to be *a small fraction of* the 830

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<sup>100</sup> Exhibit C1-13, Sect. 2, pg. 2.1, lines 33-37, pg. 2.2, lines 1-6; B1-57, Attachment 4, pg. 84, lines 15-22

<sup>101</sup> Exhibit C3-19B, PFD pg. 384, para 4.

<sup>102</sup> Exhibit B1-17, Karsten Holmsen IR 1.26.3

<sup>103</sup> Exhibit C51-2, pg. 13, Sect. 6, para 1-14

<sup>104</sup> Exhibit B1-17, Karsten Holmsen IR 1.26.9, pg. 2

milliGauss (mG) established under the guidelines for short term exposure by WHO and ICNIRP <sup>105</sup>.

EMF exposure on the ground directly above the underground ducts, at maximum future power loads, is calculated by BCTC to be 530 mG, or the *small fraction* of 64 percent of ICNIRP guidelines. While the EMF levels could be substantially reduced by burying the lines deeper and by appropriate shielding, BCTC is not proposing this mitigation because of the increased installation costs and reduced transmission capacity of the lines.

BCTC has made the statement that

*“at nearly all locations, the maximum magnetic field exposure levels at the edge of the ROW will be substantially less than they are in relation to the existing facilities”.* <sup>106</sup>

This is in conflict with BCTC’s IR response that:

*“The EMF at the edge of the right-of-way nearest the remaining 138 kV overhead line will be essentially unchanged”.* <sup>107</sup>

There is also a conflict between BCTC’s general statements throughout its CPCN application with those made by Mr. Wong, representing BCTC on the EMF panel. It is generally stated that the second existing 138kV circuits will be retained between ARN and VIT to supply power to the southern Gulf Islands until the second 230 kV underground circuit is in service <sup>108</sup>. However, this is contradicted in Mr. Wong’s EMF calculation where his understanding is that the southern Gulf Islands will be supplied from VIT, and therefore has calculated the future 1L18 EMF levels in Tsawwassen on the basis of only a 165A charging current in the 138kV lines. <sup>109</sup>

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<sup>105</sup> Exhibit B1-1, pg. 86, lines 8-11

<sup>106</sup> Exhibit B1-1, pg. 86, lines 11-13

<sup>107</sup> Exhibit B1-17, Karsten Holmsen IR 1.26.14

<sup>108</sup> Exhibit B1-1, pg. 2, lines 18-19, pg. 52, lines 26-28; pg. 95, lines 6-9

<sup>109</sup> Exhibit B1-101, pg. 1, TR 28, pg.5372, lines 5-7

If Mr. Wong's assumption is correct, the question arises why a redundant supply link that is aging, deteriorating, costly to maintain, with significant power losses, is being retained from ARN, when the supply is more efficiently and reliably provided over the new facilities from VIT.

Since it is not expected that the VITR will carry the maximum loads of 600 MW during the first years of operation Mr. Wong's calculations were made on average loads. However, it should be expected that because of the increased energy demand on Vancouver Island and the Gulf Islands, the loads on 1L129 and 1L18 will gradually increase and reach maximum loads within the next ten years. Furthermore, under a potential energy disruption to transmission capacity from other areas, compensation for the loss of this transmission capacity would have to be met from 1L129 and 1L18 for an indefinite period of time until capacity is restored on the affected facilities. For these reasons, EMF calculations for the VITR should be based on the maximum values the residents along the line may be exposed to.

The accuracy and appropriateness of BCTC's calculated EMF measurements<sup>110</sup> are questionable, and appear to be underestimated. While according to Mr. Wong's statement, actual field check measurements were conducted along the line in Tsawwassen, no supporting records of these measurements were provided for comparison.<sup>111</sup> Numerous actual EMF measurements taken by the Intervenor on the 138kV circuits through Tsawwassen at various times since December 2004 has consistently indicated twice the levels of those calculated by BCTC, as high as 120mG under the line sag and up to 50mG at the ROW edge<sup>112</sup>. Furthermore, contrary to what is shown by the formula calculated values, and also contrary to BCTC's undertaking response<sup>113</sup>, the 1L17 circuit has consistently indicated the highest EMF levels during actual measurements. Also, contrary to

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<sup>110</sup> Exhibit B1-101, Table 3

<sup>111</sup> TR. 28, pg. 53, lines 20-23

<sup>112</sup> Exhibit C1-13, Sect. 2, pg. 2.2, lines 2-6

<sup>113</sup> Exhibit B1-126

what is shown by Mr. Wong's calculated graphs <sup>114</sup>, at no time when both circuits have been energized, has a reading on the Tsawwassen ROW between the two circuits been shown below 20 mG.

Consequently, the BCTC academic assessments and EMF calculations are not consistent with reality, and therefore, the confidence level of the EMF values presented by BCTC is low. It is submitted that BCTC does not know with any certainty what the exact EMF exposure levels will be at the various locations along the ROW and adjacent homes, and what potential negative health effects this exposure presently has, and will have with the future installations.

The WHO precautionary principle should be followed since alternative routes for the new lines are available at little or no additional costs <sup>115</sup>, and the removal of the existing 138kV lines would be an economic benefit to BC Hydro, BCTC, the Corporation of Delta and the residents of Tsawwassen and Delta.<sup>116</sup>

With respect to the evidence and testimonies given by the experts during these hearings, the construction of new electrical transmission facilities which will expose the public and the residents to a consistent EMF exposure level greater than 2-4 mG is unacceptable. Furthermore, the decommissioning and removal of the existing, high EMF emitting 138 kV facilities between ARN and SAL, which will no longer be required, must be made a priority.

