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May 13, 2021

Penticton Indian Band
c/o Mandell Pinder LLP
433 - 1080 Mainland Street
Vancouver, B.C.
V6B 2T4

Attention: Mrs. Tarlan Razzaghi

Dear Mrs. Razzaghi:

Re: FortisBC Energy Inc. (FEI)

Project No. 1599152

**Application for a Certificate of Public Convenience and Necessity for the
Okanagan Capacity Upgrade Project (Application)**

Response to the Penticton Indian Band (PIB) Information Request (IR) No. 1

On November 16, 2020, FEI filed the Application referenced above. In accordance with the British Columbia Utilities Commission Order G-97-21 setting out the Regulatory Timetable for the review of the Application, FEI respectfully submits the attached response to PIB IR No. 1.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Commission Secretary
Registered Parties

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 1

1 **1.0 Topic: Gas Demand**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application; pdf**
3 **pg. 29**

4 Section 3.3 - Peak Demand is Expected to Increase Resulting in Capacity Shortfall

5 1.1 Please provide the information that FEI bases its statements about past and
6 forecasted population growth in section 3.3, including any spreadsheets
7 produced or relied upon.

8
9 **Response:**

10 FEI relies on historical census data provided by BC Stats, as well as population growth
11 projections prepared for FEI by BC Stats. Please refer to the response to BCSEA IR1 3.9 for the
12 raw data sources.

13
14

15

16 1.2 Please provide the assumptions FEI is making with respect to future building
17 construction over the course of the Project's lifespan.

18

19 **Response:**

20 FEI assumes this question relates to assumptions on peak demand changing with
21 improvements in future building construction. Please refer to the response to PIB IR1 2.2.

22
23

24

25 1.3 Please provide the assumptions FEI is making with respect to future coldest
26 weather events.

27

28 **Response:**

29 FEI assumes the future coldest weather events through the forecast period would be equivalent
30 to the current design temperatures or design degree days for each region served by the ITS.
31 Please refer to Section 3.3.1.1 of the Updated Application for a description of the extreme value
32 analysis used for determining the design temperature and the values used in the Thompson
33 Okanagan regions served by the ITS. Please also refer to the response to BCUC IR2 43.2.1 for
34 a history of how the design degree day values for the ITS have changed over time.

35

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 2

1 **2.0 Topic: Gas Demand**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 31**

4 In simple terms, current peak demand is determined by extrapolating the observed
5 variation of existing customers' daily consumption versus temperature to the region's
6 system design temperature.

7 2.1 How has FEI accounted for climate change in its demand forecasting over the
8 Project's lifespan?

9
10 **Response:**

11 Please refer to the response to BCUC IR1 8.4.

12
13

14
15 2.2 How has FEI accounted for government climate policy, such as changes to
16 building codes, subsidies for heat pumps, carbon pricing, or other policy that may
17 have a substantial effect on gas demand?

18
19 **Response:**

20 FEI forecasts peak demand requirements using current measurements of customer
21 consumption that reflect the impact of existing codes and policy. FEI recognizes there may be a
22 reduction in annual gas demand as a result of the cited policies, but the effect on peak demand
23 is uncertain and so FEI has not speculated on future changes. As a result, FEI applies the
24 currently calculated peak use per customer (UPC_{peak}) to future forecast customers and does not
25 assume a change over time. Please refer to the responses to BCUC IR1 5.2, 5.2.1 and 5.4 for
26 additional discussion on FEI's assumptions related to UPC_{peak} over the forecast.

27 Please also refer to the response to BCOAPO IR2 14.1 for discussion of how FEI envisions a
28 future where the majority of the energy it delivers through its system, including the Project, will
29 be renewable. Additionally, please refer to the response to CEC IR2 54.2 for discussion on
30 trends in electrification and peak demand.

31

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 3

1 **3.0 Topic: Project Economic Impacts**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg.84**

4 The Project is expected to result in an overall positive impact to residents and
5 businesses through the creation of additional employment, the procurement of local
6 materials, and the use of local services, such as lodging and dining. Further, the Project
7 will benefit the Okanagan region, by helping to meet long-term capacity requirements for
8 a reliable and safe gas system, as population is forecast to increase for the next 20-year
9 period as described in Section 3.3 of the Application.

10 3.1 Please provide the analysis undertaken by FEI to make this conclusion, and the
11 data and assumptions relied upon.

12
13 **Response:**

14 As outlined in Section 3.3 of the Updated Application, FEI's forecast population increase data is
15 based on Statistics Canada data as well as population projections prepared for FEI by BC Stats.
16 These data sources indicate historical annual average population growth rate of 1.6 percent
17 over the 20 year period from 1996 to 2016. The forecast anticipates continued growth over the
18 next 20 years. The Project will provide long-term capacity to meet growing energy demand in
19 the region, thereby supporting continued economic growth.

20 FEI's expectation that the Project will result in a positive overall economic impact to residents
21 and businesses is based on its experience on past projects and the anticipated economic
22 benefit to local Indigenous and non-Indigenous businesses contracted on the Project, and
23 members of the local Indigenous and non-Indigenous workforce hired for positions on the
24 Project.

25 For example, between 2014 and 2019, FEI invested approximately \$300 million in the Lower
26 Mainland Intermediate Pressure System Upgrades (LMIPSU) project. FEI and its contractors
27 supported more than 350 suppliers in over 40 municipalities and Indigenous communities in
28 Metro Vancouver and across British Columbia. Of this investment, \$263 million was spent in
29 goods, materials, and services for the project. LMIPSU project general contractors spent 5.5
30 percent of their BC-based spend on Indigenous-affiliated businesses.

31 Finally, FEI's contractors are required to develop participation plans to optimize access and
32 opportunities for local Indigenous and non-Indigenous businesses and for local members of the
33 workforce for major projects. Subsequently, FEI tracks these socio-economic benefits and
34 requires that its contractors and consultants report on local Indigenous and non-Indigenous
35 participation.

36

37

38

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 5

1 **4.0 Topic: Project Economic Impacts**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 84**

4 Throughout the Project, FEI will endeavor to track the following: Project investment in
5 local Indigenous communities, Project investment in municipalities/regional districts,
6 local employment opportunities, and other community investment activities.

7 4.1 What does “endeavour” mean, in this context, and what will FEI do in the course
8 of “endeavouring” to track investment and employment?

9
10 **Response:**

11 In this context, FEI uses “endeavour” to refer to the steps FEI will take to track socio-economic
12 benefits. In this regard, FEI will track local Indigenous and non-Indigenous contracting,
13 employment, and training on the Project. Based on this tracking, FEI will communicate the
14 results through project communications and its sustainability reports. For an example of past
15 project communications please refer to the following web link:

16 [https://talkingenergy.ca/topic/ideal-welders-proving-industry-partnerships-are-key-local-growth.](https://talkingenergy.ca/topic/ideal-welders-proving-industry-partnerships-are-key-local-growth)
17

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 6

1 **5.0 Topic: Project Economic Impacts**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg.119-120**

4 FEI is committed to building strong working relationships with Indigenous groups guided
5 by FEI’s Statement of Indigenous Principles (Appendix I-1). FEI recognizes that the
6 potential impacts of the Project on the title, rights, and interests of affected Indigenous
7 groups must be identified and avoided or mitigated as appropriate. To achieve this, FEI
8 recognizes that its engagement approach will need to be thorough, timely, and
9 meaningful. 1 FEI also endeavors to create project benefits for local Indigenous groups,
10 through capacity building and economic opportunities.

11 5.1 Does FortisBC acknowledge that this application to the BCUC has proceeded
12 before reaching agreements with Penticton Indian Band regarding whether and
13 how to avoid and mitigate project impacts to Syilx title, rights and interests?
14

15 **Response:**

16 Although an agreement was not reached with PIB regarding potential impacts to PIB’s rights
17 and interests prior to FEI filing its Application with the BCUC, FEI will continue to engage with
18 the PIB to find solutions that mitigate any potential impacts to Syilx rights, title, and interests that
19 may be revealed through the development process for the Project. In that regard, FEI has
20 engaged with PIB on the proposed OCU Project since 2019 in an effort to study, understand,
21 and mitigate potential impacts to PIB’s rights and interests. This process has included entering a
22 capacity funding agreement with PIB to prepare four reports to assess potential impacts, holding
23 meetings to discuss mitigations, and seeking additional meetings to discuss potential impacts
24 and mitigations. Details of this engagement and FEI’s continued efforts to meet with PIB to
25 discuss ways to avoid or mitigate potential impacts to Syilx interests are ongoing and are further
26 described in the responses to BCUC IR2 62.1 and 62.2.

27
28

29
30 5.2 What does “endeavour” mean, in this context, and what will FEI do in the course
31 of “endeavouring” to create project benefits?
32

33 **Response:**

34 In this context, FEI uses “endeavour” to refer to the steps FEI will take to provide opportunities
35 for Project benefits. FEI is seeking to provide opportunities for local Indigenous and non-
36 Indigenous contracting, employment, and training on the Project. At this time, preliminary
37 discussions are ongoing with economic development leads of Indigenous communities, and/or
38 directly with Indigenous community affiliated companies.

39

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 7

1 **6.0 Topic: Project Economic Impacts**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg.126**

4 FEI will incorporate feedback from Indigenous groups into the Project’s procurement
5 plans to identify socio-economic opportunities of mutual interest. FEI will garner detailed
6 reporting on Indigenous employment and socio-economic impacts during this Project
7 lifecycle. Follow-up meetings will be scheduled with Indigenous groups as additional
8 information around employment opportunities, contracting and procurement becomes
9 available.

10 6.1 What are the Project’s procurement plans?

11

12 **Response:**

13 FEI’s Project procurement plans identify the expected goods and services the Project will
14 require and the overall strategy to obtain these goods and services. These plans have different
15 forms and variations depending on the stage of the Project. At this stage in the Project’s
16 lifecycle (i.e., BCUC regulatory review and approval), the Project’s procurement plans are still
17 under development. FEI continues to meet with Indigenous groups to seek input and will work
18 with local Indigenous communities to ensure local Indigenous businesses and workforce
19 members have access to potential Project opportunities. Access to potential contract
20 opportunities for Indigenous businesses is based on consideration of best value, including
21 safety, quality, cost, and performance.

22

23

24

25 6.2 What does “garner” mean, in this context, and what will FEI do to undertake this?

26

27 **Response:**

28 In this context, FEI uses “garner” to mean that FEI will collect socio-economic benefits data
29 including local Indigenous and non-Indigenous contracting, employment, and training on the
30 Project.

31 Please also refer to the response to PIB IR1 4.1.

32

33

34

35 6.3 Please identify the potential economic costs of the Project and who FEI expects
36 to incur these costs?

37

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 8

1 **Response:**

2 The magnitude and treatment of the Project costs are explained in Section 6 of the Updated
3 Application and are summarized here for convenience:

4 1. The estimated capital cost to construct the OCU Project is \$271.3 million in as-spent
5 dollars.

6 2. Consistent with FEI's treatment for CPCNs, the capital costs of the Project (i.e., the
7 costs included in the "Sub-Total Construction Cost Estimate (As-spent)"¹ in Table 6-1
8 referenced above) will be held in Work in Progress, attracting AFUDC during the
9 construction period. Once construction of the Project is completed in 2023, and the
10 specific assets are commissioned and placed in service, FEI will transfer the associated
11 costs to the appropriate plant asset accounts and include them in FEI's rate base on
12 January 1 of the year following their in-service date.

13 3. Pursuant to sections 59 to 61 of the UCA, FEI is also seeking approval of a new non-rate
14 base deferral account, titled the "OCU Application and Preliminary Stage Development
15 Costs Deferral Account", for deferral treatment of the costs of preparing the Application
16 and Preliminary Stage Development Costs. These deferred costs would be included in
17 rate base and amortized over a three year period beginning January 1, 2022.

18 Overall, the Project cost will be recovered in customer rates and will result in an estimated
19 delivery rate impact of 2.21 percent in 2024 when all construction is complete and after all
20 assets are placed in service in 2023. For a typical FEI residential customer consuming 90 GJ
21 per year, this would equate to an approximate average bill increase of \$9 per year.

22
23

24

25 6.4 Please list the economic costs that the rate increase is intended to cover?

26

27 **Response:**

28 Please refer to the response to PIB IR1 6.3.

29

¹ The CPCN Application on line 9, page 95 of makes reference to "(i.e., the costs included in the subtotal "Project Capital Budget" in Table 6-1 referenced above)", however Table 6-1 does not have a line item titled such. The wording is updated within this response to correctly reflect the appropriate line item from within Table 6-1.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 9

1 **7.0 Topic: Screening and Evaluation of Alternatives**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 46**

4 FEI evaluated all five alternatives on their technical merits and on the basis of high level
5 cost estimates, to screen out those that did not accomplish the objectives of the OCU
6 Project as identified in Section 4.1.

7 7.1 How were the screening criteria selected?

8

9 **Response:**

10 Note that with respect to the PIB IR series 7 questions, FEI assumes that PIB is requesting
11 information relating to the screening of alternatives against project objectives to identify feasible
12 alternatives, and in IR series 8 is requesting information relating to evaluation of those feasible
13 alternatives to select a preferred alternative. The following responses are based on these
14 assumptions.

15 Project development includes an iterative process during which a project is refined from a high-
16 level project need to specific project objectives through to selecting a preferred alternative (in
17 this case, a pipeline route). For the OCU Project, FEI's system capacity planning group
18 identified an impending capacity shortfall in the Okanagan region, and estimated the timeframe
19 in which FEI should expect this shortfall to occur. In response, FEI initiated the Project to
20 identify alternatives, and develop and implement a preferred solution to address the Project
21 need and meet the specific Project objectives.

22 If an identified alternative failed to mitigate the risk of a capacity shortfall in the region within the
23 required timeframe (i.e., was unable to meet the Project objectives), it was not considered a
24 feasible Project alternative. Other criteria are not as relevant early in project development, as
25 alternatives which do not meet the project objectives cannot be considered feasible. Regardless
26 of how well a non-feasible alternative might score against other potential criteria, it must be
27 eliminated due to its failure to mitigate the risk of a shortfall in the required timeline. Therefore,
28 alternatives that do not meet the project need are screened out early to ensure a prudent use of
29 funds associated with investigating project alternatives.

30 FEI considers identifying and addressing the technical needs of the project to be an appropriate
31 and necessary first step in alternatives screening, as there is no value in further developing any
32 alternative which does not meet the project objectives.

33

34

35

36 7.2 Why did the screening process rely on these criteria and not other criteria, such
37 as those used in the alternatives evaluation (pg. 48), the pipeline selection
38 process (p.63), or other criteria?

39

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 10

1 **Response:**

2 The alternatives screening process is intended to identify alternatives that can progress to the
3 next stage of development (i.e., they would meet the Project objectives). At the screening stage,
4 the project is not sufficiently developed to apply the criteria described on page 48 or page 63 of
5 the Updated Application.

6 The alternatives screening process also allows FEI to identify the potential alternatives to further
7 focus on and develop such that more detailed evaluation criteria can be applied. Once
8 additional information on the feasible alternatives is gathered, the evaluation criteria as
9 discussed on page 48 can be applied to validate the feasibility of alternatives and to select a
10 preferred alternative. At this point, the preferred option can be developed further until sufficient
11 detail is known to apply the routing criteria detailed on page 63.

12 As explained in the response to PIB IR1 7.1, project development is an iterative process
13 throughout which alternatives are refined, and evaluated in more detail at progressive stages of
14 the process. The application of additional criteria follows this project development.

15
16

17

18 7.3 How were the technical and cost criteria developed?

19

20 **Response:**

21 Please refer to the response to PIB IR1 7.1 for an explanation of how the technical criteria were
22 developed. During the initial screening stage, costs were considered and evaluated at a high-
23 level, but alternatives were screened out based on their inability to meet the Project objectives,
24 not based on preliminary cost estimates as explained in Section 4.4.2 of the Updated
25 Application.

26
27

28

29 7.4 Who was involved in developing these criteria?

30

31 **Response:**

32 FEI's internal subject matter experts, who have the necessary specific system knowledge and
33 expertise (i.e., FEI's System Capacity Planning and Asset Management groups), identified the
34 alternatives and established appropriate technical screening criteria.

35
36

37

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 12

1 **8.0 Topic: Screening and Evaluation of Alternatives**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 46**

4 Evaluation criteria were grouped into three primary categories:

- 5 • Asset Management Capability;
- 6 • Project Execution and Lifecycle Operation; and
- 7 • Financial.

8 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf.**
9 **pdf pg.50**

10 Weightings were assigned to the overall categories of evaluation criteria as shown in
11 Table 4-3. Asset Management Capability was weighted the most heavily to reflect the
12 importance of meeting FEI's overall technical objectives. Weighting was split evenly
13 between the other two categories. Both are considered important as they measure
14 various types of impact to the communities affected by the OCU Project. Weightings
15 were also assigned to the criteria within each category, also as summarized in Table 4-
16 3.

17 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf.**
18 **Pg. 49**

19 The sole criterion within this category measures the financial impact of the project on
20 FEI's 24 customers. FEI considered the long term rate impact to FEI's non-bypass
21 customers in order to 25 financially compare all three feasible alternatives. This was
22 completed by evaluating the present 26 value of the incremental revenue requirement as
23 well as the levelized delivery rate impact over 27 the 70 year analysis period for each
24 alternative based on the estimated capital cost and 28 operating cost.

25 8.1 How were these criteria selected?

26
27 **Response:**

28 Please refer to the response to BCUC IR1 22.5 for a description of the method used to select
29 evaluation criteria which were then used to select the preferred alternative from the three
30 feasible alternatives for the OCU Project.

31
32

33
34 8.2 Why did the screening process rely on these criteria and not other criteria, such
35 as those used in the alternatives evaluation (p48), the pipeline selection process
36 (p63), or other criteria?
37

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 13

1 **Response:**

2 Please refer to the response to PIB IR1 7.2. FEI notes that PIB IR1 7.2 and 8.2 appear to be
3 duplicated.

4
5

6

7 8.3 How were the technical and cost criteria developed?

8

9 **Response:**

10 Please refer to the response to BCUC IR1 22.5 for a description of the method used to select
11 evaluation criteria used to select the preferred alternative from the three feasible alternatives for
12 the OCU Project.

13

14

15

16 8.4 Who was involved in developing these criteria?

17

18 **Response:**

19 Please refer to the response to BCUC IR1 22.5 for a list of the parties involved in developing
20 these criteria.

21

22

23

24 8.5 How were Indigenous groups and/or stakeholders involved in developing the
25 criteria?

26

27 **Response:**

28 FEI developed its evaluation criteria internally, relying on its internal subject matter experts to
29 identify and develop criteria to be used for the evaluation. The evaluation criteria assist FEI in
30 gathering preliminary information related to the scope of the Project, such that FEI has sufficient
31 information with which to engage Indigenous groups and stakeholders.

32

33

34

35 8.6 How were the weights derived, and who was involved in determining the weights
36 of the criteria?

37

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 14

1 **Response:**

2 Please refer to the response to BCUC IR1 22.5 for a discussion of the weighting process, and a
3 list of the parties involved in developing these weightings.

4
5

6

7 8.7 Why do “Environmental, Public, and Indigenous Impacts” receive the lowest
8 weight of all criteria?

9

10 **Response:**

11 FEI selects and assigns weightings to its evaluation criteria in order to place emphasis on
12 aspects of a project which drive decision making. In other words, criteria that differ noticeably
13 between alternatives are generally more heavily weighted to help with the decision making
14 process. For example, in this case, certain Project alternatives carried very high degrees of
15 schedule risk, while others did not. Selecting an alternative with high schedule risk would have
16 the potential to cause delays to project completion, which would result in negative impacts on
17 FEI’s customers, the public, and Indigenous groups. Schedule risk was therefore included as a
18 criteria and weighted highly, whereas in a project with less time-sensitivity or less differentiation
19 between alternatives, this may not be included as a criteria at all.

20 Conversely, FEI did not highly weight “Environmental, Public, and Indigenous Impacts” on the
21 OCU Project due to the limited differentiation expected between the impacts caused by the
22 three feasible alternatives. This is because each alternative was selected specifically to
23 minimize impacts on the environment, the public, and Indigenous groups. While initially
24 identifying its alternatives, FEI chose to select alternatives which would allow utilization of
25 existing utility rights-of-way wherever possible: Alternative 1 made use of the existing VER PEN
26 323 right-of-way, while Alternatives 2 and 3 allowed FEI to optimize routing between the VER
27 PEN 323 right-of-way and the FBC powerline right-of-way. No alternative proposes construction
28 of new right-of-way through land not adjacent to existing infrastructure (except potentially for
29 portions of a route, where deviation from existing rights-of-way is unavoidable).

30 When initially considering the weighting, FEI noted that there would likely be little difference
31 between the impacts on environment, public, and Indigenous groups, and therefore that the
32 scores assigned against this criterion for each of the three feasible alternatives would not differ
33 greatly. Given that all three alternatives make use of existing rights-of-way as much as possible,
34 and that this minimizes the impacts these alternatives may have, FEI determined that weighting
35 this criterion highly would not change the final outcome of the alternative selection, but would
36 instead dilute the impact from other critical evaluation criteria during the selection process.

37

38

39

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 15

1 8.8 Please clarify what the financial criterion is, given the variety of financial topics
2 raised in the description.

3

4 **Response:**

5 The financial criterion FEI used to evaluate the Project alternatives was the rate impact to FEI's
6 customers. This refers to the percentage impact that FEI's investment in the OCU Project will
7 have on the delivery component of FEI's customers' bills². As described in Lines 34 to 36 on
8 Page 47 of the Updated Application, this criterion was the: "Ability for an alternative to be
9 completed with the lowest possible rate impact. The alternative which minimizes the rate impact
10 to FEI's customers will score the highest." Alternatives that had higher rate impacts received
11 lower scores (refer to Table 4-7 on Page 55 of the Updated Application).

12

² The delivery component is currently approximately 60 percent of the total bill before taxes.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 16

1 **9.0 Topic: Screening and Evaluation of Alternatives**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg.61**

4 Based on these considerations, FEI has determined that the final route selected must
5 meet the following objectives:

- 6 • Safe (to construct and to operate);
- 7 • Minimize impacts to the community, stakeholders and Indigenous groups;
- 8 • Minimize environmental impacts;
- 9 • Maximize the use of modern standard pipeline construction techniques; and
- 10 • Mitigate rate impacts to customers.

11 9.1 Please explain the conditions, situations, and factors under which the Project will
12 not use modern standard pipeline construction techniques.

13
14 **Response:**

15 The final route selected for the OCU Project has identified that construction activities can be
16 completed using modern standard pipeline construction techniques throughout.

17

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 17

1 **10.0 Topic: Screening and Evaluation of Alternatives**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg.62:**

4 Section 5.3.2. Step 2: Feasible Route Options Determination and Evaluation

5 10.1 Why did the screening of the five alternatives and the evaluation of the three
6 remaining alternatives rely on different criteria?

7
8 **Response:**

9 The project alternative results summarized in Table 4-9 of the Updated Application utilized
10 different criteria than the route evaluation results in Table 5-4 of the Updated Application
11 because they are used at different stages of the Project for different purposes. Please also refer
12 to the response to PIB IR1 7.1.

13
14

15
16 10.2 Why did the pipeline selection process rely on these criteria listed on p63 and not
17 other criteria?

18
19 **Response:**

20 The criteria developed by FEI for the pipeline route selection process are consistent with those
21 used for other FEI CPCN applications. Please also refer to the response to BCSEA IR1 16.3 for
22 information regarding the use of route selection evaluation criteria in other FEI CPCN
23 applications.

24
25

26
27 10.3 How were the pipeline selection criteria developed?

28
29 **Response:**

30 Please refer to the response to CEC IR1 22.1.

31
32

33
34 10.4 Who was involved in developing these criteria?

35
36 **Response:**

37 Please refer to the response to CEC IR1 22.1 for a list of parties involved in this process.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 18

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10.5 How were Indigenous groups and/or stakeholders involved in developing the criteria?

Response:

Please refer to the response to CEC IR1 22.1. To summarize, the evaluation criteria and associated weightings were developed by an internal team of FEI subject matter experts, including representatives from the Asset Management, Engineering, Project Management, Regulatory Affairs, Community and Indigenous Relations, Environmental Management, and Property Services departments.

Please also refer to the response to PIB IR1 8.5.

10.6 How did FEI address or adjust for any overlaps among criteria (e.g., between the Socio-Economic, Cultural Heritage, and the Human Environment criteria)?

Response:

FEI addressed any overlaps among criteria by clearly defining the considerations of each criterion. The evaluation considerations for each criterion are outlined in Table 5-2 of the Updated Application. The FEI subject matter experts relied on their experience on previous projects when developing the scoring and ensured any potential overlaps were identified and addressed.

10.7 How were the weights shown at Table 5-2 derived, and who was involved in determining the weights of the criteria? For example, why did engineering receive the same weight (5%) as cultural heritage (5%)?

Response:

The weightings shown in Table 5-2 were determined as part of the same process that determined evaluation criteria and considerations. For further detail, please refer to the response to CEC IR1 22.1.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 19

1
2 10.8 Why did the environmental category receive the lowest overall weight (25%) of
3 the three categories?
4

5 **Response:**

6 FEI considered three broad categories of evaluation criteria to assess route options for the
7 Project: Community and Stakeholder criteria, Environmental criteria and Technical criteria. The
8 process for developing the weightings is described in FEI's responses to CEC IR1 22.1 and
9 22.2.

10 As shown on Table 5-2 of the Updated Application, the Environmental category consisted of
11 three sub-criteria: Ecology, Cultural Heritage, and Human Environment. When completing the
12 weighting activity, FEI considers whether the criteria will identify risks or opportunities with
13 respect to the different route options. FEI considered that any potential ecological, cultural
14 heritage, or human environment impacts would be similar between the route options, and would
15 have similar mitigation strategies during and after construction.

16 As such, FEI considered that 25 percent was an appropriate weighting when compared to other
17 categories.

18 Of note, Human Environment (one component of the Environmental Category) was the highest
19 weighted of the 12 criteria.

20
21

22

23 10.9 Please explain further how the segment evaluation scores in Table 5-5 (p67 of
24 the application) were calculated.

25

26 **Response:**

27 FEI determined the segment evaluation scores in Table 5-5 by calculating the sum of the
28 weighted scores for all the criteria. The weighted score is calculated by multiplying the individual
29 scoring for each criterion by its corresponding weighting. Details of the scoring of each
30 evaluation criterion for all options are provided in the Route Selection Report, P-00760-PIP-
31 REP-0009, included in Appendix A-1 of the Updated Application.

32

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 20

1 **11.0 Topic: Screening and Evaluation of Alternatives**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 20**

4 The information presented in this Application accords with the guidelines set out in the
5 BCUC’s 2015 Certificate of Public Convenience and Necessity Application Guidelines
6 (the CPCN Guidelines).

7 11.1 Section 2 (ii) of the Guidelines states that applications should include a
8 “comparison of the costs, benefits and associated risks of the project and
9 feasible alternatives, including estimates of the value of all of the costs and
10 benefits of each alternative or, where these costs and benefits are not
11 quantifiable, identification of the cost area or benefit that cannot be quantified.”
12 Please indicate where this information was provided in the application.

13
14 **Response:**

15 The cited comparison forms the basis of the Alternatives comparison in Section 4.6 of the
16 Updated Application. Specific evaluation criteria are defined to allow the costs, benefits, and
17 risks associated with each alternative to be ranked and compared. A discussion of the rationale
18 behind each score assigned to each alternative is provided in that section.

19 The risks associated with the preferred alternative are further analyzed in Confidential Appendix
20 C-1 of the Updated Application.

21
22

23
24 11.2 Section 2 (v) of the guidelines states that applications should include a “schedule
25 and supporting discussion comparing the project and feasible alternatives in
26 terms of social and environmental factors, and the applicant’s assessment
27 regarding the overall social and environmental impact of the project relative to
28 the overall impact of the feasible alternatives”. Please indicate where this
29 information was provided in the application.

30
31 **Response:**

32 This information is provided as part of Section 4.6.2 in the Updated Application, where a
33 discussion of the scoring assigned to the “Environmental, Public, and Indigenous Impacts”
34 criterion is provided.

35
36

37

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 21

1 11.3 Section 2 (vi) of the guidelines states that applications should include
2 “[i]nformation relating the project to the applicant’s approved long-term resource
3 plan filed pursuant to section 44.1 of the UCA, including the extent to which the
4 project was considered in the plan, and, if applicable, a discussion explaining
5 how the plan provides support and justification for the need for the project”.
6 Please indicate where this information was provided in the application.
7

8 **Response:**

9 This information is provided in Sections 3.4 and 9.3 of the Updated Application.
10
11

12
13 11.4 Section 3 (Public Consultation (i)) of the guidelines states that applications
14 should include an “[o]verview of the community, social and environmental setting
15 in which the project and its feasible alternatives will be constructed and operated,
16 and of the public who may be directly impacted by the project and its feasible
17 alternatives.” Please indicate where this information was provided in the
18 application.
19

20 **Response:**

21 Please refer to Section 5 of the Updated Application for details regarding the social, community,
22 and environmental setting in which the Project and its feasible alternatives will be constructed
23 and operated. Please refer to Section 8 of the Updated Application for an overview of
24 stakeholders and Indigenous groups FEI identified and with whom FEI began consultation and
25 engagement with respect to the Project.
26
27

28
29 11.5 Section 3 (Public Consultation (ii)) of the guidelines states that applications
30 should include a “[d]escription of the issues and concerns raised during
31 consultations, the measures taken or planned to address issues or concerns, or
32 an explanation of why no further action is required to address an issue or
33 concern.” Please indicate where this information was provided in the application.
34

35 **Response:**

36 Table 8-1 on page 116 and Table 8-4 pages 123-124 of the Updated Application (reproduced
37 below for convenience) identify the key issues arising from engagement with stakeholders and
38 Indigenous groups, respectively, at the time of submission of the Updated Application.

1

Table 8-1: Issues and Concerns Raised

Issue	Description of Issue	FEI's Response
Lack of access to natural gas	Two landowners have emailed and asked why they are not able to access natural gas, as the new gas line would pass by their house.	FEI explained that the Project is a transmission gas line and not a distribution gas line. This new gas line will connect into FEI's larger Interior Transmission System, which brings energy to FEI's customers throughout the Okanagan. These landowners were also put in touch with FEI's planning department and provided cost-to-connect information.
Rate impacts	Several customers have asked questions about the potential rate impact of the Project, including during the virtual open houses.	FEI responded the Project was in the early stage of development and rate impacts would be shared as part of the CPCN application.
Community engagement	Several members of the public expressed concerns about engagement, specifically whether virtual engagement was adequate.	The Company will continue to engage with respect to the Project, including in-person engagement activities such as open houses, as public health guidelines allow.
Route	Several landowners have raised issues regarding the proposed route, including the potential impact to the future development of their lands, impact to crops and impacts to view scape (including loss of trees).	The Company has, in many cases, been able to adjust the route to minimize the potential adverse impacts to landowners. Where the route could not be adjusted, these concerns have been taken into account in the appraisals that have been completed and the amount of compensation being offered to landowners.
Past FEI/FBC Work	Several landowners have raised concerns about past utility access to their lands including access without notice and conditions left following work completion.	Concerns have been communicated to local FEI/FBC managers to ensure appropriate communications take place prior to entering private lands; ensure sites are left clean following work activities.
Compensation	Aside from route, the most significant concern raised by landowners is the amount of compensation FEI is offering as payment for the acquisition of land rights.	FEI has had independent appraisals completed by a qualified land appraisal firm and has taken into consideration all categories of compensation that would be payable in the context of an expropriation. FEI has provided landowners with access to the appraisals and has encouraged them to obtain legal advice related to the contents of the offer.

2

1

Table 8-4: Summary of Engagement with Indigenous Groups

Issue	Description of Issue	FEI's Response
Potential Environmental Impacts	Some Indigenous groups expressed concerns about the impacts to plants, animals and the importance of preserving ancestral remains in regards to the implementation of the route.	Both groups discussed how to incorporate traditional plants and medicines during corridor restoration, to rebuild cultural picking areas and ensure animals return to the area. We also discussed ideas around how to preserve ancestral remains and keep trespassers away from areas of significant importance. FEI discussed potential restoration solutions to their concerns such as the E-Community Garden project to grow local plants at the En'owkin Center. Next steps are to continue discussions on how these actions could be achieved.
Engagement Opportunities	Some communities raised interest around their involvement with the Project and the review of the AIA, AOA, and EOA documents.	These areas of interests were all included in the capacity funding agreements, as work plan items. FEI has also ensured that there is either a PIB or WFN monitor onsite for all geotechnical investigations.

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11.6 Section 4 (iv) of the guidelines states that applications should include "Human capital resources required to undertake the project." Please indicate where this information was provided in the application.

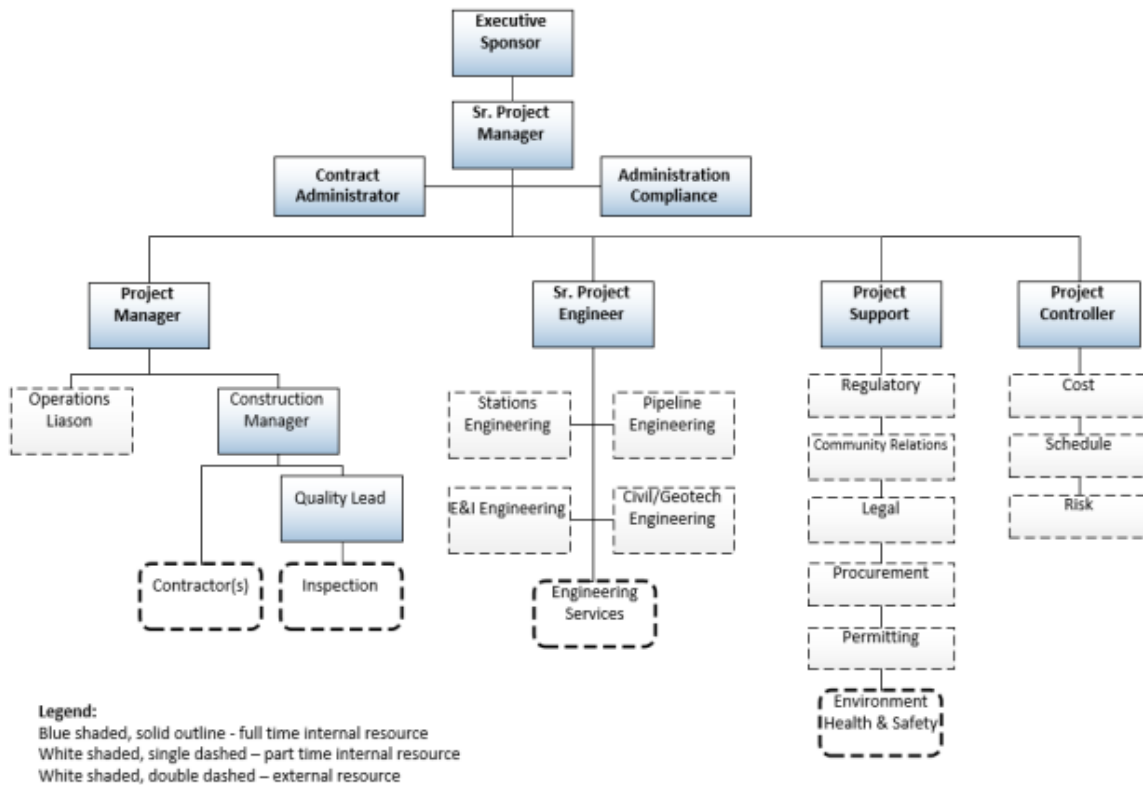
Response:

10

11

A chart of the human capital resources required to manage the Project is found in Section 5.7, Figure 5-4 of the Updated Application. FEI has reproduced it here for convenience.

Figure 5-4: Proposed Resources and Organizational Chart



The Executive Sponsor for the execution of the Project is the Vice President, Major Projects.

- 1
- 2 The human capital resources required to undertake (i.e., construct) the Project are described in
- 3 Confidential Appendix A-3 to the Updated Application (Exhibit B-1-2), specifically, Attachments
- 4 B.4 and B.8.
- 5

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 25

1 **12.0 Topic: Public Interest**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg.18**

4 Based on the information in the Application, which is summarized above, FEI believes it
5 has demonstrated that the Project is in the public interest and should be approved as set
6 out in the Application.

7 12.1 Please identify the specific public interest factors FEI relies upon to reach this
8 conclusion.

9
10 **Response:**

11 The primary reason the Project is in the public interest is that it provides a long-term practical
12 solution to increase the ITS capacity so that FEI can meet the forecast peak demand and
13 continue to provide gas service to customers safely and reliably. As described in the Updated
14 Application, without adding more delivery capacity to the existing ITS, FEI would be required to
15 curtail customers in the central and north Okanagan regions, shedding load from the system in
16 order to maintain pressure and preserve supply to the remaining customers. In a worst-case
17 scenario, during cold winter days, should it become impossible to shed sufficient load through
18 the curtailment of large interruptible service customers, core customers (i.e., firm supply
19 customers) in these areas would be impacted by a loss of gas supply resulting in these
20 customers being left without gas for heat, hot water, and cooking for an extended period,
21 depending on the extent of the capacity shortfall. The Updated Application (which is consistent
22 with the current BCUC CPCN Guidelines), together with FEI's responses to information
23 requests, provide:

- 24 1. Justification of the need for the Project.
- 25 2. Analysis of alternatives to the Project and selection of the preferred alternative.
- 26 3. Appropriate selection and determination of the pipeline route and sizing.
- 27 4. A reasonable cost estimate for the Project.
- 28 5. Plans to manage risks over the life of the Project and to mitigate environmental and
29 archeological impacts.
- 30 6. Public consultation and Indigenous engagement plans.

31

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 26

1 **13.0 Topic: Public Interest**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf.**
3 **Pg. 127**

4 Section 46 (3.1) of the UCA states that in considering whether to issue a CPCN, the
5 BCUC must consider:

6 (a) the applicable of British Columbia’s energy objectives,

7 (b) the most recent long-term resource plan filed by the public utility under section
8 44.1, if any, and

9 (c) the extent to which the application for the certificate is consistent with the
10 applicable requirements under sections 6 and 19 of the Clean Energy Act (CEA).

11 13.1 Please explain how the Project serves BC energy objective (b), i.e., “to take
12 demand-side measures and to conserve energy”?

13
14 **Response:**

15 FEI notes that the BCUC’s consideration is of the “applicable” energy objectives. Which
16 objectives are applicable will differ for each project, and in some cases, none of the energy
17 objectives will be directly relevant. Where this is the case, FEI seeks to demonstrate that the
18 project is not inconsistent with the energy objectives.

19 The OCU Project is needed to meet growing customer demand in the Okanagan region and is
20 consistent with BC’s energy objectives. While the Project itself does not directly contribute to
21 demand-side measures, FEI notes that the Project is not inconsistent with British Columbia’s
22 energy objectives. Please refer to the responses to CEC IR1 44.1 and BCUC IR1 40.1 which
23 describe how FEI’s Project advances BC’s energy objectives.

24
25

26
27 13.2 Please explain how the Project serves BC energy objective (d), i.e., “to use and
28 foster the development in British Columbia of innovative technologies that
29 support energy conservation and efficiency and the use of clean or renewable
30 resources”?

31
32 **Response:**

33 Please refer to the response to PIB IR1 13.1.

34
35

36

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 27

1 13.3 Please explain how the Project serves BC energy objective (g), i.e., “to reduce
2 BC greenhouse gas emissions... by 2020 and for each subsequent calendar
3 year to at least 33% less than the level of those emissions in 2007” and “by 2050
4 and for each subsequent calendar year to at least 80% less than the level of
5 those emissions in 2007”?
6

7 **Response:**

8 Please refer to the response to PIB IR1 13.1.
9
10

11
12 13.4 Please explain how the Project serves BC energy objective (h), i.e., “to
13 encourage the switching from one kind of energy source or use to another that
14 decreases greenhouse gas emissions in British Columbia”?
15

16 **Response:**

17 Please refer to the response to PIB IR1 13.1.
18
19

20
21 13.5 Please explain how the Project serves BC energy objective (i), i.e., “to encourage
22 communities to reduce greenhouse gas emissions and use energy efficiently”?
23

24 **Response:**

25 Please refer to the response to PIB IR1 13.1.
26
27

28
29 13.6 Please explain how the Project serves BC energy objective (j), i.e., “to reduce
30 waste by encouraging the use of waste heat, biogas and biomass”?
31

32 **Response:**

33 Please refer to the response to PIB IR1 13.1.
34
35
36

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 28

1 13.7 Please explain how the Project serves BC energy objective (I), i.e., “to foster the
2 development of first nation and rural communities through the use and
3 development of clean or renewable resources”?

4
5 **Response:**

6 Please refer to the response to PIB IR1 13.1.

7
8

9
10 13.8 What incremental volume of natural gas consumption will be attributed to the
11 Project?

12
13 **Response:**

14 The OCU Project supports growing demand in the region and those changes in demand,
15 regardless of their cause, will impact greenhouse gas emissions. The impact in GHG emissions
16 from the OCU Project will be small relative to the significant GHG reductions expected from
17 FEI’s transition to renewable gas, consistent with provincial targets and the CleanBC plan.

18 FEI estimates that annual demand for energy from its system in the area impacted by the OCU
19 Project will grow by up to 1,800 terajoules³ (TJ) between 2022 (the year in which current
20 capacity of the system in the Okanagan is expected to be reached) and 2030. The combustion
21 of this gas would result in approximately 90,000 tonnes of CO2 emissions.

22 The estimated forecast of demand attributable to the OCU Project in 2022 based on the annual
23 demand forecast provided in the 2017 LTGRP is 20,800 TJ. Estimated demand growth is
24 therefore approximately 9 percent over that period. Over the same period, FEI expects to
25 increase renewable gas content to at least 15 percent as stipulated in the provincial climate
26 plan, CleanBC. As such, the transition to renewable gas and the associated GHG emissions
27 reductions are expected to significantly outpace the incremental demand and GHG emissions
28 associated with the OCU Project.

29 For example, by 2030, FEI anticipates that 30 petajoules⁴ (PJ) of renewable gas will be brought
30 online to achieve CleanBC’s 15 percent renewable gas target. The transition to 15 percent
31 renewable gas content will achieve at least 1.5 million tonnes of CO2 emissions reductions
32 compared to the 90,000 tonnes associated with the increase in gas demand in the Okanagan
33 region. Furthermore, as described in the response to BCOAPO IR2 14.1, by 2050 FEI intends
34 to transition the majority of its gas portfolio to be renewable in order to reach the Province’s
35 legislated 80 percent GHG reduction target.

36

³ One terajoule is equal to one thousand gigajoules.

⁴ One petajoule is equal to one million gigajoules or one thousand terajoules.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 29

1

2

3 13.9 What will be the incremental greenhouse gas emissions associated with the
4 Project?

5

6 **Response:**

7 Please refer to the response to PIB IR1 13.8.

8

9

10

11 13.10 How will air quality in the service region's communities be affected by the
12 increased natural gas combustion associated with the Project?

13

14 **Response:**

15 The OCU Project supports growing demand in the region and those changes in demand,
16 regardless of their cause, will impact air quality.

17 Natural gas and renewable natural gas are both clean burning fuels which emit low levels of
18 particulates, oxides of nitrogen and sulphur, and other emissions compared to alternative fuels.
19 The growth in gas demand that is occurring in the Okanagan area will result in increases to
20 some emissions. However, where the OCU Project enables the switching from higher carbon-
21 containing or emissions-producing fuels such as oil, wood, or propane for space heating, or
22 diesel or fuel oil for transportation, improvements in gaseous and particulate emissions will
23 occur.

24

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 30

1 **14.0 Topic: Project Lifespan**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application**

3 14.1 What is the lifespan of the project?

4
5 **Response:**

6 The financial analysis covers the expected average life of transmission pipe of 65 years which is
7 used for depreciation purposes, plus the five prior years for pre-construction and construction.
8 The 65-year post-project analysis period is based on the average service life (ASL) of
9 Transmission Mains as determined in FEI's 2017 Depreciation Study (approved through BCUC
10 Order G-165-20). Using the ASL is consistent with the basis of the analysis period used in FEI's
11 recently filed CPCN Applications. The five prior years are related to project development,
12 regulatory approvals, and the construction schedule of the Project. Please also refer to Section
13 6.2 of the Updated Application.

14
15

16

17 14.2 What is the expected service life of the Project once construction is completed
18 and the Project is commissioned?

19

20 **Response:**

21 During the regulatory review of FEI's Application for a CPCN for the Inland Gas Upgrades
22 Project, a similar question was received regarding the expected lifespan of gas transmission
23 pipelines⁵. In order to respond to that question, FEI retained JANA Corporation to provide an
24 expert opinion on the likely maximum physical life of a transmission pipeline. The curriculum
25 vitae of Dr. Ken Oliphant and Wayne Bryce, principals of JANA Corporation, who are primarily
26 responsible for this response, are included as Attachment 14.2. Relevant portions of the
27 response to BCUC IR2 45.1 in the Inland Gas Upgrades Project are reproduced below.

28 JANA Corporation provided the following response:

29 **JANA's Technical Opinion on Functional Lifetime of a Gas Transmission**
30 **Pipeline**

31 FEI requested that JANA provide a 3rd Party expert opinion regarding the useful
32 life of a well-designed, constructed, operated and maintained transmission
33 pipeline.

