



Springbank Off-Stream Reservoir Project

Draft Environmental Assessment Report

January 2021

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Projet de réservoir hors cours d'eau de Springbank- Rapport préliminaire d'évaluation environnementale

Executive Summary

Alberta Transportation (the Proponent) is proposing the construction of an off-stream storage reservoir, which includes a diversion channel, dam structures and outlet structures approximately 18.5 kilometers west of Calgary, Alberta. The Springbank Off-stream Reservoir Project (the Project) would be located in a floodplain drainage area of the Elbow River and its tributaries. The diversion channel is designed to convey a peak diversion flow of approximately 600 metres cubed per second during extreme flood events towards a natural floodplain that will act as a storage reservoir. The reservoir will remain dry until a flood event occurs and would store up to 77,771,000 metres cubed of diverted water at maximum capacity. Diverted water would be gradually returned to the Elbow River once flooding has subsided. The Project is designed to prevent or reduce flood damage to the City of Calgary.

The Impact Assessment Agency of Canada (the Agency) is carrying out a federal environmental assessment (EA) of the Project under the requirements of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The Project is subject to CEAA 2012 because it would involve activities described in the schedule to the *Regulations Designating Physical Activities* as follows:

- item 6: *The construction, operation, decommissioning and abandonment of a new structure for the diversion of 10 000 000 m³ per year or more of water from a natural water body into another natural water body.*

On August 28, 2019, the Impact Assessment Act (the IAA) came into force and CEAA 2012 was repealed. However, in accordance with the transitional provisions of the IAA, the environmental assessment of this Project is being continued under CEAA 2012 as if that Act had not been repealed.

The Project is subject to a provincial environmental assessment under the Alberta *Environmental Enhancement and Protection Act*. The Alberta Natural Resources Conservation Board will make a public interest decision on the Project.

This draft Environmental Assessment Report summarizes the assessment conducted by the Agency, including the information and analysis on the potential environmental effects of the Project. This report also includes the Agency's conclusions on whether the Project is likely to cause significant adverse environmental effects after taking into account the implementation of mitigation measures. The Agency prepared this report in consultation with Environment and Climate Change Canada, Fisheries and Oceans Canada, Indigenous Services Canada, Infrastructure Canada, Health Canada, Natural Resources Canada, and Transport Canada following a technical review of the Proponents' Environmental Impact Statement and an evaluation of the potential environmental effects of the Project. Furthermore, this report was informed by comments submitted throughout the environmental assessment process by Indigenous nations and the public.

The Agency analyzed environmental effects on areas of federal jurisdiction in relation to section 5 of CEAA 2012, including fish and fish habitat, aquatic species, migratory birds, federal lands; as well as with respect to Aboriginal peoples, health and socio-economic conditions, physical and cultural heritage, current use of lands and resources for traditional peoples, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. The Agency also considered effects related to changes to the environment that are directly linked or necessarily incidental to federal decisions that may be

required for the Project, including potential authorization(s) under the *Fisheries Act* (subsection 35(2)) by Fisheries and Oceans Canada; a permit under the *Species at Risk Act* (SARA) for effects on species that are listed as endangered or threatened on Schedule 1 by Environment and Climate Change Canada; and a permit under opt-in provisions of the *Navigation Protection Act* (subsection 4(1)) by Transport Canada.

This report provides an assessment of impacts of the Project on Aboriginal or Treaty rights, as recognised and affirmed by section 35 of the *Constitution Act, 1982*, held by First Nations and Métis peoples, including hunting, trapping, fishing, plant harvesting, and the use of sites and areas of cultural importance for the exercise of rights.

The main residual environmental effects from the Project in relation to section 5 of CEAA 2012 are:

- effects on fish and fish habitat from fish mortality and fish health, and the loss or alteration of fish habitat;
- effects on migratory birds due to impacts on habitat that directly impact migratory birds or their nests, risk of collisions with vehicles, and exposure to contaminants in project components with open water;
- effects on species at risk;
- effects on the current use of lands and resources for traditional purposes by Indigenous people, including from loss or alteration of access for Indigenous use;
- effects on the health of Indigenous peoples due to exposure to air and water contaminants, noise, and country foods and reduced ability to harvest subsistence and economic resources; and,
- effects to sites or things of historical, archaeological, or paleontological significance to Indigenous people.

In reviewing the environmental effects of the Project, the Agency also considered past, existing and reasonably foreseeable projects and activities and their potential to contribute to cumulative environmental effects on fish and fish habitat, migratory birds, and current use of lands and resources for traditional purposes.

The Proponents' project planning and design incorporates measures to mitigate the adverse effects of the Project. These include adherence to existing guidelines and regulations and planning to identify, control and monitor environmental risks.

The Agency has identified key mitigation and follow-up program measures that would prevent or reduce potential adverse effects, verify the accuracy of the environmental assessment predictions and verify the effectiveness of mitigation measures. The Agency, in selecting key mitigation and follow-up program measures, was informed by the Proponent's commitments, expert advice from federal authorities and provincial ministries, and comments from Indigenous communities and the public.

Key mitigation measures include minimizing effects of changes in air quality and noise; monitoring groundwater quantity and quality changes; managing sediment concentrations and the settling of sediment in the Elbow River and in the reservoir, implementing erosion control measures, monitoring and adaptive management measures for changes to water quality during all phases of the Project; implementing a fish rescue plan and monitoring of effects to fish and fish habitat; carrying out project activities in a manner that

protects and avoids harming, killing or disturbing migratory birds, nests, eggs or habitat that directly impact migratory birds; developing a rescue protocol for migratory birds and species at risk to implement prior to a flood event; prioritizing the use of the land by Indigenous nations; continual engagement with Indigenous nations; development of an Indigenous Land Use Advisory Committee to advise on various aspects of use within the land use area; and establishing a portion of land near or within the Land Use Area as a staging area for use by Indigenous nations.

The Agency concludes that, taking into account the implementation of the key mitigation and follow-up program measures, the Project is not likely to cause significant adverse environmental effects as defined under CEAA 2012. These key measures will be considered by the Minister of Environment and Climate Change (the Minister) in establishing conditions as part of the Decision Statement under CEAA 2012. Conditions accepted by the Minister would become legally binding on the Proponent if the Minister ultimately issues a Decision Statement indicating that the Project may proceed. In addition, it is the Agency's expectation that all of the Proponent's commitments would be implemented in order for the Project to be carried out in a careful and precautionary manner.

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List of Abbreviations and Acronyms

| Abbreviation/Acronym | Definition |
|----------------------|--|
| Agency | Canadian Environmental Assessment Agency |
| CEAA 2012 | <i>Canadian Environmental Assessment Act, 2012</i> |
| COSEWIC | Committee on the Status of Endangered Wildlife In Canada |
| draft EA Report | draft Environmental Assessment Report |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| ha | Hectare |
| Km | Kilometre |
| LAA | Local Assessment Area |
| m | Metre |
| PDA | Project Development Area |
| Project | Springbank Off-Stream Reservoir Project |
| RAA | Regional Assessment Area |
| SARA | <i>Species at Risk Act</i> |

Glossary

| Term | Definition |
|-------------------------------|--|
| Deleterious substance | A substance is deleterious if it is harmful to fish, if it limits the use of fish by humans (for example contamination of fish by dioxins or shellfish by E. coli), or if by going through some process of degradation, it harms the water quality (for example, oxygen-depleting wastes). A substance is also deleterious if it exceeds a level prescribed by regulation. |
| Environmental sensitive sites | Represents one or more of the following: critical wintering habitat; critical breeding habitat; species fidelity to dens and nests; and/or may be culturally significant sites. |
| Habitation | A structure built in many different shapes and sizes of a number of different materials, including concrete, wood, brick, metal, and stone. Most types have a foundation, a roof, walls, doors and windows providing access to people and allowing light and air to enter. |
| Heritage resources | A land or resource (e.g., an artifact, object, or place) that is considered as heritage or any structure, site, or thing is distinguished from other lands and resource by the value placed on it. |
| Heritage sites | Sites with potential cultural or heritage value. |
| Sensitive sites | Sites that contain high quality habitat areas (i.e., known calving sites). |
| Species of Management Concern | The proponent describes their species of management concern to be any species that is listed federally as endangered, threatened, or special concern on any Schedule of the <i>Species at Risk Act</i> ; designated federally as endangered, threatened, or special concern by the Committee on the Status of Endangered Wildlife in Canada; listed provincially as endangered, threatened, or special concern, including species legally protected under the Alberta Wildlife Act; and/or designated provincially as At Risk, May be at Risk, or Sensitive according to the Alberta Environment and Parks General Status of Alberta's Wild Species. |
| Total suspended solids | A quantitative water quality measurement of the suspended solids, or sediment, in the water column and is the direct measurement of the total solids present in a waterbody. |
| Turbidity | Measure of the lack of clarity or transparency of water caused by biotic and abiotic suspended or dissolved substances. The higher the concentration of these substances in water, the more turbid the water becomes. |
| Wetland | Land saturated with water long enough to promote formation of water altered soils, growth of water-tolerant vegetation, and various kinds of biological activity that is adapted to the wet environment and separated into five classes: fen, bog, marsh, swamp, and shallow open water wetlands (includes open water areas less than two metres deep with wetland characteristics). |

1 Introduction

Alberta Transportation (the Proponent) proposes to construct infrastructure to mitigate flooding on lands in and adjacent to the Elbow River, approximately 15 kilometres west of Calgary, Alberta. As proposed, the Springbank Off-Stream Reservoir Project (the Project) will be located in a floodplain drainage area of the Elbow River and its tributaries to divert floodwater during extreme flood events from the Elbow River to a temporary reservoir constructed in an adjacent wetland. The floodwater will be stored in the temporary reservoir before being diverted back in to the Elbow River. The purpose of the Project is to prevent and reduce flood damage on infrastructure, water courses, and people in the City of Calgary and downstream communities.

The Project includes the construction of an off-stream storage reservoir, including a diversion structure and channel, an off-stream storage dam, outlet works, debris deflector, road modifications and bridges. Upon operation, the proposed off-stream reservoir will have a footprint of approximately 1,438 hectares and have a 100 year operating life. The reservoir will remain dry until a flood event occurs and would store up to 77,771,000 cubic metres of diverted water at maximum capacity, which constitutes 25 percent more capacity than the 2013 design flood. Diverted water will be gradually returned to the Elbow River once flooding has subsided. The Project is scheduled to be functionally operational within 36 months of commencement of construction. There are no plans to expand or decommission the Project in the foreseeable future.

1.1 Draft Environmental Assessment Report

The Draft Environmental Assessment (EA) Report summarizes the analysis conducted by the Impact Assessment Agency of Canada (the Agency), in accordance with the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), and presents the Agency's conclusions on whether the Project is likely to cause significant adverse environmental effects after taking into account the proposed key mitigation measures. Following a public comment period on the Draft EA Report, the Agency will finalize the EA Report and provide it to the Minister of Environment and Climate Change (the Minister). The Minister will consider the EA Report, as well as the comments received from the public, Indigenous nations, members of the Technical Advisory Group (TAG)¹ and federal authorities in making a decision on whether the Project is likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures. The Agency will also recommend that the Minister establish, through his Decision Statement, conditions that the Proponent must meet with respect to mitigation and follow-up program requirements in the event that the Project is permitted to proceed.

Key dates for the EA leading to the release of this Draft EA Report:

- April 2016: the Proponent submitted the project description
- June 2016: the Agency determined that a federal EA was required and the EA commenced

¹ Membership of the Technical Advisory Group includes federal, provincial, and local governments, and Indigenous nations with the mandate, skill set, and expertise relevant to conduct the review of the Project.

- July 2016: the Agency issued the draft Guidelines for the Preparation of an Environmental Impact Statement (EIS Guidelines) for public comment
- August 2016: Final EIS Guidelines issued
- September 2017: TAG established with members from Indigenous nations, federal authorities, the City of Calgary and Rocky View County
- October 2017: received the Environmental Impact Statement (EIS) and the EIS Summary
- October - November 2017: the Agency determined that the information provided in the EIS did not fully conform to the requirements outlined in the EIS Guidelines
- March 2018: the Proponent submitted a revised EIS and EIS Summary
- April - June 2018: the Agency held a public comment period on the EIS Summary
- June 2018 – November 2020: the Agency conducted a technical review of the information and issued two rounds of information requests to the Proponent
- January 4, 2020: the Agency commenced the comment period on the Draft EA report

1.2 Scope of Environmental Assessment

1.2.1 Environmental assessment requirements

On August 28, 2019, the *Impact Assessment Act* (the IAA) came into force and the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) was repealed. However, in accordance with the transitional provisions of the IAA, the environmental assessment of this Project is being continued under CEAA 2012 as if that Act had not been repealed.

The Project is subject to CEAA 2012 as it would involve activities described in paragraph 6 of the Physical Activities Schedule to the *Regulations Designating Physical Activities*:

The construction, operation, decommissioning and abandonment of a new structure for the diversion of 10,000,000 cubic metres per year or more of water from a natural water body into another natural water body.

The Project is also subject to Alberta's *Environmental Protection and Enhancement Act* (EPEA). The Agency and Alberta Environment and Parks coordinated the federal and provincial EA processes through acceptance of a single EIS by the Proponent to satisfy both the provincial and federal requirements and information sharing during the technical review of the EIS.

1.2.2 Factors considered in the environmental assessment

The Guidelines for the Preparation of an Environmental Impact Statement (EIS Guidelines) issued by the Agency specifies the nature, scope and extent of the information required to support the EA, and outlines the environmental effects and the factors that must be considered, including valued components. Valued components are environmental and socio-economic features that may be affected by a project and that have been identified to be of concern by the Proponent, government agencies, Indigenous nations or the public.

The Final EIS Guidelines for the Project can be found on the Canadian Impact Assessment Registry internet site at the following link: <https://iaac-aeic.gc.ca/050/evaluations/document/132441>

1.2.3 Methods and Approach

The Proponent assessed the Project's effects using a structured approach that is consistent with accepted practices for conducting EAs and with the Agency's *Operational Policy Statement: Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects* under CEAA 2012. The application of mitigation measures were considered by the Proponent in the analysis, and the predicted residual environmental effects were characterized based on the following assessment criteria:

- magnitude: the degree of change from baseline conditions or other standards, guideline, or objectives, which may be expressed quantitatively or qualitatively;
- geographic extent: the geographic or spatial area within, which the residual effects is expected to occur;
- frequency: how often the residual effect would occur during a Project phase or activity in a specified time period;
- duration: the period of time over which the residual effect would occur;
- timing: consideration of the periods of time of an effect (e.g. species breeding season, Indigenous spiritual and cultural practices);
- reversibility: whether the residual effect on the valued components can be returned to its previous condition once the activity or component causing the disturbance ceases; and
- ecological/socio-economic context: the current degree of anthropogenic disturbance and/or ecological sensitivity in the area, which the residual effect would occur.

The Agency is reviewing various sources of information in conducting its analysis, including:

- the EIS and EIS Summary;
- information received in response to the information requirements issued by the Agency following its review of the EIS;
- advice from expert federal departments and agencies, provincial departments and agencies, and the TAG;
- advice from potentially affected Indigenous nations, including multiple First Nations and the Métis Nation of Alberta – Region 3; and
- comments received from the public.

The Agency established a TAG to provide the Agency with advice regarding the environmental assessment of the Project, with members from Indigenous nations, federal authorities, the City of Calgary and Rocky View County. The TAG members contributed expertise, local and Indigenous knowledge, and worked directly with federal departments to review the information, identify issues, review potential mitigation measures, and influence the design of monitoring and follow-up requirements.

Federal departments and agencies with specialist information and expert knowledge relevant to the Project supported the Agency throughout the EA process. The Agency requested information from Fisheries and Oceans Canada, Transport Canada, Environment and Climate Change Canada, Health Canada, Natural Resources Canada, Infrastructure Canada and Indigenous Services Canada. Their advice and expertise has been incorporated into the chapters that follow.

The valued components selected by the Agency to support the assessment of environmental effects under CEAA 2012 and the potential effects on the *Species at Risk Act* (SARA) listed species are outlined in Table 1, Chapter 2.1.

The Agency determines the significance of residual effects of project construction, dry operations, and flood and post-flood phases on areas of federal jurisdiction (Chapter 7) by taking into account mitigation and follow-up measures. The Agency also considers the effects of accidents and malfunctions that may occur in connection with the Project (Chapter 8.1), effects of the environment on the Project (Chapter 8.2), and cumulative environmental effects (Chapter 8.3).

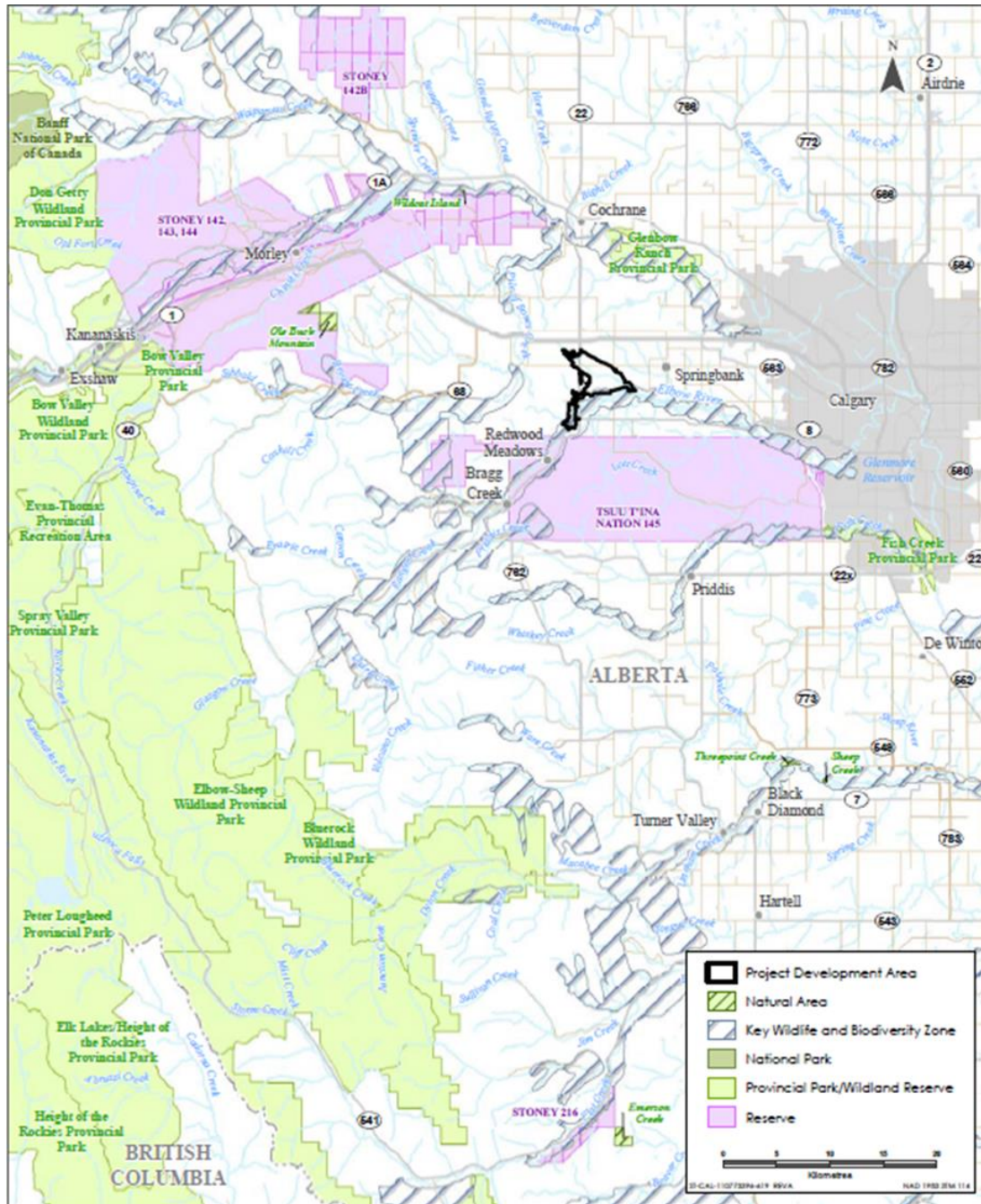
The Agency's analysis, including how the Agency incorporated information received from Indigenous nations, the public, and expert departments and agencies, is provided throughout this report.

2 Project Overview

2.1 Project Location and Temporal and Spatial Boundaries

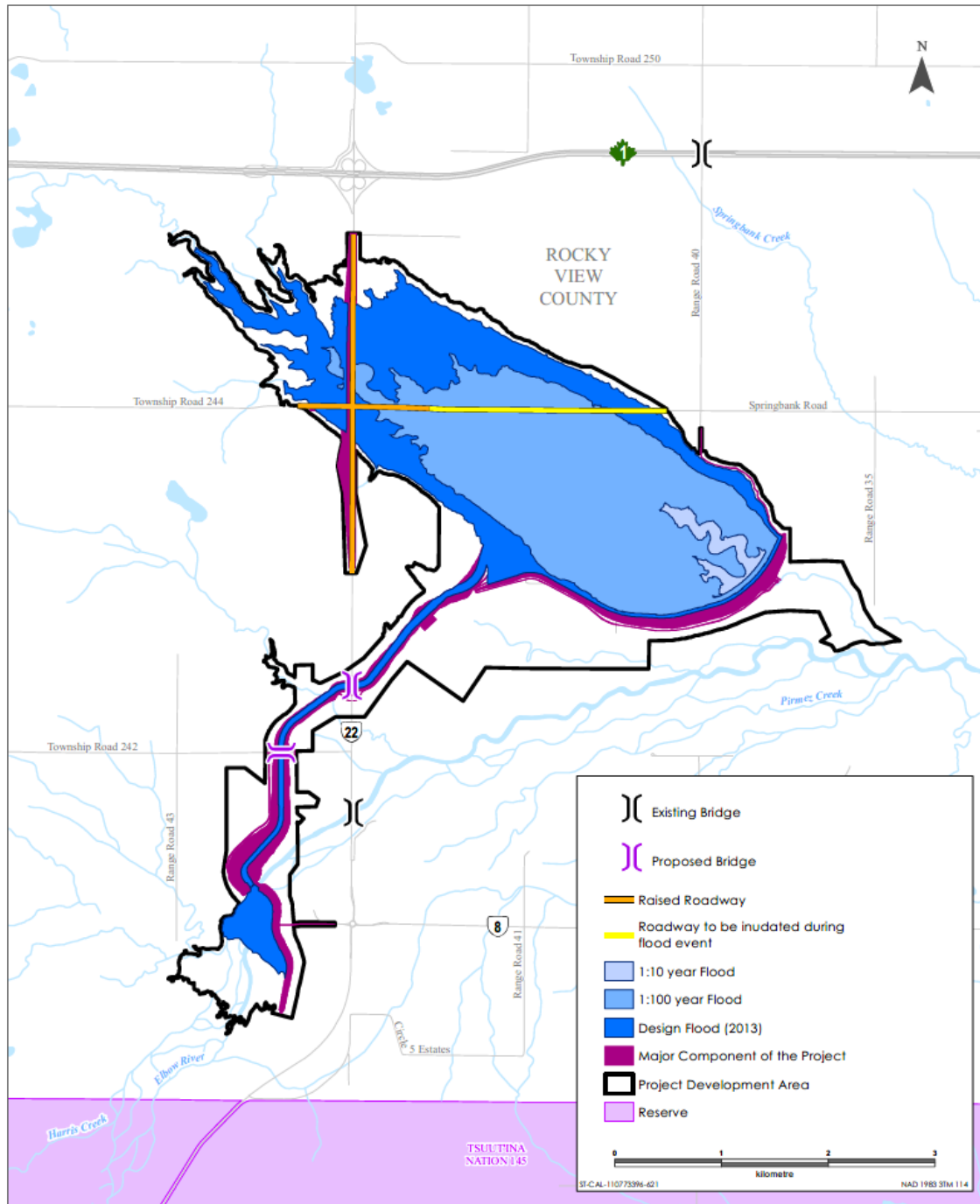
The project location or Project Development Area (PDA) is depicted in Figure 1. The PDA is the anticipated area of temporary physical disturbance associated with the construction and dry operation of the Project and is approximately 1,438 hectares.

Figure 1 Location of the Springbank Off-Stream Reservoir Project



The Proponent identified three proposed flood scenarios to assess potential effects on the environment of a range of flows. These floods are a small flood (1:10 year), a large flood (1:100 year), and the equivalent of the 2013 design flood, for which the Project is designed. The three proposed flood scenarios are depicted in Figure 2.

Figure 2 Project Flood Scenarios



Sources: Base Data - ESR, Natural Earth, Government of Alberta, Government of Canada
Thematic Data - ERBC, Government of Alberta, Stantec Ltd

Spatial and temporal boundaries of an EA are established to define the area and timeframe within which a project may interact with the environment and cause environmental effects. The spatial and temporal

boundaries vary among valued components depending on the nature of the potential Project interaction with the environment.

Spatial Boundaries

The Proponent defined spatial boundaries as the geographic range over which the Project's potential environmental effects may occur. The Project would be located in and adjacent to the Elbow River, approximately 15 kilometres from the City of Calgary. Local assessment areas (LAA) for each valued component were used to measure baseline environmental conditions and to assess effects on each valued component. Regional assessment areas (RAA) for each valued component were used to measure baseline conditions at a larger scale to assess the maximum predicted geographic extent of effects on each valued component. Table 1 summarizes the LAA and RAA identified by the Proponent for each valued component. Figures 3 and 4 provide a visual representation of the Proponent's LAA and RAA for each of their valued components.

Temporal Boundaries

The Proponent defined temporal boundaries based on the timing and duration of project activities that could cause environmental effects. The purpose of the temporal boundaries is to identify when an effect may occur in relation to specific project phases and activities. For all valued components, the Proponent used the following temporal boundary of construction over a 36 month period, with a 100 year operations life of the project alternating between dry operations, flood and post-flood phases. Temporal boundaries for the Project generally include the various phases of a Project:

- site preparation and construction;
- dry operation;
- flood operation;
- post-flood operation; and
- decommissioning and reclamation.

The Project is expected to have a 100 year operation life and the permanent structures are not expected to be decommissioned.

Table 1 Valued Components Analyzed by the Agency and their Local and Regional Assessment Areas

| Valued Component Included in the Agency's Analysis | Agency Rationale | Corresponding Valued Component Selected in the EIS | Local Assessment Area (LAA) | Regional Assessment Area (RAA) |
|--|--|---|---|---|
| Effects identified pursuant to subsection 5(1) of CEAA 2012 | | | | |
| Fish and fish habitat | <p>Project-related activities may affect fish and fish habitat due to direct mortality, erosion and sedimentation, changes to water quality and quantity, and habitat destruction and loss.</p> <p>Due to the ecological importance, the legislated protection of fish and fish habitat and species at risk, and the cultural and socioeconomic importance of fish and fishing are included. There is also a high likelihood of project-valued component interactions.</p> | Assessed within the Proponent's analyses of effects on aquatic ecology. | The LAA included the PDA and portions of the Elbow River and associated tributaries potentially affected by the Project. The major surface water features included: Elbow River from Elbow Falls to the Inlet of Glenmore Reservoir (approximately 67 kilometres); an unnamed tributary that Highway 22 currently crosses to the immediate north of the Elbow River; and an unnamed tributary that drained southeastward from Highway 22. The LAA also included habitats from the Elbow Falls to the inlet of the reservoir. The LAA had a total area of 10,364 hectares. | The RAA had the spatial boundary for the cumulative effects assessment for the aquatic ecology portion and included: the LAA; the Elbow River Watershed including Glenmore Reservoir; Springbank Creek east of the LAA; and a number of small tributaries or ephemeral watercourses. The Elbow River watershed in the RAA had approximately 385 kilometres of channel upstream of the Glenmore Reservoir, and approximately 6,560,646 square metres of fish habitat (based on bankfull width). The RAA had a total area of 125,438 hectares including the Glenmore Reservoir. |
| Migratory birds | <p>Project construction, dry operation and flood and post-flood phases may affect migratory bird behavior due to sensory disturbances and habitat loss.</p> <p>Due to the ecological importance, the legislated protection of migratory</p> | Assessed within the Proponent's analyses of effects on wildlife and biodiversity. | The LAA included the PDA and a one kilometre buffer. The LAA had a total area of 4,860 ha. | The RAA consisted of a 15 kilometre buffer around the PDA and was selected to encompass an average home range of a female grizzly bear of 500 square kilometres. The RAA had a total area of 102,817 hectares. |

| Valued Component Included in the Agency's Analysis | Agency Rationale | Corresponding Valued Component Selected in the EIS | Local Assessment Area (LAA) | Regional Assessment Area (RAA) |
|--|--|---|---|---|
| | birds and species at risk are included. There is also a high likelihood of project-valued component interactions. | | | |
| Federal lands | Project-related changes to the environment may affect Tsuut'ina Nation Reserve 145 and the Stoney Nakoda Nations Reserves 142, 143, and 144 due to potential changes in groundwater, the Elbow River, air quality, ambient light and the acoustic environment. | Assessed within the Proponent's analyses of effects on land use and management; traditional land and resources use. | The federal lands valued component used the LAAs of all other valued components where effects overlap with federal lands. The Tsuut'ina Nation Reserve 145 and the Stoney Nakoda Nations Reserves 142, 143 and 144 were mapped and assessed as a continuous area for all valued components. | The federal lands valued component used the RAAs of all other valued components where effects overlap with federal lands. The Tsuut'ina Nation Reserve 145 and the Stoney Nakoda Nations Reserves 142, 143 and 144 were mapped and assessed as a continuous area for all valued components. |
| Groundwater and hydrogeology | Project-related changes to the environment due to potential changes in groundwater and hydrogeology. | Assessed within the Proponent's analyses of effects on hydrogeology and groundwater modelling. | The LAA included the PDA and had a nominal one kilometer radius buffer of the PDA. The LAA was reduced where the buffer extends outside of the floodplain and terrace of the Elbow River to the south. | The RAA was based on the regional hydrogeological conditions for the numerical groundwater model. It extended from the Elbow River floodplain and terrace to the south, to a surface and shallow groundwater flow divide in the north and to Jumpingpound Creek in the west. The RAA had a total area of 14,000 hectares. |
| Surface water and hydrology | Project-related changes to the environment due to potential changes in surface water and hydrology. | Assessed within the Proponent's analyses of effects on surface water and hydrology. | The LAA included the PDA and the Elbow River headwaters from Redwood Meadows to the inlet of the Glenmore Reservoir and | The RAA included the LAA, which was within the Elbow River watershed from headwaters west and southwest of the Don Getty |

| Valued Component Included in the Agency's Analysis | Agency Rationale | Corresponding Valued Component Selected in the EIS | Local Assessment Area (LAA) | Regional Assessment Area (RAA) |
|--|--|--|---|--|
| | | | included the proposed dam, reservoir, diversion channel and low-level outlet (i.e. unnamed creek that runs through the off-stream reservoir). | Wildland Provincial Parks to the Glenmore Dam. The Glenmore Dam is located within the City of Calgary. |
| Atmospheric environment | Project-related changes to the environment due to potential changes in air quality. | Assessed within the Proponent's analyses of effects on air quality and climate. | The LAA was 20 by 20 square kilometres centered on the PDA and extended six kilometres beyond the PDA boundary. | Same as the LAA. |
| Changes to the environment on Indigenous peoples—current use of lands and resources for traditional purposes | Project-related changes to the environment may affect the availability and quality of fish, plant, and wildlife species used by Indigenous peoples for hunting, trapping, fishing and gathering. Project-related activities will disturb or reduce access to lands and resources used by Indigenous peoples for traditional purposes. | Assessed within the Proponent's analyses of effects on land use and management and traditional land and resource use. | The LAA included the PDA and a one kilometre radius buffer centred on the PDA. The LAA for the traditional land resource use followed the riparian, wetland and terrestrial landscapes (wildlife and biodiversity) LAA. The aquatic LAA for the traditional land resource use followed the fish and fish habitat (aquatic ecology), which was the Elbow River watershed and included the diversion channel to the Glenmore Reservoir. The LAA had a total area of 4,860 hectares. | The RAA followed the wildlife and biodiversity RAA, which was the PDA plus a 15 kilometre buffer centred on the PDA. The aquatic RAA for traditional land resource use followed the aquatic ecology RAA, which was the Elbow River watershed and includes Glenmore Reservoir. The RAA had a total area of 22,540 hectares. |
| Changes to the environment on Indigenous peoples—physical and cultural heritage; and any structure, site or thing that is of historical, archaeological, | Project-related changes to the environment may directly affect, disturb or prevent access to sites, structures or things of cultural importance to Indigenous peoples. | Assessed within the analyses of effects on land use and management; traditional land and resource use; and historical resources. | The LAA encompassed the LAA for traditional land and resource use. Specifically for the Proponent's assessment of archaeology, the LAA was the same as the PDA. For the Proponent's assessment of paleontology, the LAA included | The RAA encompassed the RAA for traditional land and resource use. No RAA was defined for archaeology. For the Proponent's assessment of paleontology, the RAA was determined by physical and cultural heritage and sites of importance as identified by each |

| Valued Component Included in the Agency's Analysis | Agency Rationale | Corresponding Valued Component Selected in the EIS | Local Assessment Area (LAA) | Regional Assessment Area (RAA) |
|---|--|--|--|--|
| paleontological or architectural sites of significance of the Indigenous peoples | | | the PDA and a one kilometre radius buffer. The LAA had a total area of 4,860 hectares. | of the Indigenous nations listed in the EIS Guidelines. |
| Changes to the environment on Indigenous peoples—health and socio-economic conditions of the Indigenous peoples | Project-related changes to the environment may affect Indigenous peoples' health and socioeconomic conditions. | Assessed within the analyses of effects on public health; infrastructure and services; and economy and employment. | <p>Human health—the LAA and RAA used the same area, which is 20 by 20 square kilometres centered on the PDA, in addition to the waters of the Elbow River from the diversion channel to the Glenmore Reservoir.</p> <p>Economic conditions—the LAA encompassed the communities most likely to experience economic effects from the Project: the City of Calgary, Tsuut'ina Nation Reserve 145, the Stoney Nakoda Nations Reserves 142, 143 and 144, and surrounding communities including Bragg Creek, Redwood Meadows, Springbank and Cochrane.</p> <p>Infrastructure and services—the LAA included communities that might experience increased demand: the City of Calgary, boundary of Rocky View County, and Tsuut'ina Nation Reserve 145.</p> | <p>Human health—same as the LAA.</p> <p>Economic conditions—same as the LAA.</p> <p>Infrastructure and services—same as the LAA.</p> |
| Effects identified pursuant to subsection | | | | |

| Valued Component Included in the Agency's Analysis | Agency Rationale | Corresponding Valued Component Selected in the EIS | Local Assessment Area (LAA) | Regional Assessment Area (RAA) |
|---|---|--|----------------------------------|----------------------------------|
| 79(2) of the <i>Species at Risk Act</i> | | | | |
| Federal species at risk and species of conservation concern | The <i>Species at Risk Act</i> (SARA) requires consideration of listed species when conducting an EA under CEAA 2012. The Agency is examining effects on species assessed by the <i>Committee on the Status of Endangered Wildlife in Canada</i> (COSEWIC) as endangered, threatened, or of special concern. Project-related activities such as potential disturbance of terrestrial habitat and wetlands can affect SARA listed species and their habitat. | Applicable species at risk were assessed within the Proponent's analyses of effects on fish and fish habitat, wildlife and biodiversity, vegetation and wetlands, and aquatic ecology. | Same as the migratory birds LAA. | Same as the migratory birds RAA. |

