Alberta Transportation
Springbank Off-Stream Reservoir Project
Environmental Impact Study

Review prepared for
Piikani Nation by:

Schaldemose & Associates Inc.
Kevan Berg, Integral Ecology Group
Dr. Shanti Berryman, Integral Ecology Group
Douglas Geller, Western Water Associates Ltd.
Drew Lejbak, Associated Environmental Consultants Inc.
Bryer Manwell, Western Water Associates Ltd.
Dr. Brenda Miskimmin, Associated Environmental Consultants Inc.
Carrie Oloriz, The Human Environment Group
Lisa Schaldemose, Schaldemose & Associates Inc.
Clint Smyth, Integral Ecology Group
Rob Stuart, The Human Environment Group

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1. Introduction

1.1. Context and History

The Calgary flood of of the Elbow River in 2013 resulted in the evacuation of 80,000 residents from the city. Three thousand buildings were flooded and 35,000 lost power. It is estimated that the cost of a similar flood event on the Elbow River could cost upwards of $680 million.

In October 2015, the Government of Alberta announced that it would move forward with the Springbank Project, combined with upstream local flood mitigation, to reduce the impact of flooding on the Elbow River.

1.2. Regulatory Context

Alberta Transportation is applying to the Alberta Natural Resources Conservation Board (NRCB) for approval to construct and operate the Springbank Off-stream Reservoir Project (the Project), located approximately 15 km west of Calgary in Rocky View County. Alberta Transportation is also applying to the Canadian Environmental Assessment Agency (CEA Agency) for approval by the federal Minister of Environment and Climate Change.

Alberta Transportation will hold all approvals for the Project until construction completion. Approvals will then transfer to Alberta Environment and Parks (AEP) for operation and maintenance of the Project. The purpose of the Project is to help reduce the effects of future extreme floods on infrastructure, water courses and people in the City of Calgary and downstream communities.

1.3. Review Purpose

This review was completed by a team of consultants on behalf of the Piikani 147 Nation (Piikani Nation), representing the interests of Piikani members living in Southern Alberta.

For this review the main document we reviewed was the Springbank Off-stream Reservoir Project Environmental Impact Statement that was filed by Alberta Transportation in March 2018 with the NRCB and CEAA.

The intent of this review is to highlight the possible issues or concerns that the Piikani Nation might wish to raise with Alberta Transportation or the regulators. Where appropriate, recommendations are made to address an identified issue or concern.

Funding for this technical review was provided through a CEAA Contribution Agreement for the Springbank Off-stream Reservoir Project. This technical review provides a summary of Project-specific and cumulative effects issues of concern as well as potential mitigation measures for consideration during consultation between Piikani Nation and Alberta Transporation and between Piikani Nation and the governments of Alberta and Canada.

1.4. Review Scope

This technical review includes reviewing the environmental impact statement report (EIS), which addressed the technical, environmental and social aspects of the proposed Project prepared in accordance with Section 19 of the Canadian Environmental Assessment Act 2012 (Canadian Environmental Assessment Agency 2012) and the Guidelines for the Preparation of an Environmental Impact Statement pursuant to (CEAA 2012), issued June 23, 2016 (Canadian Environmental Assessment Agency 2016) as well as Section 48 of the *Environmental Protection and Enhancement Act* (EPEA; Province of Alberta 2017) and the final terms of reference (FToR) issued by AESRD (AEP) on February 5, 2015.

Specifically, the review consisted of a Piikani-led examination of the application and supporting appendices for the Application under the *Canadian Environmental Assessment Act* 2012 and *Environmental Protection and Enhancement Act*, *Natural Resources Conservation Board Act* and the *Water Act*. for the Springbank Off-stream Reservoir Project, filed November 3, 2017.

1.5. Project Reviewers

The review was coordinated by Lisa Schaldemose (Schaldemose & Associates inc.), Rob Stuart (The Human Environment Group), Dustin Wolfe and Lisa Old Crow (Piikani Consultation Office). Specific components were reviewed by the following individuals:

- Doug Geller and Bryer Manwell, Western Water Associates Ltd. – Hydrogeology
- Brenda Miskimmin and Drew Lejbak, Associated Environmental Consultants Inc. – Hydrology, Surface Water Quality and Aquatic Ecology
- Kevan Berg and Shanti Berryman, Integral Ecology Group – Terrain and Soils, Vegetation and Wetlands, Biodiversity
- Clint Smyth and Kevan Berg, Integral Ecology Group – Wildlife
- Rob Stuart, The Human Environment Group – Historical Resources
- Carrie Oloriz, The Human Environment Group – Land and Resource Use
- Lisa Schaldemose, Schaldemose & Associates inc. –Senior Review

1.6. Review Approach

The technical review's purpose is to assess the following:

1. **Application completeness** – compare the content of the application to the Environmental Impact Statement Guidelines and Terms of Reference and identify any deficiencies.
2. **Appropriateness of assessment conclusions** – highlight any assessment conclusions that do not represent Piikani Nation's perspective in terms of potential impacts to rights.

3. Highlight potential environmental effects, cultural effects and cumulative effects that might affect Piikani Nation's ability to exercise constitutionally protected rights.

4. Provide recommendations to address potential environmental, cultural and cumulative effects based on an understanding of the community's key concerns.

To enable easy tracking of issues we have numbered all [in square brackets] comments and their associated requests, should the Springbank Off-Stream Reservoir Project proceed. These requests are also presented in summary tables with Piikani Nation's key concerns. The category column of the tables indicates the potential path forward to address the issue or concern. Categories are listed as follows:

- **Agreement** – A suggested activity (mitigation or monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.
- **Regulatory** – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Springbank Off-Stream Reservoir Project is ultimately approved).
- **Response** – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

1.7. Disclaimer

This report is submitted to Piikani Nation for its use for such purposes as:

- assisting the community to understand the Project's potential impacts;
- consulting with Alberta Transportation regarding Project mitigation;
- informing the NRCB and other provincial departments of Piikani Nation's issues and concerns with respect to the Project;
- informing the Canadian Environmental Assessment Agency and other federal departments of Piikani Nation's issues and concerns with respect to the Project; and
- consulting with the governments of Alberta and Canada regarding potential impacts on Piikani Nation's interests and Aboriginal rights and accommodation.

Consultation with community members is not concluded, and continued consultation with Alberta Transportation and the governments of Alberta and Canada is required.

The requests regarding Project-specific mitigation are preliminary and not intended to imply Piikani Nation's consent or agreement. These mitigation measures will not mitigate all of the Project's effects but are rather proposed to minimize or offset them. **Requests are made in the event regulatory approval is**

given for this Project and are made without prejudice to Piikani Nation's position regarding Project approval.

1.8. Review and Validation of Key Issues

Piikani Nation has reviewed and validated the key concerns and requests described in this review prior to its submission.

[1] General Request

This technical review contains many requests for additional information, or for Alberta Transportation to work with Piikani Nation in the design, development, implementation and monitoring of a variety of plans and programs. For Piikani Nation to have effective involvement with Alberta Transportation on these plans and programs there will be a need for Piikani Nation and Alberta Transportation to agree on capacity support for Piikani Nation. As a general comment for all these types of requests, capacity support should be provided to Piikani Nation to effectively participate.

2. Springbank Off-Stream Reservoir Project Overview

2.1. Introduction

In 2013, a sizable flood caused damage within the City of Calgary and the surrounding area, when the Glenmore Reservoir overflowed due to exceeding its capacity. Concerns over property damage that could be caused by future floods prompted the need to create further surface-water storage for the Elbow River during flood events. Inundation of the river to bank-full conditions typically occurs in the spring and summer, due to the high volume of snow melt that occurs in the front range of the Rocky Mountains and this snowmelt is the predominant source of water in the Elbow River.

As part of the Terms of Reference, Alberta Transportation considered five locations for this project. Two of the choices were deemed unsuitable. The remaining three options:

- Glenmore Reservoir Underground Diversion Tunnel
- McLean Creek Dam; and
- Springbank Off-stream Reservoir

were further studied and it was determined that the Springbank Off-stream Reservoir option provided the most benefit with the fewest environmental, operational, recreational and financial risks.

2.2. Location and Topography

The Project will be located 15 km west of Calgary in Rocky View County in the Province of Alberta (Township 24, Range 04/03 W5M). See Figure 2-1.

The Project will be predominately situated on private land that has been used for ranching and agriculture since the late 1800s. There are also several acreages and commercial developments within the Project area. There is a small portion of the Project that will be located on Crown land; it will include rights-of-way (RoW) for roads and road allowances and the bed and banks of the Elbow River and its tributaries.

The relief within the proposed Project area will be approximately 70 m with an average elevation of 1200 m above sea level (asl). The physiography was defined as sloping lower foothills and hummocky uplands, all of which is heavily dissected by intermittent streams. Till soils dominate the landscape with significant lacustrine deposits that border more permeable valley-bottom alluvial aquifers associated with modern-day watercourses.

2.3. Project Components

Piikani Nation understands that the off-stream reservoir would work in tandem with the Glenmore Reservoir and will store water only if or when flood levels in

the Elbow River exceeded 160 m^3/s, and flow downstream of the Glenmore Reservoir was expected to exceed 170 m^3/s. The Project will have the capacity to divert up to 600 m^3/s of flow from the Elbow River to the off-stream reservoir, which would temporarily hold 77,771,000 m^3 of water as active flood storage. There would be no permanent water storage in the reservoir.

Flows more than the diversion capacity will pass the diversion structure and be stored within the Glenmore Reservoir, up to its allocated flood storage capacity of 10,000,000 m^3. The total storage capacity of 87,771,000 m^3 provided by the system (i.e., the off-stream reservoir and the Glenmore Reservoir) will exceed the amount of water that overtopped Glenmore Dam during the 2013 flood and caused damage from overland flooding downstream.

The Project's main components would be a (see Figure 2-2):[1]

- diversion structure on the main channel and floodplain of the Elbow River;
- diversion channel to transport diverted floodwater into the reservoir;
- dam to temporarily contain the diverted floodwater; and
- low-level outlet in the dam to return retained water back to the river after the flood subsided through an existing unnamed creek channel.

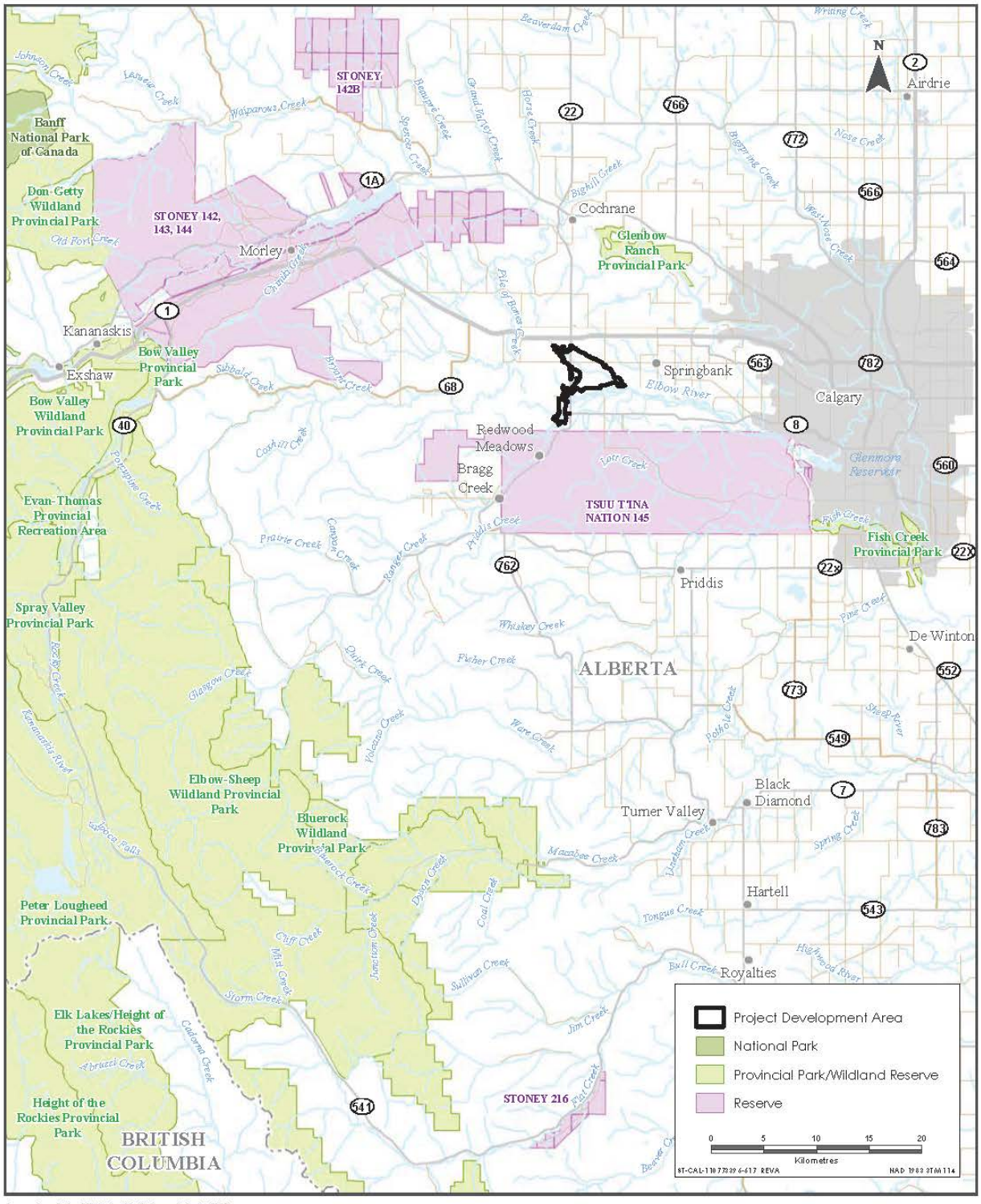
2.4. Approval Requirements

The Project requires an Environmental Impact Assessment (EIA) under the Alberta *Environmental Protection and Enhancement Act* (Province of Alberta 2017). In 2015 Alberta Environment and Parks (AEP) issued the final Terms of Reference. Alberta Transportation applied to several regulators for Project approvals; see Table 2-1 for provincial requirements and Table 2-2 for federal requirements.

Table 2-1: Provincial Legislative Requirements

Responsible Agency or Regulator	Legislation	Protected Resources
Natural Resources Conservation Board	*Natural Resources Conservation Board Act*	Public interest
Alberta Culture and Tourism	*Historical Resources Act*	Archaeological, palaeontological, historical and cultural resources
Alberta Environment and Parks	*Water Act*	Waterbodies, including wetlands; aquatic environment
	Fisheries Act	Stocks conservation; fish capture methods.
	Soil Conservation Act	Prevent soil loss or deterioration; mitigation
	Weed Control Act	Requires landowners or occupants to destroy prohibited or noxious weeds; control to prevent spread
	Wildlife Act	Protecting wildlife species (and their residences) listed on the *Wildlife Act* as endangered or threated

[1] EIA, Volume 1, Section 1.2, page 1.4



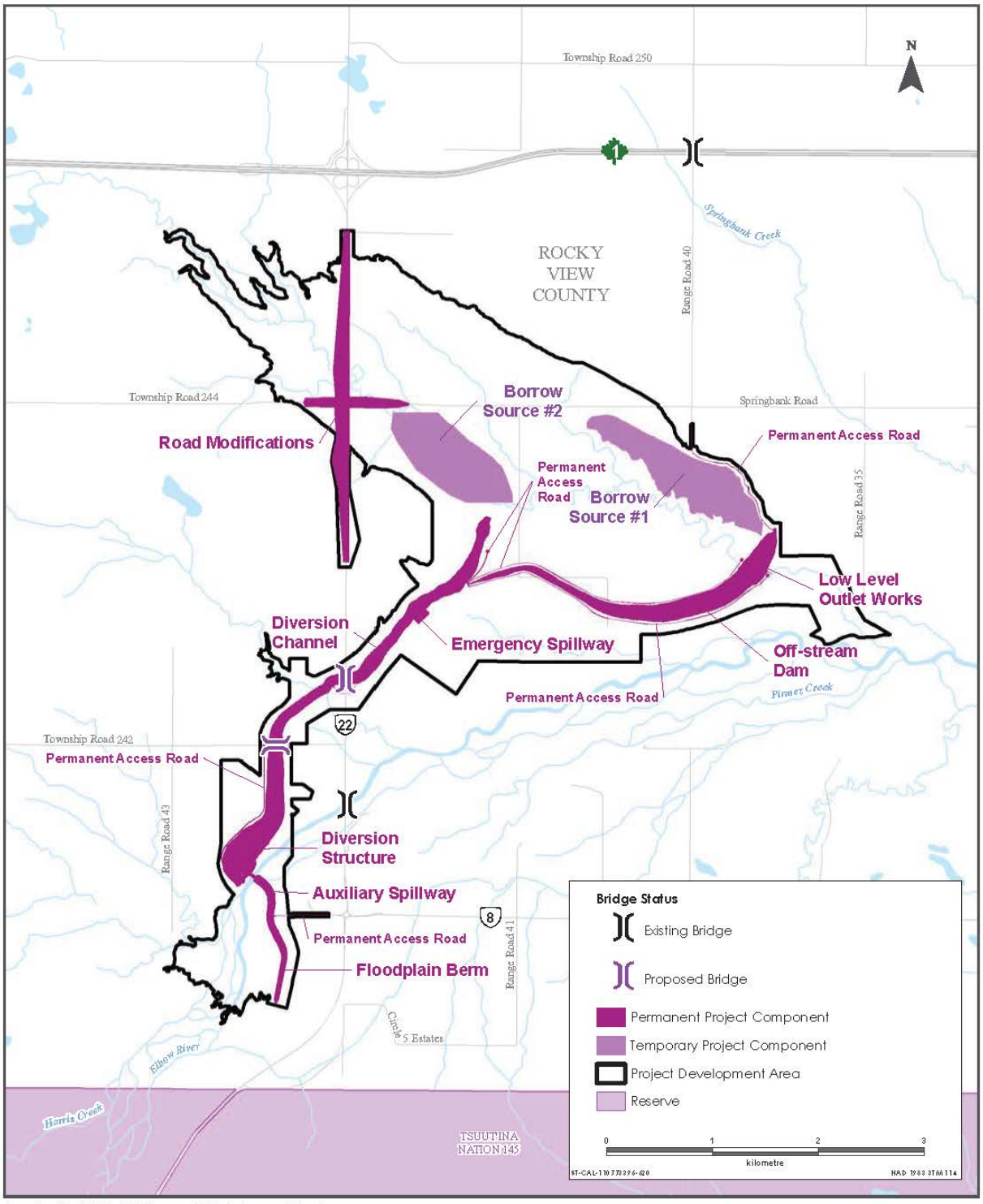
Springbank Off-stream Reservoir Project Location

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Figure 1-1

Figure 2-1: Proposed Location – Springbank Off-Stream Reservoir Project



Main Components of the Project

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ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Figure 3-1

Figure 2-2: Main Components – Springbank Off-Stream Reservoir Project

Table 2-2: Federal Legislative Requirements

Responsible Agency or Regulator	Legislation	Protected Resources
Transport Canada	*Navigation Protection Act*	For any works built or placed in, on, over, under, through, or across a navigable water
Fisheries and Oceans Canada (DFO)	*Fisheries Act*	Commercial, recreational and Aboriginal (CRA) fisheries, fish that support a CRA fishery and their habitat
Environment Canada	*Migratory Birds Convention Act*	Migratory bird populations, individuals and their nests within Canada
	Species at Risk Act	Wildlife and plant species at risk

2.5. Timing

Tthe Project was scheduled to be functionally operational by the spring of 2021 (able to accommodate a 1-in-100-year flood) and constructed (able to accommodate the design flood) for the spring of 2022.

None of the Project's permanent components will be decommissioned.

2.6. Environmental Risks

Alberta Transportation foresaw no long-term risks, such as:

- air quality
- light pollution
- noise
- liquid discharges
- waste water

after Project construction was completed.

2.7. Indigenous Engagement Program

DEMA Land Services conducted an Indigenous Engagement Program on behalf of Alberta Transportation; engagement included face-to-face meetings, workshops and site visits. Alberta Transportation's engagement with Indigenous groups began in 2014 with five Treaty 7 First Nations (including the Piikani Nation) in accordance with The Government of Alberta's *Guidelines on Consultation with First Nations on Land and Natural Resource Management* (Government of Alberta 2014a) and the *First Nation Consultation Plan* (Government of Alberta 2014b) approved by the Aboriginal Consultation Office (ACO).

The Treaty 7 First Nations provided Alberta Transportation with information regarding their current land uses. Alberta Transportation provided capacity for the First Nations to conduct traditional use studies.

In 2016, Alberta Transportation broadened the Indigenous Engagement Program to include eight additional Indigenous communities and organizations (Figure 2-3).

The Piikani Nation raised concerns about having its Elders involved in the site visits to assess the Project's effects on medicinal plants and Blackfoot Traditional Knowledge. Alberta Transportation funded a TUS that the Piikani Nation delivered in 2017.

Piikani Nation's other concerns and requests are discussed in more detail in this report.

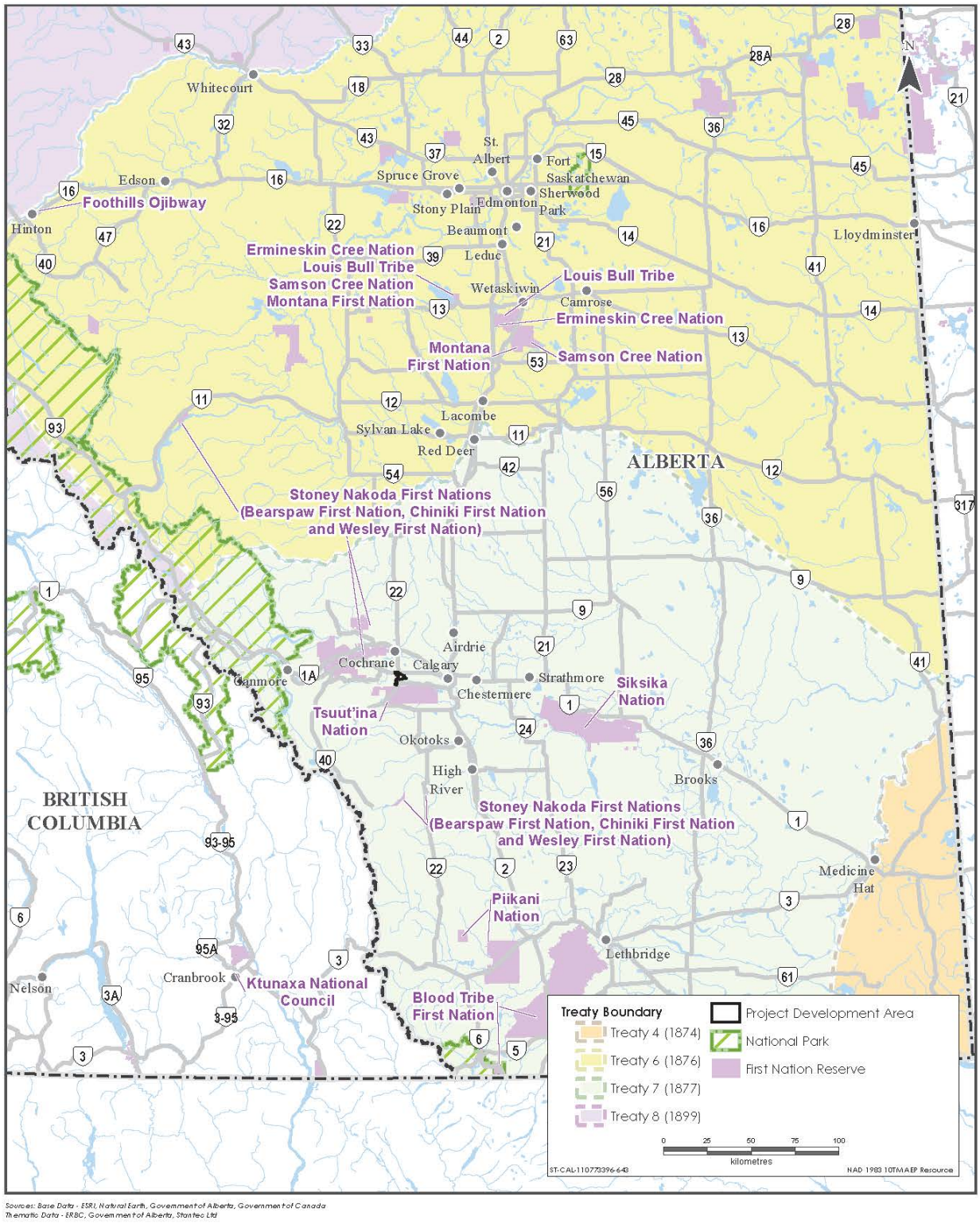

Figure 2-3: Indigenous Groups or Organizations Locations – Springbank Off-Stream Reservoir Project

3. Hydrogeology

3.1. Project and Impact Assessment Overview

This review focused on the following sections of the Environmental Impact Assessment pertaining to the Springbank Off-stream Reservoir Project (herein referred to as the "Project"):

- Volume 1: Project Description;
- Volume 3: Section 5 (Hydrology) and Section 6 (Hydrogeology); and
- Volume 4 Appendices: Appendix 1 Hydrogeology (Hydrogeology Baseline Technical Data Report (TDR) and Groundwater Numerical Modelling TDR)

The project development area (PDA) for hydrogeology is the immediate area of Project activities. The PDA was limited to the anticipated area of physical disturbance associated with the construction and operation of the Project. The PDA is approximately 1438 hectares (ha) and includes:

- the diversion structure (0.36 ha);
- diversion channel (64.23 ha);
- off-stream dam (42.47 ha);
- low-level outlet works (0.04 ha);
- off-stream reservoir (816.03 ha, the maximum possible backflooding area); and
- internal access roads and borrow areas.