34 Based on JANA's awareness of transmission pipeline historical failure data and
35 available industry literature, JANA's opinion is that there is not currently an

⁵ Refer to the response to BCUC IR2 45.1 (Exhibit B-10) in the Inland Gas Upgrades Project proceeding:
https://www.bcuc.com/Documents/Proceedings/2019/DOC_54202_B-10-FEI-Responses-to-BCUC-IR2.pdf.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 31

1 industry-recognized finite lifetime for a well-maintained and appropriately
2 assessed pipeline. This opinion is based on:

- 3 • Industry studies demonstrating that there is no time-dependent
4 degradation of the fundamental properties of the steels used in natural
5 gas pipelines¹. The strength properties of steel pipelines, provided time-
6 dependent threats such as corrosion are managed, will not degrade over
7 time.
- 8 • An industry study, based on analysis of historical transmission pipeline
9 failures, that concluded that “a well-maintained and periodically
10 assessed pipeline can safely transport natural gas indefinitely²” That is,
11 with proper application of Integrity Management approaches, there is no
12 recognized finite lifetime for a transmission pipeline.
- 13 • JANA’s analysis of PHMSA historical transmission pipeline failure data
14 that confirms the analysis conducted in the above-referenced study.

15 ¹ Clark, E.B., Leis, B.N., and Eiber, R.J., “Integrity Characteristics of Vintage Pipelines,” Appendix
16 C, The INGAA Foundation, Inc. 2005.

17 ² The Role of Pipeline Age in Pipeline Safety, INGAA Foundation Final Report No. 2012.04

18

19 FEI provides the following key findings in the report cited by JANA: “The Role of Pipeline
20 Age in Pipeline Safety”:

KEY FINDINGS

Ultimately, the safety of a particular natural gas transmission pipeline is not necessarily related to its age because:

1. 85% of pipeline incidents reported to PHMSA from 2002-2009 occurred irrespective of the age of the pipeline, with just 15% related in some way to the age of the pipeline.
2. The properties of the steels which comprise natural gas pipelines do not change with time; that is, pipe does not “wear out.”
3. The fitness of a pipeline for service does not necessarily expire at some point in time.
4. The integrity of those pipelines for which the fitness for service may degrade with the passage of time can be assessed periodically. Timely repairs - and other mitigation efforts - based on those assessments will ensure the pipeline’s continued fitness for service.
5. A well-maintained and periodically assessed pipeline can safely transport natural gas indefinitely.



FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 32

1 The opinion of JANA Corporation and the key findings of the report cited above support
2 FEI's view that the common understanding in the industry is that natural gas transmission
3 pipelines can have an indefinite useful life in the absence of external influences and
4 depending on their design, construction, maintenance, and monitoring.

5 FEI's natural gas transmission pipelines came into service in British Columbia in 1957,
6 meaning that FEI's oldest pipeline is approximately [64]⁶ years old. While FEI undertakes
7 site-specific replacements or repairs over the life of its pipelines, there is no indication at this
8 time that any of FEI's pipelines, including those installed in 1957, are approaching the end of
9 their useful life. FEI's expectation is that its integrity management programs can extend the
10 life of its pipelines indefinitely.

11

⁶ Updated from 62 years as filed in the response to BCUC IR2 45.1 (Exhibit B-10) in the Inland Gas Upgrades Project proceeding, recognizing those responses were filed in 2019.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 33

1 **15.0 Topic: Project Economics**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf.**
3 **Pg. 17**

4 A summary of the total forecast capital costs and average cost of service, is as follows:

5 Total Capital Cost (as-spent dollars) is \$271.3 million (including AFUDC and tax offset
6 credit of \$0.7 million); and

7 Average Annual Delivery Rate Impact over the Project duration is \$0.026 / GJ.

8 15.1 Please explain the tax offset credit.

9

10 **Response:**

11 FEI clarifies the sentence referenced in the preamble above had a number of typographical
12 error. The sentence should read as follows:

13 “Total Capital Cost (as-spent dollars) is \$271.3 million (including AFUDC) **less**
14 **Deferred net-of-tax** offset of **\$0.8** million”. [Emphasis added]

15 FEI further clarifies that the \$0.8 million offset is not a tax credit. The \$0.8 million credit is the
16 net-of-tax (after tax) amount for the deferral account that holds the application and preliminary
17 stage development costs as discussed in Section 6.3.2 of the Updated Application. Please also
18 refer to Table 6-3 of the Updated Application for the calculation of the \$0.8 million credit.

19

20

21

22 15.2 Historically, what rates of return has FEI been provided for other projects, what
23 factors have shaped these rates of return, and how does the rate of return and
24 factors shaping this for the Okanagan Capacity Upgrade Project compare with
25 other projects?

26

27 **Response:**

28 Consistent with past CPCN applications, for the OCU Project FEI has used the capital structure
29 and rate of return (ROE) approved by the BCUC at the time of the CPCN application. FEI's
30 current common equity component of 38.5 percent and ROE of 8.75 percent were approved by
31 BCUC Order G-129-16 and were effective as of January 1, 2016. Further, in that Order, the
32 Panel directed that the common equity component and ROE would remain in effect until
33 otherwise determined by the BCUC. The short and long term debt components and the rate of
34 return for debt used are the approved debt rates for the relevant year that the CPCNs were filed.

35 The following tables list recent CPCN projects and the capital structure and rates of return that
36 were used for their financial analysis.

1

Table 1: Capital Structure and Rates of Return

Line No.	Particulars	OCU, PGR, CTS-TIMC, TLSE	IGU	LMIPSU
1	Capital Structure			
2	Short Term Debt	2.36%	5.10%	7.58%
3	Long Term Debt	59.14%	56.40%	53.92%
4	Common Equity	38.50%	38.50%	38.50%
5	Total	100.00%	100.00%	100.00%
6	Rate of Return			
7	Short Term Debt	2.19%	2.10%	2.12%
8	Long Term Debt	4.78%	5.26%	6.65%
9	Common Equity	8.75%	8.75%	8.75%
10	Income Tax Rate	27%	27%	26%
11	Return on Rate Base ¹	6.25%	6.44%	7.12%
12	Reference: Date of Compliance Filing and BCUC Order	December 11, 2020, Appendix A, Schedule 26; BCUC Order G-319-20	January 19, 2018, Appendix A, Schedule 26; BCUC Order G-196-17	October 31, 2014, Appendix A, Schedule 28; G138-14/G-65-14/G-47-14 BCUC letter L-1-14

2 ¹ Return on Rate Base = (Line 2 x Line 7 + Line 3 x Line 8 + Line 4 x Line 9). For example, for the OCU
3 Project this would be 6.25% = (2.36% x 2.19% + 59.14% x 4.78% + 38.5% x 8.75%).

4

5

Table 2: Key to CPCN Projects Listed in Table 1

Acronym from Table 1	Project Name
OCU	Okanagan Capacity Upgrade
PGR	Pattullo Gas Line Replacement
CTS – TIMC	Coastal Transmission System – Transmission Integrity Management Capabilities
TLSE	Tilbury LNG Storage Expansion
IGU	Inland Gas Upgrades
LMIPSU	Lower Mainland Intermediate Pressure System Upgrade

6

7

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 35

1 **16.0 Topic: Risks**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application**

3 16.1 What safety risks does the project pose, and how have these been considered
4 and accounted for in this public interest application?

5
6 **Response:**

7 The safety risks associated with the Project primarily relate to the construction activities and the
8 hazards pertaining to the workforce conducting those activities. During the detailed design
9 phase, FEI and its design consultants will develop a Project specific Safety Management Plan
10 (SMP), which will prescribe the safety requirements for each aspect of the Project.

11 In order to be invited into the RFP process for the construction contract, proponents must meet
12 WorkSafeBC safety performance threshold and demonstrate to FEI successful safety
13 performance on previous projects. Once engaged in the RFP process, and as part of the
14 evaluation process, proponents must develop and present to FEI how they would manage
15 safety of the Project. Demonstrated safety performance, knowledge of applicable safety
16 legislation, and adequacy of plans to address safety hazards and regulations are material
17 considerations prior to awarding the construction contract.

18 In addition, the successful proponent must develop and submit to FEI for approval, prior to
19 commencing construction activities, its construction SMP outlining how it will meet or exceed the
20 safety requirements prescribed within FEI's Project specific SMP requirements. The successful
21 proponent will then have to implement its construction SMP during execution and FEI will
22 monitor their performance and compliance against that plan.

23 Given the extensive information on how FEI will manage and mitigate any safety risks as
24 explained in the Updated Application, and further described in the responses to information
25 requests, FEI considers that the BCUC has ample evidence on which to make a public interest
26 determination that also considers the safety of the Project.

27

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 36

1 **17.0 Topic: Project Footprint**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 14**

4 In summary, as further described in Section 5.2, FEI requests that the BCUC grant a
5 CPCN for the construction and operation of a new approximately 30 km section of 406
6 mm pipeline and associated facilities.

7 17.1 Is the precise length of the new proposed pipeline currently known? If so, what is
8 it? If not, why not?

9
10 **Response:**

11 Based on 30 percent completion of the design and route alignment, the length of the OLI PEN
12 406 Extension is 30,370 metres. As discussed in the response to PIB IR2 21.3, this length may
13 change slightly depending on any route adjustments that may occur during detailed design.

14

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 37

1 **18.0 Topic: Project Timeline**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 14**

4 If the Project is approved, FEI will commence construction of the Project in Q1 of 2022.
5 The new pipeline and stations are scheduled to be in service by Q3 of 2023, with Project
6 completion and close-out activities to be completed by Q1 of 2024.

7 18.1 What is FEI's plan if the Project is not approved or not approved within this
8 timeline?

9
10 **Response:**

11 Should the Project not be approved, FEI would be forced to curtail firm (i.e., non-interruptible)
12 customers on the coldest winter days in the Okanagan region when the system is experiencing
13 its peak demand. The scale and frequency of the gas outages resulting from growing demand
14 without an associated capacity upgrade would increase each year as demand grows. As
15 discussed in Section 3.4 of the Updated Application, the inability to reliably serve customers due
16 to a shortage of capacity on the ITS during an expected 1 in 20 year weather event is
17 considered unacceptable to FEI. Please also refer to the response to PIB IR1 19.1 for a
18 discussion of FEI's statutory obligation to serve customers.

19 Should the Project approval be delayed, depending on the length of the delay, FEI would
20 investigate other construction methods to shorten the construction schedule. FEI would also re-
21 evaluate the risk and cost associated with working through higher-risk construction seasons
22 (e.g., wildfire season, bird nesting season, etc.), accelerating the work with additional crews,
23 and/or phasing the Project to only install sufficient pipe to meet the 2023/24 winter peak. Any
24 such measures will increase costs to implement and will also increase the environmental and
25 safety risks to the Project, resulting in additional costs to effectively manage the increased risk.
26 If the measures discussed immediately above to reduce the overall construction schedule are
27 insufficient to complete the Project on time, FEI would explore the feasibility of mitigating the
28 resulting short term capacity shortfall with the only remaining option: CNG injection using mobile
29 tankers. CNG injection presents risks and challenges. Please refer to the responses to the
30 BCUC IR1 11 series of questions for a discussion on why FEI considers CNG injection to be an
31 undesirable option, and to the response to BCUC IR2 48.1 for a high-level estimate of the costs
32 associated with attempting to mitigate the shortfall using trucked CNG.

33

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 38

1 **19.0 Topic: Project Alternatives**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 38**

4 DESCRIPTION AND EVALUATION 1 OF ALTERNATIVES

5 19.1 Please provide the assessments conducted by FEI on alternatives to carrying out
6 the project, including such things as alternative local power and price increases
7 to reduce demand.

8
9 **Response:**

10 Please refer to Section 4 of the Updated Application that includes detailed assessment and
11 analysis of alternatives to the Project. FEI has not assessed alternatives such as local (i.e.,
12 targeted) price increases to reduce demand. Under sections 38 and 39 of the *Utilities*
13 *Commission Act* (UCA), FEI must provide service to customers who apply for it without undue
14 discrimination or undue delay. Further, as per sections 59 to 61 of the UCA, the BCUC is
15 charged with setting rates for FEI's customers which must be just, reasonable, and not unduly
16 discriminatory. Targeted rate increases intended to reduce demand in a local area would
17 deviate from the established BC regulatory principle of applying "postage stamp" rates to all
18 customers equally throughout the FEI service area and could be considered unjust and
19 discriminatory.

20 FEI is unclear what PIB is referring to by "alternative local power" in the context of a natural gas
21 distribution utility. FEI is not a gas producer, nor are there any local gas supplies of significance
22 in the Okanagan area that could be used to offset the demand of local customers.

23

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 39

1 **20.0 Topic: Long Term Gas Resource Plan**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 36**

4 The need to address a future capacity shortfall in the Okanagan area was previously
5 identified in FEI's December 14, 2017 Long Term Gas Resource Plan (LTGRP) filing:13
6 The ITS peak demand will reach pipeline capacity when the system cannot maintain
7 minimum system pressures near the high load centres in the central Okanagan region.
8 Expected load growth will cause an expansion requirement to address this constraint in
9 2022. For each regional system, higher or lower than expected load growth could shift
10 the timing of system expansion requirements either ahead or further out in time. The
11 potential for additional new, large industrial demand could create a step change in load
12 delivery requirements and a corresponding advancement of system expansion
13 requirements. Further, the Project was also identified as a potential major project in
14 Section 3.3.3.3 of the FEI 2020-2024 Multi-Year Rate Application filing. In that section it
15 was noted that: FEI forecasts that by 2022 inlet pressure to Kelowna Gate Station will
16 drop below 2400 kPa and this will result in a shortage of supply to the Kelowna
17 distribution system and the IP pipeline serving West Kelowna.

18 20.1 Please confirm FEI did not undertake any consultation with PIB on this LTRP and
19 whether or not you were none was directed by a Crown entity or regulatory
20 decision maker to consult with PIB on this Plan?

21
22 **Response:**

23 FEI confirms that it was not directed by a Crown entity or regulatory decision maker to consult
24 with PIB on the LTGRP. However, FEI did invite PIB to the community engagement events
25 during the 2017 LTGRP preparation but did not receive a response.

26

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 40

1 **21.0 Topic: Project Route and Right of Way**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application - pdf**
3 **pg. 83**

4 The proposed alignment of the preferred alternative is located within or directly adjacent
5 to existing rights of way as much as possible. The proposed route overlaps with
6 watercourses, patches of mature trees, and areas with potential for plant communities at
7 risk. Habitat for wildlife or plant species at risk was identified along the proposed
8 alignment of the preferred alternative and surrounding area. Invasive plants are present
9 in the vicinity of the proposed alignment.

10 The proposed alignment of the preferred alternative was assessed for potential impacts
11 or effects on the ecological environment. Final routing will be selected to minimize
12 disturbance to sensitive environmental features. Best management practices will be
13 applied to minimize any remaining potential negative impacts or effects on the
14 environment. Invasive plant management will be applied throughout construction to
15 minimize the potential spread or introduction of invasive plants. Some vegetation
16 removal will be required during site preparation and construction.

17 21.1 Please provide a more detailed description of the new right of away required for
18 the Project, including how much of the line is non-contiguous with adjacent right
19 of way and how much new clearing there will be and quantify the vegetation
20 clearing of the Project.

21
22 **Response:**

23 The width of the new right of way required for the OLI PEN 406 Extension will be 18 metres.
24 Approximately 80 percent will parallel existing linear corridors, i.e., FBC's 73L power
25 transmission line and FEI's VER PEN 323 transmission line. Areas non-contiguous with
26 adjacent right of way are due to either natural features or landowner negotiations.

27 Clearing and grading for the Project will take place only in areas designated as temporary work
28 space and permanent right of way, as well as for access to the construction site. The amount of
29 required vegetation clearing will be determined during the detailed design following the
30 completion of land surveys.

31
32

33
34 21.2 What is the right of way of the whole ITS system; and the clearing of the whole
35 ITS system?

36
37 **Response:**

38 The ITS consists of 2,285 km of right of way, covering FEI's service territory of the BC Interior
39 from Chetwynd in the North, Grand Forks to the South, Cache Creek to the West and Sparwood

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 41

1 to the East. The right of way width for the ITS ranges from 10 to 18 metres, depending on the
2 terrain, land availability, and pipe size.

3 FEI's operational vegetation management occurs on a 3 to 5 year cycle with the goals of:

- 4
- 5 • Ensuring compliance with the CSA Z662 standard for Oil & Gas Pipeline Systems;
 - 6 • Ensuring the safety and reliability of the gas system assets;
 - 7 • Providing access for operations and maintenance activities;
 - 8 • Maintaining clear sight lines for pipeline identification to prevent third party damage; and
 - 9 • Reducing or eliminating the potential for pipeline damage (including damage to pipeline
10 coating) from trees and/or root systems.

11 Vegetation management aims to maintain a minimum of 2 metres from the sidewall of the
12 pipeline clear of trees and shrubs with a healthy understory of only grasses and low growing
13 plants to ensure the above goals are met.

14
15

16

17 21.3 Please detail the potential for final routing differ from what is proposed?

18

19 **Response:**

20 FEI believes it is unlikely the final route will differ from the proposed alignment provided in the
21 Class 3 estimate. Any deviations will be the result from technical or construction challenges
22 determined during detailed engineering design or from continued stakeholder and landowner
23 consultation.

24 Please also refer to the response to BCUC IR2 54.1.

25

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 42

1 **22.0 Topic: Fisheries Act Authorizations**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 84**

4 Federal permits, notifications and approvals may be required to comply with the
5 provisions of the Fisheries Act, Species at Risk Act (SARA), and Explosives Act.
6 Notifications and authorizations to comply with the provisions of the Fisheries Act may
7 be required for works associated with geotechnical investigation and construction
8 activities. Fisheries and Oceans Canada is responsible for permitting any federally-
9 regulated waterbody where there is potential for fish and fish habitat alteration disruption
10 and destruction.

11 22.1 How many federal authorizations will be required from DFO for water crossings
12 and what is the proposed timeline to seek such authorizations?
13

14 **Response:**

15 FEI's detailed design consultant (IPPL) is currently reviewing all 22 watercourse crossings to
16 confirm or amend the crossing methodology determined during the FEED phase of the Project
17 with input from the Project team, including the environmental consultant, and Indigenous
18 groups. Please also refer to the response to PIB IR1 42.1 regarding the determination of water
19 crossing methodologies.

20 Once crossing methodologies have been confirmed through detailed engineering, FEI will
21 submit one or more Requests for Project Review to the DFO. The DFO will confirm the actual
22 number of Authorizations required through this process. Currently, FEI anticipates that DFO
23 Authorization may be required for one watercourse crossing, and the duration to obtain an
24 Authorization is a minimum of approximately six months.

25
26

27
28 22.2 Have you had any preliminary discussions with DFO regarding these works and
29 required authorizations?
30

31 **Response:**

32 FEI has not had any preliminary discussions with the DFO regarding the Project to date. As the
33 detailed engineering phase of the Project advances, and FEI has a better understanding of the
34 Project details and its requirements, FEI plans to have discussions regarding the Project with
35 the DFO.

36

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 43

1 **23.0 Topic: PIB Rights and Title**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 18**

4 Consultation, engagement and communication with public, local government, residents,
5 landowners, businesses, Indigenous groups and other stakeholders are important
6 components of FEI's development plan for the OCU Project.

7 23.1 What communication has FEI had and received from any Crown entity or
8 statutory decision-maker regarding the aboriginal consultation and
9 accommodation requirements for this Project?

10

11 **Response:**

12 The BC Oil and Gas Commission (BCOGC) and FEI held discussions and exchanged emails in
13 February and March 2021 to discuss the Indigenous communities that the BCOGC planned to
14 consult for the proposed OCU Project. The BCOGC indicated that it planned to consult with the
15 following Indigenous communities:

- 16 • Lower Similkameen Indian Band;
- 17 • Nooaitch Indian Band;
- 18 • Okanagan Indian Band;
- 19 • Penticton Indian Band;
- 20 • Upper Nicola Band; and
- 21 • Westbank First Nation.

22

23 The BCOGC is a Crown agency and therefore responsible for Indigenous consultation in
24 respect of its decisions. In the course of the regulatory process managed by the BCOGC, FEI is
25 expected to engage Indigenous communities in accordance with the BCOGC's Oil and Gas
26 Activity Application Manual. FEI conducts preliminary discussions with identified Indigenous
27 communities and provides documentation for the BCOGC review process. During the BCOGC
28 permitting and consultation process that will occur prior to authorization for construction, more
29 detailed Project information will be provided to Indigenous communities for review and
30 comment.

31

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 44

1 **24.0 Topic: PIB Rights and Title**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 18**

4 To date, FEI has adequately consulted and engaged with key stakeholders including
5 Indigenous groups.

6 24.1 Please confirm this statement reflects FEI's view that Indigenous groups are
7 stakeholders and not the view of PIB or any Crown entity or statutory decision-
8 maker.

9
10 **Response:**

11 The statement was made in error and does not accurately reflect FEI's view. FEI considers
12 Pentiction Indian Band to be an Indigenous group with constitutionally protected rights. FEI's
13 view is that it has adequately consulted and engaged with key stakeholders and Indigenous
14 groups to date. FEI's conclusion is based on its view and not any determination made by PIB or
15 any Crown entity or regulatory decision-maker. FEI will continue to engage with key
16 stakeholders and Indigenous groups, including continuing to engage with PIB directly regarding
17 the Project and to discuss how to mitigate impacts. This view is accurately captured in Section
18 8 of the Updated Application.

19
20

21
22 24.2 Please confirm that this conclusion is FEI's view and not the conclusion of PIB or
23 any Crown entity or regulatory decision-maker.

24
25 **Response:**

26 Please refer to the response to PIB IR1 24.1.

27

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 45

1 **25.0 Topic: PIB Rights and Title**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 84**

4 5.9 REQUIRED PERMITS AND APPROVALS

5 25.1 Why is the free prior and informed consent from PIB not listed?

6

7 **Response:**

8 It is the intention of FEI to engage in discussions with PIB with the aim of obtaining its consent;
9 however, such consent is not a statutory or regulatory requirement for FEI and therefore was
10 not listed in Section 5.9.

11

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 46

1 **26.0 Topic: PIB Rights and Title**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 120**

4 At this time, there are no known outstanding issues or concerns with regard to the
5 Project, which cannot be addressed through planned future engagement. FEI continues
6 to engage Indigenous groups on the Project.

7 26.1 Please identify the outstanding issues or concerns that FEI proposes to address
8 through planned future engagement? Please detail FEI's proposed schedule for
9 such engagement?

10

11 **Response:**

12 Please refer to the responses to BCUC IR2 62.2 and 63.2 for an updated record of engagement
13 with Indigenous groups. FEI intends to continue to engage with all Indigenous groups on an
14 ongoing and frequent basis throughout the life of the Project.

15 With respect to the Pentincton Indian Band (PIB) specifically, FEI has requested to meet with the
16 PIB to continue discussions regarding its comments, concerns, and to develop mitigation
17 measures. FEI is awaiting two PIB reports identified in the Capacity Funding Agreement to
18 better understand its concerns. These meetings and reports will support future discussions, with
19 the goal of developing a schedule for further engagement in collaboration with the PIB.

20

21

22

23 26.2 Please confirm Fortis has not been provided with PIB's consent to the Project.

24

25 **Response:**

26 Confirmed. FEI intends to engage in discussions with PIB with the aim of obtaining consent from
27 PIB. This approach is consistent with the extensive engagement with PIB on the Project to date.
28 Please also refer to the response to BCUC IR2 62.2 that provides further details on FEI's
29 engagement with PIB to date.

30

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 47

1 **27.0 Topic: PIB Rights and Title**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 120**

4 While the constitutional duty to consult rests with Crown agencies, FEI's engagement
5 activities with Indigenous groups will aid the appropriate Crown agency in fulfilling its
6 responsibilities. FEI is committed to working with Crown agencies and Indigenous
7 groups to identify, avoid, and mitigate potential impacts on Indigenous title, rights and
8 interests.

9 27.1 What communication has FEI sent or received from any Crown entity or decision-
10 maker regarding the aboriginal consultation and accommodation requirements on
11 this Project?

12
13 **Response:**

14 Please refer to the response to PIB IR1 23.1.

15

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 48

1 **28.0 Topic: PIB Rights and Title**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 120**

4 During early engagement with Indigenous groups, the area of the Project was identified
5 as being historically and culturally significant. As outlined in Section 8.3.3, FEI has
6 developed an agreement in collaboration with the PIB to identify and mitigate issues
7 raised. Under the agreement with PIB, an interim report on its findings along the route
8 was received on October 30, 2020, as per the agreement. FEI is currently working on a
9 similar agreement with WFN.

10 Concerns raised by Indigenous groups during FEI's engagement can be broadly
11 characterized as relating to two themes, outlined in the following table. Table 8-4:
12 Summary of Engagement with Indigenous Groups

13 Section 8.3.6 FEI's Indigenous Engagement Process to Date Has Been Appropriate

14 28.1 Please confirm that engagement with PIB on avoidance and mitigation has not
15 been completed and that FEI is currently awaiting receipt of PIB's assessment of
16 Use and Occupancy and Traditional and Ecological Knowledge Keeper Reports.

17
18 **Response:**

19 FEI confirms that it has not yet received the PIB's assessment of Use and Occupancy and
20 Traditional and Ecological Knowledge Keeper Reports, which were scheduled to be shared with
21 FEI earlier this year as per the Capacity Funding Agreement. FEI expects the reports
22 imminently and is ready to meet at the PIB's convenience to continue to discuss any potential
23 impacts and potential mitigation and avoidance. FEI and the PIB began preliminary discussions
24 regarding mitigation measures for select interests identified by the PIB in Q4 2019. Please also
25 refer to the response to BCUC IR2 62.1 for an updated table of Indigenous engagement
26 activities.

27
28

29
30 28.2 How did FEI incorporate the results of the Penticton Indian Band UOMS
31 INTERIM Report: Fortis BC Okanagan Capacity Upgrade Project into the Project
32 design and application submitted to the BCUC?

33
34 **Response:**

35 FEI received the UOMS draft interim report on October 28, 2020. FEI acknowledges that the
36 UOMS report does highlight broad areas which are important to the PIB; however, the report
37 was in draft format and lacked sufficient detail to allow FEI to fully understand the nature of any
38 impacts from the presently planned alignment of the Project. As a result of this lack of detail,
39 FEI did not update the Application to reflect this report. Further engagement between FEI and

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 49

1 the PIB is required to understand the information contained within the draft report. This will be
2 facilitated by receipt of the final report, which is still forthcoming.

3 FEI attempted to meet with the PIB since submitting the Application to discuss the UOMS
4 report, however the PIB has not been available for such meetings since January of this year.
5 FEI looks forward to continuing engagement with the PIB on the more detailed, final report when
6 it is provided to FEI by the PIB, and to working to incorporate this information into the Project
7 design.

8
9

10

11 28.3 How did FEI incorporate the results of the Penticton Indian Band CHRA Report:
12 Fortis BC Okanagan Capacity Upgrade Project (dated July 2020) into its Project
13 design and application submitted to the BCUC?

14

15 **Response:**

16 FEI received the CHRA draft report on September 29, 2020. FEI acknowledges that the CHRA
17 report highlights broad areas which are important to the PIB; however, the report was in draft
18 format and lacked sufficient detail to allow FEI to fully understand the nature of the impact of the
19 Project. As a result of this lack of detail, FEI did not amend the Application to incorporate this
20 report. However, FEI has included the overarching concerns expressed by the PIB in the CHRA
21 draft report in the Application. Further engagement between FEI and the PIB is required to
22 understand the information contained within the draft report. This engagement will be facilitated
23 by receipt of the final report, which is still forthcoming.

24 FEI requested to meet with PIB since submitting the Application to discuss the CHRA report;
25 however, the PIB has not been available for such meetings since January 2021. FEI looks
26 forward to continuing engagement with the PIB on the more detailed final report when it is
27 provided to FEI by the PIB, and to working to incorporate this information into the Project
28 design.

29

30

31

32 28.4 Is FEI in agreement that FEI still needs to work closely with PIB to better
33 understand the significance of this distinctive landscape for PIB, including its high
34 use for cultural, educational, subsistence, habitation, medicinal, spiritual and
35 ceremonial purposes in order to avoid and mitigate potential impacts of the
36 Project on PIB.

37



FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 50

1 **Response:**

2 Yes, FEI is committed to working closely with the PIB throughout the life of the Project and to
3 ongoing dialogue. FEI's commitment is demonstrated in the responses to BCUC IR2 62.1 and
4 62.2, which highlight its engagement efforts to date. FEI continues to be interested in meeting
5 with the PIB to discuss potential impacts and mitigations.

6

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 51

1 **29.0 Topic: PIB Rights and Title**

2 **Reference: pdf pg. 17**

3 FEI Has Estimated the Project Costs and Rate Impact in Accordance with the BCUC
4 CPCN Guidelines A summary of the total forecast capital costs and average cost of
5 service, is as follows:

6 • Total Capital Cost (as-spent dollars) is \$271.3 million (including AFUDC and tax
7 offset credit of \$0.7 million);and

8 • Average Annual Delivery Rate Impact over the Project duration is \$0.026 / GJ.
9 For a typical FEI residential customer consuming 90 GJ per year, this would
10 equate to approximately \$9.00 per year.

11 29.1 Please advise whether FEI's estimated costs and consequent rate impact
12 calculations considers PIB's inherent, including aboriginal rights and title to
13 economic benefits from Syilx lands and resources proposed to be taken and
14 used by FEI, including those recognized by S. 35(1) of the Constitution Act, the
15 United Nations Declaration of the Rights of Indigenous People and the
16 Declaration of the Rights of Indigenous People Act?

17
18 **Response:**

19 FEI's estimated costs and consequential rate impact calculations included FEI undertaking
20 appropriate engagement with Indigenous groups regarding the Project, as well as benefits to
21 Indigenous groups.

22

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 52

1 **30.0 Topic: Environmental and Archeological Assessments**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 17**

4 FEI has assessed the environmental and archaeological impacts for the OCU Project.
5 Based on the assessments undertaken, FEI expects that the Project will have minimal
6 environmental and archaeological impacts. FEI anticipates that potential environmental
7 impacts of the Project can be mitigated through the implementation of FEI's standard
8 environmental protection and mitigation measures.

9 30.1 Confirm these are preliminary assessments based on the Environmental
10 Overview Assessment attached as Appendix F and the Archeological Overview
11 Assessment attached to the application as Appendix G.

12
13 **Response:**

14 Confirmed.

15

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 53

1 **31.0 Topic: Environmental and Archeological Mitigation**

2 **Reference: FortisBC Energy Inc. Okanagan Capacity Upgrade Application pdf**
3 **pg. 100**

4 FEI is committed to delivering safe, reliable energy in an environmentally responsible
5 manner to all the communities that it serves. Based on its preliminary assessment, FEI
6 expects minimal environmental and archaeological impacts for the OCU Project.
7 Potential environmental impacts of the Project can be mitigated through the
8 implementation of standard best management practices and mitigation measures.

9 31.1 Please specify what standard best management practices and mitigation
10 measures are referred to here.

11

12 **Response:**

13 The standard best management practices and mitigation measures referred to include, but are
14 not limited to, the following subject areas:

- 15 • Archaeological and cultural areas mitigation and management;
- 16 • Archaeological monitoring;
- 17 • Environmental monitoring;
- 18 • Erosion and sediment control;
- 19 • Invasive species mitigation and management;
- 20 • Soil management;
- 21 • Water mitigation and management;
- 22 • Vegetation mitigation and management;
- 23 • Wildlife mitigation and management; and
- 24 • Restoration planning and management.

25

26 FEI's identification and preliminary assessment of potential effects of the Project is appropriate
27 for the stage of its development and consistent with the level of detail required for a CPCN
28 application. Project development is necessarily an iterative process and FEI believes it would
29 not be in its customers' interest for FEI to advance the development of this Project's detailed
30 plans, including its detailed design and associated environmental management plans and
31 mitigation measures, prior to receiving the BCUC's approval. As a result, project and site-
32 specific management plans will be developed during the detailed engineering phase of the
33 Project. These plans will incorporate standard practices for construction, as well as site and/or
34 sensitivity-specific measures as-needed, dependent on detailed engineering design, which has
35 yet to be developed.

36 As described in Section 7 of the Updated Application, FEI will undertake further environmental
37 assessments as required, and develop environmental mitigation measures and environmental

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 54

1 management plans during the detailed engineering and contractor Request for Proposal (RFP)
2 phases of the Project. These further assessments, measures and plans are required in order to
3 apply to the BCOGC for an *Oil and Gas Activities Act* (OGAA) permit, as well as other permits
4 such as Fisheries and Oceans Canada requests for project reviews/authorizations, and species
5 at risk permits (if required).

6 The Environmental Protection and Management Regulation (EPMR) provides the statutory
7 authority to the BCOGC for the management and protection of environmental values. It is the
8 responsibility of the OGAA permit applicant to satisfy the BCOGC that the proposed activity will
9 not create material adverse effects, as outlined in Sections 4 through 7 of the EPMR, which
10 address water, riparian values, wildlife and wildlife habitat, and old-growth management areas,
11 resource features and cultural heritage resources. The BCOGC's Environmental Protection and
12 Management Guideline⁷ is included in Attachment 31.1 to this response.

13

14

15

16 31.2 Please provide data and all other information used to support conclusion that
17 environmental impacts can be mitigated through the implementation of these
18 management practices.

19

20 **Response:**

21 FEI's conclusion that environmental impacts can be mitigated through the implementation of
22 best management practices is based on the Environmental Overview Assessment (EOA)
23 prepared by Hemmera Envirochem Inc., FEI's environmental consultant for the Project, and
24 experience from past construction projects.

25 Section 9.0 of the EOA (included as Appendix F in the Updated Application) lists references
26 reviewed to support the preparation of the EOA. These references, along with field observations
27 and the professional judgement of the environmental consultants aided in the preparation of the
28 EOA and the conclusion that the environmental impacts can be mitigated through the
29 implementation of best management practices.

30

⁷ <https://www.bcogc.ca/files/operations-documentation/Environmental-Management/epmg-december-21-release-v27-2018.pdf>.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 55

1 **32.0 Topic: Archeological Resources**

2 **Reference: Appendix G: 5.4.3 Archeological Potential Modelling pdf pg. 285**

3 The purpose of predictive modelling in archaeology is to identify areas that have higher
4 potential to contain archaeological remains than areas selected randomly. Predictive
5 models use environmental and cultural variables to make their predictions. Some models
6 use a wide range of mapped environmental variables (e.g., slope, slope direction,
7 vegetation classes, soil types, distance to various water bodies, trails) to determine
8 archaeological site potential.

9 32.1 Confirm that Archeological sites identified as “rock shelters”, “rock art”, and
10 “petro-forms” (rock alignments or rock cairns) are frequent indicators of
11 Indigenous use and occupation in the Okanagan Valley area and are associated
12 with rocky or steeply sloping lands.

13
14 **Response:**

15 Confirmed.

16
17

18
19 32.2 Please describe the limitations of existing GIS-based models used in the
20 Archeological Assessment Overview Assessment Report in identifying rocky or
21 steeply sloping lands.

22
23 **Response:**

24 The Project’s Archeological Overview Assessment Report references the Okanagan Timber
25 Supply Area – Archeological Overview Assessment archaeological potential model (Arcas
26 Consulting Archeologists Ltd. 1997). The limitations with regards to identifying rocky or steeply
27 sloping lands are described in the Arcas report and have been summarized below for ease of
28 review.

29 This model captured slope using elevations available in the TRIM Digital
30 Elevation Model. To address limitations related to computer processing power
31 that made it unfeasible to calculate slope at a pixel resolution of 10 m square, the
32 study area was divided into 100 m square pixels and the percentage of slope for
33 each pixel was calculated using the maximum and minimum elevation recorded
34 within each 100 m square pixel.

35 The Okanagan Timber Supply Area – Archeological Overview Assessment
36 archaeological potential model included rock outcrop features which were
37 identified from Forest Cover data however missing data was noted from “Tree
38 Farm Licenses, some provincial parks, and alienated lands in valley bottom
39 settings (Arcas Consulting Archeologists Ltd. 1997: 103)”.



FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 56

1 FEI notes that 100 m square is a large area and terrain within an area that large can be quite
2 variable. This means that it is possible for the model to miss identifying small features such as
3 short, steep slopes or large boulders. Similarly, it is also possible that pixels can bisect
4 landforms and thus not capture them accurately which could result in a misrepresentation of the
5 terrain's slope.

6

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentiction Indian Band (PIB) Information Request (IR) No. 1	Page 57

1 **33.0 Topic: Archeological Resources**

2 **Reference: Appendix G: 5.4.3 Archaeological Potential Modelling pdf pg 286**

3 Preliminary Field Reconnaissance (PFR) was conducted by Golder within portions of
4 the Project area in summer of 20204 to ground-truth modelled archaeological potential
5 within the study area and help inform the HCA permit application for the AIA phase.

6 33.1 What is the status of the Preliminary Field Reconnaissance (PFR) summary
7 report?

8
9 **Response:**

10 The draft PFR report has been completed. It was provided to the Pentiction Indian Band and
11 Westbank First Nation on February 9, 2021 for its review and comment. To date, FEI has not
12 received any comments on this report.

13
14

15

16 33.2 When will it be provided to the British Columbia Utilities Commission for
17 consideration?

18

19 **Response:**

20 The Phase 1 Preliminary Field Reconnaissance (PFR) report is currently in draft and has not yet
21 been finalized, pending review and comment by Indigenous groups. FEI notes that PFR work
22 will inform the Archaeological Impact Assessment (AIA) scope, along with input from Indigenous
23 groups. The scope of the AIA will be determined subsequent to the BCUC process during the
24 detailed engineering and design phases of the Project.

25 Please also refer to the response to PIB IR1 31.1.

26

27

28

29 33.3 What were the results of the PFR?

30

31 **Response:**

32 The first phase of the PFR covered approximately half of the proposed Project footprint; it did
33 not cover areas where access had not yet been granted due to ongoing industrial activities
34 and/or safety concerns. The second phase of the PFR will begin during the detailed engineering
35 phase of the Project.

36 The first phase of the PFR has identified two previously unrecorded surface lithic sites and one
37 culturally modified tree within the study area. It should be noted that these sites were identified

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 58

1 outside of the proposed right of way but within a potential temporary work space. In addition, a
2 total of thirty areas of high archaeological potential (AOPs) were identified. These findings will
3 be used to help develop the Archaeological Impact Assessment scope of work as well as
4 provide opportunities to further refine the pipeline route during the detailed engineering phase of
5 the Project.

6
7

8

9 33.4 Confirm that the PFR conducted by Golder was limited to a route which has since
10 been partially redesigned, and that ancillary components such as access roads
11 and workspaces were not included in the survey coverage.

12

13 **Response:**

14 The first phase of the PFR was conducted on a route which has since been partially redesigned.
15 Some access roads and temporary workspaces adjacent to the proposed alignment were
16 included in the PFR.

17 A complete list of all access roads and temporary workspaces was not available at the time of
18 the first phase of PFR so they could not be included in the survey coverage. However, FEI plans
19 to cover these additional ancillary components in the second phase of the PFR.

20

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 59

1 **34.0 Topic: Archeological Resources**

2 **Reference: Appendix G: 5.4.3 Archeological Potential Modelling pdf pg 287**

3 It is recommended that additional PFR be completed of the entire Project Area (about 53
4 hectares) once snowfree conditions are available. The purpose of the additional PFR
5 would be to meaningfully include Indigenous communities in the assessment of
6 archaeological potential and to accurately define the boundaries of high potential areas
7 that will require subsurface testing during the AIA phase. Should the archaeological
8 potential model that is currently under development by the Archaeology Branch become
9 available prior to the PFR, potential mapping for the Study Area and Project Area should
10 be updated prior to undertaking field work. Following the PFR, an AIA will be conducted
11 under an HCA Section 12.2 permit. The objectives of the AIA will include the following:

- 12 1) identify, record, and assess archaeological sites located within the Project Area;
- 13 2) identify and evaluate possible impacts by the proposed development to these
14 archaeological sites, if present; and
- 15 3) recommend appropriate impact management actions, including mitigation actions
16 where significant archaeological deposits are encountered in unavoidable conflict
17 with proposed developments. The AIA will consist of a visual inspection and
18 subsurface testing program within areas identified as high archaeological
19 potential by the qualified Field Director and field crew during the PFR.

20 34.1 Has FEI completed the recommended additional PFR for the entire Project area,
21 and if not, when will it be completed and will it be completed before an
22 Archeological Impact Assessment is undertaken?

23

24 **Response:**

25 FEI has started Preliminary Field Reconnaissance (PFR) for the entire area, but it is not
26 complete at this time. The remaining PFR is planned to be completed prior to and/or concurrent
27 with the Archeological Impact Assessment (AIA).

28

29

30

31 34.2 How will further archeological assessments incorporate and account for Syilx
32 cultural use areas and values in carrying, including with respect to identifying the
33 appropriate study area size?

34

35 **Response:**

36 FEI understands the question to be: “How will further archeological assessments incorporate
37 and account for Syilx cultural use areas and values, including with respect to identifying the
38 appropriate study area size?”



FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 60

1 With permission from the PIB, FEI would provide the information included in the Syilx Traditional
2 and Ecological Knowledge Keeper's (TEKK) reports received to date (Archaeological Overview
3 Assessment and Cultural Heritage Resource Assessment), in a format acceptable to TEKK, to
4 FEI's archaeological consultant, Golder Associates, for consideration during the planned AIA
5 work.

6 The study area of the AIA will include the proposed Project footprint, including the right of way,
7 temporary workspaces, and access routes that may be disturbed by Project activities. If
8 additional AIA areas are requested by Indigenous groups, they may be considered for AIA
9 activities if they are within land where FEI has rights to conduct AIA work.

10

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 61

1 **35.0 Topic: Land Use**

2 **Reference: Appendix F, Table 4.1 pdf pg.170**

3 The selected alignment is located in the City of Penticton along its eastern extent of city
4 limits, and the whole alignment is located entirely within the Regional District of
5 Okanagan-Similkameen. Land ownership through the southern half of the selected
6 alignment is primarily private, with intermittent sections of overlapping unknown, Crown,
7 and municipal lands. The majority of alignment sections north of Naramata are Crown
8 land with some areas of private and municipal lands. The general study area encroaches
9 into 0.17 ha of ALR (soil capability class of 7) located south of Strutt Creek on the west
10 side of the selected alignment. Several Development Permit Areas and planning areas
11 are located over the portion of the selected alignment and general study area within the
12 City of Penticton.

13 35.1 Is it your understanding that the selected alignment is within Syilx Territory, and
14 in particular the Area of Responsibility of the Penticton Indian Band? If so, why
15 no mention of that here?

16

17 **Response:**

18 As discussed in Section 8.3.2 and 8.3.3 of the Updated Application, FEI's understanding, based
19 on its discussions with the Penticton Indian Band (PIB), Westbank First Nation, and the BC Oil
20 and Gas Commission, is that the selected alignment is within Syilx Territory, and specifically
21 within the PIB's and Westbank First Nation's areas of responsibility. However, FEI has not been
22 provided with or shown a map of PIB's area of responsibility.

23

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 62

1 **36.0 Topic: Land Use**

2 **Reference: Appendix F, Section 5.3.1 pdf pg.195**

3 The Project is located entirely within the Regional District of Okanagan Similkameen
4 (RDOS), with approximately 8 km south of Turnbull Creek and northwest of Penticton
5 Creek located within the municipality of Penticton. Both regional and municipal bylaws
6 that will be pertinent to the Project have been noted in the following sections.

7 36.1 Please confirm that the southern terminus of the selected alignment overlaps
8 Development Permit Area (Hillside / Steepslope) identified in the RDOS Official
9 Community Plan Area E and this area is within the Environmentally Sensitive
10 Development Permit (ESDP) Area.

11

12 **Response:**

13 Confirmed.

14

15

16

17 36.2 Please provide development restrictions for the ESDP area.

18

19 **Response:**

20 FEI is exempt from the RDOS' Environmentally Sensitive Development Permit (ESDP) area
21 requirements⁸; therefore, no development restrictions are applicable to the Project. Please also
22 refer to the response to BCUC IR1 38.3.

23

24

25

26 36.3 Confirm the selected alignment overlaps an area identified as “aquifer
27 vulnerability - moderate” in the Okanagan-Shuswap Land and Resource
28 Management Plan.

29

30 **Response:**

31 Confirmed.

32

33

34

⁸ Section 23.2.8.1 of the RDOS Electoral Area “E” Official Community Plan¹ exempts “construction, repair, maintenance or alteration of public utility works, including sanitary sewer, storm sewer, water, natural gas, cable, hydro-electric or telecommunications works, but excluding communication towers and antenna systems” from the RDOS' Environmentally Sensitive Development Permit (ESDP) area requirements.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 64

1 **37.0 Topic: Surface Water Quality and Quantity**

2 **Reference: 5.8.1.1 pdf pg.82**

3 Possible impacts to the physical environment include the potential for discharge of
4 deleterious substances to water and soil during the installations of the [Horizontal
5 Directional Drill] HDDs, and directional boring or open cuts for shorter crossings.
6 Hazardous and non-hazardous wastes generated will be managed appropriately
7 including storage, containment, labelling, transport and disposal.