Figure 3 Local and Regional Assessment Areas for Various Valued Components

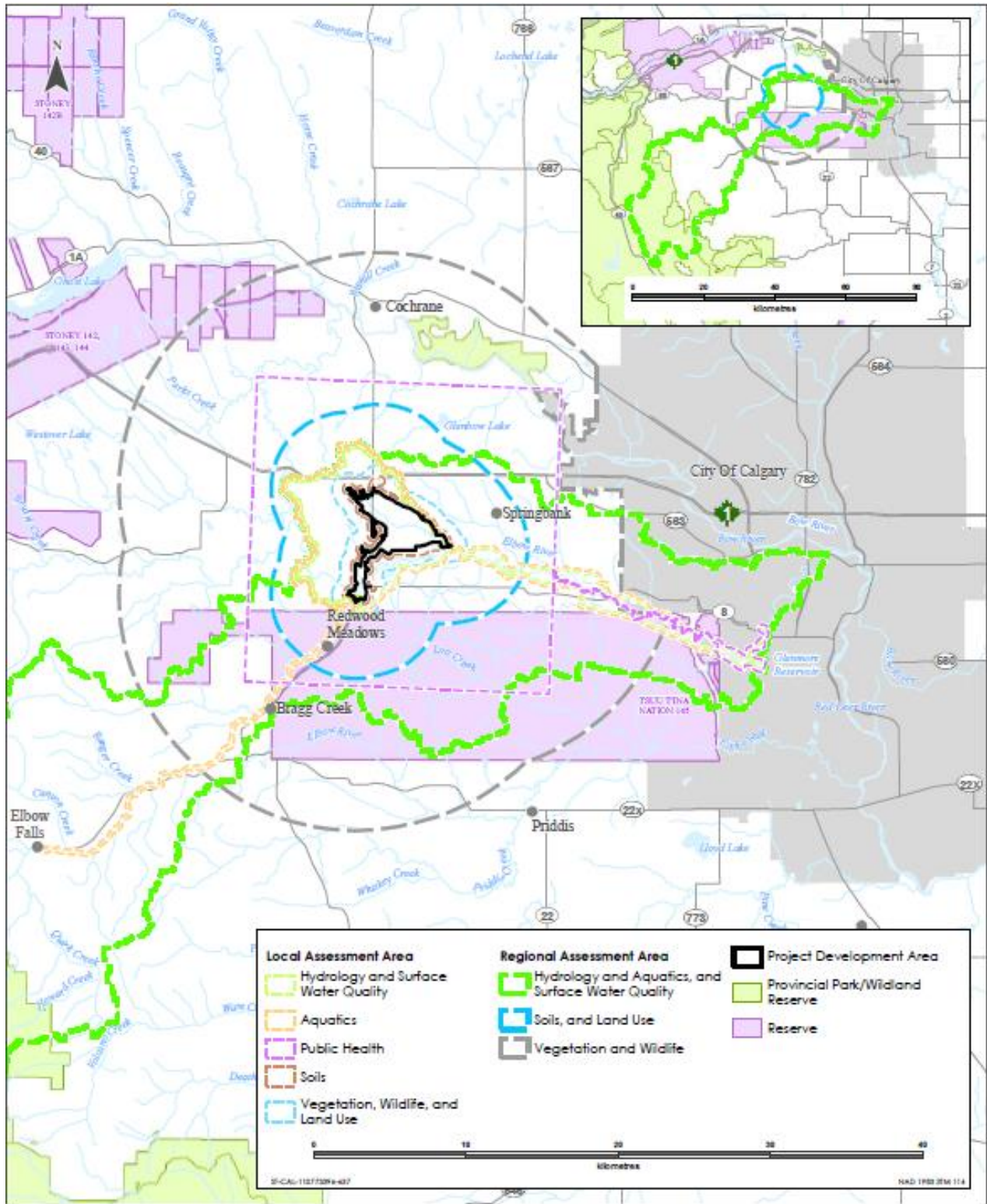
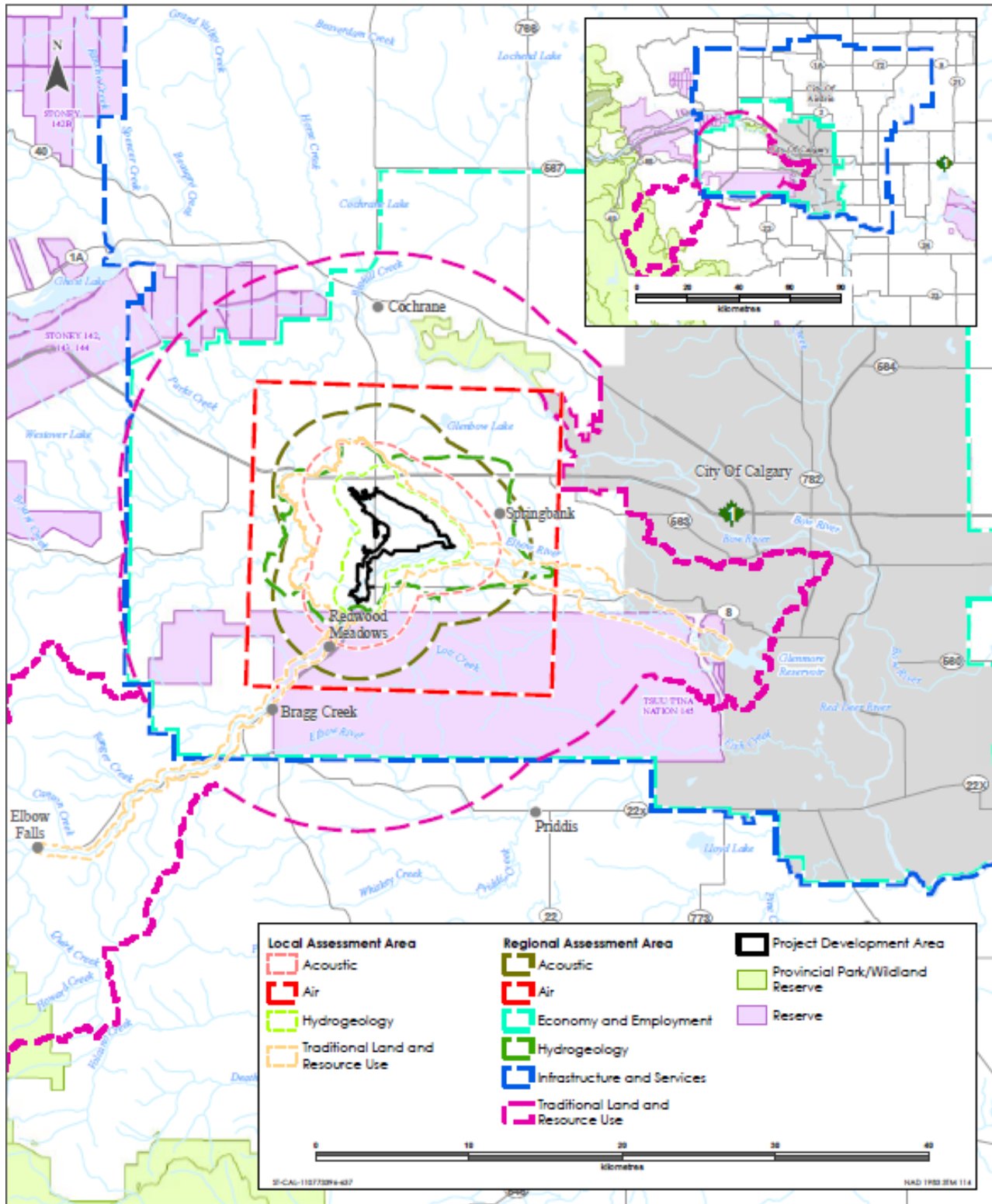


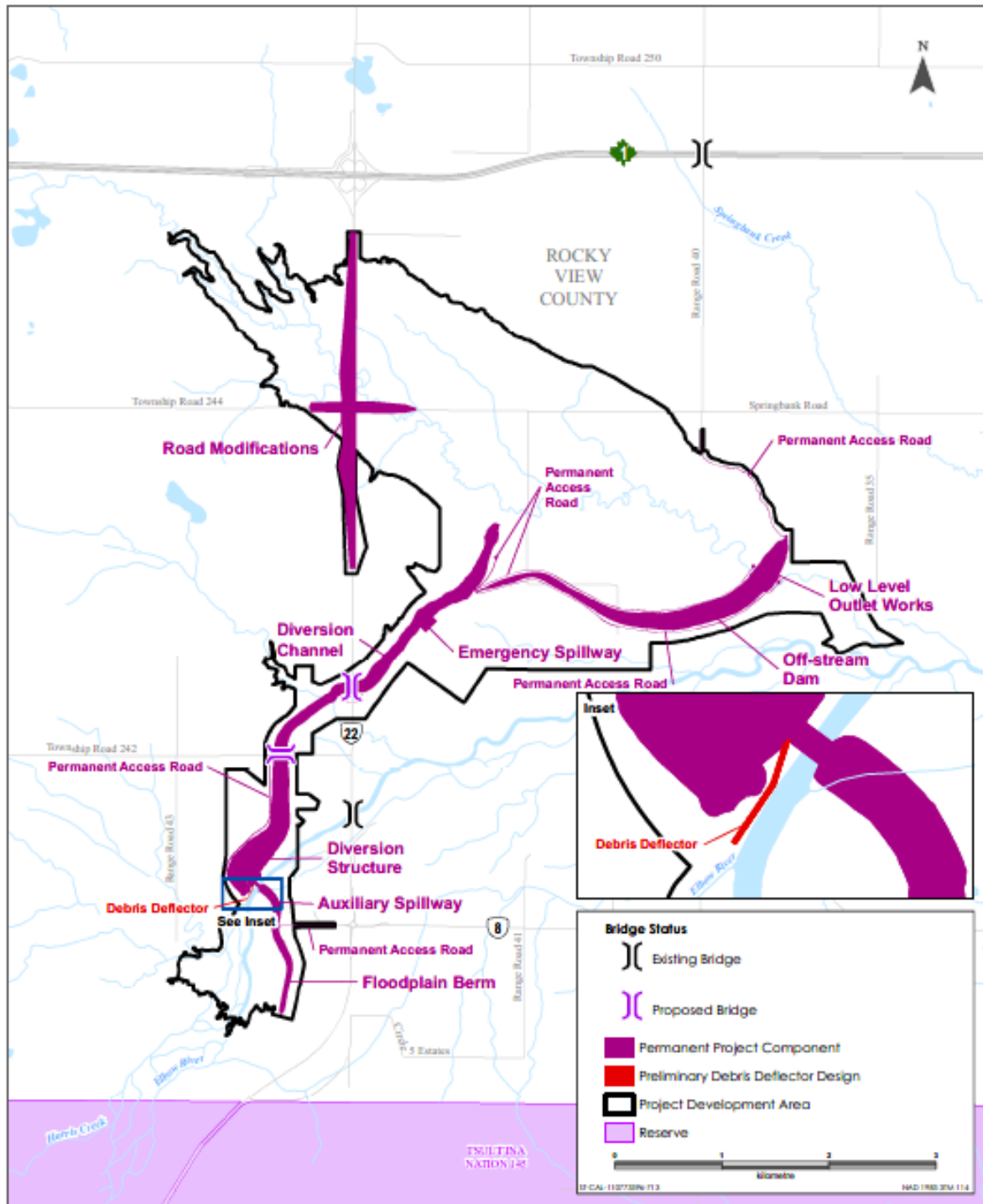
Figure 4 Local and Regional Assessment Areas for Various Valued Components



2.2 Project Components

The Project components are depicted in Figure 5 and described below. A video of the Springbank Off-Stream Reservoir Project Conceptual Animation (Alberta Transportation, August 2017) can be accessed here: <https://www.youtube.com/watch?v=INP5dKtiJOY>

Figure 5 Project Components



Sources: Base Data - ERI, Natural Earth, Government of Alberta, Government of Canada
 Demographic Data - ENRC, Government of Alberta, Statistics Ltd

Diversion System

The diversion system would consist of five main elements: the diversion inlet, service spillway, floodplain berm, auxiliary spillway and debris deflector.

The diversion inlet would be a gated concrete structure that controls the diversion of river water into the diversion channel during flood events. The service spillway would be a gated concrete structure located in the Elbow River channel adjacent to the diversion inlet designed to control Elbow River water elevations upstream of the diversion inlet during a flood event. The diversion inlet and service spillway would be contained within a contiguous concrete structure that would sit within the Elbow River channel. The auxiliary spillway spans the 214 metres between the floodplain berm and the service spillway.

The floodplain berm would be an earth embankment approximately 1,000 metres long located on the south floodplain of the Elbow River. Together with the auxiliary spillway, it would act to constrain flow in the Elbow River and direct it to the diversion structure. The auxiliary spillway, a dam safety component, would be a solid concrete spillway (concrete cut-out) structure that would be covered with an earthen embankment to convey excess flood flow without overtopping failure, or circumventing the floodplain berm.

The debris deflector would be installed along the west side of Elbow River, at the opening of the diversion channel. During flood operations, water levels would rise to a height where the debris deflector is within the current extent of Elbow River. The structure would exclude large debris from the diversion inlet and promote its conveyance through the service spillway and down into Elbow River.

Diversion Channel

The diversion channel would be a 4,700 metre long channel with a bottom width of 22 metres and channel depth of 8.3 metres, located on the south end of the reservoir and off-stream dam and east of the Elbow River. It would carry floodwater from the diversion inlet to the off-stream reservoir and be able to accommodate a design maximum flow of 600 cubic metres per second, allowing for a maximum height of 6.4 metres for floodwater and a minimum of 1.9 metres of freeboard (room between the water and the tops of the channel wall). The channel would gradually flare out downstream for 700 metres to a width of 150 metres include a grade control structure where it would enter the reservoir. The base of the channel would vary between bedrock, grass and riprap. The channel side wall would consist of bedrock, riprap, or 15 centimetres of topsoil and grass to protect it from erosion.

Emergency Spillway

The emergency spillway would be a 200 metre long concrete structure on the diversion channel that would permit unregulated overflow first to a graded outlet channel and then overland to the Elbow River. The purpose of the emergency spillway is to prevent the stored water from overtopping the reservoir and instead release it in a controlled manner over the bedrock and return it to the Elbow River. It would be located on the east side of the diversion channel approximately 1,300 metres upstream of the off-stream reservoir.

Off-Stream Reservoir and Dam

The dam would include two zoned earthen embankments to be constructed adjacent to the Elbow River across two valleys and a tributary that would temporarily impound diverted floodwater in the Unnamed Creek valley. The primary embankment would be approximately 3,300 metres long with a maximum embankment height of 30 metres. Material excavated from the diversion channel, supplemented if necessary by borrow material, would be used to construct the off-stream dam, which will be located on the southeast side of the reservoir. The reservoir would fill to the north and west of the embankment. The second embankment would be approximately 400 metres long with a maximum embankment height of 23 metres. The upstream face of this portion of the dam would form the right descending bank of the diversion channel. In accordance with the Canadian Dam Association Guidelines and Alberta Dam and Canal Safety Guidelines, the dam and its associated facilities are proposed to be designed as an “Extreme” hazard facility.

The off-stream reservoir would use existing topography to provide a dry basin for floodwater retention. The reservoir would be located north of the Elbow River and northeast of the diversion system. At the maximum designed flood event (2013 design flood), the flooded reservoir would cover an area of 730 hectares and the duration of diversion would be 3.75 days, with a residence time in the reservoir of 20 days and a release time of 38 days to drain the reservoir.

Low-Level Outlet

Floodwater would be released from the reservoir to the Elbow River on the north end of the Project by means of a gated concrete structure near the east end of the dam embankment that controls discharge to an existing unnamed creek. The low-level outlet structure would consist of an approach channel, discharge gate, gatehouse, discharge conduit, and outlet channel. The gate would be operated locally by the gatehouse located on the southeast side of the reservoir adjacent to the Elbow River.

Access and Utilities

Road upgrades and new bridges would be required to maintain access to the area during flood events. The Project would require multiple permanent access roads for on-going infrastructure operation and maintenance. All permanent access roads for the Project would be gated and access would be limited to operations and maintenance vehicles.

The Project would involve works such as relocation and/or raising the vertical profile of portions of Highway 22, Springbank Road/Township Road 244 and Township Road 242. Range Road 40 would be upgraded to act as a detour for Springbank Road during a flood. In addition to the roadway improvements, a bridge is required over the diversion channel.

Oil and gas pipelines operated by four companies (TransCanada Pipelines Ltd., Pengrowth Energy Corp., Veresen Inc. and Plains Midstream Canada) are located in the proposed diversion channel, dam and reservoir areas. Portions of the pipelines would be retrofitted or relocated/realigned depending on their location in relation to the project components. The Project may require adjustments, retrofitting or relocation of other utilities in the area including natural gas, electricity, and telephone and internet infrastructure.

The Project is proposed to include features that would be required during site preparation and infrastructure construction, but not during Project operations and would be reclaimed when no longer needed. These temporary features would include: access roads, laydown areas, borrow sources, soil stockpiles, replaced portion of Highway 22, bridge across diversion channel, Elbow River diversion channel and floodplain berm.

2.3 Project Activities and Timing

Key activities associated of the Project as phased under construction and operation and are described below. The Proponent stated that none of the permanent components of the project would be decommissioned.

The current projected timeline is for the Project to be functionally operational after the second year of construction (1:100 year flood) and to be fully operational to handle the 2013 design flood after the third year of construction. The Project will commence with site preparation and construction activities, which will last for approximately 36 months following commencement of construction and will operate for 100 years. Timing of activities will be determined by information gathered during pre-construction surveys for species at risk at the species specific appropriate time of year prior to start of construction. The project-specific Environmental Construction Operations Plan and Wildlife Mitigation and Monitoring Plan will include wildlife features and mitigation measures and will be developed prior to start of construction.

Site Preparation and Construction (36 months)

The site preparation phase and construction phase would involve the construction and installation of all of the components such as: diversion inlet, service spillway, and debris deflector; floodplain berm; diversion channel; off-stream reservoir; and off-stream dam, and low-level outlet; and modification and construction of the roads and bridge.

Additionally, it would involve the construction of temporary areas that will be reclaimed post construction, including: the river cofferdam; the south (non-river) side of the floodplain berm; the upper side walls of the diversion channel; the dam embankment; contractor laydown areas; borrow areas; spoil areas; side slopes and back slopes of new roads; areas disturbed by utility construction; temporary construction access roads that have been decommissioned; the decommissioned portion of Highway 22; the temporary channel used for the diversion of the Elbow River; and all other areas disturbed by construction that are not required for operation and maintenance.

Operations (Indefinite)

The operations would involve three distinct phases – dry operations, flood operations and post-flood operations.

Dry operations would be the normal state for the Project when no flood event is occurring. The diversion inlet gates would remain closed and the service spillway gates would remain open allowing normal flow conditions in the Elbow River. Project components would undergo routine inspection and

maintenance during this phase. During dry operations the debris deflector will remain outside the wetted edge of Elbow River so as to not pose a navigation or public safety hazard.

Flood operations would occur when flows in the Elbow River meet or exceed 160 cubic metres per second. The auxiliary service spillway gates would be raised to create a backwater upstream of the diversion structure, and the diversion inlet gates would be lowered to allow flows through the diversion channel for storage in the off-stream reservoir. Once the off-stream reservoir has been filled, the diversion inlet gates would be closed and the auxiliary service spillway gates lowered. The diverted floodwaters would be retained in the off-stream reservoir until the flood event has subsided.

Once the flood event has ended, post-flood operations would involve opening the outlet structure gates to allow the waters retained in the off-stream reservoir to re-enter the Elbow River. The operational rule for releasing water is when flows drop below 160 cubic metres per second in the Elbow River, which is the earliest release scenario. Conversely, the latest release scenario is releasing the water based on keeping flows in Elbow River at or below bankfull flow rates (47 cubic metres per second). The estimated days from start of diversion to complete reservoir drawdown of the 2013 design flood (worst case scenario) for early release and late release times are proposed to be 39.2 days and 61.5 days, respectively. Other post-flood operations include maintenance activities, as required, of the diversion system, diversion channel, debris deflector, off-stream reservoir, off-stream dam embankment, low level outlet, and roads and bridge. Post-flood maintenance activities would include removal of sediment and debris, confirmation of functionality, repair, internal drainage and regrading, revegetation and inspections.

3 Purpose of Project and Alternative Means

3.1 Purpose of Project

The purpose of the Project is to reduce the effects of future extreme flood events on infrastructure, water courses and people in the City of Calgary and downstream communities.

3.2 Alternative Means of Carrying Out the Project

CEAA 2012 requires that environmental assessments of designated projects take into account alternative means of carrying out the Project that are technically and economically feasible, and consider the environmental effects of any such alternative means.

The Proponent assessed alternative means of carrying out the following aspects of the Project: project location; purpose of the Project; diversion infrastructure including the diversion system, floodplain berm, access road, auxiliary spillway, diversion structure, debris deflector and diversion inlet, emergency spillway, off-stream dam location, low level outlet channel, bridge; and realignments and modifications to public roads.

3.2.1 Alternatives Assessment

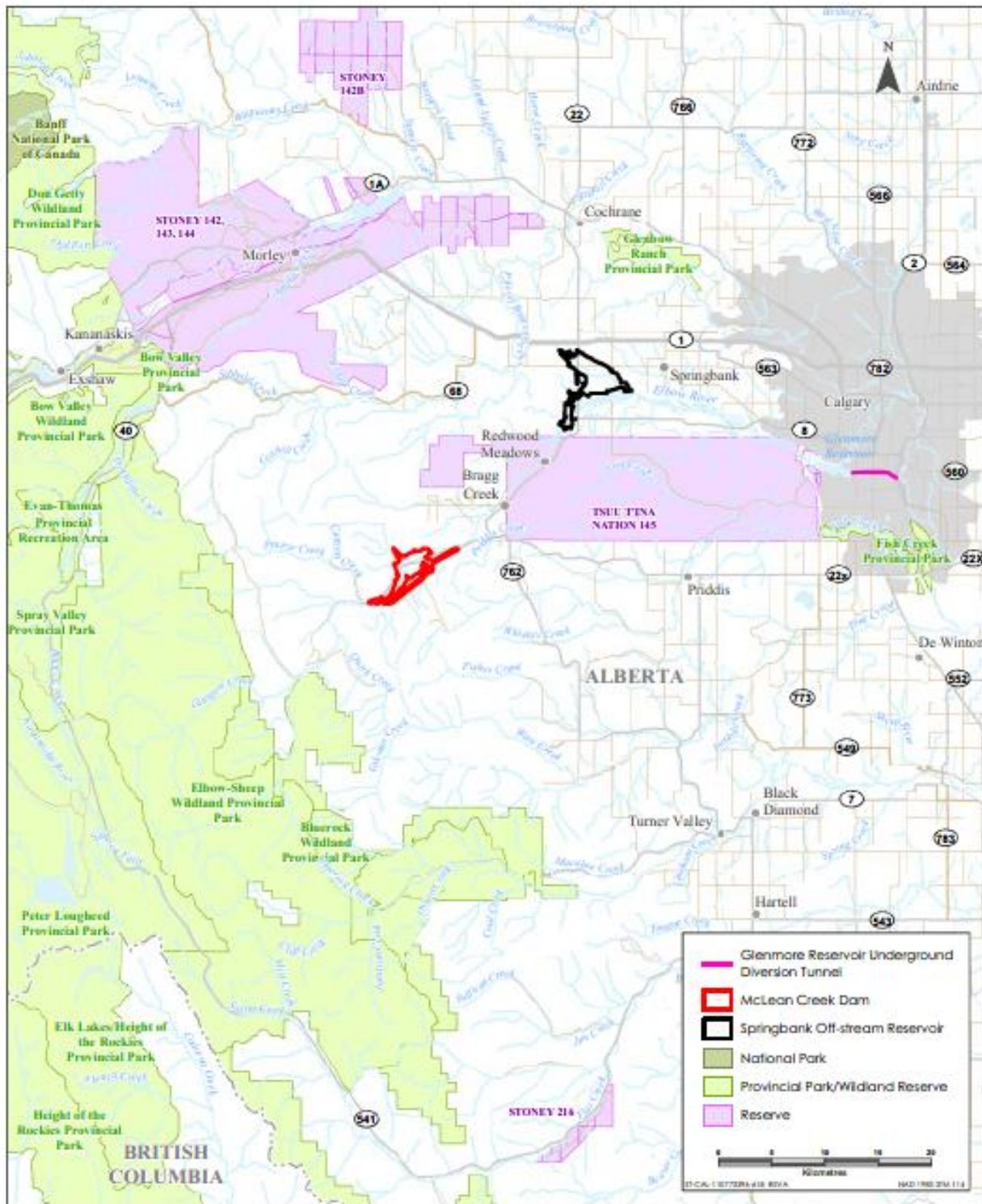
Project Location

Initially, the Proponent considered five potential sites for flood mitigation on the Elbow River (Figure 6) including:

- a dry dam on Quirk Creek near the upper reaches of the Elbow River;
- a dry dam on Canyon Creek, also near the upper reaches of the Elbow River;
- an underground diversion tunnel running east from Glenmore Reservoir and discharging into the Bow River;
- an earth fill dam built on the main channel of the Elbow River near its confluence with McLean Creek (MC1) and spanning the Elbow River valley; and
- an off-stream reservoir at Springbank Road (the Springbank Off-Stream Reservoir Project).

The Quirk Creek option was not further evaluated due to slope stability concerns. The Canyon Creek option was not further considered because the volume was too small for the amount required for flood mitigation. The Proponent further evaluated the remaining three options considering benefit/cost ratio for a high and low damage scenario for 1:100 and 1:200 year return periods. The Glenmore Reservoir diversion was not considered further because of its much lower benefit/cost ratio. The Proponent studied the remaining two alternative means of carrying out the Project, which were focused on alternate sites for the Project. The alternative sites were an off-stream reservoir near Springbank Road, and an earthen dam built near the confluence of the Elbow River and McLean Creek.

Figure 6 Alternative Project Locations for Elbow River Flood Protection in the Calgary Area



The McLean Creek (MC1) option would have been located in Kananaskis Country, approximately ten kilometres upstream from the hamlet of Bragg Creek and 40 kilometres west of the City of Calgary. The McLean Creek option involved an earth fill dam across the Elbow River Valley, which would provide flow regulation within the river. Normal river flows would be controlled through two gated, six metre diameter low-level diversion tunnels located along the south side of the Elbow River channel. Other elements of the option would have included an ungated service spillway and an auxiliary spillway to protect the dam during more extreme flood events. The McLean Creek option would have been a dry reservoir, but would have maintained a permanent pond of 3.5 million cubic metres of water to control sediment migration to the outlet structure.

The earth fill dam in this option would have created a permanent barrier to fish movement on the Elbow River, including Bull Trout, which is a federally-listed species at risk. The dam would have created a permanent upstream pond and changed the habitat from riverine to lake habitat. The dam would have blocked river sediment transport, thereby changing erosion and reshaping the downstream river habitat. Due to the in-stream nature of the McLean Creek option, it would have posed a greater risk of failure during construction and would require more complex engineering to construct. Also, the McLean Creek option would have cost more and taken longer to construct than the other option.

In undertaking an assessment of the potential effects of the McLean Creek option on Indigenous health and socio-economic conditions, physical and cultural heritage, current use of lands and resources for traditional purposes, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, the Proponent concluded that the option may result in positive, substantive, residual effects on non-traditional land and resource use and on Indigenous health and safety and emergency response, positive non-substantive residual effects on socio-economic conditions and services, and generally adverse changes in residual effects. There were no recorded historical values or notable architectural values present in the McLean Creek option area.

The Proponent selected the Springbank Off-Stream Reservoir Project as the preferred option.

Project Purpose

Based on public comments and concerns, the Proponent assessed two additional projects as alternative means of carrying out flood mitigation: the Tri-River Joint Reservoir and the Micro-Watershed Impounding Concept.

The Tri-River Joint Reservoir would have included damming of the Sheep River. The Proponent concluded that this option as proposed could not meet the Province's flood mitigation objectives and was not determined to be feasible due to environmental restraints such as complex geology, limited ability to have any notable flood attenuation capacity for the Sheep River watershed, and poor water management for Elbow River and Highwood River.

The Micro-Watershed Impounding Concept would have included an alternative series of low-head dams or weirs through the Elbow River and its tributaries. The Proponent concluded that this alternative was not feasible as construction, maintenance and operation of a network of approximately 2,200 micro-

dams would be too costly, have low flood resiliency and reliability, take extended time to be operational, and would have too large a disturbance footprint and greater environmental effects.

Diversions Infrastructure

Diversions System

Two locations for the diversion system were considered: the initial design concept and an alternate location 400 metres upstream of the proposed location within the Elbow River. The environmental effects of both locations would be similar. The extent of the changes to the environment would depend on the extent/length of the diversion channel, which would extend to the reservoir. The initial design concept was chosen as the preferred diversion system location due to lower costs and because the distance from the diversion system to the reservoir is shorter, reducing the area of disturbance and resulting in less loss of vegetation and wildlife habitat.

Three types of gates were considered for the service spillway to control water flow downstream: underflow radial gates, which draw from the bottom of the water column; bottom hinged steel flap overflow gates with top mounted hydraulic cylinders; and Obermeyer crest overflow gates. An Obermeyer crest gate was selected as the preferred alternative for the service spillway. Overflow gates provide better forebay water level control than underflow gates and are superior in debris passage. Further, overflow gates are able to open without power, permitting river flows to pass in the event of a dam safety issue. In comparison to steel flap gates, benefits of Obermeyer crest gates include lower cost, ease of installation and modular design.

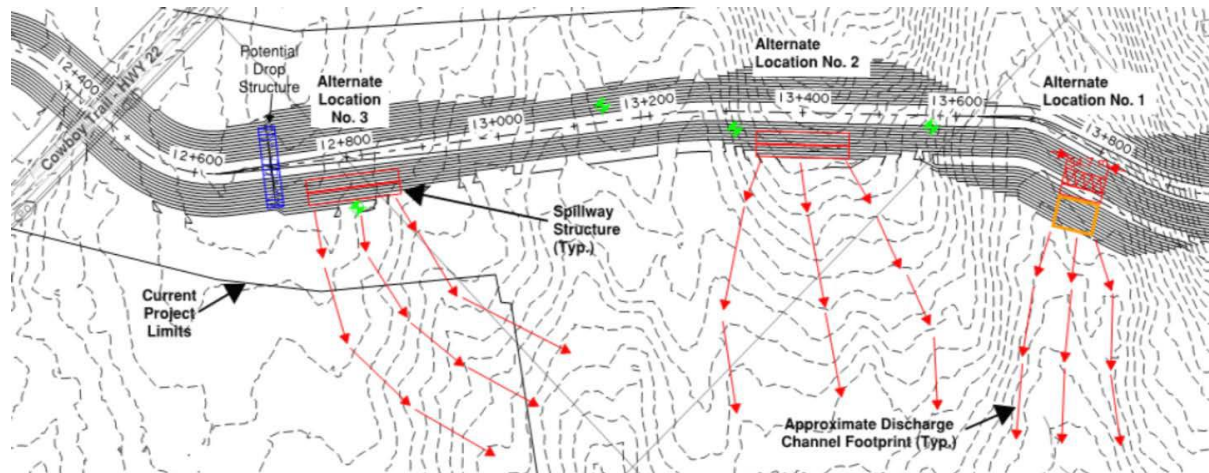
Three alternatives for the auxiliary spillway were considered prior to the selection of the proposed design: an earth embankment with an articulated concrete block overlay; an earth embankment with a roller compacted concrete overlay; and a roller compacted concrete with an earthen overlay. The chosen alternative of a roller compacted concrete base overlain by topsoil is more conducive to ungulate movement and is less expensive than having a roller compacted concrete overlay.

Three alternatives for the debris deflector were evaluated: no additional debris management; debris capture, which consists of a series of vertical members upstream of the diversion inlet to collect large woody debris; and debris deflector, which promotes the passage of debris downstream through the service spillway by constructing a structure comprised of horizontal members mounted to vertical supports. The debris deflector arrangement was deemed to provide the greatest protection to the diversion channel and off-stream storage dam, while providing sufficient mitigation opportunities to reduce the debris deflector's effects on flood operations and maintenance.

Emergency Spillway

Three alternative spillway locations were considered within the off-stream storage dam embankment (see Figure 7).

Figure 7 **Alternative Spillway Locations**



Alternate Location 2 was deemed the most appropriate location for the emergency spillway because of the more stable bedrock materials present and particularly because of the diversion channel drop structure that would be required at Location 3. Environmentally, although both Location 2 and 3 are in bedrock, offering less potential for erosion, Location 2 offered the advantage over Location 3 of being within the PDA and not requiring an expansion of the PDA and further land use disturbance.

Off-Stream Dam

Three preliminary alternatives were proposed for the dam toe location (the junction of the face of the dam with the natural ground surface): dam toe in conceptual design location with monitoring for erosion; dam toe in conceptual design location with bank toe stabilization in place to mitigate the potential for erosion; and dam relocated upstream. Both conceptual design location options would require instream work to mitigate erosion issues. Given the better geotechnical conditions (less toe erosion potential from the river), the elimination of the need of instream work and the ability for the dam to remain in the existing PDA, relocating the dam upstream was chosen as the preferred alternative for the dam location.

Low-level Outlet Channel

The low-level outlet channel is designed to drain the reservoir following the diversion of the Elbow River during a flood. Two alternatives were considered for the outlet channel: upsizing the existing stream to accommodate peak design flow to the Elbow River and delaying reshaping, and armouring of the low-level outlet channel (unnamed creek) until it is necessary. Upsizing the existing stream would involve instream work and offer the potential for erosion of sediment into the stream and downstream to the Elbow River.

Delaying the reshaping and armouring of the low-level outlet channel was chosen as the preferred alternative as disturbance would be less extensive. Root mass from the vegetation in the existing channel may provide erosion protection within the floodplain area. Additionally, maintenance can be performed using smaller equipment that can access the stream banks without wide-scale vegetation removal, which would reduce potential effects on the unnamed creek.

Realignments and Modifications of Public Roads and Highway 22 Bridge

Three roadways, Highway 22, Springbank/Township Road 244 and Township Road 242, would require relocation and/or raising the vertical profile, with bridges over the diversion channel. To select the preferred option, the Proponent considered construction cost, environmental constraints, historical resources constraints, effects on existing developments, the effects of floods on the road infrastructure and remediation requirements, effects on future access management, road user costs and travel distance.

Highway 22 is a two-lane undivided rural highway. Three design options were considered for protecting Highway 22. The selected option proposed that Highway 22 would be raised to provide 0.5 metre freeboard and 1.0 metre for the pavement structure depth above 2013 design flood level. The length of the raised roadway would be approximately 1,800 metres. Culverts in the raised road embankment would be sized at 3.67 metres to facilitate filling and draining of the reservoir during a flood event. A new bridge would be constructed on the existing Highway 22 alignment where Highway 22 crosses the diversion channel. The Proponent has not completed the detailed design for the planned diversion structure and the Highway 22 bridge, but stated that the bridge will be constructed above the high-water mark.

Springbank Road is located east of Highway 22 and is a paved east–west regional collector road that provides access to existing properties and future development in the area. Three options were considered for Springbank Road. The selected option maintained the existing Springbank Road, except for the modifications necessary to permit an at-grade intersection with raised Highway 22.

Township Road 242, west of Highway 22, is a two-lane roadway that serves a gravel pit and a small number of country residential dwellings. With Township Road 242 intersecting the diversion channel, three modifications were considered. The selected option would maintain the existing Township Road 242 alignment and add a bridge over the diversion channel.

3.2.2 Views Expressed

Public

Public comments received during the technical review of the EIS indicated that the Proponent should consider alternative means of reducing the effects of future extreme floods on infrastructure, water courses and people, such as the McLean Creek Dam, the Tri-River Joint Reservoir of Alberta and the Micro-Watershed Impounding Concept.

Indigenous Nations

There are three main concerns expressed by Indigenous nations related to alternative means.

1. Multiple Indigenous nations expressed concerns that the McLean Creek alternative has not been adequately reviewed as a feasible option and that the additional benefits of the flood mitigation on Tsuut'ina Reserve 145 are not considered.
2. Tsuut'ina First Nation noted a concern that alternatives are evaluated and selected without Indigenous consultation.

3. The Stoney Nakoda Nation noted concerns that the alternatives do not consider options on the Bow River and that the Project will not have the design capacity to protect Calgary from flooding.

A summary of comments provided to date by Indigenous nations, along with responses from the Proponent and the Agency are summarized in Appendix B.

3.2.3 Agency Analysis and Conclusion

The Proponent considered the cost-effectiveness, technical feasibility, reliability, potential environmental effects, and feedback from the public and Indigenous nations on the identified alternative means of carrying out the Project. Based on its review of the EIS and other information, the Agency is satisfied that the Proponent has sufficiently assessed alternative means of carrying out the Project for the purposes of assessing the environmental effects of the Project under CEAA 2012.

4 Consultation and Engagement Activities

4.1 Crown Consultation with Indigenous Peoples

The Crown has a duty to consult Indigenous peoples in Canada, and to accommodate where appropriate, when its proposed conduct might adversely impact a potential or established Aboriginal or Treaty right. Consultation with Indigenous peoples is also undertaken more broadly to aid good governance, sound policy development and decision-making.

4.1.1 Consultation led by the Agency

In addition to the federal government's broader obligations, CEAA 2012 requires consideration of the effects of changes to the environment on Aboriginal peoples' health and socio-economic conditions, physical and cultural heritage, current use of lands and resources for traditional purposes, and on structures, sites, or things of historical, archaeological, paleontological, or architectural significance. In order to fulfill the Crown's consultation obligations, the Agency serves as the federal Crown Consultation Coordinator and is consulting with Indigenous nations in a manner that is integrated with steps in the EA process. Analysis of potential effects to Indigenous nations is presented in Chapters 7.4, 7.5 and 7.6. Assessments of potential impacts on potential or established Aboriginal and Treaty rights are discussed in Chapter 9.0.

Indigenous nations invited to participate in consultations include those identified as having an interest in the Project due to proximity, traditional land use, and the extent of potential adverse effects on potential or established Aboriginal or Treaty rights. The Agency is consulting with Blood Tribe (Kainai Nation), Ermineskin Cree Nation, Foothills Ojibway First Nation, Louis Bull Tribe, Métis Nation of Alberta—Region 3, Montana First Nation, Piikani Nation, Samson Cree Nation, Siksika Nation, Stoney Nakoda Nation and Tsuut'ina Nation. The Agency considered that there may be potential impacts to the Métis Nation British Columbia Region 4, the Ktunaxa Nation Council and the Shuswap Indian Band, and determined further consultation was not required.

The Agency supports participation of Indigenous nations through its Participant Funding Program. Funds are made available to reimburse eligible expenses of participating Indigenous nations. Eleven identified Indigenous nations applied for and were allocated a total funding of \$893,358 through this Program.

The Agency has invited feedback from Indigenous nations on how it could help facilitate participation in the EA and on the potential environmental effects of the Project. This information will also contribute to the Crown's understanding of potential adverse impacts on potential or established Aboriginal or Treaty rights protected under Section 35 of the *Constitution Act, 1982* (Section 35 rights), and related interests, and the effectiveness of measures proposed to avoid or minimize those impacts. Indigenous nations receive regular updates from the Agency to keep them informed of key developments and to solicit feedback. The Agency integrates the Crown's consultation and engagement activities throughout the EA process and invites Indigenous nations to review and provide written comments on the documents listed in Table 2.

