From:	Laura Friend
To:	"Meghan Jurijew"
Cc:	Springbank Group
Subject:	Springbank SIR#1 - NRCB Submission
Date:	June 15, 2018 2:55:00 PM
Attachments:	NRCB Springbank SIR 1 - June 15.doc Ltr to AT wrt priority SIRs 21FEB2018.pdf
Importance:	High

Hello Meghan,

Please find attached the NRCB's compiled list of SIRs for the EIA, meeting EP's deadline of June 18.

It includes the NRCB's priority SIR questions that were forwarded to AT on February 21, 2018, and all questions have been updated to reflect the additional material received since March. I have attached a copy of the NRCB's February 8, 2018 priority SIRs and February 21, 2018 cover letter for your information (since Margot Trembath was EA Coordinator at that time).

Laura

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Supplemental Questions for [Springbank SR1]

Please review the *Guide to Reviewing Environmental Impact Assessments Reports* (http://esrd.alberta.ca/ea) prior to completing this table.

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
1. EIS Summary, Section 3.6.2.4, Page 3.24 and Volume 1, Section 2.2.5, Pages 2.25 and 2.26. AT lists two options when discussing alternatives for the low-level outlet channel: *upsizing the existing stream to convey to peak design flow to the Elbow River* and *delay reshaping the channel until it is necessary*. AT states that the *choice was made to delay maintenance on the channel until such a time as it may be required.* a. Provide rational for considering channel work in the existing stream maintenance instead of deferred construction. b. Provide the cost of upsizing the existing channel in the existing stream to peak design flood at the time of Project construction.	**SC**	2.2/7.2	No	Project Description
2. Volume 1, Section 1.3.2.1, Page 1.12. AT states *Area C: has options for grazing through public leases. The land would be publicly owned and privately stewarded* **Volume 3A, Section 12.4.2, Page 12.24.** AT states *AEP would own and manage these areas.* (including Area C) **Volume 4, Appendix D, Section 5.1.3, Page 5.1.** AT states *Area C is generally north of the Springbank Road and west of Highway 22 and would be inundated at the design flood. These lands would remain under private ownership and management. Current land uses, which are mainly agricultural, can continue.* a. Clarify the future ownership of Area C.	**SC**	7.2	No	Project Description
3. Volume 1, Section 2.2.1.3, Table 2-2, Pages 2.10 and 2.11.	**PAW**		No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
EIS Summary, Section 3.6.1, Table 3-2, Pages 3.16 to 3.17. Table 2-2 describes recreational use of the MC1 area including loss of campsites and impact on hiking, cross country skiing, snowshoeing, guiding, outfitting, etc. a. Clarify the extent to which recreational activities described in the tables are expected to be available in the operational phase of MC1.				
4. Volume 1, Section 2.2.1.3, Table 2-2, Page 2.12 **EIS Summary, Section 3.6.1, Table 3-2, Page 3.18.** In the category *Construction Timelines*, AT states *that 'Special measures would be required for winter construction, including heating and hoarding for concrete, and the continuous 24-hour per day earthfill operations" should rapid year-round construction proceed. Such measures would also affect the cost of construction.* a. Costing for MC1 appears in numerous sections of the EIA including the cost-benefit analysis. Confirm whether year-round construction was contemplated for MC1 and whether the additional costs were included in the MC1 construction cost estimates used throughout the document.	**PAW**		No	Project Description
5. Volume 1, Section 2.2.1.3, Table 2-3, Page 2.13. AT states the *Catchment Area* for the Springbank Project is *868 km^2* and for the MacLean Creek (MC1) Option is *695 km^2*. **EIS Summary, Section 3.0, Page 3.2 and Volume 1, Section 1.2, Page 1.3.** AT states that the Project *can hold 77,771,000 m^3 of water as active flood storage.* **Volume 1, Section 2.2.1.2, Page 2.5.** AT states that the MC1 Option is *designed to withstand the probable maximum flood (PMF) of 2770 m^3/s. The maximum reservoir volume, when passing that flood, would be 93 million m^3…* a. Explain the methodology and rationale for concluding that flood protection is greater with a SR1 larger catchment area even though SR1 has a smaller maximum reservoir compared to MC1.			No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
6. Volume 1, Section 2.2.1.3, Table 2-2 & Table 2-3, Pages 2.9-2.13 **EIS Summary, Section 3.6.1, Table 3-2, Pages 3.15 to 3.18.** a. Provide a concordance table showing references for each bulleted item in the tables. b. Identify which of the comparisons between the Project and MC1 in these tables are currently applicable.	**PAW**		No	Project Description
7. Volume 1, Section 2.2.1.3, Table 2-3, Page 2.13 AT states the Project is *Operational in 2020* while the MC1 Option is *Operational 5.5 years from decision to move forward* under the project timeline. a. Clarify baseline project timelines for SR1 and MC1 under assumption each project is initiated at the same time.			No	Project Description
8. Volume 1, Section 2.2.1.3, Table 2-3, Page 2.13. For the parameter, *Flooding Risk During Construction*, AT states *Minimal risk to downstream communities during construction.* a. What is the *minimal risk* compared to? b. What is the maximum flood event downstream communities would be protected from during each year of the Project construction?	**SC**		No	Project Description
9. Volume 1, Section 2.2.1.3, Table 2-2, Page 2.12 **EIS Summary, Section 3.6.1, Table 3-2, Page 3.18.** Under the category *Conclusions*, AT states *Overall, the assessment and scoring for SR1 are considerably more favourable than for the proposed MC1. When social and recreational values enter into the equation the evidence is overwhelmingly in favour of the social good created by the Project from a cost, environmental and risk basis.*	**PAW**		No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
a. Provide references for the scoring and evidence that support this statement including reference to the *social good* created by the Project.				
10. Volume 1, Section 2.2.1.3, Table 2-3, Page 2.13; Volume 3A, Section 17.4.1.5, Tables 17-14 and 17-15, Pages 17.25 and 17.26; Volume 4, Supporting Documentation, 1. IBI Report, Executive Summary, Page 2 and Section 6.2.2, Exhibit 6.1, Page 35 ; and Reference Document: Springbank Off-stream Storage Project, Preliminary Design Report (DRAFT), Stantec Consulting Services Ltd., March 31, 2017, Section 13.4, Page 200, and Appendix G Construction, Page 3112 of 3119. AT provides Project costs that include *$372 million (including the estimated $60 million the government will recover from the sale of any surplus land purchased*…. (Volume 1), that *Project construction is estimated at $249 million* (Volume 3A), $291.7 million plus another $80 million for land costs (Volume 4), and a total cost opinion of *$279 million* (Reference Document). a. Provide detailed final costs for the Project and clarify discrepancies.	**PAW**	7.2[F]	No	Project Description
11. Volume 1, Section 2.2.2.2, Page 2.20 and Section 3.2.1.2, Page 3.7. AT states the Obermeyer Crest Gate's *inability to pass bedload during floods is partially mitigated with the addition of the adjacent sluiceway, which passes flow and sediment* (Page 2.20), while the sluiceway is not listed when the service spillway and its components are described (Page 3.7). a. Describe the sluiceway location and function.	**SC**	2.1[B]	No	Project Description
12. Volume 1, Section 3.2.6, Pages 3.18. AT states *The conduit will discharge into an 18 m long energy dissipation basin to reduce the speed of the water entering the channel.* **EIS Summary, Section 3.6.2.4, Page 3.24 and Volume 1, Section 2.2.5, Pages 2.25.**	**SC**	2.6/3.2	No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states *The existing stream is undersized to handle the design peak discharge and, therefore, it would likely erode and scour during high discharges from the low-level outlet works.* a. Assess potential accidents and/or malfunctions at the off-stream dam due to erosion and scouring of the existing stream channel.				
13. Volume 1, Section 3.3.8, Table 3-7, Page 3.32. AT states *Temp Bridge Construction is scheduled to occur in May, June and July of 2019.* **Reference Document: Springbank Off-stream Storage Project, Preliminary Design Report (DRAFT), Stantec Consulting Services Ltd., March 31, 2017, Appendix G Construction, Pages 3109 to 3112 of 3119.** Temporary bridge construction costs (installation and removal) are not included as a line item in the cost table. a. Provide the construction costs of the temporary bridge installation and removal.	**SC**	7.2[F]	No	Project Description
14. Volume 1, Section 8.0, Page 8.1 to 8.3 and Volume 4, Supporting Documentation. AT references reports for the Project (Stantec) and for the MC1 alternative (from Opus) which are not included in the Supporting Documentation. a. Provide the final report(s), as listed in Section 8.0, in the Supporting Documentation.	**SC**		No	Project Description
15. Volume 1, Section 8.0, Page 8.3. AT references *Stantec Consulting Ltd. 2017b. Springbank Off-stream Storage Project Interim Design Report*, dated March 31, 2017 which is watermarked DRAFT and has no signature or stamp.	**SC**		No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
a. Provide a final (signed and stamped) version of this report. b. Provide an updated concordance table with any report and EIA section changes if required.				
16. Volume 3A, Section 4.3, Page 4.21. AT suggests that blasting may be required for the diversion channel, and that details on the blasting would be submitted by the contractor to AT. **Volume 1, Section A.2.1.3, Page A.6** AT states *If rock is encountered, it will be mechanically removed using rippers or pneumatic or hydraulic breakers. Blasting will not be permitted.* a. Explain if bedrock is expected to be encountered during diversion channel excavation. b. Provide details of permitting and requirements for blasting. c. Clarify the depth of bedrock that can be removed using rippers or breakers. d. If blasting is planned: i. comment on additional noise effects of blasting on receptors, and ii. comment on additional air quality effects of blasting (wet and/or dry, as appropriate) on receptors. e. If blasting is not planned: i. comment on the noise effects of the bedrock excavation construction techniques (rippers and/or breakers), and, comment on the air quality effects of the bedrock excavation construction techniques (rippers and/or breakers).	**SC**		No	Project Description
17. Volume 3A, Section 17.4.1.2, Page 17.24; and Reference Document: Springbank Off-stream Storage Project, Preliminary Design Report (DRAFT), Stantec Consulting Services Ltd., March 31, 2017, Section 13.3.3, Page 200.. AT states that *[c]ost estimates considered the conceptual designs presented in Stantec (2017)* and that [c]*ost estimates are considered Class D (accurate to within +/-50%) (Volume 3A).*	**SC**	7.2[F]	No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT later states that a *contingency factor of 15% is utilized at this point in the process to reflect the level of study and knowledge that is possessed currently* (Reference Document). a. Explain why a cost contingency factor of 15% is appropriate for the Project if the cost estimates are +/-50%. b. Update the cost contingency factor percentage and/or the cost estimate percentage for the Project.				
18. Volume 3B, Section 17.3, Tables 17-4 to 17-6, Pages 17.8 to 17.10 and Volume 3B, Section 17.7, References, Page 17.12. The data in Tables 17-4 to 17-6 are not included in the referenced reports. **Volume 4, Supporting Documentation, 1. IBI Report, Section 5.2, Page 34.** AT states *Upstream protection to the 1:200-year level on the Elbow River results in a reduction of $27.7 million in AAD from the existing mitigation amount.* a. Provide the report source for the data in Tables 17-4 to 17-6. b. Provide information detailing the calculation of the $27.7 million AAD in Section 5.2, similar to the information detailed in the 2017 IBI Report section 5.1.1 and 5.1.2.	**SC**	7.2	No	Project Description
19. Volume 3D, Section 1.2.2, Page 1.2. AT states *failure or breach of the service spillway, auxiliary spillway, or flood plain berm during flood operations as a result of electrical or design failure of the diversion structure.* While the potential of electrical failure at the service spillway is listed as an item to be discussed, potential electrical failure at the diversion inlet is not included in this list and other sections of the EIA contain details on potential malfunction of electrical failure of the diversion structure.	**SC**	2.6/3.2	No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
a. Describe the failure or breach of the service spillway, diversion inlet, auxiliary spillway, or flood plain berm during flood operations as a result of electrical failure at the service spillway and/or the diversion inlet. i. Include failure of service spillway to be raised (left, right or both sides) and failure of the diversion inlet gates to be raised (left, right or both gates). **ii.** Discuss time implications (and associated flood water volumes passing downstream of the service spillway) arising from an electrical failure at the time the service spillway and diversion inlet would be activated to divert flood waters for the 1:100 and 2013 floods.				
20. Volume 3D, Section 1.6.2, Page 1.31. AT states *Floodplain berm/diversion structure (f)ailure or breach would result in similar effects to VCs relative to an unmitigated flood (in the absence of the Project), including inundation of surrounding areas, as well as commercial property; however the effects are predicted to be short term (approximately 30 minutes).* a. Clarify how an unmitigated flood (in absence of the Project) has predicted short term effects of approximately 30 minutes. Include the flood effects of: i. the volume (and flow rate) of water held behind the floodplain berm/diversion structure at one moment in time, and, **ii.** the volume (and flow rate) of water that would flow through a failed floodplain berm/diversion structure from the time of failure until the end of the flood.	**SC**	2.6/3.2	No	Project Description
21. Volume 4, Supporting Documents, 1. IBI Group Report, August 2017, Page 1 and Exhibit 4.1, Page 11. AT provides the costs of the Project *Off-Stream Storage Dam $38,643,000.* **Volume 4, Appendix E, Attachment 3A, Section 3A.3.1, Page 3A.11.** AT states *Earth material for the construction of the off-stream dam will be borrowed primarily from the diversion channel excavation (4.75 million m^3). Additional earth material (1.09 million m^3) will be borrowed from a designated are within the PDA (Borrow*	**SC**	7.2[F]/ 2.2[B]	No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
Area 1). **Reference Document: McLean Creek (MC1) Dam, Updated Conceptual Design Report – Final – Vol 1 of 2, Opus Stewart Weir, August 23, 2017.** **Section 10.3.1, Page 51.** AT states *the estimated 4.5 million m^3 of dam earthworks* **Appendix A, Page 97 of 134.** AT states *SUB-TOTAL, MAIN DAM $98,699,300* The Project dam and the MC1 dam require a similar volume of earthworks for construction of an earth fill dam. a. Explain the cost difference between the Project dam ($38 million) and the cost of the MC1 dam ($98 million).				
22. Volume 4, Supporting Documentation, 1. IBI Report, Page 2. The Treasury Board of Canada recommends the application of a discount rate of 8% for regulatory interventions and 3% for the evaluation of social goods (enviro/human health, etc). a. Describe how the discount rate of 4% was selected and indicate if the 4% real rate is intended to reflect the time value of money, risk, or both. b. Provide a sensitivity analysis of the real discount rate ranging between 3% and 8%.	**PS**		No	Project Description
23. Volume 4, Supporting Documentation, 1. IBI Report, Section 3.3.1.1, Page 10, and Exhibits 3.5, 3.6 and 3.7. The IBI report includes a "Triple Bottom Line" analysis. a. Explain the rationale for analyzing SR1 but excluding MC1 from the Triple Bottom Line analysis. b. Explain how the triple bottom line analysis of the 12 mitigation scenarios were used to	**PAW**		No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
compare SR1 and MC1.				
24. Volume 4, Supporting Documentation, 1. IBI Report, Exhibit 5.9. The table shows total estimated average annual damages under the existing mitigation scenario at $116,579,000 million. The $116.6M is broken down to the Bow River $57,128,000 and the Elbow River at $41,451,000, totaling $98,579,000. a. Explain the discrepancy in the totals.	**PAW**		No	Project Description
25. Volume 4, Supporting Documentation, 1. IBI Report, Section 4.1.2.2, Page 12-13. AT stats *[f]or the purpose of the benefit/cost analysis, it is assumed that the land (residual) and improvements acquired outside the Project Perimeter would be re-soild at comparable values (acquisition prices).* The possibility of injurious affection suggests a potential differential between the purchase and resale of land. a. Provide justification for the assumption that the market value for land will be unchanged between the purchase and resale of land after affected portions are removed. b. If a price differential is anticipated, adjust the benefit/cost analysis accordingly.	**PS**		No	Project Description
26. Volume 4, Supporting Documentation, 1. IBI Report, Section 4.1.2.9.1, Page 19. AT states *Due to a lack of full access to parcels and information, [it] was unable to take into account potential losses in income from cell phone towers, oil and gas wells, or other parcel specific sources of income.* a. Confirm that there are no current oil or gas wells that will be impacted by the Project. b. Provide the results of discussions with mineral rights holders about the Project.	**PS**		No	Project Description
27. Volume 4, Supporting Documentation, 1. IBI Report, Exhibit 4.12, Page 22.	**PS**		No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
The text preceding Exhibit 4.12 states that the *…total potential leaseback income for the Project Perimeter is $1,392,000 per year*, however the total potential income presented in the table is $714,620. a. Explain the income discrepancy.				
28. Volume 4, Supporting Documentation, 1. IBI Report, Section 5.1.1.2.3, Page 28. Regarding indirect damage estimates for habitat restoration: a. Provide justification for the monetization method used for avoided habitat damages and clarify why a benefits-transfer method to evaluate values for the habitat was not used. b. Clarify whether any environmental damages are anticipated to result from the construction and/or operation of either SR1 or MC1. If so, included these damages as project costs in the benefits/cost analysis.	**PS**		No	Project Description
29. Volume 4, Supporting Documentation, 1. IBI Report, Section 5.1.1.2.4, Pages 28 and 2 AT states *The methodology for assigning a monetary value to intangible damages such as public health is detailed in the Calgary Flood Mitigation Option Assessment study. These amounts represent the present value of annual payments for 100 years derived from secondary research on household willingness-to-pay to avoid the intangible effects of flooding.* The willingness to pay (WTP) estimates used in the calculation of avoided intangible damages seem high compared to published WTP estimates for reduction in morbidity or mortality (for example see Adamowicz et al., 2011 and Alberini et al., 2006, respectively). a. Provide rationale for the willingness to pay estimates used to calculate avoided intangible damages. b. Clarify if/how intangible damages were adjusted to account for the probability of a flood occurring.	**PS**		No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
c. Provide references for willingness to pay estimates or adjust calculations as required. d. Provide the Calgary Flood Mitigation Option Assessment study.				
30. Volume 4, Supporting Documentation, 1. IBI Report, Section 5.1.4.2, Page 34. AT states *Detailed design of the dyke system has been estimated at $32.8 million (previously estimated at $6 million)* under the heading *Flood Defences at Bragg Creek.* *The Province is initiating this solution independent of considerations relating to benefits accruing to MC1 vs SR1. Accordingly, these are considered "sunk costs" and no additional benefits to MC1 or costs to SR1 associated with this standalone alternative have been factored into the benefit/cost analysis.* *Given the total value of flood recovery projects associated with the 2013 flood ($5.6 million) it is suggested that the additional benefits would be nominal in any event and would not impact the benefit/cost ratio significantly.* **Volume 4, Supporting Documentation, 1. IBI Report, Section 5.1.4, Page 33.** AT discusses that Bragg Creek and Redwood Meadows *could be afforded partial, if not full protection, by the proposed McLean Creek project. These potential damages averted constitute costs over and above those accruing to the City of Calgary and would logically be taken into consideration as part of the benefit/cost analysis*. a. Explain what additional flood mitigation is necessary at Bragg Creek with the MC1 option. b. Provide updated results for the net present value and benefit/cost ratio for the Project and MC1 when the costs and benefits of the flood protection dykes at Bragg Creek are included.	**PAW**		No	Project Description
31. Volume 4, Supporting Documentation, 1. IBI Report, Section 6.2.3, Page 36. AT states *To fairly include this difference in the benefit/cost analysis, the annual benefits (average annual damages averted) begin in 2020 for the SR1 project and in 2023 for the*	**PAW**		No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
MC1 project. Over the same 100 year period (2018-2118), with the 4% discount rate, the four-year advantage gives SR1 $74 million in additional present value of benefits compared to MC1. Under *Assumptions regarding timing*, AT lists that the annual benefit amounts begin in year 3 for SR1 and year 6 for MC1. a. Explain the contradiction between the 4 year differential for annual benefits in the explanatory text compared to the 3 year differential stated in the assumptions. Which year differential was used to calculate the present value of benefits? b. Provide the difference in present value of costs between SR1 and MC1 given that costs for SR1 are expended in two years and sooner compared to MC1 costs that occur later and spread over a longer period.				
32. Volume 4, Supporting Documentation, 1. IBI Report. Apart from probability of flooding, the BCA report does not specifically address the risk and uncertainty associated with key parameters in the benefit cost analysis. a. Provide a robust sensitivity analysis that identifies uncertain variables in the study and demonstrates the magnitude of changes in these parameters on the study outcome. A Monte Carlo simulations in place of traditional sensitivity analysis is acceptable.	**PS**		No	Project Description
33. Reference Document : McLean Creek (MC1) Dam, Updated – Conceptual Design Report – Final – Vol 1 of 2, Opus Stewart Weir, August 23, 2017. **Section 1.2, Page 3.** **Section 6.1.4.1, Pages 28 and 29.** AT states that the McLean Creek option is proposed to work in conjunction with Glenmore Reservoir to attenuate flood events. a. Clarify how the storage at Glenmore Reservoir is to be considered in conjunction with the McLean Creek option to mitigate the design (2013) flood.	**SC**	2.2[B]	No	Project Description