8 37.1 Please provide FEI's Accidents and Malfunctions Management Plan that includes
9 information on spill prevention and response for storage and leaks of hazardous
10 and non-hazardous material or other accidental emissions from machinery or
11 equipment; and information on how to manage and/or mitigate unexpected
12 impacts that may be identified in low-risk Areas of Potential Concern (APECs).

13
14 **Response:**

15 Information on spill prevention and response for storage and leaks of hazardous and non-
16 hazardous material or other accidental emissions from machinery or equipment will be included
17 in the Project Environmental Management Plan, which will be developed during the detailed
18 engineering phase, rather than through an Accidents and Malfunctions Management Plan. In
19 addition, once retained, the construction contractor will be required to develop and provide a
20 project-specific Environmental Protection and Spill Response Plans.

21 Information on how to manage and/or mitigate unexpected impacts that may be identified in low-
22 risk Areas of Potential Concern (APECs) will also be included in the Project Environmental
23 Management Plan and the contractor's project-specific Environmental Protection Plan, which
24 will be developed as described above.

25 Please also refer to the response to PIB IR1 31.1.

26
27

28
29 37.2 Please provide the site-specific management plans for APECs that are classified
30 as medium-risk or high-risk.

31
32 **Response:**

33 Site-specific management plans for APECs that are classified as medium-risk or high risk have
34 not yet been developed. Further assessment of these APECs will be completed during the
35 detailed engineering phase and prior to these management plans being developed.

36 Please also refer to the response to PIB IR1 31.1.

37

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 65

1 **38.0 Topic: Surface Water Quality and Quantity**

2 **Reference: 5.8.1.2 pdf pg.83**

3 Contaminated sites may be present along the proposed alignment of the preferred
4 alternative. Preliminary studies identified the location and nature of potential
5 contaminated sites. Further studies will be completed prior to construction to identify
6 appropriate handling and disposal techniques.

7 38.1 Please provide detailed information on the types of assessment to be conducted
8 (e.g., installation of monitoring wells; collection of soil samples) to support
9 characterization of risks of the Areas of Potential Concern and what
10 investigations will be done to support characterization of risks.

11

12 **Response:**

13 At this time, FEI does not have detailed information on the types of assessment to be conducted
14 to support characterization of risks of the Areas of Potential Environmental Concern (APECs). If
15 FEI needs to construct in an APEC, assessments may involve the collection of water and soil
16 samples and the installation of monitoring wells. Please also refer to the response to PIB IR1
17 31.1 which outlines FEI's further plans to assess and mitigate environmental impacts of the
18 Project.

19

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 66

1 **39.0 Topic: Surface Water Quality and Quantity**

2 **Reference: 7.2.1.2 pdf pg.103**

3 FEI will undertake further assessment of the high risk APEC during the detailed
4 engineering phase of the Project to minimize the risk of this APEC on the Project costs
5 and timelines.

6 39.1 Please provide more detailed information on the types of assessment to be
7 conducted (e.g., installation of monitoring wells; collection of soil samples) to
8 support characterization of risks.

9
10 **Response:**

11 FEI is currently working with the City of Penticton and the Regional District of the Okanagan-
12 Similkameen to develop a scope for a desktop review of existing information and data. This
13 desktop review will be used to determine the need and details on further assessment, if
14 required. Please also refer to the response to PIB IR1 31.1 which outlines FEI's further plans to
15 assess and mitigate environmental impacts of the Project.

16

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 67

1 **40.0 Topic: Surface Water Quality and Quantity**

2 **Reference: Appendix F; 3.2 pdf pg. 164**

3 Hemmera conducted a desktop assessment for the selected alignment to identify
4 APECs where contaminated soil and groundwater may be encountered during the
5 proposed construction activities.

6 **Reference: Appendix F; Section 4.2 pdf pg. 173**

7 To the north of Penticton is the Campbell Mountain Landfill, which is located to the east
8 of the selected alignment. The landfill is currently in operation, having opened in 1972.

9 40.1 Please detail any investigation or search of existing data on the nature and
10 extent of contamination in either groundwater or soils in the vicinity of the
11 Campbell Mountain Landfill, collected by the operator, to determine preliminary
12 evaluation of the potential interaction between the Project and contaminated
13 material.

14
15 **Response:**

16 FEI's environmental consultant undertook a provincial Contaminated Site Registry review and a
17 Federal Contaminated Sites Inventory to determine if registered contaminated sites were
18 located in proximity to the Project, as described in the Environmental Overview Assessment
19 (Appendix F to the Updated Application). Please also refer to the response to PIB IR1 39.1.

20

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 68

1 **41.0 Topic: Surface Water Quality and Quantity**

2 **Reference: Appendix F; 6.0 pdf pg.198**

3 The list of Risk Areas for each lateral was further refined by removing identified APECs
4 where contaminated soil, if encountered, will likely be reused as fill or spread within the
5 ROW, resulting in a reduced risk to the Project.

6 41.1 This language requires clarity. Is this intended to say that the route was altered to
7 avoid APECs with greater likelihood that contaminated soils could be used as
8 fill/spread? If not, what is FEI intending to say?

9
10 **Response:**

11 Hemmera confirms this sentence was intended to be deleted from Appendix F, but was
12 inadvertently missed during editing. FEI confirms the cited statement is not applicable to the
13 OCU Project.

14

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 69

1 **42.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 2.0 Project Scope and Area pdf pg.160**

3 The alignment will be installed primarily via open cut construction, where practical.
4 Horizontal directional drilling has been chosen as the preferred method for the Penticton
5 Creek crossing as conditions are not favourable for open cut construction.

6 42.1 How will FEI determine the need for HDD of other water crossings?
7

8 **Response:**

9 FEI determines crossing methods based on an analysis of advantages and disadvantages of
10 different methodologies. Please also refer to the response to BCUC IR1 25.2 for more
11 information on the construction methods FEI considered for water crossings along the pipeline
12 route.

13 During an impact mitigation initiative with members from the PIB, FEI engaged an external
14 trenchless crossing expert to review the feasibility of trenchless options (not limited to HDD) for
15 all of the water crossings on the OCU Project. FEI will use this information to work with
16 stakeholders and Indigenous groups to better understand the impact of each water crossing and
17 to select an appropriate crossing methodology for each crossing during the detailed design
18 stage.

19
20

21

22 42.2 Please provide the conceptual design plan of the Penticton Creek crossing?
23

24 **Response:**

25 Attachment 42.2 outlines the geotechnical path and conceptual design plan for the Penticton
26 Creek HDD alignment.

27

1 **43.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 3.0 Methods pdf pg.162**

3 Table 3.1 Sources of Desktop Information and Section 3.3 Fish and fish Habitat

4 43.1 How is FEI intending to incorporate Indigenous Knowledge into the fish and fish
5 habitat assessment?

6
7 **Response:**

8 FEI provided the Environmental Overview Assessment (EOA) to Indigenous groups for their
9 review and comment. Where comments were received, they were reviewed and incorporated, or
10 will be addressed in the Environmental Management Plan (EMP). Penticton Indian Band and
11 Westbank First Nation provided technicians to participate in the environmental Preliminary Field
12 Reconnaissance (PFR) and were provided opportunity to review and comment on the Pre-
13 Construction Site Assessment report (habitat assessment). To date, FEI has received and
14 incorporated comments from Westbank First Nation. In addition, Indigenous groups will have
15 the opportunity to review and provide comment on the Project EMP.

16 The Syilx Traditional and Ecological Knowledge Keepers (TEKK) were contracted to provide
17 four community led studies and associated reports: Archeological Overview Assessment,
18 Cultural and Heritage Resource Assessment, Use and Occupancy Mapping, and the Traditional
19 Ecological Knowledge Keepers. These reports will be used in further project design and in
20 development of the EMPs.

21
22

23
24 43.2 What Department of Fisheries Oceans' sources of information has FEI
25 considered for salmon?

26
27 **Response:**

28 The Environmental Overview Assessment (EOA) desktop review of Fisheries and Oceans
29 Canada (DFO) resources was limited to the Aquatic Species at Risk online database to identify
30 mapped occurrences of aquatic species or their critical habitat that overlap with the general
31 study area. No salmon specific DFO data sources were reviewed as part of the EOA.

32 The following resources were reviewed for fish and fish habitat:

- 33 • Fisheries Information Summary System (ECCS 2019a);
34 • BC Species and Ecosystem Explorer (CDC 2019);
35 • COSEWIC (Government of Canada 2019a);
36 • Aquatic Species at Risk online database (DFO 2019);
37 • iMapBC (Province of British Columbia 2019c);



FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 71

- 1 • Freshwater Atlas online mapping databases (Province of British Columbia 2019b); and
- 2 • Municipal and regional district online map data, where available.
- 3

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 72

1 **44.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 3.1 Land Use pdf pg.164**

3 Land use data sources from Table 3.1 were reviewed within the general study area.
4 Desktop studies identified the following features within the general study area for the
5 selected alignment:

- 6 • General ownership of land (e.g., federal, provincial Crown, municipal, private,
7 unknown)
- 8 • Regional districts and municipalities encompassed by the general study area
- 9 • Parks and protected areas within the general study area
- 10 • Agricultural Land Reserve (ALR) areas overlapped by the general study area and
11 the number of properties within the ALR intersected by selected alignment.

12 44.1 Please confirm FEI is committed to being informed by the Syilx land and
13 resources information provided by PIB.

14
15 **Response:**

16 FEI is committed to considering land and resource information provided by Indigenous groups.
17 As discussed in Appendix I-4 in the Updated Application and in the responses to BCUC IR2
18 62.1 and 62.2, FEI has been engaging with the PIB since June 2019, as well as other Syilx
19 communities and groups, and wishes to be informed by the Syilx land and resources information
20 provided by the PIB. FEI and the PIB agreed to a Capacity Funding Agreement that outlines the
21 engagement process and timelines in order for FEI to understand the PIB's and Syilx's
22 comments and concerns, and to develop mitigation measures. TEKK have prepared two
23 reports to date, and FEI awaits the remaining two reports and an opportunity to discuss those
24 with the PIB. As identified in the Capacity Funding Agreement with the PIB, the timing of receipt
25 of such information may impact how it can be incorporated into FEI's regulatory applications and
26 processes.

27

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 73

1 **45.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 3.3 Fish and Fish Habitat pdf pg.165**

3 For the purposes of this report, fish species of concern were defined as species that are
4 listed under the federal Species at Risk Act, SC 2002, c. 29 (SARA); species afforded
5 protection by the BC Wildlife Act, RSBC 1996, c. 488; and species that fall under the BC
6 Oil and Gas Commission (OGC) High Priority Wildlife species list (as outlined in the
7 OGC Environmental Protection and Management Guideline Ver 2.7 (OGC 2018)).

8 45.1 Please provide rationale for why COSEWIC listings are not considered.

9
10 **Response:**

11 The *Species at Risk Act* (SARA) established the Committee on the Status of Endangered
12 Wildlife in Canada (COSEWIC) in 2003 and requires that its results be reported to the Canadian
13 government and to the public. Wildlife species that have been designated by COSEWIC may
14 then qualify for legal protection and recovery under the SARA. It is up to the government to
15 legally protect those wildlife species designated by COSEWIC. The SARA only applies to those
16 wildlife species on the official species at risk schedules. FEI's environmental consultant,
17 Hemmera, applied a legal regulatory definition to the species at risk definition.

18
19

20

21 45.2 Please provide a listing of all COSEWIC listed species within the project area.

22

23 **Response:**

24 The following fish species are listed by COSEWIC and have the potential to occur in the Project
25 area:

- 26 • Bull Trout (*Salvelinus confluentus*); and
27 • Chinook Salmon (*Oncorhynchus tshawytscha*).

28

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 74

1 **46.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 3.3 Fish and Fish Habitat pdf pg.166**

3 Active fish sampling within the watercourses was not conducted during the PFR or
4 follow-up field reconnaissance. Where fish presence was unknown, the stream was
5 conservatively classified as fish bearing.

6 46.1 Please provide rationale for why fish sampling was not conducted?
7

8 **Response:**

9 The intent of the Preliminary Field Reconnaissance (PFR) was to obtain field validation of the
10 information in the Environmental Overview Assessment (EOA) which was collected from online
11 data sources. Fish sampling is beyond the scope of the initial PFR; however, it will be
12 undertaken during the detailed engineering phase of the Project.

13 Please also refer to the response to PIB IR1 31.1 which outlines FEI's further plans to assess
14 and mitigate environmental impacts of the Project, which will including fish sampling.

15
16

17

18 46.2 How does FEI propose to develop effective mitigation measures without
19 sampling information?
20

21 **Response:**

22 FEI relied on fish sampling records obtained from publicly available sources to initiate
23 development of mitigation measures. Where fish presence information is unknown or unclear,
24 future sampling will occur if construction methodologies could impact the watercourse. For the
25 purposes of submission of the Updated Application, this level of fish presence detail was not
26 required to develop an AACE Class 3 estimate.

27 Please also refer to the response to PIB IR1 31.1.

28

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 75

1 **47.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 4.3.1 Fish and Fish Habitat pdf pg.175**

3 Table 4.4 Mapped Watercourses Overlapping the General Study Area, Classifications,
4 and Riparian Setbacks

5 47.1 Please update this table to include known or presumed fish species present
6 within each watercourse and within the 200m study area upstream and
7 downstream of the centre line or even further downstream (what distance) of the
8 crossing.

9
10 **Response:**

11 Table 4.5 of the Environmental Overview Assessment (EOA) documents which fish species
12 have been identified in each watercourse for the Project area.

13

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 76

1 **48.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 4.3.1 Fish and Fish Habitat**

3 48.1 There is no information provided on the fish habitat present within the 200m
4 study area of each crossing. Please update with at minimum, the potential use of
5 the crossing area for spawning, migration and rearing should be indicated along
6 with the basic habitat features such as gradient, wetted width, bank structure,
7 riparian habitat etc.

8
9 **Response:**

10 The information requested is beyond the scope of the Environmental Overview Assessment.
11 However, a Pre-Construction Site Assessment (habitat assessment) report of the proposed
12 Project alignment has been developed and includes this information for watercourses where
13 access had been granted at the time of the assessment. The draft report has been provided to
14 the Penticton Indian Band and Westbank First Nation for their review and comment and will be
15 finalized once comments from both groups have been received and incorporated into the draft
16 report. FEI is awaiting comment from the PIB before disclosing a copy of the report.

17 Further watercourse assessments are planned to be completed during the detailed engineering
18 phase of the Project. Please also refer to the response to PIB IR1 31.1.

19

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 77

1 **49.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 5.2.5 Water Sustainability Act pdf pg.193**

3 For changes in and about a stream, an application for a Change Approval or submission
4 of a Notification is required under Section 11 of the WSA. Under the WSA, a stream is
5 defined as “(a) a natural watercourse, including a natural glacier course, or a natural
6 body of water, whether or not the channel of the stream has been modified, or (b) a
7 natural source of water supply, including, without limitation, a lake, pond, river, creek,
8 spring, ravine, gulch, wetland or glacier, whether or not usually containing water,
9 including ice, but does not include an aquifer.”

10 49.1 Is a Water Sustainability Act approval or notification triggered by the Project?

11

12 **Response:**

13 Section 11 of the *Water Sustainability Act* is applicable to the Project. Permitting for instream
14 works for this Project will be administered by the BC Oil and Gas Commission under the *Oil and*
15 *Gas Activities Act*.

16

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 78

1 **50.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 6.1 Biophysical Receptors pdf pg.200; Reference:**
3 **Appendix F: 7.2.3 Fish and Wildlife Salvage pdf pg.206**

4 Table 6.1 Overview of Potential Effects and Risks to Biophysical Receptors Associated
5 with the Selected Alignment

6 50.1 Please detail FEI's plans for habitat restoration and fish salvage.

7

8 **Response:**

9 The requested plans are not available at this stage. FEI will develop plans for fish salvage and
10 habitat restoration in the detailed engineering design phase when construction methodologies
11 are further defined.

12 Please also refer to the response to PIB IR1 31.1.

13

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 79

1 **51.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: Section 7.1.1. Guiding Documents and Best**
3 **Management Practices pdf pg.204**

4 51.1 Please explain why the current and new interim Codes of Practice from
5 Department and Fisheries Ocean's Fish and Fish Habitat Protection Branch are
6 not listed?

7
8 **Response:**

9 An incorrect reference was inadvertently cited and should be updated to the following:
10 "Fisheries and Oceans Canada. 2019. *Fish and Fish Habitat Protection Policy Statement*.
11 (<https://www.dfo-mpo.gc.ca/pnw-ppe/policy-politique-eng.pdf>). A description of the codes of
12 practice is outlined in Section 8.4.1 of the referenced policy statement. Applicable codes of
13 practice will be detailed in the Project Environmental Management Plan, which will be
14 completed during the detailed engineering phase. Please also refer to the response to PIB IR1
15 31.1.

16

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 80

1 **52.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 7.2 Mitigation Measures pdf pg. 205**

3 52.1 Please provide detailed information about the mitigation measures proposed for
4 stream crossings.

5
6 **Response:**

7 Detailed information about the mitigation measures proposed for stream crossings has not yet
8 been developed. FEI's environmental consultant will develop the mitigation measures for stream
9 crossings as a part of the detailed engineering phase once the construction methodology is
10 selected for each stream crossing.

11 Please also refer to the response to PIB IR1 31.1.

12

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 81

1 **53.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: 7.2.6 Site Restoration pdf. Pg. 207**

3 Areas disturbed during construction should be restored to meet or improve upon pre-
4 construction conditions, particularly for work within the ALR, in and around fish habitat,
5 and near important wildlife habitat features. Project-specific restoration plans should be
6 developed that outline how to stabilize any disturbed areas while maximizing the
7 resultant conditions and habitat values for environmental receptors.

8 53.1 Please detail how riparian areas will be restored and maintained after
9 construction.

10

11 **Response:**

12 Riparian restoration plans have not yet been developed as all stream crossing methodologies
13 have not yet been finalized. This work will begin during the detailed engineering phase.

14 Please also refer to the response to PIB IR1 31.1.

15

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 82

1 **54.0 Topic: Fish and Fish Habitat**

2 **Reference: Appendix F: Figures, pdf. pg. 214**

3 54.1 Please update figures to provide fish bearing status at each watercourse
4 crossing on the relevant figures along with habitat use if known (e.g., spawning,
5 rearing, migration)

6

7 **Response:**

8 This information is not available at this stage. This information will be collected through field
9 work conducted during the detailed engineering phase.

10 Please also refer to the response to PIB IR1 31.1.

11

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 83

1 **55.0 Topic: Vegetation**

2 **Reference: ES p.ii, Table ES.1 - Overview of Potential Effects and Risks to**
3 **Biophysical Receptors Associated with the Selected Alignment, pdf**
4 **pg. 151**

5 Vegetation project risk: “moderate”

6 55.1 How was this risk level determined given that the Project has a high potential to
7 impact at least one red-listed ecological community?

8

9 **Response:**

10 The “moderate” risk determination for vegetation was for the overall Project, and is not specific
11 to any one vegetation species or ecological community.

12

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 84

1 **56.0 Topic: Vegetation**

2 **Reference: ES p.ii, Table ES.1 - Overview of Potential Effects and Risks to**
3 **Biophysical Receptors Associated with the Selected Alignment, pdf**
4 **pg. 151**

5 Develop and implement an Environmental Management Plan and conduct environmental
6 monitoring

7 56.1 Please provide details of FEI's proposed monitoring, including specific
8 information about what will be monitored, frequency and methods.

9

10 **Response:**

11 The details of FEI's proposed monitoring have not yet been developed. They will be included in
12 the Project Environmental Management Plan which will be developed during the detailed
13 engineering phase.

14 Please also refer to the response to PIB IR1 31.1.

15

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 85

1 **57.0 Topic: Vegetation**

2 **Reference: ES p.ii, Table ES.1 - Overview of Potential Effects and Risks to**
3 **Biophysical Receptors Associated with the Selected Alignment, pdf**
4 **pg. 151**

5 Conduct surveys for plant species of concern and at-risk ecological communities with a
6 high or medium potential to be present in areas to be affected by Project activities.

7 57.1 Please provide details of survey plans, including timing, methods/approach, and
8 standards to be applied.

9
10 **Response:**

11 The details of FEI's proposed survey plans have not yet been developed. They will be
12 developed during the detailed engineering phase as the Project footprint and construction
13 methodology becomes further defined.

14 Please also refer to the response to PIB IR1 31.1.

15

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 86

1 **58.0 Topic: Vegetation**

2 **Reference: ES p.ii, Table ES.1 - Overview of Potential Effects and Risks to**
3 **Biophysical Receptors Associated with the Selected Alignment, pdf**
4 **pg. 151**

5 Develop an invasive vegetation management plan to be implemented during
6 construction

7 58.1 Please detail the specific objectives/goals of this plan.

8

9 **Response:**

10 The invasive vegetation management plan has not yet been developed. FEI will be develop this
11 plan during the detailed engineering phase of the Project. However, in general, the
12 objectives/goals of the plan may include:

- 13 • Management of invasive plants identified in the project footprint per the requirements of
14 the *BC Weed Control Act*;
- 15 • Minimize the potential for invasive plants to spread to into previously invasive free areas
16 of the project footprint;
- 17 • Minimize the potential for invasive plants to be moved off of the project footprint; and
- 18 • Restore areas of the project footprint in a manner that minimizes establishment of
19 invasive plants in the area.

20

21 Please also refer to the response to PIB IR1 31.1.

22

23

24

25 58.2 Please provide an invasive plan management plan that includes mitigation for
26 proximity of the project to Okanagan Mountain Provincial Park.

27

28 **Response:**

29 Please refer to the response to PIB IR1 58.1.

30

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 87

1 **59.0 Topic: Vegetation**

2 **Reference: ES p.ii, Table ES.1 - Overview of Potential Effects and Risks to**
3 **Biophysical Receptors Associated with the Selected Alignment, pdf**
4 **pg. 151**

5 Site restoration activities.

6 59.1 Please detail specific actions to be taken by FEI to avoid impacts and the
7 activities to be taken to restore vegetation values or compensate for impacts to
8 vegetation (e.g., at-risk communities).

9
10 **Response:**

11 FEI is unable to provide specific actions to be taken to avoid impacts and the activities to be
12 taken to restore vegetation values or compensate for impacts to vegetation (e.g., at-risk
13 communities) as these have not yet been developed. These topics will be addressed in the
14 Project Environmental Management Plan and Restoration Plans which will be developed during
15 the detailed engineering phase of the Project as the Project footprint and construction
16 methodology become further defined.

17 Please also refer to the response to PIB IR1 31.1.

18

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 88

1 **60.0 Topic: Vegetation**

2 **Reference: 3.4 Vegetation, pdf pg. 168**

3 During the PFR, the field crew collected data on vegetation community assemblage
4 along the general study area. Areas of invasive or noxious weeds within or immediately
5 adjacent to the selected alignment were recorded and geographically referenced.
6 Because the PFR was conducted in late November (November 19 to 20, 2019), visibility
7 and identification of species were limited. Areas of unique habitats encountered along
8 the ROW that were considered to have potential to support at-risk plant species (e.g.,
9 areas of old growth forest, rocky outcrops, and seeps) were recorded and geographically
10 referenced. Additional data on vegetation conditions along the selected alignment was
11 collected during the follow-up field assessment in August 2020.

12 60.1 Please provide details of the specific data collected and the methods during PFR.

13

14 **Response:**

15 The data collected and the methods used are reported in a Pre-Construction Site Assessment
16 draft report (habitat assessment). The draft report was provided to the Penticton Indian Band
17 and Westbank First Nation on February 8, 2021 for their review and comment. FEI received
18 comments from Westbank First Nation but is still awaiting comments on the draft report from the
19 PIB before finalizing this assessment report.

20

21

22

23 60.2 Please provide data results collected on August 2020 field assessment and
24 details of collection including, condition, what survey methods, detailed floristic
25 list compiled, attempts to survey for at-risk plants or confirm reported
26 occurrences of ecological communities such as Black Cottonwood – Douglas fir /
27 Douglas Maple – Common Snowberry.

28

29 **Response:**

30 Please refer to the response to PIB IR1 60.1.

31

32

33

34 60.3 Please provide rationale why the second field assessment was conducted in
35 August (following the initial one in November, when there was already snow on
36 the ground), especially given that August is also quite late in the season for many
37 plants in that habitat?

38



FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 89

1 **Response:**

2 The second field assessment was conducted in August 2020 due to the timing of finalizing the
3 contract between FEI and Hemmera. Consistent with the best management practices and
4 mitigation measures identified in the EOA as applicable to the Project, FEI plans to conduct
5 additional field assessment during the detailed design phase of the Project.

6 Please also refer to the response to PIB IR1 31.1.

7

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 90

1 **61.0 Topic: Vegetation**

2 **Reference: 4.3.2 Vegetation pdf. pg. 181**

3 The southern half of the selected alignment, approximately 16.5 km, is within the
4 Ponderosa Pine Very Dry Hot Okanagan (PPxh1) subzone, which occurs at low
5 elevations along very dry valleys of the Southern Interior Plateau of BC, and is typically
6 dominated by ponderosa pine (*Pinus ponderosa*) canopy and an understory of
7 bluebunch wheatgrass (*Agropyron spicatum*) (Hope, Lloyd, et al. 1991a). Approximately
8 6 km of the central section of the selected alignment is located within the Interior
9 Douglas-fir Very Dry Hot Okanagan (IDFxh1) subzone, which occurs in the lower
10 elevations of the Okanagan valley south of Enderby and is characterized by the
11 presence of Douglas-fir (*Pseudotsuga menziesii*) canopy cover, ponderosa pine, and
12 grassland communities comprised of bluebunch wheatgrass together with Idaho fescue
13 (*Festuca idahoensis*) (Hope et al. 1991b).

14 61.1 Please update with current taxonomy.

15

16 **Response:**

17 FEI provides the following revision to the taxonomy cited in the preamble: Bluebunch
18 wheatgrass (*Pseudoroegneria spicata*).

19

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 91

1 **62.0 Topic: Vegetation**

2 **Reference: 4.3.2 Vegetation pdf. pg. 181**

3 Vegetation densities and species composition along the PFR study area was consistent
4 with BEC zone characterization...Data from the follow-up field reconnaissance
5 confirmed that vegetation was consistent with the BEC zone characterization. The
6 existing FortisBC ROW had encroachment of non-native and invasive plant species
7 periodically throughout.

8 62.1 The vegetation descriptions are very high level, making it difficult to ascertain
9 what additional information, if any, was collected during the follow-up (August)
10 field assessment. Please provide further detailed information from follow-up field
11 reconnaissance.

12
13 **Response:**

14 Information from the follow-up field assessment is included in a draft Pre-Construction Site
15 Assessment (habitat assessment) report. Please refer to the response to PIB IR1 60.1.

16

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 92

1 **63.0 Topic: Vegetation**

2 **Reference: 3.4 Vegetation pdf pg. 167**

3 Hemmera reviewed vegetation data resources from Table 3.1 within the general study
4 area for the selected alignment. Desktop studies identified the following features within
5 the general study area:

- 6 • Biogeoclimatic (BEC) zones and subzones
- 7 • Areas of old growth forest stands, specifically legal vs. non-legal old growth
8 management areas (OGMAs)
- 9 • Federally identified critical habitat for plant species at risk
- 10 • Known locations of invasive plants.

11 63.1 Was the VRI data, which indicates 147.6 ha of old growth age class 8 and 9
12 stands in the 100m wide pipeline corridor rather than 33.1 ha of OGMAs,
13 reviewed? If not, why not?

14

15 **Response:**

16 The source of the Vegetation Resources Inventory (VRI) data referenced in the question above
17 is unknown, so FEI is unable to confirm whether the referenced data was reviewed by
18 Hemmera. VRI analysis is generally prepared during the detailed engineering phase of a project
19 in order to apply for the *Oil and Gas Activities Act* permit.

20 Please also refer to the response to PIB IR1 31.1.

21

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 93

1 **64.0 Topic: Vegetation**

2 **Reference: 4.3.2 Vegetation pdf pg. 181**

3 A summary of documented invasive plant species recorded in the general study area is
4 provided in Table 4.6 and show on Figure 4.

5 64.1 In light of significant existing provincially regulated, noxious weed infestation in
6 the proposed alignment area, what assessment has been conducted on the
7 potential implications of increased indigenous plant spread in this area related to
8 pipeline construction would be beneficial here, including for encroachment to
9 adjacent ecosystems and/or affect the ecological integrity of the adjacent
10 Okanagan Mt. Prov. Park.

11

12 **Response:**

13 FEI interprets this question as asking whether it has undertaken an assessment of the benefits
14 to the ecosystem resulting from an increase in indigenous/native plants rather than noxious
15 weed infestations.

16 FEI has not undertaken such an assessment, but would agree that the spread of native plants is
17 beneficial as compared to the spread of noxious weeds. Project restoration and invasive plant
18 management plans will be developed during the detailed engineering phase of the Project with a
19 focus on successful establishment of native plants.

20 Please also refer to the response to PIB IR1 31.1.

21

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 94

1 **65.0 Topic: Vegetation**

2 **Reference: 4.3.2 Vegetation pdf pg. 182**

3 There are no CDC occurrences for at-risk plants located in or adjacent to the general
4 study area...Desktop studies identified one plant species of concern (Thurber's
5 needlegrass) with medium potential to occur within the general study area.

6 65.1 This information appears incorrect; the CDC database indicates that there are, in
7 fact, several provincial red- or blue-listed (and OGC-listed) species in the nearby
8 area or immediate vicinity, including:

- 9 • Pale evening primrose, *Oenothera pallida* ssp. *pallida* (above Penticton at
10 project terminus)
- 11 • The Dalles milk-vetch, *Astragalus sclerocarpus* (Skaha Lake just south of
12 Penticton)
- 13 • Small-flowered lipocarpha, *Lipocarpha micrantha* (directly on the opposite
14 side of Okanagan Lake)
- 15 • Short-rayed Aster, *Symphyotrichum frondosum*, (Skaha Lake)
- 16 • Columbian carpet moss, *Bryoerythrophyllum columbianum* (along
17 lakeshore north of Naramata)
- 18 • Tiny tassel, *Crossidium seriatum* (Johnson Spring Creek)
- 19 • Nugget moss, *Microbryum vlassovii* (Penticton)
- 20 • Toothcup, *Rotala ramosior* (directly across the lake at Sun-Oka).
- 21 • Prairie gentian, *Gentiana affinis* (Summerland)

22 Moreover, Thurber's needlegrass does not range particularly close to this area,
23 the closest recorded locations being Oliver/Osoyoos – hence it is unclear why
24 this species is being singled out for mention here over other species.

25 Please update the desktop review pertaining to at-risk plants.

26
27 **Response:**

28 The Environmental Overview Assessment (EOA) identifies the general study area to be 100
29 metres on either side of the proposed centerline of the Project. Since there were no CDC
30 occurrences for at-risk plants identified within this general study area, FEI does not plan to
31 update the desktop review pertaining to at-risk plants. The species cited above are not located
32 within the general study area and are located greater than 500 metres from the proposed
33 centerline of the Project.

34 Thurber's needlegrass is considered to have medium potential to occur within the general study
35 area based on Hemmera's current understanding of the species range and known species
36 habitat associations.

37

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 95

1 **66.0 Topic: Vegetation**

2 **Reference: 4.3.2 Vegetation pdf pg. 182**

3 Three CDC occurrences for Black Cottonwood – Douglas fir / Douglas Maple – Common
4 Snowberry at-risk ecological communities overlap the general or wildlife study area.

5 66.1 CDC iMap also maps the followings at-risk community occurrences as possibly
6 within, or near to, the study area:

- 7 • Trembling Aspen / Common Snowberry (possibly overlapping with
- 8 project's south terminus)
- 9 • Common Cattail Marsh
- 10 • Baltic Rush – Common Silverweed
- 11 • Hard-stemmed Bulrush Deep Marsh
- 12 • Big Sagebrush / Bluebunch Wheatgrass

13 Please update the desktop review pertaining to at-risk ecological communities to
14 reflect these other medium to high likelihood occurrences with a ranking of
15 occurrence potential.

16
17 **Response:**

18 The Environmental Overview Assessment (EOA) identifies the general study area to be 100
19 metres on either side of the proposed centerline of the Project, and as none of the above listed
20 at-risk ecological communities were identified within this general study area, FEI does not plan
21 to update the desktop review pertaining to at-risk ecological communities. These ecological
22 communities are all located greater than 500 metres from the proposed centerline of the Project.

23

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 96

1 **67.0 Topic: Vegetation**

2 **Reference: 4.3.2 Vegetation, Table 4.7, pdf pg. 183**

3 Table 4.7 Plant Species of Concern and At-risk Ecological Communities with Potential to
4 Occur in the General Study Area.

5 67.1 The table only lists plant species. Please update to include ecological
6 communities as well (as per the table caption).

7
8 **Response:**

9 The caption for Table 4.7 of the Environmental Overview Assessment (EOA) should read: “Plant
10 Species of Concern with Medium to High Potential to Occur in the General Study Area”. At-risk
11 ecological communities was inadvertently included in this table caption.

12 EOA Appendix B, Table B.2 was also mislabeled and should read: “Plant Species and
13 Ecological Communities of Concern Identified with the Potential to Occur Within Study Area”.
14 The information requested is found in this table.

15

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 97

1 **68.0 Topic: Vegetation**

2 **Reference: Appendix B Table B.2, pdf. pg. 268**

3 Table B.1 Wildlife Species of Concern Identified with the Potential to Occur Within Study
4 Area

5 ...

6 Calochortus lyallii, Shchoenoplectiella saximontana

7 68.1 This table is inconsistent with the information provided in the analogous table in
8 the text (Table 4.1, pdf. pg 170) and mentions four species (two vascular plants,
9 two non-vascular plants) not mentioned previously in the text. The two vascular
10 species additions, C. lyallii and S. saximontana, are not known from the area and
11 are unlikely to occur there (C. lyallii, a very well studied species, is restricted to
12 South Okanagan Grasslands Prov. Park, while S. saximontana is known from
13 Osoyoos and Shuswap Lake).

14
15 **Response:**

16 FEI interprets the question as asking why Table B.2 (and not Table B.1 as referenced in the
17 preamble) appears to be inconsistent with Table 4.1 included in the EOA report.

18 Table 4.1 Summary of Environmental Conditions speaks to what at-risk plant occurrences have
19 been documented on or near the general study area. In contrast, Table B.2 Plant Species of
20 Concern Identified with the Potential to Occur within the study Area refers to the potential for
21 occurrence.

22
23

24
25 68.2 Provide the rationale for indicating these two species (along with the similarly
26 out-of-range Thurber's needlegrass) as opposed to other, more local species.

27

28 **Response:**

29 FEI interprets the question as referring to Table B.2 (and not Table B.1 as referenced in the
30 preamble).

31 The species range and known species habitat associations suggests that the species has the
32 potential to occur in the general study area.

33

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 98

1 **69.0 Topic: Wildlife**

2 **Reference: Application Section 4 - Description and Evaluation of Alternatives**

3 General - Pipeline alignment (general)

4 69.1 Please provide the environmental values of other project alternatives and the
5 specific criteria used to dismiss them.

6
7 **Response:**

8 FEI considered the following environmental values in its evaluation criterion (Environmental,
9 Public and Indigenous Impacts) to assess three feasible Project alternatives (i.e., Alternatives 1,
10 2 and 3):

- 11 • Land use;
- 12 • Contaminated sites;
- 13 • Fish and fish habitat;
- 14 • Vegetation; and
- 15 • Wildlife.

16
17 Each feasible alternative was scored against each of the evaluation criteria using a scale from 1
18 to 5. As shown in Table 4-6 of the Updated Application, Alternatives 1 and 2 both received a
19 score of 2 against this criterion, while Alternative 3 received a score of 3.

20 As discussed in Section 4 of the Updated Application, FEI identified and analyzed five
21 alternatives to address the need for the OCU Project. Of these five alternatives, two were
22 eliminated as part of the preliminary evaluation, as they were deemed to be not feasible options
23 to meet Project objectives. Please refer to PIB IR1 7.1 for further discussion of the alternative
24 screening process.

25 The remaining three feasible alternatives were assessed against the evaluation criteria
26 discussed in Section 4.5.1 of the Updated Application. These criteria include “Environmental,
27 Public, and Indigenous Impacts”. It should be noted that this was not the primary criterion which
28 determined the preferred alternative, as all three alternatives scored similarly against
29 environmental criteria. Please refer to PIB IR1 8.7 for a discussion of this criterion and the
30 scoring assigned to each alternative.

31

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 99

1 **70.0 Topic: Wildlife**

2 **Reference: Appendix F Table ES.1 pdf. pg. 151**

3 General - datasets

4 70.1 Please explain why historical datasets like the BC CDC were used without any
5 stated bias.

6
7 **Response:**

8 Historical datasets, like the BC CDC, provide a desktop-level resource to identify previously
9 documented and mapped element occurrences within the study area. The review of the BC
10 CDC aids the subsequent species at risk screening review that provides a more comprehensive
11 review of species and ecosystems-at-risk potential occurrence. Potential biases of the dataset
12 were not included as part of the Environmental Overview Assessment (EOA).

13 Some potential biases within this dataset include:

- 14 • The BC CDC focuses mapping efforts primarily on the most at-risk species and
15 ecosystems or on areas of development. For this reason not all data submitted will result
16 in a mapped element occurrence.
- 17 • The BC CDC reporting system relies on scientists and knowledgeable naturalists to build
18 the database of the locations of species and ecological communities in BC.
- 19 • It represents a database of reported and mapped occurrences (i.e., confirmed
20 observations that are then reported and subsequently mapped by the CDC). It does not
21 preclude occurrences of other species at risk that may be present; not all occurrences
22 may be mapped.
- 23 • It assumes all data reported and to be mapped has been mapped on the database. The
24 review is accurate to the date the desktop review was completed for the EOA.
- 25 • Occurrences that are not reported and not mapped will not be identified in the BC CDC
26 dataset.
- 27 • All historical occurrences are provided; current conditions may have changed since the
28 previously identified occurrence to alter habitat conditions and change likelihood of
29 presence (e.g., increase or decrease; expanded or reduced ranges).
- 30 • The varying level of studies, rigour of assessment, or species detectability will impact the
31 likelihood of occurrences to be documented and reported in this database.
- 32 • It uses a methodology and ranking system developed by the Ministry of Environment
33 and Climate Change Strategy. Regionally or culturally important species may not be
34 included (e.g., bald eagle).

35
36 FEI notes that multiple data sources were reviewed during the EOA (see Table 3.1 of the EOA
37 for a complete list) to mitigate potential biases. As the Project progresses through detailed



FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 100

1 engineering, field assessments will be undertaken to validate the data from desktop sources
2 and where possible, those assessments will account for potential biases in the historical
3 datasets.

4

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 101

1 **71.0 Topic: Wildlife**

2 **Reference: Appendix F Table ES.1 pdf. pg. 151**

3 Wildlife: Follow-up Activities... To the extent practicable, undertake construction within
4 the least risk timing windows for applicable species

5 71.1 Please provide the timing windows that will be applied including for clearing,
6 construction, and remediation activities in consideration of critical periods for
7 species at risk or other sensitive species, bird nesting periods and amphibian
8 salvage surveys.

9
10 **Response:**

11 General timing windows for wildlife are discussed in Section 7 of the Environmental Overview
12 Assessment (EOA). Timing windows for clearing, construction, and remediation activities will be
13 refined during the detailed engineering phase of the Project with consideration for wildlife timing
14 windows.

15 Please also refer to the response to PIB IR1 31.1.

16

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 102

1 **72.0 Topic: Wildlife**

2 **Reference: 3.5 Wildlife, pdf pg. 169**

3 During the PFR and the follow-up field reconnaissance, the field crew recorded,
4 described, and geographically-referenced incidental observations of wildlife of concern
5 and wildlife habitat features (e.g., raptor or heron nests, bird colonies, mineral licks,
6 wallows, dens, burrows, and wildlife trees). Activity, behaviour, and species abundance,
7 where evident and relevant, were also noted. Due to the timing of the PFR (late
8 November) and weather conditions, wildlife observations at that time were limited. The
9 follow-up

10 field reconnaissance took place in August 2020 and provided more robust wildlife
11 observations.

12 72.1 Please provide details of protection measures for Wildlife Trees.

13

14 **Response:**

15 Details of protection measures for wildlife trees have not yet been developed. They will be
16 developed during the detailed engineering phase of the Project once the construction footprint is
17 better defined and it is known whether any wildlife trees are at risk.

18 Please also refer to the response to PIB IR1 31.1.

19

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 103

1 **73.0 Topic: Wildlife**

2 **Reference: Appendix F, pdf pg. 184**

3 Table 4.10 summarizes the at-risk wildlife species occurrences documented within the
4 wildlife study area. This study area overlaps seven recorded occurrences of at-risk
5 wildlife for American badger, flammulated owl, Great Basin spadefoot, Nuttall's cottontail,
6 white-headed woodpecker, and two mapped masked (i.e., confidential) CDC
7 occurrences. The masked occurrences overlap only the outer edge of the wildlife study
8 area for the selected alignment and are not expected to be impacted by the Project.

9 73.1 Please explain why some species (e.g., American Badger, Nuttall's cottontail,
10 White-headed Woodpecker) identified as having occurrences that overlap the
11 study area are not discussed in detail with respect to mitigation.

12
13 **Response:**

14 Detailed mitigation measures have not yet been developed for species with occurrences that
15 overlap the study area. Mitigation measures will be developed during the detailed engineering
16 phase of the Project.

17 Please also refer to the response to PIB IR1 31.1.

18
19

20
21 73.2 Please identify the species associated with the masked occurrences.

22
23 **Response:**

24 FEI's environmental consultant, Hemmera, contacted the CDC on July 27, 2020 about the
25 masked occurrences while preparing for the field assessment and received a response on
26 August 6, 2020. However, Hemmera is not permitted to disclose this information to FEI, or any
27 other party, because the information is considered sensitive.

28 The CDC masks the precise locations of secured occurrences of species and ecosystems at
29 risk from public viewing and download. The occurrences may be secured due to the species or
30 ecosystems being susceptible to persecution or harm, or for proprietary reasons. Release of
31 details of secured occurrences is subject to the signing of a Confidentiality and Non-
32 reproduction Agreement and a demonstrated "need-to-know".

33
34

35
36 73.3 Please identify the potential impacts to Common Nighthawk, which are a
37 threatened ground nesting species in Canada and were observed in the Project
38 area.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 104

1

2 **Response:**

3 Species-specific potential impacts were beyond the scope of the Environmental Overview
4 Assessment (EOA). In general, potential effects to wildlife were identified in Table 6.1 of the
5 EOA and include:

- 6
- 7 • Destruction of wildlife habitat features (including nests and dens) and disturbance of
wildlife using these features during construction;
 - 8 • Temporary disturbance and displacement of wildlife as a result of construction activities;
9 and
 - 10 • Direct injury or mortality resulting from equipment operation.
- 11

12 Please also refer to the response to PIB IR1 31.1.

13

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 105

1 **74.0 Topic: Wildlife**

2 **Reference: 4.3.3 Wildlife pdf pg.184**

3 74.1 Please provide a habitat balance table that summarizes: (i) the cleared area [i.e.,
4 project footprint broken down into meaningful categories such as forested (by
5 age class), grassland, UWR (by species), WHA (by species), wetland, etc., (ii)
6 temporary disturbance areas that will be reclaimed, (iii) the area of the right of
7 way within which vegetation will be managed throughout the life of the project
8 [i.e., vegetation clearing during operations that will preclude the growth of
9 conifers]. These values should be compared with the values within the study area
10 (e.g., the 500-m-wide wildlife study area).

11

12 **Response:**

13 This requested information is not available at this stage. Information of this nature is prepared
14 as required during the detailed design phase as the Project footprint becomes further defined.

15 Please also refer to the response to PIB IR1 31.1.

16

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 106

1 **75.0 Topic: Wildlife**

2 **Reference: 4.3.3 Wildlife pdf. pg. 184**

3 The wildlife study area is predominantly overlapped by multiple ungulate winter ranges
4 (UWRs) including multiple polygons for U-8-001 (mule deer; M-ODHE), the northernmost
5 section overlaps U-8-006 (moose; M-ALAL), and the southern terminus of the selected
6 alignment overlaps a polygon for U-8-005 (Mountain Goat; M-ORAM) along Ellis Creek.

7 75.1 FEI correctly identifies the Approved Ungulate Winter Ranges that are near to or
8 intersected by the project footprint. Each of the three UWRs have been
9 established by a legal Order under the authority of sections 12(1) and 9(2) of the
10 Government Actions Regulation. Accordingly, each of those Orders describes the
11 UWR and General Wildlife Measures that prescribe forest harvesting and
12 silviculture practices intended to conserve the habitat value for the species so
13 covered by the Order.

14 Most of the length of the project is in the core of a Mule Deer UWR; other parts
15 are within a Moose UWR and the southern end is near Mountain Goat UWR.
16 Clearly, the project area is situated in important and valuable ungulate winter
17 habitat.

18 Please update Appendix F (including Table 6.1) to provide (i) mapping showing
19 the overlap between UWR, (ii) a discussion of the general or specific contents of
20 any UWR Order, (iii) a discussion of any exemptions from the UWR Order that
21 the proponent may be contemplating, (iv) an interpretation of potential impacts
22 [both during construction and operations] of the project on the ungulate species
23 that might manifest via impacts to UWR, and (v) a discussion of measures to be
24 taken to avoid or mitigate impacts of the project on UWR; such measures would
25 be contained within a construction environmental management plan (assuming
26 the proponent is not planning to proceed as exempt from the UWR Orders.

