Information Request Package 3

Springbank Off-Stream Reservoir Project

Contents

List of Acronyms and Short Forms

AEP	Alberta Environment and Parks
Agency	Canadian Environmental Assessment Agency
CAAQS	Canadian Ambient Air Quality Standards
CCME	Canadian Council of Ministers of the Environment
CDA	Canadian Dam Association
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
CEAR	Canadian Environmental Assessment Registry
COPC	Contaminants of Potential Concern
CRA	Commercial, Recreational, or Aboriginal
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
EGBC	Engineers and Geoscientists BC
EIS	Environmental Impact Statement
EIS Guidelines	Environmental Impact Statement Guidelines
ER	Exposure ratios
FN	First Nations
HC	Health Canada
IR	Information Request
LAA	Local Assessment Area
MC1	McLean Creek
MT	Mud/Bedload Transport
NO_2	Nitrogen dioxide
PAH	Polycyclic Aromatic Hydrocarbon

PDC	Planned Development Case
$PM_{2.5}$	Particulate matter with a diameter of less than 2.5 micrometers
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PDA	Project Development Area
RAA	Regional Assessment Area
SSRP	South Saskatchewan Regional Plan
ST	Sediment Transport
TF	Transportable Fraction
TKU	Traditional Knowledge and Use
TLRU	Traditional Land and Resource Use
TSP	Trisodium Phosphate
TSS	Total Suspended Sediment
TUS	Traditional Use Study
VC	Valued Component
VOC	Volatile Organic Compound

IR3-01

Topic: Climate Change

Sources:

EIS Guidelines Part 2, Sections 6.2.2; 6.6.2

EIS Volume 1, Section 1

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes – Combined (CEAR # 46, 47, 50)

Environment and Climate Change Canada Technical Review, June 18, 2018 (CEAR # 32)

Context and Rationale

The EIS Guidelines require the proponent to describe multiple components of hydrology of the Elbow River watershed, and the effects of the environment on the Project.

ECCC indicated that atmospheric moisture content is expected to increase as the atmosphere warms. This in turn would result in an increase in extreme precipitation in the future, though precise projection of future changes in extreme precipitation at the regional and local scales is difficult to obtain (IPCC, 2012, 2013; Kharin et al., 2013; Zhang et al., 2017). ECCC indicated that while there is not yet clear evidence of influence of human-induced climate change on observed floods, studies suggest human influence may have increased the likelihood of extreme precipitation that led to the 2013 Alberta flood (Teufel et al. 2017). Probable Maximum Precipitation (PMP) is projected to increase in the future with continued anthropogenic warming (Kunkel et al, 2013), affecting the Probable Maximum Flood (PMF). Additionally, because of the ongoing change in climate, there is growing uncertainty in the reliability of any return-period analysis of flood flows.

Consideration of climate change forecasts from an ensemble of models with low to high forcing allows for better prediction of potential effects of climate change on the Project. Tsuut'ina Nation noted that the Engineers and Geoscientists BC (EGBC) have specific guidance on how to incorporate effects of climate change into flood hazard and/or risk assessment.

If the frequency and size of future flooding, size of diversions, and/or likelihood of reservoir exceedance are underestimated, direct and cumulative effects to valued components including federal lands from the loss of upstream flood protection integrity may be greater than predicted. Clarity is required to understand whether change in climate, climate uncertainty, and the magnitude of effects in the context of climate change were considered when determining the design flood to understand the potential effects of the environment on the Project.

Information Requests:

a) Indicate whether, and why or why not, events with a return period similar to the 2013 flood event would likely be of greater magnitude as a result of climate change.
b) Provide information on projected future changes in the regional climate and evaluate potential future climate change related effects on the Project. Include:
    - A flood frequency and size analysis.
    - Where possible, climate change information based on projections from a range of climate models with low to high plausible future global emission scenarios.
    - Consideration of the capacity of the diversion and reservoir in the context of climate change, climate uncertainty, and magnitude of effects.
    - An assessment of how any adverse effects on the Project due to extreme events as a result of climate change in turn could result in potential effects to VCs.
    - Consideration of the guidance provided by EGBC and a rationale of why it was or was not applied.

IR3-02

Topic: Probable Maximum Precipitation

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.2.2; 6.6.2

EIS Volume 3A, Section 6.2.2.4

EIS Volume 3B, Section 6.4.4.4

EIS Volume 4, Appendix J

Stantec 2015b. Springbank Off-Stream Reservoir Project Probable Maximum Flood Analysis. Memo, Aug 7, 2015.

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Environment and Climate Change Canada Technical Review, June 18, 2018 (CEAR # 32)

Context and Rationale:

The EIS Guidelines require the proponent to present information on multiple components of hydrology of the Elbow River watershed as well as relevant meteorological information. The EIS Guidelines also require the proponent to present information on the effects of the environment on the Project.

The EIS presents four PMP scenarios based on the 2013 flood (Stantec 2015b). These scenarios consider general (synoptic, large scale) storms, orographic precipitation, and local (convective) storms. However, the EIS does not include a scenario which starts with convective storms near the foothills then supplanted by a synoptic-scale storm which is the type of event that occurred during the 2013 flooding event (Kochtubajda et al., 2016; Liu et al., 2016). A combination of initial convective rainfall over the foothills and subsequent synoptic-scale rainfall with upslope flow and orographic rainfall may lead to even stronger peak flow and this PMP scenario should be evaluated.

The EIS indicated that the 100-year rainfall amounts from the Pincher Creek Airport meteorological station were used to estimate PMP, due to it being in closest proximity and the physiographic characteristics to the Elbow River Basin, and having a long period of record. This is inconsistent with the EIS watershed analysis, which used data from the Climate WNA website and suggested differences of temperature and precipitation between the upper and lower watersheds. It is unclear whether the Pincher Creek station (300 km south of the Elbow River basin) is more representative for the upper or lower watershed. ECCC indicated that there are a

number of weather stations operated by the provincial and federal government agencies in the area.

Additional information on precipitation, including storm scenarios associated with the PMP and appropriate meteorological data, is necessary understand the rationale for the design flood and potential effects of the environment on the Project.

Information Requests:

a) Analyse an additional PMP scenario, keeping the volume equivalent to scenarios 1 and 2, and reflecting both convective and synoptic characteristics as observed in the 2013 flood event, to better model the severity of a PMP scenario associated with the design flood.
b) Identify two separate monitoring stations to represent the upper and lower basins and differentiate precipitation between the upper and lower watersheds in order to better characterize the PMP. If data is not available, describe how the 100-year rainfall amount from the Pincher Creek station is representative in the PMP scenario.

IR3-03

Topic: Design Flood

Sources:

EIS Guidelines Part 2, Sections 6.2.2; 6.6.2

EIS Volume 1, Section 3.1

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes – Combined (CEAR # 46, 47, 50)

Environment and Climate Change Canada Technical Review, June 18, 2018 (CEAR # 32)

Context and Rationale:

The EIS Guidelines require the proponent to describe multiple components of hydrology of the Elbow River watershed, and the effects of the environment on the Project.

The EIS notes that the Project is designed to mitigate floods up to the design flood level corresponding to the 2013 flood event; however, the rationale supporting the choice of this design flood level is not provided.

The assessment of potential effects in the EIS is based on the flows recorded in the Elbow River at Bragg Creek, whereas the Project design is based on the 2013 flood hydrograph recorded at Glenmore Reservoir's level gauge and select hydrometric station data within the basin. In the EIS, the PMF analysis indicated that the PMF at the diversion site would be approximately 2.3 times bigger than the peak flow during the 2013 analysis. This introduces uncertainty into the assessment.

The EIS notes that the off-stream dam is classified as an "extreme" consequence dam and the floodplain berm is classified as a "very high" consequence dam. Rocky View County indicated that if the floodplain berm is a "very high" class, the design flood should be 2/3 between the 1000-year flood and PMF, and not 1/3 between the 1:1000-year flood and PMF as described in the EIS. This suggests that the flood frequency estimates and/or the PMF estimate may not be appropriate. If the PMF is underestimated, the emergency spillway and auxiliary spillway may be undersized.

Information on the rationale for the selection of the design flood and capacity of the spillway components is required to understand the effects of the environment on the Project.

Information Request:

a) Provide a rationale for the selection of the design flood level. The response should include:
    - Consideration as to whether designing for the 2013 flood is suitable considering climate change.
    - A description of implications on the Project of projected changes from climate change in the estimations of the design values (such as 1:100 year flood, PMF and PMP).
    - A rationale for the use of 1/3 between the 1:1000 year and PMF for the floodplain berm. Provide the 1:1000-year flood peak value for clarity.
    - A description, considering climate change, of the ability of the emergency spillway and auxiliary spillway to handle a higher PMF and PMP.

IR3-04

Topic: Hydrology – Local and Regional Assessment Areas

Sources:

EIS Guidelines Part 2, Section 6.1.4

EIS Volume 2, Section 5.3.1

EIS Volume 3A, Section 6.1.4.1

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes – Combined (CEAR # 46, 47, 50)

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Context and Rationale:

The EIS Guidelines require the proponent to present information on multiple components of hydrology of the Elbow River watershed.

The EIS states that the LAA includes the project footprint in addition to "adjacent areas where environmental effects may reasonably be expected to occur" specific to each VC. The EIS also states that the RAA is the area within which the Project's environmental effects may interact or accumulate with the environmental effects of other projects of activities that have been or will be carried out such that cumulative effects may potentially occur.

The LAA for the hydrological assessment extends downstream of the PDA but appears to exclude consideration of the backwater effects of the diversion gates upstream. Potential effects upstream (e.g. backwater effects) due to high reservoir levels during the retention time should be assessed. Given the boundaries of the LAA, it is unclear whether the potential effects of local runoff draining into the reservoir and potential effects upstream of the Project are adequately characterized.

The RAA for hydrology extends only to the headwaters of the Glenmore Reservoir. Potential downstream effects due to reduced flood peaks past the Glenmore Reservoir or in the Bow River are not assessed. It is unclear whether the RAA adequately captures the full extent of potential effects downstream of the Project.

The limited rationale presented for the selection of LAA and RAA for the hydrological assessment does not allow for a full understanding of the potential environmental effects resulting from changes to hydrology.

Information Requests:

a) List and provide rationale for the criteria used to determine the LAA and RAA for hydrology.
b) Describe whether the LAA extends far enough upstream to evaluate potential effects from backwatering, local runoff, and sediment deposition.
c) Discuss whether the RAA extends far enough downstream of the Project to account for potential effects from reduced flood peaks.

IR3-05

Topic: Hydrology – Emergency Spillway and Freeboard

Sources:

EIS Guidelines Part 2, Sections 3.1; 6.2.2

EIS Volume 1, Section 3.2.3

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Context and Rationale:

The EIS Guidelines require the proponent to present information on changes to surface water, including changes to water quality and quantity and sediment quality and quantity in the event that flood event(s) exceed the capacity of the reservoir system. The EIS Guidelines also require the proponent to describe project components and operations including a detailed water management plan.

According to the CDA 2007 Dam Safety Guidelines, the initial reservoir level needs to be specified when assessing the PMF, and the level should correspond to the higher bracket of the range of reservoir level that may be expected at the commencement of the PMF. The EIS adopts a 100-year storm as the antecedent condition prior to the PMF, but it is not clear whether an initial reservoir level is considered, or how it is considered, when determining the capacity of the emergency spillway. The CDA Guidelines also require the consideration of wave run up when assessing the adequacy of the freeboard. Understanding of the initial reservoir level is required to assess the capacity of the emergency spillway and determine whether an adequate freeboard would be maintained.

The EIS states that since the reservoir will not have a permanent pool, wave wash protection will not be necessary. Although the off-stream reservoir will not have a permanent pool during dry operations, it will store water for a certain amount of time during flooding. Floods are often accompanied with relatively strong winds, which were not considered and could cause waves that affect the structures of the reservoir. The dam design shown in Figure 3-8 has a freeboard of 1.5 m from the inflow design flood pool elevation to crest. It is unclear whether this freeboard is adequate for design wave run-up as required by the CDA Dam Safety Guidelines.

Information Requests:

a) Provide a rationale for the capacity of the emergency spillway, taking into account the PMF and a range of initial reservoir levels that could occur.

b) Discuss whether the emergency spillway capacity would maintain an adequate freeboard (distance between the maximum water level and top of the dam) as required by the CDA 2007 Dam Safety Guidelines.
c) Provide a rationale for the freeboard in the reservoir considering the potential for waves due to strong winds that accompany floods.

IR3-06

Topic: Hydrology – Suspended Sediment

Sources:

EIS Guidelines Part 2, Section 6.1.4; 6.2.2

EIS Volume 3B, Sections 6.4.1; 6.4.3

EIS Volume 4, Appendix J, Figure 3-12

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Context and Rationale:

The EIS Guidelines require the proponent to present information on baseline conditions and assess changes to hydrology and water quality of the Elbow River watershed, including sediment transport characteristics and sediment quality and quantity. The EIS Guidelines direct the proponent to carry out modelling as required to present and substantiate anticipated changes.