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
b. Describe how the two reservoirs would work together. c. Identify structural and/or operational modifications to the Glenmore Dam and Reservoir will be required in order to operate McLean Creek as designed.				
34. Reference Document: McLean Creek (MC1) Dam, Updated Conceptual Design Report – Final – Vol 1 of 2, Opus Stewart Weir, August 23, 2017, Section 6.1.4.4, Page 32. AT states *The simulation implies that the 1000-year flood could be managed without mobilizing the service spillway. Peak water levels would be just at the crest elevation of the ogee weir.* **Reference Document: McLean Creek (MC1) Dam, Updated Conceptual Design Report – Final – Vol 1 of 2, Opus Stewart Weir, August 23, 2017, Section 6.1.4.5, Page 33.** AT states *The basin response to the PMF rainfall would require the tunnel gates to be fully opened, and the reservoir level would continue to climb, mobilizing first the service spillway, and after that, the auxiliary spillway.* *Peak outflows through the tunnel would reach 1000 m^3/s, peak outflows from the service spillway would reach 600 m^3/s, and peak outflows through the auxiliary spillway would reach 1000 m^3/s.* **Reference Document: McLean Creek (MC1) Dam, Updated Conceptual Design Report – Final – Vol 1 of 2, Opus Stewart Weir, August 23, 2017, Appendix A, Page 100/134.** AT states: *SUB-TOTAL SERVICE SPILLWAY $45,893,000* *SUB-TOTAL, AUXILIARY SPILLWAY $1,488,000* **Reference Document: McLean Creek (MC1) Dam, Updated Conceptual Design Report – Final – Vol 2 of 2, Opus Stewart Weir, August, 2017, Appendix 5, McLean Creek Damsite MC1-Workshop #2 Value Engineering & Risk Analysis, December 14, 2016, Page 15.**	**SC**	2.2[B]	No	Project Description

<table>
<tr><th>Question</th><th>Initials</th><th>TOR # (if applicable)</th><th>Is Additional Fieldwork Required?</th><th>SIR Category</th></tr>
<tr><td>AT states the idea/option of 12-Eliminate service spillway and use expanded auxiliary spillway.

Reference Document: McLean Creek (MC1) Dam, Updated Conceptual Design Report – Final – Vol 2 of 2, Opus Stewart Weir, August, 2017, Appendix 5, McLean Creek Damsite MC1 Value Engineering - Evaluation Phase, February 20, 2017, Page 6.
AT states 40. Eliminate service spillway and use expanded auxiliary spillway. (eliminate, not feasible)

MC1 spillways are activated for floods greater than the 1000-year flood. The service spillway has a maximum peak outflow of 600 m^3/s and a cost estimate of $45,893,000. The auxiliary spillway has a maximum peak outflow of 1000 m^3/s and a cost estimate of $1,488,000.

a. Explain why it is not feasible to eliminate the service spillway and use an expanded auxiliary spillway at MC1.
b. Provide the cost of spillways at MC1 if the service spillway was eliminated and the auxiliary spillway was designed for floods greater than the 1000-year flood and designed for 1600 m^3/s peak flow of the PMF flood.
c. Provide an updated total cost for MC1, if the spillway cost difference is greater than $1 million from the reference document spillway costs.</td><td></td><td></td><td></td><td></td></tr>
<tr><td>35. Reference Document: Springbank Off-stream Storage Project, Preliminary Design Report (DRAFT), Stantec Consulting Services Ltd., March 31, 2017, Appendix G Construction, Page 3111 of 3119.

AT states:
<table><tr><th>Item</th><th>Unit Price $/m³</th></tr><tr><td>Emergency Spillway</td><td></td></tr><tr><td>Structural concrete</td><td>1340.82</td></tr></table></td><td>SC</td><td>7.2[F]/ 2.2[B]</td><td>No</td><td>Project Description</td></tr>
</table>

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category

Off-Stream Storage Dam	
Zone 1A – Impervious Fill	*3.00*
Zone 2A – Random Fill	*1.50*
Fine filter – Zone 3A	*55.00*

Reference Document: McLean Creek (MC1) Dam, Updated Conceptual Design Report – Final – Vol 1 of 2, Opus Stewart Weir, August 23, 2017. Appendix A, Page 97 and 100 of 134.