27
28 **Response:**

29 The Ungulate Winter Range (UWR) polygons were not included in the Environmental Overview
30 Assessment (EOA) figures as they cover the entire area and therefore the extent of the range is
31 not easily visible at the scale of the figures in the EOA. FEI has provided the expanded figure in
32 Attachment 75.1 to address item (i) of this information request.

33 FEI notes that items (ii) to (v) of this information request are beyond the scope of the EOA. This
34 information will be reviewed and considered during the detailed engineering phase of the
35 Project.

36 Please also refer to the response to PIB IR1 31.1.

37
38
39

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 107

1 75.2 Please detail reclamation practices and operational vegetation management that
2 will prevent additional (unauthorized) vehicular access and reduce sight lines
3 (from a height below 3 m) to less than 100 m and maintaining a vegetation cover
4 in that part of the right-of-way directly over the pipeline that comprises forbs and
5 low-growing shrubs (including berry-producing plants that can provide food and
6 cover for a wide range of wildlife species).

7

8 **Response:**

9 Reclamation or restoration plans have yet to be developed and will be prepared during the
10 detailed engineering phase of the project. Please also refer to the responses to PIB IR1 21.2
11 and 31.1.

12

1 **76.0 Topic: Wildlife**

2 **Reference: 4.3.3 Wildlife, pdf pg. 184**

3 Amphibians were observed at multiple watercourses. A western toad adult and juveniles
4 were observed at OCU03-19 (Chute Creek) and Pacific tree frogs were observed at
5 NCD-07, NCD-05, and OCU02-12 (Turnbull Creek) (Figure 4). Numerous tadpoles
6 (species unknown) were observed at the crossing of OCU03-18 (Trust Creek).

7 76.1 Please explain why aside from being mentioned in the text, listed in Table 4.8,
8 and Table B-1 in Appendix B, Western Toad is not considered and assessed
9 relative to other amphibian species at risk.

10

11 **Response:**

12 Consistent with the intended scope of an Environmental Overview Assessment (EOA) report,
13 Hemmera focused on the identification of CDC occurrences and Critical Habitat in the wildlife
14 study area. As there are no CDC recorded occurrences of, or Critical Habitat for, western toad
15 in the wildlife study area, it was not included in Tables 4.9 and 4.10. Western toad was
16 considered as a part of the EOA with it being mentioned in the EOA text, listed in Table 4.8 and
17 Table B-1.

18

19

20

21 76.2 Please confirm that the observation of juveniles suggests there may be a
22 breeding pond nearby.

23

24 **Response:**

25 An observation of juveniles may suggest that there is a breeding pond nearby, but the CDC
26 species summary⁹ states that western toads “breed in shallow, littoral zones of lakes, temporary
27 and permanent pools and wetlands, bogs and fens, and roadside ditches”. As such, the
28 breeding waterbody may not necessarily be a pond.

29

30

31

32 76.3 Please confirm Western Toads spend much of their time in upland habitat and
33 that consideration of habitat impacts in both upland and aquatic habitats is
34 required for this species.

35

⁹ <https://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=16554>.



FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 109

1 **Response:**

2 FEI confirms that the western toad is known to spend much of its time in upland habitat. Habitat
3 impacts in both upland and aquatic habitats will be considered during the detailed engineering
4 phase of the Project and avoidance and mitigation measure included in the Project
5 Environmental Management Plan. Please also refer to the response to PIB IR1 31.1.

6

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 110

1 **77.0 Topic: Wildlife**

2 **Reference: Table 4.8, pdf. pg. 185**

3 77.1 Explain why Little brown myotis (*Myotis lucifugus*) is excluded from table despite
4 known occurrences within the proposed project area with a high probability of
5 occurrence.

6
7 **Response:**

8 Table 4.8 of the Environmental Overview Assessment (EOA) identifies species with medium to
9 high potential to occur within the wildlife study area. As noted in Table B.1 of Appendix B of the
10 EOA, Little Brown Myotis is identified as having low potential to occur in the Project area based
11 on the review of the CDC datasets.

12 Please also refer to the response to PIB IR1 31.1.

13
14

15 77.2 Explain why Western Skink (*Plestidon skiltonianus*) excluded from table despite
16 known occurrences within the proposed project area with high probability of
17 occurrence.

18
19 **Response:**

20 Table 4.8 of the Environmental Overview Assessment (EOA) identifies species with medium to
21 high potential to occur within the wildlife study area. As noted in Table B.1 of Appendix B of the
22 EOA, western skink is identified as having low potential to occur in the Project area based on
23 the review of the CDC datasets.

24 Please also refer to the response to PIB IR1 31.1.

25
26

27 77.3 Please update table to reflect habitat requirements particularly given the
28 emphasis on critical habitat assessments as a means of mitigating potential
29 impacts to species at risk resulting from the proposed project.

30
31 **Response:**

32 Table 4.8 summarizes the species with medium to high potential to occur in the wildlife study
33 area and is not intended to identify the habitat requirements of these species.

34 During the detailed engineering phase of the Project, as greater definition of the Project footprint
35 is obtained, FEI will undertake further site-specific assessments to determine if habitat values
36 for wildlife of concern exist on the Project footprint and will develop mitigation measures, as
37 required.

38 Please also refer to the response to PIB IR1 31.1.

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentinction Indian Band (PIB) Information Request (IR) No. 1	Page 111

1 **78.0 Topic: Wildlife**

2 **Reference: Table 4.8 pdf pg. 185**

3 Footnote 4 Medium: Hemmera’s current understanding of the species range and known
4 species habitat associations suggests that the species is expected to occur in the study
5 area on a temporary or regular (i.e., predictable) seasonal basis and in densities that
6 facilitate persistence of a functional population within the study area. High: Hemmera’s
7 current understanding of the species’ range and known species habitat associations
8 suggests that the species is expected to occur in the study area regularly, and in
9 densities that would be expected to occur in provincial benchmark habitats.

10 78.1 Please detail how a species was determined to have a medium or high potential
11 to occur and how data collected during the two field visits (one in November and
12 one in August) or during the desktop exercise support these designations.

13
14 **Response:**

15 The species at risk screening assessed medium and high potential to occur within the wildlife
16 study area based on confirmed species ranges, habitat associations, and known occurrences or
17 a combination of these factors using professional discretion and knowledge of the species
18 habitat requirements.

19 Prior to field visits, Hemmera completed the assessment based on desktop review of available
20 resources (as described in Section 3.5 of the EOA) and its professional expertise. Field visits
21 were used to further refine the assessment whereby species at risk were assigned a “high”
22 ranking if the species itself or optimal habitat conditions for the species were observed in the
23 field, while species at risk were assigned at least a “moderate” ranking if suitable habitats were
24 identified in the field.

25

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 112

1 **79.0 Topic: Wildlife**

2 **Reference: 5.2.7 pdf pg. 194**

3 **5.2.7 Wildlife Act**

4 In general, the BC Wildlife Act provides a regulatory framework for the management of
5 wildlife and, in very limited circumstance and limited to a few specifically designated
6 species, wildlife habitat (i.e., bird nests) in the province. The Wildlife Act protects most
7 native vertebrates from direct harm or harassment, regulates hunting, trapping and sport
8 fishing, protects nesting birds and active nests that are occupied by a bird or its egg(s).
9 The nests of some bird species are afforded specific consideration under Section 34b of
10 the Wildlife Act regardless of whether they are occupied. These protected nests, as
11 relevant to this Project, include those used seasonally by peregrine falcon, burrowing
12 owl, bald eagle, osprey, and great blue heron.

13 79.1 Detail the nest assessments conducted and the planned assessments for the
14 construction period, including for habitat used by ground nesters such as
15 Common Nighthawk.

16
17 **Response:**

18 No assessments specific to nests have been conducted to date. Nest assessment planning will
19 occur during the detailed engineering phase once the Project footprint is better defined.

20 Please also refer to the response to PIB IR1 31.1.

21

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 113

1 **80.0 Topic: Wildlife**

2 **Reference: Appendix F - 6.1 Biophysical Receptors; Table 6.1, pdf pg. 201**

3 Destruction of wildlife habitat features (including nests and dens) and disturbance of
4 wildlife using these features during construction

5 80.1 Please detail how FEI will provide for restoration or compensation for the
6 destruction of wildlife habitat features.

7

8 **Response:**

9 Restoration plans have not yet been developed for the Project. These plans will be developed
10 during the detailed engineering phase of the Project.

11 Please also refer to the response to PIB IR1 31.1.

12

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Penticton Indian Band (PIB) Information Request (IR) No. 1	Page 114

1 **81.0 Topic: Wildlife**

2 **Reference: Appendix F - 6.1 Biophysical Receptors; Table 6.1, pdf pg. 201**

3 Conduct detailed follow-up assessments to determine if critical habitat features or
4 attributes for the following species are present, disturbed or destroyed:

- 5 • Lewis's woodpecker
- 6 • Great Basin spadefoot
- 7 • Desert nightsnake
- 8 • Western rattlesnake
- 9 • Great Basin gopher snake

10 81.1 Please provide when this detailed assessment will be provided and how the
11 results will be presented to Penticton Indian Band and the BCUC?

12
13 **Response:**

14 The further assessments will be completed during the detailed engineering phase of the Project
15 once the project footprint is further defined. Please refer to the response to PIB IR1 31.1.

16 PIB members/technicians will be invited to participate in the field component of the
17 assessments. The draft report will be provided to the PIB for its review and comment before the
18 report is finalized, per the existing Capacity Funding Agreement.

19 Depending on the timeline to complete the assessment report(s), including review by the
20 Indigenous groups, the report likely will not be finalized before the BCUC renders a decision on
21 this Project.

22

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 115

1 **82.0 Topic: Wildlife**

2 **Reference: Appendix, F, Section 7.2, Mitigation Measures pdf pg. 205**

3 Project-specific and site-specific mitigation measures are typically developed once the
4 project design, timing, footprint, and construction method have been finalized. They are
5 developed to minimize or reduce an anticipated adverse effect.

6 82.1 Why have these mitigation measures not been developed at this time given the
7 proposed design, timing, footprint and method proposed in the Application?
8 When will the line be considered finalized enough by FEI for the purpose of
9 developing mitigation?

10

11 **Response:**

12 The specific mitigation measures have not yet been developed because the detailed
13 engineering phase has not been completed. Once the Project footprint and construction
14 methodology are better defined, the species and habitat features present within the footprint can
15 be confirmed and appropriate mitigation measures developed. However, general mitigation
16 measures are listed in Table 6.1 and Section 7.2 of the Environmental Overview Assessment.

17 Please also refer to the response to PIB IR1 31.1.

18

19

20

21 82.2 Please detail the mitigation measure for impacts to wildlife habitat, wildlife habitat
22 features, and old-growth forests that occur in the proposed project area and
23 compensatory measures for habitats degraded as a result of the project.

24

25 **Response:**

26 Please refer to the response to PIB IR1 82.1.

27

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 116

1 **83.0 Topic: Wildlife**

2 **Reference: Appendix F, 7.2.2.3, Amphibians and Turtle General Least-risk**
3 **Periods pdf pg. 206**

4 In areas where amphibians and turtles are expected, construction should be avoided
5 during hibernation, breeding, and migration periods, as determined by a QEP.

6 83.1 Please provided the relevant construction avoidance periods.

7

8 **Response:**

9 Once the Project footprint and construction methodology are further defined, FEI will assess
10 whether amphibians or turtles are present or have the potential to be present within the
11 footprint. At that time, construction avoidance periods will be prepared for applicable species.

12 Please also refer to the response to PIB IR1 31.1.

13

FortisBC Energy Inc. (FEI or the Company) Application for a CPCN for the Okanagan Capacity Upgrade (OCU) Project (Application)	Submission Date: May 13, 2021
Response to Pentincton Indian Band (PIB) Information Request (IR) No. 1	Page 117

1 **84.0 Topic: Wildlife**

2 **Reference: Appendix F, 7.2.6, Site Restoration pdf pg. 207**

3 Areas disturbed during construction should be restored to meet or improve upon pre-
4 construction conditions, particularly for work within the ALR, in and around fish habitat,
5 and near important wildlife habitat features. Project-specific restoration plans should be
6 developed that outline how to stabilize any disturbed areas while maximizing the
7 resultant conditions and habitat values for environmental receptors

8 84.1 Will FEI commit to develop a project wide restoration plan to address habitats
9 impacted by the project and identify additional habitat enhancement actions to
10 enhance habitat for species of management concern including ungulates and
11 species at risk.

12

13 **Response:**

14 As noted in the preamble, FEI intends to develop a restoration plan specific to the Project (i.e.,
15 project wide). FEI will consider habitat enhancement when developing the restoration plan.

16

Attachment 14.2



Ken Oliphant, Ph.D., P.Eng.

Executive Vice President & Chief Technology Officer
JANA Corporation

PROFILE

Dr. Ken Oliphant is Executive Vice President and Chief Technology Officer of JANA. “Dr. Ken” received his undergraduate degree in Chemical Engineering from the University of Toronto and his Ph.D. in Chemical Engineering from Queen’s University. Prior to co-founding JANA, he spent his career at Rohm & Haas and AT Plastics. Ken’s specific focus is in piping system risk assessment and management, performance validation and lifetime forecasting. Under Ken’s technical leadership, JANA’s Expert Team partners with gas pipeline operators to develop Integrity Management strategies based on JANA’s state-of-the-art mechanistic-probabilistic risk modeling, allowing pipeline operators to make fully-informed decisions.

EXPERIENCE

JANA Corporation
1999 > Current

Executive Vice President & Chief Technology Officer

JANA was founded in 1999 as a testing laboratory for plastic piping systems. Over the next 15 years, JANA grew to be the largest hydrostatic testing lab in North America and the largest oxidative resistance testing lab in the world. In 2014, JANA sold its laboratory assets to NSF International and turned its entire focus to JANA’s state-of-the-art risk models for gas pipeline systems. Emerging from JANA’s 300,000,000 hours of plastic pipe testing experience, advanced reliability engineering tools from the aerospace and nuclear industries, and the performance modelling tools developed at JANA over the last two decades, JANA’s risk models are used by North American gas pipeline operators to create Risk Assessments customized to an operator’s specific piping network. JANA is proud to have made an impact on the integrity of natural gas pipelines serving over 51 million homes in the US and Canada.

Responsibilities:

- Works closely with Executive Team to provide the vision needed to support current and future business needs by building an innovative technological roadmap by setting short and long-term technical goals while ensuring alignment with company’s strategy
- Leads all aspects of JANA’s technology development
- Directs the company’s technology strategic direction, development and future growth for platforms, partnerships and external relationships
- Provides leadership to a rapidly expanding Risk Model Development team in a fashion that supports JANA’s culture, mission and values
- Actively researches leading edge technologies, conducts case studies and makes determinations on the direction of new technologies
- Outlines technical opportunities and risks to deliver technologies and identifies new innovations
- Collaborates with pipeline operators to develop high-level risk strategies to allow optimal integration of risk assessments into corporate decision-making processes

EDUCATION

Queen's University
1994

Ph.D. Engineering Chemistry

University of Toronto
1989

B.A.Sc. Chemical Engineering

INDUSTRY PARTICIPATION

Industry Associations

Over his career, Dr. Oliphant has participated in the industry as follows:

- Professional Engineers of Ontario (PEO)
- Association of Professional Engineers and Geoscientists of Saskatchewan
- Plastic Pipe Institute (PPI)
- Canadian Standards Association (CSA)
- American Gas Association (AGA)
- Canadian Gas Association (CGA)
- ISO TC138 (Plastics pipes, fittings and valves for the transport of fluids)
- ISO TC 251 (Asset Management)

Technical Leadership

- ISO TC138 Co-Chair, Canada
- ISO TC251 Subcommittee
- CSA B137 Distribution Subcommittee
- PPI Hydrostatic Stress Board
- CSA Z662

Regulatory Influence

JANA has supported its clients and their communities in the following regulated jurisdictions:

- Alberta
- California
- Virginia
- British Columbia
- Ontario
- Canadian Federal Code
- US Federal Code

PUBLICATIONS

- “Integrating QRA Outputs into Pipeline Integrity Management Decision-Making”, Dr. K. Oliphant, P.Eng. and W. Bryce, P.Eng., JANA Corporation, 2019.
- “Bayesian Modeling for Integrity Management”, Dr. K. Oliphant, P.Eng. and A. Zhong, JANA Corporation, American Gas Association 2019 Pipeline Risk Data Workshop, Albuquerque, 2019.
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- “Implementing Probabilistic/Quantitative Absolute Risk Models in Natural Gas Utilities”, R. Gardner, Xcel Energy, W. Luff and K. Oliphant, JANA Corporation, American Gas Association, Nashville, 2019.

- “A Risk-Based Approach to Legacy Cross Bore Inspection Optimization”, D. Joyal and K. Oliphant, JANA Corporation, Canadian Gas Association, Ottawa, 2019.
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- “A Critical Review of Pipeline Risk Modeling Approaches”, William Luff, Dr. Ken Oliphant, Wayne Bryce and James DuQuesnay, JANA Corporation, American Gas Association, Phoenix, 2016.
- “Bowtie Risk Assessment of Electrofusion Fitting Installations”, Dr. Ken Oliphant, P.Eng., James DuQuesnay, William Luff, JANA Corporation, American Gas Association, Phoenix, 2016.
- “An Absolute Risk Model Framework for Gas Pipelines”, K. Oliphant, Ph.D., P.Eng., W. Luff, M.A.Sc., W. Bryce, P.Eng., JANA Corporation, American Gas Association, Phoenix, 2016.
- “A Risk Based Approach to Leak Survey Optimization”, William Luff and Dr. Ken Oliphant, JANA Corporation, American Gas Association, Phoenix, 2016.
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- “A Risk Based Approach to Managing Aldyl Piping in Gas Distribution Systems”, K. Oliphant, Ph.D., P.Eng., P. Vibien, P.Eng., W. Luff, MSc., P. Angelo, Ph.D., Jana, Aurora, ON Canada, Gene Palermo, Ph.D., Palermo Plastics Pipe Consulting, TN United States, Canadian Gas Association, 2015.
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- "Recycling of Ground Rubber Tires in Polymer Blends using Reactive Compatibilization", K. Oliphant and W.E. Baker, Proceedings, Polymer Processing Society, 7th Annual Meeting, Hamilton, Ontario, Canada, April 22-24, 1991.



Wayne Bryce, P.Eng.
President & Chief Executive Officer
JANA Corporation

PROFILE

Wayne Bryce is President & CEO of JANA. Wayne is a Mechanical Engineer from McGill University in Montreal and has spent his entire career in the field of piping systems. Joining DuPont out of University, Wayne led the team that developed proprietary process technology saving \$20 million in capital and reducing operating costs by over 30% annually. Following that success, Wayne launched a completely new product for DuPont and grew the market penetration of an established product line by 42%. In 1999, Wayne co-founded JANA, with a mission to ensure Better Pipelines for a Better World. Under Wayne's leadership, this Mission defines, directs and drives JANA. Wayne ensures that JANA invests deeply in developing the absolute best technology that empowers gas pipeline operators to genuinely manage their assets in a risk-informed manner and profoundly mitigate the inherent risks of operating pipeline assets.

EXPERIENCE

JANA Corporation
1999 > Current

President & Chief Executive Officer

JANA was founded in 1999 as a testing laboratory for plastic piping systems. Over the next 15 years, JANA grew to be the largest hydrostatic testing lab in North America and the largest oxidative resistance testing lab in the world. In 2014, JANA sold its laboratory assets to NSF International and turned its entire focus to JANA's state-of-the-art risk models for gas pipeline systems. Emerging from JANA's 300,000,000 hours of plastic pipe testing experience, advanced reliability engineering tools from the aerospace and nuclear industries, and the performance modelling tools developed at JANA over the last two decades, JANA's risk models are used by North American gas pipeline operators to create Risk Assessments customized to an operator's specific piping network. JANA is proud to have made an impact on the integrity of natural gas pipelines serving over 51 million homes in the US and Canada.

Responsibilities:

- Through consensus and support of Executive Team, directs the creation and implementation of strategic corporate business plans including financial goals and controls, product development and defined focus and value-added initiatives
- Sets direction with Executive Team in planning new business strategies
- Evaluates and advises on the impact of long-range planning, introduction of new programs/strategies and regulatory action
- Participates in the development of the corporation's plans and programs as a strategic partner
- Represents the company as required, including attendance of important functions, industry events and public meetings
- Builds strong relationships with key players (early adopters, thought leaders) in the various geographies and industries

EDUCATION

McGill University
1989

B.Sc. Mechanical Engineering

INDUSTRY PARTICIPATION

Industry Associations

Over his career, Mr. Bryce has participated in the industry as follows:

- Professional Engineers of Ontario (PEO)
- Institute of Asset Management (IAM)
- Canadian Standards Association (CSA)
- ISO TC 138 (Plastics pipes, fittings and valves for the transport of fluids), ASME B31.8
- Canadian Gas Association (CGA)
- American Gas Association (AGA)
- Western Energy Institute (WEI)
- Plastics Pipe Institute (PPI)

Technical Leadership

- ISO TC138 Co-Chair, Canada
- Board of Directors, IAM Canada
- Gas Piping Technology Committee (GPTC)

Regulatory Influence

JANA has supported its clients and their communities in the following regulated jurisdictions:

- Alberta
- California
- Virginia
- British Columbia
- Ontario
- Canadian Federal Code
- US Federal Code

PUBLICATIONS

- “Integrating QRA Outputs into Pipeline Integrity Management Decision-Making”, Dr. K. Oliphant, P.Eng. and W. Bryce, P.Eng., JANA Corporation, 2019.
- “Incorporating Low Probability High Consequence Events into Risk Models”, Dr. K. Oliphant, P.Eng., W. Bryce, P.Eng. and Dr. Vida Meidanshahi, JANA Corporation, American Gas Association 2019 Pipeline Risk Data Workshop, Albuquerque, 2019.
- “Probabilistic Risk Models for DIMP”, R. Gardner, Xcel Energy, W. Bryce, P.Eng. and Dr. K. Oliphant, P.Eng., JANA Corporation, American Gas Association 2019 Pipeline Risk Data Workshop, Albuquerque, 2019.
- “A Framework for Pipeline and Storage Facilities Risk Modeling”, Dr. K. Oliphant, P.Eng. and W. Bryce, P.Eng., JANA Corporation, 2018.
- “Pipeline Risk Modeling – How Much Data do I Need?”, W. Bryce P.Eng., Dr. K. Oliphant, P.Eng., JANA Corporation, American Gas Association, Orlando, 2017.
- “Power Law Analysis Implications of the San Bruno Pipeline Failure”, Dr. K. Oliphant, P.Eng., W. Bryce, P.Eng., W. Luff, JANA Corporation, 11th International Pipeline Conference, Calgary, September 26-30, 2016.

- "Modeling the Consequences of Pipeline Risk", Dr. K. Oliphant, W. Bryce and W. Luff, JANA Corporation, American Gas Association, Phoenix, 2016.
- "A Critical Review of Pipeline Risk Modeling Approaches", William Luff, Dr. Ken Oliphant, Wayne Bryce and James DuQuesnay, JANA Corporation, American Gas Association, Phoenix, 2016.
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Attachment 31.1

Environmental Protection and Management Guideline

December 2018

Version 2.7

About the Commission

About Us

The BC Oil and Gas Commission is the single-window regulatory agency with responsibilities for regulating oil and gas activities in British Columbia, including exploration, development, pipeline transportation, and reclamation.

The Commission's core services include reviewing and assessing applications for industry activity, consulting with First Nations, cooperating with partner agencies, and ensuring industry complies with provincial legislation and all regulatory requirements.

The public interest is protected by ensuring public safety, respecting those affected by oil and gas activities, conserving the environment, and ensuring equitable participation in production.

For general information about the Commission, please visit www.bcogc.ca or phone 250-794-5200.



Mission

We regulate oil and gas activities for the benefit of British Columbians. We achieve this by:

- Protecting public safety.
- Respecting those affected by oil and gas activities.
- Conserving the environment.
- Supporting resource development.

Through the active engagement of our stakeholders and partners, we provide fair and timely decisions within our regulatory framework.

We support opportunities for employee growth, recognize individual and group contributions, demonstrate accountability at all levels and instill pride and confidence in our organization.

We serve with a passion for excellence.

Vision

To provide oil and gas regulatory excellence for British Columbia's changing energy future.

Values

Respectful Accountable Effective
Efficient Responsive Transparent

Table of Revisions

The Commission is committed to the continuous improvement of its documentation. The table below summarizes revisions to the Environmental Protection and Management Guideline. Revisions are posted to the documentation section of the Commission's website at the beginning of every month and are effective one month after posting, unless otherwise noted. For more information about the Commission's monthly revisions, and for details of this month's revisions, please visit the [Documentation section](#) of the Commission's website.

Stakeholders who would like to provide input or feedback on Commission documentation may send comments to OGC.Systems@bcogc.ca.

Posted Date	Effective Date	Chapter	Summary of Revision(s)
May 18, 2018	June 18, 2018	Various	Various edits have been made to this document to reflect changes to EIMS. For more detailed information regarding these changes, refer to INDB 2018-10.
May 28, 2018	June 18, 2018	Section 1.9 & 1.9.1 Table 1.5 & 1.7	Updated the sections and the Tables to reflect changes to EIMS. For more detailed information regarding these changes, refer to INDB 2018-10.
December 21, 2018	January 1, 2019	Various	Various edits have been made throughout the document to clarify and streamline guidance. Planning and operational guidance regarding Wildlife Habitat Features edited and diagram added to clarify Commission expectations.

Table of Contents

Preface	8
About	8
Guideline Structure	8
Guideline Scope	8
Additional Guidance	9
Compliance and Enforcement	9
Chapter 1: Permit Considerations and Directions	10
1.1 Government’s Environmental Objectives	10
1.2 Planning and Operational Measures (POMs).....	11
1.3 Material Adverse Effect	12
1.4 Water Values	13
1.4.1 Water Works and Water Supply Wells.....	13
1.4.2 Identified Groundwater Recharge Areas and Identified Aquifers	15
1.4.3 Designated Watersheds	15
1.5 Riparian Values	16
1.6 Wildlife and Wildlife Habitat-.....	18
1.6.1 Hierarchy of External Wildlife Guidance	18
1.6.2 Wildlife Habitat Areas, Ungulate Winter Ranges and Fisheries Sensitive Watersheds	19
1.6.3 High Priority Wildlife	23
1.7 Caribou in British Columbia.....	27

1.7.1 Interim Operating Practices for Oil and Gas Activity in Identified Boreal Caribou Habitat in British Columbia	29
1.8 Wildlife Tree Retention Area	29
1.9 Wildlife Habitat Feature	30
1.9.1 Management of Commission Identified Wildlife Habitat Features	30
1.10 Old Growth Management Areas	35
1.11 Resource Features	37
1.11.1 Karst	39
1.11.2 Range Development	40
1.11.3 Research/Experimental Crown Land	40
1.11.4 Permanent Sample Site	41
1.11.5 Recreation Features	41
1.12 Cultural Heritage Resources	43
1.12.1 Cultural Heritage Resources and First Nations Engagement	43
Chapter 2: Operating Area Requirements	45
2.1 Water Quality	45
2.2 Aquifers	46
2.3 Crossing Streams, Wetlands & Lakes	47
2.4 No Deleterious Materials into Streams, Wetlands or Lakes	47
2.5 Operations within Wetlands	48
2.6 Range Barriers	48
2.7 Invasive Plants	49
2.8 Forest Health	50

2.9 Conserving Soil.....	51
2.10 Seismic Lines	52
2.11 Areas to be Restored	52
2.11.1 Additional or Concurrent Regulatory Requirements.....	52
Chapter 3: Adjacent Areas	54
3.1 Water Quality	54
Chapter 4: Exemptions and Deviations.....	55
4.1 Exemptions by the Commission	55
4.2 Deviations	55
Chapter 5: Classification, Identification and Establishment	56
5.6 Wetland Riparian Classes	61
5.6.1 Hydrophytic Vegetation	62
5.6.2 Classifying Wetlands	62
5.6.3 Establishing Wetland RMA Boundaries.....	63
5.7 Lake Riparian Classes	63
5.7.1 Establishing Lake RMA Boundaries	65
Appendix A: Definitions	68
Appendix B: Mitigation Strategy	76
Appendix C: Restoration and Reclamation	80
Appendix D: High Priority Wildlife.....	87
Appendix E: Caribou Designatable Units in NEBC.....	115
Appendix F: Hierarchy of External Wildlife Guidance	116

Appendix G: Relevant Legislation and Regulatory Requirements..... 118

Appendix H: Spatial Layers..... 119

Appendix I: Additional Information..... 123

Preface

About

The Environmental Protection and Management Guideline is intended as a reference document for oil and gas applicants and permit holders. The guideline was developed to assist oil and gas companies and those potentially impacted by oil and gas activities to understand the requirements of the [Environmental Protection and Management Regulation](#) (EPMR). This guideline is not intended to take the place of the applicable legislation. It outlines the minimum legal requirements for environmental protection and management. Users are encouraged to read the full text of legislation applicable to each section.

The guideline has been prepared to be as comprehensive as possible; however, it is not all encompassing and may not cover all situations. Where circumstances or scenarios arise that are not covered by this guideline, contact Commission staff for clarification and assistance.

Guideline Structure

This guideline is organized to closely reflect the structure and order of the EPMR.

Guideline Scope

The EPMR, and guidance herein, applies only to Crown land and does not apply to subsurface oil and gas activities associated with an operating area. As defined in the Oil and Gas Activities Act, an operating area means an area, identified in a permit, within which a permit holder is permitted to carry out an oil and gas activity (i.e., geophysical exploration, wellsite, facility area, road, pipeline, activities prescribed by regulation). The regulation does not apply to private land. However, it is advised that this guidance be applied to streams that are encountered on private land as well.

The EPMR is a results-based regulation, operating under the professional-reliance model of the Oil and Gas Activities Act (OGAA).

OGAA and its associated regulations specify the requirements that must be followed in applying for and conducting oil and gas activities. It is the responsibility of applicants and their qualified professionals (QP) (see [Appendix A: Definitions](#)) to identify and apply the best available practices to meet the requirement.

This guideline is limited in scope to the Commission's application processes and the authorities and requirements established within OGAA or specified enactments established thereunder. Carrying out oil and gas and related activities may require additional approvals from other regulators or create obligations under other statutes. It is the permit holder's responsibility to know and uphold all of their legal obligations. Additional regulatory requirements are listed in [Appendix G: Relevant Legislation](#); this list should not be considered comprehensive

Additional Guidance

Additional guidance is available in the [Documentation section](#) of the Commission's website and the [Glossary](#). OGAA and its associated regulations provide the primary source of legal definitions. Appendix I of this document, also provides a comprehensive list of additional guidance.

Spatial data from the BC Geographic Warehouse (BCGW) is available to view through iMapBC, and can be accessed through [BCGW](#). A list of relevant spatial data can be found in [Appendix H](#).

Compliance and Enforcement

This document does not replace legislation or affect legislative requirements. All permit holders are ultimately responsible for ensuring they understand and meet all requirements of OGAA, regulations and their permits. Should a person not comply with OGAA, the Commission may take compliance and enforcement actions. For more information regarding the Commission's Compliance and Enforcement (C&E) processes, please refer to the [Compliance and Enforcement Manual](#).

Chapter 1:

Permit Considerations and Directions

1.1 Government's Environmental Objectives

The Environmental Protection and Management Regulation (EPMR) provides the statutory authority to the BC Oil and Gas Commission (the Commission) for the management and protection of environmental values. Key environmental values requiring management and protection are identified as the Government's Environmental Objectives (GEOs) under Part 2 of the EPMR.

The GEOs guide the Commission in making determinations on permit applications and for permit conditions. It is the duty of the Commission's Delegated Decision Maker (DDM) to consider and apply the GEOs before issuing permits and authorizations. Section 25(1) of OGAA states that the Commission, after considering the GEOs, may issue permits and authorizations to an applicant if they meet the requirements including those prescribed under Part 2 of the EPMR. In issuing a permit, the Commission must specify the oil and gas activity(ies) (the activity) the person is permitted to carry out, and, in accordance with OGAA Section 25(2), may impose any conditions on the permit that the Commission considers necessary to meet the intent of GEOs.

Through applying the GEOs to a permitting decision, the DDM must be satisfied that the proposed activity meets the objectives as set out under Part 2 of the EPMR. Applicants must demonstrate adherence to the GEOs by following the EPMG, utilizing the Commission's Environmental Information Management System (EIMS), applying Area-based Analysis (ABA) and submitting information through the Commission's Application Management System (AMS).

It is the responsibility of the applicant to satisfy the Commission's DDM that the proposed activity will not create a material adverse effect, as outlined in [Sections 4 through 7 of the EPMR](#). Consideration of a material adverse effect or change to an environmental value, whether material or adverse, is considered based on all available information. Where

planning and operational measures exist for a specific environmental value(s) adherence to these measures satisfies the respective GEOs.

1.2 Planning and Operational Measures (POMs)

Planning and Operational Measures (POMs) have been developed to provide clarity to the Commission's expectations for oil and gas activities proposed within areas of specific environmental value.

Planning measures are measures that the applicant incorporates in the planning phase to minimize impacts to specific environmental values; including but not limited to the activity placement, layout, activity types and avoidance.

Operational measures are measures that are employed during the operational phases of an activity, which may be mandated via permit condition (i.e., timing and restoration requirements) to minimize impacts to specific environmental areas. POMs for several GEOs can be found in the EPMG and in the Commission's online [EIMS](#).

Applicants are required to indicate in AMS if their application adheres to the EPMG. Where an application is unable to comply with the POMs, supplemental information in the form of a rationale and/or a mitigation strategy may be required. Applicants are advised to seek input from a Qualified Professional (QP) early on in the planning phase of an activity so that projects can be designed with consideration to environmental values.

1.2.1 Rationale Requirements

A rationale is required when an applicant deems that they are unable to plan and/or operate the proposed activity in accordance with the POMs.

Rationales must:

1. Be prepared by a QP;

2. Include an explanation of why the oil and gas activity cannot be planned in accordance with the planning and operational measures provided by the Commission; and
3. Provide a detailed description of the alternate measures planned for the activity. Describe how the stated objectives specified in the planning and operational measures will be achieved.

If the recommended POMs have been appropriately incorporated into the application, no additional rationale is required.

1.2.2 Mitigation Strategy Requirements

A mitigation strategy is required for a potentially impacted environmental value where POMs have not been listed in the EPMG or EIMS.

For example, where an activity overlaps a known proposed wildlife habitat area (WHA) or proposed ungulate winter range (UWR), the proponent is expected to submit a mitigation strategy. POMs are developed once a WHA or UWR is established by Ministerial Order under OGAA.

A mitigation strategy is also required where an ABA status of Enhanced Management or Regulatory Policy, has been assigned to an environmental value, or at the discretion of the DDM.

Mitigation strategies must be prepared in accordance with [Appendix B](#) of this document and must address all environmental values impacted.

1.3 Material Adverse Effect

A material adverse effect refers to a change to an environmental value established by the GEOs that is both material (i.e. serious, of consequence) and adverse (i.e. injurious, damaging, unfavourable).

The consideration of material adverse effect is rooted in what an informed person could reasonably consider based on the available information. A potential effect must be both material and adverse (i.e. injurious or damaging, with an appreciable consequence) to be found inconsistent with the GEOs. Initial consideration should be given to whether an adverse effect is likely to occur as a result of the proposed operating area. If there is a likelihood of an adverse effect, consequences of that effect must be assessed.

Where a material adverse effect test is applied, a QP must provide a statement in the mitigation strategy, for each activity in an application, indicating how the material adverse effect test was evaluated/met/passed.

1.4 Water Values

This section pertains to oil and gas operations and water values.

For information regarding authorizations for activities such as water withdrawal, instream works and temporary transportation or storage of water for the purposes of conducting an oil and gas activity, refer to the Commission's [Water Information](#) webpage and [Documentation](#) section.

[Section 4](#) of the EPMP outlines objectives with respect to water quality, quantity and timing of flow to meet the GEOs for water; all oil and gas activities must be planned and undertaken in accordance with Section 4. The following sections provide supplemental information for interpretation and adherence to Section 4.

1.4.1 Waterworks and Water Supply Wells

Applicants are expected to identify all known waterworks, water supply wells, and mapped groundwater capture zones for water supply wells within 100 meters (m) of a proposed operating area (excluding geophysical applications) as part of the activity application.

Oil and gas operating areas should not be planned within 100m of known waterworks, water supply wells, and mapped capture zones for water supply wells.

If it is not practicable to locate the activity more than 100m away, the Commission requires that the proponent submit a mitigation strategy.

Applicants should provide as much detail on the nature of the proposed oil and gas activity and any mitigations they are proposing to decrease the risk of the well or waterworks being affected by the oil and gas activity. This may include the location of the well or waterworks on the application, a description of the nature of the well or waterworks, an assessment of risks to water supplies, and rationale, including documentation addressing why it is not practicable to stay more than 100m away.

In addition to minimizing any adverse effects, there is a notice requirement to the owner or user of the waterworks or water supply wells at least 72 hours before adversely affecting the water supply and providing an alternate supply of water ([EPMR Section 9](#)). Additional guidance regarding mitigation strategies can be found in Appendix B: Mitigation Strategy.

For applications on private land, additional waterworks and water supply well information may be obtained from private land owners and/or from the following:

[The Commission's Groundwater Review Assistant](#)

[Groundwater Wells and Aquifers Groundwater Well Search](#)

[Ministry of Environment Water Well Application Water Well Search](#)

[iMAP BC](#)

1.4.2 Identified Groundwater Recharge Areas and Identified Aquifers

The Minister responsible for administering the [Water Sustainability Act \(WSA\)](#) may, by order, identify an aquifer and/or a groundwater recharge area, under [Section 34](#) of the EPMR.

Operating areas should not be located within a groundwater recharge area or on top of an identified aquifer. If this is not practicable, the Commission requires that the applicant submit a mitigation strategy with their application. The mitigation strategy should contain a statement by a QP as to the likelihood of a material adverse effect, and measures that will be taken to address the material adverse effect.

At this time, there are no orders for identified aquifers or groundwater recharge areas under the WSA. The guidance herein will be updated as identification occurs and orders are subsequently established.

1.4.3 Designated Watersheds

Several designated watersheds have been established under [Section 35](#) of the EPMR by the Minister of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD); the order is available on the [FLNRORD website](#). Designated watersheds which were initially identified under the [Forest and Range Practices Act](#) (FRPA) at the time that the EPMR came into effect (October 4th 2010), were approved by the Minister of FLNRORD on August 18, 2011.

Operating areas should not be located within a designated watershed. If this is not practicable, the Commission requires that the applicant submit a mitigation strategy for locating the activity within the boundaries of the designated watershed. The mitigation strategy should contain a statement by a QP as to the likelihood of a material adverse effect, and if applicable, measures that will be taken to address the material adverse effect.

It is the responsibility of the applicant to ensure, and demonstrate to the Commission, that an operating area does not cause a material adverse effect on a designated watershed, as per [EPMR Part 2 – Section 4 GEOs, Water](#).

1.5 Riparian Values

[Section 5](#) of the EPMR outlines objectives with respect to riparian values to meet the GEOs for water, habitat and ecosystem integrity. All oil and gas activities must be planned and undertaken in accordance with Section 5 of the EPMR, in alignment with [EPMR Part 4 – Classification, Identification and Establishment](#). This section of the regulation outlines when an oil and gas activity is permitted under the EPMR within lakes, streams, wetlands, and their associated riparian areas.

The EPMR requires that no activities be located within a Riparian Reserve Zone (RRZ) except to facilitate a crossing. Activities are permitted within a Riparian Management Zone (RMZ) to facilitate a crossing, or when the operating area will not have a material adverse effect on the ability of the RMZ to protect the RRZ and conserve fish habitat, biodiversity, and water values. Oil and gas, and related activities, must be planned in a manner to maintain stream channel processes, stream temperatures, shoreline and littoral habitat values, fish habitat, wildlife trees and habitat for furbearers and other wildlife.

OGAA applications refer to the EPMR definition of a “stream”, whereby a stream is a watercourse, including a watercourse that is obscured by overhanging or bridging vegetation or soil mats, that contains water on a perennial or seasonal basis, is scoured by water or contains observable deposits of mineral alluvium, and that (a) has a continuous channel bed that is 100m or more in length, or (b) flows directly into (i) a fish bearing stream or a fish bearing lake or wetland or (ii) a waterworks.

Applications not associated with an OGAA application, require authorization under the WSA for changes in and about a stream. For these applications, the definition of a stream in the WSA is used. Under the WSA, a stream “means (a) a natural watercourse, including a natural glacier course, or a natural body of water, whether or not the stream channel of the stream has been modified, or (b) a natural source of water supply, including, without limitation, a lake, pond, river, creek, spring, ravine, wetland or glacier, whether or not

usually containing water, including ice, but does not include an aquifer". See [Chapter 4.8](#) of the Oil and Gas Activity Application Manual for application requirements regarding changes in and about a stream.

The POMs in Table 1.1 capture the Commission’s expectations for oil and gas activities proposed within riparian areas. Applications that adhere to POMs do not require a rationale or mitigation strategy unless the proposed activity will impact a RRZ with an ABA status of Enhanced Management or Regulatory Policy.

Please refer to Section 1.2 of this document for further information on POMs, and requirements for rationale statements and mitigation strategies in permit applications. Please refer to [Supplementary Information for Area-based Analysis](#) for additional information regarding ABA.

Table 1.1: Planning and Operational Measures to Meet Government’s Environmental Objectives for Riparian Areas.

Objectives: <ul style="list-style-type: none"> • Maintain a fully functioning riparian management area. • Minimize impacts to vegetative cover, large woody debris, stream temperature, ground water flow, water quality, bank stability, channel characteristics, pool depth and volume, wildlife habitat and biodiversity. 		
Activity Type	Planning Measures (Avoidance and Minimization Techniques)	Operational Measures (Mitigation and Restoration Techniques)
All	<ul style="list-style-type: none"> • Plan oil and gas activities to avoid RRZ and RMZ except where necessary to cross a RMZ or RRZ. • Those activities with locational flexibility (camps, borrow pits, storage, temporary workspaces) should be planned to be outside Riparian Management Area (RMA). • Where a crossing cannot avoid a RMA: <ul style="list-style-type: none"> • Plan to utilize existing disturbance and limit new cut. Mark/flag sensitive areas and avoid. <ul style="list-style-type: none"> • Minimize width of Right of Way (ROW). ROW to cross perpendicular 	<ul style="list-style-type: none"> • Limit removal of timber and vegetation, and minimize impacts to root mat and duff layer. • Appropriate measures must be taken to limit and control erosion and sedimentation (such as run-off control, rip-rap, vegetation retention, sediment trapping, timing, surface roughening and infiltration). • Employ minimal disturbance techniques that facilitate rapid deactivation and natural regeneration. • Time activities to minimize impacts (dry periods, or periods with snow cover and frozen ground are favorable).

	<p>to creek where stream banks are low and stable.</p> <ul style="list-style-type: none"> Determine ABA status of RRZ and follow ABA guidance for Normal, Enhanced and Regulatory Policy. 	<ul style="list-style-type: none"> Upon completion of activity, undertake measures to control access and promote natural or assisted regeneration. These measures are to encourage re-establishment of pre-existing ecological trajectory. Monitor site of a stream crossing installation to ensure successful erosion control and restoration.
Linear Features (roads, pipelines, seismic)	<p>Seismic</p> <ul style="list-style-type: none"> Minimize number of stream crossings 	<p>Seismic:</p> <ul style="list-style-type: none"> Employ minimal impact seismic methods. Upon completion of activity, undertake measures to control access and promote natural or assisted regeneration. These measures are to encourage re-establishment of pre-existing ecological trajectory.
<p>Source: DFO Operational Statements, ABA guidance documents, MOE General BMPs and Standard Project Considerations.</p>		

1.6 Wildlife and Wildlife Habitat-

[Section 6](#) of the EPMP includes the GEOs related to the management and protection of wildlife and wildlife habitat values. All oil and gas activities must be planned and undertaken in accordance with Section 6 of the EPMP. The following sections provide supplemental information for interpretation and adherence to Section 6.

1.6.1 Hierarchy of External Wildlife Guidance

The Commission has clarified its utilization of existing external wildlife documentation, in order to provide consistent guidance for oil and gas activity in NEBC.

The BCOGC Hierarchy of External Wildlife Guidance for Managing Potential Oil and Gas Activities within NEBC (Appendix F) outlines the Commission’s consistent and transparent utilization of external wildlife documentation, referenced in the development of EIMS guidance for NEBC species.

For all area's under Ministerial Order (i.e., WHAs and UWRs designated under OGAA) within NEBC, Management Objectives and POMs have been adapted from General Wildlife Measures (GWMs) and associated guidance in relevant OGAA and FRPA Orders, and have been summarized within EIMS.

Where timing windows are stated within an Order, they are noted within the POMs. Where timing windows are *not* specified within an Order, timing windows are *not* applied to the designated area.

For assessing documentation available for identified High Priority Wildlife (HPW), the Commission started with relevant Accounts and Measures for Managing Identified Wildlife (species accounts), developed by MOE under the Identified Wildlife Management Strategy. As part of this process, the Commission assessed the applicability of guidance and any associated timing windows for oil and gas activities. Applicable guidance was then adapted for inclusion in the EIMS.