The Agency considered comments received from Indigenous nations following their review of the EIS and the EIS Summary and asked the Proponent to provide additional information on a number of topics through information requests. Indigenous nations were provided an opportunity to review and comment on the additional information, as applicable.

Table 2 Public and Indigenous Nations Comment Opportunities during the EA Process

| Subject of Consultation | Dates |
|--|--------------------------|
| Summary of the Project Description | May 9 – 30, 2016 |
| Draft EIS Guidelines | June 23 – July 25, 2016 |
| EIS Summary and EIS | April 30 – June 15, 2020 |
| Draft EA Report and Potential Conditions | Ongoing |

Appendix B contains a summary of comments provided to date by Indigenous nations, along with the Proponent and Agency responses. A subset of comments are also discussed in the context of individual valued components throughout Chapters 6 and 7.

The Agency received concerns and incorporated input from all Indigenous nations engaged in the Project throughout the EA process. On April 1, 2020, Tsuut’ina Nation withdrew all objections to the Project and its participation in the EA process. The Agency will continue to inform Tsuut’ina Nation about opportunities to participate in the process. The Agency incorporated concerns and input from Tsuut’ina Nation in this report but acknowledges that these concerns may have been addressed through additional means outside the EA process.

4.2 Proponent Indigenous Engagement Activities

The Proponent is engaged with a total of 13 Indigenous nations located in Alberta and British Columbia. Engagement methods included phone calls, emails, written letters and reports. The Proponent stated that they would continue to provide information and to solicit feedback on the Project, mitigation, monitoring and follow-up measures.

The Proponent’s engagement with Indigenous nations began in 2014 with five Treaty 7 First Nations:

- Blood Tribe (Kainai Nation)
- Piikani Nation
- Siksika Nation
- Stoney Nakoda Nations (Bears paw First Nation, Chiniki First Nation and Wesley First Nation)
- Tsuut’ina Nation

The Treaty 7 First Nations were provided with Project information, and the opportunity to provide information regarding current use, to conduct site visits in the PDA, and to conduct traditional land use studies.

In June 2016, the Proponent began to engage with an additional eight Indigenous nations including:

- Ermineskin Cree Nation
- Foothills Ojibway First Nation

- Ktunaxa Nation
- Louis Bull Tribe
- Métis Nation of Alberta—Region 3
- Métis Nation British Columbia—Region 4
- Montana First Nation
- Samson Cree Nation

Project information was sent by the Proponent to these additional communities and organizations and these additional Indigenous nations were provided with the same opportunities as those above. When contacted by the Proponent, Ktunaxa Nation has stated that it would not be participating in the engagement activities for the Project and would not be engaging with the Proponent further on the Project.

Key concerns raised by Indigenous nations during Proponent engagement include:

- impacts to rights, cultural experience, and the exercise of rights;
- incorporation of Indigenous knowledge and traditional land use studies;
- access and quality of traditional land and resource use, such as for fishing, hunting, trapping and gathering including access to the PDA, and loss and changes to wetlands;
- impact to Indigenous health, well-being, and access and quality of country foods;
- effects on federal lands;
- impact to sites and resources of cultural and historical importance;
- access to capacity funding;
- consideration of alternatives to the Project;
- potential for accidents and malfunctions;
- loss of aesthetics;
- increase of noise, dust and air pollution;
- changes to groundwater quantity and quality;
- changes and effects of hydrology of the Elbow River and tributaries;
- changes to fish and fish habitat regarding fish migration, fish stranding and rescue, destruction of habitat, fish spawning;
- changes to vegetation (surveys, culturally important species, invasive species, monitoring, reclamation, revegetation); and
- effects to wildlife, such as habitat and habitat fragmentation, habitat connectivity and wildlife movement, habitat modelling, mitigation, migratory birds, culturally significant species (elk, grizzly bear), and restricted activity periods.

4.3 Public Participation

4.3.1 *Public Participation led by the Agency*

To date the Agency has provided three opportunities for the public to participate in the EA process, as outlined in Table 2. The release of this Draft EA Report and the potential conditions for review and

comment represents a fourth opportunity. Paper copies of the draft EIS Guidelines and EIS Summary were made available at public viewing centres in Calgary, Bragg Creek, and Cochrane. Notices of the opportunities to participate were posted on the Canadian Environmental Assessment Registry (Canadian Impact Assessment Registry) Internet Site and advertised through local media.

The Agency made funding available through its Participant Funding Program to support the public in reviewing and providing comments. Through this program, \$36,690 was allocated to three members of the public.

The Agency participated in four Proponent open houses, two in November 2017, and two in May 2018. The Agency also hosted five separate TAG meetings with attendance from Indigenous nations, federal authorities, the City of Calgary and Rocky View County. In response to the public notice during the comment period on the EIS Summary, submissions were received from members of the public, members of the TAG, Indigenous nations and federal authorities.

Key issues raised by the public include:

- federal EA timelines and process;
- consideration of alternatives to the Project;
- effects to wildlife habitat and migration;
- effects to fish and fish habitat;
- social and economic effects to the surrounding communities; and
- impacts to Indigenous peoples and effects to reserve lands.

There are groups opposed to the Project, including those who requested alternative options for flood mitigation, predominantly McLean Creek and the Tri-River Joint Reservoir. There is also a group supportive of the Project “Calgary Rivers Community Action Group” who has requested expedited timelines.

4.3.2 Public Participation Activities by the Proponent

The Proponent carried out public engagement activities since November 2014, including Project notification, meetings with landowners and with stakeholders, open houses and other activities. These have included three facilitated presentations to affected landowners, ten public open houses, over 40 meetings with affected landowners and organized stakeholder groups (including Bow River Basin Council, Elbow River Watershed Partnership, Alberta Environment and Parks Water Collaborative, the Calgary River Communities Action Group, Calgary Regional Partnership, Western Irrigation District and affected industry and utilities), and ongoing meetings with Rocky View County and City of Calgary administration.

Key concerns raised during proponent engagement include:

- project costs;
- timelines;
- alternatives to the Project;
- accidents and malfunctions (debris, reservoir failure);,
- land use (access);

- drainage time, air quality (dust);
- groundwater quantity;
- hydrology of the Elbow River;
- water quality;
- fish stranding;
- aquatic environment; and
- land acquisition.

5 Existing Ecosystem

CEAA 2012 defines the environment as the components of the earth, including the land, water, and air, all organic and inorganic matter and living organisms, and the interacting natural systems that include these components. This Chapter summarizes information on the existing ecosystem presented by the Proponent.

5.1 Biophysical Environment

The Project would be located in the Foothills Parkland natural subregion in Alberta, which is a transition zone between prairie grasslands and montane and alpine forests and characterized by rolling topography with hills. The vegetation generally comprises of rough fescue grasslands, willow shrublands, and aspen woodlands. The immediate area surrounding the Project is dominated by an agricultural landscape of about 48 percent, which includes tame pasture, annual cropland and hayland. The Project area also includes forested areas, such as mixed, broadleaf, and coniferous forests, but these are largely restricted to areas bordering the Elbow River and large patches near the intersection of Range Road 40 and Springbank Road, and west of Highway 22 near Township Road 244. Wetlands are dispersed throughout the area and mostly occur along drainages and adjacent to the Elbow River.

Habitat types present in the Project area, such as grassland, shrubland, and mixed forest, provide suitable habitat for bird species listed under the *Migratory Birds Convention Act 1994* (MBCA) and species of management concern (SOMC²). There is relatively less habitat available in the area for species dependent on broadleaf (deciduous) forest, coniferous forest, and wetlands. The Elbow River to the south and the Bow River to the north of the Project are provincial key wildlife and biodiversity zones, which are a combination of important winter ungulate habitat and areas of high potential for biodiversity. Potential project effects extend within sharp-tailed grouse, sensitive raptor ranges, and the Grizzly Bear Support Zone identified in the draft Alberta Grizzly Bear Recovery Plan.

The Project would be located within the Elbow River Watershed, which is part of the Bow River Basin. The Elbow River flows eastward from Elbow Lake in the eastern slopes of the Canadian Rockies to the City of Calgary, where it flows into the Glenmore Reservoir and then merges with the Bow River. The portion of the Elbow River that would be directly affected by Project infrastructure is an irregularly meandering channel across a wide valley.

² The Proponent describes their species of management concern to be any species that is listed federally as endangered, threatened, or special concern on any Schedule of the *Species at Risk Act*; designated federally as endangered, threatened, or special concern by the Committee on the Status of Endangered Wildlife in Canada; listed provincially as endangered, threatened, or special concern, including species legally protected under the Alberta Wildlife Act; and/or designated provincially as At Risk, May be at Risk, or Sensitive according to the Alberta Environment and Parks General Status of Alberta's Wild Species.

The Elbow River valley consists of a sand and gravel floodplain bordered by river terraces. Soils in the Project area vary from Regosols developed on the sands and gravels of the floodplain, Gleysols on poorly drained uplands, and Black Chernozems on the well-drained uplands.

Along with the Elbow River, there are several small, naturally occurring waterbodies in the PDA, including an unnamed creek that runs through the reservoir area which will be used as the low level outlet and various wetlands. These waterbodies are primarily fed from tributaries to the Elbow River. Runoff contributions to these waterbodies are intermittent and result in fluctuating water levels. It is expected that the unnamed creek will continue to receive some runoff as long as water remains within the watershed.

The intensity of the 2013 flood event was the result of increased rainfall at high elevations, increased runoff from snowmelt over partially frozen soil and a 36 hour storm event. Localized pockets of high intensity convection driven rainfall over the foothills and plains, as well as in the upper Elbow River watershed, also contributed to extreme runoff conditions.

The deposition of river sands and gravels over glacial deposits in the Elbow River valley resulted in formation of an alluvial aquifer, an important source of groundwater for the river and local residents. The alluvial aquifer provides temporary storage for water from the Elbow River during floods, and then releases that water back to the river.

Groundwater flow directions are anticipated to be towards the Elbow River as it is considered to be a hydrogeological divide. However, there also exists areas of shallow groundwater that flow west toward Jumpingpound Creek and areas in the Bow River watershed where groundwater flows north.

The Elbow River is rated as primarily good run fish habitats, interspersed with riffle and pool habitats and contains a variety of fish species including brook trout, brown trout, bull trout, burbot, cutthroat trout, mountain whitefish, rainbow trout, white sucker, longnose sucker and mountain sucker. Bull trout and westslope cutthroat trout are considered threatened fish species under Schedule 1 of the *Species at Risk Act*. However, genetically pure (non-hybridized with rainbow trout) westslope cutthroat trout stocks are considered unlikely given existing moderate cold water habitat conditions. Bull trout stock are considered to be present within the Elbow River and most abundant in the sections from the project site upstream to the Elbow Falls and above Elbow Falls.

Within the Project area, spawning, overwintering and rearing habitats are rated as moderate-good to good habitat for forage, coarse and sport fish.

The Project would be located in a rural setting, where ranching and farming are the primary activities, and air emission sources are generally limited to local and highway traffic, vehicle use and refueling, and residential heating.

5.2 Human Environment

The Project would be located within Treaty 7 territory, a traditional meeting grounds for many First Nations and Métis people, and within the Métis Nation of Alberta – Region 3. Indigenous peoples have

engaged in traditional activities and have had a relationship with the land in the Project area for thousands of years. The Project would be located 15 kilometres west of Calgary within the Northern Plains Culture Area. There is firm archaeological evidence that this area has been occupied since the end of the last glaciation, approximately 13,000 years ago. Since the late 1800s, land privatization, creation of transportation networks, pipeline rights-of-way and utility corridors, tourism and recreation activities, and commercial and residential development have contributed to the modification of land use in the area.

The Project would be located in a rural environment, with combination of natural environment and human activities including traffic (i.e. existing highways) and an active agricultural industry. The Elbow River serves as a direct drinking water source to approximately one in six Albertans and supports recreational, agricultural, urban and rural developments.

The majority of the PDA is currently privately owned land, which lies within Rocky View County and is mainly used for ranching and farming. There are six farmsteads, eight residential areas, and four agricultural areas. There are also three regions within the PDA that are owned by local organizations that operate summer camps at these properties. A small portion of the PDA is public land composed of rights-of-way for roads and road allowances, and the bed and banks of the Elbow River and its tributaries. Current land use by Indigenous peoples continues in the area on unoccupied Crown lands, such as the riparian zone along the banks of the Elbow River, and other private lands, which Indigenous nations have been granted permission to access by private landowners.

The nearest First Nation Reserve is the Tsuut'ina Nation Indian Reserve 145, located 395 metres south of the proposed Project perimeter. Reserve lands would be both upstream and downstream of the Project. The Stoney Nakoda Nations' reserve lands would also be close to the Project, having multiple reserves located approximately 16 kilometres west, 28 kilometres northwest, and 62 kilometres south of the Project.

Through the Proponent's Indigenous engagement program, Tsuut'ina Nation indicated that their citizens continue to depend on the lands and waters in their traditional territory, including the Project area, to support traditional activities. These traditional activities include hunting, fishing, and harvesting of various species including medicinal plants. Tsuut'ina Nation, Stoney Nakoda Nations, Blood Tribe (Kainai Nation), Siksika First Nation, and Piikani Nation also identified trails and travel routes, fishing, plant gathering, trapping, and cultural and archaeological sites within the region. Blood Tribe (Kainai Nation), Ermineskin Cree Nation and Samson Cree Nation have cultural and historical resources in the Project area. Siksika Nation indicated that the natural resources and heritage sites found in the Project area are central to their culture. Stoney Nakoda Nations explained that a Stoney Nakoda cultural story talks about the Springbank Creek.

Although the majority of the PDA is currently privately owned, Indigenous nations are granted access by some land owners to carry out cultural practices. Ownership of private lands in the PDA would be transferred to the provincial Crown before project construction. Multiple Indigenous nations have indicated that these lands have been and continue to be important to their respective nations for hunting, gathering, and cultural practices. Concerns have been raised regarding continued access to these lands once they are acquired by the province for the Project.

Métis Nation of Alberta – Region 3 indicated that the Métis have historically used, travelled and occupied the lands and waterways throughout the province. The Métis have documentation that provides clues to how their ancestors lived on the land and waterways since coming west, including forts and trading posts. Métis Nation of Alberta – Region 3 also noted that there is potential for Métis homesteads, cart trails, historical use areas and potential burial sites within the proximity of the Project.

The public also uses areas potentially affected by the Project. Access for recreation, livelihood, and to unique sites or special features may be along existing roads and other public right of ways that intersect these areas. For example, sportfishers may drive along Highways 22 and 8 and walk along public right of ways that intersect the river. Access to Our Lady of Peace Roman Catholic Mission cairn and monument plaque at the southern end of Range Road 43 is accessible via Highway 22 and Township Road 242.

The Elbow River supports a recreational fishery that has been a part of known local and national fishing culture from the early 1990s, with the Glenmore Reservoir being a popular sport fishing location for northern pike, trout and perch. There are no known commercial fisheries on the Elbow River, nor are there commercial fishing licenses on any lakes adjacent to or affected by the Project.

Groundwater dependent traditional uses and culturally sensitive areas are also identified by Indigenous nations. Multiple uses of groundwater resources are indicated which include drinking water (potable purposes), domestic and agricultural uses. A number of contact springs were also identified along the northeast side of the reservoir area and at least one along southwest valley wall of the reservoir.

6 Predicted Changes to the Environment

6.1 Atmospheric Environment

The Project could cause residual effects on atmospheric environment through:

- vehicle exhaust and fugitive emissions during Project construction inside and near the project description area (PDA); and
- noise from construction (piling and other construction activities).

With input from federal departments, Indigenous nations, and the public, the Agency has summarized the Proponent's assessment on the changes to the atmospheric environment. This summary supports the analysis of effects of the environment on federal lands (Chapter 7.6), Indigenous peoples' health and socio-economic conditions (Chapter 7.5) Indigenous peoples' current use of lands and resources for traditional purposes and physical and cultural heritage (Chapter 7.4), including the mitigation and follow-up measures.

6.1.1 Proponent's Assessment of Environmental Effects

Construction and Dry Operations

The Project is predicted to be a source of air emissions, odours, and noise during construction. The Proponent determined that the Project would not result in measurable changes to light conditions, greenhouse gas emissions (GHG), and carbon sequestration capacity. While mitigation measures for these pathways of effects are discussed in this chapter, the Agency agrees with the Proponent's characterization of potential effects thus these pathways are not discussed further. During the dry operations phase, associated activities will be limited to periodic inspections and routine maintenance and there are no interactions of the Project with air quality, light or GHG emissions; therefore, the Proponent did not anticipate any significant adverse effects on ambient air quality.

The main sources of air emissions due to project construction includes vehicle exhaust and fugitive emissions (ground based sources) inside and near the PDA, including potential for total suspended particles, fine particulate matter (PM_{2.5}), and nitrogen dioxide (NO₂) concentrations to be greater than the regulatory guidelines and standards outside the PDA. Additionally, noise would be generated from construction activities (i.e., piling activities for bridge construction, haul truck traffic and general construction activities within the channel) that may be above the federal guidelines (Health Canada Mitigation Noise Level).

The Proponent concluded that residual effects of fugitive dust would be moderate to high in magnitude during construction; however, the effects would be local in extent and reversible in the long-term.

Flood and Post-Flood

The main effect to air quality during flood and post flood operations is anticipated to be due to fugitive dust from sediment deposition in the off-stream reservoir. Fugitive dust was assessed to be a result of wind erosion of deposited sediments in the off-stream reservoir after impounded flood water has been

released back into the Elbow River. The main finding of the modeling is the potential for total suspended particles, fine particulate matter (PM_{2.5}), and nitrogen dioxide (NO₂) concentrations to be greater than the regulatory guidelines in the area outside the PDA. However, because these emissions are ground based, the greatest air quality changes due to these emissions occur inside and near the PDA, decreasing to Base Case levels with increasing distance from the PDA.

During post-flood operations, the Proponent predicted that 3.7 percent of the LAA (192.6 hectares of the reservoir) would be covered by sediment less than three centimetres deep, and 0.8 percent (37.4 hectares of the reservoir) would be covered by sediment between three centimetres and ten centimetres deep. Sediment deposition of more than ten centimetres was predicted at 3.0 percent of the LAA (145 hectares of the reservoir), which would have greater effects on the fugitive dust emissions.

With implementation of the proposed mitigation measured as well as the adequate adaptive management nature of fugitive dust mitigations, the Proponent expected to be able to adequately control fugitive dust to low levels that would not have appreciable adverse environmental effects. The Proponent concluded that residual effects of fugitive dust to the atmosphere be low in magnitude during flooding and a moderate to high magnitude during post-flood due to the prediction that ambient concentrations are greater than 50 percent of the ambient criteria (moderate) or greater than the ambient criteria (high) for the different substances of interest. The effects would be local in extent and reversible in the long-term for both flood and post-flood phases.

Given the low recurrence of the floods that result in sediment deposition and the proposed mitigation measures and adaptive management, the Proponent did not anticipate any significant adverse effects on ambient air quality due to fugitive dust.

6.1.2 Proposed Mitigation Measures, Monitoring and Follow-Up

Construction and Dry Operations

- Discharge of atmospheric contaminants from construction operations will be prevented in accordance with the Alberta Ambient Air Quality Objectives.
- Project construction vehicles will be required to meet current emission control standards.
- The concentration of sulphur in diesel fuel shall not exceed 15 milligram per kilogram.
- Engines and exhaust systems will be properly maintained. Equipment that shows excessive emissions of exhaust gases would not be operated until corrective repairs or adjustments are made. Construction vehicle idling times will be reduced to the extent possible in order to reduce emissions, as a best management practice.
- Re-establishment of the vegetation cover on the deposited sediment post construction will mitigate the temporary loss of carbon sequestration capacity.
- Dust generating construction activities will be suspended during periods of excessive wind should dust suppression measures not be working adequately.
- During dry periods, water will be applied to haul roads and/or disturbed areas to mitigate dust emissions. The application of water will be limited to non-freezing temperatures to prevent icing that can present a safety hazard. Watering is most effective immediately after application, and

repeated watering several times a day may be required, depending on surface and meteorological conditions.

- Chemical dust suppressants would be applied to haul roads as an alternative option to watering. Chemical dust suppression would be applied on an as-needed basis during high wind conditions or if particulate matter concentrations are in exceedance of the Canadian Ambient Air Quality Standards and if an increase of watering is determined ineffective or unfeasible at the time.
- Silt fences and other erosion control methods such as mulching and application of tackifiers would be used to prevent soil loss from soil stockpiles due to wind erosion.
- The Proponent will follow the specific threshold limits for blasting air overpressure and vibration at sensitive receptors specified by Environment Canada (2009) and Health Canada (2017).
- Construction air quality monitoring will be continuous over 24 hours and extend throughout the entire construction period.
- Measured concentrations of fine particulate matter and nitrogen dioxide at the continuous monitoring station will be reviewed monthly during construction to evaluate potential effects on air quality.
- Construction total suspended particles and fine particulate matter (PM_{2.5}) monitoring will include visual observation and the installation and operation of an Environmental Beta Attenuation Monitor to measure ambient concentrations of these parameters.
- During the construction phase, total suspended particles and fine particulate matter (PM_{2.5}) monitoring equipment will be placed at two locations: along the road between the diversion channel excavation work, and in the dam construction site. Monitoring equipment will also be placed adjacent to the borrow source, if it is used.

Flood and Post-Flood

- If natural re-vegetation post-flood is too slow or otherwise unsuccessful within the six months after a flood event, a tackifier will be applied when and where required to prevent wind erosion.
- During the post-flood phase, particulate monitoring sites will be established at locations based on the presence of dry surfaces and expected paths of wind-blown materials.

Follow-up and Monitoring

- Air quality monitoring will include:
 - continuous construction nitrogen dioxide (NO₂) monitoring;
 - continuous total suspended particles monitoring throughout all project phases;
 - continuous fine particulate matter (PM_{2.5}) monitoring throughout all project phases; and
 - continuous meteorology monitoring for wind speed, wind direction, temperature and other variables throughout all project phases.
- The location for monitoring of fine particulate matter (PM_{2.5}), and nitrogen dioxide (NO₂) will be determined in consultation with appropriate regulators and consistent with the Canadian Council of Ministers of the Environment ambient air monitoring protocol and guidelines.
- Measured pollutant concentrations will be evaluated against the Alberta Ambient Air Quality Objectives to trigger investigation, potential adaptive mitigation and reporting.

- Ambient air quality monitoring will be combined with review of weather data (from an onsite meteorological station), to evaluate the effectiveness of current mitigation and to assess the need for more rigorous dust mitigation.
- Ambient monitoring may be deployed to monitor potential effects associated with windblown sediment. Whether it is necessary to employ monitoring will be determined in consultation with stakeholders and regulatory agencies and will depend on the quantity, location and moisture of deposited sediment, time of year and whether mitigation to limit erosion has been applied.
- The details of the monitoring program and the results will be made available to nearby residents.
- Results of air quality monitoring will be reported to the Environmental Inspector during the construction phase who will pass them on to the Alberta Transportation Provincial Environmental Coordinator who will initiate action if exceedances are noted. During the post-flood phase, results will go to the Environmental Coordinator for Alberta Environment and Parks, the Project operator.

6.1.3 Views Expressed

Federal Authorities

Health Canada recommends continuous monitoring of nitrogen dioxide (NO₂) and fine particulate matter (PM_{2.5}) from which adaptive management levels are to be targeted towards reducing population exposure to these air pollutants. Health Canada also stated that the Alberta Ambient Air Quality Objectives or the Canadian Ambient Air Quality Standards should not be used as triggers to implement mitigation measures as human health risks exist below these levels. The use of all available mitigation measures that are technically and economically feasible are encouraged to be implemented and this includes ensuring exceedances of the Canadian Ambient Air Quality Standards are minimized.

Health Canada also recommends that in addition to the mitigation measures proposed by the Proponent, a formalized complaint-response protocol be implemented with monitoring and mitigation measures defined in the event of complaints. It is recommended that the Proponent implement all technically feasible and economically viable mitigation measures in order to reduce noise levels to the extent possible.

Environment and Climate Change Canada noted that the Proponent has sufficiently incorporated previous advice to implement best practices to reduce levels of particulate matter (PM) and nitrous oxide (NO) emissions during construction activities to reduce the potential for air quality effects on local communities.

Environment and Climate Change Canada noted the importance of continuous monitoring of nitrogen dioxide (NO₂) and fine particulate matter (PM_{2.5}), as proposed by the Proponent in their draft air quality management plan, including the evaluation of public and community exposure relative to both the Alberta Ambient Air Quality Objectives and the Canadian Ambient Air Quality Standards. Environment and Climate Change Canada also noted that a specific monitoring site should be identified to ensure it is representative of communities near the Project and capable of identifying any air quality impacts from the project.

Indigenous Nations

Indigenous nations raised concerns related to dust during construction and operations, air quality and visual impact.

There are two main concerns expressed by Indigenous nations related to atmospheric environment:

- Tsuut'ina Nation outlined Project-specific concerns related to dust and air pollution during construction activities and the potential for contaminated dry dust given Tsuut'ina Nation's proximity to the Project area.
- Multiple Indigenous nations noted concerns about potential air quality effects from flood residue spread by the wind, deposition of silt in the reservoir and wind-blown dust from the reservoir.

A summary of comments provided to date by Indigenous nations, along with Proponent and Agency responses, are summarized in Appendix B. Additional mitigations related to Indigenous peoples' health and socio-economic conditions can be found in Chapter 7.5 of this report.

Public

Members of the public expressed concerns related to project related changes to air quality due to construction dust, air pollution, and dust from the silt left in the reservoir after a flood.

6.1.4 Agency Analysis and Conclusion

The Agency is of the view that the Proponent has adequately described the potential effects of the Project to the atmospheric environment. Residual effects of fugitive dust are anticipated to be moderate to high in magnitude during construction; however, the effects would be local in extent and reversible in the long-term. The Agency acknowledges that there would be a low recurrence of the floods that result in extensive sediment deposition and based on the proposed mitigation measures and adaptive management, effects would be local in extent and reversible in the long-term for both flood and post-flood phases.

Key Mitigation Measures to Avoid Significant Effects and Follow-up Program Requirements

The Agency considers the mitigation, monitoring and follow-up measures proposed by the Proponent listed in Section 6.1.3 to be necessary to ensure there are no significant adverse effects to atmospheric environment. The Agency also considered the following mitigation measures identified through expert advice from federal authorities and comments received from Indigenous nations and the public as necessary to ensure there are no significant adverse effects to atmospheric environment:

- Prior to construction, the Proponent will finalize an air quality management plan in consultation with Environment and Climate Change Canada and Health Canada.
 - The plan will include Canadian Ambient Air Quality Standards as targets, mitigation and monitoring of several criteria air contaminants identified as being of potential concern or importance to the Project.
 - It will describe mitigation measures that will be implemented, monitoring methods, and adaptive management methods if criteria air contaminants exceed targets, based on the Canadian Ambient Air Quality Standards.

- A monitoring location will be identified within the community of Springbank, approximately 4.5 kilometres east of the Project.
- Use of a formalized complaint-response protocol be implemented with monitoring and mitigation measures defined in the event of complaints.
- Throughout construction, flood, and post flood operations, applicable measured pollutant concentrations will be evaluated monthly against the 2020 Canadian Ambient Air Quality Standards to trigger investigation and reporting.
- If exceedances in Canadian Ambient Air Quality Standards are noted, additional mitigations to reduce air emissions will be implemented. These include the suspension of construction activity, increased watering of access roads or the spraying of surfactants, during the construction phase; and the spraying of surfactants during the post-flood phase.

6.2 Groundwater and Hydrogeology

The Project could cause residual effects to the quantity and quality of groundwater resources through:

- Changes to the quantity and quality of groundwater during construction and dry operation phases which could occur through construction activities such as localized dewatering and through the incision of the diversion channel infrastructure.
- Changes to groundwater quantity and quality during the flood and post flood phases, including interaction with the surface water system through infiltration or potential for spills and changes to surface water quality.

With input from federal departments, Indigenous nations, and the public, the Agency has summarized the Proponent's assessment on the changes to groundwater quantity and quality and hydrogeology. This summary supports the analysis of the current use of lands and resources for traditional purposes and physical and cultural heritage of Indigenous peoples (Chapter 7.4), the health and socio-economic conditions of Indigenous peoples (Chapter 7.5), and effects of the environment on federal lands (Chapter 7.5), including the mitigation and follow-up measures.

6.2.1 Proponent's Assessment of Environmental Effects

Construction and Dry Operations

Interactions between the Project's construction and dry operations and groundwater quantity and quality include:

- groundwater withdrawals for construction dewatering;
- groundwater seepage into open excavations;
- groundwater seepage into the diversion channel when dry; and
- groundwater contamination related to construction activities through spills and infiltration.

Potential changes in groundwater levels could occur due to the construction of various Project components below the baseline groundwater levels. Namely, the construction of the diversion channel

is anticipated to incise into subsurface units and bedrock. However, effects would be limited to areas near the diversion channel.

The Project has the potential to change groundwater quantity in and near the PDA as a result of local, shallow and temporary subsurface dewatering that might be required to facilitate construction of the diversion channel, dam and floodplain berm, outlet works, bridge, excavation of borrow pits, and utility realignments. Construction dewatering, if required, would be done locally and according to the terms and conditions of dewatering licences issued by Alberta Environment and Parks and best management practices. These requirements would be included as part of the Environmental Construction Operation Plan prepared by the contractor. Standard construction dewatering methods will be used, including methods to cut off excessive seepage where trenches extend below the water table in order to mitigate preferential flow paths. Potential for incidental spills and infiltration of substances through the surface water mechanisms that may alter groundwater quantity will be minimized through best management practices, and the mitigations identified for Surface Water and Hydrology in Section 6.3.3.

Limited duration effects to groundwater quantity from construction dewatering are not expected to result in noticeable secondary changes to groundwater quality. The duration of construction dewatering would be short-term and effects would be reversible. Construction dewatering is not expected to lead to effects on groundwater on federal lands due to their limited extent and the presence of the Elbow River which acts as a regional flow divide. Effects to federal lands are discussed in Chapter 7.6 of this report.

Groundwater seepage collected in the diversion channel may infiltrate back into the ground (returning to the groundwater system) or, where the local infiltration capacity is exceeded, continue to flow overland toward existing surface water drainage courses. Increases in groundwater levels up to six metres are predicted in the northeastern areas of the diversion channel (near its outlet into the off-stream reservoir) due to the additional infiltration of water into this area. Regardless of resulting net increase or decrease, the extent of the changes to groundwater levels are expected to be limited to near the diversion channel and within the LAA.

The magnitude of this effect would be low to moderate because seepage could result in changes in groundwater quality beyond the range of expected natural variability in the diversion channel. Additionally, this would be a continuous and irreversible effect as it is expected that the diversion channel would be in place indefinitely.

Project activities such as road construction, reclamation, reservoir sediment clean up, channel maintenance, and road and bridge maintenance activities occur on or above the land surface, and by extension above the groundwater table, and are not expected to lead to interactions with groundwater under normal circumstances. The Proponent does not anticipate significant effects to the quantity or quality of groundwater due to project-related construction and dry operation activities.

Flood and Post-Flood

Interactions between the Project's flood and post-flood phases and groundwater quantity and quality include:

- changes to groundwater quantity or flow patterns; and
- changes to groundwater quality through infiltration and changes to surface water quality.

Interaction with groundwater can occur during the filling and draining of the reservoir and are dependent on the scale of the flood event (e.g., design flood, 1:100 year flood). During a design flood, effects on groundwater quantity would occur in localized areas near the diversion channel, dam structure, and off-stream reservoir. Changes in groundwater levels range from a lowering of approximately nine metres within the diversion channel, to an increase of 24 metres near the upstream toe of the dam. The maximum extent of effects is within the LAA and north of the Elbow River. Any groundwater seepage out of the off-stream reservoir and into the Elbow River would not be perceptible compared to the flow rates in the Elbow River during a design flood.

Effects to groundwater quantity would be limited to the LAA and north of the Elbow River. Further effects are only expected in limited areas where the groundwater table is near ground surface. Project effects to groundwater supply wells would not affect its intended purpose or potability. Groundwater quality is not anticipated to exceed the Guidelines for Canadian Drinking Water Quality for a consecutive period exceeding 30 days for parameters that do not already exceed the guidelines under existing conditions.

Effects to groundwater quality may occur due to the changes to groundwater flow patterns near the Elbow River valley or in areas near the diversion channel and off-stream reservoir. Retention of flood water in the reservoir during operation, as well as downward infiltration of flood affected surface water (with potentially relatively higher sediment loads) into the subsurface groundwater system could result in changes in groundwater quality. Due to the very low hydraulic conductivities of the upper sediments in the reservoir area, the groundwater flow velocities in the area are very low. Groundwater levels are anticipated to recover to pre-flood levels with one year following the end of the flood, and in turn infiltration of surface water and migration away from the off-stream reservoir would be limited to the same time period.

There are no likely significant residual effects on groundwater quantity and quality because there would be limited interaction of the Project with groundwater resources, limited areas over which infiltration could occur, a short retention time period, and limited flow paths for potentially affected water.

6.2.2 Proponent Key Mitigation Measures, Monitoring and Follow-Up

Construction and Dry Operations

- Construction dewatering will be in accordance with the terms and conditions of the provincial *Environmental Protection and Enhancement Act* and *Water Act* approvals and the federal *Fisheries Act* and *Navigable Waters Protection Act*.
- The Proponent will develop a Care of Water Plan (Alberta Transportation's *Civil Works Master Specifications for Construction of Provincial Water Management*) that will include the use of cofferdams, pumping systems, sumps, pipelines, channels, flumes, drains and other dewatering works to permit construction of the work in the dry.
- Construction dewatering will be minimized through diligent construction planning.
- Existing water wells within the reservoir footprint will be decommissioned and plugged off to prevent groundwater contamination and to prevent flood waters from infiltrating nearby water wells.

- Seepage in the dry diversion channel will be allowed to infiltrate back into the subsurface, or flow back into the Elbow River via surface water drainage pathways.

Follow-Up and Monitoring

- Groundwater monitoring during construction will involve the inspection of disturbances to the groundwater system, including monitoring of construction dewatering and deep excavations.
- Prior to construction, the Proponent will finalize a Groundwater Monitoring Plan in consultation with appropriate regulators.
- The Proponent will include groundwater monitoring locations (wells) that are within or immediately adjacent to Project infrastructure, around the perimeter of the reservoir, and between the Project and potential receptors.
- Data to be collected will include water level and the broad suite of analytical parameters, including routine major ions, dissolved metals, nutrients, various organic parameters including benzene, toluene, ethylbenzene, xylenes (BTEX) and F1 to F2 fraction hydrocarbons, and bacteriological parameters.
- A selection of domestic water wells outside the project footprint but within the LAA will be sampled during dry operations and as soon as practical following a diverted flood.
- If exceedances in groundwater parameters are noted, the following steps will be taken:
 - re-evaluate field and laboratory data to identify potential issues that could result in the exceedance and have the lab recheck the results and reanalyze the sample
 - identify potential well integrity issues that could result in the exceedance
 - re-sample the monitoring well in question and analyze to verify the concentration
 - increase the sampling frequency for the affected monitoring well if the trigger is confirmed
- Follow-up action will then be initiated to further address the exceedance. Alberta Environment and Parks (as operator of the Project) will initiate one or more of the following actions:
 - evaluate the potential sources or causes of the parameter concentration increases
 - conduct a field assessment which may include installing additional monitoring wells to delineate the extent of impacts, both horizontally and vertically implement appropriate management controls to mitigate the impact
 - identify, design and implement appropriate engineering control or remedial measures
- Changes in water quality that cause constituents to exceed *Canadian Drinking Water Quality Guidelines* will be further investigated and a remediation plan developed in consultation with appropriate regulators.

Additional mitigations, follow-up, and monitoring measures applicable to project related effects from groundwater and hydrogeology can also be found in the following chapters of this report: Surface Water and Hydrology (Chapter 6.3), Indigenous Peoples—Current Use of Lands for Traditional Purposes, and Physical and Cultural Heritage (Chapter 7.4), Indigenous peoples’ health and socio-economic conditions (Chapter 7.5), Federal Lands (Chapter 7.6), and Accidents and Malfunctions (Chapter 8.1).

6.2.3 Views Expressed

Federal Authorities

Natural Resources Canada expressed that additional information is needed to fully understand the groundwater modelling but concluded that additional information or alterations to the groundwater modelling would likely not result in changes to the Proponent's conclusions and that results would not be significantly altered.

Indigenous Nations

Multiple Indigenous Nations provided comments and views on the impacts of the project to surface and groundwater on current use, physical and cultural heritage, and health and socioeconomic conditions.