The EIS indicates that suspended sediment concentration decreases as discharge decreases. Some of the decrease is due to the reduction in supply as runoff decreases and the decreased turbulence of the lower discharge downstream of the diversion inlet. The largest size fraction of the suspended sediment would drop out of suspension at the lower discharge once the normal flow is established downstream of the service spillway, and suspended sediment concentrations may be reduced by more what is demonstrated.

It is unclear whether the estimated peak suspended sediment concentration at Highway 22 is representative of the entire downstream reach of the Elbow River, or is reduced due to its proximity to the service spillway where turbulence is high. Additionally, the curves in Figure 3-12 appear to be skewed due to the inclusion of local effects. It is unclear whether conclusions regarding sediment transport would change if the local effects were eliminated and therefore slopes were increased.

Clarity on the meaning of the figures and associated predictions of effects is needed in order to assess potential effects to hydrology.

Modelling

The EIS states that sediment transport for the three flood scenarios was modelled based off a hydrodynamic numerical model (MIKE21), and the mud/bedload transport (MT) and sediment transport (ST) modules. The morphological changes to the bed reported by the MIKE21 model seem to be in four small areas and not in a critical area at the Diversion Inlet. Additionally, it is

not clear how the MT and ST modules were combined to accurately stimulate sediment transport.

Rocky View County indicated that the equation used to evaluate suspended sediment, the Meyer-Peter and Muller equation, is most suitable for estimating gravel transport and may underestimate sediment transport with fine sediments or high current speeds. Therefore, it may not be suitable for evaluating the fate of suspended sediment released from the reservoir and the high velocities associated with flows released into the tributary downstream of the low level outlet.

Interactions between suspended sediment and bedload transport are important in assessing effects to the morphology of the river, including degradation and aggradation in the river channel. Clarity of the modelling of fine sediment transport is needed.

Shear Stress

The EIS notes that once the flow goes below160 m^3/s, the shear stress required to mobilize sediment "with diversion" is higher than with "no diversion." Rocky View County indicated that the shear stress should be the same unless the flow is deeper or steeper, which could be caused if hydraulic conditions at the site are affected by turbulence and not representative of downstream conditions. Clarity is required regarding the shear stress, in order to understand the figures and assess potential effects to suspended sediment concentrations.

Information Requests:

a) Provide a rationale for the estimated peak suspended sediment concentration reduction at Highway 22.
b) Discuss whether increased slopes would change conclusions regarding sediment transport.
c) Provide additional details on the sediment transport model. Include how the results for the MT and ST modules were combined and a description of what areas were reported by the MIKE21 model.
d) Provide rationale for using the Meyer-Peter and Muller equation to estimate sediment transport and discuss whether the results on the sediment transport model were validated against a total load formula.
e) Provide a rationale for why the shear stress “with diversion” is higher than with “no diversion.”

IR3-07

Topic: Hydrology – Unnamed Tributary

Sources:

EIS Guidelines Part 2, Section 6.1.4

EIS Volume 1, Section 3.2, Figure 3-1

EIS Volume 4, Appendix J, Section 3.3.1.2

Environment and Climate Change Canada Technical Review, June 18, 2018 (CEAR #32)

Context and Rationale:

The EIS Guidelines require the proponent to present information on hydrology and water quality of the Elbow River watershed, including the delineation of drainage basins at appropriate scales (water bodies and watercourses) overlaid by key project components.

The EIS states that the LAA contains several tributaries to the Elbow River that contribute flow from the plains. The tributaries inside the reservoir area will drain through the low level outlet. The EIS describes and depicts a tributary that crosses Highway 22 near Township Road 242; however, no information is provided about the tributary between the proposed new bridges shown in Figure 3-1.

Clarity is required on the project interactions with and effects on this tributary as it may have potential effects to VCs.

Information Request:

a) Clarify the disposition of the unnamed tributary that currently crosses Highway 22 near Township Road 242 before joining the Elbow River.
b) Describe the project interactions and effects of any changes to the unnamed tributary on VCs.

IR3-08

Topic: Project Operation – Flood Frequency

Sources:

EIS Guidelines Part 2, Section 3.1; 3.2.2; 6.1.4

EIS Volume 1, Section 3.1 and 7.4

EIS Volume 3B, Section 3.2.8

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Piikani Nation – Technical Review of EIS, June 15, 2018 (CEAR #48)

Context and Rationale:

The EIS Guidelines require the proponent to describe the operation of key Project components and a schedule for all Project activities including a water management plan for Project operation. The EIS Guidelines also require the proponent to present information on multiple components of hydrology of the Elbow River watershed.

There are conflicting statements in the EIS regarding when the Project will operate. In Volume 1, Section 3.1, the EIS states that the diversion of flood waters begin when flows in the river exceed 160 m^3/s (approximately a 1:7 year flood). However, Volume 1, Section 7.4, Table 7-3 of the EIS indicates that during floods, flows of approximately 160 m^3/s (approximately a 1:10 year flood) will continue in the Elbow River downstream of the low level outlet, and Volume 1, Section 3.1, Table 3-1 of the EIS shows that a 1:10 year flood is estimated to have a peak discharge of 200 m^3/s. Further, Stantec noted to the Piikani Nation that the minimum streamflow for the Project to operate is a 1:10 year return period flood.

Throughout the EIS, the 1:10 year flood is used to estimate potential effects. For example, in Volume 3B, Section 3.2.8, the EIS indicates that dust emissions would only be a concern for a flood event that exceeds a 1:10 year flood. There is concern that dust emissions would be present any time the Project is in operation. There is also concern that in a wet cycle, the flood operation of the Project could be more frequent, which may lead to additional environmental effects that have not been assessed.

Understanding the frequency of Project operation and when water management practices will be implemented is critical to the assessment of environmental effects.

Information Requests:

a) Clarify at what flow volumes and what flood frequency the Project will be in operation.

b) Anytime potential effects are assessed based on the Project operating at the 1:10 year flood ratio, reassess the potential effects to each VC based on the highest frequency of Project operation.

IR3-09

Topic: Project Operation – Effects from changes in Flood Frequency and Sediment Load and Transport on the Elbow River

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.1.5; 6.2.2; 6.3.1; 6.3.3

EIS Volume 1, Sections 3.1; 7.4

EIS Volume 3A, Section 8.4.4

EIS Volume 3B, Sections 6.2; 6.4; 6.7; 8.2

EIS Volume 4, Appendix J, Table 3-4

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Piikani Nation – Technical Review of EIS, June 15, 2018 (CEAR #48)Samson Cree Nation – Springbank Off-Stream Reservoir Project Written Submission – June 25, 2018 (CEAR #52)

Montana First Nation – Review of Springbank Off-Stream Reservoir EIA, June 2018 (CEAR #51)

Alberta Transportation Responses to CEAA Annex 2: A) Early Technical Issues, May 11, 2018

Fisheries and Oceans Canada – Comments on the EIS, June 19, 2018 (CEAR #28)

Context and Rationale:

The EIS Guidelines require the proponent to present information on multiple components of hydrology of the Elbow River watershed, including those that affect water quality and quantity, sediment quality and quantity, and fish and fish habitat. Flows and associated sediment transport within river systems affect water quality as well as fish and fish habitat.

Flood Frequency

Based on the current diversion rate, the Elbow River below the diversion may not flood except in extreme circumstances, which could have potential effects to the larger gravel bars downstream of the diversion channel. This could also affect river morphology, vegetation types and sizes growing on the gravel bars, wetlands and other sensitive areas, which are vital for river health and flood/drought management.

For example, during Project operations, up to 600m^3/s will be diverted from the Elbow River to maintain a flow of 160m^3/s. Therefore, the minimum 500 m^3/s threshold to mobilize the thalweg

armour layer (coarse sediment) would only occur for floods at a recurrence interval of 200 years or longer, instead of the current expected 50 year interval. This suggests that general bed motion in the Elbow River downstream of the inlet will occur less frequently as a result of the Project.

Sediment Transport

The EIS stated that Project magnitude of effects to suspended sediment concentrations or yields were not determined because they are a direct consequence of the intent of the Project, which is flow diversion. The EIS notes that the change in suspended sediment transport during the diversion would be limited to the local assessment area. This assessment may be incorrect if the proportion of sediment mass removed from the Elbow River during diversion is sizeable compared to the total annual yield in the Elbow River. Rationale or clarification is required, as reducing sediment concentrations or yields is not the intent of the Project. These changes may have implications for the downstream morphology of the Elbow River channel, the sustainability of the deltaic area around the mouth of the Elbow River where it enters the Glenmore Reservoir, and fish habitat, riparian areas, vegetation, and wildlife habitat.

Fish and Fish Habitat

The EIS indicated that no significant changes in sediment transport are anticipated; therefore there would be no alterations to the quality of fish habitat. The EIS also indicates that erosion in the outlet channel and the potential requirement for maintenance could result in alterations to fish habitat, increased turbidity, and the deposition of sediment in substrates in the outlet channel and in the Elbow River downstream of the low level outlet. DFO indicated that when sediment is released from the reservoir, it will likely be deposited downstream on areas that contain fish habitat.

In its responses to CEAA Annex 2: A) Early Technical Issues Question 5, the proponent commits to implementing adaptive management for TSS if levels are significantly greater than predicted. This qualitative description does not allow for a conceptualization of when TSS adaptive management measures would be implemented.

Additional information is required on sediment deposition (fine and coarse) and mitigation measures in order to understand potential effects to fish and fish habitat.

Information Requests:

a) Assess the environmental effects of a reduced frequency of inundation of the Elbow River downstream of the Project.
b) Clarify how coarse sediment and bedload transport downstream will be maintained if discharges greater than $160 m^3/s$ will no longer occur, or will occur on a limited basis, in the Elbow River downstream of the diversion channel.
c) Assess the environmental effects from changes in sediment yields. Include:

- Discussion on the importance of and Project effects to sediment deposition and resuspension dynamics within the diversion channel and Elbow River downstream of the low level outlet.
- Data on expected sediment mass that would be removed from the Elbow River under each flood scenario and a comparison to the annual sediment yield of the Elbow River.
- Explanation of whether the corresponding loss of sediment supply was accounted for in modelling potential changes in channel degradation/aggradation downstream of the diversion channel as a result of flood operations.
- Discussion on how sediment yields in the Elbow River may or may not be reduced over several decades, taking into account the probability of each flood scenario and the corresponding loss of sediment yield.

d) Explanation of why effects of a 30% decrease in sediment yield in the Elbow River would be expected to be restricted to the local assessment area. Provide an assessment of potential effects to fish and fish habitat from the changes (regardless of significance) in sediment deposition from the Project, including:
   - An assessment of where sediment would be deposited downstream of the low level outlet channel, and on the type(s) of fish habitat it is predicted to settle on.
   - A description of how 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.

e) Provide a follow-up and monitoring plan for TSS, including:
   - A description of what adaptive management measures would be implemented for high levels of TSS and when they would be implemented.

IR3-10

Topic: Project Operation – Water Retention in the Reservoir

Sources:

EIS Guidelines Part 2, Sections 3.1; 3.2.2; 6.1.4

EIS Volume 1, Section 6.3

EIS Volume 3B, Section 6.4

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Context and Rationale:

The EIS Guidelines require the proponent to describe the operation of key Project components and a schedule for all Project activities including a water management plan for Project operation. Further, the EIS Guidelines require the proponent to present information on multiple components of hydrology of the Elbow River watershed and describe any changes from the Project to water quality and quantity.

The EIS states that water from the reservoir will be tested prior to draining and concentrations will need to meet the Alberta Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines prior to release back into the Elbow River. However, if the residence time increases to mitigate potential effects to water quality, this could have additional effects associated with seasonality, post-flood maintenance, and future flood capacity.

Table 6-4 of the EIS indicates that in the design for 1:100 year and 1:10 year floods, there will be a percentage of the volume of water remaining in the reservoir after release. Figures 6-11 and 6-16 in the EIS suggest that the reservoir levels for the 2013 design flood and 100-year floods were nearly the same at the end of release, and the steep ends of the drawdown curves suggest that the low-level outlet would have been closed before the reservoir is empty. The EIS also indicates that the low-level outlet will remain open to allow the unnamed creek to flood through during the dry and post-flood operation. Details of the routing analysis are needed to understand the reservoir release curves as they may not be representative of the actual operation and it is not clear what release decisions were applied in the model to produce those curves.

Additionally, the EIS notes that there are some depressions in the reservoir area. If those depressions cannot be drained, resulting limitations to storage capacity should be considered, as they would be filled with local runoff before the flow diversion operation.

Understanding retention within the reservoir is required to accurately assess potential effects, including effects to water quality, fish and fish habitat, land use, physical and cultural heritage, and impacts to rights.

Information Requests:

a) For each flood scenario, provide details on how long the proponent intends on retaining water within the reservoir in order to meet the CCME Water Quality Guidelines, and the potential effects to VCs from doing so.
b) Provide the volumes, depths, and surface area of water expected to be pre-existing in depressions in the reservoir pre-diversion and remaining in the reservoir post-release for each flood scenario. Describe where this water would be stored, the time will take for this water to dry out or be released, and the potential effects to VCs.
c) Given the information requested above, provide a table with values demonstrating the total retention time for each flood scenario (including retention during flooding, draw down time, and additional time needed for any water left in the reservoir after release to dry out or be released).