Where species accounts were unavailable, or where species accounts were available but timing windows were not specified, the Commission completed a review to determine the appropriateness of the guidance and/or timing windows stated in the Compendium of Wildlife Guidelines for Industrial Projects in the North Area, BC – Interim Guidance (the Compendium), as noted in the hierarchy.

Where species accounts and appropriate Compendium guidance were absent, gaps in HPW guidance were filled by outsourcing to species experts selected by the Commission.

The Order and species-specific guidance, provided in EIMS, is the result of the Commission's utilization of the hierarchy process.

1.6.2 Wildlife Habitat Areas, Ungulate Winter Ranges and Fisheries Sensitive Watersheds

[Section 6\(a\) of the EPMR](#) states that oil and gas activities should not be located within designated wildlife habitats. These are established WHAs, UWRs and FSWs.

WHAs, UWRs and FSWs are the highest level of protection afforded under OGAA and every effort should be made to avoid impacts to these areas when planning oil and gas activities.

WHAs in particular are often small areas encompassing habitat necessary for critical wildlife life stages and other high-risk periods. The Commission’s DDM must consider Section 6(a) when reviewing and making determinations on oil and gas activities.

1.6.2.1 Wildlife POMs for Consideration in WHAs and UWRs

The Commission has updated the process for applying POMs in WHAs and UWRs to:

- 1) clarify the expected application of wildlife POMs; and to
- 2) clarify what deliverables will be required by the applicant at the time of application submission.

This process is only applicable to applications for activities located within NEBC. The process is mapped below in Figure 1.1: BCOGC Wildlife POMs Consideration Process for WHAs and UWRs.

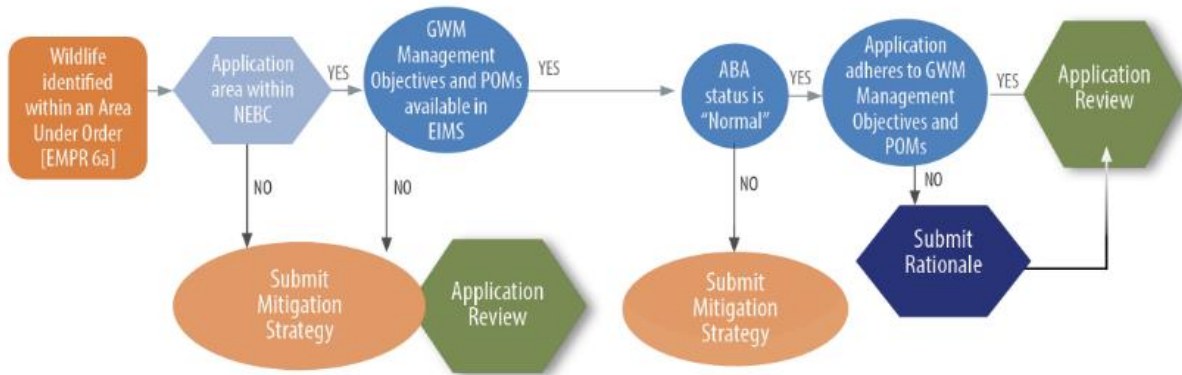


Figure 1.1: BCOGC Wildlife POMs Consideration Process for WHAs and UWRs where an application area may impact a wildlife value.

When a proposed oil and gas activity overlaps (impacts) a UWR or WHA in NEBC, applicants are required to refer to EIMS for a summary of oil and gas specific objectives and POMs for the impacted WHA or UWR.

The Commission expects applicants to meet Order specific objectives and apply the POMs to limit environmental impacts, and minimize and mitigate any disturbance. Specific timing windows are provided within the POMs and applicants must consider these as an inherent part of their planning and operations. If an applicant is unable to meet the objectives and/or adhere to the POMs, they must submit a rationale and/or mitigation strategy with their application. Where timing windows are *not* specified with an Order, timing windows are *not* applied to the designated area.

Where an application area overlaps an UWR/WHA with an ABA status of normal and the applicant adheres to the Order specific POMs, a rationale is not required. However, where the ABA status for UWR or WHA is Enhanced Management or Regulatory Policy, the applicant must refer to the ABA guidance and submit a mitigation strategy with the application. [See Supplementary Information for Area-based Analysis](#) and [EIMS](#) guidance for additional information. Refer to Section 1.2 for additional information on POMs, and requirements for rationale and mitigation strategies in permit applications.

For application areas outside of NEBC, obtain direction from a QP and develop a project specific mitigation strategy. The mitigation strategy must be submitted with the application.

In addition to the guidance provided in EIMS, it is the permit holder's responsibility to know and uphold all of their legal obligations associated with other relevant legislation.

1.6.2.2 Fisheries Sensitive Watersheds POMs Considerations

To assist applicants in understanding the Commission's expectations for oil and gas activities proposed within FSWs, a table of general POMS for FSWs has been included below. Please refer to Section 1.2 of this document for further information on POMs, and requirements for rationale statements and mitigation strategies in permit applications.

Table 1.2 Planning and Operational Measures Applicable to All Fisheries Sensitive Watersheds.

<p>Objectives:</p> <ul style="list-style-type: none"> • Maintain natural hydrological conditions, natural streambed dynamics, and stream channel integrity. • Maintain the quality, quantity, and timing of water flow consistent to protect downstream fisheries and watershed values. • Protect the habitat of salmonid fishes including Bull Trout, Chinook, Coho, Kokanee, Rainbow Trout, Sockeye & Westslope Cutthroat. 		
Activity Type	Planning Measures (Avoidance and Minimization Techniques)	Operational Measures (Mitigation and Restoration Techniques)
All	<ul style="list-style-type: none"> • Identify and avoid key spawning sites and congregations. • Mark/flag sensitive areas and avoid. • Utilize existing disturbance, limit new cut and minimize width of ROW in riparian areas. • Minimize instream crossing methods. • Avoid clearing forested areas on gentle slopes located above steep terrain. 	<ul style="list-style-type: none"> • Limit removal of timber and vegetation, and minimize impacts to root mat and duff. • Appropriate measures must be taken to limit fine sediment from entering streams (such as run-off control, rip-rap, vegetation retention and sediment trapping). • Employ minimal disturbance techniques that facilitate rapid deactivation and natural regeneration. • Time activities to minimize impacts (dry periods, or periods with snow cover and frozen ground are favorable). • Upon completion of activity, undertake appropriate measures to control access and promote natural or assisted regeneration. These measures are to encourage re-establishment of pre-existing ecological trajectory. • Monitor site of stream crossing to ensure successful erosion control and restoration.
Linear Features (roads, pipelines, seismic)	<p>Seismic</p> <ul style="list-style-type: none"> • Limit number of crossings. 	<p>Seismic:</p> <ul style="list-style-type: none"> • Employ minimal impact seismic methods. • Upon completion of activity, undertake measures to control access and promote natural or assisted regeneration. These measures are to encourage re-establishment of pre-existing ecological trajectory.
<p>Source: DFO Operational Statements, Area-Based Analysis guidance documents, MOE General BMPs and Standard Project Considerations</p>		

1.6.3 High Priority Wildlife

The EPMR Section 6(b) requires that “oil and gas activities on an operating area outside of a wildlife habitat area be carried out at a time and in a manner that does not result in physical disturbance to HPW or their habitat, including disturbance during sensitive seasons and critical life-cycle stages”.

HPW are those species requiring specific management and/or protection, including those listed within a “[Category of Species](#)” under OGAA. HPW are often species not captured within Zones, WHAs or UWRs designated through other sections of the EPMR.

1.6.3.1 HPW Determination Process

The Commission uses the HPW Determination Process to determine which species are included in the HPW list. Subsequent lists of HPW will be determined periodically so that the list remains current. The HPW Determination Process indicates the values applied when considering a species for classification as a HPW species, and subsequently afforded additional protection under 6(b) of the EPMR.

In following the HPW Determination Process, the Commission filters species by Ministerial Order, provincial status, priority as noted in the BC Conservation Framework, and those species identified by action groups or the BC Conservation Framework.

The method is as follows:

1. **Species identified in OGAA Ministerial orders for Categories of Species at Risk and Categories of Ungulates.** “Species” in these orders currently include mammals, birds, amphibians, reptiles, fish, invertebrates, plants and plant communities. Where species are listed in an Order, they are included in the HPW list. If they are not listed in an Order, they are then assessed in regards to Provincial status.
2. **Add any vertebrate or non-vertebrate animal species, vascular or non-vascular plants, plant communities and lichens on the provincial Red and Blue lists.** Note that the definition of “wildlife” under the EPMR includes all of these categories except plant communities, which are included here to maintain consistency with Ministerial orders. Species which are *not* identified as Red or Blue listed are *not* included in the HPW list.

3. **Species are then filtered for species ranked as priorities 1, 2 or 3 for any of the three goals of the BC Conservation Framework.** This is to ensure that Commission requirements for proponents is consistent with government’s stated priorities.
4. **Filter for species requiring habitat protection or restoration, as identified by Action Groups of the BC Conservation Framework.** Species requiring habitat protection or restoration are likely to require actions to ensure that oil and gas activities do not result in physical disturbance to them or their habitats.

Additional information including the Commission’s list of HPW species, can be found in [Appendix D](#).

1.6.3.2 Wildlife Management Objectives and POMs Consideration for HPW

The Commission has provided an updated process to clarify the expected application of wildlife POMs for HPW and to clarify what deliverables will be required by the applicant at the time of application submission. This process is only applicable to applications for activities located within NEBC and is mapped below in Figure 1.2: BCOGC Wildlife POMs Consideration Process for HPW.

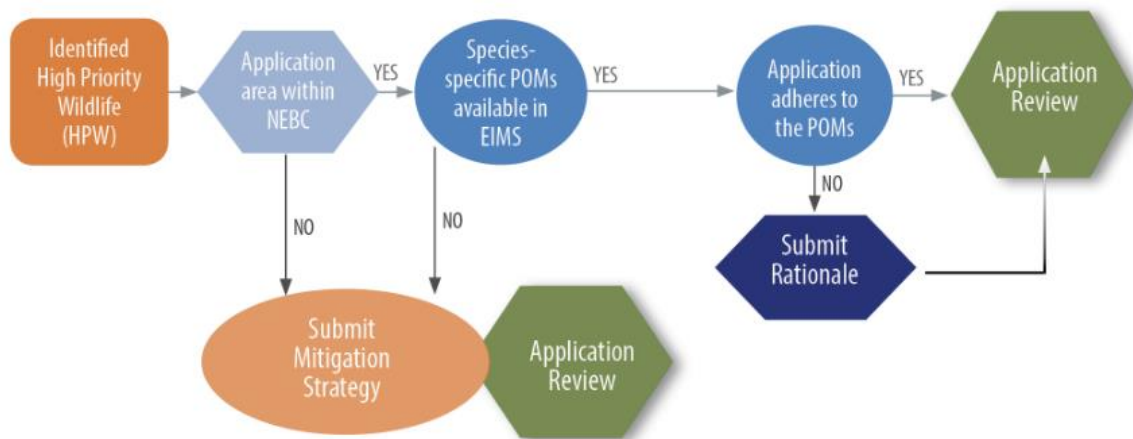


Figure 1.2: BCOGC Wildlife POMs Consideration Process for HPW where an application area may impact a wildlife value.

When a proposed oil and gas activity potentially impacts a HPW species, applicants are required to refer to EIMS for the specific POMs provided for that species. POMs are provided for a selection of HPW species within NEBC.

The Commission expects operators to meet management objectives at the planning phase to limit environmental impacts, and to apply POMs to minimize and mitigate any disturbance. Applicants must refer to relevant species-specific timing windows within EIMS and consider these as an inherent part of planning and operations (refer to Section 1.6.3.3 below for more information on timing window guidance for HPW species). If an applicant is unable to adhere to the species-specific POMs, they must submit a rationale with their application. Where HPW species are not listed in EIMS, a mitigation strategy will be required with the application.

Species listed in EIMS may occur outside of NEBC, however the guidance housed within EIMS is specific to application areas within NEBC. Where an application area and related species occurrence falls outside of NEBC, the applicant must obtain direction from a QP and submit a mitigation strategy with their application.

Refer to Section 1.2 for additional information on POMs, and requirements for rationale and mitigation strategies in permit applications.

In addition to the guidance provided in EIMS, it is the permit holder's responsibility to know and uphold all of their legal obligations associated with other relevant legislation.

1.6.3.3 Timing Window Guidance for HPW

The EPMR Section 6 (b) refers to "time and in a manner", which the Commission interprets to mean the use of timing windows and best practices to avoid physically disturbing HPW species or their habitat.

Timing windows for a selection of HPW species within NEBC are found within EIMS. The Commission expects that applicants to review and apply species-specific guidance found within EIMS to all oil and gas activity within NEBC. Timing windows should be considered an inherent part of planning and operations, in order to alleviate impacts during critical periods.

Compliance with the timing windows noted within EIMS does not negate the proponent’s responsibility to consider and plan riparian works and/or stream crossings within “least risk windows” for aquatic species in the Peace Region. Refer to Section 4.8 of the Oil and Gas Activity Application Manual for additional information regarding Changes in and About a Stream.

Application specific timing windows may be subject to revision or refinement by the Commission, as well as by other Provincial and Federal agencies.

Operations outside of NEBC will require region-specific guidance and direction from a QP. Additional communication with regional offices and reference to other region-specific documents may be required in addition to the resources noted in the table below.

Table 1.3 Timing Window Guidance - Peace Region (NEBC)

Type of Guidance	Description
Environmental Information Management System (EIMS)	Guidance for considering impacts to wildlife and wildlife habitat in the Peace Region (NEBC)
Interim Operating Practices for Oil and Gas Activities in Identified Boreal Caribou Habitat in British Columbia	Specific timing windows and management practices for boreal caribou
Peace Region Selected Terrestrial and Aquatic Wildlife Least-Risk Windows	Least-risk timing windows for aquatic species in the Peace Region

Table 1.4 Timing Window Guidance for Application Areas Outside of the Peace Region (NEBC).

Type of Guidance	Description
Accounts and Measures for Managing Identified Wildlife	Species Accounts-various summaries of the status, life history, distribution and habitats of Identified Wildlife, and specific guidelines for management of their habitats.
A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia – Interim Guidance.	Guidance for considering and mitigating impacts to wildlife and wildlife habitat in the Skeena, Omineca and Peace Regions.
Omineca Reduced Risk Timing Windows for Fish and Wildlife	Instream reduced risk work windows for the Omineca Region.
Skeena Region Reduced Risk In-stream Work Windows and Measures	Instream reduced risk work windows for the Skeena Region.
Working around water: Regional Timing Windows	Regional Timing Windows for BC
Commission or FLNRORD Regional office	Link to provincial agency contacts.

Harassment or disruption of wildlife is prohibited at any time under the [Wildlife Act](#); as such, applicants are advised to be mindful of potential impacts regardless of the timing of operations.

1.7 Caribou in British Columbia

The province of British Columbia is currently transitioning from the provincial caribou classification (Mountain, Northern and Boreal Caribou) to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) classification system of Designatable Units.

There are primarily three [Designatable Units](#) of caribou in NEBC¹:

- DU6 Boreal Caribou;
- DU7 Northern Mountain Caribou; and
- DU8 Central Mountain Caribou

As the province transitions, there will be mixed use of old and new caribou nomenclature throughout literature, legal orders, guidance and spatial data. To ensure clear understanding, applicants are encouraged to review information at the [Provincial Caribou website](#) and work with a QP. In addition, applicants must adhere to EIMS and [Interim Operating Practices for Oil and Gas Activities in Identified Boreal Caribou Habitat in British Columbia](#) (IOPs).

At this time, nomenclature in provincial orders and guidance for WHAs and UWRs has not been updated for Designatable Units. EIMS provides guidance for activities proposed within designated areas (UWRs and WHAs) for Boreal and Northern Caribou based on pre-DU naming system. Despite inconsistencies in naming conventions, guidance in Section 1.6.1 of this document remains relevant for Caribou in WHAs and UWRs and must be followed by applicants.

In areas of identified habitat for caribou, applicants are advised to identify caribou using the ecotype information provided in the BCGW spatial layer:

[WHSE WILDLIFE INVENTORY.GCPB CARIBOU POPULATION SP](#)

It is advised that the following reference material be considered when operating in caribou habitat:

- IOP for DU6 Boreal Caribou (see EIMS);
- POMS in EIMS for northern caribou for DU7 Northern Mountain Caribou; and/or

¹ DU9 Southern Mountain Caribou also exist in BC. The DU9 Southern Mountain Caribou range closely aligns with the south-western boundary of NEBC

- [South Peace Northern Caribou Standardized Industry Management Practices](#) provides draft guidance for DU8 Central Mountain Caribou in NEBC.

In an effort to address HPW until Central Mountain Caribou are listed in EIMS, a mitigation strategy will be required for applications that fall within DU8 Central Mountain Caribou but outside of a WHA or UWR.

1.7.1 Interim Operating Practices for Oil and Gas Activity in Identified Boreal Caribou Habitat in British Columbia

Guidance targeted at reducing impacts to boreal caribou populations and their habitat has been developed by the Ministry of Environment (MOE) titled: [Interim Operating Practices for Oil and Gas Activities in Identified Boreal Caribou Habitat in British Columbia](#) (IOPs). The IOPs were transmitted to the Commission by MOE as operational policy that must be followed for all oil and gas activities within identified Boreal Caribou habitat. For activity in identified Boreal Caribou habitat, the Commission considers adherence with the IOPs as a satisfactory requirement for mitigation.

1.8 Wildlife Tree Retention Area

All oil and gas activities must be planned and undertaken in accordance with [Section 6 \(c\)](#) of the EPMR which states that “no portion of an operating area be within a wildlife tree retention area”. Wildlife Tree Retention Areas (WTRAs) are valuable components of stand-level biodiversity.

An example of a WTRA is a Wildlife Tree Patch (WTP): a patch of trees excluded from harvesting within or adjacent to a forestry cutblock. Where WTPs may be impacted, proponents are advised to plan and operate in accordance with Section 6 (c). Once a cutblock is deemed free to grow, the WTP is no longer considered a WTRA unless there are specific values associated with the WTP requiring further consideration. For example, there are WTPs established to protect stick nests, archaeological sites, biodiversity values, etc. that require consideration regardless of cutblock status.

Applications that will impact a WTRA require a mitigation strategy as per Section 1.2 of this document. Within the mitigation strategy, the applicant must document the value(s) the WTRA was established to protect, how efforts were taken to avoid the WTRA during project planning, and if the WTRA is entered, how impacts will be minimized, mitigated, and restored. The mitigation strategy is assessed by the Commission's DDM to ensure consistency with the GEOs.

1.9 Wildlife Habitat Feature

Oil and gas activities must be planned and undertaken in accordance with Section 6 (d) of the EPMR, which states that "oil and gas activities not damage or render ineffective a wildlife habitat feature". The identification and establishment of Wildlife Habitat Features (WHF) is enabled through Section 26 of the EPMR. To date, the Minister responsible for the Wildlife Act has not identified any features.

Although no WHFs have been identified by the Minister, the Commission has identified WHFs by policy and considers the impacts to these features during the review and determination process. It is the responsibility of the proponent to identify WHFs in relation to a proposed oil and gas activity. Where WHFs are identified, applicants should plan operations in such a manner that they not damage or render a WHF ineffective.

Commission identified WHFs include:

- HPW dens;
- Significant mineral licks and wallows; and
- HPW nests of birds exhibiting nest fidelity.

In order for a mineral lick or wallow to be considered "significant", there should be evidence of use over several years by multiple animal species. A lick/wallow that is not used every year or that is used by a single animal should not be considered "significant".

1.9.1 Management of Commission Identified Wildlife Habitat Features

When Commission-identified WHFs are identified in the ordinary course of planning an oil and gas activity (including during consultation with First Nations

communities, stakeholder engagement and/or fieldwork), the applicant is required to map the locations of WHF on their construction plans and implement the appropriate setbacks. Specifically, identified WHFs located within the respective setback distance must be shown on the construction plan. Setbacks are further explained below and in table 1.5. Guidance for WHF management is focused on setbacks and Critical Timing Windows in order to maintain integrity and continued use of the WHF by the wildlife species.

The Commission has developed WHF setback requirements based on:

- Oil and gas activity type;
- Degree of disturbance;
- Timing of the proposed activity; and
- Whether or not the WHF is utilized during a critical life-cycle stage (i.e., nests and dens).

In some instances, additional setbacks may be required due to a lack of topographical relief, sparse vegetation density, extensive use of habitat, and other special considerations.

The application of setbacks is described as follows:

Applicants are expected to conduct a pre-work field assessment to identify the presence/absence of WHF within the applicable setback distances (see table 1.5 below) in the following areas:

- WHAs: these areas are relatively small in size and known to contain key habitat features for the wildlife species in which they were established for. For these reasons, full survey is expected.
- UWRs and CDC polygons: these are typically large areas with key habitat features spread out across the landscape. Therefore, survey can be concentrated to those areas exhibiting key habitat features within the UWR / CDC polygon.

EIMS includes a comprehensive description of key habitat features associated with UWR, WHA and HPW species.

Critical Timing Windows:

Critical Timing Windows are applied hierarchically depending on whether the WHF falls within a WHA, UWR or HPW habitat. Where a WHF has been identified within a WHA/UWR for that species, adherence to the WHA/UWR-specific Critical Timing Windows noted in EIMS is expected. For all other occurrences outside of a WHA/UWR, within HPW habitat, or in situations where a Critical Timing Windows is not provided in EIMS, use the species-specific Critical Timing Windows. Critical Timing Windows for all HPW species in NEBC are provided in EIMS. Guidance in EIMS is limited to NEBC and therefore applications located outside NEBC that are impacting WHFs must be submitted with a mitigation strategy (including project timing).

Requirements for consideration of WHFs based on activity disturbance levels, activity type and activity timing are outlined in Table 1.5 below. Also, refer to Figure 1.3 (below) for a demonstration of how setbacks and survey distances apply to oil and gas activities proposed within areas where WHF survey is required.

Table 1.5: Setback and survey requirements for WHFs relative to activity disturbance levels, activity type and activity timing.

Nature of Disturbance	Example Activity Types	Setback Requirements	Applicable Areas
Continuous	<ul style="list-style-type: none"> Multi-Well Pad Site. Facility sites with continuous operation and associated traffic. 	<p>500m setback from WHF is required at all times due to continuous nature of disturbance.</p> <p>Applies to all Commission Identified WHFs.</p>	<p>In WHA/UWR/CDC polygon, a pre-work survey for WHF presence/absence is required for full 500m.</p>
Short term - high impact	<ul style="list-style-type: none"> Road and pipeline construction (clearing and site prep). Seismic line cutting. 	<p>250m setback for occupied and 100m setback unoccupied (HPW species timing windows are provided in EIMS).</p> <p>For features that are not utilized for critical life-cycle stages (licks and wallows) a standard</p>	<p>In WHA/UWR/CDC polygon, a pre-work survey to identify potential WHFs is required. For oil and gas activities planned to occur in accordance with the timing windows, the WHF survey will investigate areas within 100m of the proposed activity boundaries. For activities that cannot adhere to</p>

		100m setback would apply.	the timing windows, a 250m WHF survey distance is required. For features that are not utilized for critical life-cycle stages (licks and wallows) a standard 100m setback would apply.
Moderate to low disturbance of short-term nature.	<ul style="list-style-type: none"> • Pipeline operations. • Road maintenance. 	No setback restrictions, apply to these activities; however, individual animals may still be affected by these activities, so caution should be taken and activities kept a practicable distance away, where possible.	N/A



Figure 1.3: The application of setbacks and survey distances for oil and gas activities proposed within areas requiring WHF survey.

Refer to the POMs in Table 1.6 below to determine the Commission’s expectations for minimizing potential impacts to WHFs. For general inquiries regarding POMs, rationale statements and mitigation strategy requirements in permit applications, please refer to Section 1.2.

Table 1.6: Planning and Operational Measures for Commission-Identified Wildlife Habitat Features.

Objectives: Not damage or render ineffective a wildlife habitat feature.		
Activity Type	Planning Measures (Avoidance and Minimization Techniques)	Operational Measures (Mitigation and Restoration Techniques)
Multi wells and facility sites with high volumes of associated traffic high impact - continuous.	<ul style="list-style-type: none"> During the early planning stages of an activity, identify WHFs potentially impacted by the proposed activity. Plan so that impacts to wildlife habitat features are avoided (WHF are not damaged or rendered ineffective). In a WHA/UWR/CDC polygon, conduct a pre-work survey to identify WHF within full 500m setback distance. 	<ul style="list-style-type: none"> The setback identified for these long duration, high impact activities is 500m. This setback distance is applicable at all times.
Road and Pipeline clearing, site preparation and construction and mechanical Seismic line-cutting. <ul style="list-style-type: none"> High impact, short-term, 	<ul style="list-style-type: none"> During the early planning stages of an activity, identify WHFs potentially impacted by the proposed activity. Plan so that impacts to wildlife habitat features are avoided (WHF are not damaged or rendered ineffective). In a WHA/UWR/CDC polygon, conduct a pre-work survey to identify WHF within entire setback area: <ul style="list-style-type: none"> 100m for unoccupied; or 250m for occupied. 	<ul style="list-style-type: none"> For WHF utilized for critical life-cycle stages (dens and nests) 250m setback for occupied and 100m setback unoccupied. Apply EIMs HPW species timing windows to determine which setback distance applies. For features that are not utilized for critical life-cycle stages (licks and wallows) a standard 100m setback applies.
All Pipeline and Road operations and maintenance <ul style="list-style-type: none"> Short-term, low impact. 	<ul style="list-style-type: none"> During the early planning stages of an activity, identify WHFs potentially impacted by the proposed activity. Plan activities so that wildlife habitat features are avoided (WHF are not damaged or rendered ineffective). 	No setback restrictions apply to these activities; however, individual animals may still be affected by these activities, so caution should be taken and activities kept a practicable distance away from a WHF.

1.10 Old Growth Management Areas

[Section 7\(a\)](#) of the EPMR prescribes objectives with respect to Old Growth Management Areas (OGMAs) to meet the GEOs as defined in Section 1(2) of OGAA. All oil and gas activities must be planned and undertaken in accordance with Section 7(a). It is the duty of the Commission's DDM to consider Section 7(a) when reviewing and rendering decisions on oil and gas activities.

It is the responsibility of FLNRORD (or the minister responsible for administering the Land Act) to establish OGMAs under OGAA and section 32 of the EPMR. In NEBC, OGMAs are established within the boundaries of the Dawson Creek Timber Supply Area (TSA) ([see order M007/2015](#)).

Where proposed oil and gas activities will impact OGMAs, the Commission expects the applicant to adhere to the POMs listed in the table below. Where the applicant cannot adhere to the POMs they must submit a rationale and/or mitigation strategy as per Section 1.2 of this document.

As per guidance in the POMs, determining ABA status for OGMAs is required as a component of the permit consideration for OGMA incursions. ABA calculates and reports the level of disturbance within OGMAs and identifies high risk-areas (i.e., those exceeding the managed development allowance) as Regulatory Policy. For more information regarding OGMAs in ABA, please refer to the [Industry Bulletin 2018-13 June 15, 2018 Old Growth Management Areas Added to Area-based Analysis](#).

Proposed incursions into OGMAs identified as having ABA status Normal are expected to follow the guidance provided in the POMs (below), however incursions into Regulatory Policy OGMAs undergo a more stringent permit determination process. Permit applications proposed within OGMAs having ABA status Regulatory Policy require:

- a mitigation strategy submitted by the applicant; and
- follow the Enhanced Review Process.

The mitigation strategy and outcome(s) of the Enhanced Review Process will help inform the DDMs final determination under Section 7(a) of the EPMR.

Please note that the ABA ‘old forest’ value and OGMA are different. The ‘old forest’ value in ABA represents polygons of forests meeting the definition of ‘old’, while OGMA are spatially defined polygons that represent various aged trees (age classes) including old, near-old and recruitment. For more information regarding ‘old forest’ and OGMA in ABA, please refer to the [‘Supplementary Information for Area-based Analysis’](#) and [‘Area-based Analysis Data and Process Documentation’](#).

Table 1.7: Planning and Operational Measures to Meet Government’s Environmental Objectives for Old Growth Management Areas.

Objectives:		
<ul style="list-style-type: none"> Maintain the old seral stage forest representation within the OGMA (including high value growth features such as large diameter trees, coarse woody debris, remnants, standing dead trees, stumps, nursery logs and structurally complex forest stands). Maintain disturbance levels below the Managed Development Allowance (MDA). 		
Activity Type	Planning Measures (Avoidance and Minimization Techniques)	Operational Measures (Mitigation and Restoration Techniques)
All	<ul style="list-style-type: none"> Plan oil and gas activities to avoid OGMA. Those activities with locational flexibility (camps, borrow pits, storage, temporary workspaces) should be planned to be outside of OGMA (camps, borrow pits, storage, temporary workspaces). Where avoidance is not practicable: Determine ABA status of OGMA and follow ABA guidance for Normal and Regulatory Policy. Use existing disturbance and where possible coordinate access with other resource users. Plan activity to minimize impacts to old seral stage forest. Utilize existing disturbance such as recently harvested areas or natural openings. 	<ul style="list-style-type: none"> Modify/Minimize operational footprint to avoid high value growth features such as large diameter trees, coarse woody debris, remnants, standing dead trees, stumps, nursery logs and structurally complex forest stands. Employ minimal disturbance techniques that facilitate rapid deactivation and natural regeneration. Limit removal of timber and vegetation, and impacts to root mat and duff. Retain and redistribute coarse woody debris following operational activity. Upon activity completion, undertake measures to control access and promote natural or assisted regeneration. These measures are to encourage re-establishment of pre-existing ecological trajectory.

	Minimize width of Right of Way (ROW). ROW to cross at the narrowest section and to limit fragmentation.	
Linear Features (roads, pipelines, seismic)	All: <ul style="list-style-type: none"> Minimize clearing for new linear disturbances within OGMA. 	Seismic: <ul style="list-style-type: none"> Employ minimal impact seismic in OGMA. Use meandering avoidance. Minimize depth of mulch layer to allow regeneration.
Source: MFLNRORD Guidance for Incursions into OGMA 2016.		

1.11 Resource Features

All oil and gas activities must be planned and undertaken in accordance with [Section 7\(b\)](#) of the EPMR: “that oil and gas activities will not damage or render ineffective a resource feature”. The Commission’s DDM has the duty to consider the activity proposed with respect to Section 7(b).

Applicants are encouraged to advise the Commission of any Resource Features (as defined in the EPMR) as early as possible, even prior to application submission, to allow the Commission time to consider and facilitate any required engagement with other government agencies and avoid delays in application processing.

All resource features defined in [Section 25 of the EPMR](#), must be identified on construction plans. Where resource features are identified, oil and gas activities should be planned and operated in a manner that will ensure that resource features are not damaged or rendered ineffective.

If a permit holder carrying out an oil and gas activity finds a resource feature that was not identified on an approved operational plan or permit, the permit holder must stop and/or modify the activity that is in the immediate vicinity of the feature to the extent necessary to remove the threat of impact to the resource feature. The permit holder must then promptly advise the Commission of the existence and location of the resource feature.

To assist applicants in understanding the Commission’s expectations for minimizing potential impacts to resource features, a table of POMs is provided below in Table 1.8 Please note that additional requirements exist for karst features in Section 1.12.1 and recreation features in Section 1.12.5. These sections must be referenced where there is a potential impact to karst or recreation features.

Please refer to Section 1.2 of this document for additional information on POMs, and requirements for rationale statements and mitigation strategies in permit applications.

Table 1.8: Planning and Operational Measures to Meet Government’s Environmental Objectives for Resource Features.

Objective: Maintain continued use and physical integrity of resource features.		
Activity Type	Planning Measures (Avoidance and Minimization Techniques)	Operational Measures (Mitigation and Restoration Techniques)
All	<ul style="list-style-type: none"> Plan the location of oil and gas activities to avoid resource features. Certain activities are more flexible in their location and should be located to avoid disturbance to resource features. Plan activities so that resource features continue to be readily used and serve the same value and purpose that they did prior to the activity taking place. In situations where an activity must be located in close proximity to a resource feature with adjacency concerns (i.e. a recreation site), minimize impacts to the resource feature by: utilizing existing disturbances and minimizing the footprint. 	<ul style="list-style-type: none"> Appropriate operational setback should be applied to minimize impacts and maintain the integrity of resource features. Upon completion of activity, undertake measures to control access and promote natural or assisted regeneration. These measures are to encourage re-establishment of pre-existing ecological trajectory. For resource features identified in EPMP 25 (b), (d), (e), (f), (g), plan activity timing to occur outside of periods of high usage or high probability of use, as impacts may be more significant during these times.
Linear Features (roads, pipelines, seismic)	<p>All:</p> <ul style="list-style-type: none"> Avoid generating new linear disturbances that create new or alternate access to resource features. <p>Pipelines:</p> <ul style="list-style-type: none"> Where operationally necessary to go through the location of a resource feature, use minimal impact techniques 	<p>All:</p> <ul style="list-style-type: none"> Upon completion of activity, undertake measures to control access and promote natural or assisted regeneration. These measures are to encourage re-establishment of pre-existing ecological trajectory. Install access control measures to limit use by motorized traffic in areas where

	(such as boring), to avoid surface impacts.	<p>a resource features may be damaged or rendered ineffective by new access.</p> <p>Seismic:</p> <ul style="list-style-type: none"> • Employ minimal impact seismic methods.

1.11.1 Karst

Karst is recognized as a valuable, non-renewable resource that can be highly sensitive to disturbance. It is a distinctive topography that develops as a result of the dissolving action of water on soluble bedrock, which produces a landscape characterized by fluted and pitted rock surfaces, vertical shafts, sinkholes, sinking streams, springs, subsurface drainage systems and caves. The unique features and three-dimensional nature of karst landscapes result from a complex interplay between geology, climate, topography, hydrology, and biological factors over long time scales.

Reconnaissance karst potential mapping has been completed for the province and is available through BCGW (refer to Appendix H Spatial Layers). It should be recognized that this mapping is not inclusive of all karst features in the province, but is intended as a guide for areas where karst is likely to be encountered.

Applicants are encouraged to advise the Commission of any Karst Features as early as possible, even prior to application submission. Where an activity has been proposed in an area identified as having karst potential the applicant must employ a QP to conduct pre-site assessments in order to confirm presence/absence of karst. The results of the pre-site assessment must be submitted to the Commission in the form of a report.

The pre-site assessment report must be prepared in accordance with mitigation strategy requirements and include:

- justification for project placement;
- location(s) of identified karst formation(s); and

- mitigation measures that will be employed to ensure retention of karst formation integrity.

Proponents are encouraged to use the [Karst Management Handbook for British Columbia](#) when preparing mitigation measures as to how the activity will not damage or render ineffective the karst resource.

Please refer to Section 1.2.2 and Appendix B of this document for further information on Mitigation Strategy Requirements in permit applications.

1.11.2 Range Development

This resource feature includes any range development as defined under the Forest and Range Practices Act (FRPA). A range development includes a structure, an excavation, or a livestock trail identified in a range use plan or a range stewardship plan. It also includes an improvement to forage quality or quantity on an area that results from the application of seed, fertilizer or prescribed fire to the area, or the cultivation of the area.

Spatial data for some range developments like structures, fences, gates, water developments, etc. are found on the [BCGW](#) or by contacting [Regional FLNRORD staff](#) who work in the Range Branch.

1.11.3 Research/Experimental Crown Land

This includes any Crown land used for research or experimental purposes. Much of the information on experimental, trial and research site locations and characteristics can be found by contacting the local forest district office or the major licensees within the district, who may be conducting field experiments. Some spatial data for experimental, trial and research site locations can be obtained through [BC Geographic Warehouse](#). The provincial universities and colleges are also sources of information on Crown Land used for research.

1.11.4 Permanent Sample Site

Specifically, this is defined as a permanent sample site used as a snow course by or on behalf of the Federal or Provincial government for the purpose of measuring the water content of the snow pack on a given area.

Snow is an important water resource that cannot be accurately measured by snow depth alone. Permanent Sample Sites used as snow courses by or on behalf of the Federal or Provincial government have been established to measure snow water equivalent.

Spatial information for Provincial [snow courses](#) is available via BC Geographic Warehouse; federal information can be obtained via the [Canadian Cryospheric Information Network](#).

1.11.5 Recreation Features

Recreation features include: an interpretive forest site, a recreation site or a recreation trail (single, linear, or a network of trails within a recreation polygon) established or continued under FRPA; a trail or other recreation facility that is authorized under FRPA; and a recreation feature identified under FRPA. Recreational features have been established by FLNRORD and can be established for commercial ventures through the Land Act.

Applicants are encouraged to advise the Commission of any Recreation Feature (as defined in the EPMR) as early as possible, even prior to application submission, to allow the Commission time to consider and facilitate any required engagement with other government agencies and avoid delays in the application processing. Authorization by the District Recreation Officer (FLNRORD) is required for all business or industrial activities on legally established recreation sites, trails or interpretive forests as defined in section 16 of the Forest Recreation Regulation under FRPA.

POMs are provided below for Recreation Features; however, compliance with the POMs does not negate the proponent’s responsibility to communicate with the Commission to facilitate any necessary engagement. Where a proponent does not adhere to the POMs, they must submit a rationale and/or mitigation strategy with their application.

Refer to Section 1.2 of this document for additional information on POMs, and requirements for rationale statements and mitigation strategies in permit applications.

Spatial data for recreational features are available through the [BCGW](#).

Table 1.9: Planning and Operational Measures for Recreation Features.

Objectives:		
<ul style="list-style-type: none"> • Maintain continued use and physical integrity of resource features. • Ensure that industrial activity does not impose safety concerns for the general public. 		
Activity Type	Planning Measures (Avoidance and Minimization Techniques)	Operational Measures (Mitigation and Restoration Techniques)
All	<ul style="list-style-type: none"> • Plan activity to maintain a 500m setback to ensure retention of the integrity and use of the resource feature and avoid/minimize potential impacts to a recreation feature. • Where it is operationally necessary to locate an activity within 500m a recreation feature, noise, light, aesthetics, traffic and H2S potential must be considered. • In situations where an activity must be located 500m of a recreation feature with adjacency concerns (i.e. a recreation site), minimize impacts to the resource feature by utilizing existing disturbances and minimizing the footprint. • Minimize the size and number of any necessary crossings. • Avoid locating industrial camps or water withdrawal locations within recreation sites. 	<ul style="list-style-type: none"> • Plan activity timing to occur outside of periods of high usage or high probability of use, as impacts may be more significant during these times. • Keep shared access free of debris and road maintenance obstructions (for example plowed snow, gravel, culverts). • Use visible signage for crossing locations with recreation trails. • Within 500m of a recreation feature, undertake measures to control access and promote natural or assisted regeneration, upon the completion of an activity. These measures are to encourage re-establishment of pre-existing ecological trajectory.

<p>Linear Features (roads, pipelines, seismic)</p>	<p>All:</p> <ul style="list-style-type: none"> • Avoid creating new linear disturbances that create access to recreation features. • Minimize the size and number of necessary crossings. <p>Pipelines:</p> <ul style="list-style-type: none"> • Where operationally necessary to go through the location of a resource feature, bore underneath to avoid surface impacts. <p>Roads:</p> <ul style="list-style-type: none"> • Access should be designed to avoid the developed portions of a recreation site. 	<p>Seismic and Pipelines:</p> <ul style="list-style-type: none"> • Where a resource feature could be damaged or rendered ineffective by the activity (i.e., in close proximity), install access control measures to limit motor vehicular access. • Keep travel portions of trails, free of debris and/or obstructions, where proposed activities and existing trails share a right of way. <p>Roads:</p> <ul style="list-style-type: none"> • Establish treed buffers or earth berms between recreation site/trails and access roads, where appropriate.
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1.12 Cultural Heritage Resources

A Cultural Heritage Resource is an object, site or location, that is not regulated under the [Heritage Conservation Act](#), but that is of historical, cultural, archaeological or traditional significance or is subject to a treaty right.

Section 7 of the EPMP prescribes objectives with respect to cultural heritage resources to meet the GEOs as defined in Section 1(2) of OGAA. All oil and gas activities must be planned and undertaken in accordance with [Section 7\(c\)](#) of the EPMP.

1.12.1 Cultural Heritage Resources and First Nations Engagement

Applicants contemplating oil and gas activities are expected to engage potentially affected First Nations early in the planning process. As part of this engagement, proponents should work proactively with First Nations to develop data sets cataloguing cultural heritage resources and special management measures for important areas identified through the engagement to ensure compliance with Section 7(c) the EPMP.

It is the responsibility of the applicant to identify any cultural heritage resource as defined under the EPMR through discussions with First Nations communities and ensure oil and gas activities will conserve, or if necessary, protect the identified cultural heritage resource. In the event a cultural heritage resource is identified within the oil and gas operating area, it is the responsibility of the applicant to provide a mitigation strategy outlining how the cultural heritage resource will be conserved, or if necessary protected, during and upon completion of the oil and gas activity. The Commission encourages applicants to work with the affected First Nation(s) in developing such mitigation strategies. The mitigation strategy as it relates to the cultural heritage resource in question, should include information to assist the Commission's DDM in considering the GEO for cultural heritage features when considering authorizing an oil and gas activity permit.

In the event a heritage site, heritage object, or any other feature, place or material that may contain historical or archaeological value as defined by the [Heritage Conservation Act](#) [RSBC 1996] Chapter 187 is encountered, the permit holder must cease disturbance activities and immediately notify the Commission's Archaeology Branch.

1.13 Area-Based Analysis (ABA) Planning

Applicants planning an oil and gas activity in NEBC must utilize the Commission's ABA assessment tool in order to minimize cumulative effects to the environment, minimize footprint of activities and reduce restoration/reclamation timeframes on environmental values.

For more information on ABA and its requirements, see the Supplementary Information for ABA Guideline on the [Commission's website](#).

Chapter 2:

Operating Area Requirements

[Part 3](#) of the EPMR contains the legal environmental requirements that a permit holder conducting an oil and gas activity must comply with in all cases; often referred to as “operator requirements”. The following sections expand on the specific legal requirements on operating areas.

2.1 Water Quality

The requirement under [Section 9\(1\)](#) of the EPMR requires that there is no material adverse effect on the quality, quantity or flow of the water to the waterworks or water supply well located within an operating area as a result of conducting an oil and gas activity.

If it is not practicable to comply with sub-section (1), applicants must demonstrate adherence with all qualifying criteria in Section 9(2), if applicable, through submission of a rationale. A mitigation strategy must also be submitted, with the application, outlining how the mitigation measures will result in effective minimization of the adverse effect. A notice to water users or owners is also required in this event. The Commission’s DDM may use the proposed mitigations as conditions on permit.

This information should also be readily available to Commission C&E staff if requested during operational inspections.

Please Note:

Section 9, Water Quality, refers to conditions where the water works or water supply well is located on the operation area, whereas Section 20, Water Quality, refers to conditions where waterworks or water supply wells are adjacent to an operating area.

2.2 Aquifers

Under Section 10 of the EPMR, it is the responsibility of the permit holder to ensure that activities on an operating area do not cause a material adverse effect on the quality, quantity or natural timing of flow of water in an aquifer.

An aquifer means a geological formation, a group of geological formations, or a part of one or more geological formations, that contains water with up to 4,000 milligrams per litre of total dissolved solids and is capable of storing, transmitting and yielding that water. Regulatory requirements for construction and operation of facilities and wells include requirements relevant to the protection of aquifers. The following additional guidance is provided to applicants regarding aquifer protection pursuant to Section 10 of the EPMR.

The applicant should identify aquifers that may be present in the subsurface below the operating area, based on:

- available [provincial aquifer information](#);
- and/or retrieved using the Commission's [Groundwater Review Assistant Tool](#);
- available borehole or well data in the vicinity of the operating area;
- and/or assessments conducted by a QP.

The applicant must take measures to prevent adverse effects on the quality, quantity or natural timing of flow of water in an aquifer.

Water Quality: If any substances that have the potential to cause adverse effects on groundwater quality are released to the ground surface or subsurface at a site, it is the applicants / permit holder's responsibility to know and comply with all applicable legislation including regulations for spill reporting (e.g., [BC Spill Reporting Regulation](#)). Remediation or mitigation measures may be required to ensure compliance with Section 10 of the EPMR.

Quantity and timing of flow: Industry water source wells and water supply wells require a water authorization under the Water Sustainability Act. The application for a water authorization includes a technical assessment prepared by a QP to assess effects of groundwater extraction on the aquifer. Information on the technical assessment

requirements is available in the province's "[Guidance for Technical Assessment Requirements in Support of an Application for Groundwater Use in British Columbia.](#)" Information regarding groundwater licence applications is provided in the Commission's [Water Licence Application Manual](#).

2.3 Crossing Streams, Wetlands & Lakes

In general, it is only acceptable for an operating area to be located within a stream, lake or wetland where it is required to cross the stream, lake or wetland. Where crossing of a stream, wetland or lake is proposed, applicants must provide the relevant information required on the application form and, where appropriate ([as per the Oil and Gas Activity Manual chapter 4.8 Change in and About a Stream Activity Details](#)) submit a project rationale prepared by a QP as part of the oil and gas activity application. The submission to the Commission must include a QP statement justifying the proposed operations and any planned mitigation to meet the requirements of Section 11 of the EPMR.

In-stream activities on fish streams, or stream reaches that could affect fish habitat or water quality either directly or downstream, may only be undertaken when conditions are such that impacts to fish or fish habitat are avoided.