The main concerns related to groundwater and hydrogeology included:

- Multiple Indigenous nations expressed concerns about potential groundwater effects that could affect waters that run through traditional lands. Stoney Nakoda Nations and Tsuut'ina Nation noted that the waters that flow through the traditional lands have sustained their people since time immemorial. Multiple Indigenous nations indicated that there is cultural and spiritual significance of water, and that project interference with natural flow of water will have impacts on cultural practices, and Indigenous Nations will experience changes in their own ways. Effects on Indigenous peoples' current use of the lands and resources for traditional purposes and physical and cultural heritage are discussed in Chapter 7.4.
- Tsuut'ina Nation identified Elbow River as a source of drinking water and noted the importance of the river's connection to groundwater. Tsuut'ina Nation indicated that the reserves' domestic drinking water depends on the groundwater in the Elbow River Alluvial Aquifer. Tsuut'ina noted that there are over 1,500 wells on their reserve. Effects to federal lands are discussed in Chapter 7.6.
- Multiple Indigenous nations expressed concerns regarding potential effects on water quantity or quality within water wells or groundwater dependent springs; potential for increased flooding of land related to groundwater discharge; changes in groundwater quantity or quality that in turn affect groundwater dependent traditional uses.
- Multiple Indigenous nations provided comments regarding the impacts to drinking water quantity (availability of groundwater and surface water) and quality (including mercury and methylmercury concentrations) on the health and socioeconomic conditions. Effects on Indigenous peoples' health and socio-economic conditions are discussed in Chapter 7.5.

Public

The protection of groundwater resources was noted to be of importance to local landowners due to their reliance on groundwater for potable and agricultural uses. Concerns were also expressed about how the project will interact with groundwater resources and the effects of these interactions on water well yields, groundwater quality, springs, wetlands, agricultural productivity and interaction with surface water resources.

Concerns were raised about the flood and post flood impacts to groundwater including but not limited to residues, pollutants, and sediments that have the potential to affect drinking water quality, including for residential purposes.

6.2.4 Agency Analysis and Conclusions

The Project has the potential to result in changes to hydrogeology and groundwater that may impact groundwater-dependent traditional uses and culturally sensitive areas, drinking water, and water used for domestic purposes. Agency analysis and conclusions as they relate to project effects to groundwater quality and quantity are discussed in Chapter 7.4 (Indigenous Peoples—Current Use of Lands for Traditional Purposes, and Physical and Cultural Heritage), Chapter 7.5 (Health and Socio-economic Conditions of Indigenous Peoples), and Chapter 7.6 (Federal Lands). Overall, conclusions drawn in these chapters are informed by the Agency’s understanding that changes to groundwater resulting from the project are low magnitude, local, intermittent, short-term, and reversible, with the application of the mitigation, monitoring, and follow-up measures outlined in this chapter. The Agency understands that while modelling of potential effects to groundwater may not be fully understood at this time, additional detail in this regard would not affect associated conclusions. The Agency is satisfied that project effects to groundwater are not expected to affect yield or quality of ground water supply wells, such that they would be rendered unusable for their intended purposes.

Key Mitigation Measures to Avoid Significant Effects and Follow-up Program Requirements

The Agency considers the mitigation, monitoring and follow-up measures proposed by the Proponent listed in Section 6.2.4 to be necessary to ensure there are no significant adverse effects to the environment. The Agency considered the following additional key mitigation, monitoring and follow-up measures identified through expert advice from federal authorities, and comments received from Indigenous nations and the public:

- As a part of the Groundwater Monitoring Plan, the Proponent will include water well locations in between the Project and Tsuut’ina IR 145. Results of the monitoring of these wells will be communicated with Tsuut’ina Nation.

6.3 Hydrology and Surface Water Quality

The Project could cause residual effects on water resources through:

- Changes to the hydrology of the Elbow River, tributaries, and wetlands in the PDA
- Changes to surface water quality in the Elbow River

With input from federal authorities, Indigenous nations, and the public, the Agency has summarized the Proponent’s assessment on the changes to hydrology and surface water. This summary supports the analysis of fish and fish habitat (Chapter 7.1), Indigenous peoples’ health and socio-economic conditions (Chapter 7.5), and Indigenous peoples’ current use of lands and resources for traditional purposes and physical and cultural heritage (Chapter 7.4) of this report, including the mitigation and follow-up measures.

6.3.1 Proponent's Assessment of Environmental Effects

The primary purpose of the Project is to mitigate downstream flood hazard to the City of Calgary by modifying the hydrology of the Elbow River during high flows by temporarily diverting water. This hydrological interaction is intentional and expected.

The Project would be designed so that diversion can occur when flows exceeds 160 cubic metres per second in the Elbow River. The aim of this diversion would be to maintain 160 cubic metres per second in the Elbow River, while enabling total flows of up to approximately 760 cubic metres per second where the diversion capacity of 600 cubic metres per second is met. Diverted waters would be stored in the off-stream reservoir until release, through the low-level outlet.

In response to concerns raised, the Proponent introduced two operational scenarios for releasing floodwater from the off-stream reservoir: early and late releases. In the early release scenario, floodwater would be stored until the flow in the Elbow River drops below 160 cubic metres per second. This is the earliest that water could be released as the risk of flood damage would begin to accrue downstream of Glenmore Reservoir when the flow in the river exceeds 170 cubic metres per second. In the late release scenario, floodwater would be stored in the reservoir until the flow returns to bankfull flow rates, 47 cubic metres per second, in the Elbow River. Actual operational release could occur at any point between those two scenarios.

Hydrology

Construction and Dry Operation

Changes in hydrological regime and sediment transport dynamics could result during the Project's phases of construction and dry operation, where activities are limited to maintenance.

The Project would have the potential to change hydrology during construction and dry operation as clearing, grading, and construction of the diversion channel, dam, and floodplain berm could change the runoff response to precipitation events. Increased compaction of surfaces could result in less infiltration and the potential for enhanced runoff. Similarly, removal of vegetation may also increase runoff because of lowered surface roughness. However, given the distance of the majority of the PDA from active channels, increases in runoff would unlikely cause changes within the larger hydrological regime of the Elbow River.

Permanent diversion of five small tributaries intersected by the diversion channel and the dam would affect the input of flow from these tributaries into the Elbow River. However, the Proponent stated that the change of direct flow input into the Elbow River from the five intersected tributaries is anticipated to be negligible.

Construction and maintenance activities could result in the release of suspended sediment and bedload-sized material into the Elbow River and the low-level outlet. However, best management practices and implementation of erosion and sediment control plans would mitigate this release.

During dry operation, localized changes in hydraulics around the diversion structures in the Elbow River may result in shifts in the location of the channel scour and deposition of bedload material. However,

these effects would be localized and are unlikely to have a measurable effect on downstream sediment transport. Further, the changes in sediment transport during the construction and dry operation phases of the Project were evaluated at the watershed scale. Due to the limited nature of Project interactions expected with sediment transport during these phases, the Proponent does not anticipate any residual effects on sediment transport.

Interactions between Project construction and dry operations and hydrology (i.e., surface water quantity) are not anticipated to have residual effects to hydrological regime and sediment transport dynamics. Flow in the Elbow River and the low-level outlet would not be impeded and intermittent flow from the diverted small tributaries, including any potential groundwater seepage, would be negligible. No changes to the existing hydrological conditions of the Elbow River are anticipated as a result of construction or dry operations.

Flood and Post-flood

Flood and post-flood operations could result in changes to hydrology through changes in suspended sediment concentrations in the reservoir, the low-level outlet, and the Elbow River; deposition of sediment in the reservoir; and a change in channel morphology in the low-level outlet. Effects from evaporation from the reservoir during retention of floodwater are anticipated to be negligible.

The Proponent anticipates that the diversion of floodwater would cause a high magnitude effect on suspended sediment concentrations and local suspended sediment yields in the Elbow River. Floods larger than the 1:10 year flood would cause sediment yield reductions greater than 30 percent from existing conditions, because water high in sediment would be diverted into the reservoir and some amount of sediment would be deposited prior to the water being released. Release of water from the reservoir through the low-level outlet would temporarily increase localized suspended sediment concentrations and yields in the Elbow River. If flood flow rates in the Elbow River exceed 760 cubic metres per second, a larger portion of the flood flow and associated suspended sediment would remain in the Elbow River. During a flood, alteration of both peak flow rate and flow volume is the intended purpose of the Project.

Given that the probability of diversion would be 10 percent or less in any given year, changes to the hydrological regime due to diversion would be unlikely to modify the long term median flow values in a meaningful way. During retention of water in the reservoir, a portion of the suspended sediment would permanently settle at the bottom of the reservoir. The longer the residence time, the greater the deposition that is expected. Upon release back into Elbow River through the low-level outlet, sediment remaining in suspension within the reservoir would be removed together with sediment that is remobilized and resuspended.

Channel Morphology

Operation of the Project would change the nature of bedload transport in the Elbow River, resulting in downstream changes in channel morphology as a function of reduced shear-stresses and, thus, the potential for mobility of bedload.

Changes in morphology in the Elbow River would likely take the form of reduced mobilization on bar heads, decreases in degradation (decreased deposition) and aggradation (increased deposition), and changes in channel planform (the pattern of a river when viewed from directly above). Additional input

of discharge from tributaries would also change flow dynamics downstream of those confluences and subsequently, the geomorphology. Overall, the combination of these effects could affect fish habitat structures downstream due to changes in bed mobility during large, low probability floods, which would modify substrate composition and structure (e.g., changes in bedform structure). Effects to fish and fish habitat are discussed in Chapter 7.1 of this report.

During the release of floodwater, high magnitude changes to geomorphology would be expected in the low-level outlet. However, the majority of the mobilized bed material was predicted to remain within the low-level outlet and minimal interaction with Elbow River is anticipated to occur. Further engineering review of the foundation soil resulted in the modification of the location of the low-level outlet, moving it approximately 190 metres southwest from the original design location, and the need for channels to and from the low level outlet. An additional back-up gate was also added to improve operations reliability. The new design includes measures to reduce erosion along the full length of the low level outlet, to further mitigate sediment mobilization and to reduce sediment input into Elbow River.

During diversion, there would be a high magnitude effect on the morphology of the Elbow River and low level outlet channel. The Project would reduce aggradation and degradation of the Elbow River during a large flood. Although high magnitude effects are predicted, channel planform and bedload movement is predicted to be maintained such that only the magnitude of aggradation and degradation during diverted floods would be affected. The current form of Elbow River is unlikely to change significantly due to the operation of the Project; however, high residual effects to the hydrology of the Elbow River due to flood operations are still anticipated.

Surface Water Quality

Construction and Dry Operation

Construction effects to water quality and quantity would include water withdrawals for dust suppression and other construction needs, increased erosion potential from riparian vegetation removal and grading, release of sediment into watercourses through agitation or excavation of the stream bed or banks, and herbicides applied on land to control weeds entering watercourses.

Water withdrawals for dust suppression and other construction needs would be required and could affect downstream water quality by decreasing assimilative capacity. Given that any water withdrawals during construction would be short term and of relatively small quantity, no effects to downstream assimilative capacity would be anticipated, and therefore, this effect pathway is not discussed further.

Land-based construction activities such as riparian vegetation removal or grading would increase erosion potential, resulting in mobilization of sediments to a water body. In addition, instream construction activities and agitation or excavation of the stream bed or banks could cause the release of sediment into a watercourse.

Vegetation along the Project infrastructure would be maintained and weed growth managed, including the application of herbicides to control weeds. Herbicides applied on land to control weeds could enter local watercourses.

Project construction and dry operation phases are not anticipated to result in residual effects to surface water quality. Changes in suspended sediment concentrations, considering construction mitigation measures and construction monitoring, would be limited to construction and within the PDA. The predicted effect of the construction of the Project on downstream water quality in the Elbow River and the Glenmore Reservoir is negligible, given that sediment concentrations will be monitored during construction and mitigation measures will be implemented if necessary.

Flood and Post-Flood

Surface water quality in the Elbow River would be affected by both reservoir filling and draining, primarily by settled suspended sediment that is mobilized during high flows in the off-stream reservoir and the low-level outlet. Surface water quality could also be affected by methylation of metals and changes in water temperature and dissolved oxygen in the reservoir during reservoir filling and retention. During reservoir draw down, released water from the reservoir would affect the low-level outlet and Elbow River as the water could contain methylmercury as a result of organic matter decomposition in the reservoir, and differences in temperature and dissolved oxygen content. The amount of time the water would be held in the reservoir would affect the sediment, methylmercury, temperature, and dissolved oxygen levels.

Sediment concentrations in the Elbow River would likely be high during natural flood conditions; the Project would not substantially change these high concentrations during diversion. A portion of the suspended sediment concentrations would settle out of the water when retained in the reservoir and would stay in reservoir during water release. During the last few days of water release back into Elbow River, suspended sediment concentrations are predicted to increase in the low-level outlet and cause a short-term peak due to resuspension.

An early release of water from the reservoir would provide some benefits to water quality over late release as the temperature in the reservoir would not increase as much in the early release scenario compared to the 1:10 year flood with a late release scenario. However, in some cases, a late release would have benefits over early release: during the 1:100 year flood with a late release scenario, there would be more time for suspended sediments to deposit in the reservoir, thereby reducing the effects on fish in the river and decreasing the concentration of nutrients released from the reservoir.

The Proponent modelled predicted total suspended solids concentrations and predicted exceedances of the *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (CCME 2003) for all flooding scenarios, except early release for the 1:10 year flood. In both the 1:100 year and 2013 design flood scenarios, total suspended solids concentrations would be higher than the CCME guidelines levels, regardless of when the release occurs. However, an earlier release time would result in reduced sediment deposition within the reservoir due to the reduced amount of time that water spends in the reservoir. As a result, total suspended solids concentrations in the Elbow River would be greater in early release than in late release. The longest period of high levels of total suspended solids would occur in a design flood scenario, resulting in 35 days on average of exceedances in the Elbow River.

The predicted sediment deposition patterns on the channel bed, due to release of water from the reservoir, would not affect fish habitat in the downstream extent of the Elbow River between the Project and Glenmore Reservoir.

During flood operation, potential exceedance of the total suspended solid guidelines during water releases are considered to be significant; however, they are predicted to occur infrequently and are reversible. The magnitude and duration of residual effects are reduced during the more frequent events such as the 1:10 year flood. Residual effects would increase during the less frequent, larger magnitude floods, such as the 1:100 year and design floods. The Project would increase suspended sediment concentrations for a short duration (days) at the end of release of water back into Elbow River.

There would be a potential for methylmercury to be retained in water as it is released back into the Elbow River because vegetation and soil would be inundated. The estimated low and high methylmercury concentrations in all flooding scenarios would be below the *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (CCME 2003). No toxicological effects on aquatic life are anticipated as the guideline concentration would not be exceeded. After release of water into the Elbow River, the reservoir area would not contribute methylmercury; microbial decomposition processes would cease in the reservoir. It is possible that decomposition processes continue in relatively small areas near the low-level outlet. However, these processes are not expected to affect water quality measurably in the Elbow River downstream of the Project.

Depending on the level of flooding and length of time water is held in the reservoir, temperature in the river could increase or decrease as a result of the retained water being released back into the river. Water temperature and dissolved oxygen would be most affected in the reservoir during smaller floods (1:10 year flood), with a late release when water levels in the reservoir are shallow and reservoir water temperatures are affected by solar radiation and summer air temperatures. Dissolved oxygen is predicted to decrease gradually over the duration water is held in the reservoir, up to two milligrams per litre. Effects on the river from released water would only be expected to last two days; however, they would extend downstream for at least 24 kilometres. Water temperatures would be monitored in the reservoir; however, due to the short duration, mitigation measures for increased water temperatures were not proposed.

During larger floods, water levels in the reservoir are sufficiently deep that reservoir water temperatures would not increase at the same rate as in the Elbow River, thus once water is released it will have a slight cooling effect on the river. In larger flooding scenarios, dissolved oxygen levels were predicted to decrease slightly, but not to the extent that fish and aquatic life would be threatened. Dissolved oxygen concentrations in the low-level outlet channel were expected to increase due to increased water velocity, increased mixing, and re-aeration of water.

If a change in temperature did occur and if dissolved oxygen remains below the saturation point, effects on water quality are anticipated to be temporary and localized due to the rapid mixing with the water in the Elbow River. The Project is not anticipated to cause likely significant residual effects to temperature and dissolved oxygen in the Elbow River.

During post-flood operations, sediment clean up, channel maintenance, and road and bridge maintenance could introduce sediment to the low-level outlet and into Elbow River; however, no residual effects from post-flood operations were anticipated as erosion control and other mitigations would be employed.

6.3.2 Proposed Mitigation Measures, Monitoring and Follow-Up

The mitigation measures and monitoring activities proposed for early release and late release would be applicable for the full spectrum of release scenarios, although the degree to which individual measures would be applied would depend on the size of the flood and the timing of release. A list of measures and activities are outlined by project phase.

Construction and Dry Operation

- All applicable regulatory notifications, permits, and authorizations including the *Environmental Protection and Enhancement Act*, *Water Act*, *federal Fisheries Act*, and *Navigable Waters Protection Act*, will be obtained before the start of any instream construction.
- Instream work areas will be isolated from the main river flow by using cofferdams, silt fences and turbidity barriers.
- Total suspended solids levels will be controlled and reduced using silt fences and turbidity barriers to ensure the water quality from care of water system discharges is made equal to or better than the initial water quality.
- Water will be discharged in a manner that avoids erosion by using turbidity barriers, containment berms and settling ponds.
- Transport of hazardous materials to and from the Project site, storage, use and disposal will be in accordance with regulatory requirements.
- Machinery and construction equipment will arrive on site in a clean and mechanically sound condition, and be maintained free of oil, fuel and other fluid leaks, invasive species and noxious weeds. Equipment will be inspected daily, and any leaks will be immediately repaired. Service vehicles to carry fuel spill clean-up materials.
- Fuel and lubricant storage tanks will be contained with berms and impermeable liners, and will be a minimum of 100 metres from rivers, streams and surface waterbodies.
- Excavated materials and debris will be stockpiled above the highwater mark and in such a way as they do not enter the watercourse. Silt fences will be used to contain soil erosion.
- Activities near water will be planned and completed in the dry and isolated from watercourses to ensure that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, other chemicals or other deleterious materials do not enter the watercourse.
- Post construction, surface drainage patterns will be re-established where possible.
- Drainage and erosion control measures (e.g., silt fences) will be set up around stockpiles to prevent erosion.
- Riprap materials to prevent erosion will be installed on the diversion channel side slopes in critical areas such as outside curves, on the water face of the off-stream storage dam, and where the diversion channel enters the reservoir.
- Bank and riparian areas disturbed during construction will be reclaimed and re-vegetated. Use of native or agronomic plant species and native seed species will be used in reclaimed areas to maintain a strong sod-layer and contribute to long term stability of soils to prevent erosion.
- Sediment laden dewatering discharge will be pumped into a vegetated area or settling basin to allow sediment to settle out before returning it to the water body.

- Silt fences, turbidity barriers and clean granular berms will be used to contain the sediment and other deleterious substances and to prevent it from entering a watercourse or water body.

Flood and Post-Flood

- The diversion channel outfall into the reservoir and the low-level outlet outfall that returns water back into the Elbow River will include erosion protection and energy dissipation blocks to control flows.
- Soil testing of deposited sediment will be conducted after each flood event.
- Low-level outlet gates will be used to control the flow rate to allow further settling of sediment prior to release. A turbidity curtain may also be employed in the off-stream reservoir to slow velocities and promote additional settling during drawdown, if adaptive mitigation reveals it is necessary.

Monitoring and Follow-up

- Effects monitoring (i.e., monitoring for changes to water quality) will be used to determine if project-related changes occur in the Elbow River. Where negative effects to the usability of the Elbow River water are detected, Alberta Environment and Parks will provide information and advisories to local and downstream users, including the City of Calgary, so water use can be modified to mitigate negative consequences (e.g., avoid using water or increase treatment options). Monitoring is scalable if changes to water quality are detected; the spatial extent of monitoring sites and frequency of sampling can be increased on an as-needed basis.
- The monitoring program will include suspended sediment monitoring in the Elbow River.
- Suspended sediment concentrations will be monitored upstream and downstream of instream construction activities to identify potential sediment-related effects from construction.
- Total suspended solids will be monitored and measured in conformance with Alberta Transportation's *Turbidity and Monitoring Specifications*.
- Prior to construction, water quality samples will be collected from the Elbow River to establish baseline mercury and methylmercury levels in the river.
- During reservoir operations (i.e., while water is held in the reservoir and during reservoir drawdown), water samples for total mercury (ultra-low level) and methylmercury analysis will be collected at the following locations: Elbow River upstream of the intake structure (upstream), off-stream reservoir, and low-level outlet below the off-stream reservoir outlet gate.
- Threshold triggers will be used to indicate when increased monitoring should be implemented according to the relevant guidelines as follows:
 - *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (CCME 2003)
 - *Environmental Quality Guideline for Alberta Surface Waters* (Government of Alberta 2018)
- Water quality monitoring stations will be located in the Elbow River upstream of the intake structure (upstream), within the off-stream reservoir, within the low-level outlet below the off-stream reservoir outlet gate, and in the Elbow River downstream of the outlet gate (downstream). These locations will be determined in consultation with Environment and Climate Change Canada and Fisheries and Oceans Canada.

- Following a flood event where water is diverted from the Elbow River, channel morphology studies will be conducted on the Elbow River and outlet channel.
- Light Detection and Ranging (LiDAR) mapping and instream observations of the Elbow River and outlet channel will be carried out both prior to release of water from the reservoir and after such a release. The results will be analyzed and compared to modelling results presented in the EIS and provided to Alberta Environment and Parks and to Fisheries and Oceans Canada.
- Following a flood that results in the diversion of water to the reservoir and prior to discharge from the reservoir, water samples will be collected at the low-level outlet channel and analyzed for various water quality parameters. Results will be provided to the City of Calgary and appropriate regulatory bodies.
- Adaptive management (including the use of a turbidity curtain) will be implemented as it may determine that additional settling during drawdown is necessary to slow velocities of water.
- A terrain and soils follow-up program will be developed and consist of erosion and sediment monitoring as part of the construction contractor's permanent erosion and sediment control plan for the Project, as required under Alberta Transportation's Erosion and Sediment Control Manual.
- Monitoring of sediment will include daily visual inspections for signs of sediment influx. If such occurrences are noted, the source of the sediment will be investigated by the environmental inspector and actions to prevent further influx will be implemented. Mitigation measures will include those from Alberta Transportation's *Erosion and Sediment Control Manual*.

6.3.3 Views Expressed

Federal Authorities

During the review process, the Proponent provided a draft Surface Water Monitoring Plan, which generally outlined monitoring thresholds for action, as well as proposed monitoring sites, including upstream, reservoir, outlet channel, and far downstream at the Sarcee Bridge. Environment and Climate Change Canada identified that such a distant downstream location would not be sufficient to assess the effectiveness of mitigation or the need for additional mitigation measures and adaptive management. Environment and Climate Change Canada requested that additional near-field monitoring be implemented with corresponding feedback to apply mitigation and adaptive management.

Based on the information provided to date, and the most recent water quality modelling data, there may be the potential for residual unmitigated effects to aquatic life from the Project. The potential for effects is dependent on the concentration of and duration of exposure to total suspended solids, which vary across flood and release scenarios. Due to the uncertainty in the flood conditions that may occur, the release strategy employed by the Proponent, the effectiveness of mitigation measures, and water quality monitoring will be crucial aspects of the Project in avoiding significant adverse effects. Water quality monitoring conducted at near-field sites can reduce uncertainty and validate the effectiveness of mitigation and adaptive management strategies.

Additionally, Environment and Climate Change Canada indicated that the Proponent has not provided information on the potential for accumulation of methylmercury in the food web of the reservoir or downstream environment. Without this information, the potential for residual effects is unknown. To appropriately determine whether mercury in the food web of the reservoir or downstream environment occurs after flooding, baseline measurements of mercury and methylmercury need to be collected in the

food web of the upstream and downstream environment as well as in the reservoir directly after flooding.

Indigenous Nations

Water is of paramount importance to all Indigenous nations; it is said to be a life force that connects all things. Waterbodies and water quality across the province has been affected by industrial development and agricultural leases. Water affects fish, wildlife, and Indigenous nations' ability to undertake traditional practices.

Indigenous nations have noted that the waters that flow through the traditional lands have sustained their people since time immemorial. Multiple Indigenous nations noted concerns about changes to upstream and downstream water quality, effects to drinking water quality (including methylmercury concentrations), and availability of groundwater and surface water resources. Tsuut'ina 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.

Multiple Indigenous nations expressed concerns regarding effects to water quality due to silt build up in the Elbow River as well as in the off-stream reservoir due to flooding, particularly the extent of debris and sediment that may be left in the reservoir as a result of a flood. Additionally, concerns were raised regarding potential surges due to initial water diversion that may flood high bank riparian areas that would not otherwise be impacted if the flood were permitted to proceed naturally. Effects of the Project on Indigenous peoples' current use of lands and resources for traditional purposes and physical and cultural heritage are discussed in Chapter 7.4.

Public

Members of the public raised concerns regarding an increase in sedimentation as a result of the Project, resulting in effects to water quality in the area. Concerns were also raised about the Project resulting in herbicides flowing into drinking water sources.

Rocky View County indicated concern regarding downstream effects to gravel bars, including the types and sizes of vegetation, due to operation of the Project. Additionally, Rocky View County noted concerns about effects to the Elbow River, wetlands, and other sensitive areas, due to sediment deposition at the confluence of the low level outlet and Elbow River after draw down occurs. In May 2020, Rocky View County withdrew all objections in relation to the Project proceeding through the regulatory process.

6.3.4 Agency Analysis and Conclusion

The Agency is of the view that the Proponent has adequately described the potential effects of the Project to surface water and hydrology. The Agency acknowledges that the Project will cause residual effects to surface water quality and modify the hydrology of the Elbow River during high flows by temporarily diverting and retaining water. The Agency understands that depending on the size of the flood and time retained within the reservoir, potential residual effects to aquatic life exist. Effects to fish and fish habitat are discussed in Chapter 7.1 of this report.

Key Mitigation Measures to Avoid Significant Adverse Effects and Follow-up Program Requirements

The Agency considers the mitigation, monitoring, and follow-up measures proposed by the Proponent listed in Section 6.3.3 to be key mitigation measures and necessary to ensure there are no significant adverse effects to the environment as defined by Section 5 of CEEA 2012. The Agency considered the following additional key mitigation, monitoring, and follow-up measures identified through expert advice from federal authorities, and comments received from Indigenous nations and the public:

- The Proponent's Surface Water Monitoring Plan will include near field monitoring, with corresponding feedback to apply mitigation, and actions and mechanisms to assess and mitigate the potential effects to aquatic life.

6.4 Terrestrial Landscape

The Project could cause residual effects on the terrestrial landscape, including vegetation, wetlands, and wildlife habitat, through:

- alteration or loss of terrestrial habitat including change in terrain stability, change in soil quality and quantity, and loss of native upland, wetland plant communities or wetland functions from the LAA.

With input from federal departments, Indigenous nations, and the public, the Agency has summarized the Proponent's assessment on the changes to terrestrial landscape, vegetation and wetlands. This summary supports the analysis of fish and fish habitat (Chapter 7.1), migratory birds (Chapter 7.2), species at risk (Chapter 7.3), Indigenous peoples' current use of lands and resources for traditional purposes and physical and cultural heritage (Chapter 7.4), and Indigenous peoples' health and socio-economic conditions (Chapter 7.5) of this report, including the mitigation, monitoring and follow-up measures.

6.4.1 Proponent's Assessment of Environmental Effects

The alteration or loss of terrestrial habitat was assessed by the following factors: change in terrain stability, change in soil quality and quantity, loss of native upland or wetland plant communities, and a change in wetland functions from the LAA.

Construction and Dry Operation

No interaction with terrain stability is expected during construction and dry operations because the terrain is flat and stable and maintenance activities are not anticipated to change soil quality or quantity.

Overall, the change in terrain stability and change in soil quality and quantity following construction and dry operations is an adverse change that is moderate in magnitude, local in extent (confined to the PDA), and long-term. The effect at this stage of the project on soil quality is assessed as not significant.

Construction and dry operations could result in a loss or change in vegetation species diversity and wetlands function. A direct loss of a plant species of management concern, traditional use plant and wildlife species, wildlife habitat, and wetland areas could occur due to vegetation clearing, ground disturbance, deposition of dust, or a change in surface or groundwater flow patterns. Indirect effects on plant species could occur from herbicide applications during weed control and on wetland areas or wetland types due to construction activities.

Residual effects on vegetation and wetlands during construction and dry operations would be short-term to long-term duration. During construction, the Project will result in the alteration and permanent loss of terrestrial habitat, including native grassland, where there is overlap with permanent Project structures. However, reclamation of the construction area will result in a variety of changes to the vegetation in the area. Grasslands are expected to re-establish within three years but resemble early seral communities for 12 years or more beyond construction. Tree and shrub communities will become grassland with trees and shrubs establishing naturally in time. The amount of wildlife habitat directly and indirectly affected is relatively small compared to the availability of wildlife habitat remaining in the RAA. The long-term persistence and viability of traditionally harvested wildlife species are unlikely to be affected.

Flood and Post-Flood

Potential effects to vegetation species, wetlands, and wildlife habitat could occur due to the deposition of sediment from flooding operations. The Project could lead to changes in habitat from traditionally used plant or wildlife species that support hunting, trapping and plant gathering activities. In both early release and late release, sedimentation could lead to effects on plant community diversity, plant species diversity, and wetland function, which could result in effects on wildlife habitat and wetlands. Based on model results, most effects for early release and late release will be to agricultural land.

The maximum sediment depth is predicted to be between 2.36 metres and 1.86 metres across the deepest parts of the reservoir in a design flood scenario. In smaller flooding scenarios and if water is released from the reservoir as soon as feasible, less sediment deposition would occur. No effect on plant communities is expected in areas of less than three centimetres of sediment deposition. Most of the sediment deposition is expected to range from ten centimetres to 100 centimetres deep in the reservoir (319 hectares (39.07 percent) for early release; 337.36 hectares (41.32 percent) for late release) in a design flood scenario. Sediment ranging from three centimetres to ten centimetres deep will cover 15.22 percent to 18.96 percent of the reservoir for early release and late release, respectively. Sediment deposition between ten centimetres and 100 centimetres is expected to result in mortality of plants in the herb and short shrub strata, and tall shrub and trees are predicted to survive. Sediment greater than 100 centimetres deep will cover 0.63 percent to 0.69 percent for early release and late release, respectively. Complete vegetation loss, including herbs, shrubs and trees, is expected in areas of greater than 100 centimetres of sediment deposition.

Sediment deposition will reduce wildlife habitat suitability, depending on sediment depth during post-flood operations. Although this sediment deposition will temporarily reduce habitat suitability in the reservoir, it is expected these areas will be recolonized by vegetation from the surrounding area and seeded if revegetation targets are not met. Areas that might receive deeper sediment (e.g.

ten centimetres to 100 centimetres or great than one metre) would require a longer recovery time for habitat to become suitable for wildlife. The amount of wildlife habitat directly and indirectly affected is relatively small compared to the availability of wildlife habitat remaining in the RAA. The long-term persistence and viability of traditionally harvested wildlife species are unlikely to be affected.

For both early release and late release, traditionally used plant species are expected to re-establish by natural recruitment, and permanent loss of traditionally used plants is not predicted. Similarly, for both early release and late release, the amount of wildlife habitat directly and indirectly affected is relatively small compared to the availability of wildlife habitat remaining in the RAA. The long-term persistence and viability of traditionally harvested wildlife species are unlikely to be affected.

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. Effects on one rare plant as well as the potential for effects on unidentified plant species of management concern could occur. It is likely that habitat for plant species of management concern exists elsewhere in the RAA as affected vegetation and wetland land units exist elsewhere in the RAA. Effects on plant communities of management concern are not anticipated, because none were identified within the RAA.

6.4.2 Proposed Mitigation Measures, Monitoring and Follow-up

Construction and Dry Operation, and Flood and Post-Flood

- Construction and maintenance activities will be restricted to the reservoir footprint to reduce the area of disturbance during construction and post-flood operations.
- To the extent possible, wetlands will be avoided (including temporary disturbance). Where avoidance is not possible, disturbance will be minimized. Temporary disturbance will only have above ground vegetation clearing, leaving the soils intact. Wetlands will be re-contoured and seeded with an approved custom native wetland seed mix. Permanent disturbance of wetland area will be replaced or compensated for in accordance with the *Alberta Wetland Policy*.
- Any permanent clearing of wetlands will require provincial authorization under the *Water Act*, and permanent disturbance of wetland area will be replaced or compensated for in accordance with the *Alberta Wetland Policy*.
- Revegetate specifically with species of interest for traditional and medicinal use as per discussions with Indigenous nations. Seed mixes and monitoring details will be determined with Indigenous nations and stakeholders.
- Progressive reclamation including revegetation will be conducted in a timely manner to decrease erosion and habitat loss.
- Trees will be allowed to naturally re-establish and forest use will be limited to Indigenous traditional and cultural use.
- Weed control (mechanical and/or chemical) will be implemented where necessary to promote successful revegetation that includes traditional plant establishment and growth. Herbicide will not be applied within 30 metres of plant species or ecological communities of management concern, wetlands or waterbody.

- Topsoil will be stripped and stockpiled for future use in the reclamation of disturbed areas, ensuring topsoil horizon salvage and prevention of admixing. A topsoil replacement plan will be developed for the reclamation of various disturbed areas.
- Pre-construction wildlife surveys will be conducted to establish species-specific mitigation.
- Setback buffers from active nests or dens will be established in accordance with provincial and federal guidelines.
- Restricted activity periods during construction and maintenance will be followed.
- The salvage protocol for wildlife will be developed in consultation with provincial and federal regulators as well as Indigenous nations and included in the final Wildlife Mitigation and Monitoring Plan. The migratory bird and species at risk salvage program will provide opportunities for Indigenous nations to participate in salvage efforts as part of the Indigenous Participation Plan.
- Proposed reduction in water retention time in the off-stream reservoir (when river flows are less than 160 cubic metres per second) to reduce: sediment deposition on native vegetation communities that provide wildlife habitat; amount of particulate matter that will settle out and become sediment; and the number of days habitats are temporarily available to wildlife.

Monitoring and Follow-Up

- The terrain and soils follow-up program will consist of erosion and sediment monitoring developed as part of the construction contractor's permeant erosion and sediment control plan for the project (required under Alberta Transportation's *Erosion and Sediment Control Manual*). During subsequent erosion and sediment monitoring programs, finds will be documented. The Proponent has developed a Draft Vegetation and Wetland Mitigation, Monitoring and Revegetation Plan, which includes monitoring vegetation re-establishment following a flood.
- Soil monitoring will focus on compaction, erosion and areas of poor vegetation growth.
- Areas of sediment deposition where wind erosion may be an issue may be hydroseeded with native plant species and a tackifier to reduce erosion.
- An operation and maintenance plan for the reservoir will be developed that would include sediment stabilization and debris management.
- Disturbed areas will be monitored for noxious and prohibited weeds and species controlled as identified in the *Alberta Weed Control Act* and associated regulations.
- A wildlife mitigation and remote camera monitoring program will be implemented to evaluate the effectiveness of mitigation measures and determine whether Project components impede wildlife movement.

6.4.3 Viewed Expressed

Indigenous Nations

With regards to changes in habitat, Indigenous nations noted concerns regarding the potential for the Project to increase habitat fragmentation causing impediments to wildlife movement. Indigenous nations noted the existence of important wildlife habitat along the Elbow River and that wildlife use the floodplain and wetlands adjacent to the river. Stoney Nakoda Nations proposed that the Proponent provide an overpass for facilitate habitat connectivity and wildlife movement.

Multiple Indigenous nations were concerned about effects to vegetation species of cultural importance, including rare species. They stated that the Proponent's initial assessment, including species selection, species presence, abundance and distribution may be inaccurate due to a lack of engagement of Indigenous peoples. Species specific mitigations were suggested to be required for vegetation species of importance. Indigenous nations expressed the importance of a full understanding of all potential pathways of effects to vegetation and wetlands for meaningful assessment of potential project effects on vegetation and wetlands, including culturally important plant species, and the effects of such changes to Indigenous peoples.

Additional concerns were also expressed regarding revegetation planning and the successful recovery of habitat types being affected (grassland to wetland) to support traditional plants and harvesting. Forested ecosystems were also noted as important to current use, cultural heritage, and the exercise of Aboriginal and Treaty rights.

Piikani Nation expressed their concerns that the Project would adversely affect soil quantity and quality in the LAA as well as vegetation, biodiversity, wetlands, and habitat.

A summary of issues raised by Indigenous nations is presented in Appendix B.

Public

Comments received from the public included concerns regarding the destruction and alteration of wildlife habitat, including wetlands.

6.4.4 Agency Analysis and Conclusion

The Agency is of the view that the Proponent has adequately described the potential effects of the Project to the terrestrial environment. The loss of terrestrial habitat due to the Project would be site specific and partially reversible, as areas cleared during construction will be revegetated. However, habitat types in the LAA would be modified.

Habitat loss due to flooding would be site specific, intermittent, and partially reversible as natural vegetation regrowth and revegetation will occur. The long-term persistence and viability of wildlife species are unlikely to be affected from habitat loss and alteration caused by the Project.

Key Mitigation Measures to Avoid Significant Adverse Effects and Follow-Up Program Requirements

The Agency considers the mitigation, monitoring, and follow-up measures proposed by the Proponent listed in Section 6.4.4 to be necessary to ensure there are no significant adverse effects to the terrestrial landscape. The Agency did not identify any additional key mitigations required.

Additional mitigation, monitoring and follow up measures applicable to the terrestrial landscape, can be found in the following chapters of this report: Migratory Birds (Chapter 7.2), Species at Risk (Chapter 7.3), and Indigenous peoples' current use of lands and resources for traditional purposes and physical and cultural heritage (Chapter 7.4).