IR3-11

Topic: Project Components – Channel Improvements

Sources:

EIS Guidelines Part 2, Section 3.2; 6.1.4; 6.1.5; 6.2.2; 6.3.1

EIS Volume 1 Section 2.2.5

EIS Volume 3A Section 6.5.2

Rocky View County – Comments on the EIS, June 15, 2018

Fisheries and Oceans Canada – Comments on the EIS, June 19, 2018

Context and Rationale:

The EIS Guidelines require the proponent to describe Project activities for the different phases of the Project. Further, the EIS Guidelines require the proponent to present information on multiple components of hydrology of the Elbow River watershed, including those that affect water quality and quantity and fish and fish habitat.

The EIS states that two alternatives were considered for construction and operation of the low level outlet channel (to drain water from the reservoir back into the Elbow River): upsizing the existing unnamed creek to convey peak design flow to the Elbow River and delaying reshaping the unnamed creek channel until it is necessary.

Due to the design discharge from the low level outlet (27 m^3/s) and the current capacity of the unnamed creek (approximately 1 m^3/s), improvement and restoration of the unnamed creek and the Elbow River downstream of the low level outlet would be required as soon as a major flood occurs. The EIS states that most maintenance on the unnamed creek will occur after a large flood event so that the effects to the unnamed creek can be evaluated for damage. This is because there may be the possibility of less extensive damage to the unnamed creek and adjacent environment from the flood than would occur when upsizing to a design flood. Currently, only regrading on the unnamed creek to convey flows away from critical infrastructure is planned.

The release of large flows into the unnamed creek and Elbow River is expected to produce significant degradation (erosion, sediment loading, etc). The highest sediment depths are expected to occur close to the low level outlet (up and downstream of the outlet). The unnamed creek will have limited or no flow again until the sediment has been removed from its channel upstream of the low level outlet. If the sediment is not removed, what flow does occur through the unnamed creek will deliver high concentrations of fine sediment to the Elbow River each time it rains. As the Project does not include the improvement of the unnamed creek and Elbow

River up and downstream of the low level outlet until after a flood, the increased flow may affect morphology and sediment loading.

Additional information is required to understand effects on hydrology, water quality and quantity, and fish and fish habitat associated with the construction and operation of the low level outlet channel.

Information Requests:

a) Provide a rationale for not conducting maintenance on the unnamed creek to enable the accommodation of flood flows prior to a flood event.
b) Assess the potential environmental effects from the release of large flows into the unnamed creek and the Elbow River channel downstream of the low level outlet, particularly from bedload transport.
c) Describe the potential improvement and restorations (design and costs) needed, proposed timing of the works, and the potential environmental effects from any channel improvements or restorations within the unnamed creek and the Elbow River up and downstream of the low level outlet.

IR3-12

Topic: Effects of the Environment on the Project – Maintenance

Sources:

EIS Guidelines Part 2, Sections 3.2.2; 6.6.2; 8

EIS Volume 1 Attachment A, Table A-5, pp.A.30

EIS Volume 3C, Section 2

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Context and Rationale:

The EIS Guidelines require the proponent to describe ongoing and post-flood recovery and/or maintenance of each Project component and to provide details of planning, design, and construction strategies to minimize the potential effects of the environment on the Project.

These information requirements are interrelated as maintenance activities may serve to mitigate the effects of the environment on the Project. The EIS states that design mitigation measures were incorporated into the Project but provides limited details as to which features specifically mitigate effects of the environment on the Project. The EIS indicates that a Project-specific inspection and monitoring plan for geotechnical conditions will be developed and provides high level commitments to monitoring and adherence to standards. Post-flood repair and maintenance activities are generally described. Servicing the overflow gate structure and any in-stream components may require river flow management, including isolation of the site using cofferdam, dewatering, flow diversion, etc. Additional information is required on potential in-stream maintenance activities, the potential effects to valued components, and the associated regulatory requirements.

The future development of a Project-specific maintenance, inspection and monitoring plan does not allow for a conceptualization of potential effects from or mitigated by specific maintenance activities, such as removal of debris and sediment from the outlet components. Additional details are required in order to assess potential effects to valued components, specifically hydrology, hydrogeology, wildlife and biodiversity, and fish and fish habitat.

Information Requests:

a) Provide details on dam integrity monitoring and ongoing maintenance activities for the floodplain berm, to account for potential effects of the environment on the Project..
b) Provide additional information on post-flood repair and maintenance activities including a list of any in-stream maintenance activities that may be required, the potential effects to valued components, and any associated regulatory requirements.

IR3-13

Topic: Bedload Sediment Accumulation

Sources:

EIS Guidelines Part 2, Section 6.2.2

EIS Volume 1 Attachment A, Section 2.2.2.2

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Context and Rationale:

The EIS Guidelines require the proponent to present information on changes to groundwater and surface water, including changes to sediment quality and quantity.

Rocky View County indicated that when the Obermeyer (overflow) crest gates are raised during the flood operation, there is the potential to stop bedload transport until sediment accumulates up to the top of the gates. This may affect the discharge capacities of the service spillway and diversion inlet and result in bedload entering and accumulating in the diversion channel. Accumulated sediment may also increase the structural load on the gates.

The Water Management Plan in the EIS indicates drawbacks to the Obermeyer crest gate which include its inability to pass bed load during floods; this would be partially mitigated with the addition of the adjacent sluiceway which passes flow and sediment. Additional detail regarding bedload sediment accumulation and continuity of bedload transport is required to understand potential environmental effects related to sediment accumulation, movement, and discharge.

Information Requests:

a) Discuss how bedload sediment accumulation in front of the Obermeyer crest gates would affect river morphology and the performance, capacity, and integrity of the service spillway, diversion inlet, and gate structure.
b) Discuss the effectiveness of the sluiceway in providing continuity of bedload transport.

IR#: IR2-14

Topic: Hydrogeology – Potential Changes to Groundwater

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.2.2

EIS Volume 3A, Sections 5.3; 5.4.2; 5.4.2.2

EIS Volume 3B, Section 5.1

EIS Volume 4, Appendix I Hydrogeology Baseline Technical Data Report, Sections 2.3, 3.1 and 3.2

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes - Combined (CEAR # 46, 47, 50)

Natural Resources Canada – Comments on the EIS, June 19, 2018 (CEAR #45)

Context and Rationale:

The EIS Guidelines require the proponent to present information regarding baseline conditions (such as delineation of stratigraphic boundaries) and changes to groundwater quality and quantity resulting from the Project. The EIS Guidelines direct the proponent to carry out modelling as required to present and substantiate anticipated changes.

Project Interactions with Groundwater

The EIS notes that road construction and reclamation activities during construction and dry operations, and reservoir sediment clean up, channel maintenance, and road and bridge maintenance during project flood and post-flood operations, are not expected to interact with hydrogeology. The EIS indicates that there will be no interaction as the activities will occur at or above the ground surface and above the water table. However, the EIS does note that lay down activities could potentially interact with groundwater such that groundwater quality is affected (e.g. incidental spills). No additional rationale is provided to describe why effects on groundwater quality may occur during lay down activities and not during road construction, reclamation, reservoir sediment clean up, channel maintenance, and road and bridge maintenance activities.

Additional information is required to understand the potential effects from all project activities on groundwater.

Diversion Channel and Construction Dewatering

The EIS 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 various Project components. As construction of the diversion channel will lower groundwater levels, details of the hydrostratigraphic units encountered along the diversion channel are required in order to accurately assess the potential changes to groundwater levels.

The EIS indicates that groundwater that would seep into the diversion channel (when dry) would remain within the watershed and that regional-scale effects on groundwater quantity can be mitigated by allowing seepage in the dry diversion channel to infiltrate back into the subsurface, or flow back into the Elbow River via surface water drainage pathways. While construction dewatering is not a permanent process, the quantity of groundwater removed for construction dewatering may be greater than what will seep into the operating diversion channel.

The majority of the Tsuut'ina Nation's private water wells draw water from the upper weathered bedrock, it is possible construction dewatering could significantly affect available groundwater.

Additional details on the diversion channel and construction dewatering are required to understand potential changes to groundwater quantity and quality and the effects of those changes, including effects on federal lands and on Indigenous peoples.

Information Requests:

a) Provide rationale as to why effects on groundwater quality are not expected to occur during road construction, reclamation, reservoir sediment clean up, channel maintenance, and road and bridge maintenance activities. If pathways of effects are identified, revise the assessment of effects to groundwater accordingly.
b) Identify the hydrostratigraphic units that will be encountered by the diversion channel excavation.
c) Prepare a NW-SE cross section that intersects the diversion channel approximately 150 m west of Highway 22 for scenarios EE0 (Average Flow Condition Simulation Under Existing Conditions) and PP0 (Average Flow Condition Simulation with the Project) with the water table shown.
d) Provide a description of the dewatering activities (location, methods, timing) for the construction of the Project. Discuss aquifers requiring dewatering and their depth.
e) Provide a numerical groundwater model simulation that predicts potential effects on groundwater from construction dewatering.
f) Provide a description of the effects of construction dewatering on federal lands.

IR3-15

Topic: Hydrogeology – Groundwater Sampling, Monitoring and Follow-up

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.2.2

EIS Volume 3A, Section 5.2

EIS Volume 3B, Section 5.2

EIS Volume 4, Appendix I Hydrogeology Baseline Technical Data Report, Sections 2.3, 3.1 and 3.2

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes – Combined (CEAR # 46, 47, 50)

Natural Resources Canada – Comments on the EIS, June 19, 2018 (CEAR #45)

Context and Rationale:

The EIS Guidelines require the proponent to present information regarding groundwater, including baseline information such as location of monitoring wells, and changes to groundwater quality and quantity resulting from the Project. The EIS Guidelines direct the proponent to carry out modelling as required to present and substantiate anticipated changes.

The EIS does not clearly present where groundwater monitoring wells are located. The EIS indicates that shallower monitoring wells were installed within the first water-bearing unit encountered and the deeper (bedrock) monitoring wells were installed in the first water-bearing bedrock unit. Hydraulic conductivities and water levels were measured in these wells and used as input data to the numerical groundwater model. Wells were not installed in the weathered upper portion of the bedrock, suggesting that hydrogeological conditions in this layer were not evaluated or used as model inputs for calibration, and therefore, the numerical groundwater model does not predict effects in the upper weathered bedrock.

Water may be able to flow between the lower bedrock and the upper weathered bedrock; however, these two layers cannot be considered a single hydrostratigraphic unit as they may have different hydraulic properties, particularly in areas of the RAA where saturated till or clay overlies the weathered bedrock.

Tsuut'ina Nation's private water wells are installed in the upper weathered bedrock. It is important to include data from wells in the upper weathered bedrock in order to accurately predict hydrogeological conditions for Tsuut'ina IR 145.

The EIS indicates that the field sampling program identified bedrock with varying permeabilities (heterogeneities, sandstone vs. claystone); however, the conceptual model did not consider the complexity of fractured flow in bedrock as bedrock was conceptualized as a single mass without heterogeneities. The uncertainty of groundwater flow direction and velocity in bedrock environments needs to be considered to assess potential implications on private water wells within the fractured bedrock. Inclusion of bedrock heterogeneities is required in order to accurately predict potential effects to groundwater quantity and quality.

Additionally, the EIS only discusses the use of domestic water wells in follow-up and monitoring. The purpose of the follow-up program is to validate the results of hydrogeological modelling and domestic wells on their own are of limited value to evaluate water level predictions. The use of dedicated monitoring wells to allow groundwater head monitoring for both dry operations and flood/post-flood response should be considered.

The EIS indicates that landowners and the Tsuut'ina Nation identified concerns with potential project effects on groundwater and local water wells. A follow-up and monitoring program will validate the results of the hydrogeological modelling and monitor the effects of a flood on groundwater in the LAA; however, the LAA is not inclusive of Tsuut'ina Nation IR 145. Therefore, there is uncertainty regarding effects to reserve lands.

Additional information is required to understand the potential changes to groundwater and the effects of those changes, including effects on federal lands and on Indigenous peoples.

Information Requests:

a) Clearly identify and label the groundwater monitoring well locations and depths.
b) Install or use monitoring wells on Tsuut'ina IR 145 that are representative of Tsuut'ina Nation's private water wells and use the hydraulic head data from these monitoring wells to calibrate the numerical groundwater model.
c) Include bedrock heterogeneities and fractured bedrock in the Conceptual Hydrostratigraphic Framework.
d) With regards to monitoring and follow-up:
    - Discuss the potential for use of dedicated monitoring wells (current or new) to allow groundwater head monitoring (i.e. with dataloggers) for both dry operations (along diversion channel) and flood/post-flood response (near reservoir).
    - Describe how high detection limits will affect follow-up and monitoring actions.
    - Confirm whether any of the current monitoring wells will be maintained for use in follow-up and monitoring.
    - Detail a follow-up and monitoring program for groundwater on Tsuut'ina IR 145. Include surveys and monitoring of Tsuut'ina's private water wells for water levels, prior to and during construction and during dry operations until groundwater under Project conditions reaches static conditions and well interference can be assessed.

e) Provide details on initial sampling of domestic wells prior to construction in order to establish pre-project baseline conditions.