The local assessment area (LAA) includes the PDA and a nominal 1-km buffer surrounding the PDA to address potential localized hydrogeological effects, such as water level and water quality changes near to the construction areas and localized seepage into the diversion channel during dry operations. The LAA is reduced where the buffer extends outside of the floodplain and terrace of the Elbow River to the south.

The regional assessment area (RAA) is 14,000 ha and is based on the regional hydrogeological conditions and boundary conditions for the numerical groundwater models used in the assessment. Lateral extent of the RAA is bounded by:

- a surface and shallow groundwater flow divide in the north;
- a boundary to the northwest to encompass the subwatershed of three small tributaries to the Elbow River;
- the floodplain and terrace of the Elbow River to the south; and
- Jumpingpound Creek to the west.

The scope of the hydrogeology assessment has been developed in accordance with the Terms of Reference issued by Alberta Environment and Parks (AEP) for the Project's environmental assessment (Alberta Environment and Sustainable

Resource Development 2015). Specifically, Section 3.3 of the Terms of Reference addressed requirements for hydrogeology. The scope of the hydrogeology assessment was also developed in accordance with the guidelines for an environmental impact statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project (Canadian Environmental Assessment Agency 2016). Specifically, Sections 6.1.4 and 6.2.2 of the guidelines address requirements for the hydrogeology assessment.

Alberta Transportation provided a modelling assessment of the proposed flooding effects;[2] in summary, the assessment provided an adequate overview of the site hydrogeology; however, the duration of the Baseline monitoring was short. Monitoring occurred between October 2016 and May 2017 for water levels and geochemistry baseline was derived from one round of monitoring well samples, completed during fall (baseflow) conditions.

Only 12 domestic wells within the RAA were sampled. In addition to insufficient sampling to establish Baseline groundwater quality, the main data gap in the assessment is addressing the effect of the Reservoir on downgradient groundwater levels (and groundwater users) over time.

Bank Storage of surface water derived from mountain snow melt is the primary mode of recharge to the alluvial aquifer associated with the Elbow River in the lower reaches of the watershed, as it meanders through Springbank, before entering the Glenmore Reservoir. As indicated above, the active flood storage volume for the Project is 77,771,000 m^3; although groundwater flow modelling was performed, there remains a lack of consideration of what will happen to the water levels in the well-connected alluvial aquifer, downgradient of the Project over time, through successive cycles of storage, release, and re-filling of the reservoir.

A total of 392 water well drilling records were identified within the RAA, after screening the data. The types of well uses, as reported in the Alberta Water Well Information Database (AWWID), included:

- 277 for domestic use;
- 50 for stock use;
- 31 for domestic and stock use;
- seven for industrial purposes;
- two for irrigation purposes;
- five for municipal use; and
- 20 for unknown use.

Comments provided below pertain to Alberta Transportation's application and planned development impact assessments, as well as the Baseline information.

[2] EIA, Volume 4, Appendices: Appendix 1 Groundwater Numerical Modelling TDR

3.2. Land-User Concerns for Impact to Groundwater and Surface Water

Issues and key concerns related to hydrology and hydrogeology raised during public and First Nations consultation included:

- protecting groundwater resources, which is of importance to local landowners due to their reliance on groundwater for potable and agricultural uses;
- the potential for the Project to interact with groundwater resources as a cause for concern, related to effects on water-well yields, groundwater quality, springs, wetlands, agricultural productivity and interaction with surface water resources;
- the potential for the Project to affect groundwater quality within the alluvial deposits in the Elbow River Valley;
- the potential for effects on shallow groundwater levels near the Project during flood events;
- the potential for the Project to affect the availability of groundwater for domestic use;
- permanent alteration of flow in the Elbow River; and
- increased sedimentation in the Elbow River.

Through the Project-specific Indigenous Engagement program, Tsuut'ina Nation expressed concerns that the Project would permanently alter the flow of the Elbow River and result in flooding of portions of Tsuut'ina Nation traditional territory. Tsuut'ina Nation noted the potential for flood water, including any debris or contamination it contains, to spill over the floodplain berm and on to the Tsuut'ina Nation #145 Reserve. They mentioned the potential for methylmercury contamination both upstream and downstream. More frequent floods and higher flood volumes than those predicted in the project description could occur because of global warming.

Tsuut'ina Nation noted that the Project would result in increased sedimentation in the Elbow River, especially during construction, but also during operation. The Nation stated that community members rely on the Elbow River for drinking water and noted concern regarding effects of the Project on Tsuut'ina Nation's ability to use the river as a water source. Tsuut'ina Nation depends on the groundwater in the Elbow River Alluvial Aquifer for the reserve's drinking water. Tsuut'ina Nation explained that the project doesn't plan to line the reservoir, so any contaminants would likely seep into the groundwater system.

> *"Any potential contamination or change to the flow of the Elbow River is therefore likely to contaminate our aquifer."*

Piikani Nation voiced concern regarding silt build up in the Elbow River as well as in the proposed Springbank Reservoir due to flood cessation. Piikani Nation used the example of the Oldman Dam and the silt shadow that has developed. The Piikani also expressed concerns about effects upstream and downstream of the Project.

Stoney Nakoda Nation has stated:

> *"When Treaty 7 was signed, the SNN neither surrendered their Aboriginal title to water within their traditional territory nor surrendered any other interests pursuant to an associated Aboriginal right. The SNN continue to hold these rights. Therefore, the SNN are concerned that the project will impact these rights and traditional use of lands in the Project area."*

The Stoney Nakoda Nation also stated:

> *"Stoney Nakoda Nation[s] feel[s] a Cultural Use Study and a Stoney Hydrology report is required."*

The Siksika Nation noted:

> *"During a major flood there may be an initial upstream surge of water as the gates are raised on the control structure to divert water to the reservoir. This upstream surge may flood high bank riparian areas that would not otherwise be impacted if the flood were permitted to proceed naturally."*

The Kainai First Nation expressed concern about impact on wetlands and upstream and downstream effects. The Kainai First Nation also expressed concern about debris and sediment that might be left in the reservoir as a result of a flood. Kainai First Nation expressed concerns that instream work within Elbow River will impact fish and there could be temporary downstream impacts from project construction.

3.3. Groundwater Setting and Assessment

The following section details the hydrogeologic setting for the Project and the major aspects of the EIA as it pertains to identifying and assessing potential impacts to groundwater and surface waters.

The major hydrostratigraphic units in the RAA are as follows:

Unconsolidated

- basal silt, sand and gravel
- till
- glaciolacustrine clay
- recent fluvial sand and gravel

Bedrock

- Undifferentiated Bedrock – the bedrock lithology has been described in some detail, the more porous and permeable bedrock is comprised of sandstone and

siltstone; while the less permeable bedrock in the area is comprised of claystone, mudstone and shale.

EIA Table 5-1 provided a list of the potential effects of the Project on hydrogeology as follows:

- groundwater withdrawals for construction dewatering;
- groundwater seepage into open excavations;
- groundwater seepage into the diversion channel when dry;
- changes to groundwater quantity or flow patterns that can in turn affect groundwater quality; and
- groundwater contamination related to construction activities.

This preliminary framework was created to support the early stages of the assessment process. The preliminary framework was used in conjunction with the Project description to determine appropriate hydrogeology assessment areas and to guide the hydrogeological field program for the Project. The publicly available data and the Project-specific field data were used to build a three-dimensional conceptual site model (3D CSM) for the groundwater resources within the RAA. The 3D CSM covers approximately 14,000 ha based on the boundary of the RAA.

The intent of the 3D CSM was to synthesize the available data to:

- improve the understanding of the local and regional physiographic setting;
- develop a hydrostratigraphic framework of the RAA; and
- provide the basis for the numerical groundwater flow and contaminant transport modelling to be used in the effects assessment of the environmental impact assessment.

The compiled hydrostratigraphic units were used to develop the 3D CSM using Leapfrog Hydro software. The modelling was completed in an iterative process whereby reinterpretation or culling of boreholes that were inconsistent with the overall hydrostratigraphic framework was conducted during each iteration.

An interpreted potentiometric surface for the unconsolidated deposits and potentiometric surface for the bedrock units were created for the RAA. A potentiometric surface represented the elevation to which water would rise due to pressure in the aquifer if it was confined and was similar to the water table in the unconfined areas of the aquifer. Potentiometric surfaces were prepared for the surficial aquifer in the unconsolidated Quaternary deposits and for the undifferentiated shallow bedrock aquifer.

The potentiometric surface in the unconsolidated deposits was based on a combination of Project-specific groundwater monitoring data, water level data from AWWID drilling records, and surface water elevations where shallow groundwater intersected the land surface. The water levels within the LAA were well described based on the data gathered during the Project-specific field program. Outside the LAA, water levels were derived from the AWWID and LiDAR

data. Hydraulic head values were calculated based on elevations obtained from the LiDAR data for the Project and the recorded non-pumping static water levels in the database.

3.4. Hydrogeology Key Requests and Concerns

[2] Baseline Assessment

The Baseline hydrogeological assessment entailed gathering stratigraphic data from the drilling program(s) carried out for the Project. Water quality and water level data were collected from 31 locations. Water quality (12 locations) and water levels at the 31 locations appear to have been evaluated (tested/sampled) only once, during the fall (October 2016).

Typically, Baseline assessments involve multiple rounds of water quality samples through all the seasons, with statistics applied to establish both Baseline values spatially in the monitored units, as well as the range of natural variation in parameters (if any), by location and aquifer. The results as presented were not considered Baseline, but rather a snapshot in time of conditions in fall 2016, during low water.

Data loggers (pressure transducers) were installed in ten wells to monitor water levels from October 2016 to May 2017 to help inform the numerical model. As water quality had only been assessed during baseflow conditions, it would be prudent to have performed at least three rounds of sampling, during high, receding and low groundwater conditions, to assess the seasonal variance of water quality at the monitored locations.

Almost 400 wells were identified in the RAA, of that 277 were designated domestic use, yet only ten domestic wells were monitored during the Baseline assessment. To address the concerns of the local land users we recommend that Alberta Transportation conducts a more in-depth well survey that will allow for a greater monitoring network and further calibration points for numerical model verification.

[2] Request

Piikani Nation requests that Alberta Transportation:

i. conducts additional water quality sampling, from more wells, and through all seasons to establish a more robust Baseline, before or during construction of the Project to confirm the validity of the EIA assessment results;

ii. engages in long-term monitoring of more than ten domestic wells within the RAA and conducts additional additional well surveys to acquire further pertinent information for the long-term monitoring program;

iii. provides Piikani Nation with updates regarding additional investigations of the Project and seasonal characterization of groundwater quality; and

iv. consults with Piikani Nation about its mitigation plans in the event of unexpected effects on groundwater quality and quantity in the RAA.

[3] Numerical Model

Spatial boundaries of the model included the features noted above:

- a surface and shallow groundwater flow divide in the north;
- a boundary to the northwest to encompass the subwatershed of three small tributaries to the Elbow River;
- the floodplain and terrace of the Elbow River to the south; and
- Jumpingpound Creek to the west, which was used as the basis for defining the numerical model domain for groundwater modelling.

The vertical boundaries were defined by the ground surface as the uppermost surface and an arbitrary lower surface at an elevation of 1080 m ASL.

The numerical model was required to evaluate potential changes to the hydrogeologic system caused by floods and construction and operation of the Project. A numerical model represented the groundwater flow through a saturated porous media (in this case, unconsolidated and bedrock materials), considering the hydraulic properties, sub-surface geologic materials and associated physical parameters that govern the flow within the porous media.

A numerical flow model based on finite element method (FEM) was selected due to the large size of the RAA, complex geologic framework, time-variable boundary conditions, and irregular geometry of the physiographic setting and project components. A numerical solution technique minimized the number of simplifying assumptions that would be required using other analytical methods, thus yielding a more detailed depiction of the hydrogeologic setting and system response within the RAA.

The finite element sub-surface flow and transport system (FEFLOW) is a numerical groundwater modelling system that is capable of modelling three-dimensional (3D) groundwater flow and mass transport. FEFLOW was selected to simulate the groundwater flow because it is a well-documented, well-tested proprietary code capable of advanced simulation of regional and local groundwater systems due to its ability to simulate time-varying boundary conditions with variable mesh resolution within an irregular model domain.

The potentiometric surface of the upper water table found within unconsolidated surficial deposits was presented in the Hydrogeology Baseline TDR.[3] Groundwater elevations within the surficial geologic layer generally followed the topography and range from at the ground surface (BGL) to approximately 8.0 m BGL. These groundwater elevations were used as initial hydraulic heads during calibration of

[3] EIA, Volume 4, Appendix I

the numerical model. Temporal changes in groundwater levels were evaluated using data logging pressure transducers installed at ten monitoring wells within the RAA. Hydrographs from October 7, 2016 to May 24, 2017 were presented in the Hydrogeology Baseline TDR.

Calibration of the model at steady state conditions used a combination of parameter estimation routines implemented by FePEST until a reasonable fit between observed and simulated steady-state heads was observed. Additional manual calibrations in transient simulations were also completed to refine the model's dynamic response.

A total of eight FEFLOW predictive simulation runs were completed to represent hydrogeologic conditions without the project operating and operation conditions. Simulation results that were used directly to support the effects assessment were presented in more detail in the hydrogeology effects assessment.[4]

Five control points (CP) were used to assess temporal changes in groundwater levels at a given location, over the simulation period. Simulated hydrographs represented the hydraulic head changes at CP1, CP2 and CP3, which are located at 29 m, 184 m, and 202 m from the Elbow River. Simulated hydrographs further represented the hydraulic head changes at CP4 and CP5, which are situated approximately 156 m and 204 m downstream of the off-stream dam.[5]

The results of a series of modelling scenarios showed that the groundwater levels and flow patterns were altered within the vicinity of the proposed Project. Changes were observed within the reservoir area during flooding and receded toward pre-flood conditions following floods. Changes in the groundwater flow regime were also observed along the proposed diversion channel.

The numerical model covered a large area and yet only 31 data points were used to calibrate the model. Although there appeared to be adequate success with model calibration, the area covered by the numerical model is large and there were only 31 locations where the model had been calibrated and only for baseflow (fall 2016) conditions.

Further, though transient modelling appeared to have been performed, the long-term effects on groundwater resources downgradient of the Project did not appear to have been explicitly addressed in the model. No sensitivity analysis or assessment of the model limitations and uncertainties appeared to have been performed on the numerical model. Further monitoring of the existing network along with additional further water level monitoring at locations at further distances from the PAA are recommended to help verify model predictions and reduce uncertainty.

[4] EIA, Volume 3B, Section 5
[5] EIA, Volume 3A, Figure 6-7

[3] Request

Piikani Nation requests that Alberta Transportation:

i. conducts additional water level monitoring to confirm the validity of the EIA assessment results; and

ii. provides Piikani Nation with updates regarding additional investigations of the Project and validation of the numerical model.

[4] Impact Assessment

The effects assessment for hydrogeology during the construction and dry operations phase of the Project used both quantitative and qualitative techniques. The development and calibration of the numerical groundwater flow model was used for the hydrogeology effects assessment and is addressed above.

As with any surface impoundment involving large volumes of water, the Project has the potential to alter groundwater quantity through groundwater seepage into the diversion channel when dry. Groundwater that seeps into the diversion channel (when dry) would infiltrate back into the groundwater system at a downstream location that is not saturated or continue to flow by gravity down the diversion channel and into the off-stream reservoir. Once there, groundwater seepage collected in the diversion channel might infiltrate back into the ground (returning to the groundwater system) or, where the local infiltration capacity was exceeded, continue to flow overland toward existing surface water drainage courses.

There, groundwater seepage would become part of the surface water system, eventually draining through the outlet structure. Groundwater seepage into the dry diversion channel would occur only in some areas where the local groundwater table is near ground surface and where the diversion channel has been cut to an elevation below the seasonally variable water table.

Groundwater levels range from approximately 1338 m ASL in the southwestern areas of the RAA, to approximately 1147 m ASL in the eastern edge of the RAA within the Elbow River valley. In general, the groundwater flow patterns exhibit a predominance of topographic control over the flow regime, with upland areas along ridges driving flow toward low lying areas, including local drainage features, the Elbow River valley, and the off-stream reservoir area.

The Elbow River valley is a hydraulic divide for shallow groundwater, with flow directions on either side of the valley directed inward towards it. The groundwater flow patterns are almost the same as was the case for the existing conditions simulation, indicating that at the scale of the RAA, changes in groundwater flow patterns would be almost imperceptible. Net change in potentiometric heads that could be attributable to dry operations were generally limited to areas of the diversion channel.

In southwestern areas of the diversion channel (near the inlet structure), net negative changes in groundwater levels of up to 5.5 m were predicted due to the

incision of the diversion channel into the ground surface below the original groundwater table level.

This diversion channel incision, and resulting seepage face, caused a localized lowering of the groundwater table as groundwater was allowed to discharge into the dry channel. In northeastern areas of the diversion channel (near its outlet into the off-stream reservoir), net positive changes in groundwater levels of up to 6 m were predicted due to the additional infiltration of water into this area. This infiltration locally raised the groundwater table as additional seepage water that was conveyed in the diversion channel (when not in operation) and was allowed to infiltrate back into the ground near this location. In either area of net negative or positive change, the extent of the changes in potentiometric head were limited to near the diversion channel and well within the LAA.

For dewatering during construction, the Project has the potential to change groundwater quantity in and near the PDA as a result of local, shallow and temporary sub-surface dewatering that might be required to facilitate construction of the diversion channel, dam and floodplain berm, outlet works, bridge, excavation of borrow pits, and utility realignments, although with the construction mitigation measures presented in Section 5.4.2.3, and listed below, these effects were expected to be low in magnitude.

The need for temporary construction dewatering will be evaluated during the construction planning for the Project and will be determined based on the construction method to be employed at a given location, local water table conditions at the time of construction, the timeframe for construction, and the locations and depth of excavations (or other subsurface disturbance) required. Dewatering outside the PDA was not expected to be required for construction. Where construction dewatering occurred, local water table elevations would be temporarily lowered, and a localized interaction between the Project and groundwater resources would occur.

Effects on groundwater quantity could be expected because of construction dewatering. Dewatering creates a “cone of depression” (lowering) in groundwater levels that are greatest near the pumping location, and gradually rise back toward static (non-pumping) groundwater levels with increasing distance away from the pumping location. The maximum depth of this cone of depression would depend on the depth of excavation required (groundwater levels would normally be lowered slightly below the depth of excavation in order to keep the excavation dry). The lateral extent of the cone of depression would be dependent upon the pumping rate and hydraulic properties of the hydrostratigraphic unit that was being dewatered.

Mitigation of construction dewatering, if required, would be done locally and according to the terms and conditions of dewatering licences issued by AEP (where applicable and if required) and best management practices. This would be included as part of the Environmental Construction Operation Plan Plan (ECO) prepared by the Project contractor. Standard construction dewatering methods will be used, including methods to cut off excessive seepage where trenches

extended below the water table to mitigate preferential flow paths. Other mitigation measures would be as follows:

- Water will be discharged in a manner to avoid erosion using turbidity barriers, containment berms and settling ponds. Construction dewatering, if required, would be in accordance with the terms and conditions of the *Environmental Protection and Enhancement Act* approval conditions, and *Water Act* approval and the federal *Fisheries Act* and *Navigable Waters Protection Act*.

- A Care of Water Plan will include using cofferdams, pumping systems, sumps, pipelines, channels, flumes, drains, and other dewatering works to permit construction of the work in the dry.

- TSS levels will be controlled and reduced using silt fences and turbidity barriers so that the water quality from care of water system discharges would be made equal to or better than the initial water quality. TSS levels will be monitored by carrying out frequent water quality testing.

- Construction dewatering will be limited through diligent construction planning.

- Existing water wells within the reservoir footprint will be decommissioned and plugged off to prevent groundwater contamination.

Regional-scale effects on groundwater quantity can be mitigated by allowing seepage in the dry diversion channel to infiltrate back into the sub-surface, or flow back into the Elbow River through surface water drainage pathways. Silt fences and turbidity barriers will be used as required to control TSS so that the water quality from care of water system discharges is made equal to or better than the initial water quality by carrying out frequent water quality testing.

As is described in the previous section, the Project has the potential to affect groundwater levels and flow patterns because of construction (dewatering) and dry operations (seepage into the diversion channel). Since groundwater quality is dependent upon its flowpath through the sub-surface, flow velocities, and recharge/discharge relationships with surface water (notwithstanding other anthropogenic alterations of groundwater quality), alterations to the Baseline groundwater flow regime can create secondary effects on groundwater quality.

Changes in groundwater quantity during construction and dry operations of the Project were evaluated in the context of the hydrogeological framework of the RAA and in consideration of Project infrastructure and activities occurring during these phases. Due to the limited interaction of the Project with groundwater resources, the residual effects on groundwater quantity would be not significant, with a moderate degree of confidence.

Changes in groundwater quality during construction and dry operations of the Project were related to secondary effects associated with changes in groundwater

levels, whereby alterations of the existing flow regime will affect change in groundwater quality due to alteration of groundwater flowpaths or interactions with surface water.

Alberta Transportation says that with the Project's limited interaction with groundwater resources the residual effects on groundwater quality would be not significant, with a moderate degree of confidence; however, long-term changes to the flow dynamics between groundwater and surface water within the RAA have not truly been vetted in the current EIA. As already noted, there are almost 400 water wells within the RAA and only a very small number (ten) have been monitored within the very limited Baseline assessment; further assessment of potentially effected domestic wells should be carried out.

[4] Request

Piikani Nation requests that Alberta Transportation:

i. monitors the effects of dewatering during construction; and

ii. performs adequate groundwater (levels and quality) monitoring during construction and dry operation of the Project to confirm the localized effects of the derivation ditch on groundwater surface water interaction.

[5] Culturally Sensitive Areas and Monitoring

Traditional Land and Resource Use (TLRU) information was gathered through Project-specific traditional use studies (TUS) conducted by potentially affected Indigenous groups and through the results of Alberta Transportation's Indigenous Engagement program. At the time of writing this assessment, Alberta Transportation had received a Project-specific TUS report from Piikani Nation, as well as a joint interim TUS report from Kainai First Nation and Siksika Nation.

Further, publicly-available literature was reviewed for TLRU information relevant to the Project. Secondary source materials reviewed included:

- TUS studies conducted by Indigenous groups;
- TLRU assessments, supplemental filings, and hearing evidence for other developments;
- government reports and databases;
- legal proceedings;
- historical and ethnographic literature; and
- relevant internet sources (such as Indigenous community websites and the Indigenous and Northern Affairs Canada website).

While it is acknowledged that recent land use for the PAA has been private and the land has been utilized for agriculture activity, traditional use predated current uses and there remain opportunities for such use. However, Alberta Transportation's regulatory application did not appear to have assessed potential existence of groundwater-dependent, traditionally used culturally sensitive areas,

such as cabins, recreational sites, fishing, hunting, and plant gathering areas within the PAA that could be impacted by the Project.

This use could be indirect through plant gathering (e.g., medicinal plants) or direct (accessing shallow groundwater or springs near cabins, fishing or hunting sites). There is considerable potential for surface water/groundwater interaction in the project area. Community members (land users) could have insights that would help inform monitoring programs, such as those discussed in the preceding requests.

[5] Request

Piikani Nation requests that Alberta Transportation:

i. confirms that it has considered potential traditional groundwater use in any culturally sensitive areas;

ii. if it identifies or is informed through the TLRU study about traditionally used, culturally sensitive areas within the Project impact area, develops mitigative measures to protect these sensitive areas including the contribution of natural groundwater flow to such areas; and

iii. consults with community members to inform and participate in monitoring activities related to culturally sensitive areas and considers incorporating the role groundwater plays in sustaining identified areas for monitoring and mitigation.