AT states

Item	*Unit Price $/m³*
Service Spillway (Page 100)	
Concrete	*730.00*
Main Dam (Page 97)	
Zone 1A – Impervious	*10.00*
Zone 2A – Unclassified Fill	*10.00*
Zone 3A – Fine filter	*20.00*

Both the reports list similar sources and methods for developing the cost estimate for the respective projects. However, some of the unit prices in the line cost items are quite different between the projects.

a. Review the detailed line item costs for the Project and MC1 of comparable products and services. If the unit price difference is significant, and the quantity required makes a "material difference" (greater than $1 million) to the cost of the Project or MC1, then:
   i. provide project specific justification for the material difference,
   ii. provide an appropriate unit price for use with both projects (Project and MC1) and explain why that choice was made, or,
   iii. provide multiple pricing options (high and low, at minimum) for that line item.
b. Provide updated costs for both Project and MC1, if the total cost is materially different.
c. Update any EIA sections affected by the updated costs.

<table>
<tr><th>Question</th><th>Initials</th><th>TOR # (if applicable)</th><th>Is Additional Fieldwork Required?</th><th>SIR Category</th></tr>
<tr><td>36. Reference Document: Springbank Off-stream Storage Project, Preliminary Design Report (DRAFT), Stantec Consulting Services Ltd., March 31, 2017, Appendix G Construction, Page 3109 of 3119.

AT states that:
<table><tr><td>Highway 22 Bridge Crossing</td><td>See Separate Breakout</td></tr><tr><td>Township Road 242 Bridge Crossing</td><td>See Separate Breakout</td></tr><tr><td>Grade and Resurface Hwy 22 and Springbank Rd</td><td>See Separate Breakout</td></tr></table>
The separate cost breakouts for these items were not supplied.

a. Provide the separate cost breakouts for the stated items.</td><td>SC</td><td>7.2[F]</td><td>No</td><td>Project Description</td></tr>
<tr><td>37. Volume 3A, Section 10.2.2.2, Figure 10-3, Page 10.20 and Volume 3A, Section 10.2.2.3, Page 10.29.

AT states Three plant species of management concern were identified during rare plant surveys in the PDA….

Volume 3A, Section 10.4.4.1, Page 10.50.

AT states Effects on plant SOMC from vegetation clearing are not anticipated, because none were observed in the PDA.

a. Clarify the contradiction between these two statements and confirm the number of plant SOMC in the PDA.</td><td>SC</td><td>3.7</td><td>No</td><td>Vegetation</td></tr>
<tr><td>38. Volume 3A, Section 10.4.5, Page 10.51.

AT states that Residual project effects are expected to be adverse, moderate in magnitude…..

Volume 3A, Section 10.5, Page 10.52</td><td>SC</td><td>3.7</td><td>No</td><td>Vegetation</td></tr>
</table>

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states that *All residual project effects are expected to occur during construction, be low in magnitude…..* **Volume 3A, Section 10.5, Table 10-14, Page 10.53** AT indicates that the magnitude of all residual effects is L (Low). a. Clarify the contradiction in the above statements and confirm the Project residual effects for Wetlands.				
39. Volume 3A, Section 10.4.3, Page 10.50. AT indicates that the change in community diversity effects would be reversible for temporary disturbances, and irreversible for permanent project components. **Volume 3A, Section 10.5, Table 10-14, Page 10.53.** AT indicates that the change in community diversity effects would be reversible. a. Clarify the reversibility of residual effects for the Change in Community Diversity.	**SC**	3.7	No	Vegetation
42. Volume 3A, Section 5.3, Page 5.28 AT states that construction of the water diversion structure is not expected to interact with groundwater resources. Section 5.4.2.1, page 5.30 states that the project has the potential to change groundwaer quantity in and near the PDA as a result of local dewatering that might be reqired for the varous project components, including the diversion channel. a. Explain the contradiction between these two sections.	**WC**		No	Hydrogeology
43. Volume 3A, Section 5.4.2.2, Page 5.32	**WC**		No	Hydrogeology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states that *The Project has the potential to change groundwater quantity in and near the PDA as a result of local, shallow and temporary subsurface dewatering that might be required to facilitate construction of the diversion channel, dam and floodplain berm, outlet works, bridge, excavation of borrow pits, and utility requirements*. a. Comment on the potential impact of the cones of depression associated with dewatering activities on yield from local water wells. b. What mitigation measures will be taken to reduce any impacts on water wells caused by dewatering activities?				
44. Volume 3B, Section 5.2.1, Page 5.2 AT used a mathematical model to depict the subsurface geologic setting and associated physical parameters that govern the flow of groundwater through porous media. a. Comment on the significance of groundwater flow through fractures in local geological deposits (e.g., glacial till, shallow bedrock) b. Comment on the impact of not considering fracture flow on modelling prediction scenerios.	**WC**		No	Hydrogeology
45. Volume 3B, Section 5.2.1.1, Page 5.3. The mathematical model was calibrated using a combination of heads measured in monitoring wells situated within the LAA, heads measured in domestic wells situated in the RAA, and other information. Since the length of the open interval and depth of water wells can be highly variable it can be challenging to use water level information from wells to generate an accurate potentiometric surface since the hydraulic head information can be extremely variable. a. Comment on how variability of hydraulic head in water wells was accounted for during mathematical model calibration.	**WC**		No	Hydrogeology
46. Volume 3B, Section 5.2.3.2, Page 5.50	**WC**		No	Hydrogeology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states that water wells in the PDA will be decommissioned as part of the construction phase. Proper decommissioning or reclamation of the wells will be important to ensure these wells do not provide a pathway for surface water to impact groundwater quality (particularly in the off-stream storage area). a. Provide details on the process that will be used to "decommission" water wells in the PDA. b. Indicate whether the monitoring wells installed in the PDA as part of the hydrogeological/geotechnical assessment will also be "decommissioned".				
47. Appendix 1, Hydrogeology Baseline Technical Data Report, Section 2.6, Page 2.14 AT states that *An interpreted poteniometric surface for the unconsolidated deposits and poteniometric surface for the bedrock units were created for the RAA. A potentiometric surface represents the elevation to which water would rise in the aquifer if it was not confined, and is equivalent to the water table in the unconfined areas of the aquifer.* a. Given that some unconsolidated deposits and bedrock units are confined, comment on the significance of considering the geologic units to be unconfined when developing the potentiometric surfaces.	**WC**		No	Hydrogeology
48. Volume 3C, Section 2.3, Page 2.3 a. Clarify if the the proposed groundwater monitoring is a one-time event or will it be on-going. b. Provide information on the sampling frequency and parameters analyzed if the monitoring is on-going.	**WC**		No	Hydrogeology
49. Volume 3A, Section 11.4.2.2, Page 11.39 AT states that when an active nest or den is found, provincial or federal disturbance setback distances for SOMC will be used.	**WC**		No	Wildlife and Biodiversity

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
a. Clarify what setback distance will be used for SOMC identified in the PDA that are not listed in the provincial or federal tables (e.g., olive-sided flycatcher).				
50. Volume 3A, Section 11.4.6, Table 11-4, Page 11.66 The table states that changes in movement are expected to be "*reversible*". Yet, in Section 11.7.2 (Page 11.68) it is stated that *there is some uncertainty how ungulates and other wildlife would respond to these structures if they are encountered during daily or seasonal movements*. a. Given the uncertainty of how ungulates and other wildlife would respond to permanent project structures (e.g., diversion channel), comment on why changes in movement are expected to be reversible?	**WC**		No	Wildlife and Biodiversity
51. Volume 3B, Section 11.3.2.1, Page 11.9 AT states that "flood events of *moderate* magnitude can help maintain riparian habitat. a. Clarify what flood intensity is considered moderate?	**WC**		No	Wildlife and Biodiversity
52. Volume 3B, Section 11.3.2.2, Page 11.9 AT states that a qualified biologist would be employed to conduct nest searches when sediment cleanup and debris removal from the off-stream storage area occurs seven days following reservoir draining and during the Restricted Activity Period. a. Why would the nest searches occur seven days following reservoir draining (i.e., why not before seven days)?	**WC**		No	Wildlife and Biodiversity
53. Volume 3C, Section 2.9, Page 2.4 a. Clarify if there will be wildlife monitoring during maintenance activities in the restricted	**WC**		No	Wildlife and Biodiversity