IR3-16

Topic: Hydrogeology – Regional Assessment Area Boundary

Sources:

EIS Guidelines Part 1, Section 3.3

EIS Guidelines Part 2, Sections 6.1.4; 6.2.2

EIS Volume 3A, Section 5

EIS Volume 4, Appendix I, Hydrogeology Baseline Technical Data Report, Sections 2.3; 3.1; 3.2

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes - Combined (CEAR # 46, 47, 50)

Context and Rationale:

The EIS Guidelines require the proponent to present information regarding groundwater, including baseline information and changes to groundwater quality and quantity resulting from the Project. The EIS Guidelines direct the proponent to carry out modelling as required to present and substantiate anticipated changes. The EIS Guidelines also notes that spatial boundaries may vary dependent on VC and require a rationale for the selected boundaries.

The EIS indicates that the southern boundary of the RAA and numerical groundwater model is the floodplain and terrace of the Elbow River.

The EIS indicates that "the Elbow River valley is a hydraulic divide for shallow groundwater" and that groundwater on either side of the valley will be to the Elbow River. The EIS predicts that under the design flood, a 1:10 year flood, and 1:100 year flood, groundwater flows towards the Elbow River. However, the Elbow River Water Management Plan (May 2008) states that flow direction in the shallow groundwater near the Elbow River is from the river into the alluvial aquifer under flood conditions. As a result, it is unclear, under flood conditions, where groundwater will flow and whether the location of the south model boundary is reasonable.

Potential effects on Tsuut'ina IR 145 cannot be reliably estimated, as the numerical groundwater model in the EIS over-estimates the hydraulic heads and may not accurately predict flow under flood conditions along the southern model boundary, directly on and adjacent to Tsuut'ina IR 145.

Figure 5-16 of the EIS depicts a dramatic decrease in hydraulic head between the reservoir and the adjacent aquifer suggesting a base of low permeability engineered clay. However, the base of the reservoir is composed primarily of naturally occurring till and clay and a decrease in hydraulic head between the reservoir and adjacent aquifer would not likely occur. If times of high

permeability occur at the reservoir base, the hydraulic head increase will result in greater changes to the groundwater system than predicted.

Additionally, the EIS demonstrates a discrepancy between the measured and modelled heads between Figures 5-6 and 5-10, causing further uncertainty in the model predictions.

Additional information is required to understand the potential changes to groundwater and the effects of those changes, including effects on federal lands and on Indigenous peoples.

Information Requests:

a) Extend the RAA's southern boundary within the hydrogeological model to a location where the groundwater boundary conditions can be more reliably estimated. The new boundary should include a portion of Tsuut'ina IR 145. It has been suggested by Tsuut'ina Nation that the Elbow River watershed boundary be used as the southern boundary. Include a robust prediction of potential effects to Tsuut'ina IR 145.
b) Update relevant sections of the EIS to account for the new southern boundary:
    - Reconstruct and recalibrate the numerical groundwater model to adequately model the hydrogeology of the Elbow River and shallow aquifer and to assess potential effects to groundwater.
    - Re-simulate the flood scenarios once the numerical groundwater model has been reconstructed and update relevant figures.
    - Conduct a sensitivity analysis on the model including introducing high permeability windows into the reservoir base.
    - Conduct and report the particle tracking simulation and conduct sensitivity analyses using high permeable windows.
    - Reassess the potential effects to groundwater on Tsuut'ina IR 145.
c) Natural Resources Canada noted a possible error in Section 5.1.4.1 of the EIS, which states "a boundary to the northwest to encompass the subwatershed of three small tributaries to the Elbow River". Clarify if this is supposed to be northeast. If it is the northeast, describe any changes made to the analysis.

IR3-17

Topic: Hydrogeology – Groundwater Modelling

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.2.2

EIS Volume 3B, Section 5

EIS Volume 4, Appendix I, Hydrogeology Baseline Technical Data Report, Section 3

EIS Volume 4, Appendix I, Groundwater Numerical Modelling Technical Data Report, Sections 2.2; 3; 4.1; 4.2; 5, 5.1; 6

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes – Combined (CEAR #46, 47, 50)

Natural Resources Canada – Comments on the EIS, June 19, 2018 (CEAR #45)

Context and Rationale:

The EIS Guidelines require the proponent to present information regarding groundwater, including baseline information and changes to groundwater quality and quantity resulting from the Project. The EIS Guidelines direct the proponent to carry out modelling as required to present and substantiate anticipated changes.

Boundary Conditions

Several details of the boundary conditions used for hydrogeological modelling need additional description and/or justification as boundary conditions can have a significant influence on model results and the interpretation of project-related effects.

Although potential evapotranspiration (evaporation and plant transpiration) may exceed annual precipitation, a small distributed groundwater recharge is possible due to seasonal or short term excess precipitation/melt. In the current numerical groundwater model, water inputs are mostly limited to locations of prescribed head boundary conditions (i.e. mostly at model edges).

As most of the tributaries to the Elbow River within the hydrogeological modelling domain are intermittent, it is unclear why the numerical groundwater model uses prescribed (fixed) boundary conditions along intermittent streams. Additionally, several of these streams have isolated locations of prescribed boundary conditions.

As time varying hydraulic heads are not provided for locations other than those presented in Figure 4-5, it appears that the specified-head boundary conditions on the exterior boundary are time invariant, or else the time variations that have been implemented are not described.

Additionally, there is no specified recharge boundary condition. Consequently, there appears to be no time-variable boundary conditions for water input to the model.

Set-up and Calibration

Multiple details of the hydrogeological model settings, parameters and calibration, including the transient model setup, are required to understand model results.

The model boundary conditions include prescribed heads at both the top and bottom of the groundwater flow system and not a range of possible heads, which may hinder the calibration of model parameters. Additionally, the locations of most calibration targets are in close proximity to locations of prescribed head boundary conditions, which may limit the calibration of model parameters. Identification of all locations used as calibration targets is needed.

The EIS indicates that there was no need to differentiate among the bedrock formations due to the similarities in lithologies. The numerical groundwater model shows that the calibrated hydraulic conductivity values for the shallow bedrock range over almost three orders of magnitude. Information to understand the range of calibrated values is needed.

Hydraulic conductivities (K) are presented for various monitoring wells, borehole intervals, and as preliminary model estimates although final calibrated hydraulic conductivities values are not provided. Maps and cross-sections of final calibrated values would be beneficial to understand the hydraulic conductivities.

Additional information is required to understand the potential changes to groundwater and the effects of those changes, including effects on federal lands and on Indigenous peoples.

Information Request:

a) Apply distributed groundwater recharge across the hydrogeological model domain, or provide a rationale as to why it does not need to be considered.
b) Provide additional details on boundary conditions:
    - Provide rationale for the use of prescribed boundary conditions as the main boundary condition along the model exterior and along intermittent streams.
    - Document the use of any constraints on prescribed head boundary conditions (e.g. the use of “seepage face” boundary conditions).
    - Indicate why several of the intermittent streams have isolated locations of prescribed boundary conditions.
c) Provide additional detail on the time variant conditions applied:
    - Describe the boundary conditions used along the diversion channel for steady-state simulation PP0 (Average Flow Condition Simulation with the Project).
    - Discuss how boundary conditions were applied along the rest of the diversion channel, reservoir and Elbow River.

- Include time-varying boundary condition data for the perimeter boundary for each layer of the model domain and describe how this data was collected or inferred. Clarify what time variations have been implemented.
- Discuss how the model accommodates variable water inputs from precipitation during flood simulations. Specify the time-variable boundary conditions that control the water inputs to the model.

d) Provide additional detail on the model set-up and calibration. Include:
   - The number of model layers, which hydrostratigraphic units are assigned to which layers, and how hydraulic conditions are treated in each layer (free, phreatic, confined or dependent);
   - All locations used as calibration targets;
   - Whether groundwater flow rates or discharge were used to constrain model calibrations;
   - The full range of model parameters (e.g. hydraulic conductivity) that may produce reasonable model calibrations; and
   - Whether any attempts were made to calibrate specific storage values in transient models.

e) Provide additional detail on hydraulic conductivities. Include:
   - A table that shows the initial and final (calibrated) hydraulic conductivities value for each hydrostratigraphic unit and report the anisotropy ratio;
   - Maps and cross-sections of final calibrated hydraulic conductivities values, and the three zones of calibrated bedrock hydraulic conductivity; and
   - A rationale for the range in calibrated hydraulic conductivity values for the shallow bedrock and compare them with the measured values.

f) Describe the following aspects of the transient model setup:
   - Report the specific storage (Ss) values for each hydrostratigraphic unit (and specific yield for any unconfined layers). Describe how these values were obtained and estimate an appropriate range of values.
   - Indicate the time step used and justify why a fixed time step was used for a model in which rapid water level changes are modelled.

g) Describe any changes to the outcome of the numerical groundwater model and in turn to the assessment of changes to groundwater, including effects on federal lands and Indigenous peoples.

IR3-18

Topic: Hydrogeology – Groundwater Baseline and Model Sensitivity

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.2.2

EIS Volume 3A, Section 5

EIS Volume 3B, Section 5

EIS Volume 4, Appendix I, Groundwater Numerical Modelling Technical Data Report

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes – Combined

Natural Resources Canada – Comments on the EIS, June 19, 2018 (CEAR #45)

Context and Rationale:

The EIS Guidelines require the proponent to present information regarding groundwater, including baseline information and changes to groundwater quality and quantity resulting from the Project. The EIS Guidelines direct the proponent to carry out modelling as required to present and substantiate anticipated changes.

Clarifications and additional information are required regarding the groundwater baseline studies and hydrogeological modelling in order to understand the potential changes to groundwater and the effects of those changes, including effects on federal lands and on Indigenous peoples.

For example, it is not clear what model or hydrostratigraphic layer(s) are represented in the potentiometric head maps of hydrogeological modelling. Clarity is needed because the water table crosses hydrostratigraphic units and vertical gradients are present.

The cross section figures in the EIS indicate that the unconsolidated deposits may be unsaturated along many ridges and hillslopes. The potentiometric maps for unconsolidated deposits should only indicate contours for areas where unconsolidated deposits are saturated. Areas where the water table is below the unconsolidated deposits should be clearly indicated.

The hydrogeological units represented by control points CP4 and CP5 (bedrock or unconsolidated deposits) are not indicated. Natural Resources Canada noted that, given the lack of hydraulic response at these locations, additional locations closer to the reservoir (in which there is a response) would help demonstrate how the response of piezometric heads varies with distance from the reservoir in response to reservoir flooding.

The simulation times of the various hydraulic head maps shown in Figure 6-6 are not clearly indicated. Natural Resources Canada indicated it might be more useful to indicate the time with respect to the boundary condition hydrograph.

Hydrogeological modelling should include a sensitivity analysis to consider the potential effects of model uncertainty on transient model results and predicted effects. Uncertainties in specific storage and hydraulic conductivity can have a significant influence on piezometric head propagation. The sensitivity to specific storage values is of particular significance since the model was calibrated to hydraulic conductivity under steady state conditions.

Information Requests:

a) Specify what units/layers are represented in the potentiometric head maps and discuss how these maps were produced.
b) Identify all water level measurement locations used to map the potentiometric surface of unconsolidated deposits and clearly identify areas where the water table is below the unconsolidated deposits.
c) Provide contour maps of the surface topography and bedrock surface topography to allow for a comparison with piezometric head maps.
d) Indicate the hydrogeological units represented by control points CP4 and CP5.
e) Clearly identify the simulation times of the various hydraulic head maps shown in Figure 6-6 (Volume 4, Appendix I) or indicate the time with respect to the boundary condition hydrograph (e.g. arrows showing simulation times on Figure 5-1 (Volume 3B, Section 5)).
f) Provide a sensitivity analysis to demonstrate the influence of uncertainty in hydrogeological model parameters on the distance of piezometric head propagation resulting from the PP1 scenario (Design Flood with Project Operation).

IR3-19

Topic: Groundwater – Culturally Sensitive Groundwater Resources

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.1.9; 6.2.2; 6.3.4

Piikani Nation – Technical Review of EIS, June 15, 2018 (CEAR #48)

Context and Rationale:

The EIS Guidelines require the proponent to present information regarding groundwater, including baseline information and changes to groundwater quality and quantity resulting from the Project. The EIS Guidelines also require the proponent to assess the effects of changes to the environment on Indigenous peoples, including on physical and cultural heritage.

The EIS does not assess the potential existence of groundwater-dependent, traditionally used and culturally sensitive areas, such as cabins, recreational sites, fishing, hunting, and plant gathering areas within the RAA, LAA or PDA. Pathways of effects for groundwater-dependent traditional uses could be indirect through plant gathering (e.g. medicinal plants) or direct (accessing shallow groundwater or springs near cabins, fishing or hunting sites). These pathways are often related to the considerable potential for surface water/groundwater interaction in the project area.