7 Predicted Effects on Valued Components

7.1 Fish and Fish Habitat

The Project could cause residual effects on fish and fish habitat through:

- Change in fish mortality and health
- Habitat loss and alteration

The Agency is of the view that the Project is not likely to cause significant adverse effects on fish and fish habitat, including aquatic species at risk, after taking into account the proposed key mitigation measures. The Agency recommends follow up and monitoring measures to evaluate the accuracy of predictions related to fish and fish habitat and to determine the effectiveness of mitigation measures proposed to minimize adverse effects on fish and fish habitat from project activities.

While the Agency anticipates residual effects to fish and fish habitat, the Project would require a *Fisheries Act* authorization and additional mitigation and offsetting measures as a part of that process to ensure effects to fish and fish habitat would be appropriately mitigated or offset. The Agency notes the importance of robust follow-up and monitoring, including timely post-flood fish rescue, to determine the effectiveness of mitigation measures in minimizing adverse effects on fish and fish habitat from project activities.

The Agency's conclusions are based on its analysis of the Proponent's assessment as well as the views expressed by federal authorities (Environment and Climate Change Canada, Fisheries and Oceans Canada, Health Canada), Indigenous nations, and the public.

7.1.1 Proponent's Assessment of Environmental Effects

The Proponent predicted that as a result of the Project, fish and fish habitat may experience adverse effects related changes to fish habitat, mortality risk, and health.

Fish Mortality and Effects to Fish Health

Construction and Dry Operation

The Project would result in an increased risk of direct mortality to individual fish and/or their eggs due to: sedimentation from on-land construction activity; the intensity, duration, and timing of instream work; or the stranding of fish as a result of project-related barriers (such as reduced flows, concrete gate). The operation of equipment and material placement could also affect aquatic organisms that support the fishery. Also, the introduction of toxic (contaminant) substances from construction activities could compromise the health of fish.

The Project would not threaten the long-term persistence or viability of aquatic species of management concern in the RAA with the proposed construction phase mitigation measure in place. During dry operations, it is expected that mortality risk would be reduced to levels similar to existing conditions.

Flood and Post-Flood

The flood and post-flood phases of the Project would cause some fish mortality that would threaten the long-term persistence and/or viability of aquatic species and fish that support fisheries in the RAA. Specifically, during post-flood operations, stranding in the reservoir would be expected to cause mortality of fish that did not swim out of the reservoir during post-flood draining; however, this level of fish mortality was not predicted. The ability to rescue stranded fish would depend on the extent of areas ponded, reservoir drawdown rate, and sediment deposition in the reservoir which effects drainage and fish movement. Also, changes in water temperature due to water released from the reservoir would result in direct mortality as well as cause a variety of sub-lethal or stress related effects on fish, specifically, incubating eggs and spawning adults as these are more susceptible to temperature changes. Flooding of upland areas could lead to increased nutrient concentrations which could lead to eutrophication and have undesirable effects on fish health. Further, turbidity of flood waters and of waters released from the reservoir would affect water quality and subsequently fish mortality.

The plan and design of the diversion structure and reservoir would limit the effects of floods in the Elbow River. The low frequency of floods, along with adjusting the depth of water held in the reservoir, and the rate of drawdown in the reservoir, with monitoring and contingency plans for stranded fish, would avoid and/or limit fish mortality. While the effects on fish mortality are not fully known, efforts to rescue stranded fish could be undertaken during monitoring of receding flood water.

Residual harm to fish due to fish mortality from entrainment and stranding in the reservoir would not be significant if successful fish rescues are undertaken to relocate stranded fish.

Habitat Loss and Alteration

Construction and Dry Operation

The Project would cause the alteration of approximately 5,400 square meters of the bed and banks of the Elbow River at the planned gate structures, debris deflector, and immediately downstream. This would include the permanent alteration of 1,854 square meters of class 2 and 3 run type fish habitat from the footprint of the gate, and the temporary alteration of 2,696 square metres of rapid and class 2 and 3 run fish habitat types from temporary work areas between the gate and diversion canal.

Construction and dry operation activities could change sediment concentrations, water temperatures, habitat structure, nutrient concentration and food supply, migration patterns, and fish access in the Elbow River and tributaries in the LAA. Instream construction activities would result in temporary or permanent alteration or destruction of fish habitat. During dry operations, the concrete gates with depths shallower than 198 centimeters could impede the upstream movement of bull trout during late summer spawning migrations. The transition from the concrete gates to the spilling basin may also create a drop that is too tall for small fish to jump up.

Flood and Post-Flood

The Project would result in direct and indirect alteration of fish habitat during flood and post-flood operations. The diversion of flows from the river could alter habitats by reducing the flows in the river channel, and therefore, local water velocities in the Elbow River. Changes in river velocity from floods can reduce the movement of bedload, reduce scour that creates pools, reduce mobilization and

deposition of gravel that creates salmonid spawning habitat, reduce the mobilization of woody debris, and change the slope and vegetative cover on the banks. It is expected that there would be a temporary increase in turbidity in the outlet channel and in the Elbow River downstream of the low-level outlet during the release of water contained in the reservoir following a flood.

The Proponent determined that residual effects on fish habitat would be high due to the function of bedload movement in Elbow River and low-level outlet. The duration of the effect is likely short- to long-term depending on flood magnitude and the extent of subsequent non-divested flows. It was predicted that natural channel planform and bedload movement would be maintained and only the magnitude of aggradation and degradation during diverted floods would be affected. This indicated that fish habitat in the low-level outlet channel would likely be altered considerably (high magnitude) during release, whereas fish habitat alteration downstream of the low-level outlet, in Elbow River, would be small.

The increased turbidity (transport of cover material and debris) by the flood waters could cause short-term increases in sediment load which could result in short-term, localized adverse effects on surface water quality and aquatic ecology, including fish habitat.

The Project would not result in the destruction of fish habitat by preventing fish passage during flood and post-flood phases. With maintenance on the diversion structure and mitigation, upstream movement of fish during post-flood operations would not differ from upstream movement during dry operations.

Given the infrequency of diversion and the implementation of mitigation measures, the potential change in suspended sediment concentrations downstream is not anticipated to result in residual effects on fish habitat.

The Project would result in direct and indirect alteration of fish habitat during construction, dry operation, flood, and post-flood phases. However, the amount of fish habitat permanently affected or destroyed would be relatively small compared to the availability of fish habitat remaining in the RAA.

7.1.2 Key Mitigation Measures, Monitoring and Follow-Up

Mitigation measures proposed by the proponent to minimize effects on fish mortality and health and on fish habitat are outlined by project phase.

Construction and Dry Operation

- Building material used in watercourses, including concrete, silt fences, turbidity barriers, and containment berms would prevent the release or leaching of substances that may be deleterious to fish.
- Works in water would be timed with respect to the restricted activity periods (RAPs) wherever possible. For the Elbow River, the RAP is May 01–July 15 and September 16–April 15.
 - Condition and use of restricted activity periods will be provided within further project permitting and authorization under the *Fisheries Act*.
- Fish passage in the Elbow River would be maintained throughout the construction phase by diverting the Elbow River and maintaining flows downstream by a temporary bypass channel.

- The location of any instream works would be isolated from the watercourses using silt fences, turbidity barriers and clean granular berms.
- Stream bank and bed protection methods (e.g. swamp mats, pads) would be used if rutting is likely to occur during access to the bed and shore. Temporary access structures would be used where steep and highly erodible banks are present.
- The top substrate from a wetted channel would be stripped and stockpiled for later use as the top layer of reclaimed instream substrate which would improve the recolonization rate and maintain average mobile substrate sizes.
- To manage stream depths downstream of the spillway, rock v-weirs would be installed at three gradient changes (i.e. steps) to converge stream flows to the middle of the river channel in a manner that increases water depth. Each v-weir will provide flow conveyance and fish passage between gradient changes from downstream to upstream.
- The diversion channel and low-level outlet channel would have erosion protection and energy dissipation blocks to control flows.
- When removing the isolation barriers, the downstream isolation barriers would be gradually removed first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle prior to removing the upstream isolation materials.
- Water intake pipes would be screened to prevent entrainment or impingement of fish. Screens are to comply with the Department of Fisheries and Ocean's *Freshwater Intake End-of-Pipe Fish Screen Guidelines*. Where debris removal from the structures is required, debris removal would be timed to avoid disruption to sensitive fish life stages (i.e., outside the RAP), unless the debris and its accumulation is immediately threatening the integrity of the structure or relates to an emergency (i.e., risk of structure failure).

Flood and Post-Flood

- Debris would be cleaned from the structure gates after a flood recedes to allow unimpeded fish passage upstream over the structure.
- Drainage areas within the reservoir would be graded to reduce stranding of fish during release of stored flood water from the reservoir.
- Drawdown of stored flood waters would be conducted in a controlled manner to avoid soil erosion and to maintain slope stability.
- After draw down occurs, the fish rescue contingency plan would be initiated for any fish identified in isolated pools.
- Isolated pools would be identified and marked, and a Qualified Aquatic Environmental Specialist will determine whether there are stranded fish in the pool that require rescue and relocation to secure habitats in the Elbow River.
- The low-level outlet canal would also be surveyed to identify isolated pools where fish might be stranded.
- A sampling of fish that are injured (e.g. swimming on side and cannot maintain balance) or dead would be captured when safe to do so using dip nets. Observations and photographs of external physical damage to fish would be recorded.
- Post-flood maintenance would include grading areas to prevent fish stranding in isolated pools.

Monitoring and Follow-Up

- A monitoring program (Surface Water Quality Monitoring Plan) will be undertaken to identify if fish passage is impeded for migratory salmonids or other fish species during construction and dry operation phases.
 - Details of fish passage success criteria will be developed with Department of Fisheries and Oceans.
- A sediment release monitoring plan will be developed in accordance with Alberta Transportation Special Provision: *Use in Tenders that Involve Instream Work*, the Canadian Council of Ministers of the Environment *Guidelines for the Protection of Freshwater Aquatic Life*, and the Government of Alberta's *Environmental Quality Guidelines for Alberta Surface Waters*.
- Turbidity levels both upstream and downstream of the Project will be collected using a turbidity meter. Exceedances of established criteria will be reported to the appropriate provincial or federal regulatory authorities.
- Annual offset monitoring will be undertaken to assess condition of habitat offsetting measures and identify potential remediation measures and determine if offsetting is functioning as intended. Remediation measures and contingencies will be developed if monitoring identifies deficiencies. Offset monitoring will occur and be conducted by a qualified environmental professional during start-up and critical periods of construction.
- Post-flood fish rescue monitoring will be undertaken at a frequency and in conditions that allow for successful and safe fish rescue. Monitoring for fish rescue activities will include:
 - During the release of water, isolated pools will be identified and the potential for fish to become stranded will be assessed.
 - Monitoring in and around the off-stream reservoir outlet structure to observe if and how fish congregate around the outlet and whether conditions permit their movement out of the reservoir.
 - Visual monitoring to assess potential harm or mortality of fish caused by movement through the outlet.
- Water quality in the off-stream reservoir will be monitored using hand-held meters to assess water temperature and dissolved oxygen to inform fish capture and handling methods.

7.1.3 Views Expressed

Federal Authorities

Fish Mortality and Effects to Fish Health

Fisheries and Oceans Canada advised that if the actual extent of warming in the reservoir is greater than predicted, the dissolved oxygen would subsequently be lower and would result in greater than predicted effects to fish entrained and held in the reservoir, including bull trout, which are listed as Threatened under the *Species at Risk Act*. If the fish rescue mitigation measure is not timely, then effects to a listed species at risk may be such that it threatens the survival and recovery of the species in the Elbow River. Fisheries and Oceans Canada identified the need for frequent, daily or weekly, monitoring and reporting of temperature and dissolved oxygen throughout the reservoir during flooding to validate modeling predictions.

Entrainment would not likely in itself result in significant residual effects. However, the extent of death of fish to bull trout from cumulative effects is not well understood and could result in jeopardy to the survival and recovery of the species in the Elbow River. Fisheries and Oceans Canada noted that the Proponent has a Duty to Report death of fish under Section 38(4) of the *Fisheries Act* as well as monitoring and reporting obligations under conditions in Section 73(6) of the *Species at Risk Act*. Additional information would be gathered as a part of the *Fisheries Act* authorization process to enable Fisheries and Oceans Canada to assess the risk to bull trout in the Elbow River.

As flooding occurs, accumulation of debris on the debris deflector structure could result in elevated velocities that could impinge fish. Fisheries and Oceans Canada noted that this is not likely to cause significant environmental effects and is satisfied with the Proponent's response, but recommended monitoring and follow-up activities to be conducted to verify predictions and to remove any debris that may have accumulated.

Change in Habitat

Fisheries and Oceans Canada noted that if effects are different than predicted, sediments may settle on suitable spawning substrates or on the eggs of fall spawning fish species (in the case of a late release scenario) in the Elbow River downstream of the low level outlet channel. Fisheries and Oceans Canada advised that this would likely not have significant residual effects as it would be expected that some of the deposited sediment would remobilize during high flows; however, additional sediment deposition monitoring should be proposed to verify the accuracy of predictions.

Fisheries and Oceans Canada also indicated potential effects to fish habitat resulting from changes to the frequency, duration, or magnitude of flows. Fisheries and Oceans Canada noted that they are satisfied with the Proponent's response and this pathway of effect is not likely to result in significant residual effects. However, Fisheries and Oceans Canada noted a lack of information on fish habitat downstream and recommended a monitoring and follow-up program be developed to confirm that diversion of floodwaters above 160 cubic metres per second would not result in significant changes to fish habitat downstream. The follow-up program should compare monitoring results to pre-project survey data and qualify any changes that may be occurring as a result of the project, as well as validate the pre-project hydrodynamic and sediment transport modelling.

Indigenous Nations

Multiple Indigenous nations express concern that the Project, especially the construction phase, would adversely affect fisheries, fish health and population, movement and habitat. Specific concerns raised included fish spawning (including bull trout), overwintering areas, westslope cutthroat trout habitat recovery and the spread of Whirling disease. Indigenous nations identified the interspecies treatment of fish as concerning with respect to stranding and potential mortality of fish.

Stoney Nakoda Nations mentioned specific concerns with habitat assessment for the bull trout and cutthroat trout.

Views related to the effects of changes to fish on Indigenous peoples' current use of lands and resources for traditional purposes and physical and cultural heritage are addressed in Chapter 7.4. Views on

Indigenous peoples' health and socio-economic conditions are addressed in Chapter 7.5. A summary of issues raised by Indigenous nations is presented in Appendix B.

Public

Comments received from the public included concerns regarding the destruction and alteration of fish habit and risk of mortality and health including reproductive success.

7.1.4 Agency Analysis and Conclusion

Fish Mortality and Effects to Fish Health

The Project would result in fish mortality from construction, flood, and post-flood phases of the Project. The Agency concludes that residual effects on fish from direct mortality during construction would be negligible after the implementation of mitigation measures. The Proponent would take appropriate actions to anticipate potential flooding events and plans to rescue fish stranded in the construction area when the by-pass channel is constructed, where possible. The Proponent would develop a fish rescue plan and appropriate site-specific mitigation and monitoring activities in consultation with regulators and Indigenous nations.

The Agency recognizes that the flooding of the reservoir would result in residual effects to fish and their habitat due to changes in hydrological regime, sediment transport dynamics, and surface water quality. These changes could also alter or destroy fish habitat, which may result in the direct or indirect death of fish. Fish mortality would be limited to the area flooded, and would only occur when a flooding in the Elbow River exceeds 160 cubic metres per second (approximately a 1:7 year flood). The Agency notes that fish mortality is irreversible, but does not anticipate a change to the status of regional fish populations (moderate magnitude).

Taking into account the implementation of the mitigation measures described by the Proponent and identified by the Agency, the Agency is of the view that the Project is not likely to cause significant adverse effects on fish and fish habitat or fish population. The Agency emphasises the importance of follow-up and monitoring measures to evaluate the accuracy of the predictions related to fish and fish habitat and fish mortality and health and to determine the effectiveness of mitigation measures to minimize adverse effects on fish and fish habitat from project activities in the Surface Water Monitoring Plan.

Change in Habitat

The Project would result in the loss of habitat that would directly affect fish within the PDA. The Agency concludes that residual effects on fish habitat may result in changes to fish movement and reductions in fish abundance; however, this is not anticipated at the population level. Additionally, no residual changes to the critical habitat of species at risk are anticipated.

High magnitude changes to geomorphology are expected in the low-level outlet; however, most of the mobilized bed material is predicted to remain within the low-level outlet and minimal interaction with the Elbow River is expected. There would be increased turbidity in the outlet channel and in the Elbow River down stream of the outlet along with increased erosion in the channel.

The loss of habitat due to the Project from the barrier of upstream fish passage during flood and post-flood operations is predicted to be not significant and should not result in a change to fish distribution in the Elbow River. Habitat loss due to flooding would be site specific, intermittent, and partially reversible as natural reclamation and sediment maintenance will occur.

The effects of the Project (change in water temperature, nutrient concentrations, and dissolved oxygen concentrations) during a flood is anticipated to be of low magnitude, temporary and localized to areas where the outlet channel meets the Elbow River. The Project is not anticipated to affect temperature and dissolved oxygen in the Elbow River.

Given the proposed mitigation measures and definitions of the environmental effects rating criteria in Appendix A, the Agency is of the view that the magnitude of habitat loss and alteration would be moderate, since the loss of suitable habitat would not result in a measureable change in the abundance of fish in the RAA.

Key Mitigation Measures to Avoid Significant Adverse Effects and Follow-up Program Requirements

The Agency considers the mitigation, monitoring and follow-up measures proposed by the Proponent listed in Section 7.1.2 to be necessary to ensure there are no significant adverse effects to fish and fish habitat. The Agency also considers the following mitigation, monitoring and follow-up measures identified through expert advice from federal authorities and comments received from Indigenous nations and the public as necessary to ensure there are no significant adverse effects to fish and fish habitat:

- Offsetting measures for Project effects on fish and fish habitat, including direct instream and riparian habitat destruction will be developed and employed in consultation with Fisheries and Oceans Canada and Indigenous nations. A *Fisheries Act* authorization will be obtained prior to construction.
- A follow up and monitoring program for fish and fish habitat will be developed in consultation with Fisheries and Oceans Canada and Indigenous nations prior to construction. The follow up and monitoring program will include:
 - At a minimum, weekly monitoring of temperature and dissolved oxygen throughout the reservoir to be conducted during each flood operation to verify the accuracy of modelling. Ongoing reporting of the results of this monitoring will be provided to Fisheries and Oceans Canada.
 - After each flood event, monitoring of sediment deposition downstream of the low level outlet channel will be conducted to verify the accuracy of modelling. Results of this monitoring will be provided to Fisheries and Oceans Canada.
 - During flood operations, accumulation of woody debris on the debris deflector will be monitored.
- Post-flood, any accumulated woody debris will be moved downstream of the diversion gates when safe to do so.
- A fish rescue plan will be finalized in consultation with Indigenous nations, Environment and Climate Change Canada, and Fisheries and Oceans Canada.

- Indigenous nations will be provided the opportunity to participate in the implementation of the fish rescue plan.
- Monitoring for fish rescue activities will include:
 - Monitoring during draw down to determine the soonest possible optimal timing for fish rescue.
- Baseline fish food web sampling will be carried out prior to flooding/disturbance at two sites (one upstream and one downstream site simultaneous and co-located with mercury water sampling) for:
 - One top predatory fish species for muscle total mercury or methylmercury, carbon-13 and nitrogen-15 stable isotopes, fish age using the otolith, and morphometric data (length, fork length, weight) focusing on collection of greater than 12 adult fish at each site.
 - One lower food web fish for muscle or whole body total mercury and methylmercury, carbon-13, nitrogen 15- stable isotopes, and morphometric data.
 - Invertebrates that represent a key fish food source in this system for total mercury and methylmercury, carbon-13, nitrogen 15- stable isotopes.
- Repetition of the food web sampling will be carried out every one to three years after flooding, with frequency dependent on initial results.

Taking into account the implementation of the mitigation measures and of the monitoring and follow-up program described above, the Agency concludes that the Project would not result in significant adverse effects on fish and fish habitat.

7.2 Migratory Birds

The Project could cause residual effects on migratory birds through:

- Loss of habitat due to construction and flood operations
- Migratory bird mortality due to flooding of the reservoir area

The Agency is of the view that the Project is not likely to cause significant adverse effects on migratory birds, after taking into account the proposed key mitigation measures. The Agency recommends follow-up and monitoring measures to evaluate the accuracy of the predictions related to migratory birds and to determine the effectiveness of mitigation measures proposed to minimize adverse effects on migratory birds from project activities.

The Agency's conclusions are based on its analysis of the Proponent's assessment as well as the views expressed by federal authorities, Indigenous nations, and the public.

7.2.1 Proponent's Assessment of Environmental Effects

There are nine species of migratory birds that were identified within the regional study area that are listed under the *Migratory Birds Convention Act* and are also listed as Threatened or of Special Concern under Schedule 1 of the *Species at Risk Act* (Table 3). An additional four migratory birds protected under

the *Migratory Birds Convention Act*, but not listed under the *Species at Risk Act*, were also observed in the LAA: red knot, sprague’s pipit, baird’s sparrow, and bobolink.

Table 3 Migratory Birds Species at Risk Potentially Affected by the Project

| Migratory Bird Species | | | Status | |
|---------------------------------------|--|--------------------|-----------------------------|------------------------|
| Common Name | Scientific Name | Potential Location | SARA ¹ | COSEWIC ² |
| Common nighthawk | <i>Chordeiles minor</i> | LAA | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Olive-sided flycatcher | <i>Contopus cooperi</i> | RAA, LAA | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Loggerhead shrike, prairie subspecies | <i>Lanius ludovicianus excubitorides</i> | RAA, LAA | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Bank swallow | <i>Riparia riparia</i> | RAA, LAA | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Barn swallow | <i>Hirundo rustica</i> | RAA, LAA | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Yellow rail | <i>Coturnicops noveboracensis</i> | LAA | Special Concern, Schedule 1 | Special Concern |
| Long-billed curlew | <i>Numenius mericanus</i> | LAA | Special Concern, Schedule 1 | Special Concern |
| Horned grebe | <i>Podiceps auritus</i> | RAA, LAA | Special Concern, Schedule 1 | Special Concern |
| Western grebe | <i>Aechmophorus occidentalis</i> | LAA | Special Concern, Schedule 1 | Special Concern |

¹Species at Risk Act

²Committee on the Status of Endangered Wildlife in Canada

The Proponent predicted that migratory birds may experience adverse effects as a result of project related changes to habitat and mortality risk. The Proponent indicated that construction, dry operation, flood and post-flood activities were not likely to restrict the movement, affect health or cause changes to the biodiversity of migratory birds; therefore, these pathways of effects are not discussed.

Habitat for migratory birds include forested, wetland and grassland habitat types. The Proponent selected specific species in these habitats as key wildlife indicators to anticipate the pathways for project effects and predicted effects would be similar for a broader group of species dependent on those habitat types. The key wildlife indicators were olive-sided flycatcher for forested habitat, sora for wetland and Sprague’s pipit for grassland habitat.

Change in Habitat

Effects to migratory birds during construction and dry operation phases may occur due to clearing, channel excavation, water diversion construction, dam and berm construction, low-level outlet works construction, bridge construction, use of lay down areas, borrow extraction, reclamation and dry operation maintenance.

It is predicted that there would be a removal of 223 hectares of upland and 29.5 hectares of wetland habitats during construction, with permanent disturbance footprint remaining on 107.1 hectares of this area. There would also an expected loss of 730 hectares of nesting habitat in the design flood, including

450.4 hectares of agricultural and disturbed land, 234.5 hectares upland habitat, 20.3 hectares of wetland habitat within the reservoir and 2.5 hectares of mixed forest habitat along the Elbow River.

Construction of the Project could result in a permanent habitat loss of native grasslands (89.7 hectares) and mixed forest (34.8 hectares) habitat types in the PDA. Additionally, the Proponent predicted a reduction in wetland area abundance in the PDA of 14.3 percent (31 hectares) during construction and dry operation, as wetland tree and shrub layers would be removed through vegetation clearing and reclaimed to graminoid dominated marshes. Habitat for migratory bird species that depend on graminoid dominated wetlands, versus shrubby or treed wetland, would increase. Overall, the Proponent estimated a loss of 4.5 percent (11.0 hectares) of coniferous forest, 9.4 percent (29.5 hectares) of wetland, and 21.1 percent (89.7 hectares) of native grassland due to construction and dry operation activities.

The Project could result in temporarily unavailable migratory bird habitats during flood and post-flood phases. There would be some permanent loss of wetland habitat from sedimentation, which would be converted into upland communities as graminoid dominated marshes. The Proponent estimated the potential loss of a maximum of 70.3 hectares of wetland habitat within the reservoir due to the temporary diversion of flood waters in the off-stream reservoir. The forested, wetland and grassland habitats that would be temporarily inaccessible would be expected to last up to 45 days and extend approximately up to 39 more days before the reservoir would recede and post-flood maintenance activities would occur, for a maximum total of 84 days.

During smaller flooding events, such as the 1:10 year flood, no inundation of nesting habitats that support high densities of breeding birds (i.e., mixed forest, broadleaf forest) would be anticipated.

During large flood events, such as the 1:100 year flood, the dominant land cover type (287 hectares) of agricultural land (tame pasture), which support relatively low breeding bird densities, would be temporarily inundated. As ground nesting birds are most at risk during flood operations, the Proponent explained bird nest search efforts and salvage operations within the reservoir would focus on shrublands, wetlands and grasslands. These priority habitat areas would be expected to contain moderate densities of breeding birds.

In extreme flooding events, such as the 2013 design flood, agricultural land, which supports relatively low densities of breeding birds, would be the dominant land cover type temporarily inundated (373 hectares) along with mixed forest (9.4 hectares) and broadleaf forest (7.1 hectares). Most of the flooded area would encompass wetlands and reclaimed vegetation that may be suitable breeding habitat for ground-nesting migratory birds. Habitat loss would be restricted to the off-stream reservoir.

The Proponent predicted that the amount of wildlife habitat affected for species of management concern, including migratory birds and species at risk, to be relatively small compared to the availability of wildlife habitat remaining in the RAA.

During post-flood operations, potential direct effects predicted by the Proponent include sediment deposition, damaged/eroded vegetation, sensory deposition (habitat avoidance or displacement), and changes to or destruction of the riparian habitat on the Elbow River.

During post-flood operations, the Proponent predicted that during a design flood, 3.7 percent of the LAA (192.6 hectares of the reservoir) would be covered by sediment less than three centimetres deep, and 0.8 percent (37.4 hectares of the reservoir) would be covered by sediment between three centimetres and ten centimetres deep. At these depths, the Proponent predicted the changes to overall migratory bird habitat abundance and suitability would be minor. Sediment deposition of more than ten centimetres was predicted at 3.0 percent of the LAA (145 hectares of the reservoir), which would have greater effects on the suitability of migratory bird habitat. Maximum sediment depth would be approximately 3.4 m and would occur close to the low-level outlet, in the deepest portion of the reservoir.

The Proponent noted that accidental releases of fuels or other hazardous substances may also result in habitat alteration or impairment. Effects of accidents and malfunctions is discussed in Chapter 8.1 and 8.2 of this report.

Given the small amount of habitat disturbance relative to the availability of suitable habitat adjacent to the PDA, the Proponent concluded that residual effects to migratory bird species from habitat loss would be low in magnitude, local in extent, and reversible in the long-term.

Change in Mortality Risk

Potential bird mortality could occur during construction due to the destruction of bird nests and eggs during vegetation removal, ground disturbance, direct contact with project equipment, or falling debris or vehicles. Additionally, sensory disturbance during construction would have the potential to cause mortality from nest failure. With the implementation of mitigation measures, the Proponent predicted a low risk of wildlife mortality, including migratory birds.

The Proponent predicted potential residual effects to migratory birds through direct migratory bird mortality, nest destruction, and indirect mortality. This includes where Proponent activities and components may not meet commitments to adhere to guidance on setback buffer distances (e.g., the Project's reservoir outlet channel footprint overlaps with a bank swallow colonial nest on the Elbow River (Figure 3-1, Wildlife Data Technical Report, Appendix H to the EIS)). However, the magnitude of the residual effects during construction and dry operation phases would be expected to be low because a measureable change in the abundance of migratory birds in the LAA would be unlikely.

The diversion of flood waters would reduce mortality risk to migratory birds in riparian habitats along the Elbow River floodplain downstream of the diversion structure, but increase mortality risk for ground nesting migratory birds, eggs and nests in the off-stream reservoir (i.e., nest failure, drowning). The Proponent predicted the risk of direct mortality due to nest flooding during a design flood for tree nesting migratory birds would be low. Most of the flooded area in the reservoir would encompass wetlands and reclaimed vegetation that would be suitable breeding habitat for ground-nesting migratory birds. Rising flood waters in the off-stream reservoir would remove migratory bird residences (e.g., nests) and young (e.g., eggs, nestlings, fledglings). Residual effects are expected to be short term, irregular in frequency and limited to the PDA.

The Proponent noted that post-flood operations would require equipment to travel over potential migratory songbird nesting habitat, which could increase mortality risk for nesting birds in the PDA. This

could result in small increase in mortality risk due to a rise in traffic volume in the LAA and RAA from maintenance crews travelling to and from the Project area, thereby increasing the potential risk of animal-vehicle collisions. However, with mitigation, the Proponent predicted the magnitude of residual effects on migratory bird mortality risk during post-flood operations to be low.

7.2.2 Key Mitigation Measures, Monitoring and Follow-Up

Construction and Dry Operation

- Where possible, temporary workspaces and access roads will be located in areas that avoid native vegetation and existing access roads and previously disturbed areas would be used.
- Where possible, focusing lights on habitats that surround the work site during evening hours would be avoided to reduce potential sensory disturbance.
- Pre-construction surveys would be conducted to identify wildlife features (e.g., nests) and appropriate site-specific mitigation developed.
- Vegetation removal will be avoided during breeding season for migratory birds. Guidance on preventing harm to migratory birds are primarily based on Environment and Climate Change Canada guidance to avoid risk of incidental take of migratory birds. Restricted project activity for migratory bird species at risk is from April 15—August 31. Combined with other nesting bird species (e.g., raptors), restricted project activity extends from February 15—August 31. If vegetation removal is scheduled to occur within this restricted activity period 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.
- If an active nest is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation. It is expected that the site-specific mitigation (i.e., recommended setback distances for active nests) would be applied more frequently in habitat that have relatively higher densities of breeding birds.
- Construction and maintenance activities will be reduced as much as possible in the Key Wildlife and Biodiversity Zone identified along the Elbow River from December 15—April 30.
- Temporary work spaces will be reclaimed using native species that are compatible with pre-construction site conditions, as outlined in the reclamation plan.
- No tall structures will be erected in the PDA that might provide additional perching opportunities for birds of prey to hunt from and there is no expected increase in amount of edge habitat in the PDA.
- To reduce sensory disturbance to migratory birds, construction activities will be undertaken in the fall and winter where feasible.
- Direct mortality from vehicle collisions will be addressed through speed restrictions and compliance with provincial regulations, respectively.

Flood and Post-Flood

- If sediment partial cleanup and debris removal in the off-stream reservoir occurs more than seven days following reservoir draining, nest searches will be conducted by qualified wildlife biologist.

- Sightings of project-specific species of interest would be reported to the Environmental Inspectors(s). Protection measures might be implemented and the sighting would be recorded.
- Development and implementation of a bird rescue program (i.e., relocation of nests with eggs and/or chicks prior to flooding).
- Spatial and forecasting constraints, combined with estimated bird densities, will be used as criteria to identify where in the reservoir's footprint potential bird rescue could occur while protecting worker safety and feasibility of success.
- Salvage efforts will focus on utilizing the baseline survey information on the densities of breeding birds and ground nesting birds, which would be most at risk during flood operations. Salvage efforts will focus on shrublands, wetlands and grassland during bird nest search efforts.
- As feasible, all chicks (i.e., hatchling, nestling, fledgling) and eggs will be rescued and transported to a local wildlife rescue center(s).
- The salvage protocol will be developed in consultation with regulators as well as Indigenous nations and included in the final Wildlife Mitigation and Monitoring Plan.
- Environment and Climate Change Canada will be notified of any planned salvage program once the advance warning has been issued by Alberta Environment and Parks.
- The Proponent and Alberta Environment and Parks will establish and maintain working relationships with local wildlife rescue centers (i.e., Calgary Wildlife Rehabilitation Society, Cochrane Ecological Institute, and Alberta Institute for Wildlife Conservation) to facilitate bird rescue, including species at risk.

Monitoring and Follow-up

- A Wildlife Mitigation and Monitoring Plan would be developed in consultation with regulators and Indigenous nations.
- To account for changes in habitat over time, the reservoir would be surveyed at regular intervals of approximately five years to update the understanding of habitat conditions and to re-characterize high priority areas.

7.2.3 Views Expressed

Federal Authorities

Environment and Climate Change Canada noted that flooding is predicted to be infrequent and would have effects on a variable spatial extent within the reservoir, depending on the volume of flood waters. However, they indicated that when flooding does occur, there is a high likelihood of residual effects on migratory bird mortality and destruction of nests/eggs given that the predicted timing of flood operation overlaps with breeding periods when nesting birds may have eggs and young incapable of retreat from rapid flooding.

Environment and Climate Change Canada indicated that key mitigation measures include all the commitments associated with proponent compliance with the *Migratory Birds Convention Act*. They recommended that additional mitigation measures be integrated into the Project's Wildlife Mitigation and Monitoring Plan, including adequate flood forecasting for salvage efforts; identification of targeted salvage locations within risk habitat area; and suitable survey, salvage, and rehabilitation techniques to reduce potential effects within the reservoir during a flood. Additionally, they recommended that

monitoring and reporting activities be included to evaluate the effectiveness of these mitigation measures intended to reduce mortality from flood operations.

Indigenous Nations

Multiple Indigenous nations expressed their concerns that the Project would adversely affect migratory birds from habitat loss and changes to nesting, breeding and brood rearing caused by project infrastructure, flooding of the reservoir and habitat degradation from post-flood operations. Multiple nations expressed concerns that use of the dam would likely result in the loss of migratory bird nests.

Multiple Indigenous nations noted that bald eagles are culturally important species. Other species of management concern that are of cultural importance include Sprague's pipit birds, which the Proponent used a key indicator for the wildlife assessment.

With regards to changes in habitat, Indigenous nations noted concerns regarding the potential for the Project to increase habitat fragmentation. Indigenous nations noted the existence of important wildlife habitat along the Elbow River and that wildlife use the floodplain and wetlands adjacent to the river. Many Indigenous nations stated that important wildlife habitat features such as bird habitat need to be identified and protected throughout the lifespan of the Project.

A summary of issues raised by Indigenous nations is presented in Appendix B.

Public

Comments received from the public included concerns regarding the destruction and alteration of migratory bird habitat, including wetlands.

7.2.4 Agency Analysis and Conclusion

The Project would result in the loss of habitat that would directly affect migratory birds or their nests within the PDA. Habitat loss would result in alterations to migratory bird movement and reductions in migratory bird abundance, but not at the population level. There would be no impact to the critical habitat of species at risk.

The loss of habitat due to the Project would be site specific and partially reversible, as areas cleared during construction would be revegetated. However, habitat types in the LAA would be modified. The Proponent would conduct vegetation clearing in accordance with federal guidelines and schedule such activities outside of the identified migratory bird nesting periods.

Habitat loss due to flooding would be site specific, intermittent and partially reversible as natural vegetation regrowth and revegetation would occur.

With the proposed mitigation measures in place, the Agency is of the view that the magnitude of habitat loss and alteration would be moderate, since the loss of suitable habitat would not result in a measureable change in the abundance of migratory birds in the RAA.

While the Project would result in migratory bird mortality from construction, flood, and post-flood phases of the Project, the Agency concludes that residual effects to migratory birds from direct mortality during construction would be negligible after the implementation of mitigation measures. The

Proponent proposes pre-construction surveys which would be conducted to identify wildlife features (e.g. nests) and appropriate site-specific mitigation would be developed in consultation with regulators and Indigenous nations in the Wildlife Mitigation and Monitoring Plan.

The Agency recognizes that the flooding of the reservoir would result in residual effects to migratory birds and their nests. The Proponent would take appropriate actions to anticipate potential flooding events and planning to rescue migratory birds and their nests, where possible. Migratory bird mortality would be limited to the area flooded, and would only occur when a flooding in the Elbow River exceeds 160 cubic metres per second (approximately a 1:7 year flood). The Agency notes that migratory bird mortality is irreversible, but does not anticipate a change to the status of regional migratory bird populations (moderate magnitude).

Taking into account the implementation of the mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse effects on migratory birds.

Key Mitigation Measures to Avoid Significant Adverse Effects and Follow-up Program Requirements

The Agency considers the mitigation, monitoring, and follow-up measures proposed by the Proponent listed in Section 7.2.4 to be necessary to ensure there are no significant adverse effects to migratory birds. The Agency also considers the following mitigation, monitoring and follow-up measures identified through expert advice from federal authorities and comments received from Indigenous nations and the public as necessary to ensure there are no significant adverse effects to migratory birds:

- Implement setback buffers identified within the EIS and information request responses for migratory bird species when a nest is identified during construction and dry operations.
- Flood forecasting to support migratory bird rescue effort planning.
- Identify priority habitat areas based on estimated breeding bird densities and habitat types within the reservoir (grassland, wetlands and shrublands along the unnamed creek within the reservoir)
- Identify salvage locations through pre-construction nest searches and inventory surveys completed regularly at approximate intervals of every five years through the predicted operational life of the project, in consideration of the predicted variable extent and rate of reservoir flooding in operation.
- Develop a rescue protocol with provincial and federal regulators, and Indigenous nations, including participation by Indigenous nations through the Project's Indigenous Participation Plan.
- Engage with local wildlife rescue centre(s) and act under wildlife permits (e.g., collection license) in undertaking salvage activities for authorized wildlife species.
- Monitor any interactions between Project activities and birds and nests including species of cultural importance and species at risk to determine the effectiveness of mitigation measures to avoid harm to migratory birds, their eggs and nests.
- Control lighting required for construction of the project, including direction and timing to avoid effects on migratory birds, while meeting operational health and safety requirements.