3.5. Hydrogeology Key Concerns and Requests Summary

Table 3-1: Hydrogeology Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[2]	Baseline Assessment	Piikani Nation requests that Alberta Transportation: i) conducts additional water quality sampling, from more wells, and through all seasons to establish a more robust Baseline, before or during construction of the Project to confirm the validity of the EIA assessment results; ii) engages in long-term monitoring of more than ten domestic wells within the RAA and conducts additional additional well surveys to acquire further pertinent information for the long-term monitoring program; iii) provides Piikani Nation with updates regarding additional investigations of the Project and seasonal characterization of groundwater quality; and iv) consults with Piikani Nation about its mitigation plans in the event of unexpected effects on groundwater quality and quantity in the RAA.	Response Agreement

Number	Piikani Nation Key Concerns	Requests	Category*
[3]	Numerical Model	Piikani Nation requests that Alberta Transportation: i) conducts additional water level monitoring to confirm the validity of the EIA assessment results; and ii) provides Piikani Nation with updates regarding additional investigations of the Project and validation of the numerical model.	Response Agreement
[4]	Impact Assessment	Piikani Nation requests that Alberta Transportation: i) monitors the effects of dewatering during construction; and ii) performs adequate groundwater (levels and quality) monitoring during construction and dry operation of the Project to confirm the localized effects of the derivation ditch on groundwater surface water interaction.	Response Agreement
[5]	Culturally Sensitive Areas and Monitoring	Piikani Nation requests that Alberta Transportation: i) confirms that it has considered potential traditional groundwater use in any culturally sensitive areas; ii) if it identifies or is informed through the TLRU study about traditionally used, culturally sensitive areas within the Project impact area, develops mitigative measures to protect these sensitive areas including the contribution of natural groundwater flow to such areas; and iii) consults with community members to inform and participate in monitoring activities related to culturally sensitive areas and considers incorporating the role groundwater plays in sustaining identified areas for monitoring and mitigation.	Response Agreement

***Recommendation Categories**:

Agreement – A suggested activity that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.

Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).

Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

4. Hydrology

4.1. Hydrology Impacts

The Project was designed to prevent flood damage in the lower reaches of the Elbow River. As a result, the Project will directly impact the hydrology of the river, since the purpose was to mitigate downstream flood impacts when streamflows at the location of the diversion channel were greater than 200 m^3/s (i.e., 1-in-100-year return period peak streamflow). Although the desired goal of the Project was to maintain downstream flows at 160 m^3/s during a flood, the Project will also affect sediment movement and channel morphology.

The hydrology component of the Project was described and assessed in separate reports for construction and dry operations,[6] flood and post-flood operations,[7] and one technical data report by Stantec on behalf of Alberta Transportation.[8]

The main impacts to hydrology were the reduction in streamflows of the Elbow River when streamflows at the Project diversion channel exceeded 200 m^3/s. Also, streamflows would increase for short periods post-flood due to releases from the offstream storage reservoir into the low-level outlet.

The following hydrologic impacts were identified for construction and dry operations, as well as flooding and post-flooding operations:

- During construction and dry operations:
  - No changes to the Elbow River hydrologic regime would occur, since no water would be diverted directly from the river.
  - Five small tributaries (to the Elbow River) would be intersected by the diversion channel and storage reservoir; however, the tributary streamflows would be small, intermittent, and already impacted by roads and agricultural management upstream; therefore, the influence of the direct loss of streamflow from the tributaries (on the Elbow River) was deemed unlikely to be measurable at the watershed scale.

- During flood operations:
  - The diversion channel was proposed to be active when streamflows exceeded 200 m^3/s, with a maximum diversion channel (diversion) rate of 600 m^3/s. As a result, the impact to the natural hydrograph of the Elbow River would be significant during high water periods.
  - All diverted water was proposed to be stored within an offstream storage reservoir and released according to post-flood criteria.

[6] EIA, Volume 3A, Section 6
[7] EIA, Volume 3B, Section 6
[8] EIA, Volume 4, Appendix J

- During post-flood operations:
    - All diverted water was proposed to be stored within an offstream storage reservoir and eventually released. The releases were to be based on two criteria: (1) streamflows within the Elbow River needed to be <20 m^3/s and (2) the length of time required to drain the reservoir. As a result, streamflows within the Elbow River would increase for a short duration post high water; however, the duration of the release would be dependent on the volume of water diverted.

Sediment transport within the Elbow River would be mitigated through erosion and sediment control plans during the construction and dry operations and would be augmented during flood and post-flood operations. During flood operations, suspended sediment concentrations and sediment yields would be reduced within the Elbow River due to the diversion of streamflows into the reservoir and a portion of the suspended sediment settling within the reservoir. During post-flood operations, suspended sediment concentrations were likely to temporarily increase within the Elbow River due to reservoir release of settled sediment that was re-mobilized.

During flood and post-flood periods, channel morphology downstream of the Project would be impacted due to the reduction in shear stresses resulting in a reduced bedload[9] mobility. Specifically, the impacts to downstream channel morphology by the Project would include reduced mobilization of channel gravel bars, decreases in degradation and aggradation (downward or upward riverbed gradient changes), changes in channel planform (e.g., meander changes), and changes to substrate composition and structure (types of bottom material; e.g., sand or gravel).

During flood periods, the Project would have a high magnitude effect on channel morphology of the Elbow River; however, during post-flood periods, high magnitude effects were expected only for the low-level outlet channel.

4.2. Hydrology Assessment

Stantec's technical report provided Baseline hydrology, channel bed and suspended sediment information for the Elbow River.[10] In addition, Stantec described the development and calibration of a hydrodynamic model used to assess Elbow River hydrology, sediment transport impacts and reservoir storage dynamics during a 1-in-10-year (i.e., 200 m^3/s), 1-in-100-year (i.e., 765 m^3/s), and design flood (i.e., 1170 m^3/s) event.

Data sources for Baseline and modelling purposes included desktop surveys for existing information and field surveys specific to this Project.

[9] Bedload describes particles, including gravel, in water that are transported along the river bed.
[10] EIA, Volume 4, Appendix J

The overall conclusion was that impacts to Elbow River hydrology would be negligible on an annual runoff standpoint, but significant change would occur during high water periods when streamflows exceeded 160 m^3/s. Similarly, the magnitude of impacts to suspended sediment transport and channel morphology were both assessed as high.

The methods and assumptions used by Stantec to complete the analysis were generally appropriate for the scope of work; however, there is uncertainty associated with the sediment transport modelling component of the assessment related to actual suspended sediment concentrations during flood streamflows and mobility thresholds for suspended and bedload sediments.

This uncertainty might influence the predictions about sediment transport and channel morphology during flood and post-flood operations.

Stantec did not describe any contingency plans to address the implications of this uncertainty (e.g., dredging of reservoir if sediment deposition rates were greater than expected or mitigation of excessive suspended sediment during reservoir releases).

4.3. Hydrology Key Concerns and Requests

[6] Streamflow when Diversion Channel is Operational

Stantec indicated that the 1-in-10-year return period flood (i.e., 200 m^3/s) was the minimum streamflow that the Project would actively begin to divert. The goal of the diversion was to maintain downstream streamflows at 160 m^3/s during flood events.

[6] Request

Piikani Nation requests that Alberta Transportation (Stantec) clarifies the planned operation of the diversion channel when natural streamflows are between 160 m^3/s and 200 m^3/s (i.e., during flood events < 1-in-10-year return period).

[7] Coarse Sediment Transport at and near the Diversion Channel

Stantec indicated that studies showed that a discharge of greater than 500 m^3/s in the Elbow River was required to mobilize thalweg[11] sediment/gravel deposits, while effective discharge for suspended fine sediment movement was estimated to be between 35 m^3/s to 50 m^3/s. In addition, Stantec indicated that armouring (coarse surface layer overlying finer sediment) of the Elbow River bed increased downstream. Coarse sediment like gravel is an important component of aquatic habitat (e.g., spawning beds).

[11] Thalweg is the sediment located in the lowest elevation of watercourse or the deepest channel of a watercourse that is the result of ongoing, or historical flows.

[7] Request

Piikani Nation requests that Alberta Transportation (Stantec):

i. clarifies how coarse sediment and/or bedload transport downstream will be maintained if discharges > 160 m^3/s will no longer occur (or will occur on a very limited basis) in the Elbow River downstream of the diversion channel; and

ii. describes the importance of sediment deposition and resuspension dynamics within the diversion channel and Elbow River at and below the diversion structure.

[8] Sediment Deposition within the Reservoir

Stantec indicated that a portion of suspended sediment entering the reservoir would permanently settle at the reservoir bottom with sediment depth determined by sediment load, water depth, the effects of the underlying topography and water/particulate residence within the reservoir.

It provided estimates of the spatial distribution and depth of sediment within the reservoir under 1-in-10-year, 1-in-100-year, and design floods, but identified several assumptions related to inflowing sediment concentrations that could result in an under- or over-estimate of incoming sediment yields.

In addition, Stantec stated that resuspension and transport of deposited sediments into the low-level outlet would be a function of where and when water was moving, bed morphology, and the timing and rate of water release.

[8] Request

Piikani Nation requests that Alberta Transportation (Stantec) clarifies how the reservoir water storage capacity would be confirmed and maintained on an annual basis when the storage capacity might be reduced due to sediment deposition within the reservoir.

[9] Low-level Outlet Channel

Stantec indicated that the unnamed tributary identified to be the low-level outlet channel was characteristic of a small Alberta plains tributary with streamflows dependent upon prolonged rainfall events or rain on partially frozen ground.

The mean annual discharge within the unnamed tributary was stated to be 0.030 m^3/s with a bankfull discharge of approximately 1.0 m^3/s. Alternatively, Stantec indicated that once the offstream storage reservoir was operational, flood release rates from the reservoir (into the low-level outlet channel) would be approximately eleven to 20 times higher (under 1-in-100-year and design flood conditions, respectively) than peak flows experienced within the existing channel.

[9] Request

Piikani Nation requests that Alberta Transportation (Stantec) clarifies how the low-level outlet channel would be designed to maintain the integrity of the existing channel, limit channel bank erosion, and maintain environmental values (e.g., clear water refuge during peak streamflows within the Elbow River).

4.4. Hydrology Key Concerns and Requests Summary

Table 4-1: Hydrology Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[6]	Streamflow when Diversion Channel is Operational	Piikani Nation requests that Alberta Transportation (Stantec) clarifies the planned operation of the diversion channel when natural streamflows are between 160 m^3/s and 200 m^3/s (i.e., during flood events < 1-in-10-year return period).	Response
[7]	Coarse Sediment Transport at and near the Diversion Channel	Piikani Nation requests that Alberta Transportation (Stantec): i) clarifies how coarse sediment and/or bedload transport downstream will be maintained if discharges > 160 m^3/s will no longer occur (or will occur on a very limited basis) in the Elbow River downstream of the diversion channel; and ii) describes the importance of sediment deposition and resuspension dynamics within the diversion channel and Elbow River at and below the diversion structure.	Response
[8]	Sediment Deposition within the Reservoir	Piikani Nation requests that Alberta Transportation (Stantec) clarifies how the reservoir water storage capacity would be confirmed and maintained on an annual basis when the storage capacity might be reduced due to sediment deposition within the reservoir.	Response
[9]	Low-level Outlet Channel	Piikani Nation requests that Alberta Transportation (Stantec) clarifies how the low-level outlet channel would be designed to maintain the integrity of the existing channel, limit channel bank erosion, and maintain environmental values (e.g., clear water refuge during peak streamflows within the Elbow River).	Response

***Recommendation Categories**:
Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.
Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).
Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

5. Surface Water Quality and Aquatic Ecology

5.1. Surface Water Quality and Aquatic Resources Impacts

The proposed Project was designed to prevent downstream flood damage but has the potential to adversely affect surface water quality and aquatic resources, including fish and fish habitat.

The surface water quality and aquatic ecology components were described and assessed in separate reports for construction and dry operations,[12] flood and post-flood operations,[13] and two technical data reports by Stantec on behalf of Alberta Transportation.[14] Several additional sections that provided either background or supporting information were also reviewed to better understand the extent of the Project's impacts and mitigation.

The main impacts to water quality were likely to be through sediment transport, but other impacts might result from herbicide use and methylmercury production during flood water retention within the reservoir. Surface water quality would be affected during both reservoir filling and draining, primarily by settled suspended sediment (and associated contaminants) that is mobilized during high flows in the off-stream reservoir and the low-level outlet. Herbicides on inundated farmlands or used to control weeds along the Project infrastructure could enter local watercourses.

While methylmercury might not be produced at levels toxic to aquatic biota, conditions in the reservoir could enhance its production; drainage of the reservoir could potentially relocate produced methylmercury downstream in the Elbow River and Glenmore Reservoir.

Fish and fish habitat will be affected during the construction and flood or post-flood scenarios. Construction activities were stated to potentially change sediment concentrations, water temperatures, habitat structure, nutrient concentrations, fish food supply, and fish access in the Elbow River and tributaries in the local area. These changes will result in permanent alteration or destruction of fish habitat, including habitats of fish supporting Commercial, Recreational and Aboriginal (CRA) fisheries, which could affect the distribution and abundance of fish in the area. For example, construction of the diversion structure will result in the permanent alteration of a local area of the Elbow River, and the loss of an unnamed fish-bearing tributary to be diverted. Compensation or offset for any lost fish habitat were not described in this application.

During flood and post-flood periods, fish habitat could be degraded by sedimentation in some areas, fish might become entrained into the off-stream reservoir and might later become stranded as water levels subsided. Plans for monitoring entrainment and rescue of stranded fish were briefly described.

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[12] EIA, Volume 3A, Sections 7 and 8
[13] EIA, Volume 3B, Sections 7 and 8
[14] EIA, Volume 4, Appendix K Water Quality and Appendix M Aquatic Ecology

Residual serious harm to fish was depicted as likely not significant "if fish rescues are undertaken to relocate stranded fish". The impact of changes in sediment loads downstream in the Elbow River were assessed as "small compared to the concentrations and loads transported during a flood in the absence of the Project".

Mitigation measures to reduce the effects of construction on the aquatic environment and CRA fisheries were broadly based on best management practices (BMPs) described in the various codes of practice, including DFO's *Measures to Avoid Causing Harm to Fish and Fish Habitat* (Fisheries and Oceans Canada 2016).

5.2. Surface Water Quality and Aquatic Ecology Assessment

Stantec's technical report provided Baseline water quality, sediment quality and soils information for the local area.[15] Data sources included desktop surveys for existing information and field surveys specific to this Project. Stantec provided data from the Elbow River mainstem, a key tributary, Glenmore Reservoir, and soils in the off-stream reservoir footprint. The chemistry of the local watershed and soils was reasonably well characterized, although the map for soil and sediment sampling sites was too small scale to identify the sampled locations in relation to the Project footprint.

The overall conclusion was that effects to water quality would be minimal with few residual impacts. During flood events, eroded and deposited sediments were considered likely to be moderated by deposition within the off-stream reservoir rather than downstream in the Elbow River or Glenmore Reservoir. The report did not sufficiently address the issues of pesticide/herbicide transport and potential mercury methylation and bioaccumulation.

There was no discussion of the potential for cyanobacterial (bluegreen algae) blooms or microcystin release in the reservoir or downstream, as required by the Terms of Reference in Section 3.5.2 [E], including potential impacts on drinking water or recreation; and negligible consideration for the potential impact of existing hydrocarbon-contaminated surface soils on water quality and the aquatic environment, as required by the Terms of Reference, Section 3.5.2 [F] (Alberta Environment and Sustainable Resource Development 2015).

Stantec provided Baseline information for fish, including listing several salmonid species (e.g., brown trout, bull trout, cutthroat trout, brook trout, rainbow trout, mountain whitefish) and other sportfish like northern pike and burbot as residing in the Elbow River watershed. Like the water quality assessment, few impacts to aquatic resources, including fish and fish habitat were predicted based on the Project's design and the BMPs to be followed. No measures to prevent fish entrainment were described and the fish rescue plan was only briefly described even though an estimated 80% of fish moving downstream in the floodwaters could be swept into the off-stream reservoir during an extreme flood event.

[15] Ibid.

5.3. Surface Water Quality and Aquatic Ecology Key Concerns and Requests

[10] Increased Herbicide Concentrations

Alberta Transportation (Stantec) listed a few BMPs 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.

[10] Request

Piikani Nation requests that Alberta Transportation:

i. considers aquatic impacts related not only to herbicides applied to control vegetation during Project operations, but also any existing hydrocarbons including herbicides that are on lands within the full project footprint;

ii. provides a project footprint map at a larger scale than shown in Figure 2-1 (EIA, Volume 4, Appendix K) that more clearly depicts the locations of the sediment and soil quality sampling sites; and

iii. clarifies how it will maintain adequate setbacks for stored fuels, lubricants from vehicles and herbicide applications on the Project footprint before an extreme flood event occurs, to prevent introducing hydrocarbons or other contaminants to water during a flood event.

[11] Fisheries Act *Application*

Alberta Transportation indicated that construction of the diversion structure would result in the temporary construction-related alteration of 4550 m² of habitat, the permanent loss of 1854 m² of fish habitat in the Elbow River, and the loss of 300 m of the fish-bearing portion of the unnamed tributary to be diverted.

Compensation or offset for any lost fish habitat were not described in this application other than a vague suggestion that lost fish habitat in the tributary "*could be offset by the enhancement or construction of side channel habitat on Elbow River that could provide rearing habitat for salmonids and cover for small-bodied fish*". Note that Volume 3D, Section 2 referred to meeting the Terms in an Authorization from Fisheries and Oceans Canada (DFO), but no further information was provided.

[11] Request

Piikani Nation requests:

i. a copy of the application to Fisheries and Oceans Canada (DFO) under the *Fisheries Act* that describes the proposed offset plan for lost CRA fish habitat in the Elbow River, the fish-bearing portion of the tributary lost for diversion, and any additional fish-bearing waters that will be damaged during construction, dry operations or other phases;

ii. a copy of any DFO Authorization that has already been issued, or commitment to providing to the Piikani Nation any Authorization that might be issued in the future; and

iii. that Piikani Nation community representatives are consulted about plans to provide fish habitat replacement or offset, including the DFO consultation and Authorization process.

[12] Salvage Plan for Entrained and Stranded Fish

The reports described in several locations the potential for fish to become entrained during flood events, and to later become stranded during the water-release stage. An estimated 80% of fish moving downstream in the floodwaters could be swept into the off-stream reservoir during an extreme flood event.

The aquatics report concluded that fish mortality would be mitigated and prevented if a fish salvage plan was implemented and Volume 3C, Section 2.7 briefly described a fish monitoring and salvage proposal.

[12] Request

Piikani Nation requests that Alberta Transportation confirms that it will develop and implement plans to monitor fish entrainment following a flood event and provides a comprehensive fish salvage plan to return to the Elbow River any fish stranded and at risk of mortality within the flood control system.

[13] Water Quality Gaps

Some sections of the water quality reports were insufficient in that they either reported undetectable concentrations (because of high detection limits) or overlooked requirements of the Terms of Reference (Alberta Environment and Sustainable Resource Development 2015).

The Terms of Reference requested that Alberta Transportation evaluate nutrient concentrations, yet the detection limits reported by the laboratory were sometimes in the hypereutrophic[16] range, making it impossible to evaluate whether the Project might contribute to eutrophication of the system. For example, total phosphorus detection limits were reportedly as high as 0.05 – 0.30 mg/L for one field trip, although corrected to "low level" for the next trip; they should consistently be at or less than 0.01 mg P/L.

[16] Hypereutrophic = highly productive and likely to have recurrent and widespread algal blooms.

Also, there was no discussion of the potential for cyanobacterial (bluegreen algae) blooms or microcystin toxin release in the reservoir or downstream, as required by the Terms of Reference in Section 3.5.2 [E], including potential impacts on drinking water or recreation. Cyanobacteria blooms in eutrophic Alberta lakes are common during warm months of the year.

[13] Request

Piikani Nation requests that Alberta Transportation:

i. examines data from the analytical laboratory to determine whether detection limits used are either higher than published Canadian Council of Ministers of the Environment (CCME) or Government of Alberta water quality guidelines or are appropriate to detect each key parameter in Elbow River waters—where the detection limits are higher than guidelines, Alberta Transportation should explain how issues with laboratories used, data interpretation and aquatic system management will be addressed;

ii. ensures that water quality monitoring programs (Volume 3C, Section 2) following flood events include consistently instructing the analytical laboratory to provide "low level" detection limits for nutrients (notably phosphorus) and other parameters to ensure trophic categories can be assessed and guidelines are adhered to;

iii. consistent with the Terms of Reference, provides an assessment of the potential for the off-stream reservoir to develop cyanobacterial blooms, which might result in the production of microcystin toxins that could be introduced downstream during water release to the Elbow River and the drinking water supply, Glenmore Reservoir; and

iv. develops and communicates contingency plans should excessive cyanobacterial blooms develop in the reservoir prior to planned release to the Elbow River.

[14] Mercury Methylation and Bioaccumulation in Reservoirs

The water quality and aquatic ecology reports both discussed the potential for methylmercury production in the system. This bacterial decomposition-related process commonly occurs in man-made reservoirs when organic soils and vegetation are inundated by flood waters.

Stantec relied heavily on studies completed in northern Ontario to reach the conclusion that methylmercury would not be produced at levels harmful to aquatic biota. While it might be true that methylmercury concentrations would not be harmful to biota, it is possible that methylmercury might be produced and bioaccumulated by fish entrained in the reservoir during a flood event.

When the waters were released, and fish returned to the Elbow River, methylmercury could be introduced to the Elbow River and fish tissue might be contaminated to levels exceeding consumption guidelines.

The potential methylmercury production and movement to the Elbow River or bioaccumulation by human consumers were not evaluated.

[14] Request

Piikani Nation requests that Alberta Transportation:

i. assesses the potential for methylmercury to be produced within the flooded reservoir and transported to the Elbow River during water release;

ii. assesses the potential for methylmercury produced in the flooded reservoir to be bioaccumulated by fish to levels that might not otherwise occur, and that might exceed human consumption guidelines (in the Elbow River); and

iii. is required to monitor inorganic mercury and methylmercury in reservoir sediments, water overlying sediments, at the low-level outlet during water release, and in fish tissue just prior to salvaging fish back to the Elbow River.

5.4. Surface Water Quality and Aquatic Ecology Key Concerns and Requests Summary

Table 5-1: Surface Water Quality and Aquatic Ecology Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[10]	Increased Herbicide Concentrations	Piikani Nation requests that Alberta Transportation: i) considers aquatic impacts related not only to herbicides applied to control vegetation during Project operations, but also any existing hydrocarbons including herbicides that are on lands within the full project footprint; ii) provides a project footprint map at a larger scale than shown in Figure 2-1 (EIA, Volume 4, Appendix K) that more clearly depicts the locations of the sediment and soil quality sampling sites; and iii) clarifies how it will maintain adequate setbacks for stored fuels, lubricants from vehicles and herbicide applications on the Project footprint before an extreme flood event occurs, to prevent introducing hydrocarbons or other contaminants to water during a flood event.	Response Agreement

Number	Piikani Nation Key Concerns	Requests	Category*
[11]	*Fisheries Act* Application	Piikani Nation requests: i) a copy of the application to Fisheries and Oceans Canada (DFO) under the *Fisheries Act* that describes the proposed offset plan for lost CRA fish habitat in the Elbow River, the fish-bearing portion of the tributary lost for diversion, and any additional fish-bearing waters that will be damaged during construction, dry operations or other phases; ii) that Piikani Nation community representatives are consulted about plans to provide fish habitat replacement or offset, including the DFO consultation and Authorization process.	Response Regulatory Agreement
[12]	Salvage Plan for Entrained and Stranded Fish	Piikani Nation requests that Alberta Transportation confirms that it will develop and implement plans to monitor fish entrainment following a flood event and provides a comprehensive fish salvage plan to return to the Elbow River any fish stranded and at risk of mortality within the flood control system.	Response
[13]	Water Quality Gaps	Piikani Nation requests that Alberta Transportation: i) examines data from the analytical laboratory to determine whether detection limits used are either higher than published Canadian Council of Ministers of the Environment (CCME) or Government of Alberta water quality guidelines or are appropriate to detect each key parameter in Elbow River waters—where the detection limits are higher than guidelines, Alberta Transportation should explain how issues with laboratories used, data interpretation and aquatic system management will be addressed; ii) ensures that water quality monitoring programs (Volume 3C, Section 2) following flood events include consistently instructing the analytical laboratory to provide "low level" detection limits for nutrients (notably phosphorus) and other parameters to ensure trophic categories can be assessed and guidelines are adhered to; iii) consistent with the Terms of Reference, provides an assessment of the potential for the off-stream reservoir to develop cyanobacterial blooms, which might result in the production of microcystin toxins that could be introduced downstream during water release to the Elbow River and the drinking water supply, Glenmore Reservoir; and iv) develops and communicates contingency plans should excessive cyanobacterial blooms develop in the reservoir prior to planned release to the Elbow River.	Response Regulatory Agreement

Number	Piikani Nation Key Concerns	Requests	Category*
[14]	Mercury Methylation and Bioaccumulation in Reservoirs	Piikani Nation requests that Alberta Transportation: i) assesses the potential for methylmercury to be produced within the flooded reservoir and transported to the Elbow River during water release; ii) assesses the potential for methylmercury produced in the flooded reservoir to be bioaccumulated by fish to levels that might not otherwise occur, and that might exceed human consumption guidelines (in the Elbow River); and iii) is required to monitor inorganic mercury and methylmercury in reservoir sediments, water overlying sediments, at the low-level outlet during water release, and in fish tissue just prior to salvaging fish back to the Elbow River.	Response Regulatory Agreement

***Recommendation Categories**:

Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.

Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).

Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

6. Terrain and Soils

6.1. Introduction

The terrain and soils assessment involved three study areas:[17]

- the project development area (PDA; 1440 ha);
- the local assessment area (LAA; 1887 ha), which encompassed the PDA; and,
- the regional assessment area (RAA; 22,540 ha).

The assessment considered two potential environmental effects, including:[18]

- change in terrain stability; and
- change in soil quality and quantity.

The LAA was characterized by five main soil unit categories, including (in order of extent): [19]

a. fine to very fine textured till and glaciolacustrine parent materials (76.8% of the LAA),
b. moderately coarse to very coarse textured fluvial and glaciofluvial parent materials (9.1%),
c. undifferentiated and transitional areas (6.9%),
d. reclaimed and disturbed land (5.2%), and
e. medium-textured fluvial parent materials (2%).

The Project's construction and dry operations will result in an increase of 254 ha of disturbed and reclaimed land, which is a 13.4% increase of disturbance within the LAA.[20] It is not clear how much existing disturbance in the LAA the Project will absorb.

6.2. Terrain and Soils Key Concerns and Requests

[15] Baseline Soil Data

A total of 360 soil inspections were completed in the LAA (~1 inspection/5.25 ha; SIL 2), but the EIA did not indicate how many of the inspection locations were within the proposed construction/development footprint and the relevant figure did not present an overlay of inspection locations relative to footprint.

This absence makes it difficult to critique the adequacy and representativeness of field inspection locations relative to proposed disturbance to terrain and soils.

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[17] EIA, Volume 3A, Section 9.1.4, page 9.3
[18] EIA, Volume 3A, Section 9.1.3, Table 9-1, page 9.2
[19] EIA, Volume 3A, Section 9.2.4, Table 9-5, page 9.17
[20] EIA, Volume 3A, Section 9.4.3.3, Table 9-13, page 9.37

[15] Request

Piikani Nation is concerned about the lack of overlay of inspection locations relative to the development footprint and requests that Alberta Transportation provides figure overlays of the locations of soil inspections relative to the direct disturbance area of the development/construction footprint.

[16] Soil Quality and Quantity

In Volume 3B (Flood and post-flood operations) of the EIA, Alberta Transportation concluded that effects to soil quality and quantity were not significant because there would be a change in land use after the Project was approved, but it failed to consider other effects that changes to soil quality and quantity would have on terrestrial resources, such as vegetation and wildlife. For instance, the EIA provided extensive detail on how flooding and post-flooding activities caused by the Project might negatively alter agricultural land capability (LCC) due to changes in soil drainage and nutrient properties, physical and chemical properties, soil depth, soil salinity, water and wind erosion, among other changes.[21]

Following from these predicted changes, the EIA stated that the Project results on soil quality and quantity were adverse, of high magnitude and irreversible effect with a long-term duration.[22] Nonetheless, the EIA concluded (without elaborating) that "*despite these changes to soil quality and quantity the change in land use away from agricultural means that these changes are not significant*".[23]

This conclusion was determined solely with respect to changing LCC with no consideration or discussion of implications to terrestrial resources, such as vegetation and wildlife, despite clause 3.9.2 [A] (b) in the Terrain and Soils section (3.9) of the Project Terms of Reference, which stated (Alberta Environment and Sustainable Resource Development 2015):

> *b) discuss the relevance of any changes for the local and regional landscapes, biodiversity, productivity, ecological integrity, aesthetics and future use;*

[21] EIA, Volume 3B, Section 9.2.3, page 9.6
[22] EIA, Volume 3B, Section 9.2.4, page 9.22
[23] EIA, Volume 3B, Section 9.3, page 9.23

[16] Request

Piikani Nation is concerned about the questionable determination of significance for soil quality and quantity requests that Alberta Transportation provides an assessment of how changes to soil quality and quantity might impact other terrestrial resources, including biodiversity, productivity, and ecological integrity, as stated in clause 3.9.2 [A] (b) in the Terrain and Soils section (3.9) of the Project Terms of Reference. This assessment should involve revisions to the determination of significance for the soil quality and quantity section (Volume 3B, Section 9.3, page 9.23).

[17] Indigenous Land Use

The EIA did not address potential Project impacts to Indigenous land use in the LAA and RAA resulting from changes to terrain and soil conditions and types. Terrain and soils are closely linked to the terrestrial resources (e.g., vegetation and wildlife) that Indigenous people rely on, meaning that changes to soil conditions will have implications to Indigenous resource use.

[17] Request

Piikani Nation is concerned that there has been no discussion of the connection between soil and Indigenous land use and requests that Alberta Transportation provides an assessment of how changes to terrain and soil conditions might impact Indigenous land use resulting from implications for terrestrial resources (e.g., vegetation and wildlife). This assessment should be completed in collaboration with and informed by the Piikani Nation.

[18] Monitoring

The EIA did not provide a monitoring program for tracking potential Project impacts to soil quality and quantity or associated impacts to Indigenous land use.

[18] Request

Piikani Nation is concerned that there has been no monitoring plan for impacts to soil conditions or associated impacts to Indigenous use and requests that Alberta Transportation engages with the Piikani Nation to develop a soil monitoring program that incorporates the monitoring of soil-related impacts to Indigenous resource use.

[19] – [20] Mitigation Measures

The EIA provided some broad mitigation measures for Project effects on soil, but it did not address the importance of direct placement of salvaged surface soils as a reclamation strategy. For instance, in Volume 3A (Construction and Dry Operations), Alberta Transportation outlined three general strategies to manage topsoil, including (i) stripping and stockpiling, (ii) horizon segregation, (iii) topsoil

replacement, and (iv) revegetation.[24] [25] Alberta Transportation did not explicitly describe a plan to undertake direct placement of salvaged surface soils during conservation and reclamation activities. Direct placement should be prioritized over stockpiling to prevent depreciation in the quality of surface soil materials.

[19] Request

Piikani Nation is concerned that the Project's mitigation measures did not address direct placement of salvaged surface soils and requests that Alberta Transportation adapts the conservation and reclamation plan to maximize opportunities for direct placement of surface soils.

Alberta Transportation indicated that reclaimed areas would be revegetated with a native seed mix,[26] but it should first collaborate with Indigenous communities to ensure that the seed mix (and revegetation plan more generally) includes species of importance to the Piikani Nation and other Indigenous communities.

A revegetation plan and native seed mix developed in partnership with Indigenous people could be used for revegetation of reclaimed areas and stockpiles. Alberta Transportation's current strategy for stockpiles involves erosion mitigation by spraying tackifying agents or hydromulch, applying timber/slash or control matting, or seeding with a non-persistent cover crop.[27]

We suggest actively revegetating stockpiles with native species of importance to the Piikani Nation and other Indigenous communities. This initiative would (i) allow Alberta Transportation and Piikani Nation personnel to collaborate on techniques for successful propagation and establishment of native species of importance to the Piikani Nation, and (ii) help to maintain a seedbank on soil stockpiles for native species of Indigenous importance.

[20] Request

Piikani Nation is concerned that the Project's revegetation measures did not address species of importance to Indigenous people and requests that Alberta Transportation:

i. collaborates with the Piikani Nation to develop a revegetation plan and seed mix that includes species of importance to the Piikani Nation and other Indigenous communities, and

ii. uses the developed seed mix to revegetate both reclaimed areas and soil stockpiles.

[24] EIA, Volume 3A, Section 9.4.3.2, page 9.36
[25] Expanded detail on these strategies is provided in Soil Handling and Revegetation Mitigation Measures; Volume 4, Appendix D.
[26] EIA Volume 4, Section 5.3, p. 5.6
[27] EIA Volume 4, Section 4.6, p. 4.15

6.3. Terrain and Soils Key Concerns and Requests Summary

Table 6-1: Terrain and Soils Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[15]	Baseline Soil Data	Piikani Nation is concerned about the lack of overlay of inspection locations relative to the development footprint and requests that Alberta Transportation provides figure overlays of the locations of soil inspections relative to the direct disturbance area of the development/construction footprint.	Response
[16]	Soil Quality and Quantity	Piikani Nation is concerned about the questionable determination of significance for soil quality and quantity requests that Alberta Transportation provides an assessment of how changes to soil quality and quantity might impact other terrestrial resources, including biodiversity, productivity, and ecological integrity, as stated in clause 3.9.2 [A] (b) in the Terrain and Soils section (3.9) of the Project Terms of Reference. This assessment should involve revisions to the determination of significance for the soil quality and quantity section (Volume 3B, Section 9.3, page 9.23).	Response Regulatory
[17]	Indigenous Land Use	Piikani Nation is concerned that there has been no discussion of the connection between soil and Indigenous land use and requests that Alberta Transportation provides an assessment of how changes to terrain and soil conditions might impact Indigenous land use resulting from implications for terrestrial resources (e.g., vegetation and wildlife). This assessment should be completed in collaboration with and informed by the Piikani Nation.	Response Agreement
[18]	Monitoring	Piikani Nation is concerned that there has been no monitoring plan for impacts to soil conditions or associated impacts to Indigenous use and requests that Alberta Transportation engages with the Piikani Nation to develop a soil monitoring program that incorporates the monitoring of soil-related impacts to Indigenous resource use.	Response Agreement
[19]	Mitigation Measures	Piikani Nation is concerned that the Project's mitigation measures did not address direct placement of salvaged surface soils and requests that Alberta Transportation adapts the conservation and reclamation plan to maximize opportunities for direct placement of surface soils.	Response Agreement
[20]	Mitigation Measures	Piikani Nation is concerned that the Project's revegetation measures did not address species of importance to Indigenous people and requests that Alberta Transportation: i) collaborates with the Piikani Nation to develop a revegetation plan and seed mix that includes species of importance to the Piikani Nation and other Indigenous communities, and ii) uses the developed seed mix to revegetate both reclaimed areas and soil stockpiles.	Response Agreement

***Recommendation Categories**:
Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.
Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).
Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

7. Vegetation and Wetlands

7.1. Introduction

The vegetation and wetlands assessment involved three study areas:[28]

- the local assessment area (LAA; 4860 ha), which consisted of the project development area (PDA; 1440 ha) plus a 1 km buffer; and
- the regional assessment area (RAA; 102,817 ha), which consisted of a 15-km buffer around the PDA.

The assessment considered four potential environmental effects, including a:[29]

1) change in landscape diversity;
2) change in community diversity;
3) change in species diversity; and
4) change in wetland functions.

The LAA was characterized mainly by agricultural land (48.2% of the LAA) and uplands (33.5%), which consisted of forested areas (16.3%), native grasslands (8.7%) and shrubland (8.4%).[30] Wetlands occupy 6.4% of the LAA and included seasonal graminoid marsh (2.1%), temporary graminoid marsh (1.9%), moderate-rich shrubby fen (<1%), semi-permanent graminoid marsh (<1%) and seasonal wooded mixedwood swamp (<1%). Existing disturbed land occupies 6.1% (294.6 ha) of the LAA.

The Project's construction phase will mainly impact agricultural land (289.6 ha) but will also result in a 13.8% decrease in uplands (223.9 ha) and a 9.5% decrease in wetlands (29.5 ha).[31] Project construction will lead to a total of 683.5 ha of disturbed land in the LAA, which is 232% increase over existing conditions, but it is not clear how much existing disturbance in the LAA will be absorbed by the Project. Alberta Transportation anticipated that total disturbance would decline in the dry operations phase due to reclamation.

In the flood and post-flood operations phase, Alberta Transportation estimated that the reservoir (816 ha) would be flooded for 62 days, inundating 234.2 ha of native upland communities (41% of the PDA), 70.3 ha of wetlands, and 450.4 ha of agricultural and disturbed land.[32] The EIA stated that it is unlikely that upland species would survive prolonged flooding and anticipated high mortality of species in every stratum (trees, shrubs) of upland communities.

[28] EIA, Volume 3A, Section 10.1.4, page 10.7
[29] EIA, Volume 3A, Section 10.1.3, Table 10-1, page 10.5
[30] EIA, Volume 3A, Section 10.2.2.2, page 10.3
[31] EIA, Volume 3A, Section 10.4.3, Table 10-12, page 9.46
[32] EIA, Volume 3B, Section 10.2.2.3, page 10.11 and Table 10-8, page 10.13

Alberta Transportation anticipated that flooded areas would eventually become modified grassland ecosites through vegetation replacement from the seedbank and surrounding areas. Wetland areas would be more tolerant to prolonged flooding, but mortality could occur in the tree or shrub strata resulting in graminoid dominated marsh following flooding.

7.2. Vegetation and Wetlands Key Concerns and Requests

[21] – [22] Baseline Vegetation Data

A total of 250 site locations were surveyed in the PDA,[33] but very few surveys were completed within the 1-km buffer between the PDA and LAA,[34] which is the main study area for assessment of Project impacts.

Surveys should be evenly distributed throughout the entire LAA to groundtruth all mapped ecosites and to determine if there are any rare plants and plant communities and/or traditional use species that should be considered for mitigation.

[21] Request

Piikani Nation is concerned that there is a lack of survey locations within the 1-km buffer between the PDA and LAA and requests that Alberta Transportation completes additional surveys in the 1-km buffer between the PDA and LAA to groundtruth all mapped ecosites and to determine if there are any rare plants, rare plant communities, and/or traditional use species that should be considered for mitigation.

The EIA presented a figure and table of vegetation and wetland cover types in the LAA,[35] but the table did not indicate how many surveys were completed in each ecosite. This absence made it difficult to critique the adequacy of survey locations relative to mapped ecosites and to determine whether all ecosites were groundtruthed.

Surveys should be completed in all mapped ecosites for groundtruthing purposes and to determine if there are any rare plants and plant communities and/or traditional use species that should be considered for mitigation.

In addition, the "Field Surveys" section of the EIA did not present an explanation of how survey locations were selected.[36]

[33] EIA, Volume 3A, Section 10.2.2, page 10.17
[34] EIA, Volume 3A, Section 10.2.2, Figure 10-2, page 10.18
[35] EIA, Volume 3A, Section 10.2.2.2, Table 10-4, page 10.21
[36] EIA, Volume 3A, Section 10.2.1.2, page 10.15

[22] Request

Piikani Nation is concerned that there is a no table to describe numbers of survey locations per ecosite and requests that Alberta Transportation provides data on how many surveys were completed for each ecosite in the LAA, and an explanation of how survey locations were selected.

[23] – [25] Minimizing Disturbance

The EIA was not clear about how much existing disturbance in the LAA would be absorbed during Project construction. More effort is required to ensure that proponents incorporate existing disturbance into project footprints, especially for projects such as this that are in heavily fragmented areas that have few remaining areas with sufficient interior habitat area to support undisturbed traditional use.

[23] Request

Piikani Nation is concerned that the Project footprint might not absorb enough existing disturbance and requests that Alberta Transportation clarifies how much existing disturbance in the LAA will be absorbed during Project construction and commits to make every effort to adapt current plans to minimize the development footprint.

[24] Request

Piikani Nation requests that the Government of Alberta develops relevant policies and criteria for assessing, guiding and achieving disturbance minimization for proposed projects.

The Government of Alberta should support the engagement of Indigenous communities with respect to regional planning for land use disturbance minimization.

[25] Request

Piikani Nation is concerned that Indigenous people are not always consulted regarding disturbance minimization and requests that the Government of Alberta consults with Indigenous people regarding criteria for minimizing disturbance to natural and traditional use areas and that these criteria are incorporated into a relevant Landscape Management Plan. This collaboration would incorporate Indigenous knowledge into defining thresholds to address cumulative effects, protect Indigenous knowledge and opportunities, and guide proponents in minimizing disturbance.

[26] – [27] Rare Plants

Alberta Transportation was unclear and/or inconsistent in its reporting about species of management concern (SOMC) in the PDA. For instance, it first stated that

several SOMC were observed in the PDA, but then wrote that "none were observed in the PDA." Specifically, in the "Existing Condition Overview," the EIA stated:[37]

> *"Three plant species of management concern were identified during rare plant surveys in the PDA: blunt-leaved water cress (Rorippa curvipes), slender cress (Rorippa tenerrima) and dwarf bulrush (Tricophorum pumilum)."*

In the "Change in Species Diversity" section, the EIA stated:[38]

> *"Effects on plant SOMC from vegetation clearing are not anticipated because none were observed in the PDA. Effects on plant SOMC may still occur as unidentified plant SOMC may be present, including slender cress, blunt-leaved water cress and dwarf bulrush observed during rare plant surveys of the PDA (Section 10.2.2.3), and previously recorded plant SOMC in the RAA."*

[26] Request

Piikani Nation is concerned about inconsistent reporting about species of management concern in the PDA and requests that Alberta Transportation clarifies the inconsistent reporting about species of management concerns in the PDA.

Alberta Transportation did not consult with Piikani Nation members to:[39]

a. include rare traditional plants in the rare surveys,
b. determine if the rare species identified in the RAA and LAA were traditionally important plants, or
c. to develop species-specific mitigation plans for the three SOMC that might be removed by the Project.

[27] Request

Piikani Nation is concerned that it was not consulted about rare plants and requests that Alberta Transportation works with Piikani Nation members to determine if the rare species identified in the LAA and RAA are traditionally important, and to develop species-specific mitigation plans for the SOMC that will be removed by the Project.

[28] – [29] Traditional Use Plants

Alberta Transportation identified traditional use plants using data compiled from reports and other secondary documents,[40] but it did not consult directly with the

[37] EIA Volume 3A, Section 10.2.2.3, page 10.29; Table 10-6
[38] EIA Volume 3A, Section 10.4.4.1, page 10.50; Table 10-5
[39] EIA Volume 3A, Section 10.2.2.3, p. 10.29
[40] EIA, Volume 3A, Section 10.2.1.1, page 10.14

Piikani Nation to validate the data. The EIA presented 77 traditional use species identified through reviewing traditional ecological knowledge reports and Alberta Transportation indicated that 41 of these species were observed within the PDA.[41]

The EIA stated that there was no indication that these plants were being used by Indigenous groups and concluded that because the species were generally common and widespread that the effects of the Project to traditional use plants would be low in magnitude.[42] The EIA did not elaborate on which of the 41 traditional plant species would undergo the greatest decreases during the two Project phases (i.e., construction and dry operations, flood and post-flood operations).

Alberta Transportation should consult members of all potentially affected Indigenous groups to ensure accuracy of conclusions in the EIA for traditional use plants and the completeness of the underlying data and analysis. At minimum, engagement should include the following goals:

1) validate inventories of traditional plants,
2) add unique and uncommon (or rare) traditional plants, and
3) identify if traditional plants within the LAA are being used by indigenous people.

The potential outcome of the failure to consult is the omission and eventual disturbance of important traditional plants and habitats within the LAA.

[28] Request

Piikani Nation believes that Alberta Transportation should engage the Piikani Nation to validate traditional plant inventories and requests that Alberta Transportation collaborates with Piikani Nation and other Indigenous communities to add unique and uncommon (or rare) traditional plants and identifies if traditional plants within the LAA are being used by Indigenous people.

The EIA presented misleading arguments in the assessment of traditional use plant species for Flood and Post-flood Operations. For instance, Alberta Transportation argued that permanent loss of traditional plants was not anticipated because the plants would recover with time.[43]

> *"Because these species are common (Volume 3A, Section 10.4) and widespread, it is likely that reestablishment of these species would occur by natural*

[41] EIA, Volume 3A, Section 10.2.2.3, page 10.30
[42] EIA, Volume 3A, Section 10.4.4.2, page 10.50
[43] EIA, Volume 3B, Section 10.2.3.2, page 10.25

recruitment over time. Therefore, permanent loss of traditional plant use species is not anticipated."

This statement was misleading because it did not match the information presented in the Design Flood section (Section 10.2.2.3) of the Change in Plant Community Diversity section (Section 10.2.2). Specifically, the traditional use species that the statement referred to (Volume 3A, Table 10-7) did not coincide with the types of vegetation that Alberta Transportation expected to recover after inundation during the Design Flood, which included only three different types of modified grasslands and graminoid dominated marsh; all submerged upland and wetland communities would be permanently lost along with many associated upland and wetland traditional use plant species.[44] See Section 3.5 (Request [29]) below for further explanation.

The impact assessment for traditional use plant species was further misleading because Alberta Transportation did not present adequate information (e.g., scientific evidence and/or case studies) to demonstrate that successful grassland and marsh recovery supporting traditional plants and uses could be achieved.

[29] Request

Piikani Nation is concerned that the impact assessment for traditional use plant species is misleading and requests that Alberta Transportation revises the impact assessment of traditional use plant species (Section 10.2.3.2) for Flood and Post-flood Operations to reflect the loss of traditional use plant species that will be lost with upland and wetland communities submerged during the design flood.

[30] Vegetation Loss and Recovery

The EIA presented misleading and unsupported arguments in the Summary of Project Residual Effects and Conclusions sections in the Effects Assessment for Flood and Post-flood Operations. For instance, the EIA argued the subject of vegetation recovery, stating vaguely that:[45]

"Residual project effects to community diversity, traditional plant use and wetland functions are not anticipated because plant communities are expected to recover post-flood."

This residual-effects statement was misleading because it masked the types of vegetation in the LAA that would be lost to prolonged flooding and it generalized the vegetation types that Alberta Transportation expected to recover. As outlined in the Design Flood section (Section 10.2.2.3), 234.2 ha of native upland plant communities will be permanently replaced by three different types of modified

[44] EIA, Volume 3B, Section 10.2.2.3, page 10.11 and Table 10-8, page 10.13
[45] EIA, Volume 3B, Section 10.3, page 10.28

grasslands and 70.3 ha of wetland areas will be replaced by graminoid dominated marsh.[46] This does not include the 223.9 ha of uplands and 29.5 ha of wetlands that will be lost in the construction phase of the Project. Together, this is a significant loss of natural vegetation types (557.9 ha).[47] The residual effects statement is further misleading because Alberta Transportation did not provide a timeline of vegetation recovery or present adequate information (e.g., scientific evidence and/or case studies) to demonstrate that successful grassland and marsh recovery could be achieved.

A second misleading statement is in the conclusions, which stated that:[48]

> *"Residual effects on vegetation and wetlands post-flood would not result in the loss of native upland and wetland plant communities, or wetland functions from the LAA."*

This statement is inconsistent with information presented in the Design Flood section, as outlined above. It is unclear what the proponent meant when stating that there would not be a loss of native upland and wetland plant communities in the LAA.

[30] Request

Piikani Nation is concerned about misleading and unsupported arguments relating to vegetation loss and recovery and requests that Alberta Transportation:

i. corrects misleading statements and inconsistencies in the Summary of Project Residual Effects and Conclusions sections in the Effects Assessment for Flood and Post-flood Operations;

ii. provides supporting information to demonstrate that successful grassland and marsh recovery can be achieved; and

iii. revises the assessment rankings and conclusions to reflect the significant loss of natural vegetation types due to Project construction and flooding.

[31] – [32] Revegetation Measures

The EIA indicateds that the native areas disturbed by the Project would be seeded with a custom native seed mix that would be representative of pre-disturbance and adjacent ecosites,[49] but Alberta Transportation did not specifically list or map the projected target ecosites or provide detailed planting prescriptions. The EIA stated that species mix selection will start with a basic grass seed mixture that is used on highway and bridge projects, but the list presented was not linked to

[46] EIA, Volume 3B, Section 10.2.2.3, page 10.11 and Table 10-8, page 10.13
[47] EIA, Volume 3A, Section 10.4.3, Table 10-12, page 10.46
[48] EIA, Volume 3B, Section 10.3, page 10.28
[49] EIA, Volume 3A, Section 10.3.1, Table 10-11, page 10.37 and EIA, Volume 4, Appendix D, Section 5.3, Table 5-2, page 5.6

specific locations or ecosites.[50] Alberta Transportation should develop much more inclusive and diverse planting prescriptions to achieve equivalent capability and to support healthy ecosystems and sustained traditional uses on reclaimed areas.