Additional information is required to understand the potential changes to groundwater and effects of those changes on Indigenous peoples, including effects on physical and cultural heritage.

Information Requests:

a) Identify groundwater dependent traditional uses and culturally sensitive areas and describe potential pathways of effects. These pathways should consider the potential for any project impacts to groundwater to affect traditional use and culturally sensitive areas, regardless of whether the groundwater effects are considered significant.
b) Identify mitigation measures, and associated monitoring and follow-up, related to groundwater to protect traditional use and culturally sensitive areas. Consider and describe protection related to the contribution of natural groundwater flow.

IR3-20

Topic: Ice Regime

Sources:

EIS Guidelines Part 2, Section 6.2.2

EIS Volume 3A, Section 6.2

EIS Volume 3B, Section 6, Table A-2

Context and Rationale:

The EIS Guidelines require the proponent to assess changes to groundwater and surface water, including changes to ice regime.

The EIS notes that ice regime effects are assessed in Volume 3B, Section 6 (Hydrology). However, no discussion of ice regime is present in Volume 3B. Although the existing conditions of ice dynamics are discussed in Volume 3A, Section 6.2 of the EIS, information is not provided on consideration of changes to ice regime as a result of the Project.

Additional information is required to understand changes to ice regime that could result from the Project, and effects of those changes on valued components.

Information Requests:

a) Describe potential changes to ice regime as a result of the Project. Include a discussion the potential for Project components to affect ice jamming, particularly during flooding, and the potential effects from this on relevant valued components.
b) If necessary, update the Concordance Table (Volume 4, Appendix A, Table A-2) based on the sections that discuss ice regime effects.

IR3-21

Topic: Water Quality – Nutrients

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.2.2

EIS Volume 3A, Section 8

EIS Volume 3B, Section 8

EIS Volume 4, Appendix K

Piikani Nation – Technical Review of EIS, June 15, 2018 (CEAR #48)

Context and Rationale:

The EIS Guidelines require baseline data and assessment of potential effects to water quality associated with nutrients.

The EIS considers select nutrients of concern and risks for eutrophication. The detection limits selected may not a support a full understanding of how the Project may contribute to eutrophication. For example, some detection limits reported are within the hypereutrophic range. Further, the EIS does not provide information on the potential for cyanobacterial blooms or microcystin toxin release in the reserve or downstream.

Additional information is required regarding nutrient detection limits and potential eutrophication and toxin production, to understand potential changes to water quality and the environmental effects of those changes.

Information Requests:

a) For each nutrient, compare detection limits listed in the EIS with standard detection limits in federal and/or provincial water quality guidelines. If detection limits are higher than guidelines, provide a rationale for the selection of detection limits, describe associated limitations, and identify how these limitations will be addressed. Identify the water quality guidelines used in the assessment.
b) Describe how low-level detection limits for nutrients will be integrated into water quality monitoring and follow-up programs to ensure that trophic categories can be assessed and guidelines adhered to.
c) Provide an assessment of the potential for the off-stream reservoir to develop cyanobacterial blooms and the associated potential for the production of microcystin toxins. Include an analysis of the potential introduction and dispersion of these toxins in the Elbow River and drinking water supplies, such as the Glenmore Reservoir. Describe

associated mitigation measures and contingency plans should cyanobacterial blooms develop in the reservoir.

IR3-22

Topic: Water Quality - Modelling of Post-Flood Parameters

Sources:

EIS Guidelines Part 2, Section 6.2.2 and 6.3.1

EIS Volume 3B, Section 7.1.1.1

EIS Volume 4, Appendix K

Piikani Nation – Technical Review of EIS, June 15, 2018

Context and Rationale:

The EIS Guidelines require that any changes to TSS, turbidity, oxygen levels, water temperature, pH, dissolved oxygen, ice regime, water quality including metals, methyl mercury, nutrients, dissolved/total organic carbon, biological oxygen demand, carbonaceous biochemical oxygen demand, pesticides, aquatic indicators, and sediment quality be included in the EIS.

The EIS provides a quantitative assessment of Project effects to TSS and uses TSS as a surrogate to qualitatively examine the effects of the Project during flood and post-flood on other parameters, such as nutrients, metals, and coliforms. The EIS explains that such an approach reduces duplicative efforts and addresses the core processes that produce water quality patterns in Elbow River. However, further rationale is needed to determine whether effects to TSS is an appropriate surrogate for each of the other water quality parameters. Potential effects to nutrients, metals, and coliforms may be underestimated if TSS does not act similarly to these parameters.

Indigenous groups raised concerns with water quality changes associated with chemicals found within the reservoir area. The EIS lists a few best management practices from the Environmental Code of Practice for Pesticides to prevent introducing herbicides to surface water. Some of these included maintaining a distance between mixing/application of products and open bodies of water. However, the soil chemistry results for hydrocarbons (F3-F4) shown in Table A-4 of the technical report (Appendix K) suggested that it was likely that some of the flooded reservoir pasture lands might have had herbicides applied or are otherwise contaminated with hydrocarbons.

Additional information is required to understand changes to water quality from the project and environmental effects of those changes.

Information Requests:

a) Provide evidence that TSS is an appropriate surrogate for other water quality parameters not assessed and listed in the EIS Guidelines Part 2, sections 6.2.2 and 6.3.1. If TSS is

found to be not suitable as a proxy for any water quality parameters, provide an assessment of the potential effects to that parameter and associated potential changed to water quality.

b) With regards to pesticides and hydrocarbon contamination:
    i. Assess effects related to herbicides applied to control vegetation during Project operations, and also to any existing hydrocarbons including herbicides that are on lands within the full project footprint;
    ii. Provide a project footprint map at a larger scale than shown in Figure 2 (EIA, Volume 4, Appendix K) that more clearly depicts the locations of the sediment and soil quality sampling sites;
    iii. Clarify how adequate setbacks for stored fuels, lubricant from vehicles and herbicide applications on the Project footprint will be maintained before an extreme flood event occurs, to prevent introducing hydrocarbons or other contaminants to water during a flood event.

IR3-23

Topic: Fish and Fish Habitat – Effects of Noise

Sources:

EIS Guidelines Part 2, Sections 6.1.5; 6.2.1; 6.3.1

EIS Volume 3A, Section 4; 11

EIS Volume 3B, Section 4; 11

Context and Rationale:

The EIS Guidelines require that the assessment include consideration of changes in ambient noise levels as a result of the Project. The EIS Guidelines require the proponent to provide baseline information on and assess the effects of changes to the environment on fish and fish habitat.

Several studies (Smith et al. 2004; Hastings and Popper 2005; Popper and Hastings 2009; Voellmy et al. 2014) indicate that an increase in anthropogenic noises and associated vibrations could have a potential effect on fish, such as behavioural changes that can result in decreased fitness; temporary or permanent damage to sound receptors; avoidance of areas with elevated sound levels; and changes in anti-predator behaviours of prey species.

The EIS does not consider noise and vibration effects on fish and fish habitat.

Information Requests:

a) Provide an assessment of the effects of noise and vibration to fish and fish habitat during construction.
b) Describe mitigation measures to reduce or eliminate the effects of noise and vibration on fish and fish habitat.

IR3-24

Topic: Fish and Fish Habitat – Habitat Destruction

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.1.5; 6.2.2; 6.3.1

EIS Volume 3A, Sections 8.3; 8.4; 8.7

EIS Volume 3B, Section 8.2.5

Fisheries and Oceans Canada – Comments on the EIS, June 19, 2018 (CEAR #28)

Context and Rationale:

The EIS Guidelines require the proponent to provide baseline information on and assess the effects of changes to the environment on fish and fish habitat.

The EIS indicates that there would be temporary and permanent areas of disturbance within the bankfull of the Elbow River. For instance, the permanent diversion structure footprint is 1,854 m2 on class 2 and class 3 run type fish habitat. A characterization of the type and extent of fish habitat affected is important in determining residual impacts, and extent of offsetting required.

The EIS lists bridge construction as resulting in the permanent alteration of fish habitat, destruction of fish habitat, and death of fish. However, the details of the bridge construction are not provided. Additionally, the EIS states that during construction, the footprint within the bankfull water level may result in a temporary infill of habitat for the area that is not submerged during flows at the 1:2 flood level. This temporary infill is not explained or included as one of the Project components.

Throughout the EIS, it is not clear what areas and type of fish habitat will be affected by Project components and the type of disturbance that will occur (destruction or permanent alteration). To clearly understand the potential effects to fish and fish habitat, a summary of this information and figures should be provided.

Additionally, the EIS states that the characterization of the residual effects from the destruction of fish habitat is anticipated to be neutral in direction and short-term in duration. It is unclear how these characterizations were determined. A rationale for the characterization of residual effects is important to understand if there may be potential effects to fish and fish habitat.

Information Requests:

a) Provide a detailed breakdown of areas to be affected by the Project and the areas of each temporary or permanent structure, including:

- The extent, type and cause of fish habitat destruction resulting from bridge construction.
- Additional details on the temporary infill of habitat, including an explanation of how this infill would result in destruction of fish habitat, and the type and area of habitat destruction.
- A table listing and summarizing all destruction and permanent alteration to fish habitat.
- A figure which illustrates the area to be affected and the type of disturbance (i.e., destruction vs. permanent alteration) and relate it to the type of habitat affected.

b) Provide a rationale for the characterization of residual effects from the destruction of fish habitat.

IR3-25

Topic: Fish and Fish Habitat – Mapping

Sources:

EIS Guidelines Part 2, Sections 6.1.5; 6.3.1.

EIS Volume 3A Section 8, Figure 8.2-2; Table 8-5

Louis Bull Tribe – EIS Review Submission, July 18, 2018 (CEAR #49)

Fisheries and Oceans Canada – Comments on the EIS, June 19, 2018 (CEAR #28)

Context and Rationale:

The EIS Guidelines require the proponent to provide baseline information on and assess the effects of changes to the environment on fish and fish habitat, and require maps indicating the surface area of potential or confirmed fish habitat for spawning, nursery, feeding, overwintering, migration routes, etc.

The EIS includes a map of fish habitat that classifies fish habitat at the proposed diversion site as features (class 2 and class 3 runs, class 3 pools, rapids, riffles, and snyes). However, fish habitat is defined in the EIS as spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes. The fish habitat mapping in the EIS is not consistent with the definition of fish habitat in both the EIS and EIS Guidelines. Additionally, the EIS does not include mapping for habitat downstream of the low-level outlet.

The EIS provides an overview of the features that make up the habitat of selected fish in the Elbow River. The features noted in Table 8-5 are different than those noted in Figure 8.2-2. It is not clear whether Table 8-5 is meant to correspond with Figure 8.2-2.

Thorough characterization of fish habitat is important for understanding the effects of the Project on fish and fish habitat.

Information Requests:

a) For all areas already mapped, provide a map of fish habitat that is consistent with the definition of fish habitat provided in the EIS and the requirements in the EIS Guidelines.
b) Provide a Fish Habitat Map for the Elbow River at the low level outlet channel, consistent with the requirements in the EIS Guidelines.
c) Clarify whether Table 8-5 is meant to correspond with Figure 8.2-2, and explain the differences between the information provided.

IR3-26

Topic: Fish and Fish Habitat – Upstream Migration

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.1.5; 6.2.2; 6.3.1

EIS Volume 3A, Section 8.4.4.2

Fisheries and Oceans Canada – Comments on the EIS, June 19, 2018 (CEAR #28)

Context and Rationale:

The EIS Guidelines require the proponent to provide baseline information on and assess the effects of changes to the environment on fish and fish habitat.

The EIS indicates that downstream burbot movements should not be impeded, although upstream movements at this time might be to low velocity areas along the channel margin. This does not allow for a full understanding of potential effects of the project on fish migration and fish habitat.

Information Request:

a) Clarify and provide an explanation of current and Project related potential barriers and restrictions to migration for burbot.

IR3-27

Topic: Fish and Fish Habitat – Water Quality

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.1.5; 6.2.2; 6.3.1

EIS Volume 3B, Sections 7.4.3; 8.2.2.3

Fisheries and Oceans Canada – Comments on the EIS, June 19, 2018 (CEAR #28)

Context and Rationale:

The EIS Guidelines require the proponent to provide baseline information on and assess changes to water quality including temperature and dissolved oxygen and to provide baseline information on and assess the effects of changes to the environment on fish and fish habitat.

The EIS limits the assessment of effects of changes in water temperature and dissolved oxygen to a comparison of these parameters with the Project to these parameters in a flood event.

Fisheries and Oceans Canada indicated the comparison of Project effects to flood event effects is not suitable for determining potential effects to fish and fish habitat from changes in water temperatures and dissolved oxygen.

Information Request:

a) Provide a revised assessment of effects to fish and fish habitat from changes in temperature and dissolved oxygen. Compare potential effects to fish and fish habitat from Project changes to water temperature and dissolved oxygen at the point of discharge to existing conditions downstream of the outlet channel and in the Glenmore Reservoir.