Taking into account the implementation of the mitigation measures and of the monitoring and follow-up program described above, the Agency concludes that the Project would not result in significant adverse effects on migratory birds.

7.3 Species at Risk

The Project could cause residual effects on species at risk through:

- Loss of habitat due to construction and flood operations
- Mortality due to flooding of the reservoir area.

The Agency is of the view that the Project is not likely to cause adverse effects on migratory bird or aquatic species at risk, after taking into account the proposed key mitigation measures. The Agency recommends follow up and monitoring measures to evaluate the accuracy of predictions related to species at risk and to determine the effectiveness of mitigation measures.

The Agency’s conclusions are based on the Proponent’s assessment as well as the views expressed by federal authorities (Environment and Climate Change Canada), Indigenous nations, and the public.

7.3.1 Proponent’s Assessment of Environmental Effects

Sixteen bird, amphibian, mammal and fish species at risk protected by the *Species at Risk Act* (SARA) or listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC)³ were identified by the Proponent as potentially occurring in the local assessment area (LAA) and regional assessment area (RAA) (Table 4).

Table 4 Species at Risk Potentially Affected by the Project

| Species | | | | | Status | |
|-------------------------------------|----------------------------|--------------------------------|-------------------|-----------------------------|------------------------|------------------------|
| Common Name | Scientific Name | Observed or Potential Location | Fish ⁴ | Migratory Bird ⁵ | SARA | COSEWIC |
| Mammals | | | | | | |
| Little brown myotis | <i>Myotis lucifugus</i> | RAA/LAA | No | No | Endangered, Schedule 1 | Endangered, Schedule 1 |
| American badger, western population | <i>Taxidea taxus taxus</i> | LAA | No | No | Special Concern | Special Concern |
| Amphibians | | | | | | |

³ For this EA, and as a matter of good practice, the Agency also considered species that have been identified by the COSEWIC as being endangered, threatened or of special concern. Collectively, these are referred to as species at risk for the purposes of the Agency analysis in this EA.

⁴ See Chapter 7.1 for effects to fish and fish Habitat.

⁵ As defined by the *Migratory Bird Convention Act (1994)*. See Chapter 7.2 for effects to migratory birds.

| | | | | | | |
|---------------------------------------|--|----------|-----|-----|-----------------------------|------------------------|
| Northern leopard frog | <i>Lithobates pipiens</i> | LAA | No | No | Special Concern, Schedule 1 | Special Concern |
| Western toad | <i>Anaxyrus boreas</i> | LAA | No | No | Special Concern, Schedule 1 | Special Concern |
| Western tiger salamander | <i>Ambystoma mavoritium</i> | RAA/LAA | No | No | Special Concern, Schedule 1 | Special Concern |
| Birds | | | | | | |
| Common nighthawk | <i>Chordeiles minor</i> | LAA | No | Yes | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Olive-sided flycatcher | <i>Contopus cooperi</i> | RAA/LAA | No | Yes | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Loggerhead shrike, prairie subspecies | <i>Lanius ludovicianus excubitorides</i> | RAA/LAA | No | Yes | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Bank swallow | <i>Riparia riparia</i> | RAA/LAA | No | Yes | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Barn swallow | <i>Hirundo rustica</i> | RAA/LAA | No | Yes | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Yellow rail | <i>Coturnicops noveboracensis</i> | LAA | No | Yes | Special Concern, Schedule 1 | Special Concern |
| Long-billed curlew | <i>Numenius mericanus</i> | LAA | No | Yes | Special Concern, Schedule 1 | Special Concern |
| Horned grebe | <i>Podiceps auritus</i> | RAA, LAA | No | Yes | Special Concern, Schedule 1 | Special Concern |
| Western grebe | <i>Aechmophorus occidentalis</i> | LAA | No | Yes | Special Concern, Schedule 1 | Special Concern |
| Fish | | | | | | |
| Bull trout | <i>Salvelinus confluentus</i> | RAA/LAA | Yes | No | Threatened, Schedule 1 | Threatened, Schedule 1 |
| Westslope cutthroat trout | <i>Oncorhynchus clarkii lewisi</i> | RAA/LAA | Yes | No | Threatened, Schedule 1 | Threatened, Schedule 1 |

Eight additional species listed under Schedule 1 of the SARA and COSEWIC were identified, but are anticipated to have limited potential interaction with the Project given habitat conditions: red knot (*Calidris canutus [rufa]*), Sprague's pipit (*Anthus spragueii*), bobolink (*Dolichonyx oryzivorus*), short-eared owl (*Asio flammeus*), peregrine falcon (*Falco peregrinus*), Baird's sparrow (*Ammodramus bairdii*), rusty blackbird (*Euphagus carolinus*), and grizzly bear, western population (*Ursus arctos*).

Federal recovery strategies have been developed for certain bird species at risk, including the common nighthawk, olive-sided flycatcher, little brown myotis, and Sprague's pipit. The little brown myotis and

Sprague's pipit have partially identified critical habitat, but they do not overlap the LAA. No other critical habitat has been identified for the species at risk that have potential interaction with the Project. The Proponent identified six key wildlife indicators (olive-sided flycatcher bird, Sprague's pipit bird, sora bird species, northern leopard frog, elk, and grizzly bear) which were used to assess potential project effects on wildlife. The wildlife key indicators included species of management concern that are either legislatively protected (i.e., species at risk) or important for traditional and economic use. Migratory bird species at risk and their key indicators are discussed in Chapter 7.2 of this report. Fish species at risk are discussed in Chapter 7.1 of this report.

No plants identified as federal species at risk are predicted to be affected by the Project. Potential cumulative effects on species at risk that are important to the Indigenous peoples' current use of lands and resources for traditional purposes and physical and cultural heritage are described in Chapter 7.4.

Potential Project Effects on Terrestrial Wildlife

For terrestrial species at risk, wildlife could experience adverse effects as a result of project related changes to habitat, movement, mortality risk and health.

Project components and activities during construction and dry operation that may cause effects to wildlife include clearing, channel excavation, water diversion construction, dam and berm construction, low-level outlet works construction, road and bridge construction, use of lay-down areas, borrow extraction, reclamation and dry operation maintenance.

The Proponent described that the operation of the reservoir during a flood event (filling and draining of the reservoir) and maintenance of structures post-flood had the potential to result in a change in habitat (sediment and debris), change in movement, and change (increase) in mortality risk for wildlife species at risk. Most of the flooded area would encompass wetlands and reclaimed vegetation that may be suitable breeding habitat for species at risk (i.e., amphibians), and the Proponent predicts flood duration to extend through summer for up to 84 days (up to 45 days to operate and 39 days to drain the reservoir). Additionally, a change in health of little brown myotis and amphibian species at risk due to increased exposure to contaminants brought in by flood water and methylmercury production in the reservoir could occur.

The Proponent anticipated that operational reservoir flooding would make habitat for some species temporarily inaccessible and could result in direct mortality. Rising floodwaters in the off-stream reservoir would remove little brown myotis and bird residences and their young, change the conditions required for amphibian larvae to develop, and introduce predatory fish that can prey on amphibians (e.g., eggs, larvae, or adults).

The Proponent stated that maintenance activities during post-flood operations could result in an increase in mortality risk because of wildlife-vehicle collisions due to a rise in traffic volume for maintenance crews to travel to and from the Project area.

Little Brown Myotis

Potential project-related effects on the little brown myotis (bats) (*Myotis lucifugus*), which is listed as Endangered under Schedule 1 of the SARA, include habitat loss and alteration, sensory disturbance, direct mortality, and a change in health. Potential high suitability little brown myotis roosting habitat

occurs in the LAA and includes cavities of trees, rock crevices, or anthropogenic structures. Tree clearing and maintenance activities during construction and dry operations could result in the direct mortality of little brown myotis from the destruction of maternal roosting sites (48.8 hectares). The Proponent also indicated bats that establish roosts and hibernacula in overhanging slopes or cutbanks could be harmed if construction disturbs slope stability in those areas. Additionally, elevated noise and light (sensory disturbance) from construction could result in the indirect loss or reduced habitat effectiveness in the LAA. During flood and post-flood operations, temporary alteration or inaccessibility of habitat and a change in health could occur.

Based on the relatively small area of habitat (removal of foraging and roosting habitat) compared to the availability of suitable habitat adjacent to the Project PDA, the Proponent concluded that residual effects to the little brown myotis species at risk from habitat loss would be low in magnitude, local in extent and reversible in the long-term.

Residual effects due to mortality risk during construction and dry operations would be low in magnitude, local in extent and reversible in the long-term. While residual effects to the little brown myotis are anticipated due to the mortality of bats during flooding, the magnitude would be expected to be low because any measurable change in the abundance of little brown myotis in the LAA would be negligible. Residual effects due to mortality risk during flood and post flood operations are expected to be short-term, irregular in frequency, and limited to the PDA.

Amphibians – Northern Leopard Frog, Western Toad, and Western Tiger Salamander

Potential project-related effects on the northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavortium*), which are listed as a species of concern under Schedule 1 of the SARA, include habitat loss and alteration, disruption of movement, direct mortality, and change in health.

Potential moderate and high suitability amphibian habitat occurs in the LAA and includes a variety of wetlands, including marshes and shallow open water, as well as slow-moving sections of streams and rivers, which provide potential breeding habitat. The majority (96.9 percent) of the LAA consists of low suitability breeding habitat for amphibian species at risk, thus the potential for them to occur in the LAA is low to moderate.

During construction and dry operation, the Proponent predicted that direct habitat loss or alteration, including residences, may occur as a result of clearing activities for project infrastructure, alterations to topography, loss of wetland habitats and hydrological function and dust fall. Overall, it is predicted 3.8 percent of suitable (high and moderate combined) breeding habitat would be affected. Additionally, noise disturbance caused by construction could affect breeding habitat; however, the potential sensory disturbance is expected to decrease during dry operations when the levels and frequency of human disturbance would be reduced.

The Proponent stated that while direct mortality could occur as a result of heavy machinery used for earth movement and vegetation clearing during construction, the greatest concern for western toad and western tiger salamander populations would be vehicle-caused mortality and injury of adults and juveniles during the spring and late summer movement across roads that are in close proximity to wetlands. Direct toad mortality may also occur from the use of temporary pools in structures such as

ditches and road ruts, or within the post-flood reservoir, as tadpole development may be terminated due to pools drying up and insufficient water quality. The Proponent noted that should these pools persist for a sufficient amount of time, emerging toadlets located in the vicinity of project-related roads could be at risk of mortality from vehicle traffic.

Construction and dry operation activities could also result in alteration of movement patterns (daily or seasonal) as project structures and temporary work spaces could potentially create physical barriers where amphibians attempt to travel between breeding and overwintering wetlands. Although a majority of the diversion channel and floodplain berm would be crossable, the sections of rip rap in these project structures could still act as a barrier to amphibian movement between breeding and overwintering habitats.

During flood and post-flood operations, temporary alteration or inaccessibility of habitat may occur due to the presences of sediment and debris. They would also result in changes in movement patterns (daily or seasonal) because of habitat change and sensory disturbance. Reservoir filling could result in increased mortality risk for eggs and tadpoles. Vehicle and equipment movement during post-flood operations can result in accident mortality.

The Proponent anticipated a low magnitude of residual effects to amphibian species at risk from habitat loss because the Project would only result in the removal of small area of suitable habitat within the PDA relative to the availability of suitable habitat adjacent in the LAA.

Although no amphibian species of management concern were observed in the LAA, other amphibian species might have difficulty crossing project structures because amphibians have smaller dispersal ranges compared with large mammals. The Proponent concluded that residual effects to amphibian species at risk from movement to be moderate in magnitude, local in extent, and reversible in the long-term.

The Proponent determined that amphibian mortality risk during construction and dry operation phases is largely dependent on the proximity of breeding wetlands to roadways. The magnitude of the residual effects during both construction and dry operations would be expected to be low because a measureable change in the abundance of amphibians in the LAA would be unlikely.

The Proponent also predicted potential residual effects to amphibian species at risk due to increased mortality risk in the PDA during a flood. Most amphibian observations occurred within the off-stream reservoir and did not include any species of management concern (northern leopard frog, western toad, or western tiger salamander). Residual effects due to amphibian mortality during flooding are expected to be short-term, irregular in frequency, and limited to the PDA.

In summary the residual effects may result from animal vehicle collision mortality, maintenance activities, and an increased exposure to contaminants. With mitigation, the Proponent predicted that the magnitude of residual effects on amphibian species at risk during post-flood operations would be low.

7.3.2 Proposed Mitigation Measures, Monitoring and Follow-Up

Applicable to All Project Phases

- If nests, eggs, dens, or roots are found, species specific mitigation would be developed in consultation with Environment and Climate Change Canada.
- Appropriate setback distance for identified wildlife features will be determined by appropriate regulatory authorities.
- Disturbed non-native areas (i.e., annual crop, dugout, hayland, tame pasture) and disturbed land will be reclaimed to equivalent land capability with areas topsoiled and seeded following construction and after flooding. Revegetation will target high value native communities in areas of temporary disturbance lacking abundant weeds or aggressive non-native plant species.
- Provincial or federal disturbance setback buffers and site-specific mitigation will be implemented as required. For northern leopard frog and western toad, the Proponent proposed setbacks of 100 metres year round for ponds used for living, breeding or hibernating, for all disturbances. However for the breed pond (wintering site), which has year round restricted activity periods, the Proponent proposed setbacks of 50 meters (low), 200 metres (medium), and 400 metres (high) based on level of disturbance.
- During maintenance activities in the off-stream reservoir, all semi-permanent and permanent waterbodies would be avoided within 100 metres of the reservoir, except for during in-stream maintenance activities. Wetland setback buffers establish a distance from the water source where developments and other soil-disturbing activities are prohibited and will usually include the natural riparian vegetation around the perimeter of waterbodies.

Construction and Dry Operation

- Construction and maintenance activities will be reduced as much as possible in the Key Wildlife and Biodiversity Zone identified along the Elbow River from December 15 to April 30. If construction or maintenance during this time cannot be avoided, site-specific mitigation will be developed in consultation with Alberta Environment and Parks.
- Construction activities will be restricted to the approved construction footprint and the removal of vegetation in wetlands will be reduced to the extent possible.
- Pre-construction surveys will be conducted to identify wildlife features (e.g., nests, eggs, dens, roosts) and habitats (e.g., wetlands, nests) and appropriate site-specific mitigation developed.
- Identified wildlife features will be avoided during construction activities, as identified by appropriate signage and/or fencing.
- Vegetation removal will be avoided during restricted activity periods for migratory birds and species at risk (February 15—August 31).
- If vegetation removal is scheduled to occur within the restricted activity periods, a qualified wildlife biologist would inspect the site for nests, eggs, dens, or roots within seven days of the start of the proposed construction activity.
- Reclamation of the disturbed areas will include revegetation where possible.
- If construction activities occur within 100 metres of an amphibian species of management concern breeding wetland during the breeding season (approximately May 1 to September 30),

silt fencing will be installed around the perimeter of the wetlands to prevent amphibians from moving into active construction areas. An Environmental Monitor will be on site continuously during construction activities to investigate the fencing and relocate any amphibians trapped by the silt fencing, as directed by a Qualified Wildlife Biologist.

- All construction traffic will adhere to safety, road closure regulations, and unauthorized vehicles will be prevented from access.
- Temporary work spaces will be reclaimed using native species that are compatible with pre-construction site conditions. The diversion channel, and earthen embankment, floodplain berm, and diversion channel will be revegetated with native vegetation to the extent possible.
- A cover crop seed mixture will be used to assist in weed and erosion control on exposed soils.
- Where fencing is proposed to restrict livestock access to project structures (e.g., diversion channel), wildlife-friendly fencing will be installed.
- Wildlife underpass and fencing for project components will be constructed in a way that is conducive to continued ungulate and bear movement and migration.
- Lighting will be focused internally to work sites and positioned such that potential sensory disturbance to wildlife in the surrounding habitat is reduced.
- Where possible, ground level cutting/mowing/mulching of wetland vegetation will be undertaken instead of grubbing, and direct grading/drainage will be away from wetlands. An appropriate native seed mix that is suitable for wetlands will be used to reclaim wetland areas.

Flood and Post-Flood

- Maintenance activities will be restricted to the reservoir footprint to reduce the area of disturbance during post-flood operations.
- Sediment partial clean up and debris removal in the off-stream reservoir will occur and be mindful of the restricted activity period and Key Wildlife Biodiversity Zones. Qualified wildlife biologists will conduct surveys for wildlife habitat and features changes.
- Any amphibian species at risk will be relocated out of harm's way if encountered during the salvage program.
- If post-flood maintenance (such as sediment partial cleanup and debris removal) in the off-stream reservoir occurs more than seven days following reservoir draining, nest searches will be conducted by qualified wildlife biologists to reduce potential mortality risk to birds attempting to nest in the area. If an active nest or den is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation.

Monitoring and Follow-Up

Monitoring and follow-up proposed by the Proponent to confirm the effectiveness of measures designed to minimize effects on habitat loss and alteration, disruption of movement, direct mortality, and change in health to species at risk include:

- During the Project construction phase, six remote cameras will be deployed along the Elbow River in the same locations as used in pre-construction baseline surveys to provide relative comparisons of change. Three of these remote cameras will be placed upstream and three downstream of the diversion structure, and will monitor wildlife movement in the Key Wildlife

Biodiversity Zones for a minimum of one year during the estimated three year construction period.

- A remote camera program will be designed, in consultation with Alberta Environment and Parks, to identify whether the diversion channel acts as a barrier to wildlife movement during dry operations, especially for ungulates, and determine the effectiveness of mitigation implemented throughout the diversion channel. This will include monitoring along the Elbow River to determine if wildlife use of the Key Wildlife Biodiversity Zones has been affected by the construction and operation of the Project.
- During the Project dry operation phase, a total of 14 remote cameras will be deployed in the wildlife LAA and monitor wildlife movement for at least one-year post-construction. The six remote cameras along the Elbow River will remain at the same locations as during the construction phase. Four remote cameras will be deployed soon after completion of project construction, and placed at the same locations as pre-construction baseline surveys near Highway 22 (i.e., near the raised portion of the highway at the north end of the wildlife LAA). An additional four remote cameras will be installed along wildlife friendly fencing at the edge of the diversion channel at crossable sections where there is vegetation. Remote cameras at the diversion channel will be spaced approximately one kilometre apart.
- A wildlife biologist will visit the cameras every four months during construction and operation to change out memory cards and batteries, and check on the overall status of equipment (e.g., positioning, weather related malfunctions, animal or human tampering of equipment).
- A migratory bird and species at risk rescue protocol will be developed in consultation with regulators as well as Indigenous nations and included in the final Wildlife Mitigation and Monitoring Plan.
 - The priority habitat area of graminoid marshes and wetlands, including open water, along the unnamed creek will be targeted for rescue efforts with focused efforts on priority habitats located in the lower portions of the reservoir nearest to the dam. Amphibians will be targeted while conducting the nest searches. Based on the estimated advance flood warning of two to three days, there would be approximately 24 to 36 hours of daylight available to implement species at risk rescue program during a flood response.
 - Additional details regarding this rescue protocol are discussed in Chapter 7.2 of this report (Migratory Birds).
- To account for changes in habitat over time, the reservoir will be surveyed at regular intervals of approximately five years to update the understanding of habitat conditions and to recharacterize high priority areas.

7.3.3 Views Expressed

Federal Authorities

Environment and Climate Change Canada indicated that all mitigation associated with Proponent compliance with the *Species at Risk Act* are important to mitigate potential adverse effects to species at risk. They noted the importance of adequate flood forecasting for salvage efforts; identification of targeted salvage locations within risk habitat area; and suitable survey, salvage, and rehabilitation techniques to reduce potential effects within the reservoir during a flood be integrated into the Project's

Wildlife Mitigation and Monitoring Plan. Further to this, they recommended that monitoring, evaluating and reporting activities be included to evaluate the effectiveness of these mitigation measures intended to reduce mortality in Project flood operations (i.e., a description of how success will be measured for relocation of amphibians).

Follow-up commitments relating to monitoring the predicted effects to species at risk that are likely to occur during construction and operation, and the effectiveness of mitigation measures for these effects, should be described for each species and be included in the Proponent's follow-up program.

Indigenous Nations

Multiple Indigenous nations expressed concerns that the Project adversely affects wildlife species at risk from habitat loss and change to nesting, breeding, and brood rearing caused by project infrastructure, flooding of the reservoir, and habitat degradation from post-flood operations. Additional concerns include adverse effects to species of cultural importance through habitat loss, fragmentation, changes in migration/movement/travel corridors, travel routes, and increased vehicle collisions. Various Indigenous nations also expressed concerns regarding the Proponent's assessment of effects to culturally important wildlife species. The Proponent assessed wildlife and biodiversity as a whole, and as a result, species specific effects may be underestimated.

With regards to changes in habitat, Tsuut'ina Nation noted concerns regarding the potential for the Project to increase habitat fragmentation. Siksika Nation noted the existence of important wildlife habitat along the Elbow River and that wildlife use the floodplain and wetlands adjacent to the river. Foothills Ojibway First Nation stated that important wildlife habitat features such as bird habitat need to be identified and protected. Stoney Nakoda Nations raised concerns regarding changes to wildlife migration, and noted that the project area is an important wildlife corridor.

A summary of issues raised by Indigenous nations is presented in Appendix B.

Public

Comments received from the public include concern on the destruction and alteration of species at risk habitat, including wetlands.

7.3.4 Agency Analysis and Conclusion

The Project would result in the loss of habitat that could directly affect species at risk within the PDA. Habitat loss would result in alterations to the specific species at risk movement; however, the abundance of species at risk in the LAA would not be affected. No effects to the critical habitat of the species at risk were identified.

The key mitigation measures should be implemented to reduce any potential adverse effects of the project on species at risk. The Agency notes the importance of pre-construction surveys and the implementation of the proposed setback distances for chance finds of species at risk habitat or features.

The Agency recognizes that the flooding of the reservoir will result in residual effects to the little brown myotis and amphibian species at risk and their habitats. The Proponent would take appropriate actions to anticipate potential flooding events and planning to rescue and relocate amphibians, where possible.

Species at risk mortality would be limited to the area flooded, and would only occur when a flooding in the Elbow River exceeds 160 cubic metres per second (approximately a 1:7 year flood).

7.4 Indigenous Peoples – Current Use of Lands for Traditional Purposes; Physical and Cultural Heritage and Sites of Significance

The Project could cause residual effects to Indigenous peoples' current use of lands and resources for traditional purposes, physical and cultural heritage resources, and any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance. Appreciating the interconnected nature of these effects, this chapter will refer to potential effects on current use as an overarching term to describe these effects.

The Project could cause residual effects to current use through:

- Loss or alteration of access for current use;
- Loss or alteration of physical and cultural heritage resources and sites of significance;
- Reduced availability and quality of resources for current use;
- Altered quality of experience.

The Agency is of the view that the Project is not likely to cause significant adverse effects on current use after taking into account the proposed key mitigation measures (Section 7.4.5 of this Chapter). The Agency recommends follow-up program measures to evaluate the accuracy of predictions related to current use and to determine the effectiveness of the proposed mitigation measures (Section 7.4.5 of this Chapter). The Agency's conclusions are based on input from Indigenous nations and the Proponent's assessment of effects on current use.

7.4.1 Access for current use

7.4.1.1 Proponent's Assessment of Effects, Mitigation and Monitoring

Although the majority of the Project Development Area (PDA) is currently privately owned, Indigenous nations are granted access by some land owners to carry out cultural practices. Ownership of private lands in the PDA would be transferred to the provincial Crown before project construction.

Access would be restricted to defined areas within the PDA to account for public safety. As such, access would be completely restricted in the reservoir during flood and post-flood recovery periods and during seasonal floods. Since flood mitigation would be the primary use of the PDA, access on or across the project infrastructure would not be permitted at any time. Navigability of the Elbow River will be maintained by establishing a portage route where project construction activities and in-stream infrastructure would impede travel or transport.

The proponent will finalize a Land Use Plan that will direct land use and land management for non-restricted areas within the PDA, referred to as the Land Use Area. The Land Use Plan will permit access and prioritize use for First Nations within the Land Use Area except during the flood season. The

proponent will also establish an exclusive area for First Nations, described by the Proponent as a staging area, for temporary camps and cultural activities within or near the Land Use Area.

Supported by the proponent, a First Nations Land Use Advisory Committee will be created to facilitate the implementation of the Land Use Plan and provide recommendations.

While the proponent refers only to First Nations in its draft Land Use Plan and in referring to the First Nations Land Use Advisory Committee and First Nations staging area, the Agency considers potential effects to all Indigenous peoples, taking an inclusive-based approach discussed below.

The proponent has not presented an updated characterization of residual effects on access for current use since the presentation of the proposed draft Land Use Plan and First Nations Land Use Advisory Committee.

7.4.1.2 Views Expressed

Several Indigenous nations stated that access to the PDA is integral to their exercise of Aboriginal and treaty rights and important for the transmission of knowledge, language and culture. The Métis Nation of Alberta Region 3 raised concerns that the Proponent's assessment lacked Métis specific information.

Multiple Indigenous nations stated that there remains uncertainty over how access and land use conflicts would be managed and current use prioritized. The nations also noted concerns regarding the First Nations Land Use Advisory Committee's potential lack of decision-making authority or influence to offer meaningful input on the siting of the Indigenous staging area, prioritizing cultural practices and managing competing land uses.

Multiple Indigenous nations indicated that private lands, including those in the PDA, are preferred areas for their members due to constraints caused by development pressures in the region.

Transport Canada indicated that substantial interference to navigation from the Project could be addressed through Transport Canada's regulatory process and with imposed conditions outlined in the *Canadian Navigable Waters Act* approval(s) that may be granted for the Project. Transport Canada stated that key mitigations related to navigation proposed by the Agency may be considered in the terms and conditions of a *Canadian Navigable Waters Act* approval(s).

7.4.1.3 Agency Analysis

During construction and dry operations, the Agency anticipates that the Project's residual effects on access for current use is low in magnitude and localised within the PDA after taking into account the implementation of a Land Use Plan and other key mitigation and follow-up measures listed below in Section 7.4.5 of this Chapter.

During flood and post-flood recovery periods, residual effects on access for current use in the PDA would be localised, high in magnitude, and long-term until access in the Land Use Area can safely resume. The Agency recognizes that the occurrence of residual effects would be infrequent given that the likelihood of a 1:100 year and design flood event is low.

The Agency is of the view that the Project's effects on access for current use extends to all Indigenous nations that currently use the area. As such, the Agency recommends, for consideration in Minister's Decision Statement, that the Proponent grant Métis citizens access to the Land Use Area to carry out cultural practices to mitigate project effects to Métis citizens. The Agency also recommends that the Proponent support the Métis Nation of Alberta – Region 3's participation in the Indigenous Land Use Advisory Committee.

The Agency is of the view that the Indigenous Nations Land Use Advisory Committee is critical to ensuring that cultural practices continue in the Land Use Area. The Committee would also serve an important role in post-flood recovery operations for mitigating and monitoring the Project's effects on access for current use and for implementing adaptive mitigation measures as required. The Agency understands that Indigenous nations will be provided with the necessary capacity, such as technical and financial support, to meaningfully participate in the Committee and to carry out monitoring activities.

The Agency proposes that monitoring and follow-up programs be implemented during all phases of the Project to verify that the Land Use Plan is being carried out as intended and that the recommendations and advice from the Indigenous Land Use Advisory Committee are being considered.

7.4.2 Physical and cultural heritage resources and sites of significance

7.4.2.1 Proponent's Assessment of Effects, Mitigation and Monitoring

Located within or partially within the PDA, a total of fourteen historic structure sites and 22 archaeological (precontact period and historic period) sites were assessed by the Proponent. Some areas were not assessed due to lack of landowner access, as such, additional field work could be required by the Proponent as mandated under the Alberta *Historical Resources Act*.

Under the Alberta *Historical Resources Act*, a few of these sites were identified to have "moderate to high heritage value". The Proponent did not find sites with "very high heritage value" (e.g., spiritual sites or human burials) within the PDA. The Our Lady Peace Mission Site, a provincially protected historical resource of "high heritage value" and a site of importance to several Indigenous nations, is located outside the PDA and would not be affected by the Project.

Project infrastructure and activities would overlap all 22 archaeological sites. Disturbance to these sites would be caused by the construction of the diversion inlet, excavation of the diversion channel, realignment of Highway 22, and the re-location of existing pipelines under the diversion channel. Under the Alberta *Historical Resources Act*, these sites do not have sufficient heritage value to mandate complete avoidance. The historic structure sites within the PDA have either been destroyed by current development (cultivation) or are no longer intact and cannot be recovered. Through photography and collection of these artifacts, the Proponent stated that the Project's effects to these sites have been sufficiently mitigated.

Erosion caused by changes in the hydrodynamics of the Elbow River from reservoir draining could affect the integrity of sites along the River, including those downstream of the Project. Existing conditions of sites downstream of the Project were not assessed by the Proponent.

Additional cultural heritage resources and sites of significance potentially occur within the PDA. These cultural heritage resources and sites of significance were identified by several Indigenous nations and are associated with cultural practices (e.g., plant gathering, fishing, hunting, ceremonial, and campsites). Sites of significance and cultural heritage resources include current and historic travel routes, potential gravesites, and archeological and historical artifacts.

Additional to the regulatory requirements mandated under the *Alberta Historical Resources Act*, the Proponent will engage with each Indigenous nation to identify and mitigate effects to these cultural heritage resources and sites of significance. Mitigation measures include on-site monitoring by Indigenous nations before and during project disturbance and conducting ceremonies prior to construction.

For cultural heritage resources and sites of significance that do not overlap permanent structures, residual effects would be moderate in magnitude during construction and low in magnitude for dry operations. Residual effects would be high in magnitude for cultural heritage resources and sites that overlap permanent structures, restricted areas, and areas with temporary physical disturbance.

7.4.2.2 Views Expressed

Multiple Indigenous nations expressed concerns about the Project's disturbance to known gravesites, tipi rings, trails, camp sites, cairns, gathering sites, Springbank Creek and the site of first church. The Métis Nation of Alberta – Region 3 identified the potential for homesteads, cart trails, and historical use areas in proximity to the Project. Siksika Nation noted that the excavation for the diversion channel could have a serious effect on Blackfoot cultural items. Multiple Indigenous nations indicated that further assessment is required to identify and assess the cultural importance of these sites.

Multiple Indigenous nations stated that some sites of significance would be buried and lost from sediment deposition in the reservoir, become inaccessible, or be destroyed from project infrastructure and flood waters. Piikani Nation stated that the loss and alteration of these sites are significant to the Nation if left unmitigated.

Multiple Indigenous nations expressed concerns that the *Alberta Historical Resources Act* does not offer adequate protection to sites of significance or that not all sites of importance apply to this legislation. Siksika Nation, Piikani Nation, and Kainai First Nation emphasized the need for the repatriation of collected artifacts within the PDA and stated that Indigenous nations be part of the assessment and collection.

Multiple Indigenous nations requested that the Proponent develop a protocol for chance finds with Indigenous nations. Indigenous nations also requested that members be hired to monitor excavation for all project phases as part of this chance finds protocol. The nations also suggested that ceremonies and protocols appropriate to each affected Indigenous nation be applied for sites impacted by the Project. Siksika Nation recommended that the Proponent implement cultural awareness training for contractors prior to construction.

7.4.2.3 Agency's Analysis

The Agency agrees with the Proponent's assessment of residual effects to physical and cultural heritage resources and sites of significance. However, the Agency acknowledges that some sites of importance and cultural heritage resources would be permanently lost, altered, or inaccessible and that the requirements mandated under the Alberta *Historical Resources Act* may not fully mitigate or protect these sites and resources.

The Agency is of the view that the following key measures will avoid the likelihood of significant effects:

- providing Indigenous nations opportunities to monitor land disturbance activities;
- conducting ceremonies prior to construction; and
- hosting facilitated discussions with the Proponent and Alberta Culture and Tourism on the protection, recovery and repatriation of sites of importance and cultural heritage resources that cannot be avoided.

Analysis of effects on cultural experience and social well-being regarding the loss and alteration to sites of importance and to cultural heritage are described in Section 7.6.4 of this Chapter and Chapter 7.5 Health and Socio-Economic Conditions.

A follow-up program will be developed prior to construction and implemented during all phases of the Project. The follow-up program will support the gathering of traditional knowledge to verify cultural heritage resources and sites of significance; where there is a project interaction with these sites, adaptive management measures will be implemented as required.

The follow-up program will also include: developing a communication and engagement plan in consultation with Indigenous nations on project schedules, activities, final design plans; engagement on monitoring, mitigation on unforeseen impacts to sites of significance and cultural heritage resources; and, if required, additional mitigation measures.

7.4.3 Availability and quality of resources for current use

7.4.3.1 Proponent's assessment of effects, mitigation and monitoring

Plants and Wildlife

The Project could affect plant and wildlife species and their habitat that support cultural practices such as hunting, trapping, and plant gathering. Among the culturally important species identified to reside within the LAA by the Proponent and Indigenous nations, the elk and Grizzly Bear were used as focal species for the assessment. Traditional use studies by Indigenous nations have described culturally important plants and locations of high habitat suitability for elk in the LAA, including calving grounds within the off-stream reservoir.

The Project's effects to plants and wildlife and associated mitigations are described in Chapter 6.4 Terrestrial Landscape, Chapter 7.2 Migratory Birds, and Chapter 7.3 Species at Risk. These effects include changes in wildlife movement patterns and habitat. The Project would also result in increased

risk in wildlife mortality and habitat loss from direct vegetation removal associated with construction and grading. Habitat quality and function would also be altered during flood and post-flood operations from reservoir filling and from the sediment left behind following reservoir draining. A design flood would result in a high magnitude effect on wildlife habitat because more than ten percent of upland and wetland habitat would be temporarily affected.

The Proponent will seek input from Indigenous nations on the seed mix composition used for reclamation and provide Indigenous nations with opportunities to conduct pre-construction field visits to harvest and relocate plants of cultural significance. Indigenous nations will be provided the opportunity to contribute to the development and implementation of a wildlife salvage program that would include culturally important species. Indigenous nations will also have the opportunity to participate in post-food wildlife habitat assessments that would be used to develop site-specific mitigation measures or species-specific surveys.

Fish

The Project could affect the availability and quality of fish in the Elbow River. Various fish species in the LAA are used by Indigenous peoples for sustenance and recreational purposes. Some fish habitat would be lost and altered as a result of project construction and from changing hydrodynamics and sediment transport during flood and post-flood operations. The amount of fish habitat loss would be relatively small compared to the availability of fish habitat remaining in the RAA.

During flood and post-flood operations, the Project could cause direct fish mortality and affect fish health and habitat. Fish migration could be impeded by project infrastructure and flood debris. Fish mortality could be caused by entrainment and stranding of fish in the off-stream reservoir. Fish health and habitat could be affected by the changes in Elbow River flows and water quality during the release of water from the reservoir. The Proponent expects that these effects would be temporary and limited to the area flooded.

Further details on the Project's effects to fish and fish habitat and the associated key mitigations are described in Chapter 7.1 Fish and Fish Habitat. Proposed mitigations include fish habitat offsets, surface water quality monitoring, and a fish rescue plan. Indigenous nations will be provided with the opportunity to contribute in the development and implementation of the offset plan and fish rescue plan.

Overall Residual Effects

During construction and dry operations, residual effects on the availability and quality of resources for current use would be moderate in magnitude, extend to the LAA, long-term in duration, and irreversible.

During flood and post-flood operations, the magnitude of residual effects on the availability of resources is expected to range from low to high. The low magnitude of residual effects represents the effects to the diversity of plant communities and fish habitat. The high magnitude of residual effects represents the effects to suitable elk summer feeding habitat, grizzly bear spring feeding habitat and fish mortality in the LAA.

The Proponent concluded that the residual effects on wildlife and fish would not pose a threat to the long-term persistence and viability of species in the RAA. Furthermore, residual effects on vegetation would not result in the loss of vegetation communities in the LAA.

7.4.3.2 Views Expressed

Concerns from Indigenous nations specific to the Project's effects to plant, wildlife and fish resources are described in Chapter 6.4 Terrestrial Landscape, Chapter 7.1 Fish and Fish Habitat, Chapter 7.2 Migratory Birds, and Chapter 7.3 Species at Risk.

Multiple Indigenous nations stated that the Project's effects on the availability of resources for current use consider the relative available (accessible) areas within their traditional territories. Several Indigenous nations indicated that their traditional territories are continuously and substantially diminishing over time from urban and industrial development, which are affecting resources availability and access.

7.4.3.3 Agency Analysis

The Agency is of the view that residual effects to resource availability and quality for current use during construction and dry operations is predicted to be low in magnitude, extend to the RAA, and be long-term. Residual effects would be irreversible in areas of restricted access.