[31] Request

Piikani Nation is concerned that revegetation measures lack necessary detail and requests that Alberta Transportation develops:

i. a more detailed reclamation plan that outlines projected target ecosites and planting prescriptions needed to achieve equivalent capability and sustained traditional uses on reclaimed areas; and

ii. develops details of the reclamation plan in close collaboration with members of the Piikani Nation to restore traditional land use opportunities in the Project area.

[32] Request

Piikani Nation requests that Alberta Transportation uses only plant species native to the area in the Project revegetation program, and sources that seed from local provenances.

[33] Monitoring

The EIA presented some brief statements about monitoring,[51] but there was no indication that the Piikani Nation would be engaged in monitoring, including in the planning and implementation phases of monitoring. It is necessary that Alberta Transportation engages affected Indigenous communities when developing reclamation monitoring plans to help define meaningful monitoring criteria and indicators for traditional land use objectives and targets.

[33] Request

Piikani Nation is concerned that monitoring will not involve Indigenous communities and requests that Alberta Transportation provides opportunities and financial capacity for the community to meaningfully participate in the planning and implementation of monitoring to help define meaningful monitoring targets, criteria and indicators for traditional land use objectives.

[34] Cumulative Effects

In the Vegetation and Wetlands section of the Cumulative Effects Assessment (Volume 3C, Section 1.2.6), Alberta Transportation estimated regional cumulative effects to vegetation and wetlands using current conditions as a Baseline for

[50] EIA, Volume 4, Appendix D, Section 5.3, Table 5-2, page 5.6
[51] EIA, Volume 3A, Section 10.3, Table 10-11, page 10.38 and Section 10.8, page 10.54

comparison, but this approach is problematic and misleading because it does not consider the cumulative impacts occurring since industrial development began in the region.

For instance, though the EIA considered the impacts of other existing and future activities and projects[52] that are expected to act cumulatively with the Project, it concluded that the contribution of the Project to cumulative effects would be minor and not significant relative to the current availability of vegetation and wetlands remaining in the RAA.[53]

This approach does not acknowledge the accumulation of impacts that have occurred on the landscape since industrial development began in the region. An accurate assessment of cumulative effects would examine regional cumulative effects against a pre-development Baseline (e.g., pre-1930s), which is also the baseline for comparison that is most meaningful to the region's Indigenous communities.

This type of assessment would more accurately and comprehensively illustrate that the Project is an additional incremental contribution, among innumerable incremental regional disturbances, that together have resulted in significant degradation of ecosystems in the region. This form of assessment is supported by the *Canadian Environmental Assessment Act* (CEAA), which stated that cumulative-effects assessments should include "any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out" (Canadian Environmental Assessment Agency 2015).

[34] Request

Piikani Nation believes that Alberta Transportation should compare Project cumulative effects to a pre-development Baseline and requests that Alberta Transportation revises the significance ranking in the Vegetation and Wetlands section of the Cumulative Effects Assessment (Volume 3C, Section 1.2.6) to account for existing regional cumulative effects in the RAA that have occurred since a pre-development Baseline.

[52] EIA, Volume 3C, Section 1.2.6.2, page 1.33. The list includes: Bragg Creek Flood Mitigation, Calgary to Cochrane Trail, Community of Harmony, Bingham Crossing development, NGTL West Path Rocky View Section and upgrades to Highways 1, 8 and 22.

[53] EIA, Volume 3C, Section 1.2.6.4, page 1.38

7.3. Vegetation and Wetlands Key Concerns and Requests Summary

Table 7-1: Vegetation and Wetlands Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[21]	Baseline Vegetation Data	Piikani Nation is concerned that there is a lack of survey locations within the 1-km buffer between the PDA and LAA and requests that Alberta Transportation completes additional surveys in the 1-km buffer between the PDA and LAA to groundtruth all mapped ecosites and to determine if there are any rare plants, rare plant communities, and/or traditional use species that should be considered for mitigation.	Response Agreement
[22]	Baseline Vegetation Data	Piikani Nation is concerned that there is a no table to describe numbers of survey locations per ecosite and requests that Alberta Transportation provides data on how many surveys were completed for each ecosite in the LAA, and an explanation of how survey locations were selected.	Response
[23]	Minimizing Disturbance	Piikani Nation is concerned that the Project footprint might not absorb enough existing disturbance and requests that Alberta Transportation clarifies how much existing disturbance in the LAA will be absorbed during Project construction and commits to make every effort to adapt current plans to minimize the development footprint.	Response Agreement
[24]	Minimizing Disturbance	Piikani Nation requests that the Government of Alberta develops relevant policies and criteria for assessing, guiding and achieving disturbance minimization for proposed projects.	Regulatory
[25]	Minimizing Disturbance	Piikani Nation is concerned that Indigenous people are not always consulted regarding disturbance minimization and requests that the Government of Alberta consults with Indigenous people regarding criteria for minimizing disturbance to natural and traditional use areas and that these criteria are incorporated into a relevant Landscape Management Plan. This collaboration would incorporate Indigenous knowledge into defining thresholds to address cumulative effects, protect Indigenous knowledge and opportunities, and guide proponents in minimizing disturbance.	Regulatory
[26]	Rare Plants	Piikani Nation is concerned about inconsistent reporting about species of management concern in the PDA and requests that Alberta Transportation clarifies the inconsistent reporting about species of management concerns in the PDA.	Response
[27]	Rare Plants	Piikani Nation is concerned that it was not consulted about rare plants and requests that Alberta Transportation works with Piikani Nation members to determine if the rare species identified in the LAA and RAA are traditionally important, and to develop species-specific mitigation plans for the SOMC that will be removed by the Project.	Response Agreement

Number	Piikani Nation Key Concerns	Requests	Category*
[28]	Traditional Use Plants	Piikani Nation believes that Alberta Transportation should engage the Piikani Nation to validate traditional plant inventories and requests that Alberta Transportation collaborates with Piikani Nation and other Indigenous communities to add unique and uncommon (or rare) traditional plants and identifies if traditional plants within the LAA are being used by Indigenous people.	Response Agreement
[29]	Traditional Use Plants	Piikani Nation is concerned that the impact assessment for traditional use plant species is misleading and requests that Alberta Transportation revises the impact assessment of traditional use plant species (Section 10.2.3.2) for Flood and Post-flood Operations to reflect the loss of traditional use plant species that will be lost with upland and wetland communities submerged during the design flood.	Response Regulatory
[30]	Vegetation Loss and Recovery	Piikani Nation is concerned about misleading and unsupported arguments relating to vegetation loss and recovery and requests that Alberta Transportation: i) corrects misleading statements and inconsistencies in the Summary of Project Residual Effects and Conclusions sections in the Effects Assessment for Flood and Post-flood Operations; ii) provides supporting information to demonstrate that successful grassland and marsh recovery can be achieved; and iii) revises the assessment rankings and conclusions to reflect the significant loss of natural vegetation types due to Project construction and flooding.	Response Regulatory
[31]	Revegetation Measures	Piikani Nation is concerned that revegetation measures lack necessary detail and requests that Alberta Transportation develops: i) a more detailed reclamation plan that outlines projected target ecosites and planting prescriptions needed to achieve equivalent capability and sustained traditional uses on reclaimed areas; and ii) develops details of the reclamation plan in close collaboration with members of the Piikani Nation to restore traditional land use opportunities in the Project area.	Response Regulatory Agreement
[32]	Revegetation Measures	Piikani Nation requests that Alberta Transportation uses only plant species native to the area in the Project revegetation program, and sources that seed from local provenances.	Response Agreement
[33]	Monitoring	Piikani Nation is concerned that monitoring will not involve Indigenous communities and requests that Alberta Transportation provides opportunities and financial capacity for the community to meaningfully participate in the planning and implementation of monitoring to help define meaningful monitoring targets, criteria and indicators for traditional land use objectives.	Response Agreement

Number	Piikani Nation Key Concerns	Requests	Category*
[34]	Cumulative Effects	Piikani Nation believes that Alberta Transportation should compare Project cumulative effects to a pre-development Baseline and requests that Alberta Transportation revises the significance ranking in the Vegetation and Wetlands section of the Cumulative Effects Assessment (Volume 3C, Section 1.2.6) to account for existing regional cumulative effects in the RAA that have occurred since a pre-development Baseline.	Response

***Recommendation Categories**:

Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.

Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).

Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

8. Wildlife

8.1. Introduction

The Project's Wildlife and Biodiversity Assessment followed the content requirements of the EIA Terms of Reference prepared by the Alberta Environment and Parks (AEP) and the Canadian Environmental Assessment (CEA) Agency (Alberta Environment and Sustainable Resource Development 2015). The assessment provided descriptions of Baseline, Project impacts (construction and dry operations, and flood and post-flood operations), and cumulative effects for wildlife and biodiversity. The assessment methodology appears to have been consistent with EIAs conducted previously in Alberta.

8.2. Scope of the Wildlife and Biodiversity Assessment

The scope of the wildlife and biodiversity assessment followed guidance provided by AEP in the Guide to Preparing Environmental Impact Assessment Reports in Alberta (Alberta Environment and Sustainable Resource Development 2013) as well as the *Migratory Birds Convention Act* (MBCA), the *Species at Risk Act* (SARA), and the *Alberta Wildlife Act* (AWA).

Additional documents such as management frameworks, provincial and federal recovery strategies, as well as guidelines related to disturbance setback distances and restricted activity periods were reviewed and considered in this assessment.

The Project area is located near a Key Wildlife and Biodiversity Zone (KWBZ) as well as Environmentally Significant Areas (ESAs).

8.3. Study Areas

The determination of assessment area boundaries appears to have been appropriate from a wildlife and biodiversity perspective. The following spatial boundaries were defined for the wildlife and biodiversity assessment and included areas where the Project might interact directly or indirectly with wildlife.

The Project Development Area (PDA) was designed to include the anticipated area of physical disturbance and workspace associated with project construction activities and operation and included all phases of the Project (i.e., construction, dry operations and flood events).

The Local Assessment Area (LAA) was designed to include the PDA plus a 1-km buffer centered on the PDA and so included the area in which the construction or operation of the Project potentially could have direct or indirect effects on wildlife.

This was designed to incorporate potential zones of influence and prescribed or recommended regulatory maximum setback distances for SOMC. The Regional Assessment Area (RAA) will extend 15-km beyond the PDA and was designed for determining residual effects on wildlife and biodiversity and to assess where residual effects might act cumulatively with residual effects of past, present and

reasonably foreseeable future activities. The spatial boundary was sufficiently large to encompass an average home range of a female grizzly bear.

The temporal boundaries defined for the Project by Alberta Transportation were reasonable. Project construction would take place over a 36-month period. Dry operations of the Project will be permanent following construction with periods of dry operations alternating with flood and post-flood phases.

8.4. Key Indicators

[35] Key Indicators

The study species selected for the Springbank wildlife assessment included mammals, birds and amphibians characterized as *Species of Management Concern* (SOMC) that depend on a variety of habitat types (e.g., grassland, forests, wetlands) in the RAA that are potentially affected by the Project. Six SOMC species were chosen as indicators based on legislative protection (i.e., species at risk) or importance for traditional and economic use.

The species selected included:

- olive-sided flycatcher (*Contopus cooperi*),
- Sprague's pipit (*Anthus spragueii*),
- elk (*Cervus canadensis*),
- grizzly bear (*Ursus arctos*),
- sora (*Porzana carolina*), and
- northern leopard frog (*Lithobates pipiens*).

The bird species were chosen as key wildlife indicators because the pathways for potential Project effects on migratory birds would be similar for a larger group of *Migratory Birds Convention Act* (MBCA) species that are dependent on forest or grassland habitat types.

Elk and grizzly bear were used as representatives of wildlife species used for traditional purposes because these species depend on a variety of seasonal-use grassland, shrubland and forest habitat types that would include other wildlife species of traditional importance such as mule deer, white-tailed deer, coyote and weasel.

As indicated above, Alberta Transportation considered traditional importance when selecting wildlife indicators, but it did not directly consult with Piikani Nation members to validate and ensure accuracy of the underlying wildlife data for Piikani Nation specifically. The proponent should consult members of all potentially affected Indigenous groups to:

1) validate lists of traditionally important wildlife species;
2) add unique or overlooked species of traditional importance; and
3) identify if Indigenous members have specific knowledge about wildlife patterns within the LAA.

Failure to consult might result in negative implications to wildlife species in the surrounding region and to communities that rely on them.

[35] Request

Piikani Nation requests that Alberta Transportation collaborates with Piikani Nation to validate:

i. inventories of traditionally important wildlife species;

ii. add unique or overlooked species of traditional importance; and

iii. identify if Indigenous members have specific knowledge about wildlife patterns within the LAA.

8.5. Biodiversity

The Springbank biodiversity assessment was used to assess the effects of the Project on a range of species and ecosystems. The indicators listed in the *South Saskatchewan Regional Plan Biodiversity Management Framework* (BMF) were used as guidance to address the Terms of Reference requirement for biodiversity.

The biodiversity indicators used in the assessment were assessed at both the LAA and RAA. The biodiversity indicators used in the assessment were:

1) native cover – upland,
2) native cover – lowland,
3) native land cover patch size (upland and wetland/riparian),
4) species of management concern (vegetation and wildlife), and
5) species richness and abundance (bird and amphibian).

8.6. Traditional Use Inputs to Wildlife and Biodiversity Assessment

Traditional Land and Resource Use (TLRU) information related to wildlife and biodiversity was obtained through Project-specific Traditional Use Studies (TUS) conducted by potentially-affected Indigenous groups and through Alberta Transportation's Indigenous Engagement program. A TUS report was provided by the Piikani Nation, as well as a joint interim TUS report from Blood Tribe and Siksika Nation. Additional resources provided by the Blood Tribe and Siksika Nation were reviewed and incorporated into the assessment. The general issues and concerns expressed by Indigenous groups included:

1) wildlife habitat loss and/or disturbance,
2) sensory disturbances,
3) fragmentation of wildlife habitat,
4) potential for animal-vehicle collisions and increased wildlife mortality, and
5) biodiversity loss.

[36] Traditional Use Inputs to Wildlife and Biodiversity Assessment

Specific concerns were expressed by the Tsuut'ina regarding loss of seasonal habitat during construction, habitat fragmentation, damage to important upland and lowland ecosystems, loss of habitat and/or sediment and debris contamination during flood water retention, and loss of habitat and/or habitat connectivity of culturally significant wildlife.

The Siksika and Piikani Nations expressed concerns about reservoir construction affecting the animal homes of species such as beaver. The Piikani Nation also expressed concerns about general impacts to wildlife and specifically the stranding of fish in the reservoir during flood events.

The Stoney Nakoda Nation expressed concerns regarding wildlife movements through the Project area and enquired if the project would include fencing and if wildlife crossings would be created over highways in the area. Concerns were expressed that the Project would create barriers that would decrease the availability of birds, fish and wildlife.

The Ermineskin Cree Nation and the Louis Bull Tribe expressed concerns about maintaining the migratory patterns and game trails for wildlife and expressed concerns regarding eagle nesting and elk, moose, deer, and bears use of the Project area.

Métis Nation of Alberta (MNA) Region 3 expressed concerns about potential effects of Project construction activities and of water diversion from the Elbow River to wildlife.

The specific concerns expressed by the Indigenous groups appear to have been considered in the Project assessment within the five assessment categories identified above.

[36] Request

Piikani Nation requests that Alberta Transportation shares Species at Risk wildlife impact information gathered during the project site investigations with the Nation.

8.7. Wildlife and Biodiversity Methods

Field studies

The Project assessment relied on the determination of quantitative and qualitative changes in mapped habitat. Species-specific surveys were used to document animal presence and activity in the Project area:

- point-count breeding bird surveys were conducted for songbirds and woodpeckers,
- nocturnal acoustic and diurnal visual surveys were conducted to record the present of amphibians,
- nocturnal rail surveys were conducted to document the presence of sora,

- stick nest surveys were conducted to document the presence of raptors,
- water bird surveys were conducted to document waterfowl,
- remote cameras were used to record the presence of medium to large mammals, and
- winter track surveys were used to record winter habitat use.

[37] Wildlife Habitat Suitability Modelling

Habitat suitability models were used to evaluate potential direct (i.e., habitat loss) and indirect (i.e., sensory disturbance) effects of the Project on the habitats of five key indicators representing terrestrial (upland and lowland) and aquatic habitat types. The five indicators included:

- two migratory birds, the forest dependent olive-sided flycatcher (*Contopus cooperi*) and the grassland dependent Sprague's pipit (*Anthus spragueii*);
- two large mammals known to inhabit the Local Assessment Area (LAA), elk (*Cervus canadensis*) and grizzly bear (*Ursus arctos*), both of which were used as upland indicators; and
- the northern leopard frog (*Lithobates pipiens*), which was used as a representative of amphibians and an indicator of wetland dependent species.

Habitat suitability models for each key indicator were based on assessing the suitability of each wildlife habitat type or ecosite phase in providing the necessary life-requisites (e.g., food, cover, security) to meet seasonal habitat requirements. Vegetation and wetland mapping was completed for the LAA using Project-specific (i.e., groundtruthed) refinements of the *Alberta Grassland Vegetation Inventory* (GVI) database and the *Alberta Wetland Classification System*.

Ecosite mapping appeared to follow accepted Government of Alberta mapping protocols. A four-class rating scheme (i.e., Class 1 – high habitat suitability, Class 2 – moderate habitat suitability, Class 3 – low habitat suitability and Class 4 – very low to nil habitat suitability) was assigned for each key indicator by ecosite phase and structural stage (vegetation vertical profile).

The species habitat models were developed based on species accounts, which in turn were developed from peer-reviewed literature, government reports, and the judgements of professional biologists. Professional judgement is a customary practice for species habitat suitability modelling.

The authors indicated that historical data in the LAA was limited and observational data collected as part of Project-specific data collection surveys was collected as well but, as is typical for these projects, the survey intensity was insufficient to meet model quantity and spatial distribution validation requirements. Nevertheless, the authors of the report suggested that the derivative habitat suitability maps were a reasonable assessment of potential Project effects in the LAA.

[37] Request

Piikani Nation requests that Alberta Transportation:

i. provides more detailed descriptions for the four-class wildlife habitat rating scheme and for the performance of the wildlife habitat models; and

ii. collects more data to calibrate habitat suitability models for specific key indicators.

8.8. Mitigation Measures

Proposed mitigation measures appeared reasonable for the proposed Project phases.

[38] Construction and Dry-Operations

Construction activities have the potential to affect habitat directly and indirectly for SOMC and key indicators in the LAA. Several mitigation measures have been proposed by Alberta Transportation to minimize the Project-related effects on SOMC, including:

- locating temporary workspaces and access roads in areas that avoid wildlife features and native vegetation where possible;
- conducting pre-construction surveys to identify wildlife features;
- avoiding vegetation removal during the Restricted Activity Period (RAP) for nesting migratory birds and raptors;
- if vegetation removal is scheduled to occur within the RAP for migratory birds and raptors, a qualified wildlife biologist would inspect the site for active nests within seven days of the start of the proposed construction activity.

The EIA presented various access-related mitigations to reduce animal/vehicle collisions and other negative implications of increased access, but it did not provide a formal access management plan (AMP) and there was no mention of consulting Indigenous communities to develop an AMP.

[38] Request

Piikani Nation requests that Alberta Transportation collaborates with Piikani Nation and other Indigenous communities to develop an access management plan (AMP) for roads and other linear access features associated with the Project. Specifically, Piikani Nation would like to see an AMP with restrictions on non-essential access, and with reasonable allowances that give Piikani Nation members access to traditional lands.

Post-Flood Mitigations

Post-flood operations have the potential to affect wildlife habitat for SOMC including migratory birds and species at risk through sensory disturbances. Mitigation measures proposed by Alberta Transportation included:

- restricting maintenance activities to the reservoir footprint to reduce the area of disturbance during post-flood operations;
- having a qualified wildlife biologist conduct nest searches if sediment partial cleanup and debris removal in the off-stream reservoir occurred during the Restricted Activity Period (RAP) for nesting migratory birds and raptors;
- reducing maintenance activities as much as possible in the KWBZ identified along the Elbow River from December 15 to April 30, an important period for wintering ungulates;
- reducing weed propagation by using appropriate equipment cleaning protocols; and
- hydroseeding with native plant species to reduce erosion in areas of potential sediment deposition where wind erosion might be an issue.

8.9. Determining Significance

Alberta Transportation defined a significant environmental effect on wildlife and biodiversity as an effect that threatened the long-term persistence or viability of a wildlife species in the RAA.[54] A significant effect also included any effects that were contrary to, or inconsistent with the goals, objectives or activities of recovery strategies, action plans and management plans.

8.10. Determining Residual Effects

Specific criteria were used to characterize potential effects on wildlife and biodiversity remaining after mitigation activities have been completed. This is done for the potential effects during construction and dry operations in the LAA as well as the flood and post-flood phases. The residual effects characterization for both the construction and dry operations phase were made by comparing the Project phases with existing conditions. In contrast, the flood and post-flood phases were compared with the dry operations phase with major components of the Project in place and vegetation reclaimed after construction.

Characterization of residual effects on wildlife and biodiversity included direction, magnitude of change in habitat for key indicator species, magnitude of change in habitat for non-indicator SOMC (including migratory birds and species at risk, change in movement and mortality risk), geographic extent and frequency.

[54] EIA, Volume 3A, Section 11.1.6

8.11. Baseline, Construction and Dry Operations Assessment

The assessment of wildlife and biodiversity during the construction and dry-operations phases of the Project involved four potential Project effects, including: change in habitat, change in movement, change in mortality risk, and change in biodiversity.

The assessment of each potential effect is summarized below in terms of quantitative (i.e., direct habitat loss) and qualitative (i.e., literature- or professional judgment-based) evaluations.

[39] Change in Habitat

Existing developments (particularly agriculture, rural settlements and transportation corridors) have resulted in the loss of wildlife habitat and reduced the suitability of the remaining habitats in the RAA. The Project would result in direct and indirect loss of wildlife habitat during construction and dry operations for SOMC. However, Alberta Transportation suggested the amount of permanently affected wildlife habitat was relatively small compared to the habitat supply remaining in the RAA. The Project will cause temporary displacement and disturbance to wildlife during construction.

[39] Request

The Piikani Nation is concerned that revegetation measures are insufficiently detailed in describing the benefits of the mitigation efforts on wildlife habitat reinstatement and requests that Alberta Transportation:

i. provides a more-detailed reclamation plan that outlines how revegetation efforts will mitigate wildlife habitat loss; and

ii. develops a detailed reclamation plan in collaboration with members of the Piikani Nation.

Change in Movement

Alberta Transportation indicated that the Project would likely have more of an impact on ungulate and amphibian movement in comparison to birds and grizzly bear. The greater impacts to amphibians were attributed to their smaller dispersal distances while the greater impacts to ungulates were attributed to their difficulty traversing rip-rap.

Large mammals would likely be deflected and move around Project structures if they chose not to cross over them.

The potential adverse effect on wildlife movement could also subsequently affect the transmission of traditional knowledge. Alberta Transportation suggested that Project construction and dry operations residual effects on wildlife movement were unlikely to pose a long-term threat to the persistence or viability of a wildlife species, including species at risk in the RAA.

Change in Mortality Risk

The Project was predicted to have a low risk of wildlife mortality to migratory birds and species at risk because of proposed pre-construction surveys during the construction phase. It was expected that mortality risks would be further reduced during dry operations.

Highways and secondary roads already present in the RAA will pose an existing risk to large mammals and amphibians but since the Project would not add additional primary or secondary roads, the Project-specific mortality risk was considered low.

Change in Biodiversity

The Project, if constructed, would not result in changes to biodiversity that would threaten the long-term persistence or viability of wildlife or vascular plant SOMC in the RAA.

[40] Significance and Prediction Confidence

Alberta Transportation predicted that the residual environmental effects on wildlife would not be significant, yet it acknowledged that a measurable change in the abundance and distribution of ungulates in the LAA was possible due to the installation of permanent structures and uncrossable gaps of rip-rap in the diversion channel. It appears that the prediction of non-significance was based in part on questionable and untested provisions to manintain ungulate movement, such as materials to cover rip-rap at regular intervals. Alberta Transportation did not present adequate information (e.g., scientific evidence and/or case studies) to demonstrate that successful ungulate crossings could be achieved with the proposed cover materials for rip-rap.

[40] Request

Piikani Nation requests that Alberta Transportation provides:

i. supporting information to demonstrate that successful ungulate crossings can be achieved with the proposed cover materials for rip-rap, and

ii. revises the significance rating to reflect the predicted measurable change in the abundance and distribution of ungulates in the LAA.