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
activity period during (esp. during post flood sediment clean-up).				
54. Volume 1, Page 3.1. AT states that *the diversion capacity and combined storage of Glenmore Reservoir allows the Project to mitigate downstream flood damages* and that *a*vailable active flood storage at Glenmore Reservoir is 10,000,000 m^3. a. Clarify if storage at Glenmore Reservoir is to be considered in conjunction with the Project and if the capacity ay Glenmore Reservoir is required for the Project to mitigate the design (2013) flood. b. Describe how the two reservoirs would work together. **c.** Describe structural and/or operational modifications to the Glenmore Dam and Reservoir be in order to operate the Project as designed or for potential future joint operation.	**MI**		No	Hydrology
55. Volume 3A, Section 6.1.4.1, Page 6.6, Figure 6-1, and Volume 4, Appendix J, 2.1, Page 2.1. AT states that the *LAA included the PDA and the Elbow River from Redwood Meadows to the inlet of Glenmore Reservoir* (Volume 3A 6.1.4.1), that the *LAA extends from the diversion structure…*(Appendix J, 2.1), and in Figure 6-1 (which is used again in various sections) it appears it may start below Redwood Meadows (i.e., inlet structure) and that the LAA may include the Glenmore Reservoir. a. Clarify, and justify, the boundaries of the LAA for the hydrology assessment scenarios. b. Update any of the hydrology and surface water quality sections of the EIA affected by the boundaries of the LAA, ensuring the assessments include all areas of the LAA where applicable.	**MI**		No	Hydrology
56. Volume 3A, Section 6.1.4.1, Page 6.6, Figure 6-1, and Volume 4, Appendix J, 2.1, Page 2.1 AT states that the *RAA is the Elbow River watershed from headwaters to Glenmore Dam*	**MI**		No	Hydrology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
(Volume 3A, 6.1.4.1), that the *RAA is the Elbow River watershed, including Glenmore Reservoir* (Appendix J, 2.1), and Figure 6-1 appears to include the entire watershed, including Glenmore Reservoir and upstream and downstream of Glenmore Reservoir. *a.* Clarify, and justify, the boundaries of the RAA for the hydrology assessment, including why the Glenmore Reservoir and downstream of the Glenmore Reservoir is, or is not, included in either of the assessment areas given that the goal of the Project is to limit discharge downstream from the Glenmore Reservoir to less than 160 m^3/s. *b.* Provide a description of the hydrology of the Elbow River at Glenmore Reservoir and below Glenmore Dam to the confluence with the Bow River, if determined to be within the RAA, and/or explain why this assessment was not completed. *c.* Update any of the hydrology and surface water quality sections affected by the boundaries of the RAA, ensuring that the assessments include all areas of the RAA.				
57. Volume 3A, Section 6.1.5, Page 6.10. AT states that *[t]he definitions for magnitude of effects on hydrology, including sediment transport is further defined as follows…low magnitude change (<15%)…moderate magnitude change (15-30%)…high magnitude change (>30%)…* a. These definitions do not appear to be used when assessing magnitude of effects throughout the hydrology assessment and does not appear to be consistent with Table 6-2 on Page 6.8. The term "negligible" is often used when discussing magnitude, though is not defined here in the text. Use the provided definitions, or provide definitions for terms used, for assessing magnitude of effects throughout the hydrology sections of the EIA. Provide updates and make all necessary changes throughout the hydrology sections in both text and Tables.	**MI**		No	Hydrology
58. Volume 3A, Section 6.2.2.4, Table 6-5.	**MI**	3.4.1B	No	Hydrology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
Provide mean (1979-2016) monthly peak flows for Bragg Creek and Sarcee Bridge stations in the Table, or in a new separate table (TOR 3.4.1B).				
59. Volume 3A, Section 6.2.2.4, Page 6.33. AT states that *[t]here are several small, naturally occurring waterbodies in the PDA. These waterbodies are primarily fed by the low-level outlet and its tributaries.* a. Confirm that these waterbodies are primarily fed by the unnamed creek and its tributaries. b. Provide a figure identifying the approximate areas of these waterbodies.	**MI**		No	Hydrology
60. Volume 3A, Section 6.2.2.6, Page 6.36. AT states that *[w]ater licences allocated within the LAA and associated volumes are summarized in Table 6-9.* a. Provide a figure showing locations of each water licencee identified in the Table.	**MI**		No	Hydrology
61. Volume 3A, Section 6.5.2, Page 6.40. AT states that *... flow estimates from the five intersected tributaries are extremely low, likely intermittent and are already affected by roads, cultivation, and dugouts.* a. Provide details on how water is being diverted or managed from these tributaries. Although likely low in volume (or intermittent) during normal years, these tributaries appear to be permanently intersected by the diversion channel following construction and may convey greater volumes during flood years. b. Estimate the frequency, volume, and duration of flow that would drain from the low-level outlet as a result of inputs from the tributaries, as well as the suspended sediment concentration within this water. c. Identify mitigation measures that could be implemented if required (e.g., for	**MI**		No	Hydrology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
sedimentation). d. Evaluate residual effects on potentially impacted areas (e.g., indicator fish species and life stage).				
62. Volume 3A, Section 6.5.2, Page 6.40. AT states that *[d]uring dry operations, there is potential for increased flows in the low level outlet through the intersection of the diversion channel with shallow groundwater seepage…the spatial extent of groundwater seepage would be determined by the depth of local water tables.* a. Quantify the amount of groundwater expected to be discharged through the low level outlet and how this change relates to baseline conditions. **b.** Discuss effects this may have on unnamed creek downstream from the low level outlet.	**MI**		No	Hydrology
63. Volume 3B, Section 6.0 a. Explain what effects (cumulative or otherwise) any changes or upgrades at Bragg Creek or Redwood Meadows may have on future flow dynamics during flood events (e.g., increase water volume, speed, etc.).	**MI**		No	Hydrology
64. Volume 3B, Section 6.1, Page 6.2; Section 6.4, Page 6.12; and Section 6.5, Page 6.75. AT states that *[n]o definition for significance is provided because the purpose of the Project is to actively modify the hydrology of the Elbow River during floods by diverting flows greater than 160 m^3/s.* a. Provide assessments for significance of the Project on hydrology and determine significance for changes in hydrology, including assessment of if these changes may be neutral, positive, or negative. Without a determination of a significant change in hydrology during Project operation, it may not be effective. This should include how target discharge below the Glenmore Dam are achieved and maintained.	**MI**		No	Hydrology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
65. Volume 3B, Section 6.2.1, Page 6.3 AT states that *[t]he slope value decrease can be interpreted as indicating that a significant proportion of fine sediment goes into storage between Bragg Creek and Sarcee Bridge during high flows….the remobilization of stored sediment likely explains why the rating curve parameters suggest that suspended sediment concentrations at Sarcee Bridge are higher at low flows…* a. Explain what was defined as "fine sediment" in this statement. b. Clarify what processes control how fine sediment settles out during high flows and then is remobilized during low flows or if it is proportionally more significant.	**MI**		No	Hydrology
66. Volume 3B, Section 6.2.1, Table 6-2 a. Clarify if values are estimated (as suggested by title of the table) or based on samples (as suggested in the text). b. Explain the error associated with suspended sediment concentration laboratory analysis and whether there is any statistically significant difference between the Bragg Creek and Sarcee Bridge locations for each month. c. Describe any potential differences in interpretations if loads are considered as opposed to concentrations.	**MI**		No	Hydrology
67. Volume 3B, Section 6.2.2, Page 6.7 and Volume 4, Appendix J 3.3.4.1, Page 3.32 and 3.35. AT states that *[a]nalysis of the $D_{50\ surface}/D_{50\ subsurface}$ for the Elbow River suggests that surface armouring increases downstream and coarse sediment transport becomes increasing supply-limited (Figure 6-2).* a. Provide greater justification and support for this statement. The figure (top portion; ratios) does not indicate a significant difference with greater distance from source (i.e.,	**MI**		No	Hydrology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
near or as high ratios at 80-85 km and ~92 km as >105 km; and low ratio at 105 km as <80 km). The last ratio is highest, but relationship is weak at best. b. Describe the type of analysis that was conducted to reach this conclusion. c. What is the statistical significance of this conclusion (i.e., show that there is a significant different in the ratio from upstream to downstream)?				
68. Volume 3B, Section 6.4.1.1, Page 6.14 AT explains that *[a] single peaked, high flood flow in 2008 had an hourly peak of approximately 204 m^3/s…the hourly hydrographs from these floods are used as a best representation of the approximate 1:10…flood in the model.* a. Explain if any changes in model interpretations and assessments would be required if data from 2005 flood flows were used for the 1:10 year event (slightly greater, but similar peaks, and greater overall discharge volume; Volume 3A Table 6-7).	**MI**		No	Hydrology
69. Volume 3B, Section 6.4.1.4, Page 6.15 a. Describe the calibration and validation methods for the hydrodynamic modeling used. b. Provide modelling confidence and error (or ranges) associated with predictions made.	**MI**		No	Hydrology
70. Volume 3B, Section 6.4.2.3, Page 6.23 *AT states [b]ecause this percentage is well below 10%, the effect on the hydrological regime for the design flood, in terms of annual volume, is negligible in magnitude and transient.* a. Confirm that this statement, and associated numbers, are for the 1:100 year flood and not the design flood. b. Use defined terms for magnitude (i.e., low, moderate, high).	**MI**		No	Hydrology
71. Volume 3B, Section 6.4.3, Page 6.26.	**MI**		No	Hydrology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states that *[t]he effects of diversion would be to change suspended sediment concentrations and local suspended sediment yields in the Elbow River.* a. Explain how diversion would change suspended sediment concentrations in the River, including assumed stratification and/or variation in concentrations between diverted and non-diverted water. If suspended sediment load (yield) was meant, update text and associated assessment(s).				
72. Volume 3B, Section 6.4.3.2, Page 6.35 AT states that *[p]eak concentrations modelled at the confluence of the low-level outlet and Elbow River are in the range of 18,000 g/m^3 but decline to 5,700 g/m^3 approximately 1.0 km downstream (Table 6-7). Historical data suggests that monthly suspended sediment concentrations at the time of release in August, without 2013 data, average 16 g/m^3, with a maximum of approximately 50 g/m^3, at Highway 22 (Figure 6-1)…flow and storage effects in the Elbow River dilutes this suspended sediment input to 68.6 kt, a 25% decrease by approximately 1.0 km downstream of the confluence with the low-level outlet.* a. Discuss implications of changes to movement of the suspended sediment and increased deposition within the 1.0 km stretch downstream from the confluence of the low-level outlet with the Elbow River (i.e., difference in timing of sediment transport, sediment characteristics, and changes in deposition rate and location between baseline conditions and Project flood conditions). b. Assess potential effects of releasing water with relatively higher TSS concentrations for longer duration from the reservoir post-flood, relative to natural flood patterns.	**MI**		No	Hydrology
73. Volume 3B, Section 6.4.3.3, Page 6.39 AT summarizes that *suspended sediment concentrations would reduce slightly, but with suspended sediment yields reduced by up to 65% during active diversion.* a. Provide an assessment on the potential impacts of this (positive or negative) and the potential magnitude of these impacts.	**MI**		No	Hydrology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
74. Volume 3B, Section 6.4.4, Page 6.52 AT states that *[u]nder flood conditions, the primary particle size transported in the Elbow River would likely be gravel sized material, with a median grain size of 21 mm.* a. Clarify how flood conditions are defined here (e.g., use of discharge ranges or exceedance may be appropriate). b. Clarify how material smaller than gravel size are prevented from mobilizing during flood conditions, or if this is by relative volume/weight.	**MI**		No	Hydrology
75. Volume 3B, Section 6.4.4.1, Page 6.53 AT states that *[t]o assess the effect of active diversion on downstream geomorphology, three locations are used to illustrate potential effects. These locations represent changes in the upper, middle, and lower sections of the Elbow River downstream of the diversion inlet.* a. Estimate the spatial extent (i.e., upstream distance and surface area) of potential backwater effect on the Elbow River for each Project phase. b. Explain any differences that may occur on geomorphology upstream of the diversion inlet as a result of diversion structure operations (e.g., due to changes in elevation, velocity, volumes, etc.). c. Estimate the type, volume, and depth of sediments deposited and the locations of deposition upstream of the diversion structure.	**MI**		No	Hydrology
76. Volume 4, Appendix J, Section 2.1, Page 2.1 AT states that *[t]he LAA also encompasses the water quality modelling domain.* a. Provide details on water quality modelling. It does not appear that modelling of water quality is provided in other sections (i.e., water quality section), only summaries of data.	**MI**		No	Hydrology
77. Volume 4, Appendix J, Section 2.3.4, Page 2.24	**MI**		No	Hydrology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states that *[s]uspended sediment yields were estimated from the converted turbidity data and discharge data.* a. Provide details (e.g., data or graph(s)) on how this relationship between turbidity and sediment was determined specific to the study area.				
78. Volume 4, Appendix J, Section 2.3.5, Page 2.26 AT states that *TDS in mg/L was estimated by applying a multiplier of 0.55 to the EC values, as per the manufacturer's recommendation.* a. Explain how appropriate this multiplier is to this stretch of the Elbow River. b. Show validation results of this relationship or if it was not completed, explain why validation of this multiplier was not completed (e.g., through comparison with calculated TDS values or comparison with select samples for TDS analysis).	**MI**		No	Hydrology
79. Volume 4, Appendix J, Section 2.4.2, Page 2.37 Text is missing from the paragraph that starts [*m]odelling of sediment transport was based on a combination of field collected data and site specific mathematical relationships between discharge and the.* a. Provide the rest of the missing text.	**MI**		No	Hydrology
80. Volume 4, Appendix J, Section 3.3.2.2, Page 3.25 a. If TDS was determined by a multiplier of EC, justify why it is appropriate to discuss TDS here and not simply EC as a measured parameter?	**MI**		No	Hydrology
81. Volume 4, Appendix J, Section 3.3.4.1, Page 3.35 AT references that *long-term data sets were sourced from Alberta Environment and Parks*	**MI**		No	Hydrology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
and the City of Calgary water quality data bases (see Appendix D4 for detail). a. Where can Appendix D4 be found in the provided material? If not originally included, provide Appendix D4.				
82. Volume 3A, Section 7.2.2, Page 7.10. AT states that *[w]ater quality in the Elbow River upstream of Glenmore Reservoir* (referred to as upper Elbow River in this section) *is good in relation to aquatic ecosystem and human uses of water from the river.* a. Explain why upper Elbow River is defined differently here as compared to upper and lower in the hydrology section. b. Include a summary and characterization of current Elbow River water quality (current conditions here and during flood conditions in Volume 3B), including quantification of specific physical (e.g., temperature and DO), chemical (e.g., nutrients and metals), and microbiological (e.g., fecal coliform and E. coli) parameters. c. Assess baseline water quality for the entire RAA (TOR 3.5.1).	**MI**	3.5.1	No	Surface Water Quality
83. Volume 3A, Section 7.4.2.1, Page 7.14. AT states that *[w]ater withdrawals for dust suppression and other construction needs can be required and can affect downstream water quality…* a. Explain the appropriateness of water withdrawals for dust suppression during construction given recommendations from the SSRP and difficulties in obtaining water licenses. b. Discuss whether there are alternative water sources for dust suppression during construction activities.	**MI**		No	Surface Water Quality
84. Volume 3B, Section 7.1, Page 7.1 AT stated that *an assessment of suspended sediment, temperature, dissolved oxygen, and*	**MI**		No	Surface Water Quality

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
metal methylation was provided. a. Provide an assessment (including quantification) for lead, arsenic, and cadmium (mercury methylation and suspended sediment completed), as well as for major ions, nutrients, bacteria, invertebrates, aquatic plants, algae, temperature, and DO for all phases (i.e., flood operation, post-flood operation, construction, and dry-operations) in the Elbow River, within the Project Reservoir (flood and post-flood), and at the Glenmore Reservoir. Identify any potential changes due to storage and release of flood water in the Project reservoir on receptors and relative to applicable guidelines.				
85. Volume 3B, Section 7.2.2.2, Page 7.8 AT states that *[t]he upper Elbow River dissolved oxygen concentrations varied seasonally, but were not associated with any apparent spatial pattern.* a. Indicate when (e.g., time of day and associated temperature and solar radiation) dissolved oxygen concentration measurement were made and any implications that diurnal cycling of dissolved oxygen (in response to photosynthesis/respiration cycling, productivity, and temperature) may have on assessments and predictions. b. What is the current understanding of the productivity or trophic status of the Elbow River? Include discussion on photosynthesis/respiration cycling and influences on water quality parameters (e.g., nutrients, DO, EC, pH, metals, etc.) in the Elbow River?	**MI**		No	Surface Water Quality
86. Volume 3B, Section 7.4.2, Page 7.22 AT states that ...*it is assumed the parameters likely behave similarly to suspended sediment during a flood because the physical mechanism of negatively charged suspended sediment particles attracting positively charged matter remains the same during flood conditions.* a. Clarify how some parameters, such as some nutrient and bacteria, which are commonly associated with suspended sediments under normal/low flow, can be affected by re-suspension into the river column during flood or high flow conditions.	**MI**		No	Surface Water Quality