IR3-28

Topic: Fish and Fish Habitat – Spawning Assessment

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.1.5; 6.2.2; 6.3.1

EIS Volume 3B, Section 8.2.4

Fisheries and Oceans Canada – Comments on the EIS, June 19, 2018 (CEAR #28)

Context and Rationale:

The EIS Guidelines require the proponent to provide baseline information and assess the effects of changes to the environment on fish and fish habitat.

The EIS describes spawning periods for various fish species throughout the spring and summer months, and high level information about typical flows during those times for the Elbow River.

It is not clear whether a spawning assessment was conducted for the low level outlet and the potential effects of draw down from the reservoir are not considered.

Information Request:

a) Assess potential effects to spawning within the low level outlet channel including, including a discussion of the consequences of reservoir draw down on potential spawning activity in the low level outlet.

IR3-29

Topic: Fish and Fish Habitat – Fish Stranding

Sources:

EIS Guidelines Part 2, Sections 6.1.5; 6.3.1

EIS Volume 3B, Section 8.2.4

EIS Volume 3C, Section 1.3.5.1

Samson Cree Nation – Springbank Off-Stream Reservoir Project Written Submission – June 25, 2018 (CEAR #52)

Piikani Nation – Technical Review of EIS, June 15, 2018 (CEAR #48)

Fisheries and Oceans Canada – Comments on the EIS, June 19, 2018 (CEAR #28)

Context and Rationale:

The EIS Guidelines require the proponent to provide baseline information on and assess the effects of changes to the environment on fish and fish habitat. The EIS Guidelines also require the proponent to assess the effects of changes in the environment on Indigenous peoples.

Fish entrainment and stranding has been identified as a potential effect on fish, with associated effects on Indigenous peoples. The EIS indicates that if potential fish stranding is identified, further action will be taken to reduce the potential mortality of fish, and notes that entrainment of fish into the reservoir during active diversion may cause bodily harm to fish as they are transported along the canal. It is not clear when and what actions will be taken to reduce areas of fish stranding. Physical works to reduce areas of potential stranding, such as further grading, should be considered and additional mitigation measures should be provided.

The EIS states that 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. However, lower water quality in the reservoir as a result of warming of the water (i.e., thermal stress), lower dissolved oxygen, or increased susceptibility and/or prevalence of disease amongst fish trapped within the reservoir could result in impaired health and death to fish. Threats of predation may be elevated in the reservoir, especially during drawdown. These pathways of effects are not considered in the assessment of effects to fish.

Indigenous groups have raised concerns with the entrainment and stranding of fish from a spiritual and cultural perspective. The proposed treatment of fish has been described as antithetical to natural law that governs interspecies relationships. The assessment of associated effects and appropriate mitigations must take this into account.

Additional detail on potential effects and proposed mitigation associated with fish entrainment and stranding is required to understand potential effects to fish and potential effects to Indigenous peoples.

Information Requests:

a) Assess potential effects to fish trapped in the reservoir, specifically sensitive salmonid species, due to changes in water quality and threats of predation.
b) Provide additional mitigations that will be undertaken to reduce potential effects to fish, including mortality, should stranding occur. Describe the timing for implementation of mitigations and the associated thresholds for when mitigations would be applied.
c) Consider and discuss the natural law implications of the proposed Project relative to the treatment of fish and potential effects to Indigenous peoples. Identify related mitigation.
d) Provide the details of a monitoring and follow-up program for fish entrainment and stranding.

IR3-30

Topic: Fish and Fish Habitat - Westslope Cutthroat Trout

Sources:

EIS Guidelines Part 2, Sections 6.1.5; 6.3.1

EIS Volume 3A, Section 8.2.2.3

Métis Nation British Columbia – Technical Review (CEAR #1153)

Samson Cree Nation – Springbank Off-Stream Reservoir Project Written Submission – June 25, 2018 (CEAR #52)

Context and Rationale:

The EIS Guidelines require the proponent to provide baseline information on and assess the effects of changes to the environment on fish and fish habitat. The EIS Guidelines also require the proponent to assess the effects of changes in the environment on Indigenous peoples.

The EIS presents information on westslope cutthroat trout and its habitat, and indicates that pure-strain westslope cutthroat trout are not present within the RAA and LAA. Evidence for this conclusion is not presented in the EIS.

Westslope cutthroat trout are a species of interest to Indigenous groups. Samson Cree Nation noted that the PDA has historically provided habitat for westslope cutthroat trout and they remain present in the upper Elbow River and its tributaries, outside of the PDA. Additional information is required to assess effects on fish and effects on Indigenous peoples.

Information Requests:

a) Provide evidence of the historic and current presence of westslope cutthroat trout (pure and hybrid) within the PDA.
b) Provide evidence for claims of hybridization of westslope cutthroat trout in the RAA and LAA.
c) Describe how the Project and proposed mitigation measures for fish and fish habitat fits with and/or could contribute to overall goals of the Recovery Strategy for the Alberta populations of westslope cutthroat trout in Canada.

IR3-31

Topic: Fish and Fish Habitat – Assessment of Effects

Sources:

EIS Guidelines Part 2, Sections 6.1.5; 6.3.1; 6.6.3

EIS Volume 3C, Section 1.3.5.1

EIS Volume 4, Appendix M, Section 2.2.2

Fisheries and Oceans Canada – Comments on the EIS, June 19, 2018 (CEAR #28)

Context and Rationale:

The EIS Guidelines require the proponent to provide baseline information on and assess the effects of changes to the environment on fish and fish habitat. The EIS guidelines also require the proponent to identify and assess the Project's cumulative effects.

CRA Fisheries

Throughout the EIS, it is unclear how the proponent defines or understands the prohibition against serious harm to fish as it applies to fish and fish habitat that are part of or support commercial, recreational or Aboriginal (CRA) fisheries as defined in the *Fisheries Act*. Should the proponent be interpreting this definition incorrectly, potential effects to fish and fish habitat may be underestimated.

The EIS states that forage fish species are species that are below the top of an aquatic food chain, are an important source of food for at least some predators, and experience high predation mortality. Additionally, the EIS assumes that the presence of higher trophic feeders indicates suitable habitats for forage fish. DFO indicated that fish that support CRA fisheries are those that contribute to the productivity of a fishery (often as prey species) and also may reside in waterbodies that contain CRA fisheries or are connected by a watercourse to such waterbodies. The description of fish and fish habitat in the EIS is not consistent with interpretations practiced by the DFO Fisheries Protection Program. Accurate interpretations of the *Fisheries Act* are necessary in order to assess the potential for effects to fish and fish habitat.

Significance Determinations

The cumulative effects assessment in the EIS states that changes to aquatic ecology, bedload, and fish habitat are not expected to affect the abundance or distribution of bull trout or cutthroat trout in the Elbow River, nor affect fish species that support CRA fisheries and species at risk. On this basis, the EIS concludes that permanent alteration of fish habitat from the Project is not significant. However, consideration of effects to fish under section 5 of CEAA 2012 should not

be limited to these species. Further, rationale for the conclusion in the EIS that adverse residual effects on aquatic ecology due to the permanent alteration of fish habitat and death of fish would not affect the abundance or distribution of fish species that support CRA fisheries is not provided.

DFO indicated that there is potential spawning habitat for all fish species, including those that are a part of or support CRA fisheries downstream of the low level outlet channel that has not been considered. Additional information is required to understand potential cumulative effects to fish and fish habitat.

Information Requests:

a) Describe potential effects to fish that support CRA fisheries considering fish species that contribute to the productivity of CRA fisheries.
b) Revise the cumulative effects assessment for effects to fish and fish habitat to:
    - Demonstrate how fish spawning habitat has been considered in the cumulative effects assessment;
    - Consider effects to all potentially affected fish species or provide a rationale for the use of bull trout, cutthroat trout, fish species that support CRA fisheries, and species at risk in determining significance.
    - Provide a rationale for the conclusion that adverse residual effects on aquatic ecology due to the permanent alteration of fish habitat and death of fish would not affect the abundance or distribution of fish species.
    - Clarify how potential effects to fish were determined to be not significant given the permanent, high magnitude residual effects.

IR3-32

Topic: Human Health Risk Assessment

Sources:

EIS Guidelines Part 2, Section 6.3.4

EIS Volume 4, Appendix O, Section 6.2.4; 6.2.5

Health Canada Comments on the EIS – June 15, 2018 (CEAR # 30)

Context and Rationale:

The EIS Guidelines require the proponent to assess the effects of changes to the environment on Indigenous peoples, including on health.

The EIS makes the assumption that all chromium emissions were hexavalent chromium and does not demonstrate negligible. Health Canada indicated that the risk associated with hexavalent and trivalent chromium needs to be assessed separately as these chemicals have different effects to health. Additionally, both hexavalent and trivalent chromium may be present in soils as a result of airborne deposition post-construction. Estimates of risk associated with airborne exposure to chromium (both hexavalent and trivalent) is important to ensure that potential short duration exposure effects are not overlooked and are adequately characterized.

Information Requests:

a) Provide quantitative risk estimates for hexavalent chromium and trivalent chromium separately and provide estimates of risk associated with anticipated airborne exposure during the construction phase.
b) Describe whether elevated levels of hexavalent and trivalent chromium may be present in soils as a result of airborne deposition post-construction.

IR3-33

Topic: Country Foods

Sources:

EIS Guidelines Part 2, Sections 6.1.4; 6.1.9; 6.2.2; 6.3.4

EIS Volume 4, Appendix O, Section 6.3.2

Health Canada Comments on the EIS – June 15, 2018 (CEAR #30)

Piikani Nation – Technical Review of EIS, June 15, 2018 (CEAR #48)

Montana First Nation – Review of Springbank Off-Stream Reservoir EIA, June 2018 (CEAR #51)

Context and Rationale:

The EIS Guidelines require the proponent to assess the effects of changes to the environment on Indigenous peoples, including effects on current use and on health, both of which are related to the availability, quality, and accessibility of country foods.

The EIS notes that there is the potential for conversion of natural mercury to methylmercury during a flood. Flooding will occur over a short time period and may not be enough time to result in significant bioaccumulation or biomagnification in the food chain. However, there is uncertainty regarding retention and draw down times that may not have been considered.

The EIS indicates that the highest predicted methylmercury concentrations in the reservoir water after draining under both the 1:100 year and 1:10 year floods scenarios do not exceed the CCME guideline for the protection of aquatic life. However, the short-term (acute) provincial guideline for methylmercury is exceeded and not discussed in the EIS.

Indigenous users have identified that country foods are harvested from the Elbow River. The precautionary principle should be followed to be protective of human health.

Additional information is required to understand potential changes to country foods and effects on Indigenous peoples.

Information Request:

a) Describe the potential effects to aquatic organisms in the reservoir that will result from methylmercury concentrations reaching the 0.002 µg/L short-term guideline and exceeding the long-term (chronic) guideline established by Alberta.

b) Describe the spatial extent of potential effects that would result from the release of water containing 0.002 µg/L methylmercury, into the Elbow River, taking into account the frequency of the release of waters with this concentration.
c) Identify the country foods harvested from the Elbow River and for each describe the susceptibility to the uptake and biomagnification of methylmercury.
d) Include commitments for baseline methylmercury sampling of country foods along with a monitoring and follow-up program of methylmercury in these foods following reservoir flooding.
e) Incorporate the information from IR1-06 issued to Alberta Transportation by the Agency on June 29, 2018 into the response.

IR3-34

Topic: Noise

Sources:

EIS Guidelines Part 2, Sections 6.1.1; 6.1.9; 6.2.1; 6.3.4

EIS Volume 3A, Sections 4.3; 4.4.2.2

Health Canada Comments on the EIS – June 15, 2018 (CEAR #30)

Context and Rationale:

The EIS Guidelines require a description of baseline noise levels and changes in ambient noise levels, as well as an assessment of the effects of changes to noise levels on Indigenous peoples.

The EIS indicates that blasting may occur during Project construction and the contractor would prepare a blasting safety plan and submit it to the proponent. However, blasting was not included in the assessment of potential effects from noise. The EIS also notes that mitigation will be developed for each of the identified noise assessment scenarios when the Project schedule is finalized.

Considering noise thresholds may be exceeded at several receptors, a noise follow-up and management plan, including mitigation, should be provided. Special consideration should be given to night construction noise mitigation measures to minimize potential effects to Indigenous people's health (i.e. sleep). Effects of blasting on the sensory environment and experience of the land by Indigenous peoples should also be considered.

Information Request:

a) Provide an updated assessment of effects of noise from the Project, including blasting noise. Include proposed mitigation measures for construction noise, any residual effects after the measures are implemented, and any follow-up programs.