Project-effects prediction confidence for the construction and dry-operations phase was considered moderate based on the quality and quantity of available existing conditions data and the effectiveness of proposed mitigation during the construction and dry-operations phases. The moderate rating was based on uncertainty related to wildlife movement and how various species might respond to the diversion channel, floodplain berm, and off-stream dam during dry operations.

8.12. Flood and Post-Flood Operations Assessment

The assessment of Project effects on wildlife and biodiversity during flood and post-flood operations involved three flood and post-flood operations scenarios:

- a design flood,
- a 1-in-10-year flood, and
- a 1-in-100-year flood.

Flood operations were characterized by diversion of water from the Elbow River to the diversion channel and off-stream reservoir filling followed by the draining of the reservoir. Post-flood operations would include sediment partial cleanup and maintenance activities on Project infrastructure. In this assessment, duration was defined as short-term when a residual effect was limited to flood operations and defined as long-term when a residual effect extended beyond flood operations.

The assessment focused on five potential effects, including:

- change in habitat,
- change in movement,
- change in mortality risk,
- change in biodiversity, and
- change in wildlife health.

During flood operations, the Project would directly alter wildlife habitat as the flood waters temporarily rendered habitats inaccessible for terrestrial wildlife species, while during post-flood operations, wildlife and biodiversity would be affected by direct habitat loss and reduced habitat effectiveness. The assessment of each potential effect is summarized below in terms of quantitative (i.e., direct habitat loss) and qualitative (i.e., literature- or professional judgment-based) evaluations.

Change in Habitat

Alberta Transportation indicated that if approved the Project would result in wildlife habitat being temporarily unavailable during flood operations and post-flood operations with some permanent loss of wetlands due to sedimentation. Vegetation lost during flood events would eventually develop or be re-established via hydroseeding suitable species. Alberta Transportation suggested the amount of wildlife habitat affected for SOMC would be relatively small compared to the wildlife habitat remaining in the RAA.

Change in Movement

The Project will likely have a greater magnitude but temporary effect on ungulate movement than on the activities of birds, amphibians, and grizzly bears during a flood. Change in movement would depend on the magnitude of the flood because the extent of filling would affect whether animals go around or across the flooded area. Waterbirds might be attracted to the PDA during floods because the off-

stream reservoir would be perceived as feeding habitat. The effects on movement would be temporary and would subside during post-flood operations.

Change in Mortality Risk

Increased wildlife mortality in the PDA was anticipated during a flood although the risk was dependent on the species in question and the magnitude of the flood.

Most of the flooded area in the reservoir would involve wetlands and reclaimed vegetation that might be suitable breeding habitat for amphibians and ground-nesting migratory birds. Rising flood waters in the off-stream reservoir would remove migratory bird residences and young, change the conditions required for amphibian larvae to develop, and introduce predatory fish that could prey on amphibians.

For large mammals, mortality risk would be less because of their mobility. During post-flood operations, maintenance activities might potentially result in a small increase in mortality risk due to increased vehicular traffic. Mortality risk in the floodplain of the Elbow River, downstream of the diversion structure, would likely remain comparable to Baseline conditions.

Change in Biodiversity

The Project would not result in changes in biodiversity that would threaten the long-term persistence or viability of wildlife or vascular plant SOMC in the RAA.

Change in Wildlife Health

Overall, there would be little change to wildlife health based on the expected frequency and duration of floods. Alberta Transportation suggested that the sediment deposited in the off-stream reservoir was not expected to increase the hazards associated with contaminants that floods could transport.

Prediction Confidence

Prediction confidence was moderate based on the quality and quantity of available Baseline data and the effectiveness of mitigation during the flood and post-flood operation phases.

8.13. Cumulative Effects Assessment

With the application of mitigation measures, the Project's residual environmental effects on wildlife, including migratory birds and species at risk, and biodiversity were predicted to be not significant. Cumulative environmental effects were predicted to be not significant for the Project and in general, Project contributions to cumulative effects were low.

[41] Monitoring and Mitigation

A follow-up monitoring program was proposed by Alberta Transportation. The objective of the wildlife follow-up monitoring program will be to identify whether permanent features of the Project, such as the diversion channel, act as a barrier to

wildlife movement in the LAA, especially for ungulates. The monitoring program will be designed to verify predictions made on Project effects to wildlife movement in the LAA during construction and dry operation, monitor wildlife use of the diversion channel during dry operation, and where appropriate determine effectiveness of mitigation to reduce Project effects on wildlife movement.

Possible additional mitigation measures might include placement of substrates more suitable for wildlife to move across in vegetated areas in the diversion channel, floodplain berm and dam.

[41] Request

Piikani Nation requests that Alberta Transportation provides a more detailed description of its monitoring program and provides capability for the Piikani Nation to participate in the monitoring program.

8.14. Wildlife Key Concerns and Requests Summary

Table 8-1: Wildlife Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[35]	Key Indicators	Piikani Nation requests that Alberta Transportation collaborates with Piikani Nation to validate: i) inventories of traditionally important wildlife species; ii) add unique or overlooked species of traditional importance; and iii) identify if Indigenous members have specific knowledge about wildlife patterns within the LAA.	Response Agreement
[36]	Traditional Use Inputs to Wildlife and Biodiversity Assessment	Piikani Nation requests that Alberta Transportation shares Species at Risk wildlife impact information gathered during the project site investigations with the Nation.	Response Agreement
[37]	Wildlife Habitat Suitability Modelling	Piikani Nation requests that Alberta Transportation: i) provides more detailed descriptions for the four-class wildlife habitat rating scheme and for the performance of the wildlife habitat models; and ii) collects more data to calibrate habitat suitability models for specific key indicators.	Response Agreement
[38]	Construction and Dry-Operations	Piikani Nation requests that Alberta Transportation collaborates with Piikani Nation and other Indigenous communities to develop an access management plan (AMP) for roads and other linear access features associated with the Project. Specifically, Piikani Nation would like to see an AMP with restrictions on non-essential access, and with reasonable allowances that give Piikani Nation members access to traditional lands.	Response Agreement

Number	Piikani Nation Key Concerns	Requests	Category*
[39]	Change in Habitat	The Piikani Nation is concerned that revegetation measures are insufficiently detailed in describing the benefits of the mitigation efforts on wildlife habitat reinstatement and requests that Alberta Transportation: i) provides a more-detailed reclamation plan that outlines how revegetation efforts will mitigate wildlife habitat loss; and ii) develops a detailed reclamation plan in collaboration with members of the Piikani Nation.	Response Regulatory Agreement
[40]	Significance and Prediction Confidence	Piikani Nation requests that Alberta Transportation provides: i) supporting information to demonstrate that successful ungulate crossings can be achieved with the proposed cover materials for rip-rap, and ii) revises the significance rating to reflect the predicted measurable change in the abundance and distribution of ungulates in the LAA.	Response Regulatory
[41]	Monitoring and Mitigation	Piikani Nation requests that Alberta Transportation provides a more detailed description of its monitoring program and provides capability for the Piikani Nation to participate in the monitoring program.	Response Agreement

***Recommendation Categories**:

Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.

Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).

Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

9. Biodiversity

9.1. Introduction

The biodiversity assessment in the EIA involved three study areas:[55]

- the project development area (PDA; 1440 ha);
- the local assessment area (LAA; 4860 ha), which consisted of the project development area (PDA; 1440 ha) plus a 1-km buffer; and,
- the regional assessment area (RAA; 102,817 ha), which consisted of a 15-km buffer around the PDA.

The assessment considered two potential environmental effects, including a:[56]

- change in community diversity, as measured with two indicators, (i) native upland cover, and (ii) wetland cover; and
- change in landscape diversity, as measured with three indicators, (i) native cover, (ii) rare and traditional plant species diversity, and (iii) wildlife habitat diversity.

The analyses conducted to support the assessment of potential environmental effects listed above were largely completed in the vegetation and wetlands assessments of the Construction and Dry Operations Effects Assessment (Volume 3A, Section 10) and the Flood and Post-Flood Operations Effects Assessment (Volume 3B, Section 10).[57] The exception was the analyses of wildlife habitat diversity, which were described in Volume 4, Appendix D.

9.2. Biodiveresity Key Concerns and Requests

[42] Traditional Knowledge for Biodiversity Planning

The EIA did not describe if or how Piikani Nation members would be involved in decision-making related to reclamation for re-establishing biodiversity that supports traditional land uses. Alberta Transportation should consult with the Piikani Nation to identify and define how traditional knowledge can contribute to effective reclamation planning for biodiversity potential to support traditional land uses on the post-reclamation landscape.

[55] EIA, Volume 3A, Section 11.1.5, page 11.12
[56] EIA, Volume 3A, Section 10.1.3, Table 10-1, page 10.5
[57] EIA, Volume 3A, Section 11.1.4.2, Table 11-4, page 11.13 and EIA Volume 3B, Section 11.1.1.2, Table 11-3, page 11.6

[42] Request

Piikani Nation is concerned that there was no Piikani Nation engagement in biodiversity planning and requests that:

i. Alberta Transportation describes how it will engage the Piikani Nation in decision making related to reclamation for re-establishing biodiversity that supports traditional land uses; and

ii. the Alberta Energy Regulator requires Alberta Transportation to involve the Piikani Nation in decision making related to biodiversity re-establishment for all reclamation plans in Piikani Nation's traditional territory.

[43] Mitigation and Monitoring

The EIA contained a list of broad mitigations[58] and monitoring actions[59] to reduce Project effects on biodiversity, but it did not present criteria or thresholds to use for monitoring and measuring the effectiveness of mitigations to re-establish biodiversity to support traditional land uses on reclaimed areas.

Alberta Transportation should prepare criteria (e.g., quantitative measures) for measuring the trajectory and success of biodiversity restoration and allow Piikani Nation members to provide knowledge and input to inform these criteria as per their knowledge and land use goals (as per Request [42] above).

Similarly, Alberta Transportation should develop detailed biodiversity monitoring plans that the Piikani Nation can critique and augment. The current biodiversity monitoring plans for wildlife and vegetation are overly broad,[60] and Alberta Transportation indicated that monitoring programs were anticipated for the construction and dry operations phases of the project.[61]

It is Piikani Nation's view that monitoring plans for biodiversity should be completed as a condition for approval and that the plans should be submitted to the Piikani Nation for examination and input.

[43] Request

Piikani Nation is concerned about the lack of information regarding mitigation and monitoring for impacts to biodiversity and requests that Alberta Transportation develops biodiversity monitoring plans and criteria to measure the effectiveness of biodiversity restoration to support traditional land uses on reclaimed areas, and that these plans are submitted to the Piikani Nation to provide knowledge and input. This should be completed as a condition of application approval.

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[58] EIA, Volume 3A, Section 11.4.5.2, page 11.66 and EIA Summary, Section 6.9.2, pages 6.48 – 6.62
[59] EIA, Volume 3C, Sections 2.9.3 and 2.10.3., pages 2.11 – 2.13
[60] EIA, Volume 3C, Sections 2.9.3 and 2.10.3., pages 2.11 – 2.13
[61] EIA, Volume 3A, Sections 10.8, page 10.54

[44] Landscape Diversity

The EIA rated the Project's effects on landscape diversity change (i.e., habitat fragmentation) as reversible even though the RAA and LAA were within an already highly disturbed and fragmented landscape.[62] Alberta Transportation measured potential habitat fragmentation by estimating Project-driven change in mean patch size (ha), number of patches, and mean patch edge (km) of upland and wetland land cover types.

The results showed very little change, but the problem with Alberta Transportation's approach is that it compared estimated changes to the "existing condition", which is already highly fragmented. Alberta Transportation should reassess habitat fragmentation using an approach that can be compared to the literature, such as density of linear disturbance, and it should examine the results against a pre-development Baseline (e.g., pre-1930s), which is also the Baseline for comparison that is most meaningful to the region's Indigenous communities (see also Request [34]).

This revised approach would show that landscape connectivity is already under sustained harm and that additional disturbance in the near term will worsen this impact, regardless of future mitigations, such as reclamation of temporary disturbances. Alberta Transportation should revise the Project's residual effects on landscape diversity change to significant and irreversible.

[44] Request

Piikani Nation is concerned that linear density is already above ecosystem thresholds and requests that Alberta Transportation reassesses landscape diversity change (i.e., habitat fragmentation) using a more appropriate measure, such as density of linear disturbance, and then compares the results to published thresholds of linear density at which long-term ecosystem harm occurs.

[45] Reclaiming Temporary Disturbances

There are several instances in the EIA in which Alberta Transportation cited "reclamation of temporary disturbances" as the basis for assessing residual project effects as not significant or low in magnitude, but did not present adequate information (e.g., scientific evidence and/or case studies) to demonstrate that successful reclamation could be achieved. For instance, in the assessment of landscape diversity, the EIA stated:[63]

> *"Active reclamation of temporally disturbances on native upland areas would use Alberta Transportation custom native seed mix, and it is expected that re-*

[62] EIA Volume 3A, Section 10.4.2, p. 10.41
[63] EIA Volume 3A, Section 10.4.2, p. 10.41

establishment of native vegetation would occur in the PDA; therefore, effects of fragmentation considered reversible in temporary disturbances."

Other similar instances can be referenced above in Requests [29] and [30].

However, in all cases, the EIA did not specifically list or map the projected target ecosites or provide detailed planting prescriptions, and it contained insufficient information on how reclamation would be conducted to restore soil properties and ecological functions within terrestrial habitats that supported patterns of succession, biodiversity potential and traditional uses on the reclaimed landscape that are like the natural landscape.

[45] Request

Piikani Nation is concerned about Alberta Transportation's unsupported arguments relating to vegetation recovery and requests that regulators ensure the effects of the Project and the cumulative effects of regional development on biodiversity are assessed:

i. with the assumption that reclamation will not be completely successful at returning a full pre-disturbance suite of native plant and animal species to the Project-area landscape;

ii. during the time that the Project footprint is unreclaimed, plus the subsequent period until return of ecological function and form similar to pre-disturbance conditions; and,

iii. that the EIA is not deemed complete until this work is done.

9.3. Biodiversity Key Concerns and Requests Summary

Table 9-1: Biodiversity Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[42]	Traditional Knowledge for Biodiversity Planning	Piikani Nation is concerned that there was no Piikani Nation engagement in biodiversity planning and requests that: i) Alberta Transportation describes how it will engage the Piikani Nation in decision making related to reclamation for re-establishing biodiversity that supports traditional land uses; and ii) the Alberta Energy Regulator requires Alberta Transportation to involve the Piikani Nation in decision making related to biodiversity re-establishment for all reclamation plans in Piikani Nation's traditional territory.	Response Regulatory Agreement

Number	Piikani Nation Key Concerns	Requests	Category*
[43]	Mitigation and Monitoring	Piikani Nation is concerned about the lack of information regarding mitigation and monitoring for impacts to biodiversity and requests that Alberta Transportation develops biodiversity monitoring plans and criteria to measure the effectiveness of biodiversity restoration to support traditional land uses on reclaimed areas, and that these plans are submitted to the Piikani Nation to provide knowledge and input. This should be completed as a condition of application approval.	Response Agreement
[44]	Landscape Diversity	Piikani Nation is concerned that linear density is already above ecosystem thresholds and requests that Alberta Transportation reassesses landscape diversity change (i.e., habitat fragmentation) using a more appropriate measure, such as density of linear disturbance, and then compares the results to published thresholds of linear density at which long-term ecosystem harm occurs.	Response
[45]	Reclaiming Temporary Disturbances	Piikani Nation is concerned about Alberta Transportation's unsupported arguments relating to vegetation recovery and requests that regulators ensure the effects of the Project and the cumulative effects of regional development on biodiversity are assessed: i) with the assumption that reclamation will not be completely successful at returning a full pre-disturbance suite of native plant and animal species to the Project-area landscape; ii) during the time that the Project footprint is unreclaimed, plus the subsequent period until return of ecological function and form like pre-disturbance conditions; and, iii) that the EIA is not deemed complete until this work is done.	Response Regulatory

***Recommendation Categories**:

Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.

Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).

Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

10. Land Use and Resource Management

10.1. Introduction

Alberta Transportation completed an assessment of potential effects on Land Use in March 2018 for construction and dry operations[64] and for flood and post-flood operations.[65]

The reservoir area would sit empty for years between floods.

10.2. Land Use and Resource Management Use Key Concerns and Requests

[46] Land and Resource Use

Alberta Transportation, in Section 12.1.2, provided an overview of the approach for incorporating Traditional Ecological Knowledge (TEK) and Traditional Land Use (TLU) information into the EIA including consultation (results presented in Section 7 of the EIA) and Project-specific Traditional Land Use Studies. Piikani Nation provided a TLU report prior to Alberta Transportation submitting the EIA.

Alberta Transportation suggested that:[66]

> *"TLRU information was considered during the preparation of all aspects of the EIA including both the methodology and analysis, as stipulated by the CEA Agency project guidelines. TLRU information contributed to the understanding of existing land uses, was used to identify lands that are used traditionally and informed the assessment of potential effects. While this information did not directly affect the significance definition, it has been incorporated into the analysis of effects on which the significance determination was based"*

The Piikani Nation has stated that:[67]

> *"The project was proposed with "little or no consideration to the original history that is affirmed by traditional land use sites. Although elders and technicians of the siksikait-tsitspii have been commissioned through DEMA to identify and catalogue traditional and historic sites for Alberta Transportation, at this point it is an unknown at what level of certainty that the information gathered will be considered once the preliminary study was concluded over a three month period.... the concern arises among participants as to how issues and mitigations will be addressed and how sites identified by the team will be dealt with in the process of approval such as CEAA. The various levels of government departments, environmental agencies and archaeological experts employed to determine the impacts of the storage facility* ***do not speak to those parties***

[64] EIA, Volume 3A, Section 12
[65] EIA, Volume 3B, Section 12
[66] EIA, Volume 3A, Section 12.1.2, page 12.6
[67] W. Big Bull, 2018, page 5

affected, instead work in isolation to determine through existing information and newly acquired data regarding the life of the project to generate expert reports regarding the footprint of the SR-1."

[46] Request

Piikani Nation requests that Alberta Transportation discusses how issues of concern to Piikani Nation, their Treaty and Aboriginal Rights and traditional knowledge has been used in Project planning and site selection.

[47] – [50] Land Ownership and Use

Section 12.2.2.1described land uses near the Project as including privately-owned residences, businesses and recreation facilities; agriculture; activities on Crown lands; oil and gas and other industrial developments; consumptive recreation and livelihood and non-consumptive recreation; and unique sites and special features.

Except for the Elbow River, road allowances and a small area of land at the Highway 8 and Highway 22 intersection, the Project development area is all privately-owned land. There is no leased land.

The EIA stated that the Project falls within Rockyview County and as such land use was reviewed within the context of provincial legislation and municipal bylaws;[68] however, the land use section failed to acknowledge that the Project falls within Treaty 7 lands, the Traditional Territory of the Blackfoot people.

As the Piikani TLU described, the Blackfoot people have employed systems of governance and resource management that sustained their people for generations before colonization. These systems of governance are embedded in language, ceremonies and traditional practices and the Piikani Nation strives to keep this part of its culture and its traditions alive.

[47] Request

Piikani Nation requests that Alberta Transportation discusses how issues of concern to the Piikani Nation and its traditional and contemporary land uses and Aboriginal Rights have been used in Project planning and site selection.

[68] Bylaw C-4841-97

[48] Request

Piikani Nation requests that Alberta Transportation commits to holding a workshop with the Piikani Nation consultation office and knowledge holders where commitments related to appropriate avoidance measures, mitigation, management and accommodation strategies will be made prior to the issuing of any project permits or approvals.

[49] Request

Piikani Nation requests that Alberta Transportation provides at least three weeks' notice to the Piikani Nation prior to disturbing these areas so that appropriate Elders might be consulted and appropriate cultural protocols, including ceremonies can be planned before construction.

Prior to the start of construction, the Government of Alberta will purchase the privately-held land (surface rights only). The properties purchased would occur within the ranch and Farm, Farmstead and Public service. Once constructed, land uses within the Project area will vary.

Alberta Transportation will allow Indigenous groups to access Area A for traditional purposes and Area C will also be publicly available. Area A is also considered a conservation area, with general public access and opportunities for low impact recreation.[69] Alberta Transportation will maintain access to identified "current" use sites located outside for the designated construction and Project site limits during construction and operation (including hunting and fishing) and will advise Indigenous groups on post-construction access management.[70] Affects to access will be continuous, long-term and irreversible.[71]

While it was acknowledged that Alberta Transportation said it would permit "traditional use", it was not clear how access for Piikani Nation members would be coordinated such that they would be able to carry out ceremonies within the conservation area (Area A) or how the province would facilitate activities such as hunting within an area intended for multi-use including access by recreational users.

[50] Request

Piikani Nation requests that it co-develops the Access Management Plans for Area A of the Project.

[69] EIA, Volume 3A, Section 14, page 14.74
[70] EIA, Volume 3A, Section 14, page14-75
[71] EIA, Volume 3A, Section 14, page 14-76

[51] – [52] Applicable Legislation and Land Use Plans, Policies

Within Southern Alberta, the South Saskatchewan Regional Plan (SSRP) is the key policy document identifying strategic direction for the region. This plan recognized the significance of the South Saskatchewan Region to Aboriginal people and the special places that "memorialize a way of life that continues in song and ceremony" (Alberta Environment and Parks 2014).[72] The SSRP acknowledged the need for ongoing consultation, engagement and relationship building to provide consistency and clarity on decisions related to these issues.[73]

Of note is the direction and outcomes aimed at:

- achieving biodiversity and ecosystem function and benefits that are sustained through shared stewardship;
- enhancing the quality of life for residents through increased opportunities for outdoor recreation, and nature-based tourism opportunities; and the preservation and promotion of the region's unique cultural and natural heritage;
- including Indigenous peoples in land-use planning; and
- using land efficiently to reduce the amount of area taken up by permanent or long-term developments associated with the built-up environment.

[51] Request

Piikani Nation requests that Alberta Transportation clearly describes how the Project will align with the existing land use documents, guidelines and policies, and now Aboriginal rights and interests will be considered and accommodated.

[52] Request

Piikani Nation requests that Alberta Transportation initiates discussions with the Piikani Nation and other Aboriginal communities to consider the possibility of constructing a permanent, protected memorial dedicated to historical use and occupation of these lands by first the Blackfoot people (Piikani, Kainai and Siksika Nations), and later the Beaver (Tsuu T'ina) and Nakoda Sioux (Stoney) people.

[72] SSRP, page 36
[73] Ibid.

10.3. Land Use and Resource Management Key Concerns and Requests

Table 10-1: Land Use and Resource Management Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[46]	Land and Resource Use	Piikani Nation requests that Alberta Transportation discusses how issues of concern to Piikani Nation, their Treaty and Aboriginal Rights and traditional knowledge has been used in Project planning and site selection.	Response
[47]	Land Ownership and Use	Piikani Nation requests that Alberta Transportation discusses how issues of concern to the Piikani Nation and its traditional and contemporary land uses and Aboriginal Rights have been used in Project planning and site selection.	Response
[48]	Land Ownership and Use	Piikani Nation requests that Alberta Transportation commits to holding a workshop with the Piikani Nation consultation office and knowledge holders where commitments related to appropriate avoidance measures, mitigation, management and accommodation strategies will be made prior to the issuing of any project permits or approvals.	Response Regulatory Agreement
[49]	Land Ownership and Use	Piikani Nation requests that Alberta Transportation provides at least three weeks' notice to the Piikani Nation prior to disturbing these areas so that appropriate Elders might be consulted and appropriate cultural protocols, including ceremonies can be planned before construction.	Response Agreement
[50]	Land Ownership and Use	Piikani Nation requests that it co-develops the Access Management Plans for Area A of the Project.	Response Agreement
[51]	Applicable Legislation and Land Use Plans, Policies	Piikani Nation requests that Alberta Transportation clearly describes how the Project will align with the existing land use documents, guidelines and policies, and now Aboriginal rights and interests will be considered and accommodated.	Response
[52]	Applicable Legislation and Land Use Plans, Policies	Piikani Nation requests that Alberta Transportation initiates discussions with the Piikani Nation and other Aboriginal communities to consider the possibility of constructing a permanent, protected memorial dedicated to historical use and occupation of these lands by first the Blackfoot people (Piikani, Kainai and Siksika Nations), and later the Beaver (Tsuu T'ina) and Nakoda Sioux (Stoney) people.	Response Agreement

***Recommendation Categories**:

Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.

Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).

Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

11. Historical Resources

11.1. Summary of Comments

Overall, the Historic Resources Assessment was completed to a high professional standard. Some historic resource sites were not able to be assessed due to a lack of landowner consent for access; however, this was addressed in the EIA and it was noted that these sections will require a Historic Resource Impact Assessment (HRIA) before Project approval is granted by Alberta Culture and Tourism (ACT).