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
b. Clarify potential effects due to this process.				
87. Volume 3B, Section 7.4.2, Page 7.21 AT *anticipate[s] that these suspended sediment concentrations during the last few days of the discharge can be controlled with the low level outlet gate operations (i.e., reducing flow rate) and, possibly, also with sediment and silt fences.* a. Clarify to what degree (i.e., concentrations) suspended sediment concentrations can be reduced. b. Describe the type, and number, of sediment and silt fences proposed.	**MI**		No	Surface Water Quality
88. Volume 3B. Section 7.4.2. Page 7.23 AT states that *… reservoirs act as nutrient sinks with sedimentation and sediment water processes regulating the nutrient status of a reservoir*. a. Provide estimated (modelled or calculated) water quality parameter concentrations in water retained within the reservoir and during release back to the Elbow River, including physical, major ion, nutrient, metal, and microbiological parameters, and assess any potential effects on the Elbow River downstream (including at Glenmore Reservoir).	**MI**		No	Surface Water Quality
89. Volume 3B. Section 7.4.3. Page 7.25 AT states that *[f]or the design flood, the release of retained water…is higher in the more likely floods and smaller in the unlikely design flood.* a. Discuss implications of changes in total loading patterns of water quality parameters in the Elbow River (and Glenmore Reservoir) as a result of water retention and release from the Project Reservoir post-flood.	**MI**		No	Surface Water Quality
90. Volume 3B. Section 7.5. Page 7.34	**MI**		No	Surface Water Quality

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT concludes that *[t]he effect of the Project on water quality is not significant because the change in water quality is not anticipated to cause acute or chronic toxicity or change the trophic status of the Elbow River or Glenmore Reservoir.* a. Clarify how conclusions were determined on trophic status and toxicity when parameter concentrations were not estimated and productivity (e.g., macrophytes, periphyton, biomass, invertebrates, etc.) was not assessed.				
91. Volume 4, Appendix K, Table 3-1, Page 3.9 a. All of the columns for dissolved oxygen and temperature, simply say dissolved oxygen and temperature respectively. Provide the information for these parameters and update the table.	**MI**		No	Surface Water Quality
92. Volume 4, Appendix K, Section 3.2.2.1, Page 3.13 AT states that *[t]he upper Elbow River mainstem is not reported to have substantial macrophyte (aquatic plant) growth in literature…* Provide reference(s) for this statement. Is this consistent for periphyton and algae?	**MI**		No	Surface Water Quality
93. Volume 1, Section 3.4.1, Page 3.33. AT states *During dry operation, the diversion inlet gates will close and the service spillway gates will open (lowered).* This statement is inconsistent with Volume 1, 3.5.1, Table 3-8 that indicates *for Flow Rate < 160 m^3/s the right gate will be raised and the flow will be through left spillway.* a. Clarify the inconsistency. b. Describe expected spillway gate configuration at flow < 160 m^3/s during Dry-operation service spillway maintenance activities. c. Does spillway gate configuration at flow < 160 m^3/s during Dry-operation service spillway maintenance activities influence the effectiveness of fish passage mitigation, and if so, evaluate the effects on each indicator fish population and how the effects can	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
be mitigated?				
94. Volume 3A, Section 8, Report Section 8.2.2. Requirements specified in ToR 3.6.1 Baseline Information should be reviewed. The Desktop review provides a general overview of ecology and habitat requirements of fish species and relative abundance of fish expected to occur in the LAA. For each survey site habitat quality was rated for fish groups, not for fish species. Baseline information that describes the species composition, distribution, abundance, movements, habitat use, habitat quality, and life history parameters of fish populations currently residing within the LAA are not fully presented. There is no comprehensive discussion of the ecology of species populations identified as indicator fish species to be used by the effects assessment. a. Based on the review, identify gaps in baseline information that may hinder the ability to evaluate Project effects. **b.** Identify specific components of the baseline information data gap that that may hinder the ability to evaluate Project effects (e.g., timing and duration of Bull Trout population movements in the vicinity of the diversion structure, location and size of Mountain Whitefish spawning habitat sites downstream of the diversion structure, distribution of the Rainbow Trout population relative to the location of the diversion structure).	**RP**		No	Aquatic Ecology
95. Volume 3A, Section 8.4.2.1, Pages 8.49 and 8.50; and Section 8.4.3.8, Page 8.55. AT states *During dry operation of the project, the physical structure may be a barrier to upstream fish migration for large fish by creating an area of shallow water over the concrete gates, with depths shallower than 18 cm, that may impede the upstream movement of large fish such as bull trout, brown trout, or mountain whitefish, during late summer spawning migrations. The transition from the concrete gates to the spilling basin may also create a drop that is too tall for small fish to jump up* (Section 8.4.2.1) and that *Boulders would be added to increase the bed roughness of the channel immediately*	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
downstream of the diversion structure, which would increase water depths and reduce velocities, and Boulder V-weir structures would be constructed in the channel downstream of the gates to provide slower velocity and deeper resting zones (Section 8.4.3.8). a. Provide rationale for use of physical works in the Elbow River channel downstream of the service spillway and stilling basin as a mitigation measure to provide safe unhindered upstream and downstream fish passage through the service spillway and stilling basin. b. Provide empirical evidence that illustrates how mitigation measures in the Elbow River channel downstream of the service spillway and stilling basin mitigate water depths shallower than 18 cm that occur within the service spillway and how mitigation measures in the Elbow River channel downstream of the service spillway mitigate a water elevation drop between the service spillway and the stilling basin. c. Discuss whether Elbow River bed material transport through the service spillway area during Dry Operation and during Flood and Post-Flood Operation will influence the performance of mitigation measures in the Elbow River channel downstream of the service spillway and within the stilling basin. The discussion should include an evaluation of the expected life span of the mitigation measures in terms of structural stability and as-built specifications. Use experience gained from other AT mitigation sites to inform the discussion.				
96. Volume 3A, Section 8, Report Section 8.4.4.2, Page 8.58. AT states *During construction, fish passage concerns would be mitigated with passage around the site.* a. Provide information that demonstrates safe, unhindered upstream and downstream fish passage during operation of the Elbow River diversion channel. The information should indicate whether the diversion channel will operate during the entire period of river diversion and what measures will be applied to provide suitable water velocities and water depths for upstream and downstream passage of each indicator fish species and life stage. b. If there are periods when the diversion channel is not operating and/or effective fish	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
passage cannot be provided by the diversion channel at all flows, identify the duration and timing of hindered fish passage and indicate the indicator fish species and life stage that will be affected. **c.** If safe, unhindered upstream and downstream fish passage during operation of the Elbow River diversion channel cannot be provided revise the effects assessment of fish passage during construction.				
97. Volume 3A, Section 8.4.4.2, Pages 8.60. AT states *With mitigations, fish migrations past the structure would not be impeded in a manner that would affect the sustainability of the fish populations, the distribution, or abundance of fish, including fish that support CRA fishery, in the LAA.* Discussion of Project effects on fish passage focuses on a comparison of pre-construction conditions to post-construction conditions of the Elbow River channel downstream of the service spillway. The general conclusion from the discussion, for modelled discharges, is that pre- and post-construction conditions of the Elbow River channel are similar. There is one reference to fish passage through the service spillway structure as follows: *During discharges at 69.5 m^3/s (BSP2-3Q10max)..... Fish movement would be possible over the structure along the margins....* (Page 8.60). Fish passage through the service spillway during Dry Operations may be the most important potential effect of the Project on the health of Elbow River fish populations, but a limited evaluation of the issue is presented. a. Provide a table that summarizes fish passage requirements of each indicator fish species and life stage. The table should include the period when passage is required, the direction of passage, the expected size range of fish that require passage (Ensure that this information conforms to baseline information), and the estimated swimming ability of each indicator fish species life stage. b. Provide a table that summarizes water velocity and water depth values modelled by Volume 4, Appendix M, Attachment 8A Fish Passage Analyses for post-construction	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
conditions specific to the service spillway structure and specific to the stilling basin structure. In order to establish precision of the model outputs, the summary should include the average and range of each modelled value. Use 95% Confidence Interval as the metric for range. c. Provide illustrations of model results for post-construction condition specific to the service spillway structure and stilling basin structure. Ensure illustrations are of sufficient scale to allow clear identification of preferred fish movement routes within the service spillway and within the stilling basin (i.e., zones that provide suitable water velocity and suitable water depth for fish passage). d. Based on the above information conduct an evaluation of Project effects on fish passage within the service spillway and within the stilling basin. Ensure the evaluation includes each indicator fish species and life stage.				
98. Volume 3B, Section 8.2.2. AT states that auxiliary spillway may also activate for smaller flood events if the conveyance capacity is reduced by debris and sediment at the diversion inlet and service spillway and operations of the gates are not adjusted. a. Estimate the frequency of occurrence of auxiliary spillway activation for smaller flood events. Consider blockage of the service spillway by large woody debris at all high flow events, including flows less than 160 m^3/s. Use experience gained from other water diversion projects located in Alberta. b. Discuss the implications of auxiliary spillway activation on permanent alteration of fish habitat using the pathway effects approach. Consider erosional effects associated with overland flow, and volume of sediments generated by erosional effects. c. Identify mitigation measures that could be applied. d. Evaluate residual effects on each indicator fish species and life stage caused by auxiliary spillway activation.	**RP**		No	Aquatic Ecology
99. Volume 3B, Section 8.2.2.2 and Section 8.2.4.2.	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
The extent, complexity, and duration of Post-flood repairs and maintenance activities requires careful consideration to ensure adequate mitigation. a. Describe mitigation measures that will be used to avoid adverse effects to fish habitats during instream removal of sediment deposits located upstream of the service spillway and diversion inlets, as well as from the reservoir. b. Describe mitigation measures used to ensure unhindered upstream and downstream fish passage through the service spillway during debris removal and infrastructure repairs. c. Assess the effectiveness of mitigation measures to reduce or eliminate the potential effects. d. If mitigation measures are not completely effective evaluate the residual effects of post-flood repairs and maintenance activities.				
100. Volume 3B, Section 8.2.2.3, Page 8.11. AT states *Sediment removal is likely to be an ongoing maintenance concern in the diversion channel and in the Elbow River immediately upstream from the auxiliary spillway and diversion structure.* The Project has the potential to cause a backwater effect during Dry Operation, as well as Flood and Post-flood Operation and has implications to upstream and downstream fish habitats, as well as fish passage through the service spillway and stilling basin. a. Estimate spatial extent (i.e., upstream distance and surface area) of the backwater effect on the Elbow River channel for each Project Phase. b. Evaluate the effects of changes in channel morphology in the upstream backwater zone for each indicator fish species and life stage. Include a discussion of the duration of effect in terms of predicted number of years of altered channel morphology. c. Evaluate the effects of increased suspended sediment concentrations and the deposition of sediment on fish habitat in the upstream backwater zone and downstream of the diversion structure for each indicator fish species and life stage.	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
d. Discuss how changes may influence the ability of fish to pass the service spillway and stilling basin. Evaluate the effectiveness of fish passage mitigation given the expected changes to channel morphology caused by the backwater effect.				
101. Volume 3B, Section 8.2.2.3, Page 8.10. AT states *Volume 3B, Section 6 (Hydrology) indicates that changes in morphology in Elbow River may result in reduced mobilization on bar heads and a decrease degradation and aggradation. Modelling (see Section 6) shows that for the 1:10 year flood, the pattern of erosion of bar heads and subsequent deposition downstream would be maintained during active diversion, albeit with a moderate reduction in magnitude of approximately 24%.* a. Provide an estimate of the total LAA surface area downstream of the diversion that will be affected by a reduction in channel morphology processes caused by active diversion of flows >160 m^3/s for a 1:10 year flood. An estimate can be generated using values presented in Table 6-10 of Volume 3B, Section 6 (Hydrology) and spatial areas illustrated on maps of Elbow River Net Bed Morphology Changes With and Without Diversion presented in Figures 6.29 to 6.31 of Volume 3B, Section 6 (Hydrology). b. Estimate the surface area of fish habitats downstream of the diversion that would be susceptible to channel aggradation and to channel degradation by indicator fish species and life stage. c. Evaluate the effects of changes in channel morphology caused by active diversion of flows >160 m^3/s on each indicator fish species and life stage. Include a discussion of the duration of effect in terms of predicted number of years of altered channel morphology following the diversion. Include a discussion of long-term consequences caused by elimination of flood events > 160 m^3/s. Discuss the effects for the river section that likely will be subjected to the greatest potential effect (i.e., immediately downstream of the diversion structure).	**RP**		No	Aquatic Ecology
102. Volume 3B, Section 8.2.2.3, Page 8.12.	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states *The increased turbidity and the deposition of sediment on substrates could affect the quality of fish habitat in the low-level outlet channel and in Elbow River downstream of the low-level outlet. Given the low probability of diversion occurrence and with the implementation of mitigation measures, the potential change in sediment and turbidity that may result downstream is not anticipated to result in residual effects on aquatic ecology given the slow rate of planned post flooded reservoir drainage.* a. Compare the predicted suspended sediment concentrations released by the Low-level Outlet discharge during Post-Flood River to Elbow River background suspended sediment concentrations. b. Consider the effects of sediment release from the Low-level Outlet for 30 days when Elbow River flow is < 20 m^3/s. c. Using the above information quantify the effects of predicted suspended sediment concentration on each indicator fish species and life stage using an accepted stress index metric. d. Estimate the spatial extent of suspended sediment effect and sedimentation effect on Elbow River fish habitat downstream of the diversion. e. Estimate the expected duration of effect following completion of the off-stream reservoir release period in days, months and years. f. Using this information evaluate effects of increased suspended sediment concentrations and the deposition of sediment on fish habitat for each indicator fish species and life stage.				
103. Volume 3B, Section 8.2.2.3, Pages 8.11 and 8.12. AT states *As the water from the reservoir is released, it would mix with Elbow River water. Generally, temperature in the river can increase as a result of this release and dissolved oxygen concentrations can decrease. The effect on dissolved oxygen is expected to be localized because of rapid aeration of water… For additional details on changes in temperature and dissolved oxygen, see Volume 3B, Section 7.4.3.*	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
The change in water temperature of retained water was not quantified by Volume 3B, Section 7 (Surface Water Quality). a. Estimate water temperatures of the reservoir based on historical air temperatures and wind data for the study area. Use this information to predict water temperature of retained water released to the Elbow River. b. Provide water temperature sub-lethal and lethal thresholds for each indicator fish species and life stage. c. Based on this information evaluate the effects of elevated water temperature on the health of fish and fish use of habitats for each indicator fish species and life stage.				
104. Volume 3B, Section 8.2.4. Spillways on water control structures can cause an increase in dissolved gas pressure, also referred to as total gas pressure (TGP). Excessive TGP is potentially harmful to fish and other aquatic organisms. Elevated TGP conditions are known to extend long distances downstream in flowing water because dissolved gases are not easily released from dilution in fluvial environments. a. Provide an evaluation of the effects of elevated TGP on indicator fish species populations. The evaluation should include: i. Estimates of TGP levels for expected flood flows caused by differences between the spillway gate crest water elevation and stilling basin water elevation. ii. Estimated downstream extent of elevated TGP levels within the Elbow River. iii. Evaluation of consequences to fish habitat use, consequences to fish health, and long-term consequences to fish population health for each indicator fish species. b. If a residual effect is identified, complete a residual effects evaluation.	**RP**		No	Aquatic Ecology
105. Volume 3B, Section 8.2.4.3, Page 8.17.	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states *The mortality from entrainment is dependent on the number of fish entering the reservoir and those fish returned to Elbow River during draining of reservoir*, that *During post-flood operations, stranding in the reservoir is expected to cause mortality of fish that do not swim out of the reservoir during post-flood draining,* and that*. The number of fish potentially lost is unpredictable and is based on the ability to rescue fish, which is related to reservoir ponding areas, drawdown rate, and sediment deposition in the reservoir.* a. Provide an estimate of the portion of fish passing the facility that will be entrained into the diversion canal at each of the flood flow levels. Assume that the portion of fish that are entrained equals to the portion of water that is diverted. Estimate the portion of the fish population that may be entrained based on the spatial distribution of fish species populations in the Elbow River. b. Predict the potential for survival of each indicator fish species and life stage entrained into the reservoir using assumptions for residence times and a suspended sediment concentrations presented in Volume 3B (Hydrology) Table 6-6. c. Evaluate the effects of fish entrainment into the diversion canal on the health of each indicator fish species population. Discuss the expected portion of the population entrained (i.e., population mortality rate) and the frequency of occurrence of entrainment events. Include a discussion of additive mortality rate (mortality rate caused by entrainment + natural population mortality rate). d. Provide an estimate of the portion of fish that will pass through the service spillway. For the estimate assume that the portion of fish passing the through the service spillway is equal to the portion of water that is passed. Estimate the portion of the fish population that may pass through the service spillway based on the spatial distribution of fish species populations in the Elbow River. e. Predict the potential for survival of each indicator fish species and life stage that must pass over the spillway when the gates are in the raised position. f. Evaluate the effects of fish passage through the service spillway on each indicator fish species population health. Discuss the expected portion of the population injured or killed (i.e., population mortality rate) and the frequency of occurrence of events. Include a discussion of additive mortality rate (mortality rate caused by entrainment + natural population mortality rate).				