Where crossing a stream, wetland or lake or when 'works in and about a stream' as defined under the [WSA](#) are proposed, the applicant may require additional authorization under the WSA. Applicants can find additional information on the requirements regarding stream, lake or wetland crossings within the [Oil and Gas Activity Application Manual](#).

2.4 No Deleterious Materials into Streams, Wetlands or Lakes

[Section 12](#) of the EPMR states that oil and gas activities must not result in deleterious material entering into streams, wetlands or lakes. This requirement applies to streams, wetlands or lakes within the operating area or adjacent to the operating area. The requirement also applies to downstream waterbodies via runoff. EPMR Section 20 – Water Quality also addresses the avoidance of a material adverse effect on the quality, quantity

and timing of flow to adjacent areas. It is the duty of the applicant or permit holder carrying out the oil and gas activity to ensure and demonstrate compliance with this requirement.

2.5 Operations within Wetlands

In order to operate in a wetland, the GEOs in Section 5 of the EPMR must first be met. If the GEOs are met, and there will be operations within a wetland, Section 13 of the EPMR states that the operator must, to the extent practicable, maintain the natural flow of water in the wetland. [Section 5.6](#) of this guideline provides additional information on wetland classification and operations.

2.6 Range Barriers

A natural range barrier is a body of water, rock or other naturally occurring feature that stops or significantly impedes livestock movement to or from an adjacent area. It is the duty of the permit holder carrying out the oil and gas activity to ensure the requirements of [Section 14](#) of the EPMR are met. Wherever possible, applicants and permit holders must avoid removing or rendering ineffective natural range barriers. Breaching of a natural range barrier and the adverse effect on livestock confinement is of particular concern to range tenure holders.

During the planning of an oil and gas activity, the applicant needs to identify any range barriers that could be impacted by the proposed oil and gas activity. The application should include a plan for establishing a replacement range barrier if the activity will remove or render the natural range barrier ineffective. Discussions with a range tenure holder during the Consultation and Notification of the oil and gas activity will help to identify an appropriate time and manner to replace or avoid impacting the natural range barrier.

Where natural range barriers are encountered during the construction of the oil and gas activity that were not previously identified, it is the responsibility of the permit holder carrying out that oil and gas activity to mitigate for the breach and ensure that the requirements of Section 14 are met.

2.7 Invasive Plants

A person carrying out an oil and gas activity on an operating area must do so in accordance with [Section 15](#) of the EPMR. An invasive plant is any foreign plant species that causes or has the potential to cause detrimental impacts on human health and safety, the environment and biodiversity, agriculture, animal health, forestry, and the economy.

Applicants are responsible under the [B.C. Weed Control Act](#) and the [Weed Control Regulation](#) (WCR) to ensure noxious weeds are controlled on their operating areas. The WCR also addresses the prevention and spread of noxious weeds by transport from construction or other equipment. The species of plants listed in Schedule A Part I – Provincial Weeds of the WCR have been established as invasive plants by order under the authority of Section 33 of the EPMR (see [INDB 2018-08](#)).

Additionally, a list of species identified as weeds and invasive plants having a specific impact within Northern BC was released (see [INDB 2017-05](#)) and continues to feature species of priority for this region.

Both invasive plant lists: Schedule A Part I – Provincial Weeds of the WCR *and* the list provided in INDB 2017-05 must be used when determining priority invasive plant species for prevention and control actions in NEBC.

See the [Invasive Plant Strategy for British Columbia](#) for a summary of the detrimental effects of various invasive plants. The term “invasives” is used in this guide to apply equally to invasive plants and noxious weeds. This guide also refers to key aquatic invasives; both fish species and plants.

When planning or undertaking oil and gas activities, the applicant or permit holder (occupier) must minimize the establishment of invasives in their operating area and the spread of invasives to or from their operations. Controlling invasives is a requirement during all phases of operations - transport, construction, cleanup, operations, abandonment and restoration.

Other references for an integrated approach to managing invasives can be found here:

- [Best Practices for Managing Invasive Plants on Roadsides](#). Published by BC Ministry of Transportation and Infrastructure; available as a pocket guide. Contains best practices for roadside workers that are equally applicable to road users in the oil and gas sector.
- The [Best Practices for Managing Invasive Plants on Oil and Gas Operations](#). Pocket guide developed for British Columbia's Oil and Gas workers. Contains information on key aquatic invasive species as well.
- Ministry of Agriculture, [Seven Steps to Managing Your Weeds. A Guide for Integrated Weed Management in British Columbia](#).
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development, [Invasive Alien Plant Program - Reference Guide Part 1](#).
- [Invasive Species Council of BC](#) Advice and access to local networks of professionals.
- [Guide to Weeds in B.C.](#) A comprehensive listing of Invasive Plants found in B.C. and relevant information for control.
- [Pest Control Products Act](#) Federal Government of Canada legislation regulating the use of herbicides. Herbicide labels indicates which plant species can be treated, application rates, and what types of restrictions apply, such as buffer zones around sensitive habitats.

2.8 Forest Health

All oil and gas activities must be carried out in accordance with [Section 16](#) of the EPMP. Applicants and permit holders are required to comply with Section 16 as written. Compliance with Section 16 supports efforts to reduce the spread of insects and disease harmful to forest health.

In some cases, certain measures must be implemented in order to ensure forest health agent populations do not increase. Some forest health agents are specific to certain tree species, and as such, controlling practices must be species-specific, not generic.

Applicants should work with a qualified professional to identify forest health agents that could be harmful to forest health and to prevent the spread of such agents as a result of oil and gas activities.

Applicants are also encouraged to visit the Ministry of Forests, Lands, Natural Resource Operations and Rural Development [Provincial Forest Health website](#) for additional information.

2.9 Conserving Soil

All oil and gas activities must be carried out in accordance with [Section 17](#) of the EPMR. Applicants and permit holders are required to comply with Section 17 as written. Compliance with Section 17 supports the strong interrelationships between soil conservation, invasive plants and site restoration. Applicants must demonstrate careful planning with regards to soil conservation. Where soil is disturbed through the carrying out of permitted oil and gas activity, operators must ensure they are in compliance with Section 17 at all times.

Soil conservation practices focus on maintaining slope stability, soil productivity and natural drainage patterns, while minimizing erosion. It is an expectation for companies to consult with QPs, where appropriate, to achieve soil conservation requirements as outlined in [Section 17](#) of the EPMR.

The requirements for maintaining slope stability include the necessity to understand and plan accordingly for soil type, soil structure, slope and terrain characteristics, where they exist in association with an oil and gas activity. This includes locations of oil and gas activity that may be affected by natural slope characteristics, and locations where the oil and gas activity may affect slope stability. These areas include land on steeper slopes, at the breaks in slope, along the base of slopes and land on colluvial and alluvial fans. Terrain hazard mapping and classification in British Columbia follows the procedures developed by Howes and Kenk (1997). Applicants are encouraged to visit the Ministry of Environment's

[Terrain and Soil Standards, Manual and Guideline website](#) and the [Terrain Topics](#) website for information on understanding and mapping terrain hazards.

[Appendix C: Restoration and Reclamation](#) of this document contains additional guidance with regards to soil conservation and restoration practices for areas with disturbed soils.

2.10 Seismic Lines

Geophysical programs must be carried out in accordance with [Section 18](#) of the EPMR. Enclosed uplands, as defined in Part 1 of the EPMR, riparian reserve zones, wildlife habitat features and resource features must not be damaged or rendered ineffective during construction of a seismic line. Furthermore, it is expected the permit holders carrying out geophysical operations in B.C. will use [Low Impact Seismic](#) (LIS) techniques.

Additional information concerning geophysical activities can be found in the [Geophysical Exploration Regulation, Oil and Gas Activity Application Manual](#) and [Oil and Gas Activity Operations Manual](#).

2.11 Areas to be Restored

A permit holder must carry out oil and gas activities in accordance with [Section 19](#) of the EPMR. [Appendix C: Restoration and Reclamation](#) of this document outlines steps that must be taken to restore an operating area upon completion of oil and gas activities. A QP can propose alternative restoration methods to the Commission that will meet the regulatory requirements of Section 19.

2.11.1 Additional or Concurrent Regulatory Requirements

- [Oil and Gas Road Regulation](#): Section 19(1) (a and b) of the EPMR does not apply to an operating area that is a road right of way. There

are specific deactivation requirements for roads in Section 24 of the [Oil and Gas Road Regulation](#).

- When operating in identified boreal caribou habitat, there are restoration and reclamation requirements contained within the [Interim Operating Practices for Oil and Gas Activities in Identified Boreal Caribou Habitat in British Columbia](#).
- Muskwa Kechika Management Area (MKMA) reclamation requirement: Pre-tenure Plans are a legislative requirement that must be followed when operating, or applying to operate, in the MKMA. Pre-tenure Plans and MKMA guidelines are available on the FLRNORD [MKMA website](#).
- [Land and Resource Management Plans](#) (LRMP) and Sustainable Resource Management Plans developed for various areas of the province provide some guidance for end land use goals. The specific end land use for the site should be consistent with general LRMP direction and that of adjacent land.
- The Certification of Restoration (CoR) process is outline in the Commission's [Certificate of Restoration Application Manual](#) and is administered by the Commission. The CoR process is predicated on a minimum of one full growing season following re-vegetation.
- [Oil and Gas Activity Application Manual Chapter 5.3. Completing Application Information Details: Agriculture Land Reserve](#) : provides industry with the reclamation assessment requirements for lands within the Agricultural Land Reserve (ALR), administered by the Commission.

Chapter 3:

Adjacent Areas

3.1 Water Quality

The requirement under Section 20 of the EPMR requires that there is no material adverse effect on the quality, quantity or flow of the water to the waterworks or water supply well located adjacent to an operating area as a result of conducting oil and gas activity.

Section 20 (2) outlines circumstances where, if an operator cannot comply with Section 20 Subsection (1), or if there is a material adverse effect, but it is minimal, they are not prohibited from carrying out an oil and gas activity. However, 72 hours' notice must be given to the affected waterworks or water supply owner or user. Also, the affected owner or user must be provided with an alternate supply of water, of equal or better quality.

Please Note:

Section 9 of the EPMR, Water Quality, refers to conditions where the water works or water supply well is located on the operating area, whereas Section 20, Water Quality, refers to conditions where waterworks or water supply wells are adjacent to the operating area.

Chapter 4:

Exemptions and Deviations

4.1 Exemptions by the Commission

The Commission may exempt a person or a class of persons (e.g., all permit holders in a given area) from one or more of the environmental protection and management requirements for an operating area or an adjacent area if satisfied that, in the circumstances, it is not reasonably practicable for the person to comply with the requirement. Exemption requests must be formally submitted to the Commission, to be reviewed and approved by the [Executive Director of Permitting & Authorizations, or the Deputy Commissioner, Permitting & Authorizations.](#)

4.2 Deviations

Deviations differ from exemptions, in the context of the EPMR and this guideline. Exemptions occur where permit holders are pursuing approval to be exempt from a specific regulation, as described above. A deviation is issued in reference to guidance. Deviations to guidance are requested as part of a mitigation strategy, whereby the QP presents acceptable mitigation strategies demonstrating how the proposed work will not negatively impact the environmental value.

Chapter 5:

Classification, Identification and Establishment

Part 4 of the EPMR contains the classification, identification and establishment criteria and procedures for classifying areas and features that have unique management and protection requirements. These are areas and features that have been identified elsewhere in the regulation (i.e. through the EPMR Part 2 GEOs or the EPMR Part 3 Operating Area Requirements). It is the responsibility of the applicant to identify these areas and features as defined within the EPMR.

5.1 Riparian Classification

Stream, wetland and lake classifications and corresponding riparian widths are described and classified in EPMR [Sections 22, 23 and 24](#) and this section of the guideline. The applicant and their QPs are responsible for waterbody classification. Spatial data for waterbody classification in British Columbia is available through the [Freshwater Atlas](#) via the [BCGW](#). For additional guidance and detailed steps on classifying streams, refer to the [Forest Practices Code Fish Stream Identification Guidebook, 2nd Edition, Version 2 \(1998\)](#). If the proposed oil and gas activity, or permitted activity, is authorized under the [WSA](#) (e.g. Section 8 Water Sustainability Act Authorizations), operators are also required to comply with the relevant sections of that legislation as well as any permit conditions that have been included. Operators should also consult the Oil and Gas Activity Application Manual.

5.2 Stream Riparian Classes

All streams, as defined in Part 1 and [Section 22](#) of the EPMR, are subject to classification and all oil and gas activities in or about streams must be carried out in accordance with [Section 5](#) of the EPMR and with Section 8 of the WSA. Each stream receives a riparian

classification based on average channel width, the existence of a continuous channel bed greater than 100 m in length, the presence or absence of fish, connection to a fish-bearing stream or lake, or location within a community watershed.

The applicant must determine the riparian class of all streams that may be impacted by the oil and gas activity. Figure 5.1 below illustrates the basic steps to follow in determining stream riparian class. The steps outlined include determining fish presence and the average stream channel width.

Please Note:

The estuarine portion of a stream should be classified the same as the stream that has formed the estuary.

As illustrated in Figure 5.1, Classes S1-S4 are fish streams or streams located within a Designated Community Watershed and classes S5-S6 are non-fish streams located outside a Community Watershed.

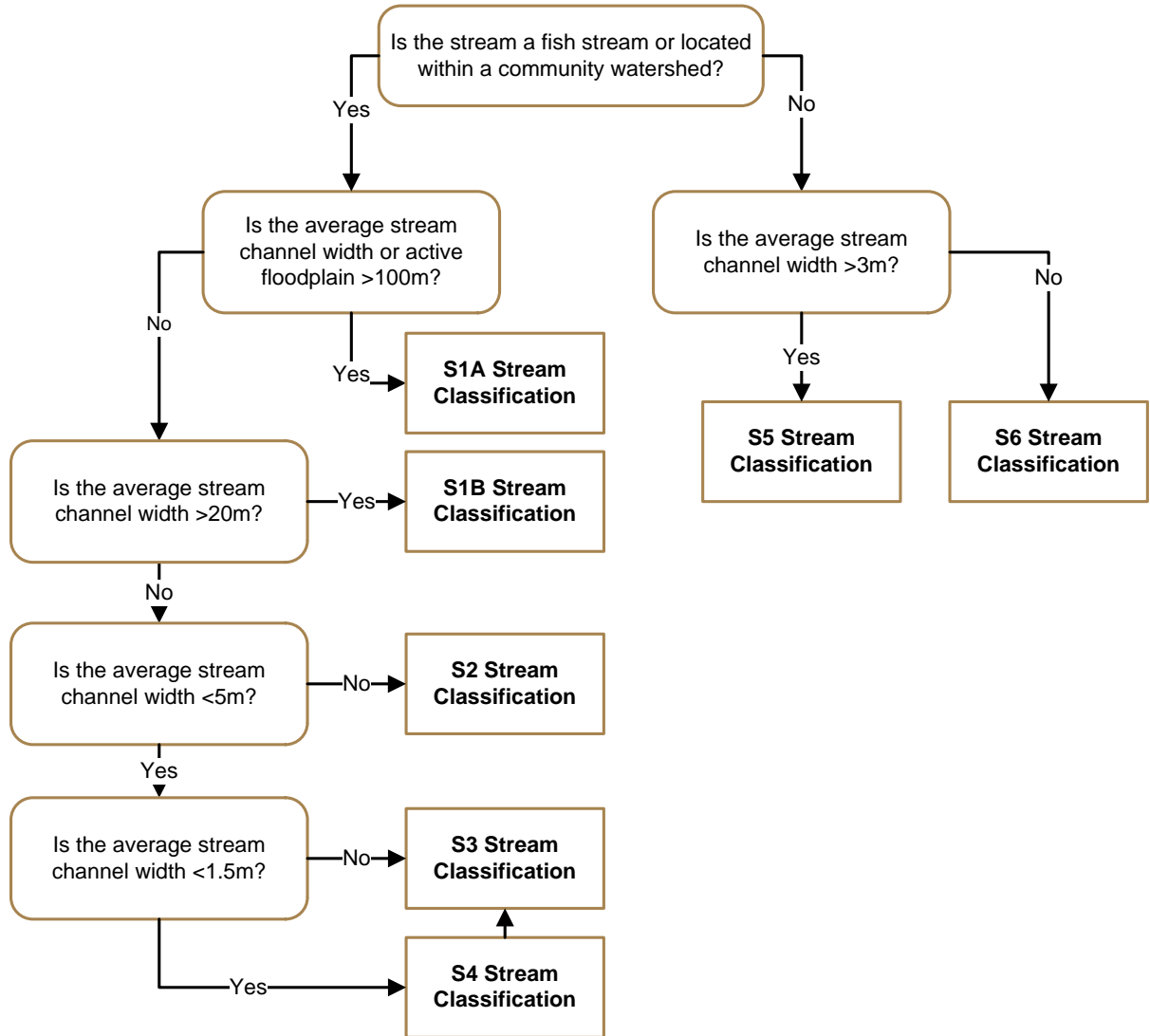


Figure 5.1: Key to stream riparian classification (Forests, 1995)

Table 5.1 illustrates the division of the Stream Riparian Management Area into Riparian Reserve Zone (RRZ) and Riparian Management Zone (RMZ).

Table 5.1: Classification criteria and corresponding RMA widths for classified streams (Forests, 1995)

Riparian Class	Riparian Management Area (metres)	Riparian Reserve Zone (metres)	Riparian Management Zone (metres)
S1-A	100	50	50
S1-B	70	50	20
S2	50	30	20
S3	40	20	20
S4	30	0	30
S5	30	0	30
S6	20	0	20

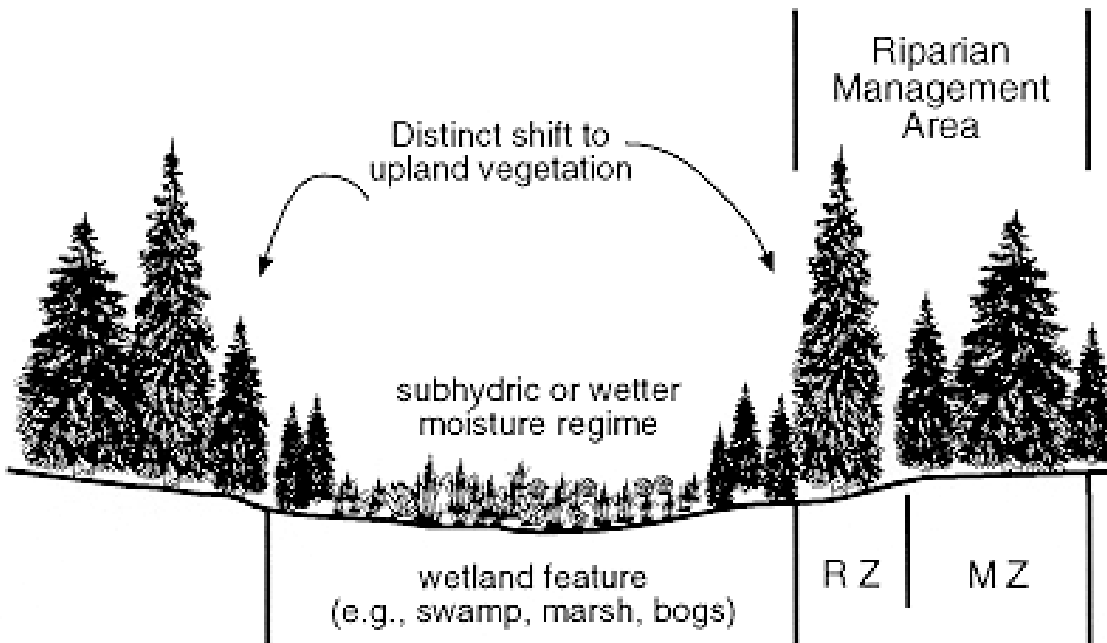


Figure 5.2: Illustration of a riparian management area, riparian reserve zone (RZ) and riparian management zone (MZ). (Forests, 1995)

5.3 Riparian Management Areas

Riparian management areas (RMAs) are transitional areas adjacent to a stream, wetland or lake where there is a distinct shift in vegetation from aquatic to upland communities; as illustrated in Figure 5.2. Special management is required in RMAs to conserve fish or wildlife habitat, biodiversity and water values of the area. RMAs are determined based on the riparian stream class, as per Section 22(4) of the EPMR and Table 5.1 (“Classification criteria and corresponding RMA widths for classified streams”, Forests, 1995).

RMA objectives are implemented to:

- Minimize or prevent impacts of oil and gas activities on stream channel dynamics, aquatic ecosystems, and water quality of all streams, lakes, and wetlands.
- Minimize or prevent impacts of oil and gas activities on the diversity, productivity, and sustainability of wildlife habitat and vegetation adjacent to streams, lakes, and wetlands, or where high wildlife values are present.

5.4 Determining Fish Presence

Applicants are responsible for determining fish presence or absence and assessing fish streams for fish habitat values and to ensure GEO’s are being met. For information on acceptable methods and tools that can be used to assess fish presence, refer to the [Forest Practices Code Fish Stream Identification Guidebook](#) and the Government of British Columbia [Resources Information Standards Committee \(RISC\)](#) or a comparable, accepted standard. Where fish inventories have been carried out by the province, the spatial information is available through BCGW. Refer to [Chapter 4.8 of Oil and Gas Activity Application Manual: Completing Changes in and About a Stream Activity Details](#) for additional guidance on Fish Habitat Assessments.

5.5 Non-Classified Drainages (NCD)

A Non-Classified Drainage (NCD) is an ephemeral or intermittent watercourse having a continuous defined channel that is less than 100 metres in length, and at some points may spread over a level area without defined banks, before flowing again as a defined channel.

A NCD is usually a stream under the WSA, and as such, may require authorization under the WSA (in the case of NEB or related activities) prior to any works in it.

If a feature depicted as a stream on the Freshwater Atlas coverage is not evident during field survey, the construction plan submitted in conjunction with an application for oil and gas activity should note “No Watercourse Evident” or “No Watercourse Visible” (or something similar). These features should not be listed as NCDs in the AMS.

5.6 Wetland Riparian Classes

All oil and gas activities in or about wetlands must be carried out in accordance with [Section 5](#) of the EPMR.

A wetland is a swamp, marsh, bog, fen or other similar area that supports natural vegetation which is distinct from the adjacent upland areas and may have up to two metres of standing water. The [WSA](#) definition of a stream includes reference to a wetland, or swamp (“includes a natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp and gulch”).

[The Field Guide to Identification of Wetlands of British Columbia](#) (Mackenzie and Moran, 2004) further defines wetlands as areas where soils are water-saturated for a sufficient length of time such that excess water and resulting low oxygen levels are principal determinants of vegetation and soil development. Wetlands will have a relative abundance of hydrophytes in the vegetation community and/or soils featuring ‘hydric’ characters.

Wetlands may or may not be treed, but when trees are present, the canopy is generally relatively open. Growth rates are much reduced compared to those on the surrounding uplands, and the soil surface is usually hummocky. Wetlands must have both:

- Hydrophytic vegetation, characterized by the predominance of plant species that normally grow in standing water or in soils that are water-saturated for all or a major portion of their growing season; and
- Subhydric or hydric soils, distinguished by free water or prolonged saturation, evidenced by dull gray gleyed horizons, within 30 centimetres of the mineral surface or by sedge or moss peat over mineral soils.

5.6.1 Hydrophytic Vegetation

To be considered hydrophytic, vegetation should include shrub or herbaceous species that occur only on organic soils or soils that are water-saturated for a major portion of the growing season. These species should make up 20 per cent or more of the combined cover of low (less than two metres), shrub and herbaceous vegetation. Most (greater than 80 per cent) of the remaining vegetation should be species that are able to establish and grow on water-saturated soils, even though they may not be restricted to these soils.

5.6.2 Classifying Wetlands

There are three riparian classes of wetlands (W1 to W3) defined in Part 1 and [Section 23](#) of the EPMP based on wetland size and the biogeoclimatic unit in which the wetland occurs. Spatial data for biogeoclimatic ecosystem classification can be found in [BCGW](#).

The applicant is responsible for determining the riparian class of all wetlands potentially impacted by the oil and gas activity. A key to riparian classification of wetlands is illustrated in Figure 5.3 below and should be used along with the [Field Guide to Identification of Wetlands of British Columbia](#).

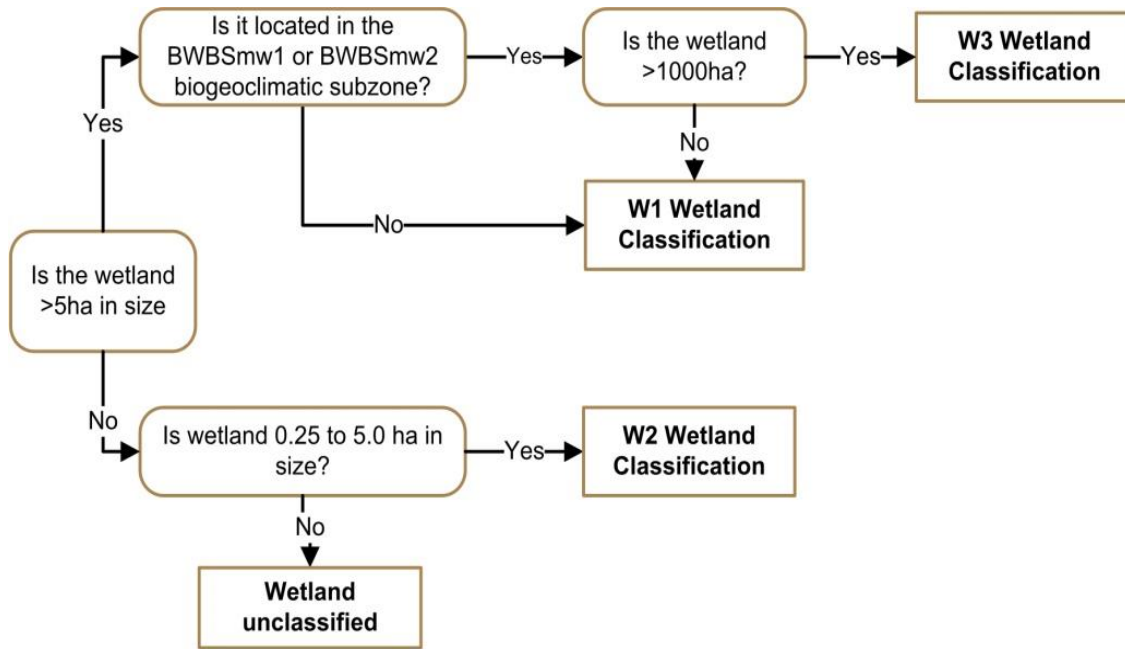


Figure 5.3: Key to Wetland Classification

5.6.3 Establishing Wetland RMA Boundaries

Table 5.2: Classification criteria and corresponding RMA widths for classified wetlands (Forests, 1995)

Riparian Class	Riparian Management Area (m)	Riparian Reserve Zone (m)	Riparian Management Zone (m)
W1	50	10	40
W2	30	10	20
W3	0	0	0

5.7 Lake Riparian Classes

All oil and gas activities in or about lakes must be carried out in accordance with Section 5 of the EPMR and Section 11 of the WSA.

All lakes within or adjacent to proposed or permitted oil and gas operations must be classified. There are five riparian classes of lakes (L1-A to L4) as determined by [biogeoclimatic ecosystem classification](#) (BEC) zone or subzone and lake size. The applicant

is responsible for determining the riparian class of all lakes that may be impacted by the proposed oil and gas activity.

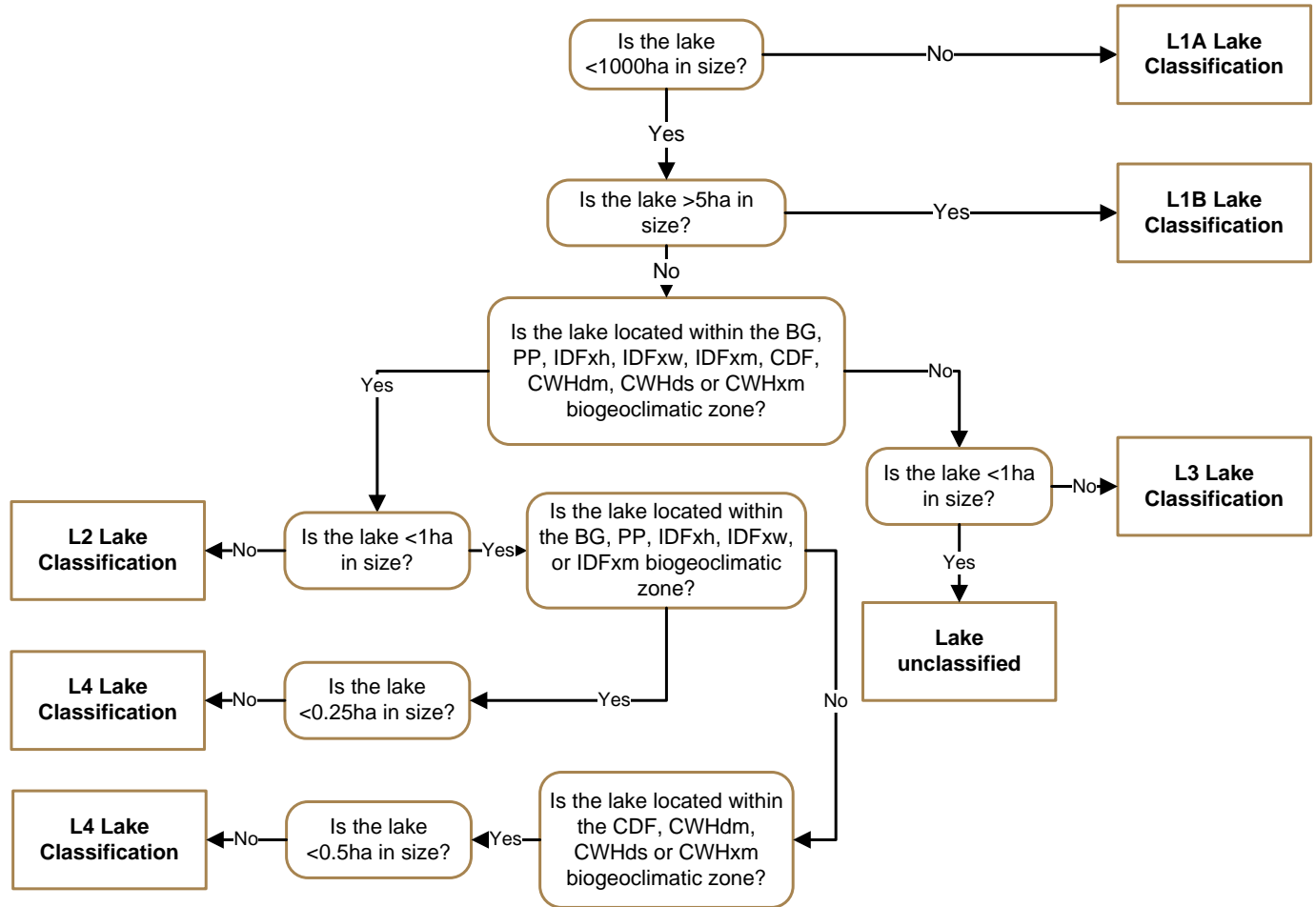


Figure 5.4: Key to Classification of Lakes

5.7.1 Establishing Lake RMA Boundaries

Table 5.3: Classification criteria and corresponding RMA widths for classified lakes (Forests, 1995)

Riparian Class	Riparian Management Area (m)	Riparian Reserve Zone (m)	Riparian Management Zone (m)
L1-A	70	50	20
L1-B	40	20	20
L2	30	10	20
L3	30	0	30
L4	30	0	30

5.8 Division 2 - Identification and Establishment

[Part 4, Division 2](#) of the EPMP identifies and enables the establishment of areas of special management to meet the GEOs outlined in Part 2. The following sections provide additional information regarding the identification and establishment of these features or areas as they relate to implementation of Part 2.

5.9 Temperature Sensitive Streams

No Temperature Sensitive Streams have been established under [Section 28](#) of the EPMP at this time. As these areas are established, guidance with respect to operations will be developed.

5.10 Categories of Species

Species categories are established by order of the Minister of FLNRORD and include the following types of wildlife:

- Species at risk: wildlife species that are endangered, threatened or vulnerable;

- Regionally important wildlife: wildlife species that are important to a region of British Columbia; and
- Ungulate species: species of ungulates for which an UWR may be established.

Establishment of species categories is the prerequisite step before being able to legally establish, by Minister's Order, an area of habitat for management and conservation of species at risk or regionally important wildlife, or for ungulate species.

Species categories for species at risk and ungulates, were approved by the Minister of the Environment on July 18, 2011. The order is available at the Ministry of Environment's [Categories of Species](#) website and may be amended from time to time. To date no regionally important wildlife species list has been established.

5.11 Invasive Plants

The species of plants listed in Schedule A, Part I – Provincial Weeds of the Weed Control Regulation have been established as invasive plants by order under the authority of Section 33 of the EPMR.

Additionally, a list of species identified as weeds and invasive plants having a specific impact within Northeast B.C. was released (see INDB 2017-05) and continues to feature species of priority for this region. Both lists must be used in planning and implementing prevention/control measures for invasive plants in NEBC.

5.12 Aquifers and Groundwater Recharge areas Identified

To date there have been no aquifers or groundwater recharge areas established [under Section 34](#) of the EPMR. As these areas are established, additional operational guidance will be published.

5.13 Review and Comment, and Notice and Consultation

[Sections 36 and 37](#) of the EPMR refer to government's responsibility to consult with affected parties and stakeholders where establishing new legal orders under the EPMR. This duty to consult, and to provide a period for review and comment, does not apply to orders that were legal under FRPA when OGAA came into effect in 2010. These are the orders that were originally legal under FRPA and were "grandparented" under OGAA, and are thus now legal considerations in the EPMR.

The Commission is regularly given the opportunity by the minister to review and comment on new proposed legal EPMR designations. Organizations who conduct geophysical exploration, construct pipelines and/or hold leases or tenures that may be affected by the legal orders are also consulted.

Appendix A: Definitions

Clarification of EPMR Definitions

Definitions provided in the EPMR are linked to specific references in the Regulation. In addition, the following definitions may be applicable in the context of this guideline.

<p>Agriculture Land Commission (ALC)</p>	<p>The Provincial Agricultural Land Commission (ALC) is an independent administrative tribunal of appointed Commissioners (and staff) who administer the Agriculture Land Reserve (ALR). The BC Oil and Gas Commission has been delegated authority to administer the permitting process for oil and gas activities on land within the ALR in the Peace Region of British Columbia, through the ALC Delegation Agreement.</p>
<p>Agriculture Land Reserve (ALR)</p>	<p>The Agricultural Land Reserve (ALR) is a provincial zone in which agriculture is recognized as the priority use. Farming is encouraged and non-agricultural uses are regulated and limited.</p>
<p>Aquifer</p>	<p>An aquifer means a geological formation, a group of geological formations, or a part of one or more geological formations, that contains water with up to 4,000 milligrams per litre of total dissolved solids and is capable of storing, transmitting and yielding that water. See also identified aquifer.</p>
<p>Biogeoclimatic Ecosystem Classification (BEC)</p>	<p>The Biogeoclimatic Ecosystem Classification (BEC) is an ecological framework and language for ecosystem management in British Columbia. BEC provides a multi-scale classification framework to describe broad biogeoclimatic zones used for applications such as protected area and land management planning, forest pest risk and wildlife habitat management. The BEC program, managed by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), is continually being updated and as such, the biogeoclimatic zones, names and spatial distribution may change from time to time. The EPMR references the BEC zones at the time the Regulation was</p>

	created; however, the names and distribution of the zones have changed since then and the new zones should be used when applying the requirements in the EPMR.
Bog	A bog is a wetland that has organic soils with a water table at or near the surface. Soils are predominantly poor to moderately decomposed sphagnum moss peats. The bog surface is usually unaffected by groundwater and thus waters are generally acid and low in nutrients. Bogs are usually carpeted by sphagnum mosses and ericaceous shrubs. They may be treed or treeless. Bogs with an open growth of scrubby trees are commonly referred to as muskeg.
Cavity Tree	A tree that is generally larger and older, and that has holes, hollows or cavities along its trunk or main limbs that are used by wildlife species for foraging, roosting, nesting or denning.
CDC	BC Conservation Data Center. Part of the Registries and Resource Information Division in the BC government that collects and disseminates information on rare and endangered plants, animals and plant communities of BC.
Categories of Species	Categories of Species are established by Order of the Minister of Environment, and include: Species at Risk, Regional Important Wildlife, and Ungulate Species. Establishment of species categories is the prerequisite step before being able to legally establish, by Minister's Order, an area of habitat (polygon) for management and conservation of species at risk or regionally important wildlife (wildlife habitat area), or for ungulate species (ungulate winter range).
DBH (Diameter Breast Height)	The stem diameter of a tree measured at breast height (~1.3m above the ground)
Deleterious Material	Deleterious materials are materials or operating techniques that could cause harm or damage to the environment or habitat.
Deleterious Substance	A substance likely to have a negative impact on water. Defined in Section 34 of the Fisheries Act.

EIMS	Environmental Information Management System. EIMS is a web based system that lists environmental planning and operational measures associated with wildlife and other environmental values.
Fen	A fen is a wetland that has organic soils and a water table at or above the surface. Soils are primarily moderately to well-decomposed sedge and non-sphagnum moss peats. Waters are mainly nutrient rich with a near neutral to slightly acid pH. The vegetation consists primarily of sedges, grasses, reeds, mosses, and some shrubs. Scattered trees may be present.
Fish Salvage	Fish salvage is the authorized capture of fish species present in an isolated worksite or dewatered area.
High Priority Wildlife	High Priority Wildlife (HPW) are those species requiring specific management and/or protection, including species listed as a “ Category of Species ” under OGAA. HPW are often species not captured under the zones, areas or ranges designated through other sections of the EPMP. See Appendix D: High Priority Wildlife of this document.
High Water Mark	The high water mark is the point on a stream bank usually indicated by a clearly visible change in vegetation and sediment texture. This border is sometimes shown by the edges of rooted terrestrial vegetation. Above this border, the soils and terrestrial plants appear undisturbed by recent stream erosion. Below this border, the banks typically show signs of both scouring and sediment deposition.
Identified Aquifer	Under the EPMP an “identified aquifer” means an aquifer identified in an order by the minister responsible for administering the Water Sustainability Act.
Identified Habitat	Identified habitat is known wildlife habitat associated with High Priority Wildlife. It includes habitat identified in WHAs, UWRs, and CDC polygons and habitat that has been identified in the ordinary course of planning an oil and gas activity (including consultation with First Nations communities, stakeholder engagement and/or field work).

Key Habitat Features	Key habitat features are the specific features and habitat attributes within identified habitat that are essential for the survival of the species; such as areas associated with nesting, calving, winter forage, breeding, security and hibernation.
Lek	An area in a large opening where birds (e.g., grouse) gather to court, display and mate.
Marsh	A marsh is a wetland that has mineral or sometimes well-decomposed peat soils. When peat soils are present they are often enriched with mineral materials. Waters are nutrient rich with near-neutral to basic pH. Surface water levels typically fluctuate seasonally, with declining levels exposing matted vegetation or mudflats. Emergent vegetation includes grasses, cattails, sedges, rushes, and reeds which cover more than 25 per cent of the wetland surface.
Material Adverse Effect	A material adverse effect refers to a change to an environmental value established by Government's Environmental Objectives that is both material (i.e. serious, of consequence) and adverse (i.e. injurious, damaging, unfavourable). The consideration of material adverse effect is rooted in what an informed person could reasonably consider based on the available information. A potential effect must be both material and adverse (i.e. injurious or damaging, with an appreciable consequence) to be found inconsistent with Government's Environmental Objectives.
Measures, Operational	Are measures that are employed during the operational phases of an activity, which may be mandated via permit condition (i.e., timing and restoration requirements) to minimize impacts to specific environmental areas.
Measures, Planning	Are measures that the applicant incorporates into the planning phase to minimize impacts to specific environmental values including, but not limited to, activity placement, layout, activity types and avoidance.
Mitigate	To mitigate is the action of reducing the severity or seriousness of the impact.
Mitigation Strategy	A mitigation strategy is a project specific report completed by a qualified professional that addresses the elimination, reduction

	and control of adverse environmental effect, including restitution of any damage to the environment through avoidance, mitigation and restoration.
Natural Range Barriers	A natural range barrier is a body of water, rock or other naturally occurring feature(s), that stops or significantly impedes livestock movement to or from an adjacent area.
Non-Classified Drainage (NCD)	A non-classified drainage (NCD) is an ephemeral or intermittent watercourse having a defined channel that is less than 100 metres in length, and at some points may spread over a level area without defined banks, before flowing again as a defined channel. They are generally defined as streams under the Water Sustainability Act , but do not meet the criteria for the definition and classification of stream under the EPMR. Refer to the Water Information webpage on the Commission’s website for more information on when to include NCDs in applications under the Water Sustainability Act.
Northeast British Columbia (NEBC)	The geographic region in the northeast corner of British Columbia consistent with the Western Canadian Sedimentary Basin and Watershed Management Basins for which the Commission’s Area-based Analysis is located and applied. The term “NEBC” is frequently used in other Commission documentation to describe where specific guidance/requirements apply.
Oil and Gas Activity	Oil and gas activity as defined in Section 1(2) of OGAA includes: geophysical exploration, the exploration for and development of petroleum, natural gas or both, the production, gathering, processing, storage or disposal of petroleum, natural gas or both, the operation or use of a storage reservoir, the construction or operation of a pipeline, the construction or maintenance of a prescribed road and the activities prescribed by the regulation.
OGMA (Old Growth Management Area)	One or more areas established under section 32 of the EPMR for the purposes of providing old seral stage forest representation.
Practicable	Practicable means capable of being effective, done or put into practice; feasible. This term refers to the fact that an applicant or permit holder has reviewed and considered the full range of options available in the context of social, economic and

	<p>environmental implications. Where it is practicable to use one of the options in the range then the requirements of the EPMR apply; however, if a practicable option does not exist then the requirements may not apply. Where it is not practicable to meet the requirements of the EPMR, it is important for applicants and permit holders to document considerations, rationale, process followed; experts and information consulted to demonstrate due diligence; and to submit that information to the Commission as part of the application.</p>
<p>Qualified Professional (or Specialist)</p>	<p>A qualified professional, or qualified specialist, is a member in good standing of a profession regulated in British Columbia and who is recognized by that profession as being qualified to work in an area of practice for which an opinion or advice is required. This person possesses an appropriate combination of formal education, knowledge, skills and experience to conduct a technically sound and rational assessment for the area of practice, and is familiar with applicable provincial regulation, policies, protocols and guidelines. They will usually be; an RPBio or RBTech (registered with The College of Applied Biology of BC); an RPF or Forest Technologist (registered with the Association of BC Forest Professionals); a P.Eng or P.Geo. (registered with the Association of Professional Engineers and Geoscientists of BC); and/or a P.Ag (registered with the BC Institute of Agrologists);.</p>
<p>Range Development</p>	<p>A range development is a structure, excavation, trail or cultivated area created for the purpose of rangeland or livestock management.</p>
<p>Rationale</p>	<p>A rationale is a brief explanation of the fundamental reasons, or logical basis, for a proposed course of action. A rationale is required when an applicant deems that they are unable to plan and/or operate the proposed activity in accordance with the POMs, and must be prepared by a QP.</p>
<p>Reach</p>	<p>A reach is a relatively homogeneous section of a stream having a sequence of repeating structural characteristics (or processes) and fish habitat types. The key physical factors used to determine reaches in the field are channel pattern, channel confinement, gradient, and streambed and bank materials. Stream reaches</p>

	generally show uniformity in those characteristics and in discharge.
Regionally Important Wildlife	Regionally Important Wildlife is a Category of Species that includes species considered important to a region of British Columbia, relies on habitat not otherwise protected under legislation, and may be adversely impacted by industrial activity.
Shallow Open Water Wetland	A shallow open water wetland is intermittently or permanently flooded with open expanses of standing or moving water up to 2 metres deep. Open water with no emergent vegetation covers 75 per cent or more of the wetland surface.
Soil	Soil is the upper layer of earth in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles.
Species at Risk	Species at Risk are a Category of Species that represent those species that had been previously list as Species At Risk under the Forest and Range Practices Act, and are designated as Species at Risk by Order under Section 29 (a) of the EPMR of the Oil and Gas Activities Act.
Stream (EPMR)	Under the EPMR a stream “means a watercourse, including a watercourse that is obscured by overhanging or bridging vegetation or soil mats, that contains water on perennial or seasonal basis, is scoured by water or contains observable deposits of mineral alluvium, and that (a) has continuous channel bed that is 100m or more in length, or (b) flows directly into (i) a fish stream or a fish bearing lake or wetland or (ii) a waterworks.
Stream (WSA)	Under the WSA, a stream means (a) a natural watercourse, including a natural glacier course, or a natural body of water, whether or not the stream channel of the stream has been modified, or (b) a natural source of water supply, including, without limitation, a lake, pond, river, creek, spring, ravine, wetland or glacier, whether or not usually containing water, including ice, but does not include an aquifer.
Stream channel width	Stream channel width is the horizontal distance between the streambanks on opposite sides of the stream, measured at right

	angles to the general orientation of the banks. The point on each bank from which width is measured is the high water mark.
Swamp	A swamp is a wetland that has mineral or occasionally peat soils with a water table at or near the surface. There is pronounced internal water movement from adjacent mineral areas, making the waters nutrient-rich. If peat is present, it is mainly well-decomposed wood and occasionally sedges. The vegetation is typically dominated by coniferous or deciduous trees or dense shrubs and herbaceous species.
Least Risk Timing Windows	Least risk timing windows are periods of time when oil and gas activities can be conducted with reduced risk to fish, wildlife, and associated habitat. They are also referred to as “windows of least risk”, and define the period of time when activities may be permitted to occur while minimizing the risk on the subject species and/or habitat. Least risk timing windows are specific to fish and wildlife species and the geographic area within which the work is conducted.
Ungulate	A hoofed mammal. In BC, these include goats, sheep and members of the deer family.
Ungulate Winter Range (UWR)	Habitat that is important for providing forage, security and thermal protection for ungulate species during winter,
Wallow	An area of mud or shallow water where mammals go to welter, typically developing into a depression in the ground over continued usage.
Wildlife Habitat Area (WHA)	A WHA is a habitat unit designated for the maintenance, enhancement, or restoration of Red-listed wildlife, threatened, and endangered habitats, and those species identified as being regionally important.
Wildlife Tree Retention Area (WTRA)	Wildlife Tree Retention Area (WTRA) is a forest retention area associated with a silvicultural system where forest patches or individual trees are retained to provide habitat biodiversity scenic or other value.