During flood and post-flood operations, the magnitude of residual effects to the availability and quality of resources for current use would be moderate to high. The geographic extent of these residual effects is regional and long-term. Residual effects would be reversible until vegetation types and wildlife habitat sufficiently recovers for cultural practices to resume. While these residual effects may be high in magnitude, they would be infrequent recognizing that a 1:100 year and design flood is a low probable event.

The Agency supports the views expressed by Indigenous nations that preferred use areas and accessibility, in addition to considering the relative remaining habitat and species viability within the RAA, be contextual factors in characterizing residual effects. The Agency recognizes that privately accessed lands are important for some Indigenous nations due to the increasing land use pressures and existing access constraints. Given the Proponent's Land Use Plan that ensures access and prioritizes use for Indigenous nations within the PDA, the Agency is of the view that the magnitude of residual effects on resource availability for current use will be greatly minimized.

A follow-up program involving vegetation and wildlife monitoring and Indigenous participation in post-flood recovery efforts for the PDA would be important measures for verifying project effects and for implementing adaptive management measures as required.

7.4.4 Quality of experience

7.4.4.1 Proponent's Assessment of Effects, Mitigation and Monitoring

The Proponent acknowledges that Indigenous users may choose not to pursue Indigenous use activities near the Project for a variety of personal, practical, aesthetic, and spiritual reasons, including lack of access. Various socio-economic conditions may also affect harvesting and are described in Chapter 7.5 Health and Socio-economic Conditions of this report.

The Project could affect the quality of experience while on the land and waters. These effects include:

- Change in air quality (dust);
- Noise disturbance from construction and maintenance activities;
- Change in visual aesthetics from permanent project infrastructure and post-flood debris left in the reservoir;
- Change in access or loss and alteration to sites of significance; and
- Change in the quality and availability of country foods.

Quantitative assessments on noise, air quality, and country foods are described in Chapter 7.5 Health and Socio-economic Conditions of this report. Taking into account mitigations, residual effects to air quality and country foods in relation to human health were negligible for all project phases. Noise disturbance caused by the Project would be highest during construction, namely from blasting.

The Proponent stated that Project effects to cultural experience are best evaluated by Indigenous nations that would experience the changes in their own cultural context. Through the Proponent's engagement program, several Indigenous nations stated that the Project would result in impacts to the cultural and spiritual value of water because of its interference with its natural flow within and surrounding the PDA. Concerns over water also included project effects to underground streams or springs. Stoney Nakoda Nations explained the cultural importance of the Elbow River, noting that their oral history (including songs) pertain to the water table, flood plain, and sand dunes.

The project design will facilitate natural river flow patterns to the extent possible and mitigate against extreme flooding downstream. Project effects from reservoir draining are not expected to alter sand dunes downstream. The Project's effects to groundwater and underground streams are expected to be limited to the LAA north of the Elbow River during flood and reservoir filling. Groundwater levels are expected to recover to pre-flood levels within one year following the end of the flood. Project effects are further described in Chapter 6.2 Surface Water and Hydrology and Chapter 6.3 Groundwater and Hydrogeology.

The Proponent acknowledges that mitigation of physical effects may not fully mitigate effects to spiritual and cultural effects and thus, quality of experience. The Proponent will maintain continuous engagement with each Indigenous nation to work toward addressing these ongoing concerns.

7.4.4.2 Views Expressed

Multiple Indigenous nations noted concerns that the Project would adversely affect cultural, intrinsic and spiritual values that support the quality of experience within and surrounding the project area. Maintaining spiritual and cultural connections are important for the intergenerational transfer of knowledge and cultural preservation.

Indigenous nations raised concerns about species of importance related to cultural practices and the cultural importance of inter-species relationships, particularly if the Project could cause direct fish and wildlife mortality. They stated that causing harm to culturally important species in such a manner is antithetical to natural law and would result in adverse effects to the quality of experience.

7.4.4.3 Agency Analysis

During construction and dry operations, the Agency is of the view that residual effects to the quality of experience would be low in magnitude. Nuisance disturbances, interactions with land users, changes to aesthetics from project infrastructure, and access restrictions will be localised and long-term in duration.

During flood and post-flood operations, the Agency is of the view that residual effects to the quality of experience would be high in magnitude. This high rating is due to drastic changes in aesthetics, potential for increased mortality risk of culturally important species, and change in the cultural and spiritual connection with the land from the loss or alteration of sites of importance. While these residual effects may be high in magnitude, the Agency recognizes that the occurrence of residual effects would be infrequent given that a 1:100 year and design flood is a low probable event.

The Agency believes that additional key mitigation measures would be necessary to ensure cultural practices persist and the quality of experience is maintained in the PDA and surrounding area. These key mitigation measures include: avoiding key traditional harvesting periods, and providing Indigenous cultural awareness training for all employees associated with the Project that is developed and delivered by Indigenous nations.

The Agency acknowledges the important role that the Indigenous Land Use Advisory Committee would play for ensuring that project effects to the quality of experience are minimized. As indicated previously, the Agency proposes that a follow-up program be implemented during all phases of the Project to verify that the Land Use Plan is being carried out as intended and that the recommendations and advice from the Indigenous Land Use Advisory Committee are being considered.

Should the Project proceed, the Agency proposes that the Proponent continue its engagement with Indigenous nations to support the gathering of traditional knowledge for the duration of the Project to inform changes to and/or include additional mitigation measures, as necessary. The Agency also proposes that the Proponent work toward addressing these ongoing concerns by finalizing an Indigenous Participation Plan for each affected Indigenous nation.

7.4.5 Key mitigation measures and follow-up to avoid significant effects

In conjunction with the mitigation and follow-up measures proposed by the Proponent, the Agency considers the following mitigation measures, identified through expert advice from federal authorities and comments received from Indigenous nations, as necessary to ensure there are no significant adverse effects to current use:

Access for current use

- Finalize the Land Use Plan in consultation with Indigenous nations that prioritizes access and use by Indigenous nations to areas within the PDA. Develop maps to indicate locations within the project area that are available for unimpeded use by Indigenous nations.
- In consultation with Indigenous nations, establish a portion of land near or within the Land Use Area for a dedicated Indigenous Nations staging area.
- Establish an Indigenous Land Use Advisory Committee to support the development and implementation of the Land Use Plan.
- Establish a portage route around project infrastructure and safety signage in consultation with Transport Canada.
- Prior to construction and in consultation with Indigenous nations, develop a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of mitigation measures as it pertains to the adverse environmental effects of the Project on the current use of lands and resources for traditional purposes. The follow-up program will be implemented during all phases of the Project to verify that the Land Use Plan is implemented as intended and that the recommendations and advice from the Indigenous Land Use Advisory Committee are being considered.

Physical or cultural heritage resources

- Retain monitors from Indigenous nations before and during project disturbance to enforce assessment and chance find protocols.
- Conduct ceremonies led by Indigenous nations prior to construction commencement.
- Facilitate discussions between Alberta Culture and Tourism and Indigenous nations regarding Indigenous site locations, further investigation, and mitigation options for sites disturbed by the Project.
- Prior to construction, develop a follow-up program that will be implemented during all phases of the Project to support the gathering of traditional knowledge and verification of sites of importance; where there is a project interaction with Indigenous use sites and areas, implement adaptive management measures to incorporate traditional knowledge in accordance with the protocols of respective Nations.
- Develop a communication and engagement plan in consultation with Indigenous nations. As part of this plan, notify Indigenous nations of project activities and schedules, project maps and final design components.

- Engage Indigenous nations in monitoring and in developing and implementing any unforeseen impacts on sites of importance and, if required, develop and implement additional mitigation measures.

Availability and quality of resources for Indigenous use

- Implement mitigation measures identified in Chapter 6.4 Terrestrial Landscape, Chapter 7.2 Migratory Birds, Chapter 7.3 Species at Risk, and Chapter 7.1 Fish and Fish Habitat.
- Provide opportunities for Indigenous nations to conduct pre-construction field visits to harvest and relocate plants of cultural significance.
- Develop the revegetation plan (post construction, and post-flood), wildlife salvage plan, surface water quality monitoring plan, wildlife mitigation and monitoring plan, fish rescue plan, and fish offsetting plan in consultation with Indigenous nations. Provide Indigenous nations with the opportunities to participate in implementing these plans and monitoring activities.
- Prior to construction and in consultation with Indigenous nations, develop a follow-up program to verify the availability and quality of resources in areas where changes to the environment may occur due to the Project. Implement adaptive management measures as required.

Quality of experience

- Implement mitigation measures identified in Chapter 7.5 Health and Socio-economic Conditions and in this section related to *Access for Indigenous Use, Physical or cultural heritage resources, and Availability and quality of resources for Indigenous use.*
- Avoid key traditional harvesting periods.
- Develop and implement, in consultation with Indigenous groups, cultural awareness training for all employees associated with the Project, ensuring that the training is delivered by Indigenous nations.

Taking into account the implementation of the mitigation measures described above, the Agency concludes that the Project is not likely to cause in significant adverse effects on Indigenous peoples' current use of lands and resources for traditional purposes, physical and cultural heritage, or any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance.

7.5 Indigenous Peoples – Health and Socio-Economic Conditions

The Project could cause residual effects on the health and socio-economic conditions of Indigenous peoples. The Agency considered the potential effects on the physical, mental and spiritual health of individuals and communities, and the potential effects on quantifiable and un-quantifiable socio-economic conditions and community well-being. The Agency focused its assessment on changes to the environment caused by the Project that could affect:

- Human health by reducing water quality, air quality, and the quality of country foods, as well as impacts to the acoustic environment; and

- Socio-economic conditions and community well-being through reduced access to resources, and sites of spiritual and cultural importance.

Additional changes to the environment resulting from the Project and associated effects on Indigenous peoples are discussed elsewhere in this report and are closely interconnected with health and socio-economic conditions. These include effects on federal lands, physical and cultural heritage, and current use of lands for traditional purposes.

The Agency is of the view that the Project is not likely to cause significant adverse effects on Indigenous health and socio-economic conditions after taking into account the proposed key mitigation measures outlined below. The Agency recommends follow-up program measures to evaluate the accuracy of predictions related to health and socio-economic conditions of Indigenous people and to determine the effectiveness of the proposed mitigation measures. The Agency's conclusions are based on input from Indigenous nations and Federal Authorities, as well as its analysis of the Proponent's assessment of effects on the health and socio-economic conditions of Indigenous peoples.

7.5.1 Effects on Indigenous Peoples' Health

7.5.1.1 Proponent's Assessment of Effects, Mitigation and Monitoring

The Proponent considered potential changes in health risk to the population that may result from changes in air quality, water quality, noise, and quality of country foods during construction, dry operations, and flood and post-flood operations. Project residual effects on public health during construction are anticipated to be adverse, of high magnitude, extending to the LAA, of medium-term duration, occurring at an irregular frequency, reversible, and within a resilient ecological/socio-economic context. Project residual effects on public health during flood and post-flood operations are anticipated to be adverse, of low magnitude, extending to the LAA and RAA, of short term duration, occurring at irregular frequency, reversible, and within a resilient ecological/socio-economic context.

Atmospheric Environment

With regards to potential effects from air quality, the Proponent noted that during the construction phase, combustion exhaust and fugitive dust would emit contaminants of potential concern including air contaminants such as nitrogen dioxide, sulfur dioxide, carbon monoxide, fine particulate matter (PM_{2.5}), diesel exhaust particulate volatile organic compounds, polycyclic aromatic hydrocarbons, and metals. These contaminants of potential concern may be inhaled by residents and land users, thereby increasing health risk. Potential effects to Indigenous health could occur through the deposition of air emissions to soil and subsequent uptake by plants and animals that may be consumed as country foods. The Proponent identified mitigation, monitoring, and follow up measures for effects to air quality and stated no further or specific mitigation measures would be required for effects to Indigenous peoples' health.

With respect to dust from construction activities, the Proponent outlined that dust from earthworks is localized and opportunities for harvesting country foods during construction will not be permitted in the PDA due to safety factors; therefore, effects on human health through the consumption of country foods is expected to be negligible. Dust generated by earthworks during construction is essentially inert earthen material and would have a similar chemical composition as the surrounding soil in the construction area; therefore, dust that settles during the construction phase will be primarily of the

same quality as the dust settling under current conditions (e.g., from wind or farming/ranching activities). The Proponent concluded that because Project activities will not alter the current concentrations of contaminants of potential concern concerning soil-derived dust, indoor settled dust is not considered an operable exposure pathway. Chapter 6.1 Atmospheric Environment provides further details.

The Proponent predicted no or improbable unacceptable risk to human health from criteria air contaminants, volatile organic compounds, polycyclic aromatic hydrocarbons, or metals in air emissions throughout the LAA and RAA, with the exception of fine particulate matter (PM_{2.5}). The EIS indicated that with partial mitigations to reduce fine particulate matter (PM_{2.5}) along the haul road and borrow material area, there could still be an unacceptable short-term risk to human health for residents and people adjacent to the PDA.

Mitigation measures, monitoring, and follow-up included:

- Vehicles, equipment, engines, and exhaust systems would be required to meet current emissions control standards and would be properly maintained.
- Development of an ambient air monitoring program and adaptive management techniques to control the generation of airborne dust.
- Water and/or chemical dust suppressants will be applied on an as-needed basis and dust generating activities would be suspended during periods of excessive winds wherein dust suppression measures are not working adequately.
- Vegetation re-establishment after reservoir draining to minimize wind erosion and dust.
- Speed limits will be required and project-related employees will be required to abide by those limits on access roads associated with the Project.
- Monitoring will be implemented in conjunction with emissions mitigation to provide understanding of meteorological conditions and offsite concentrations, and determine the need for more rigorous mitigation. Monitoring will include visual observation of increased particulate matter and dust and the installation and operation of an Environmental Beta Attenuation Monitor to measure ambient fine particulate matter (PM_{2.5}) and total suspended particulates concentrations.
- During the construction phase, the monitoring equipment will be placed at two locations along the road between the diversion channel excavation work and the dam construction site. Monitoring equipment will also be placed adjacent to the borrow source, if it is used. The exact locations of the monitoring stations will be determined following the detailed construction plan developed by the construction contractor. Monitoring will be continuous, and results will be reported to the Environmental Inspector during the construction phase who will pass them on to the Alberta Transportation Provincial Environmental Coordinator who will initiate action. During the post-flood phase, results will go to the Environmental Coordinator for Alberta Environment and Parks, the Project operator.
- If the monitoring program indicates that the ground-level total suspended particulate concentrations are greater than an ambient air quality objective, then additional mitigations to reduce total suspended particulate emissions will be implemented. These include the suspension of construction activity, increased watering of access roads, or the spraying of surfactants during the construction phase and the spraying of surfactants during the post-flood

phase. The details of the monitoring program and the results will be made available to nearby residents. During the post-flood phase, particulate monitoring sites will be established at locations based on the presence of dry surfaces and expected paths of wind-blown materials.

Water Quality

Reductions in drinking water quality as a result of the Project may occur that could affect Indigenous peoples' health due to construction and uptake of contaminants into water held in the reservoir which will then be released into the Elbow River and then to the Glenmore Water Treatment Plant. The potential uptake of methyl mercury into fish from water held in the reservoir was also identified as a potential pathway of effect. The Proponent identified mitigation measures for effects to hydrogeology, water quality, and aquatic ecology and stated no further or specific mitigation measures would be required for effects to Indigenous peoples' health.

Methylmercury concentrations in water retained in the reservoir are estimated to reach up to 0.002 microgram per litre during flood operations, which is below the Canadian drinking water quality guidelines for total mercury of one microgram per litre. The Proponent concluded that there is a low probability that a single water release from the off-stream reservoir after a flood could substantially change the viability of fish and as such that there are no unacceptable risks to human health from exposure to methylmercury in fish harvested from Elbow River during post-flood operations.

Further information and mitigation measures for hydrogeology, water quality, and aquatic ecology are outlined in Chapter 6.2 Groundwater and Hydrogeology and Chapter 6.3 Surface Water and Hydrology.

Mitigation measures, monitoring, and follow up included:

- Existing water wells within the reservoir footprint will be decommissioned and plugged off to prevent groundwater contamination and to prevent flood waters from infiltrating nearby water wells.
- When water sample analytical results are at or above 2.5 ng/L of total mercury or at or above 0.5 ng/L methylmercury (i.e., the monitoring target threshold) for two consecutive sampling events, Alberta Environment and Parks will issue advisories that total mercury and methylmercury concentrations in Elbow River water have increased and that this may affect drinking water and fish tissue. Advisories will be issued until mercury and methylmercury levels decrease below the monitoring target threshold.

Acoustic Environment

Pathways of effects on humans related to the acoustic environment, including noise from construction and related effects to health were considered. The Proponent identified Indigenous receptors within the RAA on the Tsuut'ina Nation reserve; no locations outside the Tsuut'ina Nation reserve where Indigenous people reside either permanently or seasonally (e.g., camps, cabins) have been identified.

The Proponent described the Project residual effects on the acoustic environment during construction as adverse, of high magnitude, extending to the LAA, of short term duration, occurring at regular frequency, reversible, and within a disturbed ecological/socio-economic context. The Proponent described the Project residual effects on the acoustic environment during flood and post-flood

operations as neutral, of low magnitude, extending to the LAA, of short term duration, occurring at irregular frequency, reversible, and within an undisturbed ecological/socio-economic context. The Proponent noted that, without mitigation, 33 of the 45 receptors identified may exceed Health Canada noise thresholds but that with the development of the detailed construction execution plan, mitigation measures would be developed to meet assessment noise thresholds. Mitigation measures, monitoring and follow-up include:

- Community updates will be provided regarding the location and timing of construction noise activities.
- Residents near to construction noise-generating activities will be notified.
- Noise abatement barriers may be used to reduce noise levels. If noise abatement barriers are ineffective, residents may have to be moved temporarily to alternative accommodation during the construction phase producing the noise.
- A complaint response procedure will be implemented to address noise complaints should they arise.
- With respect to blasting, the Proponent will follow the specific threshold limits for blasting air overpressure and vibration at sensitive receptors specified by Environment Canada (2009) and Health Canada (2017). These calculations will be done when the blasting program is designed.

Country Foods

It is anticipated that the Project would result in a negligible change in soil chemistry and there would be limited access to the country foods that would be affected by dust. Changes to the terrestrial and atmospheric environment are discussed in chapters 6.4 and 6.1, respectively.

There are no anticipated project interactions for changes in human health from consumption of country foods during construction and dry operations. Effects on human health through the consumption of country foods are expected to be negligible.

The quantity of project-related emissions of chemicals that could persist in the environment (such as metals and polycyclic aromatic hydrocarbons in diesel emissions during construction) would not affect concentrations in edible tissues.

7.5.1.2 Views Expressed

Indigenous Nations

Indigenous nations expressed concerns regarding potential changes to air quality, water quality and experiences of land use and the related effects to health. Indigenous nations noted that changes to access to country foods, such as possible reductions in elk within the proposed project area, would have an adverse effect on the physical, mental and spiritual health of community members. Indigenous nations expressed how engaging in traditional activities on the land, including accessing country foods, is important to connect with the land, their family, and community and to express, maintain, share, and pass on cultural values and knowledge. They noted that the transmission of knowledge to the next generation ensures their culture stays alive. Indigenous nations described water as the lifeblood of Mother Earth, and explained the importance of the Elbow River culturally and also to the local landscape for transportation, as a wildlife corridor, and for food from fishing. Subsequently, changes to the Elbow River may effect individual and community well being.

Federal Authorities

With respect to human health and air quality, Health Canada identified key mitigation measures as outlined in Chapter 6.1 Atmospheric Environment, including continuous monitoring of nitrogen dioxide and fine particulate matter (PM_{2.5}). With respect to noise, Health Canada recommended a formalized complaint-response protocol be implemented with monitoring and mitigation measures defined in the event of complaints and the implementation of all technically feasible and economically viable mitigation measures in order to reduce noise levels to the extent possible. Health Canada has not identified potential significant residual effects after key mitigation measures are implemented.

7.5.1.3 Agency Analysis

Taking into account the implementation of the mitigation measures described above by the Proponent and Health Canada, the Agency has not identified potential significant residual effects and concludes that the Project is not likely to cause significant adverse effects on Indigenous peoples' health. The Agency agrees with the Proponent's assessment of the Project's residual effects on public health during construction as adverse, of high magnitude, extending to the LAA, of medium-term duration, occurring at an irregular frequency, reversible, and within a resilient ecological/socio-economic context during construction and during flood and post-flood operations of low magnitude, extending to the LAA and RAA, of short term duration, occurring at irregular frequency, reversible and within a resilient ecological/socio-economic context.

The Agency recognises that project construction, operation and maintenance pose health concerns for Indigenous nations with respect to air quality, water quality, the acoustic environment and quality of country foods. The Agency also acknowledges the importance of land based connections for Indigenous peoples to engage in traditional activities, which are necessary for the intergenerational transfer of culture, spirituality, and practices to safeguard the sustainability of their culture. Considered holistically, related environmental changes will affect physical, mental, spiritual, and cultural health of Indigenous individuals and communities. Indigenous nations that would be affected by the Project could perceive a moderate risk to their physical health or safety caused by project-related environmental changes, including the uptake of methylmercury into fish, but mitigation and compensation measures could be put in place to minimize perceived risk. Perceived risk to health may lead to changes in behaviours or practices required for carrying out activities, such as fishing. Contaminant management and mitigation measures would make it possible to minimize repercussions on air, water, soil, food quality and quality of life. Participation in monitoring and follow up measures would help further reduce perceived risk to health and safety. With respect to fine particulate matter (PM_{2.5}), the Agency supports Health Canada's key mitigation measures as outlined in Chapter 6.1 Atmospheric Environment, including continuous monitoring of fine particulate matter (PM_{2.5}).

7.5.2 Effects on Indigenous Peoples' Socio-Economic Conditions

7.5.2.1 Proponent's Assessment of Effects, Mitigation and Monitoring

The Proponent did not predict residual effects on Indigenous peoples' socio-economic conditions.

However, as it may be connected with effects to socio-economic conditions, the Proponent did predict residual effects to current use of lands and resources for traditional purposes, physical and cultural

heritage, sites of importance, and Section 35 rights, as outlined in Chapter 7.4 Current Use of Lands for Traditional Purposes; Physical and Cultural Heritage and Sites of Significance. The Proponent's assessment of residual effects considered change in the distribution, diversity and abundance of traditionally used resources, access to those resources and areas, and changes to the sites and areas themselves.

The Proponent's assessment of socio-economic conditions was not focused on Indigenous peoples. In its assessment of Project effects on employment and the economy, the Proponent identified interests raised by Indigenous peoples in pursuing economic opportunities associated with the Project but no commitments are made in this regard. Generally positive effects on the regional economy and employment are anticipated, with the Tsuut'ina Reserve 145 located within the local assessment area, but the distribution of these benefits with respect to Indigenous peoples are not discussed. The Proponent considered project activities that may reduce the area of public land available for country food harvesting and potential effects to food scarcity.

The Proponent outlined that the Project will result in the conversion of private land to Crown land which will allow for future use by Indigenous nations. It is anticipated that the Project would enhance opportunities for Indigenous nations to exercise Treaty rights and traditional uses. The Proponent committed to use of the lands by Indigenous nations to be a priority outside of flood and post-flood recovery periods.

7.5.2.2 Views Expressed

Indigenous Nations

Indigenous nations identified that they have established relationships with the private landowners in the proposed project area and currently use the project area to exercise their Aboriginal, Treaty and Inherent rights including for subsistence, spiritual, and cultural use. Indigenous nations identified that they have historic trails, campsites, hunting areas, fishing waters, ceremonial and spiritual sites, trade routes, grave sites, and gathering areas throughout the project area. Indigenous nations informed the Agency that access to the private lands in the proposed project area is very important to them because of competing land use pressures within their respective traditional territories. Louis Bull Tribe indicated that due to extensive development and alteration of the natural landscape, they have to travel further and further to practice their constitutionally protected Aboriginal and Treaty rights. Ermineskin Cree Nation also noted that the PDA and LSA have become increasingly important to Ermineskin hunters and harvesters due to cumulative effects of industrial development, which has reduced the abundance of big game on Crown lands to the north and to the west of Ermineskin Reserve 138. Indigenous nations identified concerns that despite the Project resulting in the conversion of private lands to Crown lands that there will still be a net loss of lands to support their health and socio-economic conditions.

Indigenous nations raised concerns with the distribution of costs and benefits of the proposed project, noting the unequitable burden of project risk placed on Indigenous peoples. Further, Indigenous nations noted the systemic exclusion of Indigenous peoples from economic benefits of development and identified risks of these patterns being repeated in the development of the Project. Indigenous nations

requested access to construction and other contracts associated with the Project, in the event that the Project did proceed.

Indigenous nations indicated that the Project may affect their ability to hunt, fish and gather plants by affecting species and habitats that support these activities. Indigenous nations noted that the Proponent has proposed grazing leases and that grazing on the lands can restrict their ability to access and use the lands since permission would be required and may also change wildlife's use of the lands, such as elk no longer frequenting areas when cattle are present. They explained hunting for subsistence is also directly related to economic conditions and food security, and noted the project area is an important area for access to required resources. Indigenous nations explained that meat from hunting trips feeds numerous families within their communities, in particular Elders who are no longer able to hunt for themselves.

Indigenous nations identified traditional resources/species of interest to the Project area for their subsistence use in spiritual, cultural, health and socio-economic purposes, including, but not limited to:

- elk, moose, white tailed deer, mule deer, cougar, coyote, wolf, muskrat, beaver, ground squirrels, rabbit and grizzly bear;
- ruffed grouse, sharp-tailed grouse, Canada goose, mallard duck, merganser duck, wild turkey and prairie chicken;
- rainbow, brown, brook, cutthroat and bull trout, rocky mountain whitefish, char, suckers, pike and whitefish; and
- Saskatoon berries, chokecherries, blueberries, strawberries, gooseberries, smooth blue aster, plantain, willow, golden rod, mint, and herbs.

Indigenous Nations' Proposed Mitigation Measures:

- Ermineskin Cree Nation and Kainai First Nation outlined that given the potential negative effects of the Project on traditional use, knowledge, and the traditional way of life and culture of their people, the Proponent should discuss ways to support programming within the community to strengthen the transmission of the Indigenous way of life and culture to future generations.
- Siksika Nation recommended that the Proponent implement cultural awareness training prior to construction that would include visiting the areas on the land (e.g., physical and ceremonial) that are important to Indigenous nations.
- TAG participants described the historic and current systemic exclusion of Indigenous peoples from socio-economic benefits of development and expressed the need for pro-active and creative solutions including the purposeful inclusion of Indigenous nations in the economic benefits from projects such as this Project.

Public

Landowners identified historical trails within the project area. Some land owners confirmed they granted access to their lands to Indigenous peoples, including for harvesting purposes that support socio-economic well-being.

7.5.2.3 Agency Analysis

Taking into account the implementation of the mitigation measures described above in this chapter and related referenced chapters, as well as the additional mitigation measures outlined below in section

7.5.3, the Agency concludes that the Project is not likely to cause significant adverse effects on Indigenous peoples' socio-economic conditions. The Agency notes that the residual Project effects on Indigenous peoples' socio-economic conditions are partially dependent on the magnitude of flooding events. The residual effects during construction, operation and maintenance and during a 1:10 year flood would be moderate, leading to changes in the behaviours required for carrying out traditional activities but carrying out traditional activities would not be compromised overall, as most areas would remain open to use. However, a 1:100 flood event would lead to noticeable changes in the behaviours required for carrying out traditional activities in regularly used areas, such that the traditional activity would be compromised or no longer possible until revegetation and any necessary reclamation would be sufficiently advanced; the Agency considers this to be a high magnitude event but, since the impact is site specific, overall the event would not cause significant adverse environmental effects.

The Agency recognizes that project infrastructure and activities, including areas designated for flooding, and competing land uses such as recreational use and grazing, will result in long term loss of land as well as restricted land access and potential diminished quality of traditional activities. These changes affect socio-economic conditions by altering harvesting and related practices. While the Proponent concluded that the Project is anticipated to enhance opportunities for First Nations to exercise Treaty rights and traditional uses due to the conversion of private land to Crown land, Indigenous nations indicated that they have established relationships with landowners and already have permission to access and use these lands.

The Agency recognizes the project area as an area currently accessed by Indigenous peoples for socio-economic purposes, including for subsistence use. The Agency notes that the environmental effects on water, wetlands, wildlife and vegetation will impact Indigenous peoples' subsistence and cultural use in the Project area. The Agency also acknowledges the importance and value of caring for elders and how subsistence hunting contributes to the well-being of the community, including elders. The Agency understands that land based connections are essential for the transmission of culture to future generations and that without a land base, the cultures may cease to exist, which has serious implications for well-being. The Agency also recognizes the concerns expressed regarding the cumulative effects of impacts to the lands and sites of importance. Due to cumulative effects, and extensive development and alteration of the natural landscape, Indigenous nations have to travel further and further to practice their constitutionally protected Aboriginal and Treaty rights; the Project will further restrict their community well-being and contribute to socio-economic challenges through reduced access to resources and sites of subsistence, spiritual and cultural importance. Therefore, the Agency identifies a need for the Proponent to support programming within Indigenous nations to strengthen the transmission of Indigenous ways of life and cultures to current and future generations, in addition to the staging area committed to by the Proponent for use by Indigenous nations.

The Agency acknowledges that Indigenous nations requested access to construction and other contracts associated with the Project. While the Project may generate economic and employment opportunities for Indigenous peoples, there have been no specific commitments made by the Proponent. Therefore, the Agency identifies a need for the Proponent to ensure the purposeful inclusion of Indigenous nations in the economic benefits of the project, including training, employment and contracting opportunities.

7.5.3 Key mitigation measures and follow-up to avoid significant effects

In conjunction with the mitigation and follow-up measures proposed by the Proponent, as outlined in Sections 7.5.1 and 7.5.2 of this Chapter, the Agency considers the following key mitigation measures, identified by Indigenous nations, as necessary to ensure there are no significant adverse effects to Indigenous peoples' health and socio-economic conditions. Additional relevant mitigation measures and follow up and monitoring are discussed in Chapter 6.1 Atmospheric Environment, Chapter 6.3 Hydrology and Surface Water, and Chapter 7.4 Current Use of Lands for Traditional Purposes; Physical and Cultural Heritage and Sites of Significance.

Socio-economic conditions:

- The purposeful inclusion of Indigenous nations in the economic benefits of the project, including training, employment and contracting opportunities.
- Proponent support of programming within Indigenous nations to strengthen the transmission of Indigenous ways of life and cultures to current and future generations.

Taking into account the implementation of the mitigation measures described above, the Agency concludes that the Project is not likely to cause significant adverse effects on Indigenous peoples' health and socio-economic conditions.

7.6 Federal Lands

The Project could cause residual effects on federal lands through:

- Changes to air quality inside and near the PDA due to vehicle exhaust and fugitive emissions during Project construction.
- Changes to hydrogeology and groundwater that may affect groundwater dependent traditional uses and culturally sensitive areas, drinking water, and water used for domestic purposes on reserve.
- Changes to the hydrology and surface water quality of the Elbow River and tributaries as a portion of the Elbow River upstream runs through Tsuut'ina reserve lands.

The Agency is of the view that the Project is not likely to cause significant adverse effects on federal lands, after taking into account the proposed key mitigation measures, as discussed in the Atmospheric Environment (Chapter 6.1), Groundwater and Hydrogeology (Chapter 6.2) and Surface Water Quality and Hydrology (Chapter 6.3) chapters of this report. The Agency recommends an additional monitoring measure to evaluate the accuracy of predictions related to effects to federal lands and to determine the effectiveness of mitigation measures proposed to minimize adverse effects on federal lands.

The Agency's conclusions are based on its analysis of the Proponent's assessment as well as the views expressed by Indigenous nations and the public.

7.6.1 Proponent's Assessment of Environmental Effects

The nearest First Nation Reserve is the Tsuut'ina Nation Indian Reserve 145, located 395 metres south of the proposed Project perimeter. Reserve lands would be both upstream and downstream of the Project.

The Stoney Nakoda Nation's Reserves 142, 143 and 144 would also be close to the Project, located approximately 16 kilometres west, 28 kilometres northwest, and 62 kilometres south of the Project. Project-related changes to the environment may affect these reserve lands due to potential changes in air quality, hydrogeology and groundwater, and hydrology and surface water quality of the Elbow River.

The Proponent assessed federal lands through consideration of any overlap of regional assessment areas and anticipated residual effects of valued components. No anticipated residual effects are anticipated to occur on Stoney Nakoda Nations reserve lands, therefore the assessment of effects focuses on potential effects to Tsuut'ina Nation reserve lands directly adjacent to the Project.

Atmospheric Environment

The Project may cause changes to the environment that affect the air quality on Tsuut'ina reserve lands. The Proponent's air quality assessment area overlaps with the northwest portion of Tsuut'ina Nation Indian Reserve 145. Due to the short duration and small areas of effects predicted for air emissions, as well as planned construction monitoring programs and mitigation measures, the residual effects on air quality during construction and dry operations are expected to be negligible. During the post-flood phase, modelling results show the highest concentrations of air emissions (wind erosion of deposited sediment) occurring immediately east of the PDA but were planned to minimize exceedances on Tsuut'ina reserve lands with mitigation measures. See Chapter 6.1 (Atmospheric Environment) of this report for more detail.

Groundwater and Hydrogeology

The hydrogeology LAA and RAA overlaps a small area at the northwest of Tsuut'ina reserve lands, south of the Elbow River. However, Project effects on groundwater, based on hydrogeological modelling (including sensitivity analysis), would be restricted to the LAA and to the north side of the Elbow River. The Elbow River forms a hydraulic divide for shallow groundwater, with flow directions on either side of the valley directed inward toward it. Changes to groundwater are not anticipated to occur south of the river and on Tsuut'ina reserve lands. Due to the very low hydraulic conductivities of the upper sediments in the reservoir area, groundwater flow velocities (i.e., leaching of reservoir water into groundwater) were predicted to be very low.

The residual effects on groundwater quantity and quality on Tsuut'ina reserve lands would not be significant due to the limited interaction of the Project with groundwater resources, the limited areas over which this infiltration could occur, and the short period and eventual flow paths of the flood affected water. See Chapter 6.2 (Groundwater and Hydrogeology) of this report for more detail.

Surface Water and Hydrology

While the LAA for surface water and hydrology overlaps the northern edge of Tsuut'ina Nation reserve lands along the Elbow River, there is limited interaction between the Project and surface water and hydrology in the LAA. The Proponent used hydraulic modelling to predict that the back-up of water due to the diversion would be within the PDA and not reach Tsuut'ina Nation reserve lands upstream even in a design flood scenario. The Project overall is anticipated to reduce sediment from the Elbow River through settling and retention of flood water in the reservoir. However, these effects are anticipated to

occur downstream of the Project, not upstream where the Elbow River runs through Tsuut'ina Nation reserve lands.

The effects on Tsuut'ina Nation reserve lands resulting from changes to surface water and hydrology (as associated with sediment transport) would be negligible and are predicted to be not significant. In the post-flood phase, most of the changes to the Elbow River due to the Project would occur outside Tsuut'ina Nation reserve lands. See Chapter 6.3 (Surface Water and Hydrology) in this report for more detail.

7.6.2 Proposed Mitigation Measures, Monitoring and Follow-Up

The mitigation, monitoring, and follow-up measures proposed by the Proponent are listed in the atmospheric environment (Chapter 6.1, Section 6.1.3), groundwater and hydrogeology (Chapter 6.2, Section 6.2.3), and surface water and hydrology (Chapter 6.3, Section 6.3.3) chapters of this report.

7.6.3 Views Expressed

Indigenous Nations

Tsuut'ina expressed concerns regarding Project effects to federal lands in relation to drinking water quality and availability from both groundwater and surface water resources. They indicated that they depend on the groundwater in the Elbow River alluvial aquifer for the reserve's drinking water and have five registered water wells within the RAA. Other concerns presented by Tsuut'ina were related to dust from the reservoir during post-flood conditions and contaminants carried by air and water.

A summary of comments provided to date by Indigenous nations, along with Proponent and Agency responses, are summarized in Appendix B.

Public

Members of the public expressed concerns about the Project's construction and operation on reserve lands, specifically whether Tsuut'ina Nation reserve lands would be flooded as a result of the Project operations.

7.6.5 Agency Analysis and Conclusion

Project-related changes to the environment could affect Tsuut'ina Nation's reserve lands due to potential changes in the atmospheric environment, groundwater and surface water resources. These changes could subsequently affect the health and socio-economic conditions and current use of lands and resources for traditional purposes of Indigenous peoples located on Tsuut'ina Nation reserve lands. Effects to the current use of lands and resources for traditional purposes and the health and socio-economic conditions of Indigenous peoples are discussed in Chapters 7.4 and 7.5, respectively.

The Agency is satisfied that the Proponent has adequately considered the effects of the Project (atmospheric environment, groundwater and hydrogeology, and surface water and hydrology) on federal lands and that the proposed mitigation measures and follow-up activities are appropriate to account for the potential effects of Project on federal lands.

The Agency is of the view that the Project is not likely to cause significant adverse effects on federal lands, after taking into account the proposed key mitigation measures.

Key Mitigation Measures to Avoid Significant Adverse Effects and Follow-up Program Requirements

The Agency considers the mitigation, monitoring and follow-up measures as discussed in the Atmospheric Environment (Chapter 6.1), Groundwater and Hydrogeology (Chapter 6.2) and Surface Water Quality and Hydrology (Chapter 6.3) chapters of this report to be necessary to ensure there are no significant adverse effects to federal lands. The Agency also developed the following key mitigation in response to concerns expressed by Tsuut'ina:

- As a part of the Groundwater Monitoring Plan, the Proponent will include water well locations in between the Project and Tsuut'ina. Results of the monitoring of these wells will be communicated with Tsuut'ina.