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
106. Volume 3C, Section 1, Report Section 1.2.4, Page 1.25. AT lists *projects that have the potential to act cumulatively with residual environmental effects from the Project.* a. Describe any cumulative effects of Glenmore Dam and Reservoir operations on aquatic ecology.	**RP**		No	Aquatic Ecology
107. Volume 4, Appendix M, Attachment 8A. This consists of two documents -- Springbank Off-stream Storage Project (SR1) – Hydraulic Modelling to Support Fish Passage Assessment and SR1: Fish Passage Flows Analysis. SR1: Fish Passage Flows Analysis generated estimates of Elbow River discharge which were used as a basis of hydraulic modelling by Springbank Off-stream Storage Project (SR1) – Hydraulic Modelling to Support Fish Passage Assessment. The precision of hydraulic modelling output can be influenced by the precision of the input data and the accuracy of the hydraulic modelling output can be influenced by the accuracy of the input data. a. Identify the precision of the digital terrain model and illustrate the triangular mesh size used in the model domain for the service spillway, stilling basin and surrounding river channel. b. Comment on the change in hydraulic model output that would result by replacing the average river discharge (each of 8 values) presented in SR1: Fish Passage Flows Analysis Table 4 with the Upper 95% Confidence Interval value and the Lower 95% Confidence Interval value associated with each average river discharge. c. Comment on the effects of ice and the effects of large woody debris within the service spillway gate structure on the accuracy of the hydraulic model output for water velocity and water depth. d. Indicate whether hydraulic modelling assumed "flow through right gate and flow through left gate". e. If modelling assumed flow through both right and left spillway gates, comment on applicability of model outputs if spillway operation < 160 m^3/s will use "right gate	**RP**		No	Aquatic Ecology

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
raised, flow through left gate".				
108. Volume 1, Section 7.4, Table 7-3, Page 7.11. AT states that Tsuut'ina Nation has indicated that they *should be a decision maker and want the SR1 project to require Tsuut'ina's "Consent" as part of the current process.* a. Provide comments on Tsuut'ina's request to be consented as part of the current Project process.	**KMM**		No	Indigenous Engagement Program
109. Volume 1, Section 7.4, Table 7-4, Page 7.35 ; Volume 4, Part 1 Appendices, Section 3.1.4, Page 3.23. AT states that *Stoney Nakoda Nation confirmed the SR1 project is in their Traditional Territory. They want to be able to complete an internal Cultural Review of the project area with Elders.* *The Stoney Nakoda Nation feel a Cultural Use Study, a Stoney Hydrology report, and a wildlife impacts study are required.* a. Provide an update on Stoney Nakoda Nation's request for Cultural Review with Elders, a Stoney Hydrology report, and a wildlife impacts, in addition to studies completed in the EIA.	**KMM**		No	Indigenous Engagement Program
110. Volume 1, Section 7.4, Table 7-4, Page 7.36. AT states that Stoney Nakoda Nation has *expressed concerns with the Stoney lack of mapping capability and requested some assistance understanding the SR1 mapping.* a. Comment on whether AT is planning to review the SR1 mapping with the Stoney Dakoda Nation and if this has been conducted.	**KMM**		No	Indigenous Engagement Program
111. Volume 1, Section 7.4, Table 7-4, Page 7.36.	**KMM**		Yes/No	

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states that Stoney Nakoda Nation has indicated the *desire to do a site visit with Elders* and that *at the time of the request AT's agreement with landowners for access had expired. Any additional access will need to be requested on an owner by owner basis.* a. Provide an update on Stoney Nakoda Nation's request for site visits with Elders.				Indigenous Engagement Program
112. Volume 1, Section 7.4, Table 7-4, Page 7.39. AT indicates that the Stoney Nakoda Nation has informed AT that *there are two trap lines out there and Stoney members use the area for trapping.* AT stated *there are no registered traplines within the PDA. AT has requested the locations of the two traplines and were the Stoney members trap in order to determine if there is potential impact from the project.* a. Discuss potential impacts on the two traplines. b. Provide proposed mitigation measures for potential impacts.	**KMM**		No	Indigenous Engagement Program
113. Volume 1, Section 7.4, Table 7-7, Page 7.55 ; Volume 4, Part 1 Appendices, Section 3.1.1, Page 3.6. AT states that the Kainai First Nation requested *clarification as to why Kainai First Nation* was *(is) being asked for comments on the EIA, given that the EIA does not conform to the EIS guidelines.* a. Provide information on areas that do not conform to EIS guidelines in the EIA. b. Discuss whether further study or work would be carried out to address these deficiencies.	**KMM**		No	Indigenous Engagement Program
114. Volume 1, Section 1.4.1, Pages 1.14 to 1.17. A discussion of necessary Crown land dispositions was not provided as outlined in the Terms of Reference, Sections 2.4.[C] and 3.10.1[B].	**SC**	2.4[C]/3.10.1[B]	No	Land Use and Land Management

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
a. Provide the information as indicated in the Terms of Reference.				
115. Volume 3A, Section 12.4.2, Page 12.24 and Figure 12-5, Page 12.25. AT states *AEP would own and manage these areas. Area D, dam and reservoir infrastructure: there is no public access and would be fenced for public safety and security purposes.* **Volume 3A, Section 12.4.2.1, Page 12.31.** AT states that so*me recreational boating (e.g., kayaking, canoeing, rafting) does occur on the river in the PDA and LAA and the right of safe public navigation of any waterway must be maintained during the construction and operation of the Project (Transport Canada 2014).* **Volume 3A, Section 12.4.2.2, Pages 12.34 to 12.35.** AT states that *AEP would avoid the substantial interference with public navigation of the Elbow River through the following design practices:* - *As part of construction, a permanent portage will be developed around the in-stream water intake components.* - *Signs will be installed along the Elbow River channel and on the dam. Multiple signs will be placed upstream and downstream of the water intake components on both banks of the Elbow River. These signs will warn users on the Elbow River that they are approaching in-stream water intake components and of the associated danger with this infrastructure and direct them to a portage location. A floating, high visibility boom will be in place upstream and downstream of the water intake components.* *Areas B, C, and D will be restricted to public access using barbed wire fencing, gates and signs indicating "Danger" and "No Trespassing".* Similar wording referring to the permanent portage is included in Volume 3B, Section 12.2.2.1, Page 12.6. Similar mitigation wording on public access, fencing and signage is included in Volume 3B, Section 12.2.2.2, Page 12.7.	**SC**	3.10.2[A]	No	Land Use and Management

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
a. Explain how restricting access to Area D with barbed wire fencing maintains the right of safe public navigation on the Elbow River. b. Clarify why the bed and shores of the Elbow River (upstream and downstream of the diversion structure) are included as dam and reservoir infrastructure with restricted public access. c. Describe the location of the portage relative to Area D and the PDA, and explain how it will be accessible to the public.				
116. Volume 3A, Section 12.2.2.1, Figure 12-2, Page 12.14 and Page 12.18. Under the heading Aggregate Development, AT states *Alberta Transportation holds a disposition reservation (DRS) for surface material extraction in the LAA, in NW-11-024-04 W5M. There are no other quarries or pits in the assessment areas.* **Volume 3A, Section 16.2.3.1, Page 16.10.** **Volume 1, Section 2.2.6.2, Page 2.30.** **EIS Summary, Section 3.6.3.3, Page 3.29.** AT states *Township Road 242, west of Highway 22 functions as a two-lane roadway. It primarily serves a small number of country residential dwellings and the Copithorne gravel pit.* **Volume 3A, Section 16.2.3.1, Page 16.11 and Table 16-5, Page 16.12.** AT states *Table 16-5 lists the AADT volumes on Township Road 242 west of Highway 22. The average annual growth rate between 2003 and 2015 was 126.3%, but from 2003 to 2014 it was 19%. It is speculated that the increase in the growth rate on Township Road 242 between 2014 and 2015 can be attributed to the Copithorne gravel pit operations.* Figure 12-2 shows the PDA, LAA and RAA and the Township and Range Roads. Township Road 242 is shown extending beyond the LAA and ending prior to the RAA. The only road shown that connects Township Road 242 to other township roads is Highway 22.	**SC**	3.10.1[A]	No	Land Use and Land Management