Appendix B: Mitigation Strategy

The term mitigation strategy is referenced throughout the Environmental Protection and Management Guideline. In specified circumstances, the Commission requires a mitigation strategy to be submitted with an oil and gas activity application to ensure the applicant addresses adverse impacts to environmental values. This appendix outlines the requirements for a mitigation strategy. This guideline, based in part on the [BC Ministry of Environment's Policy and Procedures for Mitigating Impacts on Environmental Values, 2014](#).

Mitigation strategies must be completed by a QP, hired by the applicant, with an appropriate background relevant to the species, feature or value being addressed by the mitigation strategy. For an action or measure to be considered "mitigation", an applicant must accept responsibility for implementation of appropriate mitigation measures. OGAA operates in a model of professional reliance, whereby the professional must present and uphold the appropriate mitigation. Where the mitigation strategy is being submitted as part of the requirements to satisfy a material adverse effect test, the Commission expects a statement from the QP upholding the proposed mitigations.

The Mitigation Hierarchy

Where oil and gas activity planning identifies an environmental value that may be impacted by the carrying out of that activity, the mitigation hierarchy must be followed. Rationale for moving through the hierarchy must be provided by the applicant.



Specific Requirements of a Mitigation Strategy

All mitigation strategies submitted to the Commission must include the following key components:

Value

Identify the species, feature or value that may potentially be impacted by the proposed activity. Examples of values, in the context of proposed oil and gas and related activities, could include water works and water supply wells, Riparian Areas, Old Growth Management Areas (OGMAs), Ungulate Winter Ranges (UWRs), Wildlife Habitat Areas (WHAs), Fisheries Sensitive Watersheds (FSWs), etc.

Potential Impacts

Identify the potential impacts on the environmental values associated with the proposed activities. To determine impacts, the expectation is that the proponent will review the [EIMS](#) and/or EPMG for identification of a value's objectives.

Mitigation Strategy

The mitigation strategy must explain how the proposed activity will meet the governments environmental objectives, and where applicable, planning objectives and/or specific operational measures (POMs in the EPMG and [EIMS](#)).

Mitigation Strategy must Include:

a. Avoidance

Outline the specific aspects of the operations that may impact this species or value. Where avoidance measures may not be practicable, the applicant must include a rationale in the mitigation strategy with an explanation as to why an impact is unavoidable.

b. Site Specific Information

Identify the species, feature or value that may potentially be impacted by the proposed activity. Include site specific information regarding the species, feature or value as it directly relates to the proposed activity. Include photos, maps and any information that may help to justify the activity or the proposed approach to mitigation.

c. Operational Modifications – Minimization, Mitigation, Restoration

Explain what strategies have been incorporated into activity planning and/or will be used during the activity lifecycle to minimize, mitigate and restore impacts to the species, features or values identified. Include an explanation of how the modifications are expected to minimize impacts or reduce risk.

Specific to WHAs, UWRS, the mitigation strategy must explain how the proposed operational modifications are consistent with and will achieve the applicable objectives associated with the impacted WHA or UWR.

d. Project Monitoring Plan

Outline how the effectiveness of the proposed operational modifications will be measured. How will the applicant know whether the imposed mitigation is successful?

e. Reporting

Outline how and when reporting will be done that details the mitigation measures that were implemented, the implementation date, location and effectiveness of mitigation efforts.

f. Sign Off by Qualified Professional

All plans must be signed off by a QP relevant to the environmental component(s) the plan was prepared to address. The QP must also include a statement outlining how the measures contained in the mitigation strategy prevent the proposed oil and gas

activity from having an impact on the species, feature or value. Impact refers to “material adverse effect”, “not damaging or rendering ineffective”, and “physical disturbance”, as outlined in the EPMR.

If any of the above components are not applicable to the specific mitigation strategy, indicate so, and an explanation of why it is not applicable, within the strategy. If any of the above components are not appropriately addressed within the mitigation strategy, it will be returned to the applicant for revisions and the application will not be processed until the mitigation strategy is completed to the satisfaction of the Commission.

It is the DDM who determines whether the risks to the environmental values and associated components are acceptable.

Appendix C: Restoration and Reclamation

In addition to meeting the requirements of the EPMR, permit holders must meet the decommissioning, abandonment and/or restoration requirements of the individual activity regulations as well as any conditions in their permits.

Restoration practices for areas of disturbed soils should focus on:

- Stabilizing any cut and fill slopes, and re-contouring if required to return pre-disturbance drainage patterns and minimize erosion potential.
- Restoring surface soil to similar, pre-disturbance productivity.
- Establishing a healthy, self-sustaining, and ecologically appropriate vegetative cover, preferably using local species.

To meet the requirements of Section 19 of the EPMR for restoring site productivity, the Commission recommends that topsoil be salvaged when the activity requires surface disturbance. Guidance for topsoil stripping is included in this section. Section 19 of the EPMR is also consulted during Part 2 of the Certificate of Restoration (CoR) process, and in addition, forms the basis of site/species-specific habitat restoration requirements.

Refer to the [Certificate of Restoration Application Manual](#) and the [Restoration Verification Audit Program Procedure Manual](#) for further information regarding restoration and reclamation requirements.

Progressive reclamation should be focused on portions of operating areas that are no longer required for the oil and gas activity. Restoration and reclamation activities in identified wildlife habitat may have additional site-specific restoration requirements. Consult the Commission for additional guidance if planning restoration activities within

wildlife habitat associated with HPW, species identified under legal EPMR Order, or habitat(s) associated with a Species at Risk.

Final Restoration Planning

A QP should conduct a site visit to determine the current site conditions and what restoration activities are warranted. They should have access to the permit holder's pre-construction reclamation plan (or Schedule A on ALR land), in order to review and assess the pre-existing site conditions and the preliminary reclamation prescription.

If a preliminary reclamation plan is not available or no longer appropriate for the site conditions, then a detailed final restoration plan to stabilize and re-contour, replace topsoil and re-vegetate should be developed. The immediately adjacent site conditions should be used as the baseline if a pre-construction plan is not available.

Where surface soil disturbance has occurred, it is recommended that a qualified professional monitor the soil handling and re-vegetation activities to restore the site.

Final Reclamation Activities

Soil Handling

Soil handling during reclamation, as during initial construction, should focus on re-establishing long-term slope stability, soil productivity and natural drainage patterns, while minimizing erosion. Consideration of erosion and compaction during reclamation operations is required to ensure stable and productive soils. Do not work in wet conditions and minimize heavy equipment use. Keep topsoil separate from underlying soil layers to improve reclamation.

Well sites, facilities, roads, and associated oil and gas activities

The final reclamation plan should include soil handling specifications. The following is a generalized sequence for site reclamation of a site that applies to all oil and gas activities where soil disturbance and land contouring occurred during construction or maintenance (e.g., access roads, facilities, camps, borrow sites, temporary worksites, remote sumps, etc.):

- Clean the site of any garbage, structures or debris;
- Address removal of any surface gravel or other material brought in for access or equipment padding;
- Replace any cuts and fills to reduce the grade and contour the site to the alignment of adjacent land;
- Shape and grade any slopes to minimize erosion. Consider packing to stabilize soil;
- Restore any natural drainage patterns to their original alignment; and/or
- De-compact the surface of the subsoil to address compaction.

Replace any salvaged topsoil in the reverse order of stripping during construction. Where no topsoil has been salvaged then a substitute soil may need to be created from a mixture of subsoil material and available organic material (for example, straw, roots, duff material), to create suitable topsoil conditions for re-vegetation. Supplementation using off-site soil may be required. A QP should be consulted in these situations.

Please note that for Crown land sites located within the Agricultural Land Reserve, reclamation requirements may differ depending on site specific conditions.

Pipelines

During pipeline construction clearing, soil stripping, trenching, pipe-laying, soil replacement, and re-vegetation generally occurs in one sequence of activities over several weeks to a month at any one site. Final re-vegetation activities may be delayed to allow soil settling in the trench.

The same soil conservation and restoration outcomes are required for pipelines as for other oil and gas activities. Within the ALR, restoration of pipelines is required within the timelines described in the [OGC-ALC Delegation Agreement](#). The restoration standards are specified in [Schedule B](#) from the [OGC-ALC Delegation Agreement](#).

Re-vegetation

The long-term goal of re-vegetation should be to re-establish a native self-sustaining vegetative community that is commensurable with surrounding land uses.

Native species are recognized for their ecological function and wildlife habitat values and should be used whenever they can be sourced.

There are situations where natural re-vegetation is the preferred option and seeding may not be required. Examples include muskeg (organic) or moist mineral soil sites (not susceptible to invasive plants) with suitable replaced topsoil and both viable seeds and living plant material.

The one caution is that most severely disturbed sites with bare soil are susceptible to erosion and undesirable plant colonization and may require considerable effort and time delay to establish a suitable self-sustaining plant community free of weeds, without initial seeding. A QP should be consulted when planning natural re-vegetation on mineral and organic soils.

Short, medium, and long-term re-vegetation goals should be established within the context of the identified end land use.

Site Preparation

Site preparation is one of the most important factors in determining the success of re-vegetation projects. Inadequate preparation is one of the most common reasons

for re-vegetation failure. The following measures will help to enhance any re-vegetation project:

- Topsoil and subsoil should be conserved and replaced. Newly constructed landforms require topsoil and subsoil suitable for the type of vegetation chosen;
- Reduce any compaction that could inhibit root growth prior to seedbed preparation;
- Control persistent weeds/problem plants;
- Where needed, use equipment that produces ridges, hollows and mounds to create microsites to enhance diversity and support plant survival; and/or
- Regulate seed depth and enhance germination by ensuring good soil to seed contact by preparing a firm seedbed when drill seeding.

Guidelines for Seeding

Choice of seeding and planting methods will vary according to project goals, end land use, previous experience and specific requirements of the species being used.

- Drill Seeding - Use drill seeding where possible (rather than broadcast seeding) to make more efficient use of seed and ensure seed is placed in direct contact with soil.
- Broadcast Seeding - Use broadcast seeding in areas where access for drill seeders is poor; or for small seeded species or those that require light to germinate.

Additional Guidance for Re-vegetation

The following are selected guidelines from the [2010 Peace-Liard Re-Vegetation Manual](#) and [2013 BC Ministry of Agriculture Rangeland Seeding Manual](#).

General Guidelines for Native Plant Selection

- Select native species based on their consistency and compatibility with pre-disturbance plant communities within the appropriate biogeoclimatic subzone;
- Select native species based on known performance;

- Seed only species that will not regenerate naturally from the soil seedbank (e.g. wetland areas generally have a large seedbank and may not require seeding);
- In areas where late successional species may be difficult to establish, consider the use of early successional species or native plant species that can survive in altered conditions;
- Use a range of native plant materials (e.g. multiple species, varieties and/or ages);
- Salvage the seedbank for replacement and plant materials such as seed, shrubs or sod that might not otherwise be available.

Guidelines for Selecting Plant Material for Enhancement of Wildlife Habitat

- Use a holistic approach to re-vegetation to provide food and habitat for identified animal species;
- Use native plant materials that fulfill the life-cycle requirements of key wildlife species;
- Use species similar to those found in the adjacent offsite plant communities;
- Plant species in patterns that simulate offsite conditions.

Guidelines for Ordering Seed or other Plant Materials:

- Always ask for preferred species first. When unavailable, be prepared with alternate choices or to revise the re-vegetation plan;
- Use scientific names when ordering;
- Ensure the genetic seed source is from a similar region to prevent performance issues;
- Request a Seed Analysis Certificate from the supplier. Check certificates for species of concern;

- All seed must meet Certified #1 standards for purity and germination. None of the prohibited invasive plant seeds shall be present.;
- Legume seed must be inoculated with the correct strain of Rhizobium;
- Order early to ensure availability of seed or other plant material.

Monitoring and Final Restoration Assessment

The length of time necessary to monitor restored sites varies by situation. The CoR process is predicated on a minimum of one full growing season following re-vegetation.

Plan to assess restored areas early the following growing season to ensure the land is stable (that is, no subsidence or slumping) and the vegetation growth is vigorous with the desired species.

Any soil stability, vegetation productivity, or invasive weed issues should be immediately addressed. The site should also be assessed at the end of the establishment period which varies by species. In many cases it will take several growing seasons for evidence that an established desired plant community is achieved.

Within the ALR, when sites are no longer required for oil and gas activities, then a Schedule B Assessment is required before a CoR can be issued. Refer to the [OGC ALC Delegation Agreement](#) for more information.

Refer to the [Certificate of Restoration Application Manual](#) for further information regarding restoration requirements.

Appendix D: High Priority Wildlife

High Priority Wildlife Determination Process

The diagram outlines the process used by the Commission to identify High Priority Wildlife species for management under the EPMP. Refer to Section 1.6.3.1 for additional information.

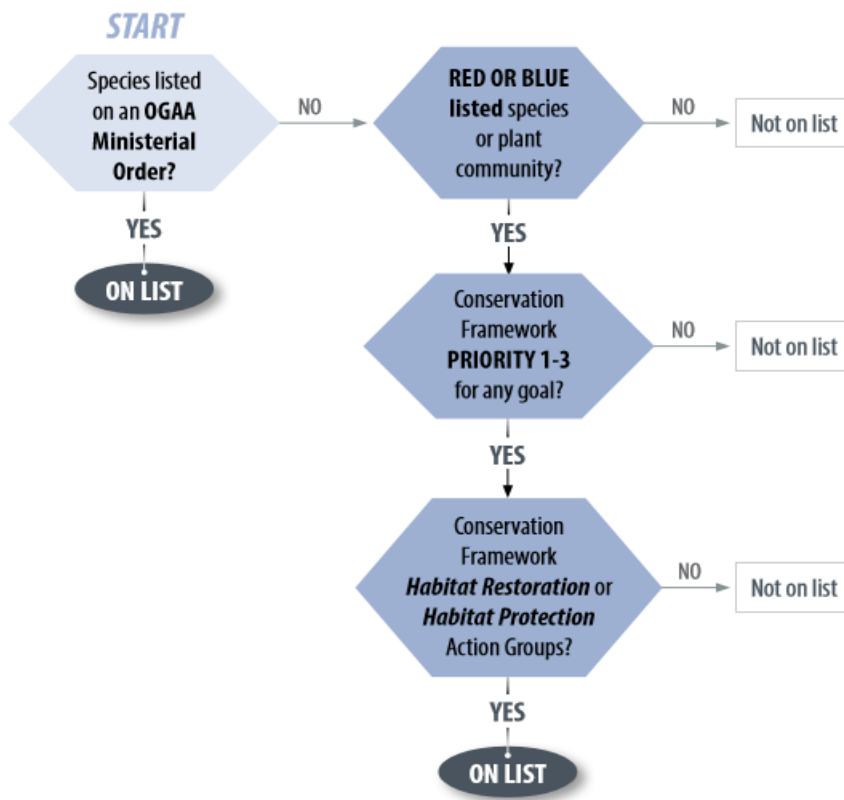


Figure D-1 High Priority Wildlife Determination Process.

List of High Priority Wildlife

The current list has increased as a result of the updated HPW Determination Process, offering consideration and protection to additional species of concern within BC.

The HPW list is categorized by geographical area, listing those species occurring within NEBC, and those found outside of NEBC. Where species are found both within and outside of NEBC, they have been included in both tables. Consistent with the EPMR definition of wildlife, each table is further organized into sections for vertebrates, invertebrates, plants, and lichens. Plant communities are also included in the HPW list to maintain consistency with Ministerial Orders.

The Commission re-evaluates the list on an annual basis to ensure any potential classification or status changes are considered in future updates of the HPW list.

HPW Species located within NEBC

COMMON NAME	SCIENTIFIC NAME
Vertebrates	
American Avocet	<i>Recurvirostra americana</i>
American Bittern	<i>Botaurus lentiginosus</i>
Bay-breasted Warbler	<i>Setophaga castanea</i>
Bighorn Sheep	<i>Ovis canadensis</i>
Black-throated Green Warbler	<i>Setophaga virens</i>
Bull Trout	<i>Salvelinus confluentus</i>
Canada Warbler	<i>Cardellina canadensis</i>
Cape May Warbler	<i>Setophaga tigrina</i>
Caribou (Boreal Population)	<i>Rangifer tarandus pop. 14</i>
Caribou (Northern Mountain Population)	<i>Rangifer tarandus pop. 15</i>

Caribou (Southern Mountain Population)	<i>Rangifer tarandus pop. 1</i>
Connecticut Warbler	<i>Oporornis agilis</i>
Cutthroat Trout, <i>lewisi</i> subspecies	<i>Oncorhynchus clarkii lewisi</i>
Elk	<i>Cervus elaphus</i>
Fisher	<i>Pekania pennanti</i>
Great Blue Heron, <i>herodias</i> subspecies	<i>Ardea herodias herodias</i>
Grizzly Bear	<i>Ursus arctos</i>
Lark Sparrow	<i>Chondestes grammacus</i>
Moose	<i>Alces americanus</i>
Mountain Goat	<i>Oreamnos americanus</i>
Mule Deer	<i>Odocoileus hemionus</i>
Nelson's Sparrow	<i>Ammodramus nelsoni</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
Sandhill Crane	<i>Antigone canadensis</i>
Short-eared Owl	<i>Asio flammeus</i>
Stone's Sheep	<i>Ovis dalli stonei</i>
Swainson's Hawk	<i>Buteo swainsoni</i>
Thinhorn Sheep	<i>Ovis dalli</i>
Upland Sandpiper	<i>Bartramia longicauda</i>
White-tailed Deer	<i>Odocoileus virginianus</i>
Wolverine, <i>luscus</i> subspecies	<i>Gulo gulo luscus</i>
Wood Bison	<i>Bos bison athabascae</i>
Yellow Rail	<i>Coturnicops noveboracensis</i>

Invertebrates	
Hotwater Physa	<i>Physella wrighti</i>
Plains Forktail	<i>Ischnura damula</i>
River Jewelwing	<i>Calopteryx aequabilis</i>
Plants	
Drummond's Thistle	<i>Cirsium drummondii</i>
Gardner's Sagebrush	<i>Atriplex gardneri</i> var. <i>gardneri</i>
Little Bluestem	<i>Schizachyrium scoparium</i>
Muhlenberg's Cord-moss	<i>Funaria muhlenbergii</i>
Porsild's Bryum	<i>Haplodontium macrocarpum</i>
Robust Bloom Moss	<i>Schistidium robustum</i>
Sprengel's Sedge	<i>Carex sprengelii</i>
Wulf's sphagnum	<i>Sphagnum wulfianum</i>
Plant Communities	
Common Cattail Marsh	<i>Typha latifolia</i> Marsh
Narrow-leaf Willow (Shrubland)	<i>Salix exigua</i> (Shrubland)

HPW Species located outside of NEBC

COMMON NAME	SCIENTIFIC NAME
Vertebrates	
American Avocet	<i>Recurvirostra americana</i>
American Badger	<i>Taxidea taxus</i>
American Bittern	<i>Botaurus lentiginosus</i>
American Water Shrew, <i>brooksi</i> Subspecies	<i>Sorex navigator brooksi</i>

American White Pelican	<i>Pelecanus erythrorhynchos</i>
Ancient Murrelet	<i>Synthliboramphus antiquus</i>
Band-tailed Pigeon	<i>Patagioenas fasciata</i>
Barn Owl	<i>Tyto alba</i>
Bighorn Sheep	<i>Ovis canadensis</i>
Blotched Tiger Salamander	<i>Ambystoma mavortium</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Brandt's Cormorant	<i>Phalacrocorax penicillatus</i>
Brant	<i>Branta bernicla</i>
Brewer's Sparrow, <i>breweri</i> Subspecies	<i>Spizella breweri breweri</i>
Bull Trout	<i>Salvelinus confluentus</i>
Burbot (Lower Kootenay Population)	<i>Lota lota pop. 1</i>
Burrowing Owl	<i>Athene cunicularia</i>
Canada Goose, <i>occidentalis</i> Subspecies	<i>Branta canadensis occidentalis</i>
Cape May Warbler	<i>Setophaga tigrina</i>
Caribou (Northern Mountain Population)	<i>Rangifer tarandus pop. 15</i>
Caribou (Southern Mountain Population)	<i>Rangifer tarandus pop. 1</i>
Cassin's Auklet	<i>Ptychoramphus aleuticus</i>
Charlotte Unarmoured Threespine Stickleback	<i>Gasterosteus aculeatus pop. 1</i>
Coastal Giant Salamander	<i>Dicamptodon tenebrosus</i>
Coeur d'Alene Salamander	<i>Plethodon idahoensis</i>
Columbia Sculpin	<i>Cottus hubbsi</i>
Cowichan Lake Lamprey	<i>Entosphenus macrostomus</i>

Cultus Pygmy Sculpin	<i>Cottus sp. 2</i>
Cutthroat Trout, <i>clarkii</i> Subspecies	<i>Oncorhynchus clarkii clarkii</i>
Cutthroat Trout, <i>lewisi</i> Subspecies	<i>Oncorhynchus clarkii lewisi</i>
Dall's Sheep	<i>Ovis dalli dalli</i>
Desert Nightsnake	<i>Hypsiglena chlorophaea</i>
Double-crested Cormorant	<i>Phalacrocorax auritus</i>
Elk	<i>Cervus elaphus</i>
Ermine, <i>haidarum</i> Subspecies	<i>Mustela erminea haidarum</i>
Eulachon	<i>Thaleichthys pacificus</i>
Fisher	<i>Pekania pennanti</i>
Flammulated Owl	<i>Psiloscoops flammeolus</i>
Fringed Myotis	<i>Myotis thysanodes</i>
Giant Threespine Stickleback	<i>Gasterosteus sp. 1</i>
Gopher Snake, <i>deserticola</i> Subspecies	<i>Pituophis catenifer deserticola</i>
Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Gray Flycatcher	<i>Empidonax wrightii</i>
Great Basin Pocket Mouse	<i>Perognathus parvus</i>
Great Basin Spadefoot	<i>Spea intermontana</i>
Great Blue Heron, <i>fannini</i> Subspecies	<i>Ardea herodias fannini</i>
Great Blue Heron, <i>herodias</i> Subspecies	<i>Ardea herodias herodias</i>
Grizzly Bear	<i>Ursus arctos</i>
Hairy Woodpecker, <i>picoideus</i> Subspecies	<i>Picoides villosus picoideus</i>
Horned Lark, <i>strigata</i> Subspecies	<i>Eremophila alpestris strigata</i>

Horned Puffin	<i>Fratercula corniculata</i>
Keen's Myotis	<i>Myotis keenii</i>
Killer Whale (Northeast Pacific Southern Resident Population)	<i>Orcinus orca pop. 5</i>
Lark Sparrow	<i>Chondestes grammacus</i>
Lewis's Woodpecker	<i>Melanerpes lewis</i>
Long-billed Curlew	<i>Numenius americanus</i>
Marbled Murrelet	<i>Brachyramphus marmoratus</i>
Merriam's Shrew	<i>Sorex merriami</i>
Misty Lake "Lake" Stickleback	<i>Gasterosteus sp. 18</i>
Misty Lake "Stream" Stickleback	<i>Gasterosteus sp. 19</i>
Moose	<i>Alces americanus</i>
Mountain Goat	<i>Oreamnos americanus</i>
Mule Deer	<i>Odocoileus hemionus</i>
Nooksack Dace	<i>Rhinichthys cataractae - Chehalis lineage</i>
North American Racer	<i>Coluber constrictor</i>
Northern Goshawk, <i>laingi</i> Subspecies	<i>Accipiter gentilis laingi</i>
Northern Leopard Frog	<i>Lithobates pipiens</i>
Northern Pygmy-Owl, <i>swarthi</i> Subspecies	<i>Glaucidium gnoma swarthi</i>
Northern Red-legged Frog	<i>Rana aurora</i>
Northern Saw-whet Owl, <i>brooksi</i> Subspecies	<i>Aegolius acadicus brooksi</i>
Olympic Shrew	<i>Sorex rohweri</i>
Oregon Spotted Frog	<i>Rana pretiosa</i>
Pacific Water Shrew	<i>Sorex bendirii</i>

Painted Turtle (Intermountain - Rocky Mountain Population)	<i>Chrysemys picta pop. 2</i>
Painted Turtle (Pacific Coast Population)	<i>Chrysemys picta pop. 1</i>
Pallid Bat	<i>Antrozous pallidus</i>
Paxton Lake Benthic Stickleback	<i>Gasterosteus sp. 5</i>
Paxton Lake Limnetic Stickleback	<i>Gasterosteus sp. 4</i>
Peregrine Falcon, <i>anatum</i> Subspecies	<i>Falco peregrinus anatum</i>
Prairie Falcon	<i>Falco mexicanus</i>
Pygmy Short-horned Lizard	<i>Phrynosoma douglasii</i>
Red Knot	<i>Calidris canutus</i>
Rocky Mountain Tailed Frog	<i>Ascaphus montanus</i>
Roosevelt Elk	<i>Cervus elaphus roosevelti</i>
Rough-legged Hawk	<i>Buteo lagopus</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
Sage Thrasher	<i>Oreoscoptes montanus</i>
Salish Sucker	<i>Catostomus sp. 4</i>
Sandhill Crane	<i>Antigone canadensis</i>
Sea Otter	<i>Enhydra lutris</i>
Sharp-tailed Grouse, <i>columbianus</i> Subspecies	<i>Tympanuchus phasianellus columbianus</i>
Sharp-tailed Snake	<i>Contia tenuis</i>
Short-eared Owl	<i>Asio flammeus</i>
Shorthead Sculpin	<i>Cottus confusus</i>
Speckled Dace	<i>Rhinichthys osculus</i>
Spotted Bat	<i>Euderma maculatum</i>

Spotted Owl	<i>Strix occidentalis</i>
Stone's Sheep	<i>Ovis dalli stonei</i>
Swainson's Hawk	<i>Buteo swainsoni</i>
Thinhorn Sheep	<i>Ovis dalli</i>
Townsend's Mole	<i>Scapanus townsendii</i>
Tufted Puffin	<i>Fratercula cirrhata</i>
Upland Sandpiper	<i>Bartramia longicauda</i>
Vananda Creek Benthic Stickleback	<i>Gasterosteus sp. 17</i>
Vananda Creek Limnetic Stickleback	<i>Gasterosteus sp. 16</i>
Vancouver Island Marmot	<i>Marmota vancouverensis</i>
Vesper Sparrow, <i>affinis</i> Subspecies	<i>Pooecetes gramineus affinis</i>
Western Bluebird (Georgia Depression Population)	<i>Sialia mexicana pop. 1</i>
Western Grebe	<i>Aechmophorus occidentalis</i>
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>
Western Meadowlark (Georgia Depression Population)	<i>Sturnella neglecta pop. 1</i>
Western Pond Turtle	<i>Actinemys marmorata</i>
Western Rattlesnake	<i>Crotalus oreganus</i>
Western Screech-owl, <i>kennicottii</i> Subspecies	<i>Megascops kennicottii kennicottii</i>
Western Screech-owl, <i>macfarlanei</i> Subspecies	<i>Megascops kennicottii macfarlanei</i>
Western Skink	<i>Plestiodon skiltonianus</i>
White Sturgeon (Columbia River Population)	<i>Acipenser transmontanus pop. 2</i>
White Sturgeon (Kootenay River Population)	<i>Acipenser transmontanus pop. 1</i>
White Sturgeon (Lower Fraser River Population)	<i>Acipenser transmontanus pop. 4</i>

White Sturgeon (Middle Fraser River Population)	<i>Acipenser transmontanus pop. 6</i>
White Sturgeon (Nechako River Population)	<i>Acipenser transmontanus pop. 3</i>
White Sturgeon (Upper Fraser River Population)	<i>Acipenser transmontanus pop. 5</i>
White-headed Woodpecker	<i>Picoides albolarvatus</i>
White-tailed Deer	<i>Odocoileus virginianus</i>
White-tailed Ptarmigan, <i>saxatilis</i> Subspecies	<i>Lagopus leucura saxatilis</i>
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>
Williamson's Sapsucker, <i>nataliae</i> Subspecies	<i>Sphyrapicus thyroideus nataliae</i>
Williamson's Sapsucker, <i>thyroideus</i> Subspecies	<i>Sphyrapicus thyroideus thyroideus</i>
Wolverine, <i>luscus</i> Subspecies	<i>Gulo gulo luscus</i>
Wolverine, <i>vancouverensis</i> Subspecies	<i>Gulo gulo vancouverensis</i>
Yellow Rail	<i>Coturnicops noveboracensis</i>
Yellow-breasted Chat	<i>Icteria virens</i>
Invertebrates	
Audouin's Night-stalking Tiger Beetle	<i>Omus audouini</i>
Behr's Hairstreak	<i>Satyrrium behrii</i>
Blue-grey Taildropper	<i>Prophyaon coeruleum</i>
Broadwhorl Tightcoil	<i>Pristiloma johnsoni</i>
Common Ringlet, <i>insulana</i> Subspecies	<i>Coenonympha tullia insulana</i>
Common Woodnymph, <i>incana</i> Subspecies	<i>Cercyonis pegala incana</i>
Dark Saltflat Tiger Beetle	<i>Cicindela parowana</i>
Dromedary Jumping-slug	<i>Hemphillia dromedarius</i>
Edith's Checkerspot, <i>taylori</i> Subspecies	<i>Euphydryas editha taylori</i>

Edwards' Beach Moth	<i>Anarta edwardsii</i>
Gillette's Checkerspot	<i>Euphydryas gillettii</i>
Grappletail	<i>Octogomphus specularis</i>
Half-moon Hairstreak	<i>Satyrium semiluna</i>
Johnson's Hairstreak	<i>Callophrys johnsoni</i>
Lance-tipped Darner	<i>Aeshna constricta</i>
Large Marble, <i>insulanus</i> subspecies	<i>Euchloe ausonides insulanus</i>
Monarch	<i>Danaus plexippus</i>
Mormon Fritillary, <i>erinna</i> Subspecies	<i>Speyeria mormonia erinna</i>
Mormon Metalmark	<i>Apodemia mormo</i>
Moss' Elfin, <i>mossii</i> Subspecies	<i>Callophrys mossii mossii</i>
Northern Abalone	<i>Haliotis kamtschatkana</i>
Olive Clubtail	<i>Stylurus olivaceus</i>
Oregon Forestsnail	<i>Allogona townsendiana</i>
Plains Forktail	<i>Ischnura damula</i>
Pronghorn Clubtail	<i>Phanogomphus graslinellus</i>
Propertius Duskywing	<i>Erynnis propertius</i>
Puget Oregonian	<i>Cryptomastix devia</i>
Quatsino Cave Amphipod	<i>Stygobromus quatsinensis</i>
River Jewelwing	<i>Calopteryx aequabilis</i>
Rocky Mountain Ridged Mussel	<i>Gonidea angulata</i>
Sandhill Skipper	<i>Polites sabuleti</i>
Sand-verbena Moth	<i>Copablepharon fuscum</i>

Sonora Skipper	<i>Polites sonora</i>
Threaded Vertigo	<i>Nearctula sp. 1</i>
Viceroy	<i>Limenitis archippus</i>
Vivid Dancer	<i>Argia vivida</i>
Warty Jumping-slug	<i>Hemphillia glandulosa</i>
Western River Cruiser	<i>Macromia magnifica</i>
Zerene Fritillary, <i>bremnerii</i> Subspecies	<i>Speyeria zerene bremnerii</i>
Plants	
Alkaline Wing-nerved Moss	<i>Pterygoneurum kozlovii</i>
American Bulrush	<i>Schoenoplectus americanus</i>
Andean Evening-primrose	<i>Neoholmgrenia andina</i>
Arrow-leaved Rattlesnake-root	<i>Prenanthes sagittata</i>
Banded Cord-moss	<i>Entosthodon fascicularis</i>
Beach Bindweed	<i>Calystegia soldanella</i>
Bearded Owl-clover	<i>Triphysaria versicolor ssp. versicolor</i>
Bear's-foot Sanicle	<i>Sanicula arctopoides</i>
Bent Spike-rush	<i>Eleocharis geniculata</i>
Bog Bird's-foot Lotus	<i>Hosackia pinnata</i>
Branched Phacelia	<i>Phacelia ramosissima var. ramosissima</i>
Brook Spike-primrose	<i>Epilobium torreyi</i>
Bushy Cinquefoil	<i>Potentilla supina ssp. paradoxa</i>
California Buttercup	<i>Ranunculus californicus</i>
Cliff Paintbrush	<i>Castilleja rupicola</i>

Coast Manroot	<i>Marah oregana</i>
Coast Microseris	<i>Microseris bigelovii</i>
Coastal Wood Fern	<i>Dryopteris arguta</i>
Columbian Carpet Moss	<i>Bryoerythrophyllum columbianum</i>
Common Bladder-moss	<i>Physcomitrium pyriforme</i>
Contorted-pod Evening-primrose	<i>Camissonia contorta</i>
Deltoid Balsamroot	<i>Balsamorhiza deltoidea</i>
Dense Spike-primrose	<i>Epilobium densiflorum</i>
Dense-flowered Lupine	<i>Lupinus densiflorus</i> var. <i>densiflorus</i>
Drummond's Thistle	<i>Cirsium drummondii</i>
Dwarf Sandwort	<i>Minuartia pusilla</i>
Dwarf Woolly-heads	<i>Psilocarphus brevissimus</i> var. <i>brevissimus</i>
Edible Valerian	<i>Valeriana edulis</i> var. <i>edulis</i>
Englemann's Spike-rush	<i>Eleocharis engelmannii</i>
Fern-leaved Desert-parsley	<i>Lomatium dissectum</i> var. <i>dissectum</i>
Fissidens Moss	<i>Fissidens ventricosus</i>
Foothill Sedge	<i>Carex tumulicola</i>
Foxtail Muhly	<i>Muhlenbergia andina</i>
Fragrant Popcornflower	<i>Plagiobothrys figuratus</i> ssp. <i>figuratus</i>
Golden Paintbrush	<i>Castilleja levisecta</i>
Grand Coulee Owl-clover	<i>Orthocarpus barbatus</i>
Green-sheathed Sedge	<i>Carex feta</i>
Hairy Water-clover	<i>Marsilea vestita</i>

Haller's Apple Moss	<i>Bartramia halleriana</i>
Henderson's Checker-mallow	<i>Sidalcea hendersonii</i>
Howell's Triteleia	<i>Triteleia howellii</i>
Howell's Violet	<i>Viola howellii</i>
Joe-pye Weed	<i>Eutrochium maculatum var. bruneri</i>
Kellogg's Rush	<i>Juncus kelloggii</i>
Kincaid's Lupine	<i>Lupinus oreganus var. kincaidii</i>
Lemmon's Holly Fern	<i>Polystichum lemmonii</i>
Lindley's Microseris	<i>Uropappus lindleyi</i>
Little Bluestem	<i>Schizachyrium scoparium</i>
Low Hawksbeard	<i>Crepis modocensis ssp. modocensis</i>
Lyall's Mariposa Lily	<i>Calochortus lyallii</i>
Macoun's Fringed Gentian	<i>Gentianopsis virgata ssp. macounii</i>
Macoun's Meadow-foam	<i>Limnanthes macounii</i>
Macrae's Clover	<i>Trifolium dichotomum</i>
Marginal Wood Fern	<i>Dryopteris marginalis</i>
Margined Streamside Moss	<i>Scouleria marginata</i>
Mexican Mosquito Fern	<i>Azolla mexicana</i>
Mock-pennyroyal	<i>Hedeoma hispida</i>
Mountain Holly Fern	<i>Polystichum scopulinum</i>
Muhlenberg's Centaury	<i>Zeltnera muehlenbergii</i>
Muhlenberg's cord-moss	<i>Funaria muhlenbergii</i>
Nettle-leaved Giant-hyssop	<i>Agastache urticifolia</i>

Nugget Moss	<i>Microbryum vlassovii</i>
Oregon Ash	<i>Fraxinus latifolia</i>
Pacific Waterleaf	<i>Hydrophyllum tenuipes</i>
Pale Bulrush	<i>Scirpus pallidus</i>
Phantom Orchid	<i>Cephalanthera austiniiae</i>
Pink Sand-verbena	<i>Abronia umbellata var. breviflora</i>
Poison Oak	<i>Toxicodendron diversilobum</i>
Poor Pocket Moss	<i>Fissidens pauperculus</i>
Porcupine Sedge	<i>Carex hystericina</i>
Prairie Lupine	<i>Lupinus lepidus</i>
Prairie Wedgegrass	<i>Sphenopholis obtusata</i>
Purple Sanicle	<i>Sanicula bipinnatifida</i>
Rayless Goldfields	<i>Lasthenia glaberrima</i>
Red-rooted Cyperus	<i>Cyperus erythrorhizos</i>
Ribbed extinguisher-moss	<i>Encalypta intermedia</i>
Rigid Apple Moss	<i>Bartramia stricta</i>
River Bulrush	<i>Bolboschoenus fluviatilis</i>
Robust Bloom Moss	<i>Schistidium robustum</i>
Rocky Mountain Clubrush	<i>Schoenoplectiella saximontana</i>
Roell's Brotherella	<i>Brotherella roellii</i>
Rosy Owl-clover	<i>Orthocarpus bracteosus</i>
Rough Dropseed	<i>Sporobolus compositus var. compositus</i>
Rusty Cord-moss	<i>Entosthodon rubiginosus</i>

Sand Lacepod	<i>Thysanocarpus curvipes</i>
Sandmat	<i>Cardionema ramosissimum</i>
Satin Grass	<i>Muhlenbergia racemosa</i>
Saw-leaved Sedge	<i>Carex scopulorum var. prionophylla</i>
Scalepod	<i>Idahoa scapigera</i>
Scarlet Ammannia	<i>Ammannia robusta</i>
Scouler's Corydalis	<i>Corydalis scouleri</i>
Seaside Bird's-foot Lotus	<i>Hosackia gracilis</i>
Short-flowered Monkey-flower	<i>Erythranthe breviflora</i>
Short-rayed Aster	<i>Symphyotrichum frondosum</i>
Showy Phlox	<i>Phlox speciosa ssp. occidentalis</i>
Silky Beach Pea	<i>Lathyrus littoralis</i>
Silvery Lupine	<i>Lupinus argenteus var. laxiflorus</i>
Slender Collomia	<i>Collomia tenella</i>
Slender Muhly	<i>Muhlenbergia filiformis</i>
Slender Popcornflower	<i>Plagiobothrys tenellus</i>
Small-flowered Lipocarpa	<i>Lipocarpa micrantha</i>
Small-flowered Tonella	<i>Tonella tenella</i>
Southern Maiden-hair	<i>Adiantum capillus-veneris</i>
Spalding's Campion	<i>Silene spaldingii</i>
Sprengel's Sedge	<i>Carex sprengelii</i>
Stoloniferous Pussytoes	<i>Antennaria flagellaris</i>
Streambank Lupine	<i>Lupinus rivularis</i>

Strict Buckwheat	<i>Eriogonum strictum var. proliferum</i>
Suksdorf's Bluegrass	<i>Poa suksdorfii</i>
Tall Beggarticks	<i>Bidens vulgata</i>
Tall Bugbane	<i>Actaea elata var. elata</i>
Tall Woolly-heads	<i>Psilocarphus elatior</i>
The Dalles Milk-vetch	<i>Astragalus sclerocarpus</i>
Thurber's needlegrass	<i>Achnatherum thurberianum</i>
Tiny Tassel	<i>Crossidium seriatum</i>
Toothcup	<i>Rotala ramosior</i>
Tripterocladium moss	<i>Tripterocladium leucocladulum</i>
Tweedy's Lewisia	<i>Lewisiopsis tweedyi</i>
Twisted Oak Moss	<i>Syntrichia laevipila</i>
Ute lady's tresses	<i>Spiranthes diluvialis</i>
Vancouver Island Beggarticks	<i>Bidens amplissima</i>
Victoria's Owl-clover	<i>Castilleja victoriae</i>
Water-plantain Buttercup	<i>Ranunculus alismifolius var. alismifolius</i>
Watson's Cryptantha	<i>Cryptantha watsonii</i>
Western Centaury	<i>Zeltnera exaltata</i>
White Meconella	<i>Meconella oregana</i>
White-lip Rein Orchid	<i>Platanthera ephemerantha</i>
White-top Aster	<i>Sericocarpus rigidus</i>
Wild Tobacco	<i>Nicotiana attenuata</i>
Wine-cup Clarkia	<i>Clarkia purpurea ssp. quadrivulnera</i>

Winged Combseed	<i>Pectocarya penicillata</i>
Winged Water-starwort	<i>Callitriche marginata</i>
Wulf's sphagnum	<i>Sphagnum wulfianum</i>
Yellow Montane Violet	<i>Viola praemorsa var. praemorsa</i>
Yellow Sand-verbena	<i>Abronia latifolia</i>
Yellowseed False Pimpernel	<i>Lindernia dubia var. dubia</i>
Plant Communities	
(Balsam Poplar, Black Cottonwood) - Spruces / Red-osier Dogwood	<i>Populus spp. (balsamifera, trichocarpa) - Picea spp. / Cornus stolonifera</i>
Alkali Saltgrass - Nuttall's Alkaligrass	<i>Distichlis spicata var. stricta - Puccinellia nuttalliana</i>
Amabilis Fir - Western Redcedar / Devil's Club (Moist Submaritime)	<i>Abies amabilis - Thuja plicata / Oplopanax horridus (Moist Submaritime)</i>
Amabilis Fir - Western Redcedar / Oak Fern	<i>Abies amabilis - Thuja plicata / Gymnocarpium dryopteris</i>
Amabilis Fir - Western Redcedar / Salmonberry (Moist Maritime 2)	<i>Abies amabilis - Thuja plicata / Rubus spectabilis (Moist Maritime 2)</i>
Amabilis Fir - Western Redcedar / Three-leaved Foamflower (Moist Maritime 1)	<i>Abies amabilis - Thuja plicata / Tiarella trifoliata (Moist Maritime 1)</i>
American Glasswort - Sea-milkwort	<i>Sarcocornia pacifica - Lysimachia maritima</i>
Antelope-brush / Bluebunch Wheatgrass	<i>Purshia tridentata / Pseudoroegneria spicata</i>
Antelope-brush / Needle-and-thread Grass	<i>Purshia tridentata / Hesperostipa comata</i>
Awned Sedge Fen (Marsh)	<i>Carex atherodes Fen (Marsh)</i>
Baltic Rush - Common Silverweed	<i>Juncus balticus - Potentilla anserina</i>
Baltic Rush - Field Sedge	<i>Juncus balticus - Carex praegracilis</i>

Big Sagebrush / Bluebunch Wheatgrass	<i>Artemisia tridentata</i> / <i>Pseudoroegneria spicata</i>
Big Sagebrush / Bluebunch Wheatgrass - Arrowleaf Balsamroot	<i>Artemisia tridentata</i> / <i>Pseudoroegneria spicata</i> - <i>Balsamorhiza sagittata</i>
Black Cottonwood - Douglas-fir / Common Snowberry - Red-osier Dogwood	<i>Populus trichocarpa</i> - <i>Pseudotsuga menziesii</i> / <i>Symphoricarpos albus</i> - <i>Cornus stolonifera</i>
Black Cottonwood - Water Birch	<i>Populus trichocarpa</i> - <i>Betula occidentalis</i>
Black Cottonwood / Common Snowberry - Red-osier Dogwood	<i>Populus trichocarpa</i> / <i>Symphoricarpos albus</i> - <i>Cornus stolonifera</i>
Black Cottonwood / Common Snowberry - Roses	<i>Populus trichocarpa</i> / <i>Symphoricarpos albus</i> - <i>Rosa spp.</i>
Black Cottonwood / Red-osier Dogwood - Nootka Rose	<i>Populus trichocarpa</i> / <i>Cornus stolonifera</i> - <i>Rosa nutkana</i>
Black Cottonwood / Sitka Willow	<i>Populus trichocarpa</i> / <i>Salix sitchensis</i>
Black Cottonwood / Sitka Willow - Thimbleberry	<i>Populus trichocarpa</i> / <i>Salix sitchensis</i> - <i>Rubus parviflorus</i>
Black Cottonwood / Willows (Dry Submaritime)	<i>Populus trichocarpa</i> / <i>Salix spp.</i> (Dry Submaritime)
Bluebunch Wheatgrass - Arrowleaf Balsamroot	<i>Pseudoroegneria spicata</i> - <i>Balsamorhiza sagittata</i>
Bluebunch Wheatgrass - Junegrass	<i>Pseudoroegneria spicata</i> - <i>Koeleria macrantha</i>
Common Cattail Marsh	<i>Typha latifolia</i> Marsh
Douglas-fir - Arbutus	<i>Pseudotsuga menziesii</i> - <i>Arbutus menziesii</i>
Douglas-fir - Lodgepole Pine / Kinnikinnick (Moist Submaritime)	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Arctostaphylos uva-ursi</i> (Moist Submaritime)

Douglas-fir - Lodgepole Pine / Oceanspray / Reindeer Lichens	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Holodiscus discolor</i> / <i>Cladina</i> spp.
Douglas-fir - Lodgepole Pine / Reindeer Lichens	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Cladina</i> spp.
Douglas-fir - Ponderosa Pine / Bluebunch Wheatgrass	<i>Pseudotsuga menziesii</i> - <i>Pinus ponderosa</i> / <i>Pseudoroegneria spicata</i>
Douglas-fir - Ponderosa Pine / Bluebunch Wheatgrass - Pinegrass	<i>Pseudotsuga menziesii</i> - <i>Pinus ponderosa</i> / <i>Pseudoroegneria spicata</i> - <i>Calamagrostis rubescens</i>
Douglas-fir - Ponderosa Pine / Idaho Fescue	<i>Pseudotsuga menziesii</i> - <i>Pinus ponderosa</i> / <i>Festuca idahoensis</i>
Douglas-fir - Ponderosa Pine / Mallow Ninebark	<i>Pseudotsuga menziesii</i> - <i>Pinus ponderosa</i> / <i>Physocarpus malvaceus</i>
Douglas-fir - Ponderosa Pine / Pinegrass	<i>Pseudotsuga menziesii</i> - <i>Pinus ponderosa</i> / <i>Calamagrostis rubescens</i>
Douglas-fir - Ponderosa Pine / Snowbrush	<i>Pseudotsuga menziesii</i> - <i>Pinus ponderosa</i> / <i>Ceanothus velutinus</i>
Douglas-fir - Water Birch / Douglas Maple	<i>Pseudotsuga menziesii</i> - <i>Betula occidentalis</i> / <i>Acer glabrum</i>
Douglas-fir - Western Hemlock / Falsebox	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Paxistima myrsinites</i>
Douglas-fir - Western Hemlock / Salal (Dry Maritime)	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Gaultheria shallon</i> (Dry Maritime)
Douglas-fir - Western Larch / Pinegrass	<i>Pseudotsuga menziesii</i> - <i>Larix occidentalis</i> / <i>Calamagrostis rubescens</i>
Douglas-fir / Alaska Oniongrass	<i>Pseudotsuga menziesii</i> / <i>Melica subulata</i>
Douglas-fir / Common Juniper / Clad Lichens	<i>Pseudotsuga menziesii</i> / <i>Juniperus communis</i> / <i>Cladonia</i> spp.