IR3-35

Topic: Air Quality – Canadian Ambient Air Quality Standards (CAAQS)

Sources:

EIS Guidelines Part 2, Sections 6.1.1; 6.1.9; 6.2.1; 6.3.4; 8

EIS Volume 3A, Section 3; 15.4.4

EIS Volume 3B, Section 3; 15.4.2.3

EIS Volume 3C, Section 2.2

EIS Volume 4, Appendix E; Appendix O Table 4-1

Environment and Climate Change Canada Technical Review, June 18, 2018 (CEAR #32)

Health Canada Comments on the EIS – June 15, 2018 (CEAR #30)

Context and Rationale

The EIS Guidelines require a description of baseline air quality levels and changes in air quality, as well as an assessment of the effects of changes to air quality on Indigenous peoples. The EIS Guidelines require the proponent to compare anticipated air quality against the *Canadian Ambient Air Quality Standards* (CAAQS) for fine particulate matter.

In the EIS, the 2017 CAAQS for NO_2 are referenced and used in the health assessment but not in the air quality assessment. During the construction stage, if predicted NO_2 levels are expected to exceed the CAAQS levels, it is important to reference CAAQS NO_2 levels in the air quality and climate monitoring plan. Additionally, the EIS uses the 2015 CAAQS standards for $PM_{2.5}$ (as opposed to the 2020 standards). It is important to evaluate $PM_{2.5}$ concentrations to confirm concentrations are below the annual and 24-hour 2020 $PM_{2.5}$ CAAQS, as the Project stages are expected to occur during or after 2020.

The air quality assessment predicts exposure ratios (ER) greater than 1 for NO_2, $PM_{2.5,}$ and diesel exhaust particulate at some receptors. To compare predicted concentrations for the Project with the 2020 CAAQS, the same metric should be used (i.e. the 3-year average of the 98th percentile), and applied to both $PM_{2.5}$ and NO_2.

Additional information is required to understand project changes to air quality, relative to applicable standards, and the effects of changes in air quality on Indigenous peoples.

Information Requests:

a) Revise the air quality assessment to consider the 2017 CAAQS for $NO_{2:}$
   - Describe the potential for the Project to contribute to ambient concentrations of NO_2 that exceed the CAAQS and provide a comparison of modelled ambient concentrations of NO_2 in the LAA and RAA.
   - Assess the locations and frequency of NO_2 CAAQS exceedance that may occur as a result of the Project.

b) Compare predicted ambient and $PM_{2.5}$ concentrations with the appropriate 2020 CAAQS.
   - Provide the potential for exceedance of these standards, and describe whether existing mitigation measures described in the EIS are adequate.
   - Revise the $PM_{2.5}$ exposure limit and update the follow-up and monitoring plan to include the 2020 $PM_{2.5}$ CAAQS.

c) If CAAQS are exceeded, describe what mitigation measures would be employed and how follow-up and monitoring plans would be updated to consider monitoring with comparison to the CAAQS.
   - Describe the criteria which trigger the air quality follow-up and monitoring plan, and the timing for when mitigation measures to reduce COPC concentrations would be implemented.

d) Provide specific measures to mitigate the potential risk for adverse health effects from air contaminants that have ERs of 1 or greater.

IR3-36

Topic: Air Quality – Dust

Sources:

EIS Guidelines Part 2, Sections 6.1.1; 6.1.9; 6.2.1; 6.3.4

EIS Volume 4 Appendix E, Attachment 3A

Environment and Climate Change Canada Technical Review, June 18, 2018 (CEAR #32)

Health Canada Comments on the EIS – June 15, 2018 (CEAR #30)

Context and Rationale:

The EIS Guidelines require a description of baseline air quality levels and changes in air quality, as well as an assessment of the effects of changes to air quality on Indigenous peoples.

The EIS uses a 90% natural mitigation efficiency for fugitive dust emissions on haul roads during winter months, which assumes almost complete snow and ice cover on the road to reduce the amount of dust generated. This value is based on a study on haul roads from two diamond mines (Northern Ontario and Northwest Territories). There is uncertainty in the assessment as the winter conditions at these mines may not be similar to the Project area, as it is not likely that the Project area experiences full snow cover during winter months. Additionally, the EIS indicates that the transportable fraction (TF) used to estimate fugitive dust emissions corresponds to grasslands and is used for both summer and winter. This assumes that any accumulated precipitation (i.e. snow) does not cover the grass.

By using a high natural control efficiency based on snow and ice cover together with a TF for grasslands, it is uncertain whether calculations of fugitive dust emissions are accurate. Empirical control efficiencies are not intended to be additive and if the results are extended to other sites, different conditions and potential changes need to be adequately taken into account.

Details on road dust mitigation and monitoring of the mitigation effectiveness have not been provided. It is unclear how the dust exceedances from the Project will be managed and how any effects from interactions with the nearby developments will be determined and managed.

Additional information is required to understand project changes to air quality and the effects of changes in air quality on Indigenous peoples.

Information Requests:

a) Provide documentation that confirms that there would be enough snow cover in the Project area from November to February to achieve 90% dust control and an explanation as to why

90% natural control efficiency, derived from northern Canada, is applicable in the Project area.

b) Provide updated emission calculations, predicted concentrations, and isopleth maps with either a TF or a natural control efficiency applied in isolation.
c) Provide an analysis where both TF and natural control efficiency (in winter) is used in estimating road dust.
d) Provide details on how road dust mitigation will be applied and measured.
e) Given this information, update the environmental effects assessment for relevant VCs.

IR3-37

Topic: Air Quality –Monitoring and Follow-Up

Sources:

EIS Guidelines Part 2, Sections 6.1.1; 6.1.9; 6.2.1; 6.3.4; 6.6.3; 8

EIS Volume 1, Tables 7-3; 7-6

EIS Volume 3A, Section 3, Table 3-17

EIS Volume 3C, Section 1.2

EIS Volume 4, Appendix E; Appendix O Table 4-1 pp. 4.2

Environment and Climate Change Canada Technical Review, June 18, 2018 (CEAR # 32)

Context and Rationale:

The EIS Guidelines require a description of baseline air quality levels and changes in air quality, as well as an assessment of the effects of changes to air quality on Indigenous peoples.

The EIS presents an air quality monitoring plan; however, ECCC indicated that the information provided is lacking specific details on monitoring and adaptive management strategies that will be implemented.

Levels of NO2, $PM_{2.5}$, Trisodium Phosphate (TSP), dustfall, three Volatile Organic Compounds (VOC), and one Polycyclic Aromatic Hydrocarbon (PAH) are predicted to exceed ambient air quality criteria, and the spatial extent of the exceedances is widespread (depending on the contaminant) during construction and/or post-flood operations. Because these exceedances are widespread and frequent, it is important that specific detail on the mitigation strategies and follow-up and monitoring plan are included in the EIS.

The EIS indicates that the development of the Community of Harmony and Bingham Crossing would be ongoing during the time of the Project, but would not interact with the Project's emissions because the primary wind direction is not from the direction of these future developments. The EIS indicates that a comparison of construction emission rates cannot be done for the other developments in the study area as emission rates have not been estimated for these other projects. ECCC noted that concentrations of TSP in the application case are predicted to exceed at a spatial extent that extends close to the Community of Harmony and Bingham Crossing developments. As there are many sensitive receptors between the Project and these developments it is important to consider the potential of these developments interacting with the Project.

Many Indigenous groups have raised concerns about dust monitoring. Additional information on mitigation, monitoring, and follow-up and on cumulative effects is required to understand Project effects on air quality and on Indigenous peoples.

Information Requests:

a) Provide the details of a mitigation, monitoring and follow-up plan for NO2, $PM_{2.5}$, TSP, PAH, and dustfall, including a description of how and when adaptive management strategies will be implemented, for all phases and components of the Project.
b) Provide details on how air quality effects from interactions with the developments in the region will be determined, managed, and mitigated.

IR3-38

Topic: Air Quality – Assessment of Effects

EIS Guidelines Part 2, Sections 6.1.1; 6.2.1

EIS Volume 3A Section 15.4.4

EIS Volume 3B Section 15.4.2.3

EIS Volume 4 Appendix O, Section 6.2.4

Alberta Transportation Responses to CEAA Annex 2: A) Early Technical Issues, May 11, 2018

Health Canada Comments on the EIS – June 15, 2018 (CEAR #30)

Context and Rationale:

The EIS Guidelines require the proponent to carry out appropriate atmospheric dispersion modelling of the main contaminants resulting from various project-related activities.

The EIS provides an assessment of the health risk from the residual effects, which is assumed to be post-mitigation. It is unclear if the full suite potential changes to air quality in all phases of the project and associated effects to health were considered in the assessment. For example, with the models presented it seems potential risks to health from inhalation of COPCs prior to the implementation of mitigation measures are not considered. Design features that are constant and therefore consistently and continuously mitigate effects to air quality should be included in air quality models. However, mitigation measures that are subject to change, intermittent, discretionary implementation, or part of adaptive management should not be included in the models as it could conceal potential air quality effects associated with the Project.

Additional information is required to understand the potential effects to health related to COPC prior to the implementation of mitigation measures that are not static parts of the Project design. This understanding is necessary to assess the effects of changes to air quality on the health of Indigenous peoples.

Information Request:

a) Provide an updated assessment of health risk for each COPC for each phase of the Project prior to the implementation of mitigation measures that are not design features.

IR3-39

Topic: Air Quality - Ambient Light

EIS Guidelines Part 2, Section 6.1.1; 6.1.9; 6.2.1; 6.3.4

EIS Volume 1, Section 4.2

EIS Volume 3A, Section 3.4

Métis Nation British Columbia – Technical Review (CEAR #1153)

Technical Advisory Group – Meeting June 10-11, 2018

Context and Rationale:

The EIS Guidelines require the proponent to provide baseline information on and describe the changes to air quality, including consideration of light.

The EIS notes that portable lighting units will be used at night during construction. The EIS does not present information regarding the potential lighting of Project components during flood or post-flood operations. While the EIS concludes the Project is unlikely to have significant effects on ambient light as part of the air quality VC, consideration of the effects of increased ambient light on other VCs is not included in the EIS. Specifically, Indigenous groups have expressed concern with the potential effects on 24 hour lighting on wildlife and plants, including species of cultural importance, and on experience of the landscape.

Additional information is required to understand potential changes to light resulting from the Project and the effects of those changes on Indigenous peoples.

Information Requests:

a) Describe all potential light sources throughout the Project area during flood and post flood operations and anticipated light levels relative to relevant guidelines.
b) Assess potential effects to each relevant VC resulting from the anticipated change in ambient light.

IR3-40

Topic: Cumulative Effects – Assessment of Effects

Sources:

EIS Guidelines Part 2, Section 6.6.3

EIS Volume 2, Section 7.2.1

EIS Volume 3C, Section 1

EIS Volume 4, Appendix O, Sections 5.2; 6.2.6

Health Canada Comments on the EIS – June 15, 2018 (CEAR # 30)

Context and Rationale:

The EIS Guidelines require the proponent to identify and assess the Project's cumulative effects. The EIS Guidelines requires that the proponent specify other projects or activities that have been or that are likely to be carried out that could cause effects on each selected VC within the boundaries defined, and whose effects would act in combination with the residual effects of the Project. The EIS Guidelines require the proponent to justify the spatial and temporal boundaries for the cumulative effects assessment for each VC.

The EIS indicates that environmental effects of other past and present projects or activities are reflected in the existing baseline environment, and are considered in the project-related environmental effects assessment for each VC. The project-related environmental effects assessment for each VC only analyzes effects within the LAA and compares the project-related effects to the existing baseline for each VC. Limited project-specific studies and baseline data gathering were completed throughout the RAAs and the current state of VCs is described only at a high level. It is not clear whether current VC conditions are static or still changing in response to past and present physical activities. This creates uncertainty in the degree to which the effects of past and present physical activities are reflected in the existing baseline environment.

Additional information is required for a complete understanding of the Project's cumulative effects with all past, present, and reasonably foreseeable physical activities.

Air Quality
The EIS includes air quality as a VC in the cumulative effects assessment and provides a qualitative planned development case which notes that several future projects could potentially overlap with project-related emissions during construction but that these are not expected to materially change the predicted project-related exposures. The EIS does not present a sufficient description of the COPC that could potentially overlap with project-related emissions. The predicted COPC contributions should be assessed for all reasonably foreseeable future projects

within the RAA. Additional information is required to allow for an understanding of cumulative effects to air quality and associated effects to health of Indigenous peoples.

Information Request:

a) Update the cumulative effects assessment to:
   - further consider the effects of past and present physical activities through improved characterization of VCs throughout the RAAs and/or direct evidence to explain the effects of past and present physical activities, or present a rationale for how the level of detail available allows for a meaningful cumulative effects assessment;
   - include a discussion of any revised RAA and/or temporal boundaries and ensure these revised boundaries are reflected in the updated assessment; and
   - for the updated cumulative effects assessment for air quality, include predicted COPC contributions from potentially overlapping reasonably foreseeable future activities.

IR3-41

Topic: Cumulative Effects – Hydrology

Sources:

EIS Guidelines Part 2, Section 6.6.3

EIS Volume 3C, Section 1

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes - Combined (CEAR # 46, 47, 50)

Context and Rationale:

The EIS Guidelines require the proponent to identify and assess the Project's cumulative effects, including consideration of past, present, and reasonably foreseeable future activities. This includes an assessment of cumulative effects to the Elbow River, including its hydrology and seasonal flood process, water quality, and aquatic ecology.