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
a. Provide the legal land location of the Copithorne gravel pit. b. Describe the Copithorne gravel pit location relative to the PDA, the LAA and RAA for: i. Land Use and Management ii. Air Quality and Climate iii. Acoustic Environment iv. Infrastructure and Services c. Explain when the Copithorne gravel pit began operation and its life expectancy. d. Update any Aggregate Development sections throughout the EIA.				
117. Volume 4, Appendix N, Attachment 12A, Section 12A.3.3, Table 12A-3 and Table 12A-4, Pages 12A.8 to 12A.13. Table 12A-4 identifies business, institutional and recreational organization receptors in the LAA and RAA by name, as well as listing residential receptors. Table 12A-3 lists landowners within the PDA, but does not include if there are residences (or business, institutional and recreational organization receptors) on those land parcels. a. Identify the current land use for each land parcel within the PDA, and identify the land parcels within the PDA that contain residences.	**SC**	3.10.1[A]	No	Land Use and Management
118. Volume 3A, Section 12.4.2.1, Page 12.32. AT states that a*n overpass would be constructed at the intersection of Highway 22 and Springbank Road.* **Volume 1, Section 2.2.6.2, Page 2.30.** AT states *Design option 2 maintains existing the Springbank Road except for the modifications necessary to permit an at-grade intersection with raised Highway 22. Design option 2 is the preferred option for Springbank Road.* a. Describe the intersection proposed at the junction of Highway 22 and Springbank Road.	**SC**	2.4[A]	No	Transportation

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
119. Volume 3A, Section 16.1.4.1, Page 16.4 and Figure 16-1, Page 16.5. AT indicates the *RAA follows the boundary of Rocky View County, and includes the City of Calgary. The only Aboriginal Reserve in the RAA is Tsuu T'ina Nation 145.* Figure 16-1 shows the RAA includes a portion of the Stoney Nakoda nations. a. Clarify which Aboriginal Reserves are located within the RAA for infrastructure and services.	**SC**	2.4	No	Transportation
120. Volume 3A, Section 16.2.3.1, Page 16.11 and Table 16-5, Page 16.12. AT states *Table 16-5 lists the AADT volumes on Township Road 242 west of Highway 22. The average annual growth rate between 2003 and 2015 was 126.3%, but from 2003 to 2014 it was 19%. It is speculated that the increase in the growth rate on Township Road 242 between 2014 and 2015 can be attributed to the Copithorne gravel pit operations.* **Volume 1, Section 2.2.6.3, Page 2.30 and 2.31.** AT states that [d]*esign option 1 maintains the existing Township Road 242 alignment, but with a bridge crossing over the diversion channel. Design option 1 is the preferred option for Township Road 242.* **EIS Summary, Section 3.6.3.3, Page 3.29.** AT states *Design option 1 is the preferred option for Township Road 242. It provides the least disruption to the existing travel distance and the least requirement for new road construction.* **SR1 – Annex 2: A) Early Technical Issues, Response 1, Pages 1 to 11.** AT states *For the Township Road 242 options, the environmental evaluation was based on the overall effects on undisturbed land, where a higher potential for environmental effects exists. As a result, the construction of the bridge crossing over the channel diversion on the existing Township Road 242 alignment (Option 1) has less environmental impact than Option 2 and 3 that traverses undisturbed land.*	**SC**	2.4	No	Transportation

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
a. Provide the construction costs for the three design options for Township Road 242. b. Describe how Copithorne gravel pit access was or was not a factor in the design option decision for Township Road 242.				
121. Volume 3A, Section 16.3, Page 16.13. AT states *Project would require approximately 450 workers. It is assumed that nearly all of the construction workers would live within daily commuting distance*. **Volume 3A, Section 16.2.3.1, Table 16-3, Page 16.10 and Volume 3A, Section 16.2.3.1, Page 16.9.** AT states *Highway 22 is a two-lane undivided rural highway. Alberta Transportation has plans for twinning the highway on its current alignment in the next ten years, although a date for the twinning has not been set.* **Volume 3A, Section 16.4.2.3, Page 16.17.** AT states *Employee commuter traffic and traffic delivering construction materials, supplies and services to the site may increase traffic volumes; however, with mitigations described above and the capacity of the local road network, the traffic associated with the Project can easily be accommodated.* a. Quantify worker commuting trips per day on Highway 22 when the construction work force is at its peak and clarify if this is during 24 hour construction. b. Quantify construction vehicle trips per day on Highway 22 when the work force is at its peak. c. Provide the AADT volume required to twin Highway 22. d. Describe how the traffic associated with the Project will be accommodated on a two-lane highway that has (or is projected to have) high enough traffic volumes that highway twinning is planned in the next ten years.	**SC**	2.4[A]	No	Transportation
122. Volume 3A, Section 16.2.3.1, Page 16.9.	**SC**	2.4	No	Transportation

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states that *Highway 22 is a two-lane undivided rural highway. Alberta Transportation has plans for twinning the highway on its current alignment in the next ten years, although a date for the twinning has not been set.* It is reasonable to assume the future cost of twinning Highway 22 through the PDA would be greater with the Project (e.g., additional costs to raise a twinned highway across the reservoir and a second Highway 22 bridge over the diversion channel). a. Justify whether (or not) these additional costs for Highway 22 twining should be included as Project costs.				
123. EIS Summary, Section 3.6.3.2, Page 3.24 and Volume 1, Section 2.2.6.2, Page 2.30. AT discusses the option of raising Springbank Road above the 2013 flood level to maintain traffic during a flood event and states *The road embankment would be classified as a dam under the Dam and Canal Safety Guidelines, leading to higher engineering, construction, safety, maintenance, and licensing costs that for a typical roadway.* **EIS Summary, Section 3.6.3.1, Page 3.24 and Volume 1, Section 2.2.6.1, Page 2.27.** AT states *Design Option 1 raises Highway 22 above the reservoir design flood level…The design elevation allows 0.5m for freeboard and 1.0m for the pavement structure depth above flood design level, which results in an embankment height of approximately 5 m at the Springbank Road intersection. The length of the raised roadway is approximately 1,800 m.* a. Explain why the raised Highway 22 is not classified as a dam under the Dam and Canal Safety Guidelines. b. Provide added costs if the Highway 22 road embankment was classified as a dam.	**SC**	2.4, 2.6	No	Transportation
124. Volume 1, Section 3.2.2 and 3.2.3, Page 3.11. AT states that the design maximum flow for the diversion channel is 600 m^3/s and that the	**SC**	6.2	No	Public Health and Safety

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
design discharge capacity of the emergency spillway is 354 m^3/s. The emergency spillway is designed to operate when the diversion inlet gates cannot be closed, and the capacity of the reservoir is exhausted. a. Describe how the emergency spillway, with a 354 m^3/s capacity, will accommodate the maximum diversion channel flow of 600 m^3/s?				
125. Volume 3A, Section 15.2.1, Page 15.9 and Volume 4, Appendix O, Human Health and Risk Assessment Technical Data Report, Section 2.6.1, Page 2.7. AT states that *particulate matter is also modelled to address dust concerns in the post-flood operations phase, where high winds during dry periods can cause wind erosion and dust storms* and that the *COPC from air emissions in the HHRA are those associated with gasoline and diesel combustion exhaust during the construction phase (i.e., CACs, VOCs, PAHs and trace metals), and particulate matter in the air resulting from dust storms during the post-flood operations phase.* **Volume 3A, Section 3.4.3.3, Page 3.47.** AT states *Project emissions during construction are associated with the operation of the off-road construction equipment and earth moving activities for the construction of the major components of the Project. The following emissions sources due to construction activities are estimated:* - *Diesel combustion exhaust emissions from off-road construction equipment and haul trucks* - *Fugitive dust emissions from scraping, bulldozing and grading of topsoil and overburden* - *Mechanically generated dust by off-road equipment in transition* - *Fugitive dust emissions from truck loading and unloading* - *Mechanically generated dust by truck traffic along haul roads* - *Fugitive dust emissions from wind erosion on topsoil and overburden stockpile* **Volume 3A, Section 3.4.3.3, Page 3.48.** AT states *Most of the $PM_{2.5}$ and TSP emissions are associated with the fugitive haul road*	**SC**	6.1	No	Health

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
dust emissions. **Volume 4, Appendix O, Human Health and Risk Assessment Technical Data Report, Section 3.4, Figure 3-2, Page 3.13.** AT states: *Project Phase: Construction* *COPC Source: Haul Road Dust* *COPC: $PM_{2.5}$* *Exposure Media: Ambient Air* *Exposure Route: Inhalation of Air* *This exposure pathway is operable for Residents (all age groups) and Indigenous Receptors (all age groups).* In portions of Volume 4 (Appendix O) and Volume 3A (Sections 3 and 15), AT suggests that the $PM_{2.5}$ road dust emissions both were and were not included in the Human Health Risk Assessment (Appendix O). a. Clarify if $PM_{2.5}$ haul road dust emissions were included in the Human Health Risk Assessment (Appendix O) and Volume 3A, Section 15. Determine if the proposed mitigations for $PM_{2.5}$ emissions continue to be appropriate.				
126. Volume 4, Appendix O, Human Health and Risk Assessment Technical Data Report, Section 6.2.1, Page 6.4. AT states *For $PM_{2.5}$,…ERs are greater than 1.0 at 18 residential receptor locations* (including *SR38). These receptor locations do not include Indigenous receptor locations, or institutional facilities such as schools.* a. What are the specific health effects of $PM_{2.5}$ on receptor SR38 (Camp Gardner)?	**SC**	6.1	No	Health
127. Volume 4, Appendix O, Human Health and Risk Assessment Technical Data Report, Section 6.2.1, Page 6.4.	**SC**	6.1	No	Health

Question	Initials	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category
AT states *Short term exposures to DEP were assessed by comparing 1-hour concentrations to the acute (2-hour) DEP exposure limit. The ERs at multiple residential locations were higher than the benchmark of 1.0; the ERs at Indigenous receptor locations and schools were less than 1.0.* a. What are the specific health effects of DEP on receptor SR38 (Camp Gardner)?				
128. Volume 3A, Section 15.4.4.1, Page 15.46; Volume 3A, Section 15.4.4.1, Page 15.46; and Volume 4, Appendix O, Human Health and Risk Assessment Technical Data Report, Section 6.2.1, Page 6.4. AT states that *For $PM_{2.5}$, the short-term (1-hour or 24-hour) and long term (annual) ERs are greater than 1.0 at 16 residential receptor locations* (Volume 3A) and that *[f]or $PM_{2.5}$, the short-term (1-hour or 24-hour) and long term (annual) ERs are greater than 1.0 at 18 residential receptor locations* (Volume 4). a. Clarify the number of residential receptors where ERs are greater than 1.0.	**SC**		No	Errata

NRCB | Natural Resources Conservation Board

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21 February 2018

SENT BY EMAIL

Syed Abbas, Director
Water Management Section
Alberta Transportation
2nd fl Twin Atria Building
4999 - 98 Avenue
Edmonton, AB T6B 2X3

Dear Mr. Abbas:

Re: Springbank Off-Stream Reservoir Project – NRCB Application No. 1701
Priority Questions from NRCB

Attached are a number of priority questions identified by the NRCB from its review of the EIA/NRCB Application material filed to date by Alberta Transportation. As we discussed at our meeting in January, in situations where the NRCB identifies priority questions, it advances those questions to the proponent at the earliest opportunity. The NRCB takes this approach to minimize delays in the overall project review timeline by providing more time to respond to these questions. The NRCB understands that AEP reviewers may have similar or related questions that will appear in the anticipated formal SIR; as a consequence, the attached questions may be modified somewhat in the formal SIR.

The balance of the NRCB questions on the Alberta Transportation NRCB Application/Environmental Impact Assessment will be forwarded in due course to Alberta Environment and Parks for inclusion in the SIR.

For specific inquiries regarding the Priority Questions, please contact Walter Ceroici at 780-422-1950.