The present and proposed EMF levels within the Tsawwassen ROW are unacceptably high. While BC Hydro/BCTC have certain rights through the ROW easement agreement to occupy and use this part of the owners' properties, limits must be established with regard to the potential health hazard the residents using their yards may be exposed to. While the owners may have some reduced rights and control over the BC Hydro encumbered portions of their properties, the BC Hydro

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<sup>114</sup> Exhibit B1-101, Figures 1-24

<sup>115</sup> C1-13, Sect. 5,

<sup>116</sup> C1-13, Sect. 3,

rights do not extend to private properties outside the ROW, except for access to the ROW. Specifically, where the transmission lines run through residential areas, BC Hydro and BCTC should, under no circumstances, have the right to expose the residents and public outside the dedicated ROW to transmission line EMF levels exceeding the ambient EMF level in homes away from the transmission line.

In its Order, whether an overhead or underground alternative is chosen, the Commission is respectfully requested to direct BCTC to mitigate the EMF exposure to ensure the level at the edge of the designated ROW through residential areas is within the ambient level in neighbourhood homes not affected by transmission line EMF. These levels must be regularly monitored and under no circumstances be allowed to be exceeded.

## **8.0.0 Other Issues**

### **8.1.0 Yard Restoration**

In the event the decision is to proceed with underground construction, substantial amount of ballasting (rock/gravel) of temporary access road along ROW will be required to accommodate heavy equipment traffic through Tsawwassen properties and playing fields. The yards and fields will be compacted from heavy traffic. Subsequently, the ballasting material would have to be removed from the areas, deep rehabilitation of the soil and replacement of top soil and turf will be required upon completion of construction. Only a small proportion of the ballast will be required for backfill of ducts, as cementitious and low conductivity material would already occupy a large proportion of the 1 metre space above the ducts. A minimum of 30-40 cm of quality top soil and turf would have to be placed on top of the duct fill.

### 8.2.0 Right of Way Easement

BCTC claims the BC Hydro ROW easement includes the ability to construct and operate a 230 kV overhead line as an upgrade and replacement on the existing 138 kV ROW through Tsawwassen<sup>117</sup>.

BCTC's physical **ability** to construct a 230 kV overhead line on the existing ROW is not questioned, only its legal **right** to actually construct a new and higher voltage line under the existing agreement. A typical example of a Tsawwassen Right-of-Way Agreement was attached in a BCTC response to BCUC<sup>118</sup>. This agreement grants in perpetuity the rights and easement:

*“to construct, erect, operate and maintain towers and poles.....and to string one or more lines of wire for the transmission and distribution of electrical energy and for communication purposes .....*”.

Entered into by the parties in 1955 for the purpose of installing the two 138 kV circuits between ARN and VIT, it is respectfully submitted that there is no provision specified in this document for **upgrade** or installation of **new** or **higher voltage** transmission lines within the existing ROW.

### 8.3.0 Other Seismic

With respect to slope stability of the English Bluff and the cable tunnel the following was noted:

*“The bluff has a history of slope failure as far south as Graham Drive. During strong seismic shaking, there may be a potential risk for slope instability extending below the existing tunnel*

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<sup>117</sup> Exhibit B1-1, pg.32, lines 4-6

<sup>118</sup> Exhibit B1-6, BCUC IR 1.3.2

*invert elevation within the proposed (and existing) cable route along the bluff.”*<sup>119</sup>

#### **8.4.0 Buy-back of Tsawwassen ROW**

A buy-back of the ROW easement by the Tsawwassen owners was proposed by the Intervenor.<sup>120</sup> This proposal was designed to cover part of the costs to advance the power supply to the southern Gulf Islands related to a decommissioning of the remaining 138kV circuit through Tsawwassen. Further details of this proposal were examined during Mr. Carpenter’s cross-examination of Mr. Holmsen.<sup>121</sup>

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<sup>119</sup> Exhibit B1-39, Attachment 1, pg. 5, last two sentences on page

<sup>120</sup> Exhibit C1-13, Sect. 3, pg. 3.7, line 1, to pg. 3.8, line 30;

<sup>121</sup> TR. 24, pg. 4491, line 19, to pg. 4500, line13

## 9.0.0 Conclusion

The Highway 17 and Deltaport route options are both viable alternatives when all factors, economic as well as social and other attributes are considered without prejudice. The Commission is respectfully requested to give its consideration to one of these options for the VITR project

In paraphrasing BCTC in quoting the *Utilities Commission Act*:

*“Subject to this Act, the commission may make regulations requiring a public utility to conduct its operations in a way that does not unnecessarily interfere with, or cause unnecessary damage or inconvenience to the public.”*<sup>122</sup>

Trusting the Tsawwassen residents are considered part of the public referred to in the above paragraph, the Commission is respectfully requested to give its due consideration to the interference, damage, and inconvenience the VITR project would cause the residents of Tsawwassen.

### **Respectfully submitted by:**

*Original signed by:*

Karsten Holmsen, R.P.F.(ret.)  
Intervenor C1

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<sup>122</sup> BCTC Final Submission, pg. 25, (2) last sentence