In addition, the Piikani Nation is concerned about lack of access to archaeological reports and sites data. This concern was addressed in the EIA, where it was noted that individuals can request archaeological reports directly from ACT after the reports have been approved.[74]

11.2. Historical Resources Key Concerns and Requests

[53] Full Historical Resource Impact Assessment Not Available for Review

The Historic Resources section in the application was a detailed summary of the HRIA. The EIA stated that:[75]

> *"Because ACT considers site information to be confidential, the reports are not included as part of this filing, and Alberta Transportation is not allowed under the Act to release the reports directly to any individual or group. Once the report is approved, it can only be released by ACT to individuals or groups who request it, not by Alberta Transportation."*

With the understanding that Alberta Transportation cannot provide these reports, and that it must be requested directly from Alberta Culture and Tourism, the Piikani Nation would like to request Alberta Transportation's support in encouraging better data sharing between ACT and stakeholders.

[53] Request

Piikani Nation requests Alberta Transportation's support in encouraging better data sharing between ACT and stakeholders during efforts to obtain HRIA reports from ACT, as they become available.

[54] – [56] Baseline Data Collection Not Completed

Baseline data collection was not yet completed due to lack of landowner permission to access required areas.[76] In addition, ACT required a deep testing

[74] EIA, Volume 3B, Section 13.2 Methods, page 13.8
[75] Ibid.
[76] EIA, Volume 3B, Section 13.2 Methods, page 13.8 andSection 13.2.2.2.1 Archaeology, page 13.12

program in areas of high potential for deeply buried sites.[77] As deep testing is highly invasive, investigation has been delayed until the Project has received approval to avoid unnecessary interference with potential sites.[78] As a result, additional archaeological work was recommended in the HRIA report and might be required by ACT prior to Project approval.[79] [80]

> *"Standard mitigation measures will be determined by ACT based on their review of the HRIA… ACT will also issue requirements for any additional assessment such as a deep backhoe testing program or assessment for areas where landowner approval of access was not obtained."*

While many cultural and archaeological sites have been recovered in the project area including the flats north of the berm location, the bottom of the Elbow riverbed and on a tributary creek channel off the Elbow River, the Piikani Nation (and other Indigenous groups) has explained that there is potential for additional cultural and archaeological sites and artifacts to be unearthed during construction of the berm and diversion channel, particularly from the cliff on the west side of the Elbow River.

[54] Request

Piikani Nation requests that Alberta Transportation includes the Piikani Nation in discussions with ACT related to further investigations of identified sites within the designated construction boundary.

The Piikani Nation acknowledges the commitment Alberta Transportation made to co-develop heritage protection measures with Indigenous groups.

[55] Request

Piikani Nation requests that, once all Baseline information is collected, Alberta Transportation presents the results to the Piikani Nation and that this information is provided prior to the application being deemed complete.

[77] EIA, Volume 3B, Section 13.2 Methods, page 13.8
[78] EIA, Volume 3B, Section 13.2.2.2.1 Archaeology, page 13.15
[79] EIA, Volume 3B, Section 13.2.2.2.1 Archaeology, page 13.11
[80] EIA, Volume 3B, Section 13.2.2.2.1 Archaeology, page 13.15

[56] Request

Piikani Nation requests that it is given the opportunity to monitor construction activities near known cultural resources including the flats north of the berm location, the bottom of the Elbow riverbed and on a tributary creek channel off the Elbow River.

11.3. Historical Resources Key Concerns and Requests Summary

Table 11-1: Historical Resources Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[53]	Full Historical Resource Impact Assessment Not Available for Review	Piikani Nation requests Alberta Transportation's support in encouraging better data sharing between ACT and stakeholders during efforts to obtain HRIA reports from ACT, as they become available.	Response Agreement
[54]	Baseline Data Collection Not Completed	Piikani Nation requests that Alberta Transportation includes the Piikani Nation in discussions with ACT related to further investigations of identified sites within the designated construction boundary.	Response Agreement
[55]	Baseline Data Collection Not Completed	Piikani Nation requests that, once all Baseline information is collected, Alberta Transportation presents the results to the Piikani Nation and that this information is provided prior to the application being deemed complete.	Response Agreement
[56]	Baseline Data Collection Not Completed	Piikani Nation requests that it is given the opportunity to monitor construction activities near known cultural resources including the flats north of the berm location, the bottom of the Elbow riverbed and on a tributary creek channel off the Elbow River.	Response Agreement

***Recommendation Categories**:

Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.

Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).

Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

12. Piikani Nation's Traditional Land Use Study

12.1. Piikani Nation's Key Concerns and Requests

[57] Assessment Approach and Significance Determinations

Context

Alberta Transportation stated that the TLRU assessment was guided by both provincial **and** federal regulatory requirements:[81]

- the Government of Alberta's *Guidelines on Consultation with First Nations on Land and Resource Management* committed Alberta to consultation where land management and resource development had the potential to impact Treaty rights.

- AESRD's Terms of Reference highlight **the need to include Traditional Ecological Knowledge** alongside discussions and a determination of effects on access, hunting, fishing, trapping, gathering, traditional medicine, **cultural sites, spiritual sites and cultural purposes.**

- CEAA 2012 requirements require information regarding potential adverse effects of a Project on **Section 35 rights, title and related interests**. Section 5(1)(c) of CEAA 2012 listed specific topics to be addressed including **health and socio-economic conditions, physical and cultural heritage, current use of lands for traditional purposes and any site, structure or thing that is of historical, archaeological, paleontological or architectural significance**. In addition to access, spiritual sites, habitation sites, hunting, trapping, fishing and pant gathering, **"current uses" includes the seasonal cycles, intergenerational knowledge transmission, landforms and named places and other factors that provide context for understanding past, current and future practices and use**.[82] The CEAA guidelines also require the inclusion of **the perspective of Indigenous groups** on the assessment of impacts to potential or established Aboriginal or treaty rights and on proposed mitigation measures.[83]

As Section 14.1.3.1 correctly pointed out, Aboriginal Rights are defined as "*practices, traditions and customs integral to the distinctive culture of the Aboriginal group claiming the right that exist(ed) prior to contact with the Europeans*".

However, in the introduction to Section 14.0 Assessment of Potential Effects on Traditional Land and Resource Use, Alberta Transportation said that this component was included in the EIA because it recognized the potential for the

[81] EIA, Volume 3A, Section 14.1.1
[82] EIA, Volume 3A, page 14.12
[83] EIA, Volume 3A, page 14.9

Project to affect traditional activities, sites and resources. Alberta Transportation stated:[84]

> *"In Alberta, First Nations have constitutionally protected rights to hunt, fish, trap for food on unoccupied Crown lands to which they have a right of access for such purposes"*

The Piikani Nation notes that this statement referred to Treaty Rights but did not capture the full extent of constitutionally protected Aboriginal rights. The Springbank Reservior assessment focused on the current use of land for harvesting plant and animal resources and suggested that:

> *"Intangible components of TLRU such as spiritual connection can only be meaningfully evaluated by individuals and communities experiencing these values in their cultural context."*

However, the Piikani Nation suggests that this approach was inadequate. The Piikani Nation has endeavoured to explain to Alberta Transportation the significance of the impacts this project will have on the Piikani Nation and the significance of these impacts should be clearly stated in the EIA.

Along with other Blackfoot communities, the Piikani Nation has demonstrated to Alberta Transportation that the Project area was well used in the past and contains multiple Blackfoot traditional use sites.[85]

Piikani Nation's site visit identified tipi rings at numerous sites. There were Blackfoot traditional camps located near the main body reservoir (i.e., creek valley, the flats north of the berm and included multiple tipi rings, a buffalo rubbing stone, fire-broken rock and a Blackfoot spearhead (biface).

The Piikani Nation also identified tipi rings and old campgrounds on either side of the unnamed creek. Another site was buried in tall muskeg and was difficult to locate. Many fire hearth stones were identified near a concentration of tipi ring sites. One tipi ring was located west of the main concentration of tipi rings, possibly because it was once the lodge of *kipiitoyiss* "the old woman".

Another site was identified that included a half circle of stones, which represents a *uppiimaan*, a four-pole covered smoke lodge (PN n.d.). A historical camp, including fire hearth stones was also located on the Robinson Property.[86]

At a meeting with Alberta Transportation, other Blackfoot communities and Piikani Nation representatives:[87]

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[84] EIA, Volume 3A, page14.1
[85] EIA, Volume 3A, page 14.55
[86] EIA, Volume 3A, page 14.57
[87] Ibid.

> *"…participants identified important cultural and archaeological sites which are now overgrown with willows in the Project area. These sites are associated with ceremonies that have been practiced along the river for many years and this area may be associated with the North Trail. At the meeting, participants also indicated that the cairn identified during the archaeological field program was associated with a Blackfoot wintering site and that it's important to understand the Blackfoot Nation's territory".*

The Piikani Nation also told Alberta Transportation that Iniskims are fossils that are considered **culturally significant** and are incorporated into bundles; arrowheads and other **ceremonially significant** items are also placed in bundles.

At this meeting with Alberta Transportation, participants noted that many cultural and spiritual sites were no longer accessible and could not be identified but **are still significant**.[88] One participant noted:[89]

> *"Our concern is not having access to our traditional territory and why there are questions as to why access is being requested."*

Section 14.7 quoted a Blackfoot community member who tried to explain the significant impact destruction of cultural sites and areas related to Blackfoot songs and stories, as in terms of connections to ancestors and maintaining the spiritual teachings, customs and traditions that shape Piikani Nation culture and collective wellbeing.

The Piikani Report on the Proposed Springbank Reservoir and Dam (Big Bull, 2018) described Blackfoot occupation and history in the Project area prior to the immigration of other Aboriginal groups, missionaries and settlers; and their goals of "*protecting the Blackfoot territorial lands for present and future generations*".

It described how through language, traditions and ceremonial ways the Blackfoot were able to understand the natural world and advocate for a natural environmental authority. Their knowledge exists in parallel with the natural world. As such, maintenance of this knowledge, and the continuation of Blackfoot culture through traditions and ceremonies requires continued access to lands and resources within their territory.

> *"The Siksikaitsitapii [Blackfoot] maintain an unfettered and continuous relationship to the life surrounding the moraine and riparian landscape of the rivers, our source of spiritual sustenance, the core of our physical needs in this life we live: in this case, where water is life. The Siksikaitsitapii chose river valleys as a favored habitual homeland, among our traditional peers; all river corridors*

[88] EIA, Volume 3A, page 14.86
[89] EIA, Volume 3A, page 14.52

were addressed in the same reverence to be shared among all niitsitapii" (Piikuni: Land of the Natural Flow, William Big Bull)

The Piikani Nation has stated that "*the off stream Storage reservoir, earth filled dam and diversion canal, if constructed would desecrate and destroy all traces of the original people's existence, in this case the Siksikaitsiapii*".

Concern

Section 14.4 indicated that the determination of significance for the assessment of residual environmental effects only considered information on **current** use of lands and resources for traditional purposes.[90] The Piikani Nation Report and the EIA concurred that ranching, agriculture, infrastructure and industrial activity have severely reduced the ability for Piikani Nation members to conduct TLRU activities in the Project area, but also throughout their traditional territory. The Piikani Nation suggests that existing, adverse, long term and likely irreversible impacts that have limited, and continue to limit its ability to exercise Aboriginal and Treaty rights are significant, and any project contribution that exacerbates existing adverse regional cumulative effects is significant. This would apply to both tangible and intangible cultural connections to the land.

The approach and underlying framework for the TLU assessment significance determination described in Section 14.4 was contrary to the federal definition of Aboriginal Rights that stated:[91]

> *Aboriginal Rights are defined as "*practices, traditions and customs integral to the distinctive culture of the Aboriginal group claiming the right that exist(ed) prior to contact with the Europeans*". Suggesting that because "the Project is predominantly situated on private land that has been used for ranching and agriculture since the late 1800s and therefore the ability of TLRU activities are already substantially constrained compared to unoccupied crown land" fails to consider the Piikani perspectives on the significance of existing cumulative effects.*

The CEAA guidelines *require* the inclusion of **the perspective of Indigenous groups** on the assessment of impacts to potential or established Aboriginal or Treaty rights and on proposed mitigation measures.[92]

Even though the EIA listed the multiple traditional use sites and resources within the Project's study area, and made some effort to reiterate the knowledge the Piikani Nation has shared describing the spiritual and cultural importance of these sites and the significant impact destruction of these sites will have with respect to long-term access and the ability to carry out traditional pursuits in the Project Area, Alberta Transportation stated that "*the effects of the Project will not result in*

[90] EIA, Volume 3A, page 14.84
[91] Ibid.
[92] EIA, Volume 3A, page 14.9

the long-term loss of traditional use sites and areas in the RAA... the results are not significant".

Acknowledging the significance of the impact is important; not only in terms of respecting the Piikani People and its culture, and attempting to reconcile past infringements to Aboriginal and Treaty rights, but also because the significance rating should influence project decisions and Alberta Transportation's commitments related to the types of mitigation measures, management strategies, monitoring any other accommodations measures carried out for the Project.

As noted earlier, CEAA guidelines require including the perspective of Indigenous groups on the assessment of impacts to potential or established Aboriginal or Treaty rights and on proposed mitigation measures.[93]

It is acknowledged that Alberta Transportation has offered to hold a workshop with the Piikani Nation to obtain feedback on how traditional use information has been presented in the TLU Section of the EIA, but discussions regarding the workshop are ongoing. It is also noted that for the Piikani Nation to effectively participate in such a workshop, the community would need to prepare for and organize its input for Alberta Transportation, and that this would require Alberta Transportation to provide resources to the Piikani Nation to undertake these tasks.

Having a workshop without this initial preparation work would result in limited input being available to Albera Transportation.

[57] Request

Piikani Nation requests that Alberta Transportation commits to holding a workshop with the Piikani Nation consultation office and knowledge holders where commitments related to appropriate avoidance measures, mitigation, management and accommodation strategies will be made prior to the issuing of any project permits or approvals. Piikani Nation also requests that Alberta Transportation provides resources so that the Piikani Nation can prepare for and organize its comments prior to the workshop.

[58] – [61] Project Mitigations

Context

When meeting with Alberta Transportation, Blackfoot participants, including representatives from the Piikani Nation:[94]

> *"…highlighted that the destruction of cultural sites or locations can lead to the loss of spiritual connections to ancestors and can occur regardless of the presence of the physical site…Mitigation measures that only address the physical*

[93] Ibid.
[94] EIA, Volume 3A, page 14.86

component of a site do not mitigate effects on spiritual aspects on these locations and cultural practice."

The Piikani Nation has stated that:[95]

"The [government has an*] accepted practice of removal rather than preserving the last traces of original history undisturbed or intact".*

The Piikani Nation has recommended that prior to excavation or removal of material from sites, input from Siksikaitsiapii (keepers of our Language) should be considered.

Concern

While the EIA provided some discussion and proposed mitigations for effects to access, hunting, fishing, trapping and plant harvesting, the EIA did not make any specific commitments to protect/avoid TLUR and cultural sites, or any specific commitments to mitigate or accommodate cultural impacts to Blackfoot culture, traditions and practices that will occur as a result of the Project.

[58] Request

Piikani Nation requests that Alberta Transportation provides at least three weeks' notice to the Piikani Nation prior to disturbing these areas so that appropriate Elders might be consulted and appropriate cultural protocols, including ceremonies can be planned before construction. Piikani Nation also requests that Alberta Transportation supports the community so that appropriate ceremonies, feasts and prayers can be held.

While many cultural and archaeological sites have been recovered in the Project area including the flats north of the berm location, the bottom of the Elbow riverbed and on a tributary creek channel off the Elbow River, the Piikani Nation (and other Indigenous groups) has explained that there is potential for additional cultural and archaeological sites and artifacts to be unearthed during construction of the berm and diversion channel, particularly from the cliff on the west side of the Elbow River.

[59] Request

Piikani Nation requests that Alberta Transportation includes the Piikani Nation in discussions with ACT and Alberta Transportation related to further investigations of identified sites within the designated construction boundary.

[95] Ibid.

The Piikani Nation acknowledges the commitment Alberta Transportation has made to co-develop heritage protection measures with Indigenous groups.

[60] Request

Piikani Nation requests that it is given the opportunity to monitor construction activities near known cultural resources including the flats north of the berm location, the bottom of the Elbow riverbed and on a tributary creek channel off the Elbow River.

[61] Request

Piikani Nation requests that Alberta Transportation considers supporting Piikani Nation's cultural retention strategies, including plans to establish community-based monitoring of key cultural species and practices.

[62] – [68] Access

Context

The Project is being proposed for lands that have already been taken up by others. Government-imposed land designations and related policies have contributed to the cumulative effects adversely affecting traditional resources and the use of lands within Blackfoot traditional territory. Currently, First Nations are limited in their ability to access the project area for TLRU purposes, including the exercise of Aboriginal Rights, except where explicitly permitted by landowners. While they can access un-occupied Crown land, traditional use of these areas is also limited since hunting is prohibited along roadways.

However, in some cases, Aboriginal people have been able to plan with private land owners to hunt on their land. Approximately six landowners do allow First Nation access to their lands to hunt and fish.[96] TLU assessments completed for the Project have also identified the Elbow River as a historic travel corridor for Blackfoot and an old trail known as the old Stoney Trail (Old north-south trail) was identified by the Piikani Nation near the Robinson Property.

Concern

The proposed designation of lands within the Project area following construction limits future traditional use to Area A (Elbow River Floodplain). Access to all other Project areas will be restricted.

Area A is also considered a conservation area, with general public access and opportunities for low impact recreation.[97] Alberta Transportation will maintain access to identified "current" use sites located outside of the designated

[96] EIA, Volume 3A, page 14.19
[97] EIA, Volume 3A, page 14.74

construction and Project site limits during construction and operation (including hunting and fishing) and will advise Indigenous groups on post-construction access management.[98] Affects to access will be continuous, long-term and irreversible.[99]

While it is acknowledged that Alberta Transportation said it would permit "traditional use", it was not clear how access for Piikani Nation members will be coordinated such that they are able to carry out ceremonies within the conservation area (Area A) or how the province will facilitate activities such as hunting within an area intended for multi-use including access by recreational users.

[62] Request

Piikani Nation requests that Alberta Transportation works with the Piikani Nation to ensure cultural and spiritual values are integrated when developing access management plans. The Piikani Nation should have input into the access management plans throughout the Project's life, to ensure that Piikani Nation members have continued access to Area A and undisturbed crown land areas.

Table 14-5 suggested that no current medicinal plant gathering areas were located in the RAA, there were no Blackfoot traditional camps and that Elbow River was not used by the Piikani Nation for fishing, or as a water source;[100] however, later on page 14.72, the EIA noted that herbs and medicinal plants were identified in the Project area during site visits and this was supported by Table 14-3.[101]

Table 14-3 listed some of the natural resources used by the Piikani Nation, but this list was not complete. There are numerous other resources (such as wild onions, pin cherry, red osier dog wood, spruce, various minerals, fire wood) that are traditionally used by the Piikani Nation that were not noted in the table.

[63] Request

Piikani Nation requests that Alberta Transportation reviews this table at a workshop so that Piikani Nation use of resources is accurately captured. With so many camps it is likely that water was harvested from the Elbow River and other waterways and that a variety of food and medicinal plants were historically harvested from these areas.

Construction activities included vegetation clearing, channel excavation, water diversion construction, dam and berm construction, road construction, bridge construction, lay down areas, borrow extraction, reclamation and utility alignments.

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[98] EIA, Volume 3A, page 14-75
[99] EIA, Volume 3A, page 14-76
[100] EIA, Volume 3A, page 14.58
[101] EIA, Volume 3A, pages 14.44 to 14.46

The EIA stated that no traditionally used species would be lost in the LAA, nor would vegetation communities supporting traditionally used plants be lost in the PDA;[102] however, the EIA said that vegetation clearing during construction would reduce the riparian areas and result in a loss of 29.5 ha of wetland in the PDA. The EIA stated that changes to vegetation cover would be limited to temporary disturbance in the immediate area around the dam, diversion channel and diversion structure and that wetland cover would be replaced according to the Alberta Wetland Policy.[103]

The Piikani Nation acknowledges Alberta Transportation's commitment to providing opportunities for harvesting or relocating medicinal and ceremonial plants prior to construction.

[64] Request

Piikani Nation requests that Alberta Transportation provides at least three weeks' notice of when these salvage activities will occur.

The Piikani Nation has raised concerns with general alteration of the land within the flood basin, which provides habitat for a variety of vegetation and wildlife species – if one species is altered that the whole ecosystem might be affected.[104]

[65] Request

Piikani Nation requests that Alberta Transportation discusses the availability of vegetation, fish and wildlife species for food, traditional medicinal and cultural purposes in the LSA and RSA in the Conservation and Reclamation plan.

[66] Request

Piikani Nation requests that Alberta Transportation develops with the Piikani Nation a monitoring plan to assess Project effects on hunting, trapping, fishing, plant harvesting and cultural use following Project development.

[67] Request

Piikani Nation requests that Alberta Transportion, in collaboration with Piikani Nation, develops Project-specific triggers and limits for the Project's mitigation, management and monitoring plans that reflect Community TEK and ecological and cultural values.

[102] EIA, Volume 3A, page 14.69
[103] EIA, Volume 3A, page 14.70
[104] EIA, Volume 3A, page 14.63

[68] Request

Piikani Nation requests that Alberta Transportation considers supporting Piikani Nation's cultural retention strategies, including plans to establish community-based monitoring of key cultural species and practices.

12.2. Piikani Nation's Traditional Land Use Study Key Concerns and Requests Summary

Table 12-1: Piikani Nation's Traditional Land Use Study Key Concerns and Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[57]	Assessment Approach and Significance Determinations	Piikani Nation requests that Alberta Transportation commits to holding a workshop with the Piikani Nation consultation office and knowledge holders where commitments related to appropriate avoidance measures, mitigation, management and accommodation strategies will be made prior to the issuing of any project permits or approvals. Piikani Nation also requests that Alberta Transportation provides resources so that the Piikani Nation can prepare for and organize its comments prior to the workshop.	Response Agreement
[58]	Project Mitigations	Piikani Nation requests that Alberta Transportation provides at least three weeks' notice to the Piikani Nation prior to disturbing these areas so that appropriate Elders might be consulted and appropriate cultural protocols, including ceremonies can be planned before construction. Piikani Nation also requests that Alberta Transportation supports the community so that appropriate ceremonies, feasts and prayers can be held.	Response Agreement
[59]	Project Mitigations	Piikani Nation requests that Alberta Transportation includes the Piikani Nation in discussions with ACT and Alberta Transportation related to further investigations of identified sites within the designated construction boundary.	Response Agreement
[60]	Project Mitigations	Piikani Nation requests that it is given the opportunity to monitor construction activities near known cultural resources including the flats north of the berm location, the bottom of the Elbow riverbed and on a tributary creek channel off the Elbow River.	Response Agreement
[61]	Project Mitigations	Piikani Nation requests that Alberta Transportation considers supporting Piikani Nation's cultural retention strategies, including plans to establish community-based monitoring of key cultural species and practices.	Response Agreement
[62]	Access	Piikani Nation requests that Alberta Transportation works with the Piikani Nation to ensure cultural and spiritual values are integrated when developing access management plans. The Piikani Nation should have input into the access management plans throughout the Project's life, to ensure that Piikani Nation members have continued access to Area A and undisturbed crown land areas.	Response Agreement

Number	Piikani Nation Key Concerns	Requests	Category*
[63]	Access	Piikani Nation requests that Alberta Transportation reviews this table (Table 14-3) at a workshop so that Piikani Nation use of resources is accurately captured. With so many camps it is likely that water was harvested from the Elbow River and other waterways and that a variety of food and medicinal plants were historically harvested from these areas	Response Agreement
[64]	Access	Piikani Nation requests that Alberta Transportation provides at least three weeks' notice of when these salvage activities will occur.	Response Agreement
[65]	Access	Piikani Nation requests that Alberta Transportation discusses the availability of vegetation, fish and wildlife species for food, traditional medicinal and cultural purposes in the LSA and RSA in the Conservation and Reclamation plan.	Response Agreement
[66]	Access	Piikani Nation requests that Alberta Transportation develops with the Piikani Nation a monitoring plan to assess Project effects on hunting, trapping, fishing, plant harvesting and cultural use following Project development.	Response Agreement
[67]	Access	Piikani Nation requests that Alberta Transportion, in collaboration with Piikani Nation, develops Project-specific triggers and limits for the Project's mitigation, management and monitoring plans that reflect Community TEK and ecological and cultural values.	Response Agreement
[68]	Access	Piikani Nation requests that Alberta Transportation considers supporting Piikani Nation's cultural retention strategies, including plans to establish community-based monitoring of key cultural species and practices.	Response Agreement

***Recommendation Categories**:

Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Alberta Transportation.

Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the Project is ultimately approved).

Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Alberta Transportation is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

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Review of Alberta Transportation's Springbank Off-Stream Reservoir Project Environmental Impact Assessment Review

Appendices

Appendix A – Requests Summary Table

Number	Piikani Nation Key Concerns	Requests	Category*
[1]	General Request	This technical review contains many requests for additional information, or for Alberta Transportation to work with Piikani Nation in the design, development, implementation and monitoring of a variety of plans and programs. For Piikani Nation to have effective involvement with Alberta Transportation on these plans and programs there will be a need for Piikani Nation and Alberta Transportation to agree on capacity support for Piikani Nation. As a general comment for all these types of requests, capacity support should be provided to Piikani Nation to effectively participate.	Response Agreement
Hydrogeology			
[2]	Baseline Assessment	Piikani Nation requests that Alberta Transportation: i) conducts additional water quality sampling, from more wells, and through all seasons to establish a more robust Baseline, before or during construction of the Project to confirm the validity of the EIA assessment results; ii) engages in long-term monitoring of more than ten domestic wells within the RAA and conducts additional additional well surveys to acquire further pertinent information for the long-term monitoring program; iii) provides Piikani Nation with updates regarding additional investigations of the Project and seasonal characterization of groundwater quality; and iv) consults with Piikani Nation about its mitigation plans in the event of unexpected effects on groundwater quality and quantity in the RAA.	Response Agreement
[3]	Numerical Model	Piikani Nation requests that Alberta Transportation: i) conducts additional water level monitoring to confirm the validity of the EIA assessment results; and ii) provides Piikani Nation with updates regarding additional investigations of the Project and validation of the numerical model.	Response Agreement
[4]	Impact Assessment	Piikani Nation requests that Alberta Transportation: i) monitors the effects of dewatering during construction; and ii) performs adequate groundwater (levels and quality) monitoring during construction and dry operation of the Project to confirm the localized effects of the derivation ditch on groundwater surface water interaction.	Response Agreement

***Recommendation Categories**:

Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Proponent.

Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Proponent is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

Number	Piikani Nation Key Concerns	Requests	Category*
[5]	Culturally Sensitive Areas and Monitoring	Piikani Nation requests that Alberta Transportation: i) confirms that it has considered potential traditional groundwater use in any culturally sensitive areas; ii) if it identifies or is informed through the TLRU study about traditionally used, culturally sensitive areas within the Project impact area, develops mitigative measures to protect these sensitive areas including the contribution of natural groundwater flow to such areas; and iii) consults with community members to inform and participate in monitoring activities related to culturally sensitive areas and considers incorporating the role groundwater plays in sustaining identified areas for monitoring and mitigation.	Response Agreement
Hydrology			
[6]	Streamflow when Diversion Channel is Operational	Piikani Nation requests that Alberta Transportation (Stantec) clarifies the planned operation of the diversion channel when natural streamflows are between 160 m^3/s and 200 m^3/s (i.e., during flood events < 1-in-10-year return period).	Response
[7]	Coarse Sediment Transport at and near the Diversion Channel	Piikani Nation requests that Alberta Transportation (Stantec): i) clarifies how coarse sediment and/or bedload transport downstream will be maintained if discharges > 160 m^3/s will no longer occur (or will occur on a very limited basis) in the Elbow River downstream of the diversion channel; and ii) describes the importance of sediment deposition and resuspension dynamics within the diversion channel and Elbow River at and below the diversion structure.	Response
[8]	Sediment Deposition within the Reservoir	Piikani Nation requests that Alberta Transportation (Stantec) clarifies how the reservoir water storage capacity would be confirmed and maintained on an annual basis when the storage capacity might be reduced due to sediment deposition within the reservoir.	Response
[9]	Low-level Outlet Channel	Piikani Nation requests that Alberta Transportation (Stantec) clarifies how the low-level outlet channel would be designed to maintain the integrity of the existing channel, limit channel bank erosion, and maintain environmental values (e.g., clear water refuge during peak streamflows within the Elbow River).	Response

***Recommendation Categories**:
Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Proponent.
Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).
Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Proponent is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

Number	Piikani Nation Key Concerns	Requests	Category*
Surface Water Quality and Aquatic Ecology			
[10]	Increased Herbicide Concentrations	Piikani Nation requests that Alberta Transportation: i) considers aquatic impacts related not only to herbicides applied to control vegetation during Project operations, but also any existing hydrocarbons including herbicides that are on lands within the full project footprint; ii) provides a project footprint map at a larger scale than shown in Figure 2-1 (EIA, Volume 4, Appendix K) that more clearly depicts the locations of the sediment and soil quality sampling sites; and iii) clarifies how it will maintain adequate setbacks for stored fuels, lubricants from vehicles and herbicide applications on the Project footprint before an extreme flood event occurs, to prevent introducing hydrocarbons or other contaminants to water during a flood event.	Response Agreement
[11]	*Fisheries Act* Application	Piikani Nation requests: i) a copy of the application to Fisheries and Oceans Canada (DFO) under the *Fisheries Act* that describes the proposed offset plan for lost CRA fish habitat in the Elbow River, the fish-bearing portion of the tributary lost for diversion, and any additional fish-bearing waters that will be damaged during construction, dry operations or other phases; ii) that Piikani Nation community representatives are consulted about plans to provide fish habitat replacement or offset, including the DFO consultation and Authorization process.	Response Regulatory Agreement
[12]	Salvage Plan for Entrained and Stranded Fish	Piikani Nation requests that Alberta Transportation confirms that it will develop and implement plans to monitor fish entrainment following a flood event and provides a comprehensive fish salvage plan to return to the Elbow River any fish stranded and at risk of mortality within the flood control system.	Response

***Recommendation Categories**:
Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Proponent.
Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).
Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Proponent is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

Number	Piikani Nation Key Concerns	Requests	Category*
[13]	Water Quality Gaps	Piikani Nation requests that Alberta Transportation: i) examines data from the analytical laboratory to determine whether detection limits used are either higher than published Canadian Council of Ministers of the Environment (CCME) or Government of Alberta water quality guidelines or are appropriate to detect each key parameter in Elbow River waters—where the detection limits are higher than guidelines, Alberta Transportation should explain how issues with laboratories used, data interpretation and aquatic system management will be addressed; ii) ensures that water quality monitoring programs (Volume 3C, Section 2) following flood events include consistently instructing the analytical laboratory to provide "low level" detection limits for nutrients (notably phosphorus) and other parameters to ensure trophic categories can be assessed and guidelines are adhered to; iii) consistent with the Terms of Reference, provides an assessment of the potential for the off-stream reservoir to develop cyanobacterial blooms, which might result in the production of microcystin toxins that could be introduced downstream during water release to the Elbow River and the drinking water supply, Glenmore Reservoir; and iv) develops and communicates contingency plans should excessive cyanobacterial blooms develop in the reservoir prior to planned release to the Elbow River.	Response Regulatory Agreement
[14]	Mercury Methylation and Bioaccumulation in Reservoirs	Piikani Nation requests that Alberta Transportation: i) assesses the potential for methylmercury to be produced within the flooded reservoir and transported to the Elbow River during water release; ii) assesses the potential for methylmercury produced in the flooded reservoir to be bioaccumulated by fish to levels that might not otherwise occur, and that might exceed human consumption guidelines (in the Elbow River); and iii) is required to monitor inorganic mercury and methylmercury in reservoir sediments, water overlying sediments, at the low-level outlet during water release, and in fish tissue just prior to salvaging fish back to the Elbow River.	Response Regulatory Agreement
Terrain and Soils			
[15]	Baseline Soil Data	Piikani Nation is concerned about the lack of overlay of inspection locations relative to the development footprint and requests that Alberta Transportation provides figure overlays of the locations of soil inspections relative to the direct disturbance area of the development/construction footprint.	Response

***Recommendation Categories**:
Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Proponent.
Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).
Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Proponent is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

Number	Piikani Nation Key Concerns	Requests	Category*
[16]	Soil Quality and Quantity	Piikani Nation is concerned about the questionable determination of significance for soil quality and quantity requests that Alberta Transportation provides an assessment of how changes to soil quality and quantity might impact other terrestrial resources, including biodiversity, productivity, and ecological integrity, as stated in clause 3.9.2 [A] (b) in the Terrain and Soils section (3.9) of the Project Terms of Reference. This assessment should involve revisions to the determination of significance for the soil quality and quantity section (Volume 3B, Section 9.3, page 9.23).	Response Regulatory
[17]	Indigenous Land Use	Piikani Nation is concerned that there has been no discussion of the connection between soil and Indigenous land use and requests that Alberta Transportation provides an assessment of how changes to terrain and soil conditions might impact Indigenous land use resulting from implications for terrestrial resources (e.g., vegetation and wildlife). This assessment should be completed in collaboration with and informed by the Piikani Nation.	Response Agreement
[18]	Monitoring	Piikani Nation is concerned that there has been no monitoring plan for impacts to soil conditions or associated impacts to Indigenous use and requests that Alberta Transportation engages with the Piikani Nation to develop a soil monitoring program that incorporates the monitoring of soil-related impacts to Indigenous resource use.	Response Agreement
[19]	Mitigation Measures	Piikani Nation is concerned that the Project's mitigation measures did not address direct placement of salvaged surface soils and requests that Alberta Transportation adapts the conservation and reclamation plan to maximize opportunities for direct placement of surface soils.	Response Agreement
[20]	Mitigation Measures	Piikani Nation is concerned that the Project's revegetation measures did not address species of importance to Indigenous people and requests that Alberta Transportation: i) collaborates with the Piikani Nation to develop a revegetation plan and seed mix that includes species of importance to the Piikani Nation and other Indigenous communities, and ii) uses the developed seed mix to revegetate both reclaimed areas and soil stockpiles.	Response Agreement
Vegetation and Wetlands			
[21]	Baseline Vegetation Data	Piikani Nation is concerned that there is a lack of survey locations within the 1-km buffer between the PDA and LAA and requests that Alberta Transportation completes additional surveys in the 1-km buffer between the PDA and LAA to groundtruth all mapped ecosites and to determine if there are any rare plants, rare plant communities, and/or traditional use species that should be considered for mitigation.	Response Agreement
[22]	Baseline Vegetation Data	Piikani Nation is concerned that there is a no table to describe numbers of survey locations per ecosite and requests that Alberta Transportation provides data on how many surveys were completed for each ecosite in the LAA, and an explanation of how survey locations were selected.	Response

***Recommendation Categories**:
Agreement – A suggested activity (mitigation, monitoring) that Piikani Nation might want to consider in its Agreement negotiations with Proponent.
Regulatory – Piikani Nation's recommendation to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).
Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Proponent is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

Number	Piikani Nation Key Concerns	Requests	Category*
[23]	Minimizing Disturbance	Piikani Nation is concerned that the Project footprint might not absorb enough existing disturbance and requests that Alberta Transportation clarifies how much existing disturbance in the LAA will be absorbed during Project construction and commits to make every effort to adapt current plans to minimize the development footprint.	Response Agreement
[24]	Minimizing Disturbance	Piikani Nation requests that the Government of Alberta develops relevant policies and criteria for assessing, guiding and achieving disturbance minimization for proposed projects.	Regulatory
[25]	Minimizing Disturbance	Piikani Nation is concerned that Indigenous people are not always consulted regarding disturbance minimization and requests that the Government of Alberta consults with Indigenous people regarding criteria for minimizing disturbance to natural and traditional use areas and that these criteria are incorporated into a relevant Landscape Management Plan. This collaboration would incorporate Indigenous knowledge into defining thresholds to address cumulative effects, protect Indigenous knowledge and opportunities, and guide proponents in minimizing disturbance.	Regulatory
[26]	Rare Plants	Piikani Nation is concerned about inconsistent reporting about species of management concern in the PDA and requests that Alberta Transportation clarifies the inconsistent reporting about species of management concerns in the PDA.	Response
[27]	Rare Plants	Piikani Nation is concerned that it was not consulted about rare plants and requests that Alberta Transportation works with Piikani Nation members to determine if the rare species identified in the LAA and RAA are traditionally important, and to develop species-specific mitigation plans for the SOMC that will be removed by the Project.	Response Agreement
[28]	Traditional Use Plants	Piikani Nation believes that Alberta Transportation should engage the Piikani Nation to validate traditional plant inventories and requests that Alberta Transportation collaborates with Piikani Nation and other Indigenous communities to add unique and uncommon (or rare) traditional plants and identifies if traditional plants within the LAA are being used by Indigenous people.	Response Agreement
[29]	Traditional Use Plants	Piikani Nation is concerned that the impact assessment for traditional use plant species is misleading and requests that Alberta Transportation revises the impact assessment of traditional use plant species (Section 10.2.3.2) for Flood and Post-flood Operations to reflect the loss of traditional use plant species that will be lost with upland and wetland communities submerged during the design flood.	Response Regulatory

***Recommendation Categories**:

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Response – a deficiency or question on which Piikani Nation recommends that a response of additional information from Proponent is provided to Piikani Nation and the regulators, prior to the application being deemed complete by the regulators.

Number	Piikani Nation Key Concerns	Requests	Category*
[30]	Vegetation Loss and Recovery	Piikani Nation is concerned about misleading and unsupported arguments relating to vegetation loss and recovery and requests that Alberta Transportation: i) corrects misleading statements and inconsistencies in the Summary of Project Residual Effects and Conclusions sections in the Effects Assessment for Flood and Post-flood Operations; ii) provides supporting information to demonstrate that successful grassland and marsh recovery can be achieved; and iii) revises the assessment rankings and conclusions to reflect the significant loss of natural vegetation types due to Project construction and flooding.	Response Regulatory
[31]	Revegetation Measures	Piikani Nation is concerned that revegetation measures lack necessary detail and requests that Alberta Transportation develops: i) a more detailed reclamation plan that outlines projected target ecosites and planting prescriptions needed to achieve equivalent capability and sustained traditional uses on reclaimed areas; and ii) develops details of the reclamation plan in close collaboration with members of the Piikani Nation to restore traditional land use opportunities in the Project area.	Response Regulatory Agreement
[32]	Revegetation Measures	Piikani Nation requests that Alberta Transportation uses only plant species native to the area in the Project revegetation program, and sources that seed from local provenances.	Response Agreement
[33]	Monitoring	Piikani Nation is concerned that monitoring will not involve Indigenous communities and requests that Alberta Transportation provides opportunities and financial capacity for the community to meaningfully participate in the planning and implementation of monitoring to help define meaningful monitoring targets, criteria and indicators for traditional land use objectives.	Response Agreement
[34]	Cumulative Effects	Piikani Nation believes that Alberta Transportation should compare Project cumulative effects to a pre-development Baseline and requests that Alberta Transportation revises the significance ranking in the Vegetation and Wetlands section of the Cumulative Effects Assessment (Volume 3C, Section 1.2.6) to account for existing regional cumulative effects in the RAA that have occurred since a pre-development Baseline.	Response

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Number	Piikani Nation Key Concerns	Requests	Category*
Wildlife			
[35]	Key Indicators	Piikani Nation requests that Alberta Transportation collaborates with Piikani Nation to validate: iii) inventories of traditionally important wildlife species; iv) add unique or overlooked species of traditional importance; and identify if Indigenous members have specific knowledge about wildlife patterns within the LAA.	Response Agreement
[36]	Traditional Use Inputs to Wildlife and Biodiversity Assessment	Piikani Nation requests that Alberta Transportation shares Species at Risk wildlife impact information gathered during the project site investigations with the Nation.	Response Agreement
[37]	Wildlife Habitat Suitability Modelling	Piikani Nation requests that Alberta Transportation: i) provides more detailed descriptions for the four-class wildlife habitat rating scheme and for the performance of the wildlife habitat models; and ii) collects more data to calibrate habitat suitability models for specific key indicators.	Response Agreement
[38]	Construction and Dry-Operations	Piikani Nation requests that Alberta Transportation collaborates with Piikani Nation and other Indigenous communities to develop an access management plan (AMP) for roads and other linear access features associated with the Project. Specifically, Piikani Nation would like to see an AMP with restrictions on non-essential access, and with reasonable allowances that give Piikani Nation members access to traditional lands.	Response Agreement
[39]	Change in Habitat	The Piikani Nation is concerned that revegetation measures are insufficiently detailed in describing the benefits of the mitigation efforts on wildlife habitat reinstatement and requests that Alberta Transportation: i) provides a more-detailed reclamation plan that outlines how revegetation efforts will mitigate wildlife habitat loss; and ii) develops a detailed reclamation plan in collaboration with members of the Piikani Nation.	Response Regulatory Agreement
[40]	Significance and Prediction Confidence	Piikani Nation requests that Alberta Transportation provides: i) supporting information to demonstrate that successful ungulate crossings can be achieved with the proposed cover materials for rip-rap, and ii) revises the significance rating to reflect the predicted measurable change in the abundance and distribution of ungulates in the LAA.	Response Regulatory

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Number	Piikani Nation Key Concerns	Requests	Category*
[41]	Monitoring and Mitigation	Piikani Nation requests that Alberta Transportation provides a more detailed description of its monitoring program and provides capability for the Piikani Nation to participate in the monitoring program.	Response Agreement
Biodiversity			
[42]	Traditional Knowledge for Biodiversity Planning	Piikani Nation is concerned that there was no Piikani Nation engagement in biodiversity planning and requests that: i) Alberta Transportation describes how it will engage the Piikani Nation in decision making related to reclamation for re-establishing biodiversity that supports traditional land uses; and ii) the Alberta Energy Regulator requires Alberta Transportation to involve the Piikani Nation in decision making related to biodiversity re-establishment for all reclamation plans in Piikani Nation's traditional territory.	Response Regulatory Agreement
[43]	Mitigation and Monitoring	Piikani Nation is concerned about the lack of information regarding mitigation and monitoring for impacts to biodiversity and requests that Alberta Transportation develops biodiversity monitoring plans and criteria to measure the effectiveness of biodiversity restoration to support traditional land uses on reclaimed areas, and that these plans are submitted to the Piikani Nation to provide knowledge and input. This should be completed as a condition of application approval.	Response Agreement
[44]	Landscape Diversity	Piikani Nation is concerned that linear density is already above ecosystem thresholds and requests that Alberta Transportation reassesses landscape diversity change (i.e., habitat fragmentation) using a more appropriate measure, such as density of linear disturbance, and then compares the results to published thresholds of linear density at which long-term ecosystem harm occurs.	Response
[45]	Reclaiming Temporary Disturbances	Piikani Nation is concerned about Alberta Transportation's unsupported arguments relating to vegetation recovery and requests that regulators ensure the effects of the Project and the cumulative effects of regional development on biodiversity are assessed: i) with the assumption that reclamation will not be completely successful at returning a full pre-disturbance suite of native plant and animal species to the Project-area landscape; ii) during the time that the Project footprint is unreclaimed, plus the subsequent period until return of ecological function and form like pre-disturbance conditions; and, iii) that the EIA is not deemed complete until this work is done.	Response Regulatory

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Number	Piikani Nation Key Concerns	Requests	Category*
Land and Resource Management			
[46]	Land and Resource Use	Piikani Nation requests that Alberta Transportation discusses how issues of concern to Piikani Nation, their Treaty and Aboriginal Rights and traditional knowledge has been used in Project planning and site selection.	Response
[47]	Land Ownership and Use	Piikani Nation requests that Alberta Transportation discusses how issues of concern to the Piikani Nation and its traditional and contemporary land uses and Aboriginal Rights have been used in Project planning and site selection.	Response
[48]	Land Ownership and Use	Piikani Nation requests that Alberta Transportation commits to holding a workshop with the Piikani Nation consultation office and knowledge holders where commitments related to appropriate avoidance measures, mitigation, management and accommodation strategies will be made prior to the issuing of any project permits or approvals.	Response Regulatory Agreement
[49]	Land Ownership and Use	Piikani Nation requests that Alberta Transportation provides at least three weeks' notice to the Piikani Nation prior to disturbing these areas so that appropriate Elders might be consulted and appropriate cultural protocols, including ceremonies can be planned before construction.	Response Agreement
[50]	Land Ownership and Use	Piikani Nation requests that it co-develops the Access Management Plans for Area A of the Project.	Response Agreement
[51]	Applicable Legislation and Land Use Plans, Policies	Piikani Nation requests that Alberta Transportation clearly describes how the Project will align with the existing land use documents, guidelines and policies, and now Aboriginal rights and interests will be considered and accommodated.	Response
[52]	Applicable Legislation and Land Use Plans, Policies	Piikani Nation requests that Alberta Transportation initiates discussions with the Piikani Nation and other Aboriginal communities to consider the possibility of constructing a permanent, protected memorial dedicated to historical use and occupation of these lands by first the Blackfoot people (Piikani, Kainai and Siksika Nations), and later the Beaver (Tsuu T'ina) and Nakoda Sioux (Stoney) people.	Response Agreement
Historical Resources			
[53]	Full Historical Resource Impact Assessment Not Available for Review	Piikani Nation requests Alberta Transportation's support in encouraging better data sharing between ACT and stakeholders during efforts to obtain HRIA reports from ACT, as they become available.	Response Agreement

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Number	Piikani Nation Key Concerns	Requests	Category*
[54]	Baseline Data Collection Not Completed	Piikani Nation requests that Alberta Transportation includes the Piikani Nation in discussions with ACT related to further investigations of identified sites within the designated construction boundary.	Response Agreement
[55]	Baseline Data Collection Not Completed	Piikani Nation requests that, once all Baseline information is collected, Alberta Transportation presents the results to the Piikani Nation and that this information is provided prior to the application being deemed complete.	Response Agreement
[56]	Baseline Data Collection Not Completed	Piikani Nation requests that it is given the opportunity to monitor construction activities near known cultural resources including the flats north of the berm location, the bottom of the Elbow riverbed and on a tributary creek channel off the Elbow River.	Response Agreement
Piikani Nation's Traditional Land Use Study			
[57]	Assessment Approach and Significance Determinations	Piikani Nation requests that Alberta Transportation commits to holding a workshop with the Piikani Nation consultation office and knowledge holders where commitments related to appropriate avoidance measures, mitigation, management and accommodation strategies will be made prior to the issuing of any project permits or approvals. Piikani Nation also requests that Alberta Transportation provides resources so that the Piikani Nation can prepare for and organize its comments prior to the workshop.	Response Agreement
[58]	Project Mitigations	Piikani Nation requests that Alberta Transportation provides at least three weeks' notice to the Piikani Nation prior to disturbing these areas so that appropriate Elders might be consulted and appropriate cultural protocols, including ceremonies can be planned before construction. Piikani Nation also requests that Alberta Transportation supports the community so that appropriate ceremonies, feasts and prayers can be held.	Response Agreement
[59]	Project Mitigations	Piikani Nation requests that Alberta Transportation includes the Piikani Nation in discussions with ACT and Alberta Transportation related to further investigations of identified sites within the designated construction boundary.	Response Agreement
[60]	Project Mitigations	Piikani Nation requests that it is given the opportunity to monitor construction activities near known cultural resources including the flats north of the berm location, the bottom of the Elbow riverbed and on a tributary creek channel off the Elbow River.	Response Agreement
[61]	Project Mitigations	Piikani Nation requests that Alberta Transportation considers supporting Piikani Nation's cultural retention strategies, including plans to establish community-based monitoring of key cultural species and practices.	Response Agreement

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Number	Piikani Nation Key Concerns	Requests	Category*
[62]	Access	Piikani Nation requests that Alberta Transportation works with the Piikani Nation to ensure cultural and spiritual values are integrated when developing access management plans. The Piikani Nation should have input into the access management plans throughout the Project's life, to ensure that Piikani Nation members have continued access to Area A and undisturbed crown land areas.	Response Agreement
[63]	Access	Piikani Nation requests that Alberta Transportation reviews this table (Table 14-3) at a workshop so that Piikani Nation use of resources is accurately captured. With so many camps it is likely that water was harvested from the Elbow River and other waterways and that a variety of food and medicinal plants were historically harvested from these areas	Response Agreement
[64]	Access	Piikani Nation requests that Alberta Transportation provides at least three weeks' notice of when these salvage activities will occur.	Response Agreement
[65]	Access	Piikani Nation requests that Alberta Transportation discusses the availability of vegetation, fish and wildlife species for food, traditional medicinal and cultural purposes in the LSA and RSA in the Conservation and Reclamation plan.	Response Agreement
[66]	Access	Piikani Nation requests that Alberta Transportation develops with the Piikani Nation a monitoring plan to assess Project effects on hunting, trapping, fishing, plant harvesting and cultural use following Project development.	Response Agreement
[67]	Access	Piikani Nation requests that Alberta Transportion, in collaboration with Piikani Nation, develops Project-specific triggers and limits for the Project's mitigation, management and monitoring plans that reflect Community TEK and ecological and cultural values.	Response Agreement
[68]	Access	Piikani Nation requests that Alberta Transportation considers supporting Piikani Nation's cultural retention strategies, including plans to establish community-based monitoring of key cultural species and practices.	Response Agreement

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