The EIS excludes hydrology from the cumulative effects assessment, noting that for construction and dry operations effects would be neutral and as no residual effects are predicted no cumulative effects assessment is warranted. A neutral effect does not necessarily constitute the absence of residual effects or an adequate reason for not conducting a cumulative effects assessment. Cumulative effects to hydrology from flood and post-flood operations are also not considered as the EIS states the purpose of the Project is to modify the hydrology of the Elbow River. Project effects to hydrology, intentional or otherwise, will interact with past, present, and reasonably foreseeable physical activities and therefore must be considered in a cumulative effects assessment.

The EIS does not identify any past or present activities that would interact with the surface water quality or aquatic ecology VCs in the construction and dry operations phase. Past and present agriculture, infrastructure, residential communities and recreation and tourism have the potential to have effects to water quality and aquatic ecology.

The proponent did not identify that the Bragg Creek Flood Mitigation Project or the Southwest Calgary Ring Road would interact with the hydrology and aquatic ecology VCs in the flood and post-flood phase and did not include a rationale for why there would be no interaction. Additionally, although the Glenmore Reservoir has similar pathways of effects as the Project and is included in the RAA for some VCs, the proponent did not identify the Glenmore Reservoir as a past project that would interact with the Project VCs.

Tsuut'ina Nation noted that the hydrological baseline conditions may be underestimated in the EIS cumulative effects assessment given consideration of the Bragg Creek Flood Mitigation

Project. The Bragg Creek Flood Mitigation Design Report indicates that in the half kilometre immediately downstream of the boundary of the Hamlet of Bragg Creek (i.e., within the Tsuut'ina Reserve) and throughout the Elbow River reach where Redwood Meadows is located, water levels and in-flow velocities are anticipated to change. These changes could affect fluvial morphology and are not considered in the EIS. Long term changes with the shape of the river could interact with the physical barriers presented by the Project. If changes from the Bragg Creek Flood Mitigation Project are anticipated as far downstream as the Springbank floodgates, water volumes, depths, and temperatures appropriate to fish should be maintained under non-flood conditions, and consideration of effects to wildlife access and movement should be considered. A description of how the Elbow River will change shape over the long term (>50 years) as a result of the Bragg Creek Flood Mitigation Project should be taken into account in the assessment of potential cumulative effects for the Project.

Additional information is required to understand the cumulative effects of the Project on hydrology, surface water quality and aquatic ecology, and the interactions of these effects with other VCs.

Information Requests:

a) Considering the gaps identified above:
   - Update the Surface Water Quality and Aquatic Ecology cumulative effects assessment to include past and present projects or physical activities, or provide a rationale as to why no past or present projects and physical activities were identified as interacting with each VC.
   - Update the Hydrology and Aquatic Ecology cumulative effects assessments to include the Bragg Creek Flood Mitigation Project and the Southwest Calgary Ring Road Project. Revise and provide modeling inputs to identify and account for changes to Elbow River hydrology taking into account effects from the Bragg Creek Flood Mitigation Project. Given the revised modelling, assess cumulative effects to hydrology for construction and dry operations and reassess cumulative effects to hydrology under flood and post-flood scenarios.
   - Update the cumulative effects assessment for all VCs with RAAs that overlap with the Glenmore Reservoir to include the Glenmore Reservoir or provide a rationale for why the Glenmore Reservoir was not scoped into the cumulative effects assessment as a past project.

b) Discuss how cumulative effects to hydrology, surface water quality, and aquatic ecology, interact with other VCs such as federal lands, wildlife use patterns, and culture/sense of place and whether the updated cumulative effects assessment affects conclusions for direct or cumulative effects to these VCs.

IR3-42

Topic: Cumulative Effects – Water Management

Sources:

EIS Guidelines Part 2, Section 6.6.3

EIS Volume 1, Section 2

EIS Volume 3B, Section 18

EIS Volume 3C, Section 1

Tsuut'ina First Nation, Ermineskin Cree Nation, and Kainai First Nation – Technical Review of the EIS - Annexes - Combined (CEAR # 46, 47, 50)

Context and Rationale:

The EIS Guidelines require the proponent to identify and assess the Project's cumulative effects, including consideration of past, present, and reasonably foreseeable future activities. The EIS Guidelines require the cumulative effects assessment to take into consideration regional flood mitigation works and strategies.

The EIS notes that the Project is part of broader water management and flood mitigation within southern Alberta. For example, the EIS states that the Deltares report recommended the Project, in combination with local mitigation for Bragg Creek and Redwood Meadows, over the McLean Creek (MC1) Option. Given the scope of flood mitigation activities within the region, Tsuut'ina Nation may have an interest in developing flood mitigation infrastructure, including for the protection of Redwood Meadows, on its reserve lands. The EIS does not identify if or how this specific information was sought or considered in the assessment of potential effects to Tsuut'ina Nation lands, cumulative effects, or impacts to rights.

In meetings with the Canadian Environmental Assessment Agency, Siksika Nation has noted that Alberta Transportation suggested Project benefits to Siksika Nation, through reduced potential for flooding. However, Siksika Nation reserve lands are not included in the LAA or RAA for the Project or in the assessment of potential effects to federal lands. Siksika Nation expressed concern with how the Project fits into water management in the region which cumulatively affects their reserve lands. Specifically, concerns have been raised about potential interactions with water management of irrigation districts and communication and coordination between interested parties in a flood event. The EIS does not identify if or how this information was sought or considered in the assessment of potential effects to Siksika Nation reserve lands, cumulative effects, or impacts to rights.

The EIS does not include a cumulative effects assessment for federal lands. Given the updated assessments required, determinations of potential effects to federal lands may change and potential cumulative effects to reserve lands may not have been adequately considered.

Information Requests:

a) Describe how potential and reasonably foreseeable flood mitigation measures contemplated for Tsuut'ina Nation reserve lands were considered in the cumulative effects assessment. Identify how the Project may interact with or restrict the flood mitigation options available to Tsuut'ina Nation and how this impacts Tsuut'ina Nation's ability to exercise its governance and decision-making regarding its lands.
b) Clarify if potential benefits in terms of reduced flood risk are expected for Siksika Nation. Describe how the RAA adequately allows for this understanding and accounts for other water management and flood mitigation infrastructure that affects Siksika Nation reserve lands; integrate any revised information on the LAA and RAA for hydrology.
c) Provide updated cumulative effects analyses as needed or rationale as to why the cumulative effects determinations adequately take into account the information requested above.

IR3-43

Topic: Cumulative Effects - Project Location and Existing Disturbance

Sources:

Piikani Nation – Technical Review of EIS, June 15, 2018 (CEAR #48)

Context and Rationale:

The EIS Guidelines require the proponent to identify and assess the Project's cumulative effects, including consideration of past, present, and reasonably foreseeable future activities.

The EIS is not clear about how much existing disturbance in the LAA would be absorbed during Project construction. The Project is in a heavily fragmented area and has few remaining areas with sufficient interior habitat area to support undisturbed traditional use. Minimizing new or additional disturbance by considering existing disturbed areas when planning the Project's footprint may help to mitigate cumulative effects. Additional information is required to understand to understand Project effects in this context.

Information Request:

a) Define and identify disturbed areas within the LAA and explain how existing disturbance is, or could be, absorbed during Project construction, through current Project design or design changes.

IR3-44

Topic: Accidents and Malfunctions – Residual Effects

Sources:

EIS Guidelines, Part 2, Sections 6.6.1; 6.5

EIS Volume 3D

CEAA Annex 2: A) Early Technical Issues, Question 22 (b), May 11, 2018

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Context and Rationale:

The EIS Guidelines require the proponent to identify the probability of potential accidents and malfunctions related to the Project, including the significance of these effects and outline the criteria that should be used in determining the significance of residual effects, including magnitude, geographic extent, duration, frequency, reversibility, ecological and social extent, and existence of environmental standards, guidelines or objectives for assessing the effects.

As the EIS does not identify the key criteria used in making its significance determinations for each accident and malfunction scenario, it is not clear how these determinations were made.

Information Request:

a) For each accident and malfunction scenario, provide the criteria and associated rating used to determine the significance of residual environmental effects for each VC.

IR3-45

Topic: Alternative Means

Sources:

EIS Guidelines Part 2, Section 2.2

EIS Volume 1, Section 1.0; 2.2.1.1; 2.2.1.3,

Rocky View County – Comments on the EIS, June 15, 2018 (CEAR #571)

Context and Rationale:

The EIS Guidelines require the proponent to identify and consider the effects of alternative means of carrying out the project, and to provide an analysis of alternative means of meeting the project purposes or objectives that considers environmental effects as per CEAA 2012. The Agency's Operational Policy Statement on *Addressing "Purpose of" and "Alternative Means" under CEAA 2012* states that the first step in considering alternative means of carrying out the designated project is to identify technically and economically feasible alternative means. To do this the proponent should include economic criteria such as a comparison of cost estimation.

Cost Estimates

The EIS states that the initial cost estimates are susceptible to change, but the cost-escalation risk for the McLean Creek (MC1) option is higher than for the Springbank Off-Stream Reservoir Project (the Project) based on the Deltares 2015 report. This may no longer provide an accurate comparison due to Alberta Transportation's Project updates since 2015. Updated comparisons of estimated costs and benefits for MC1 and the Project are needed to assess the potential socio-economic effects to the surrounding communities.

Environmental Effects

The EIS compares some of the environmental effects of two options, the Springbank Off-Stream Reservoir Project and the MC1 option. The evaluation of environmental effects from MC1 in the EIS does not describe how the potential changes to the environment could affect Indigenous health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Alternatives Considered

The EIS notes the Project's purpose is to help reduce the effects of future extreme floods on infrastructure, water courses and people in the City of Calgary and downstream communities. The Agency's Operational Policy Statement on *Addressing "Purpose of" and "Alternative*

Means" under CEAA 2012 states that the approach and level of effort applied to addressing alternative means is established on a project-by-project basis taking into consideration the level of concern expressed by Indigenous groups or the public.

The EIS identified five potential locations for flood mitigation measures on the Elbow River. Public comments received during technical review of the EIS indicate interest in specific alternative means of reducing effects of future extreme floods on infrastructure, water courses and people, such as the Tri-River Joint Reservoir of Alberta and the Micro-Watershed Impounding Concept (for example, CEAR 1152 and CEAR #1037).

Information Requests:

a) Given any Project updates, provide information on the comparison of MC1 and the Project, including costs/benefits.
b) Describe how changes to the environment from the MC1 option would affect Indigenous health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.
c) Evaluate whether the Tri-River Joint Reservoir of Alberta and the Micro-Watershed Impounding Concept are feasible alternative means of meeting the Project's purpose. Consider potential environmental effects of each alternative in this evaluation.

IR3-46

Topic: Project Operations - Communications

Sources:

EIS Guidelines Part 2, Sections 3.2.2; 5

EIS Volume 1, Section 3.5

Technical Advisory Group – July 10 and 11, 2018 meeting

Context and Rationale:

The EIS Guidelines require the proponent to describe project activities involved in construction and operations and to engage with Indigenous peoples.

The EIS notes that AEP will communicate with the City of Calgary in advance of and during the flood season annually, to maintain an understanding of the system's status. Communications plans with other interested parties are not described.

Indigenous groups have presented needs regarding communication about project construction and operation. For example, Piikani Nation requested that Alberta Transportation provide at least three weeks' notice to the Nation prior to disturbance so that Elders may be consulted and appropriate cultural protocols, including ceremonies, can be planned before construction. Members of the technical advisory group identified safety concerns regarding project operations and identified a need for clear communication plans with Indigenous communities.

Effective communication could serve to mitigate risk and potential effects of the Project to Indigenous peoples, for example, by allowing continued land use in a safe manner.

Information Requests:

a) Provide details of a communications plan that includes means and procedures for communicating Project construction, maintenance, and operation activities to the public and Indigenous groups, throughout the life of the Project. Consider the needs for communicating Project operations to individuals who may be in the Project vicinity upon commencement of operations. Consider how diverse populations may require specific or targeted communication (e.g. elders). Identify how these and other considerations are reflected in the plan.
b) Incorporate input from Indigenous groups and the public on the anticipated effectiveness of the proposed communication plan. Where this input is not yet complete, describe the plan for gathering and incorporating this input in to communications plan design and implementation.

IR3-47

Topic: Priority Supplementary Information Requests from the Natural Resources Conservation Board

Sources:

Tsuut'ina Nation – Technical Review of Revised Environmental Impact Statement, June 20 2018 (CEAR #50)

Priority Supplementary Information Requests from the Natural Resources Conservation Board, February 8, 2018

Context and Rationale:

Tsuut'ina Nation has identified the information requested in the February 8, 2018 Priority Supplementary Information Requests from the Natural Resources Conservation Board as necessary to its and to the Agency's understanding of the potential effects of the Project, including potential impacts to Aboriginal and treaty rights.

Information Request:

a) Upon submission of responses to the Natural Resources Conservation Board, provide access to these responses to interested Indigenous groups and to the Canadian Environmental Assessment Agency.

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