Yours sincerely;

Bill Kennedy
General Counsel

Enclosure

cc: Margot Trembath, EA Coordinator, Alberta Environment and Parks (by email)
Mark Svenson, Provincial Transportation Environmental Coordinator, Alberta Transportation
Ronald Kruhlak, Q.C., McLennan Ross
JoAnn Jamieson, McLennan Ross
Shauna Sigurdson, Director: Prairie and Northern Region, CEAA (by email)
Shelly Boss, Project Manager, CEAA (by email)

February 8, 2018
Proposed Springbank Off-stream Reservoir Project
Priority Supplementary Information Requests from the NRCB

Question	Reviewer	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category Please refer to Appendix 5 of the *Guide to Reviewing Environmental Impact Assessment* for categories (e.g. vegetation, terrain and soils, hydrogeology, EPEA approval, etc.)
1. Volume 1, Executive Summary, Section 3.0, Table 3-1, Page 3.3. **Volume 1, Section 1.2.2.3, Table 1-3, Page 1.16.** In both tables, AT states the *Catchment Area* for the Springbank Project is *868 km^2* and for the MacLean Creek (MC1) Option is *695 km^2*. **Volume 1, Executive Summary, Section 2.0, Page 2.1.** **Volume 1, Section 1.1.1.2, Page 1.4.** AT states that the Project *can hold 77,771,000 m^3 of water as active flood storage.* **Volume 1, Section 1.2.2.2, Page 1.10.** AT states that the MC1 Option is *designed to withstand the probable maximum flood (PMF) of 2770 m^3/s. The maximum reservoir volume, when passing that flood, would be 93 million m^3…* a. Explain the methodology and rationale for concluding that flood protection is greater with a SR1 larger catchment area even though SR1 has a smaller maximum reservoir compared to MC1.	NRCB		No	Project Description
2. Volume 1, Executive Summary, Section 3.0, Table 3-1, Page 3.3. **Volume 1, Section 1.2.2.3, Table 1-3, Page 1.16.** Under *Project Timeline*, AT states the Project is *Operational in 2020* while the MC1 Option is *Operational 5.5 years from decision to move forward*. a. Clarify baseline project timelines for SR1 and MC1 under assumption each project is initiated at the same time.	NRCB		No	Project Description

Question	Reviewer	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category Please refer to Appendix 5 of the *Guide to Reviewing Environmental Impact Assessment* for categories (e.g. vegetation, terrain and soils, hydrogeology, EPEA approval, etc.)
3. Volume 4, Supporting Documentation, IBI Report, Section 5.1.4.2, Page 34. Under the heading *Flood Defences at Bragg Creek*, AT states *Detailed design of the dyke system has been estimated at $32.8 million (previously estimated at $6 million).* *The Province is initiating this solution independent of considerations relating to benefits accruing to MC1 vs SR1. Accordingly, these are considered "sunk costs" and no additional benefits to MC1 or costs to SR1 associated with this standalone alternative have been factored into the benefit/cost analysis.* *Given the total value of flood recovery projects associated with the 2013 flood ($5.6 million) it is suggested that the additional benefits would be nominal in any event and would not impact the benefit/cost ratio significantly.* **Volume 4, Supporting Documentation, IBI Report, Section 6.2.2, Exhibit 6.1, Page 35.** AT lists a total cost of $372 million for SR1, and a total cost of $406 million for MC1. The difference in these total costs is $34 million. a. What additional flood mitigation is necessary at Bragg Creek with the MC1 option? b. What are the costs, benefits and benefit/cost ratios for the Project when the costs and benefits of the flood protection dykes at Bragg Creek are included? c. Provide updated results.	NRCB		No	Project Description
4. Volume 4, Supporting Documentation, IBI Report, Section 6.2.3, Page 36. Alberta Transportation states *To fairly include this difference in the benefit/cost analysis, the annual benefits (average annual damages averted) begin in 2020 for the SR1 project and in 2023 for the MC1 project. Over the same 100 year period (2018-2118), with the 4% discount rate, the four-year advantage gives SR1 $74 million in additional present value of benefits compared to MC1.*	NRCB		No	Project Description

Question	Reviewer	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category Please refer to Appendix 5 of the *Guide to Reviewing Environmental Impact Assessment* for categories (e.g. vegetation, terrain and soils, hydrogeology, EPEA approval, etc.)
Under *Assumptions regarding timing*, Alberta Transportation lists that the annual benefit amounts begin in year 3 for SR1 and year 6 for MC1. a. Explain the contradiction between 4 year differential for annual benefits in the explanatory text compared to the 3 year differential stated in the assumptions. Which year differential was used to calculate the present value of benefits? **b.** Provide the difference in net present value of costs between SR1 and MC1 given that costs for SR1 are expended in two years and sooner compared to MC1 costs that occur later and spread over a longer period.				
5. Volume 1, Section 3.3.1.3, Page 3.31. **Volume 3A, Section 4.3, Page 4.15.** **Volume 3A, Section 4.4.2.2, Page 4.36** In these sections, Alberta Transportation suggests that blasting may be required (for the diversion channel), and that details on the blasting would be submitted by the contractor to Alberta Transportation. **Reference Document : Stantec Consulting Ltd. March 31, 2017. Springbank Off-stream Storage Project Interim Design Report, Section 9.2.2, Figure 30, Page 125.** This figure shows the diversion channel elevation and length relative to existing grade, proposed channel bottom and top of rock. In this figure, Alberta Transportation shows that approximately half of the diversion channel's bottom will be constructed in bedrock, over four bedrock zones. The approximate bedrock excavation maximum depths across the four zones are 17m, 6m, 6m, and 15m. a. If a blasting plan is employed: i. comment on the noise effects of blasting on receptors, in addition to the noise	NRCB	3.1.2	Unknown	Air Quality, Climate and Noise

Question	Reviewer	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category Please refer to Appendix 5 of the *Guide to Reviewing Environmental Impact Assessment* for categories (e.g. vegetation, terrain and soils, hydrogeology, EPEA approval, etc.)
effects already discussed in the EIA, and, ii. comment on the air quality effects of blasting (wet and/or dry, as appropriate) on receptors, in addition to the air quality effects already discussed in the EIA. b. If a blasting plan is not employed: i. comment on the noise effects of the bedrock excavation construction techniques through the depths of these bedrock zones, and, ii. comment on the air quality effects of the bedrock excavation construction techniques through the depths of these bedrock zones.				
6. Volume 3A, Section 8, Report Section 8.2.1.1. Requirements specified in ToR 3.6.1 Baseline Information should be reviewed. The Desktop review provides a general overview of ecology and habitat requirements of fish species expected to occur in the LAA. Information from historical and current studies that characterize fish and fish habitats of the Elbow River within the LAA are not presented. The field survey utilized one sample event, one fish collection method, and one qualitative fish habitat evaluation method. For each survey site habitat quality was rated for fish groups, not for fish species. Baseline information that describes the species composition, distribution, abundance, movements, habitat use, habitat quality, and life history parameters of fish populations currently residing within the LAA are not presented. There is no comprehensive discussion of the ecology of species populations identified as indicator fish species to be used by the effects assessment. a. Based on the review, identify gaps in baseline information that may hinder the ability to evaluate Project effects. b. Identify specific components of the baseline information data gap that that may hinder the ability to evaluate Project effects (e.g., timing and duration of Bull Trout	NRCB		No	Aquatic Ecology

Question	Reviewer	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category Please refer to Appendix 5 of the *Guide to Reviewing Environmental Impact Assessment* for categories (e.g. vegetation, terrain and soils, hydrogeology, EPEA approval, etc.)
population movements in the vicinity of the diversion structure, location and size of Mountain Whitefish spawning habitat sites downstream of the diversion structure, distribution of the Rainbow Trout population relative to the location of the diversion structure).				
7. Volume 3A, Section 8, Report Section 8.4.4.2, Page 8.40. AT states *During construction, fish passage concerns would be mitigated with passage around the site.* a. Provide information that demonstrates safe, unhindered upstream and downstream fish passage during operation of the Elbow River diversion channel. The information should indicate whether the diversion channel will operate during the entire period of river diversion and what measures will be applied to provide suitable water velocities and water depths for upstream and downstream passage of each indicator fish species and life stage. b. If there are periods when the diversion channel is not operating and/or effective fish passage cannot be provided by the diversion channel at all flows, identify the duration and timing of hindered fish passage and indicate the indicator fish species and life stage that will be affected. c. If safe, unhindered upstream and downstream fish passage during operation of the Elbow River diversion channel cannot be provided revise the effects assessment of fish passage during construction.	NRCB		No	Aquatic Ecology
8. Volume 3C, Section 1, Report Section 1.1, Page 1.1. AT states *The assessment of cumulative effects focuses on the construction and dry operations phases only, Volume 3A. An assessment of cumulative effects for a flood and post-flood operations, Volume 3B, is not considered possible due to the inability to predict when a flood would occur and the identity of other future projects may be occurring at the same time as a flood a*nd that *Other projects or activities that have been or will be carried out are identified for inclusion in the cumulative environmental effects assessment, based on their potential for residual environmental effects that*	NRCB		No	Aquatic Ecology

Question	Reviewer	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category Please refer to Appendix 5 of the *Guide to Reviewing Environmental Impact Assessment* for categories (e.g. vegetation, terrain and soils, hydrogeology, EPEA approval, etc.)
could interact spatially and temporally with the residual environmental effects of the Project. It is unclear why the EIA excludes flood and post-flood operations from the cumulative effects assessment when there appears to be a connection to the operation of an existing downstream facility (i.e., Glenmore Reservoir) and upstream improvements (e.g., at Bragg Creek and Redwood Meadows). a. Justify and provide rationale for excluding Flood and Post-Flood Operation from a Cumulative Effects Assessment. b. Address cumulative effects of Glenmore Dam and Reservoir operation on aquatic ecology.				
9. Volume 3A, Section 6.1.4.1, Page 6.5, Figure 6-1, and Volume 4, Appendix J, 2.1, Page 2.1. AT states that the *LAA included the PDA and the Elbow River from Redwood Meadows to the inlet of Glenmore Reservoir* (Volume 3A 6.1.4.1), that the *LAA extends from the diversion structure…*(Appendix J, 2.1), and in Figure 6-1 (which is used again in various sections) it appears it may start below Redwood Meadows (i.e., inlet structure) and that the LAA may include the Glenmore Reservoir. a. Clarify, and justify, the boundaries of the LAA for the hydrology assessment scenarios. *b.* Update any of the hydrology and surface water quality sections of the EIA affected by the boundaries of the LAA, ensuring the assessments include all areas of the LAA where applicable.	NRCB		No	Hydrology

Question	Reviewer	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category Please refer to Appendix 5 of the *Guide to Reviewing Environmental Impact Assessment* for categories (e.g. vegetation, terrain and soils, hydrogeology, EPEA approval, etc.)
10. **Volume 3A, 6.1.4.1, Page 6.5, Figure 6-1, and Volume 4, Appendix J, 2.1, Page 2.1** AT states that the *RAA is the Elbow River watershed from headwaters to Glenmore Dam* (Volume 3A, 6.1.4.1), that the *RAA is the Elbow River watershed, including Glenmore Reservoir* (Appendix J, 2.1), and Figure 6-1 appears to include the entire watershed, including Glenmore Reservoir and upstream and downstream of Glenmore Reservoir. *a.* Clarify, and justify, the boundaries of the RAA for the hydrology assessment, including why the Glenmore Reservoir and downstream of the Glenmore Reservoir is, or is not, included in either of the assessment areas given that the goal of the Project is to limit discharge downstream from the Glenmore Reservoir to less than 160 m^3/s. *b.* Provide a description of the hydrology of the Elbow River at Glenmore Reservoir and below Glenmore Dam to the confluence with the Bow River, if determined to be within the RAA, and/or explain why this assessment was not completed. *c.* Update any of the hydrology and surface water quality sections affected by the boundaries of the RAA, ensuring that the assessments include all areas of the RAA.	NRCB		No	Hydrology
11. **Volume 3B, 7.1, Page 7.2** AT acknowledges that *[t]he Terms of Reference include a requirement to assess potential and implications of lead, arsenic, cadmium, and mercury methylation.* *a.* Provide an assessment (including quantification) for lead, arsenic, and cadmium (mercury methylation completed), as well as for major ions, nutrients, bacteria, invertebrates, aquatic plants, algae, temperature, and DO for all phases (i.e., flood operation, post-flood operation, construction, and dry-operations) in the Elbow River, within the Project Reservoir (flood and post-flood), and at the Glenmore	NRCB		No	Surface Water Quality

Question	Reviewer	TOR # (if applicable)	Is Additional Fieldwork Required?	SIR Category Please refer to Appendix 5 of the *Guide to Reviewing Environmental Impact Assessment* for categories (e.g. vegetation, terrain and soils, hydrogeology, EPEA approval, etc.)
Reservoir. Identify any potential changes due to storage and release of flood water in the Project reservoir on receptors and relative to applicable guidelines.				