Douglas-fir / Common Snowberry - Birch-leaved Spirea	<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos albus</i> - <i>Spiraea betulifolia</i>
Douglas-fir / Common Snowberry - Saskatoon	<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos albus</i> - <i>Amelanchier alnifolia</i>
Douglas-fir / Common Snowberry / Arrowleaf Balsamroot	<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos albus</i> / <i>Balsamorhiza sagittata</i>
Douglas-fir / Common Snowberry / Pinegrass	<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos albus</i> / <i>Calamagrostis rubescens</i>
Douglas-fir / Douglas Maple - Red-osier Dogwood	<i>Pseudotsuga menziesii</i> / <i>Acer glabrum</i> - <i>Cornus stolonifera</i>
Douglas-fir / Douglas maple / Hooker's Fairybells	<i>Pseudotsuga menziesii</i> / <i>Acer glabrum</i> / <i>Prosartes hookeri</i>
Douglas-fir / Douglas Maple / Step Moss	<i>Pseudotsuga menziesii</i> / <i>Acer glabrum</i> / <i>Hylocomium splendens</i>
Douglas-fir / Dull Oregon-grape	<i>Pseudotsuga menziesii</i> / <i>Mahonia nervosa</i>
Douglas-fir / Pinegrass - Kinnikinnick	<i>Pseudotsuga menziesii</i> / <i>Calamagrostis rubescens</i> - <i>Arctostaphylos uva-ursi</i>
Douglas-fir / Pinegrass - Twinflower	<i>Pseudotsuga menziesii</i> / <i>Calamagrostis rubescens</i> - <i>Linnaea borealis</i>
Douglas-fir / Prickly Rose / Wild Sarsaparilla	<i>Pseudotsuga menziesii</i> / <i>Rosa acicularis</i> / <i>Aralia nudicaulis</i>
Douglas-fir / Rocky Mountain Juniper / Bluebunch Wheatgrass	<i>Pseudotsuga menziesii</i> / <i>Juniperus scopulorum</i> / <i>Pseudoroegneria spicata</i>
Douglas-fir / Rocky Mountain Juniper / Shrubby Penstemon	<i>Pseudotsuga menziesii</i> / <i>Juniperus scopulorum</i> / <i>Penstemon fruticosus</i>
Douglas-fir / Sword Fern	<i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i>
Douglas-fir / Tall Oregon-grape / Parsley Fern	<i>Pseudotsuga menziesii</i> / <i>Mahonia aquifolium</i> / <i>Cryptogramma acrostichoides</i>

Dune Bluegrass (Herbaceous Vegetation)	<i>Poa macrantha</i> (Herbaceous Vegetation)
Dune Wildrye - Beach Pea	<i>Leymus mollis ssp. mollis</i> - <i>Lathyrus japonicus</i>
Garry Oak - Arbutus	<i>Quercus garryana</i> - <i>Arbutus menziesii</i>
Garry oak / California brome	<i>Quercus garryana</i> / <i>Bromus carinatus</i>
Garry Oak / Oceanspray	<i>Quercus garryana</i> / <i>Holodiscus discolor</i>
Giant Wildrye Herbaceous Vegetation	<i>Leymus cinereus</i> Herbaceous Vegetation
Grand Fir / Dull Oregon-grape	<i>Abies grandis</i> / <i>Mahonia nervosa</i>
Grand Fir / Three-leaved Foamflower	<i>Abies grandis</i> / <i>Tiarella trifoliata</i>
Hybrid White Spruce - Trembling Aspen / Wild Sarsaparilla	<i>Picea engelmannii x glauca</i> - <i>Populus tremuloides</i> / <i>Aralia nudicaulis</i>
Hybrid White Spruce / Black Gooseberry - Devil's Club	<i>Picea engelmannii x glauca</i> / <i>Ribes lacustre</i> - <i>Oplopanax horridus</i>
Hybrid White Spruce / Devil's Club / Step Moss	<i>Picea engelmannii x glauca</i> / <i>Oplopanax horridus</i> / <i>Hylocomium splendens</i>
Hybrid White Spruce / Hardhack - Prickly Rose	<i>Picea engelmannii x glauca</i> / <i>Spiraea douglasii</i> - <i>Rosa acicularis</i>
Hybrid White Spruce / Ostrich Fern	<i>Picea engelmannii x glauca</i> / <i>Matteuccia struthiopteris</i>
Hybrid White Spruce / Prickly Rose / Palmate Coltsfoot	<i>Picea engelmannii x glauca</i> / <i>Rosa acicularis</i> / <i>Petasites frigidus var. palmatus</i>
Idaho Fescue - Bluebunch Wheatgrass	<i>Festuca idahoensis</i> - <i>Pseudoroegneria spicata</i>
Large-headed Sedge Herbaceous Vegetation	<i>Carex macrocephala</i> Herbaceous Vegetation
Lodgepole Pine / Labrador-Tea - Velvet-leaved Blueberry	<i>Pinus contorta</i> / <i>Rhododendron groenlandicum</i> - <i>Vaccinium myrtilloides</i>

Lodgepole Pine / Peat-mosses CDFmm	<i>Pinus contorta / Sphagnum spp. CDFmm</i>
Lodgepole Pine / Trapper's-Tea / Crowberry	<i>Pinus contorta / Rhododendron columbianum / Empetrum nigrum</i>
Lodgepole Pine / Velvet-leaved Blueberry / Clad Lichens	<i>Pinus contorta / Vaccinium myrtilloides / Cladonia spp.</i>
Lynghye's Sedge Herbaceous Vegetation	<i>Carex lynghyei Herbaceous Vegetation</i>
Mountain Sagebrush / Pinegrass	<i>Artemisia tridentata ssp. vaseyana / Calamagrostis rubescens</i>
Narrow-leaf Willow - Peach-leaf Willow	<i>Salix exigua - Salix amygdaloides</i>
Narrow-leaf Willow Shrubland	<i>Salix exigua Shrubland</i>
Northern Wormwood - Red Fescue / Grey Rock-moss	<i>Artemisia campestris - Festuca rubra / Racomitrium canescens</i>
Nuttall's alkaligrass - Foxtail Barley	<i>Puccinellia nuttalliana - Hordeum jubatum</i>
Ponderosa Pine - Black Cottonwood / Poison Ivy	<i>Pinus ponderosa - Populus trichocarpa / Toxicodendron rydbergii</i>
Ponderosa Pine - Trembling Aspen / Prairie Rose	<i>Pinus ponderosa - Populus tremuloides / Rosa woodsii</i>
Ponderosa Pine / Bluebunch Wheatgrass	<i>Pinus ponderosa / Pseudoroegneria spicata</i>
Ponderosa Pine / Bluebunch Wheatgrass - Idaho Fescue	<i>Pinus ponderosa / Pseudoroegneria spicata - Festuca idahoensis</i>
Ponderosa Pine / Bluebunch Wheatgrass - Rough Fescue	<i>Pinus ponderosa / Pseudoroegneria spicata - Festuca campestris</i>
Ponderosa Pine / Bluebunch Wheatgrass - Silky Lupine	<i>Pinus ponderosa / Pseudoroegneria spicata - Lupinus sericeus</i>
Ponderosa Pine / Common Snowberry / Bluegrasses	<i>Pinus ponderosa / Symphoricarpos albus / Poa spp.</i>

Ponderosa Pine / Red Three-awn	<i>Pinus ponderosa</i> / <i>Aristida purpurea</i> var. <i>longiseta</i>
Prairie Rose / Idaho Fescue	<i>Rosa woodsii</i> / <i>Festuca idahoensis</i>
Red Alder / Skunk Cabbage	<i>Alnus rubra</i> / <i>Lysichiton americanus</i>
Red Alder / Slough Sedge [Black Cottonwood]	<i>Alnus rubra</i> / <i>Carex obnupta</i> [<i>Populus trichocarpa</i>]
Roemer's Fescue - Junegrass	<i>Festuca roemeri</i> - <i>Koeleria macrantha</i>
Rough Fescue - Bluebunch Wheatgrass	<i>Festuca campestris</i> - <i>Pseudoroegneria spicata</i>
Sand Dropseed - Needle-and-thread Grass	<i>Sporobolus cryptandrus</i> - <i>Hesperostipa comata</i>
Sandberg's Bluegrass - Slender Wheatgrass	<i>Poa secunda</i> ssp. <i>secunda</i> - <i>Elymus trachycaulus</i>
Seashore Saltgrass (Herbaceous Vegetation)	<i>Distichlis spicata</i> var. <i>spicata</i> (Herbaceous Vegetation)
Seaside Arrow-grass (Marsh)	<i>Triglochin maritima</i> (Marsh)
Sitka Spruce / False Lily-of-the-valley (Very Wet Hypermaritime 1)	<i>Picea sitchensis</i> / <i>Maianthemum dilatatum</i> (Very Wet Hypermaritime 1)
Sitka Spruce / False Lily-of-the-valley (Wet Hypermaritime 1)	<i>Picea sitchensis</i> / <i>Maianthemum dilatatum</i> (Wet Hypermaritime 1)
Sitka Spruce / Salmonberry (Dry)	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> (Dry)
Sitka Spruce / Salmonberry (Moist Submaritime)	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> (Moist Submaritime)
Sitka Spruce / Salmonberry (Very Dry Maritime)	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> (Very Dry Maritim)
Sitka Spruce / Salmonberry (Very Wet Maritime)	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> (Very Wet Maritime)

Sitka Spruce / Salmonberry (Wet Maritime)	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> (Wet Maritime)
Sitka Spruce / Salmonberry (Wet Submaritime 1)	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> (Wet Submaritime 1)
Sitka Spruce / Salmonberry (Wet Submaritime 2)	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> (Wet Submaritime 2)
Sitka Spruce / Skunk Cabbage	<i>Picea sitchensis</i> / <i>Lysichiton americanus</i>
Sitka Spruce / Tall Trisetum	<i>Picea sitchensis</i> / <i>Trisetum canescens</i>
Spreading Needlegrass (Herbaceous Vegetation)	<i>Achnatherum richardsonii</i> (Herbaceous Vegetation)
Trembling Aspen - Black Cottonwood / Common Snowberry / Common Horsetail	<i>Populus tremuloides</i> - <i>Populus trichocarpa</i> / <i>Symphoricarpos albus</i> / <i>Equisetum arvense</i>
Trembling Aspen / Common Snowberry / Kentucky Bluegrass	<i>Populus tremuloides</i> / <i>Symphoricarpos albus</i> / <i>Poa pratensis</i>
Trembling Aspen / Common Snowberry / Mountain Sweet-cicely	<i>Populus tremuloides</i> / <i>Symphoricarpos albus</i> / <i>Osmorhiza berteroi</i>
Trembling Aspen / Mock-orange	<i>Populus tremuloides</i> / <i>Philadelphus lewisii</i>
Trembling Aspen / Pacific Crab Apple / Slough Sedge	<i>Populus tremuloides</i> / <i>Malus fusca</i> / <i>Carex obnupta</i>
Tufted Hairgrass (Community)	<i>Deschampsia cespitosa</i> (Community)
Water Birch / Roses	<i>Betula occidentalis</i> / <i>Rosa spp.</i>
Western Hemlock - Amabilis Fir / Deer Fern	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Blechnum spicant</i>
Western Hemlock - Amabilis Fir / Deer Fern (Moist Maritime)	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Blechnum spicant</i> (Moist Maritime)
Western Hemlock - Amabilis Fir / Pipecleaner Moss	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Rhytidiopsis robusta</i>

Western Hemlock - Amabilis Fir / Step Moss	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Hylocomium splendens</i>
Western Hemlock - Black Cottonwood / Salmonberry	<i>Tsuga heterophylla</i> - <i>Populus trichocarpa</i> / <i>Rubus spectabilis</i>
Western Hemlock - Douglas-fir / Electrified Cat's-tail Moss (Dry Submaritime 1)	<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Rhytidiadelphus triquetrus</i> (Dry Submaritime 1)
Western Hemlock - Douglas-fir / Electrified Cat's-tail Moss (Dry Submaritime 2)	<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Rhytidiadelphus triquetrus</i> (Dry Submaritime 2)
Western Hemlock - Douglas-fir / Oregon Beaked-moss	<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Eurhynchium oreganum</i>
Western Hemlock - Sitka Spruce / Lanky Moss	<i>Tsuga heterophylla</i> - <i>Picea sitchensis</i> / <i>Rhytidiadelphus loreus</i>
Western Hemlock - Western Redcedar / Deer Fern	<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Blechnum spicant</i>
Western Hemlock - Western Redcedar / Salal (Very Wet Maritime)	<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Gaultheria shallon</i> (Very Wet Maritime)
Western Hemlock / Common Snowberry	<i>Tsuga heterophylla</i> / <i>Symphoricarpos albus</i>
Western Hemlock / Flat-moss	<i>Tsuga heterophylla</i> / <i>Buckiella undulata</i>
Western Hemlock / Queen's Cup	<i>Tsuga heterophylla</i> / <i>Clintonia uniflora</i>
Western Redcedar - Douglas-fir / False Solomon's Seal	<i>Thuja plicata</i> - <i>Pseudotsuga menziesii</i> / <i>Maianthemum racemosum</i>
Western Redcedar - Douglas-fir / Oregon Beaked-moss	<i>Thuja plicata</i> - <i>Pseudotsuga menziesii</i> / <i>Eurhynchium oreganum</i>
Western Redcedar - Douglas-fir / Red-osier Dogwood	<i>Thuja plicata</i> - <i>Pseudotsuga menziesii</i> / <i>Cornus stolonifera</i>
Western Redcedar - Douglas-fir / Vine Maple	<i>Thuja plicata</i> - <i>Pseudotsuga menziesii</i> / <i>Acer circinatum</i>

Western Redcedar - Hybrid White Spruce / Black Twinberry / Soft-leaved Sedge	<i>Thuja plicata</i> - <i>Picea engelmannii</i> x <i>glauca</i> / <i>Lonicera involucrata</i> / <i>Carex disperma</i>
Western Redcedar - Paper Birch / Oak Fern	<i>Thuja plicata</i> - <i>Betula papyrifera</i> / <i>Gymnocarpium dryopteris</i>
Western Redcedar - Sitka Spruce / Devil's Club (Very Wet Hypermaritime 1)	<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i> (Very Wet Hypermaritime 1)
Western Redcedar - Sitka Spruce / Devil's Club (Very Wet Hypermaritime 2)	<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i> (Very Wet Hypermaritime 2)
Western Redcedar - Sitka Spruce / Skunk Cabbage	<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>
Western Redcedar - Sitka Spruce / Sword Fern	<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Polystichum munitum</i>
Western Redcedar - Western Hemlock / Sword Fern	<i>Thuja plicata</i> - <i>Tsuga heterophylla</i> / <i>Polystichum munitum</i>
Western Redcedar - Yellow-cedar / Spleenwort-leaved Goldthread (Moist Maritime 2)	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Coptis aspleniifolia</i> (Moist Maritime 2)
Western Redcedar / Black Twinberry	<i>Thuja plicata</i> / <i>Lonicera involucrata</i>
Western Redcedar / Common Snowberry	<i>Thuja plicata</i> / <i>Symphoricarpos albus</i>
Western Redcedar / Devil's Club	<i>Thuja plicata</i> / <i>Oplopanax horridus</i>
Western Redcedar / Devil's Club / Ostrich Fern	<i>Thuja plicata</i> / <i>Oplopanax horridus</i> / <i>Matteuccia struthiopteris</i>
Western Redcedar / Indian-plum	<i>Thuja plicata</i> / <i>Oemleria cerasiformis</i>
Western Redcedar / Red Raspberry / Oak fern	<i>Thuja plicata</i> / <i>Rubus idaeus</i> / <i>Gymnocarpium dryopteris</i>
Western Redcedar / Salmonberry	<i>Thuja plicata</i> / <i>Rubus spectabilis</i>

Western Redcedar / Slough Sedge	<i>Thuja plicata</i> / <i>Carex obnupta</i>
Western Redcedar / Sword Fern (Dry Maritime)	<i>Thuja plicata</i> / <i>Polystichum munitum</i> (Dry Maritime)
Western Redcedar / Sword Fern (Very Dry Maritime)	<i>Thuja plicata</i> / <i>Polystichum munitum</i> (Very Dry Maritime)
Western Redcedar / Three-leaved Foamflower (Dry Maritime)	<i>Thuja plicata</i> / <i>Tiarella trifoliata</i> (Dry Maritime)
Western Redcedar / Three-leaved Foamflower (Very Dry Maritime)	<i>Thuja plicata</i> / <i>Tiarella trifoliata</i> (Very Dry Maritime)
Western Redcedar / Vanilla-leaf	<i>Thuja plicata</i> / <i>Achlys triphylla</i>
Whitebark Pine / Junegrass	<i>Pinus albicaulis</i> / <i>Koeleria macrantha</i>
Woolly Sedge - Arctic Rush	<i>Carex pellita</i> - <i>Juncus arcticus</i>
Lichen	
Crumpled Tarpaper	<i>Collema coniophilum</i>
Cryptic Paw	<i>Nephroma occultum</i>
Oldgrowth Specklebelly	<i>Pseudocyphellaria rainierensis</i>
Seaside Bone	<i>Hypogymnia heterophylla</i>
Seaside Centipede	<i>Heterodermia sitchensis</i>

Appendix F: Hierarchy of External Wildlife Guidance

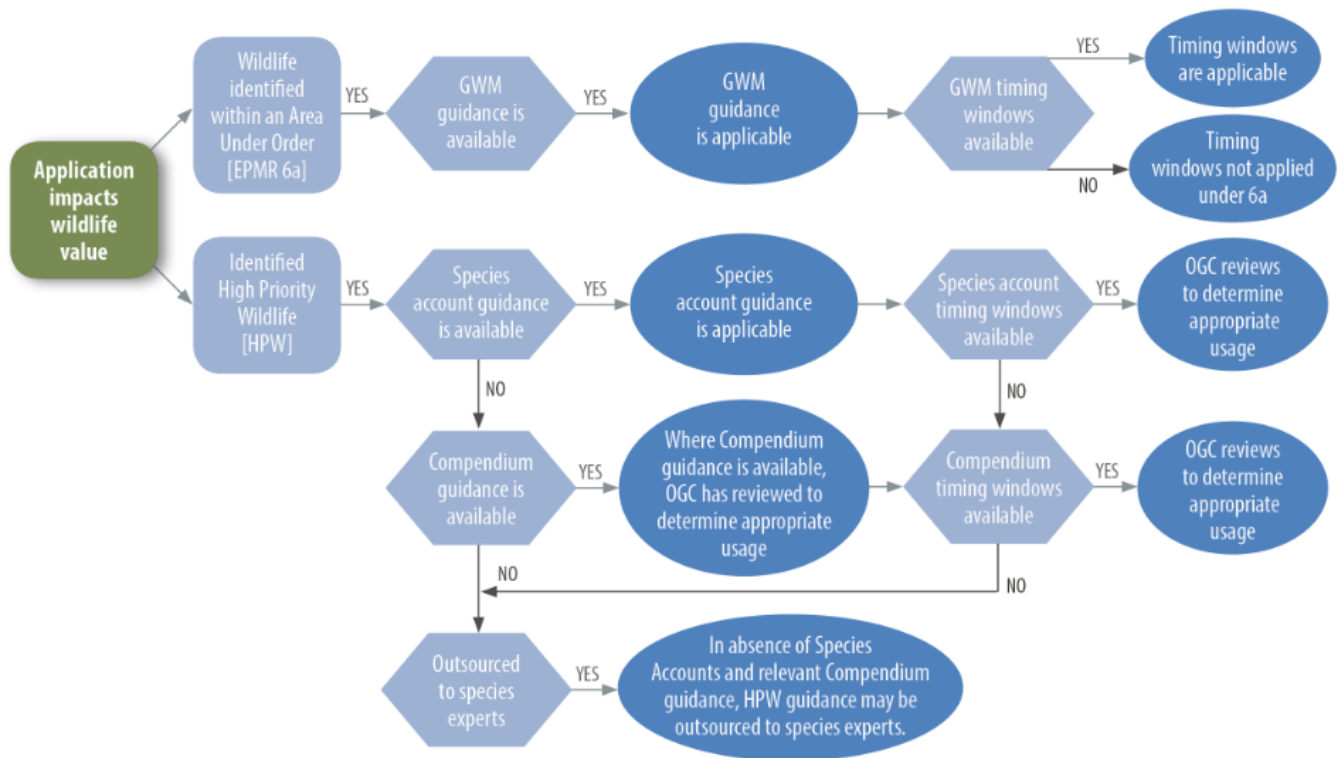


Figure F-1 BCOGC Hierarchy of External Wildlife Guidance for Managing Potential Oil and Gas Activities within NEBC.

Information Sources used in the Hierarchy:

Posted FRPA and OGAA Orders for relevant WHA's and UWR's

[A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia, Interim Guidance November 19, 2014. Ministry of Forests, Lands and Natural Resource Operations.Accounts and Measures for Managing Identified Wildlife \(Species Accounts\): Accounts and Measures by Forest Region and Measures by Species, various.](#)

Accounts and Measures for Managing Identified Wildlife, MOE, (Species Accounts)
<http://www.env.gov.bc.ca/wld/frpa/iwms/accounts.html>

Appendix G: Relevant Legislation and Regulatory Requirements

This guideline is limited in scope to the Commission's application processes and the authorities and requirements established within the Oil and Gas Activities Act (OGAA) or specified enactments established thereunder. Carrying out oil and gas and related activities may require additional approvals from other regulators or create obligations under other statutes. It is the permit holder's responsibility to know and uphold all of their legal obligations.

List of Relevant Legislation and Regulations

[BC Wildlife Act](#)

[BC Forests & Range Practices Act](#)

[BC Land Act](#)

[Migratory Birds Convention Act](#)

[Migratory Birds Regulation](#)

[Federal Species at Risk Act](#)

[BC Weed Control Act](#)

[BC Weed Control Regulation](#)

[BC Water Sustainability Act](#)

[BC Water Regulations](#)

[BC Heritage Conservation Act](#)

[BC Environmental Management Act](#)

Appendix H: Spatial Layers

Provincial spatial data is stored within the BC Geographic Warehouse (BCGW), a central, consolidated repository of land and resource information from across the province. It includes many types of data including:

- Cadastral information (tenures, ownership, boundaries)
- Resource information (vegetation, fisheries, wildlife)
- Provincial atlas (rivers, roads, buildings, topography, surveys)
- Planning and analysis information (land and resource management plans, sustainable resource management plans)

Spatial Identification

Known waterworks information, including water licences, locations of water supply wells and mapped water supply well capture zones, can be obtained from the BCGW.

[WHSE WATER MANAGEMENT.GW WATER WELLS WRBC SVW](#)

[WHSE WATER MANAGEMENT.GW WELL CAPTURE ZONES SP](#)

[WHSE WATER MANAGEMENT.WLS WATER APPROVALS SVW](#)

[WHSE WATER MANAGEMENT.WLS WATER LICENCED WRK LINE SP](#)

[WHSE WATER MANAGEMENT.WLS WATER LICENCED WRK LOC SP](#)

[WHSE BASEMAPPING.FWA MANMADE WATERBODIES POLY](#)

[WHSE WATER MANAGEMENT.WLS RESERVOIR PMT LICENSEE SP](#)

[WHSE WATER MANAGEMENT.WRIS DAMS PUBLIC SVW](#)

[WHSE WATER MANAGEMENT.WLS PWD LICENCES SVW](#)

[WHSE WATER MANAGEMENT.WLS PWD APPLICATIONS SVW](#)

[WHSE WATER MANAGEMENT.WLS POD LICENCE SP](#)

[WHSE MINERAL TENURE.OG WATER SOURCE PERMIT SP](#)

[WHSE MINERAL TENURE.OG ASSOC ANCILLARY PERMIT SP \(SITE_TYPE=WASD\)](#)

Spatial data for designated community watersheds can be found in the following layer in BCGW:

[WHSE WATER MANAGEMENT.WLS COMMUNITY WS PUB SVW](#)

Spatial data for aquifers (ref EPMP Part 3 s.10) can be found in the following layer in BCGW:

[WHSE WATER MANAGEMENT.GW AQUIFERS CLASSIFICATION SVW](#)

WHA and UWR can be found in the following spatial layers in BCGW:

[WHSE WILDLIFE MANAGEMENT.WCP WILDLIFE HABITAT AREA POLY](#)

[WHSE WILDLIFE MANAGEMENT.WCP UNGULATE WINTER RANGE SP](#)

High Priority Wildlife is associated with the following spatial layers in BCGW:

[WHSE TERRESTRIAL ECOLOGY.BIOT OCCR NON SENS AREA SVW](#)

[WHSE TERRESTRIAL ECOLOGY.BIOT OCCR MASKED SENS AREA SP](#)

[WHSE WILDLIFE INVENTORY.GCPB CARIBOU POPULATION SP](#)

[REG LAND AND NATURAL RESOURCE.WLD CARIBOU CORE HAB PEACE SP](#)

Fisheries Sensitive Watersheds can be found in the following layer in BCGW:

[WHSE WILDLIFE MANAGEMENT.WCP FISH SENSITIVE WS POLY](#)

Wildlife Tree Retention Areas can be found within the following spatial layer housed in BCGW:

[WHSE FOREST VEGETATION.RSLT FOREST COVER INV SVW](#)

Note: Spatial analysis should apply the definition query: SILV_RESERVE_CODE IS NOT NULL and SILV_RESERVE_CODE <> 'N' to identify WTRA.

OGMA can be found in the following spatial layer housed within BCGW:

[WHSE LAND USE PLANNING.RMP OGMA LEGAL CURRENT SVW](#)

Resource Features can be found in the following spatial layers, housed within [BCGW](#):

Karst:

[WHSE LAND USE PLANNING.RKPM KARST POTENTIAL AREA SP](#)

Research or Experimental Area:

[WHSE FOREST VEGETATION.RESPROJ RSRCH INSTLTNS SVW](#)

[WHSE FOREST VEGETATION.GRY PSP STATUS ACTIVE](#)

Permanent Sample Site (snow course):

[WHSE WATER MANAGEMENT.SSL SNOW MSS LOCS SVW](#)

Interpretive Forest Site, Recreation Site or Recreation Trail, Trail or Recreation Facility, Recreation Feature:

[WHSE FOREST TENURE.FTEN RECREATION POLY SVW](#)

[WHSE FOREST TENURE.FTEN RECREATION LINES SVW](#)

Range Developments:

[WHSE FOREST VEGETATION.RANGE PASTURE POLY SVW](#)

[WHSE FOREST VEGETATION.RANGE IMP FEATURE LINE SVW](#)

[WHSE FOREST VEGETATION.RANGE IMP FEATURE PNT SVW](#)

Rangeland Natural Range Barriers (ref EPMR Part 3 s.14) can be found in:

[WHSE FOREST VEGETATION.RANGE NATURAL BARRIER LINE SVW](#)

Appendix I: Additional Information

- 1) [Committee on the Status of Endangered Wildlife in Canada \(COSEWIC\)](#): Environment Canada's website for COSEWIC; a committee of experts that assesses and designates which wildlife species are in some danger of disappearing from Canada.
- 2) [Environment Canada](#): A comprehensive website containing regulatory requirements and guidance for Species at Risk, Wildlife Habitat, Migratory Birds, Ecosystem Initiatives and Biodiversity. <http://www.ec.gc.ca/nature>
- 3) [Environment Canada](#): Incidental Take of Migratory Birds in Canada. <http://ec.gc.ca/paom-itmb/>
- 4) Fisheries and Oceans Canada, 2014. *Timing windows to conduct projects in or around water*. British Columbia marine/estuarine timing windows. <http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html>
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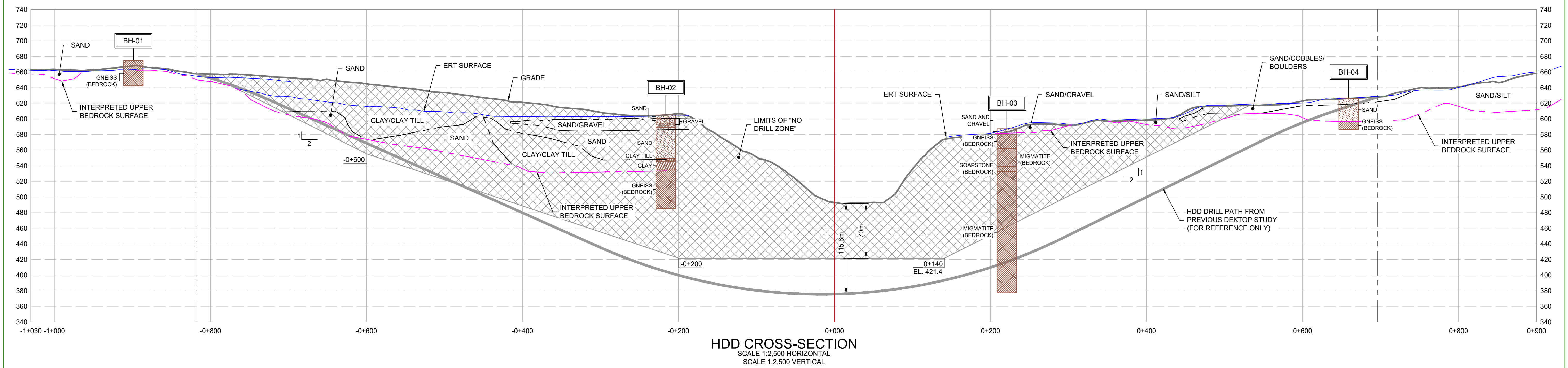
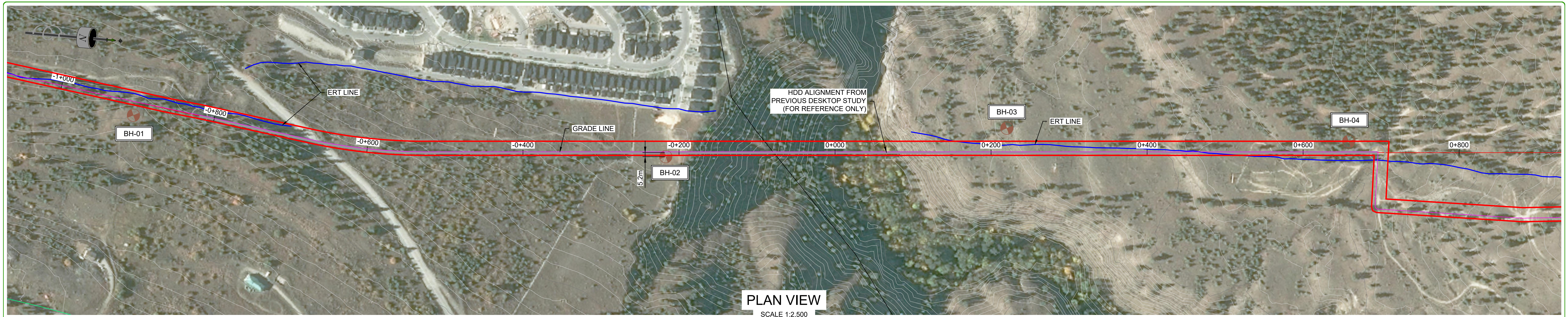
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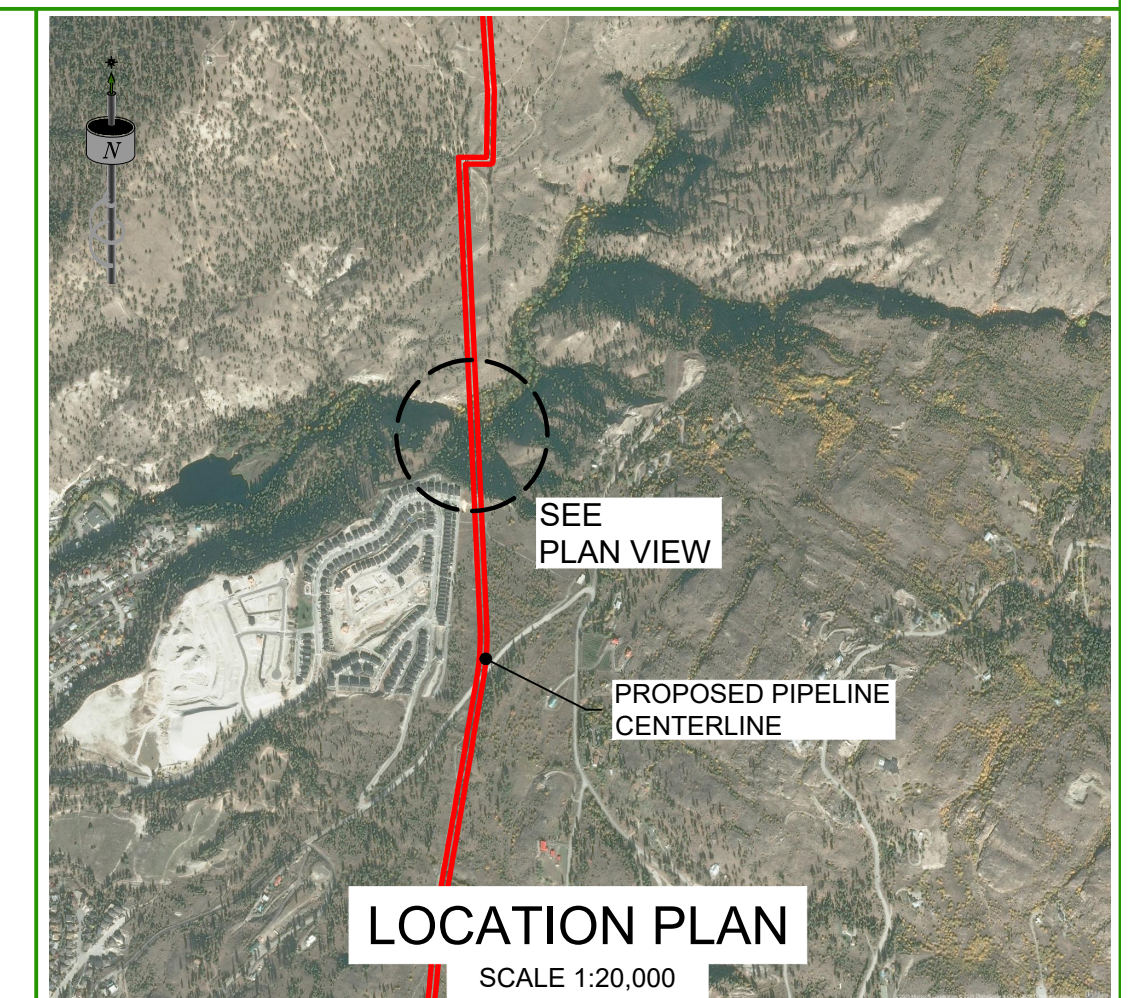
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Attachment 42.2



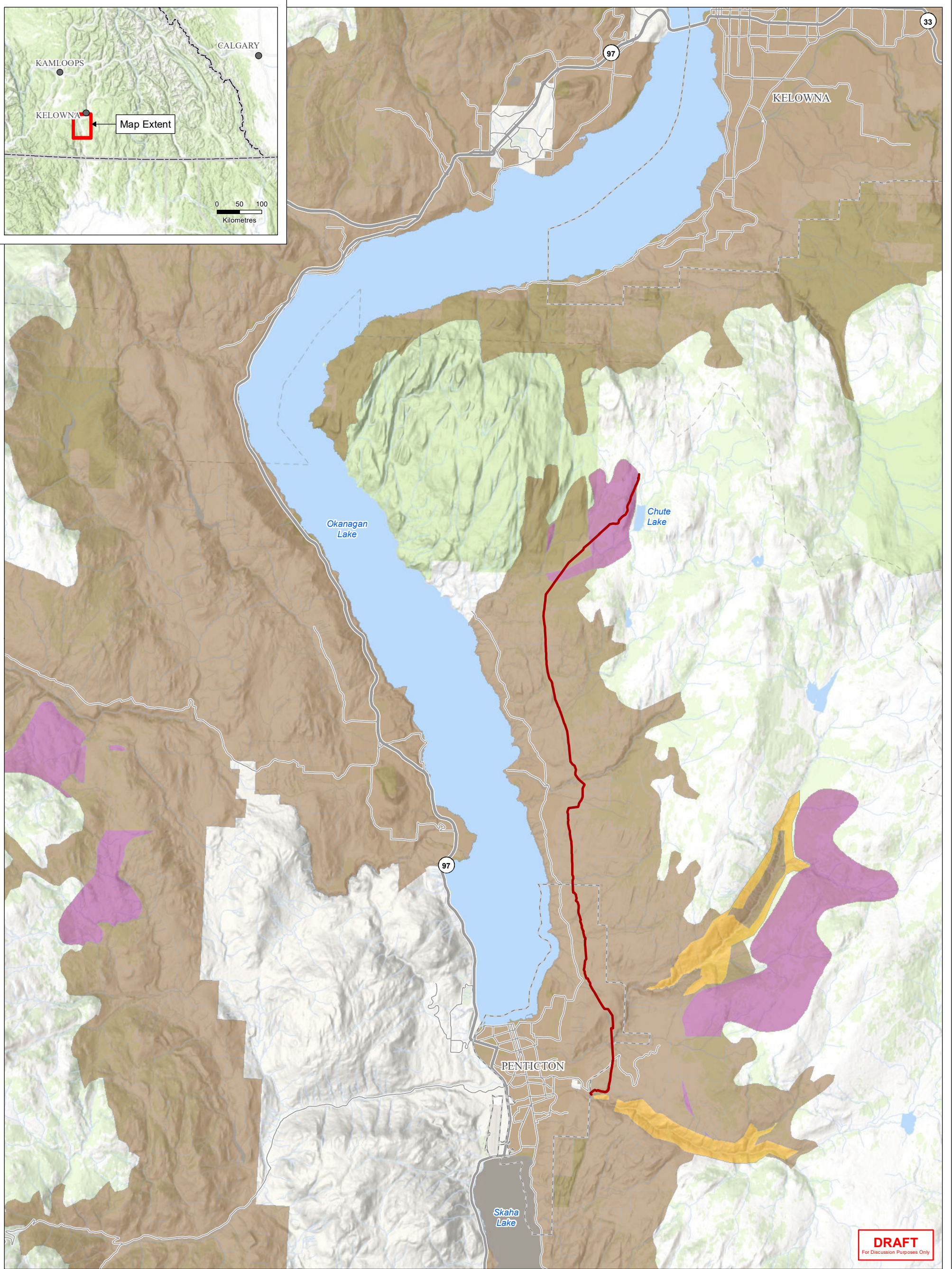
NOTES:

1. THE DEPICTED OVERBURDEN AND BEDROCK STRATIGRAPHY SHOWN IS BASED ON INTERPRETATION OF DATA FROM THE FOUR BOREHOLES DRILLED DURING THE RECENT GEOTECHNICAL INVESTIGATION, GEOPHYSICAL SURVEY, AND TERRAHDD'S UNDERSTANDING OF THE LOCAL GEOLOGY. SOME VARIATION IN SUBSURFACE STRATIGRAPHY SHOULD BE EXPECTED.
2. THE RECOMMENDED "NO DRILL ZONE" PROVIDES A MINIMUM 70m OF VERTICAL COVER BENEATH THE SURVEYED RIVER CHANNEL, AND MAINTAINS THE BORE AT OR BELOW ELEVATION 421.4m, GEODETIC DATUM, BETWEEN STATIONS -0+200 AND 0+140. A SLOPE OF 2H:1V IS DEVELOPED FOR THE "NO DRILL ZONE" AT THIS CROSSING.
3. THE ACTUAL DRILL PATH MUST BE LOCATED OUTSIDE OF THE "NO DRILL ZONE" TO AVOID/MINIMIZE CONCERNS OF GROUND SETTLEMENT AND FLUID RELEASE DURING CONSTRUCTION.
4. IT SHOULD BE NOTED THAT THE "NO DRILL ZONE" SHOWN MAY NOT REFLECT THE LENGTH OR CONFIGURATION OF THE HDD. THE ACTUAL DRILL PATH WILL DEPEND ON THE ENTRY/EXIT ANGLES SELECTED BY THE DESIGNER/CONTRACTOR AND THE MINIMUM RADIUS OF CURVATURE WHICH CAN BE ACHIEVED BY THE CONTRACTOR'S EQUIPMENT AND SAFELY TOLERATED BY THE PIPE.
5. IT IS RECOMMENDED THAT THE DIRECTIONAL DRILLING CONTRACTOR INDEPENDENTLY EVALUATE THE FEASIBILITY OF DRILLING THE CROSSING, WITH DUE CONSIDERATION GIVEN TO THE SUITABILITY OF HIS EQUIPMENT AND PROPOSED CONSTRUCTION PROCEDURES.
6. GRADE IS BASED ON AVAILABLE ONLINE INFRAWORKS DATA. BOREHOLE LOCATIONS AND ELEVATIONS ARE BASED ON FIELD SURVEY DATA.



<p>OKANAGAN CAPACITY UPGRADE PROJECT PENTICTON CREEK HDD CROSSING C 83-I / 082 E 05 TO A 4-A / 082 E 12</p>			
<p>PROJECT NO. 20-013G DWG NO. 20-013G-01 REV 01</p>		<p>DATE REV DESCRIPTION DATE DRN CKD DES ENG APPR</p>	
<p>ACAD:HDD PROFILES 20191107-MODEL</p>		<p>01 ISSUED FOR GEOTECHNICAL INFORMATION 01-20-21 AR YZ - - SG</p>	
<p>DRAWING NAME DATE REV DESCRIPTION</p>		<p>DATE DRN CKD DES ENG APPR</p>	
<p>REFERENCE DRAWINGS</p>		<p>REVISIONS</p>	

Attachment 75.1



DRAFT
For Discussion Purposes Only

- Legend**
- Proposed OLI PEN 406
 - Highway
 - Road
 - Municipal Boundary

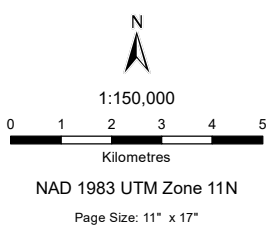
- Ungulate Winter Range**
- Moose
 - Mule Deer
 - Mountain Goat

Sources

- Contains information licensed under the Open Government Licence - Government of British Columbia
- Basemap: ESRI World Topographic Base

Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.



Okanagan Capacity Upgrade
Penticton to Chute Lake, BC

Ungulate Winter Range

104279-02 Production Date: May 6, 2021 Figure 1



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