8 Other Effects Considered

8.1 Effects of Accidents and Malfunctions

Paragraph 19(1)(a) of CEAA 2012 requires that a federal EA take into account the environmental effects of malfunctions and accidents that may occur in connection with a Project.

8.1.1 Proponent's Assessment of Environmental Effects

The Project could result in the following accident and malfunction scenarios: hazardous materials spills, fires, vehicle accidents, pipeline ruptures and failures of various components of the Project. The Proponent assessed each potential scenario's interaction with valued components, the risk of occurrence, and the residual environmental effects taking into account the Proponent's commitments, contingency, and emergency response procedures.

Hazardous Materials Spills

Potential hazardous materials that could occur on the project site includes fuels, lubricants (e.g., engine oil, transmission or drive train oil, hydraulic oil), coolants (e.g., ethylene glycol and propylene glycol) paints and solvents. The improper handling, use or storage of these materials on site would be the most likely cause of a hazardous waste spill. The highest probability of a spill would be expected to occur during construction as the materials would be stored on site.

Hazardous waste spills could have negative impacts on fish species in the river, soils and vegetation, wildlife, current use of lands and resource for traditional purposes, and potentially on surface water quality, aquatic ecology, obstruction of use of the river for recreation and human health if the spill were to occur in or near a water body. The Proponent also identified minor air quality effects from evaporating hazardous materials.

Fires

There are four potential causes of a fire that could occur during project construction and dry operation: natural events (e.g., lightning strikes and wildfires); electrical power project component malfunction; equipment malfunction; or anthropogenic activities. The likelihood of fires is highest from natural events and anthropogenic activities, as component or equipment malfunctions is unlikely to cause fires.

There would be a low probability of a fire occurring in or around the project site. If a fire were to occur, the Proponent predicted that it could affect air quality, vegetation, wildlife, land and resource use, socio-economic conditions and human health.

Vehicle Accident

Vehicle accidents could occur due to movement of equipment, supplies, materials, and personnel to and from the Project site. Vehicle accidents could result in injury or death of humans and wildlife, the release of hazardous materials, and damage to property or infrastructure. The types of substances that could be released and the resulting effects are discussed above under hazardous spills. The Proponent

predicted that the likelihood of a vehicular accident would be highest during the construction phase when traffic to and from the project site would be the highest.

Pipeline Rupture

The project development area has active buried pipelines owned and operated by various third parties. The Proponent identified two potential causes of a pipeline rupture associated with the Project: a rupture as a result of the retrofitting or re-location works during the construction phase; or during flood operations when the flood waters cover the area. The Proponent predicted potential effects from a pipeline rupture could occur to air quality, hydrogeology, surface water quality, aquatic ecology, vegetation, soils, wildlife, human health, and land and resource use for traditional purposes.

The anticipated consequences of a pipeline rupture due to retrofitting or re-location would be low given the small amounts of product released on average from most pipeline rupture events. The Proponent concluded that the likelihood of a rupture from retrofitting or re-location works would be low due to current techniques and standards for these types of activities, and the improved design and safety of pipeline projects. In the event of a pipeline rupture the third party operator would be responsible for the containment and cleanup of any contaminated soils or water. In addition, the Proponent predicted that if a rupture were to occur from pipelines underneath the diversion channel, the released product would access surface waters but be contained to the project development area for spill cleanup. Groundwater may be affected if the released product reached the water table, affected by factors such as depth to groundwater, permeability of the soil, climatic conditions, release volume and rate, and time. The released products would be small in volume, evaporate to the air, and are physically recoverable. The cleanup response would involve remediation of the soil to prevent degradation of groundwater quality.

Off-Stream Dam Failure or Breach

An off-stream dam failure or breach could occur as a result of: piping (i.e., internal erosion of soil particles within the dam caused by retained water that seeps through the dam structure), or through overtopping of the dam resulting in erosion from the crest of the dam to its base causing a rapid release of the retained water. Failure or breach of the off-stream dam during a design flood could release up to 77,771,000 cubic meters of water. The Proponent predicted that the probability of a design flood occurring in any given year would be 0.5 percent.

An off-stream dam failure or breach could occur due to flooding. Additionally, overtopping could occur if the floodwater volume exceeds the probable maximum flood design and the emergency spillway fails to operate as anticipated (due to design error or debris blockage), or if the diversion inlet gates fail to shut once the reservoir reaches maximum capacity.

If an off-stream reservoir dam failure or breach were to occur, while debris is expected to be localised at the breach site, there is potential for flood waters to carry additional clay, fine-grained earth, vegetation, and debris downstream. Direct or indirect loss of fish could occur through hydrological regime changes, direct loss or alteration of vegetation and wetlands, flooding or infilling of wildlife habitat, and potential wildlife mortality including species at risk and migratory birds. Additionally, failure or breach could affect surface water quality, aquatic ecology, soil, fish habitat, land and resource use for

traditional purposes, socio-economic conditions, infrastructure and services, and human health and safety. A dam failure or breach would result in inundation of surrounding areas, federal lands, lands used for traditional and non-traditional purposes, as well as residential and commercial property, and would have the potential for human injury or loss of life.

Diversion Structure Failure or Breach

A diversion structure failure or breach could occur through overtopping if debris accumulations, sediment accumulations, or turbulence cause sudden rises in its backwater during flood operation. The Proponent identified the worst-case scenario to be a structure or breach failure from a 2013 flood equivalent which has potential for overtopping at the maximum head elevation of 1,217.8 metres. The peak flow in the Elbow River would increase from 2,770 cubic metres per second to 3,101 cubic metres per second, resulting in a 0.2 metre rise in water surface elevation. The Proponent stated that backwater influence during a failure to operate is limited to the most upstream extent of the floodplain berm and downstream effects from the structure would be minimal as water elevation would increase by less than 0.1 metre at the Highway 22 bridge located approximately one kilometre downstream. Occurrence of accidents or malfunctions due to events such as ice jams on the Elbow River in the winter are low due to minimal winter water flow, an ice cover that thermally degrades before the mountain freshet (spring thaw), and the passive nature of the diversion structure when not in flood operations mode.

Should a failure occur, flood water containing natural debris would pass through the service spillway, over the auxiliary spillway or through a breach in the floodplain berm. Such a failure or breach could adversely affect hydrology, surface water quality, aquatic ecology, vegetation and wetlands, soils and terrain, and wildlife and biodiversity land and resource use, infrastructure and services, and employment and economy public health and safety for Indigenous and non-Indigenous receptors. The effects would be to a lesser extent than from a breach or dam failure as the water would flow back into the Elbow River.

The Proponent concluded that following the application of safeguards and contingencies, no accidents or malfunctions would be of unacceptable risk. Further, the Proponent stated that the likelihood of any of the aforementioned accidents or malfunctions occurring is low; therefore, there is a low likelihood that a significant adverse environmental effect would occur as a result.

8.1.2 Proposed Mitigation Measures, Monitoring, and Follow-up

These mitigation, monitoring, and follow-up measures are those that were identified by the Agency to be key and are applicable to all phases of the Project.

- The Proponent will develop and implement an Environmental Construction Operations Plan that will include:
 - Emergency procedures to prevent and respond to potential incidents that may impact the environment.
 - Identification of every hazardous material to be stored on site by the Contractor and all sub-contractors, along with material-specific handling, containment, storage and disposal procedures.

- Designated refueling areas will be established at least 100 metres from a water body. Fuel will be stored in a double walled tank located on an impervious tray with the capacity to hold 110 percent of the stored liquid volume. Fire extinguishers be located at all refueling stations and no smoking signs will be erected. Spill kits will be available at all refueling stations and on all vehicles and workers will be trained in their use.
- Lubricating oil will be stored in a fire proof containment locker and clearly labelled. When lubricating oil is used, the Contractor will provide a secondary containment with capacity to hold 110 percent of the stored liquid volume.
- Equipment and project components will be maintained to applicable standards in order to reduce the likelihood of malfunction resulting in fire and explosion, and spills.
- Worker health, safety, and environment training will include spill and fire prevention and response procedures.
- To reduce the potential for a spill during transportation to and from the site, transport of hazardous materials to and from the Project site, storage, use and disposal will be in accordance with regulatory requirements, and hazardous materials associated with the Project will be in compliance with the *Transportation of Dangerous Goods Act*.
- All components of the Project will be tested annually before flood season and identified issues will be resolved.
- Channel banks will be seeded and revegetated with native seed or erosion control mix to improve channel bank stability.
- Slope stability will be monitored on infrastructure features such as berms, dam, and diversion channel.
- A concrete retaining wall will be designed and constructed as part of the diversion structure to stabilize the Elbow River escarpment.
- Soil materials will not be stockpiled at slopes steeper than 3H:1V. Grade slopes will be smoothed upon completion to reduce sliding and sloughing.
- Channel banks will be seeded and revegetated with native seed or erosion control mix to improve channel bank stability.
- All electrically-powered components of the Project will have backup generators to power them and could be manipulated manually to resolve issues, if required.
- Should overtopping of the auxiliary spillway occur, the spillway will be inspected during post-flood operations for structural damage.
- Should a failure or breach of the auxiliary spillway occur, emergency response procedures will be implemented to address public safety concerns and mitigate damage to infrastructure and services during flooding.
- Prior to any retrofitting or re-location activities, pipeline operators will execute emergency preparedness plans to reduce the potential for rupture.
- Should a rupture result in contamination of the water within the off-stream reservoir, contaminated water will be held within the reservoir and not released back into the Elbow River until applicable guidelines are met.

Follow-Up and Monitoring

- A shoreline clean up and assessment program will be developed to evaluate any areas affected by an accident or malfunction.

8.1.3 Views Expressed

Federal Authorities

Environment and Climate Change Canada indicated that the Proponent did not take into account the potential for an accident or malfunction to result in the contamination of the Elbow River. However, it was noted that residual effects after mitigations are implemented should be negligible and the Proponent has committed to ensure that the areas affected would be evaluated through a shoreline clean up and assessment program.

Indigenous Nations

Ermineskin Cree Nation, Kainai First Nation, and Tsuut'ina Nation noted concerns about the contamination of groundwater and drinking water resources from potential pipeline ruptures.

Tsuut'ina Nation raised concerns regarding the potential remediation costs from effects to Tsuut'ina reserve lands due to back flooding should an accident or malfunction occur with the floodplain berm or diversion gates.

Public

Members of the public raised concerns regarding the realignment or movement of utilities and/or pipelines that run beneath the reservoir area and potential leakages or ruptures causing contamination of drinking water sources (inclusive of groundwater and surface water).

8.1.4 Agency Analysis and Conclusion

The Agency is satisfied with the Proponent's characterization of accidents and malfunctions and with the proposed approach to risk management. The Agency understands that the Proponent would take reasonable measures to minimize the probability of accidents and malfunctions. The Agency is of the view that most accidents and malfunctions, particularly those that could potentially result in serious environmental effects, are unlikely to occur and, with proper preparation, response and mitigation measures, could be managed and dealt with sufficiently.

Key Mitigation Measures to Avoid Significant Adverse Effects and Follow-up Program Requirements

The Agency considers the mitigation, monitoring, and follow-up measures proposed by the Proponent listed in Section 8.1.4 to be necessary to ensure there are no significant adverse effects due to accidents and malfunctions. The Agency also considered the following measures identified through expert advice from federal authorities and comments received from Indigenous nations and the public.

- Prior to construction, the Proponent will develop an accident and malfunction response plan that includes:

- the types, location, and quantities of all substances expected to be stored within the project development area that may cause adverse environmental effects in case of a spill;
- a description of the types of accidents and malfunctions that may cause adverse environmental effects during any phase of the Designated Project, including fire, spills and overtopping, failure or breach of the auxiliary spillway; and
- the measures to be implemented in response to each type of accident and malfunction to mitigate any adverse environmental effect caused by the accident or malfunction.

The Agency concludes that the Project is not likely to result in significant adverse environmental effects as a result of accidents and malfunctions, taking into account the implementation of the key mitigation measures.

8.2 Effects of the environment on the Project

Pursuant to paragraph 19(1)(h) of CEEA 2012, the environmental assessment must take into account any changes to the Project that may be caused by the environment, including extreme and periodic weather events.

8.2.1 Proponent's Assessment of Effects of the Environment on the Project

Environmental factors that could potentially affect the Project include extreme weather events, forest fires, and long-term implications of climate change. These factors may damage project infrastructure and increase the potential for accidents and malfunctions (Chapter 8.1).

Tornadoes

The Proponent stated that 43 tornadoes occur across the prairies each year on average and are more likely from June to August. Tornadoes produce extremely high winds that could affect personnel and equipment, or damage to infrastructure, interruption to service, emergency shutdowns, and dam failure or breach.

Seismic Events

The Proponent stated that the Project is in an area of low to moderate seismic activity and that induced seismic events could affect the Project including personnel, equipment, maintenance, structural engineering of Project components and cleanup during post-flooding operations. Seismic events occurring during flood operations could result in a dam failure or breach.

Wildfires

The Proponent stated that 64 percent of wildfires are caused by anthropogenic activities (e.g., fires on agricultural lands, project component or equipment malfunctions, or anthropogenic events) and 36 percent are caused by lightning. Fires could affect personnel, equipment, maintenance, post-flood operations, cleanup activities and damage Project components.

Climate Change

The Proponent stated that climate change would increase the frequency, duration, and magnitude of extreme weather events, including extreme precipitation events. This could increase the frequency of extreme flooding events, thereby increasing the frequency of flood operations and volumes diverted by the Project. Modelling analysis used by the Proponent depicted doubling of flood peaks from increases in May precipitation and increased flood risk during springtime from increases in snowmelt with warmer temperatures. The Proponent stated that the Project in and of itself is designed to mitigate effects of climate change and has been designed to account for future trends of climate change. The Project would be designed to exceed the Engineers and Geoscientists BC guidelines for diversion and retention capacity needed to manage a flood of the same volume as 2013 and has potential to serve as extra capacity for changes to flood volume from climate change. The Proponent added an extra 12 percent increase in peak flow rate over the current design flood and a 25 percent safety factor in the design diversion rate to accommodate for increases in volume and peak flow due to climate change.

The Proponent indicated that climate change could result in potential residual effects on the Project if the magnitude of flooding events exceeds the magnitude of the design flood. The Proponent stated that the Project would divert floodwaters until the off-stream reservoir is full; residual floodwaters would then flow out the emergency spillway or continue downstream of the Project.

The Proponent concluded that potential residual effects of the environment on the Project would be limited to damage to project infrastructure. The Proponent also concluded that residual effects resulting from damage to project infrastructure leading to a dam breach or failure would be significant, but not likely.

8.2.2 Proposed Mitigation Measures, Monitoring, and Follow-up

- Develop and implement contingency and emergency response plans, including stopping of work during construction.
- In the event of a tornado, contractors will implement contingency and emergency response measures and stop work if conditions are unsafe.
- Establish an exclusion zone around the Project for commercial operations that may result in induced seismic events. Exclusion zones would be determined in consultation with appropriate regulators.
- Implement a real-time monitoring system to monitor seismic activity within 25 kilometres of the Project.
- Develop and implement a response plan if earthquake frequencies exceed those incorporated into the design of the Project.
- In the event of a seismic event during Project construction, dry operations and post-flood operations, contractors will implement contingency and emergency response measures and stop work if conditions are unsafe.
- Damage to Project infrastructure caused by seismic events during dry operations and post-flood operations will be repaired.

8.2.3 Views Expressed

Federal Authorities

Environment and Climate Change Canada noted that understanding flood frequency and climate change projections is a key function of Project design and a consideration for effects of the environment on the Project. They recommended that the Proponent utilize appropriate methodologies from the Canadian Standards Association's Technical Guide (CSA PLUS 4013-12) *Development, interpretation, and use of rainfall intensity-duration-frequency (IDF) information: Guideline for Canadian water resources practitioners*. This technical guidance document recommends the inclusion of additional factors such as snowpack and extending climate change estimates to the year 2100 for assessing flood frequency.

Environment and Climate Change Canada noted concerns about the Proponent's modelling of potential rainfall events and recommended updating the model to accurately account for precipitation variation and important features of the spatial and temporal evolution of the 2013 flood. However, it was noted that the Proponent accounted for effects due to climate change by adding an extra 12 percent increase in peak flow rate over the current design flood and included a 25 percent safety factor in the design diversion rate.

Indigenous Nations

Tsuut'ina Nation, Ermineskin Cree Nation, and Kainai First Nation raised concerns regarding the effects of climate change on flood frequency and size.

Public

Rocky View County raised concerns regarding effects from flooding on the stability and integrity of Project components. The Proponent committed to measures to repair and inspect Project components post-flood, including sediment and debris removal, maintenance and stabilization of banks, and channel restoration.

8.2.4 Agency Analysis and Conclusions

The Agency is of the view that the Proponent has designed the Project to account for effects of the environment on the Project. Climate change may result in floods of a higher frequency and size than anticipated; however, the Project is designed to manage a flood of the design flood volume and has additional capacity if needed. The Agency is of the view that the project design and mitigation measures proposed by the Proponent would avoid or reduce potential effects.

Key Mitigation Measures to Avoid Significant Adverse Effects and Follow-up Program Requirements

The Agency considers the mitigation, monitoring and follow-up measures proposed by the Proponent listed in Section 8.2.2 to be necessary to ensure there are no significant adverse effects due to effects of the environment on the Project. The Agency also considered the following mitigation measures identified through expert advice from federal authorities and comments received from Indigenous nations and the public.

- Prior to construction, the Proponent would update the probable maximum precipitation modelling to:
 - ensure parameters are within a reasonable range;
 - account for precipitation variation that occurred during the 2013 flood; and
 - include the important features of the spatial and temporal evolution of the 2013 flood.

The Agency is satisfied that the Proponent has adequately considered the effects of the environment on the Project and that the proposed mitigation measures and follow-up activities are appropriate to account for the potential effects of the environment on the Project.

8.3 Cumulative Environmental Effects

The Project, in combination with the environmental effects of other past, existing, and reasonably foreseeable projects or activities, has the potential to contribute to cumulative environmental effects on:

- fish and fish habitat;
- migratory birds; and
- current use of lands and resources for traditional purposes.

The Agency is of the view that the Project, in combination with past, present and reasonably foreseeable projects, is not likely to cause significant adverse cumulative environmental effects and that no additional mitigation or follow-up measures are required. In making this determination, the Agency considered the project effects, the effects of other projects, views expressed by Indigenous nations and the public, and the proposed mitigation measures.

8.3.1 Proponent’s Assessment of Environmental Effects

The Proponent identified past, current and future physical activities that could potentially interact with the Project, including agriculture, infrastructure, Indigenous, recreational, residential and other land uses identified in Table 5.

Table 5 Physical Activities Included in the Cumulative Effects Assessment

| Category of Physical Activities | Specific Physical Activity |
|---|---|
| Past or Present Physical Activities that have been carried out | |
| Agricultural land use | <ul style="list-style-type: none"> • Agricultural activities, such as ranching or farming, have been occurring in the area west of Calgary for over 120 years and will continue. |
| Infrastructure land use | <ul style="list-style-type: none"> • A network of roads and road allowances exists within the Project Development Area. These roads include Springbank Road and Highway 22, as well as several township and range roads. • Power transmission lines have been operating in the Project and surround area for 90 years and will continue to be used in the future. • The PDA overlaps with several operating and abandoned or inactive pipelines. The active pipelines carry a variety of substances including high pressure and low pressure product, natural gas, and sour gas. |

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| | <ul style="list-style-type: none"> • Communications services, in the form of cables and towers, have been provided in the Project and surrounding area for 90 years, and will continue to be provided. • Several other depositions exist such as bank stabilization and a municipal fisheries habitat protection area, as well as provincial watercourse protection notation, and a provincial surface material extraction site. |
| Institutional land use | <ul style="list-style-type: none"> • The 'Our Lady of Peace' Roman Catholic Mission (est. 1872) is located close to the Diversion Structure and channel component of the Project. It is a protected provincial historic resource. The 'Our Lady of Peace' Roman Catholic Mission cairn site is located approximately 30 metres from the Project perimeter. |
| Residential land use | <ul style="list-style-type: none"> • Residential areas have and will continue to develop west of Calgary. These include Springbank, Bragg Creek, Redwood Meadows, and acreages off Highway 8 near the Project Development Area. |
| Indigenous land use | <ul style="list-style-type: none"> • The Tsuut'ina Nation (Reserve 145) is located 395 metres south of the PDA. The Stoney Nation (Reserves 142, 143 and 144) is also located near the PDA. • Multiple Indigenous nations have indicated they use the area in and around the Project for traditional purposes, including traditional/subsistence and licensed hunting activities; licensed trapping of furbearing animals for commercial sale; and traditional/subsistence, sport, and commercial fishing. |
| Tourism and Recreation land use | <ul style="list-style-type: none"> • Kamp Kiwanis summer camp is in the PDA. • Camp Gardner recreational camp is in the PDA. |
| Other land use activities | <ul style="list-style-type: none"> • Flood protection programs have been implemented for Bragg Creek and Redwood Meadows. • Additional phases of the Calgary to Cochrane Trail involve building a railway crossing along the Bowbend Trail pathway and a pedestrian bridge over the Bow River near Cochrane. • The Community of Harmony within Rocky View County has built residential developments. • Several residential, commercial/retail, infrastructure, and institutional projects within the City of Calgary are currently in the process of construction, which is in the RAA of some valued components. |
| Future Physical Activities that are certain or reasonably foreseeable | |
| Infrastructure land use, roads, trails, and pipelines | <ul style="list-style-type: none"> • Upgrades to Highways 1, 8 and 22. Upgrading of the Highway 1 and 22 interchange; upgrading the Highway 8 and 22 interchange; and upgrading of Highway 22 to four lanes and ultimately six lanes are potential future road developments near the Project. • The Southwest Calgary Ring Road will connect Highway 8 to Macleod Trail SE. It will consist of 31 kilometres of six and eight lane divided highway. Major construction commenced in early 2017 and it is expected to be completed in 2021. • Oil and gas pipelines exist within the PDA and would either be relocated within the PDA or retrofitted. One power line crosses the diversion channel and some power poles locations would be adjusted to permit a clear span over the channel. • The West Path Rocky View Section natural gas pipeline is proposed to be constructed (2019-2020) and the right of way crosses underneath the Project's diversion channel. |
| Other land use activities | <ul style="list-style-type: none"> • Calgary to Cochrane Trail involves building a railway crossing along the Bowbend Trail pathway and building a pedestrian bridge over the Bow River near Cochrane. |

| | |
|--|--|
| | <ul style="list-style-type: none"> • The Community of Harmony development will include residential, commercial, and recreational areas, as well as infrastructure and institutions. • Several residential, commercial/retail, infrastructure, and institutional projects within the City of Calgary are planned for development. |
|--|--|

Potential Cumulative Effects on Fish and Fish Habitat

During construction and dry operations, the Proponent predicted that there would be residual adverse effects on fish and fish habitat from the permanent destruction of fish habitat and changes to fish migration. The Proponent indicated that the cumulative effects of future projects in the area, including the South West Calgary Ring Road and Bragg Creek Flood Mitigation Project, may have similar effects pathways on fish and fish habitat, including the release of deleterious substances, alteration or removal of fish habitat, and flow disruption and blockage of fish passage during instream works.

The South West Calgary Ring Road channel realignments at the Elbow River and Fish Creek crossings would result in a permanent loss of fish habitat, but it is anticipated that losses would be mitigated so that potential effects to fish and fish habitat from construction would be temporary.

The Proponent does not expect the cumulative effects of habitat changes to affect the sustainability of the resident fish populations, nor the commercial, Indigenous or recreational fisheries that depend on these fish species. The Proponent concluded that the cumulative effects on fish and fish habitat attributable to the Project would be minor because the amount of fish habitat affected is small compared to the availability of fish habitat within the RAA. Project mitigation, monitoring and follow-up measures related to fish and fish habitat as discussed in Chapter 7.1 of this report.

The Proponent concluded that with mitigation, the incremental contribution of the South West Calgary Ring Road and the Bragg Creek Flood Mitigation Project combined with the Project’s predicted residual effect on fish habitat would be moderate in magnitude, occur within the RAA and at multiple irregular events including during the construction phase, the operational phases of flood and dry periods.

Potential Cumulative Effects on Migratory Birds

The Proponent noted that existing and past agriculture, residential development as well as recreation and transportation corridors have altered the current regional landscape and contributed to an existing cumulative effect on migratory birds in the RAA. At existing conditions, 54 percent of the RAA contains anthropogenic lands.

The Proponent concluded that the potential residual effects of the Project on migratory birds would be low in magnitude, occur at multiple irregular events as future projects go forward, and will be long-term in duration because future projects will result in permanent removal of vegetation. The Proponent evaluated the potential cumulative effects on species of management concern in the RAA from additional habitat loss and alteration including sensory disturbance, change in movement and mortality from the proposed Calgary to Cochrane Trail - Phase 2 and 3, the Community of Harmony - Stage 2 and 3, Bingham Crossing Development, Upgrades to Highways 1, 8 and 22, and realignment of existing pipelines and utilities. The Proponent expects that with mitigation and environmental protection measures, the cumulative effects on migratory birds would not be significant because predicted effects

on habitat, movement, and mortality are not predicted to threaten the viability of migratory birds in the RAA.

With respect to direct habitat loss, the Proponent concluded that the residual cumulative effects on migratory birds would be relatively minor, because the future projects are located on primarily disturbed or agricultural lands. The Proponent noted that upgrading highways and increased traffic volumes might result in additional sensory disturbance and reduced habitat effectiveness for some species. The construction of the railway crossing along the Bow Bend pathway as part of Phase 2 of the Calgary to Cochrane Trail and construction of a pedestrian bridge over the Bow River near Cochrane could also contribute to additional sensory disturbance. The Proponent noted that the pipeline relocation would result in direct habitat loss and sensory disturbance, but that this physical activity would take place where there would be existing ground disturbance.

Potential Cumulative Effects on Indigenous Peoples' Current Use of Lands and Resources for Traditional Purposes

Potential residual effects of the Project on current use of lands and resources for traditional purposes are anticipated to be low to moderate in magnitude. The Proponent evaluated the potential cumulative effects on the availability of, and access to, traditional resources from the proposed Calgary to Cochrane Trail - Phase 2 and 3, the Community of Harmony - Stage 2 and 3, Bingham Crossing Development, Upgrades to Highways 1, 8 and 22, and realignment of existing pipelines and utilities.

The Proponent noted that the existing anthropogenic land disturbance within the RAA (54 percent) has already contributed substantially to effects on traditional land and resource use by altering the distribution and abundance of traditionally harvested resources, reducing the extent of lands available for traditional activities, disturbing or restricting access to Indigenous use sites and areas, and changing conditions such as air quality, water quality, aesthetics and noise that may influence traditional land and resource.

The Proponent indicated that the Project, in combination with the additional or other identified projects or physical activities could affect the availability of traditional resources for current use as a result of changes to habitat for traditionally used plant and animal species; blockage of fish passage during instream works, or the creation of physical barriers or sensory disturbance that might hinder wildlife movement in the RAA; change in mortality risk in wildlife from the physical destruction of wildlife habitat features (e.g., nests, dens, roosts); and increased animal-vehicle collisions.

The proponent indicated that current land use by Indigenous nations continues in the RAA on unoccupied Crown lands, such as the riparian zone along the banks of the Elbow River, and other lands to which Indigenous nations have been granted permission to access.

The Proponent indicated that potential cumulative effects on access can occur through direct loss or alteration of trails and travel ways, restrictions on the ability to navigate to and through current use areas, or limitations on the ability to undertake current use activities. Multiple Indigenous nations have identified trails, resources and use sites within the Project area. Additionally, multiple nations have identified Elbow River as an important travel route. It is anticipated that the permanent portage around the in-stream project components could act cumulatively with adverse residual effects on the Elbow

River from the Bragg Creek Flood Mitigation Project, Southwest Calgary Ring Road, the realignment of existing pipelines and utilities, and the upgrades to Highways 1, 8 and 22. The Calgary to Cochrane Trail, the Community of Harmony and the Bingham Crossing development are not anticipated to interact with Elbow River; therefore, no contribution to cumulative effects are anticipated from these projects.

Access to traditional resources and areas for current use is already hindered in the RAA but the adverse cumulative residual effects on access would be relatively small in relation to the size of the RAA. Project construction will permanently remove those portions of trails, resources, or sites that may be intersected by the PDA; access to the trails may be further inhibited should they be intersected by future projects. The adverse residual effects of the Project on Elbow River are limited to the permanent portage around the in-stream project components, which is not anticipated to overlap with the highway upgrades or the realignment of existing pipelines or utilities. Upgrades to Highway 1, 8 and 22 would be expected to occur within the existing right of way and will therefore not result in further changes to access along Elbow River. The proposed realignment of existing pipelines and utilities is not anticipated to impede access along Elbow River because of the distance of the realignment from the river (see the EIS Volume 3A, Section 12). Therefore, no cumulative effects on access to and along Elbow River are anticipated.

Indigenous nations will have access to portions of the PDA for traditional land and resource use. With mitigation and meaningful engagement, the residual cumulative effects on access to traditional resources for current use could be low in magnitude and only occur at multiple irregular events depending on the frequency of flooding. With the exception of permanent structures (Project PDA and future project footprints) cumulative effects of future projects and activities combined with the Project's predicted cumulative effects on availability of traditional resources for current use and access to traditional resources or areas for current use are not anticipated to significantly reduce or eliminate current use from the RAA.

Potential cumulative effects on Air Quality, Hydrogeology, Water Management, Project Location and Existing Disturbance

The Proponent, based on the information available to them, does not expect interactions with past, present, and future physical activities in the RAA that would result in cumulative effects related to air quality, hydrogeology, water management, or project location and existing disturbances. The Proponent outlines there is no pathway to cumulative effects in these topic interests.

8.3.2 Views Expressed

Indigenous Nations

Multiple Indigenous nations expressed concerns with the Proponent's assessment of cumulative effects, including cumulative effects to wildlife and plant species of importance to Indigenous peoples, and cumulative effects to access to lands for current use. Indigenous nations noted that the privatization and development of lands throughout their traditional territory has already significantly affected their ability to use lands and resources for traditional purposes, which has had subsequent effects on culture and both individual and community well-being. Indigenous nations have noted the importance of prioritizing

Indigenous land use in the Land Use Area associated with the project in order for proposed mitigation measures to be effective.

Multiple Indigenous nations raised concerns regarding the amplification of the effects of floods though cumulative effect of past, present and future projects, including other flood management projects such as the Bragg Creek Flood Mitigation Project.

Tsuut'ina Nation expressed concerns regarding cumulative effects on Tsuut'ina Indian Reserve 145.

Public

The public expressed views about the cumulative effects assessment for hydrology during the construction and dry operation phase for the project, including the cumulative effects of upstream projects like the Bragg Creek Flood Mitigation Project with the potential to effect baseline conditions in the Elbow River including morphology, flows and long term impact of flooding.

Concerns were raised about the completeness of the cumulative effects assessment as well as the spatial boundaries for valued components and the predicted zone of influence for cumulative effects. Consideration of future and ongoing projects downstream of the Project in the assessment of cumulative effects were noted as important to ensure the completeness of the assessment of effects on wetland loss, drainage and buffer zones downstream of the Project, and for the watershed as a whole.

Views were also expressed about the modelling methods and outcomes and the accuracy of the conclusions drawn about cumulative effects, including the cumulative impacts of flooding land without previous history of flooding, and the cumulative impacts of various flood scenarios.

Additionally, concerns were raised regarding cumulative effects of the project on wildfire risks and occurrence in the region and effects to recreation and tourism in Bragg Creek, Kananaskis and Calgary.

8.3.3 Agency Analysis and Conclusions

The Agency is of the view that, after taking into consideration the effects of the Project and their interactions with effects from past, existing, and reasonably foreseeable projects or activities identified in Table 8.3.1, the Project is not likely to cause significant adverse cumulative effects on fish and fish habitat, migratory birds, and Indigenous peoples' current use of lands and resources for traditional purposes.

The Agency acknowledges that there would be overlap between Project effects and past, existing and future infrastructure and activities. Project effects to fish and fish habitat have the potential to act cumulatively with effects from two other large projects that have components affecting the Elbow River. However, the Agency anticipates that mitigation, monitoring, and follow-up measures, including timely fish rescue post-flood, would minimize these effects. Additional measures to mitigate and offset effects to fish and fish habitat will be developed as a part of the *Fisheries Act* authorization process.

The Agency notes that with mitigation, monitoring and follow-up measures, including migratory bird rescue prior to flooding, cumulative effects on migratory birds are not likely to be significant because predicted effects on habitat, movement and mortality would not threaten the viability of migratory birds in the RAA.

Cumulative effects of past, existing and future projects and activities combined with the Project's predicted cumulative effects on availability of traditional resources for current use and access to traditional resources or areas for current use are not anticipated to significantly reduce or eliminate current use from the RAA. The Agency notes the effectiveness of the proposed mitigation for cumulative effects to the current use of lands and resources for traditional purposes relies on ongoing Proponent consultation with Indigenous nations. The Agency acknowledges that the Proponent has committed to the development of a land use advisory committee, the inclusion of a staging area for Indigenous use, and prioritizing Indigenous current use in the Land Use Area.

9 Impacts on Aboriginal or Treaty rights

The Agency sought information from all potentially affected Indigenous nations about the nature of their Aboriginal and Treaty rights protected under section 35 of the *Constitution Act, 1982* (section 35 rights) and how the Project may affect the exercise of their rights. The Agency considered information from the Proponent and Indigenous nations about the potential impacts of the Project, to understand the nature, scope and extent of adverse impacts on rights. Where potential impacts on section 35 rights were identified, the Agency took into account the appropriate mitigation measures before determining the severity of the potential impacts.

This chapter summarizes how the Project may potentially impact section 35 rights. Appendix B summarizes all issues of concern identified by Indigenous nations throughout the environmental assessment until this draft report is issued.

Potentially affected Indigenous nations did not provide a specific methodology for assessing impacts. Some Indigenous nations suggested that the methodology follow a similar approach used in the proposed Frontier Oil Sands Mine (*Methodology for Assessing Potential Impacts on the Exercise of Aboriginal and Treaty Rights of the Proposed Frontier Oil Sands Mine*). Multiple Indigenous nations indicated that traditional knowledge, cultural aspects such as beliefs and customs, and governance should be included in the assessment.

The Agency acknowledges that each Indigenous nation is unique in its exercise of rights and that project impacts will vary by Indigenous nation. For the purposes of this report, a high-level summary of impacts to rights is presented; where applicable, impacts to a specific nation were noted. The Agency will share nation-specific impact assessments with Indigenous nations as part of fulfilling the Crown's Duty to Consult on the Project.

9.1 Existing Aboriginal and Treaty Rights

The Project is located on Treaty 7 lands and within the homeland of the Métis Nation. Treaty 7 is a historic treaty spanning what is currently southern Alberta and defines the right to hunt throughout the treaty territory. The Project is also located adjacent to Treaty 6, which is a historic treaty spanning what is currently the middle of Alberta and Saskatchewan and defines the right to hunt and fish throughout the treaty territory. All treaties in Alberta exclude lands taken up for settlement or other purposes where the First Nations cannot exercise treaty rights.

Treaty rights were modified through the *Natural Resources Transfer Act* (NRTA), which forms part of the *Constitution Act, 1930*. The NRTA secures the right of First Nations to hunt, fish and trap for food on unoccupied Crown lands or other lands to which the First Nations have a right of access for the purposes of hunting, fishing or trapping. Treaty 6 and 7 First Nations have and continue to practice rights across the province, not limited to within their treaty area.

Other uses of the lands and resources within the assessment areas, which are Aboriginal rights protected pursuant to section 35 of the *Constitution Act, 1982*, include trapping, plant harvesting, and the use of lands and resources for cultural purposes.

Overall, the Agency identified thirteen Indigenous nations for consultation on the Project. These Indigenous nations include all Treaty 7 and Treaty 6 First Nations listed in this Chapter, the Métis Nation of Alberta (MNA) Region 3, Foothills Ojibway First Nation, Ktunaxa Nation Council, Shuswap Indian Band, and the Métis Nation of British Columbia. Consultation activities led by the Agency are described in Chapter 4 of this report.

The following First Nations are signatories to Treaty 7 and reside within this Treaty territory: Tsuut'ina Nation, Stoney Nakoda Nations, Blood Tribe (Kainai Nation), Siksika Nation and Piikani Nation. On April 1, 2020, Tsuut'ina Nation withdrew all objections to the Project and its intent to participate in the EA process. Although Tsuut'ina Nation's concerns may have been addressed through means outside the EA process, the Agency has incorporated Tsuut'ina Nation's concerns and input that the Agency has been made aware of into this chapter.

Ermineskin Cree, Louis Bull Tribe, Montana First Nation and Samson Cree Nation are signatories to Treaty 6 and have traditional territories that extend over the project area.

The Project is also within the MNA Region 3, which covers the southern portion of the province. The MNA Region 3 asserts section 35 rights throughout the province of Alberta, which include hunting, trapping and fishing. MNA Region 3 stated that the project area is home to the Métis from as early as 1842.

Foothills Ojibway First Nation, Ktunaxa Nation Council and Shuswap Indian Band represent non-treaty First Nations whose rights may overlap with areas potentially affected by the Project.

9.2 Potential Adverse Impacts of the Project on Section 35 Rights

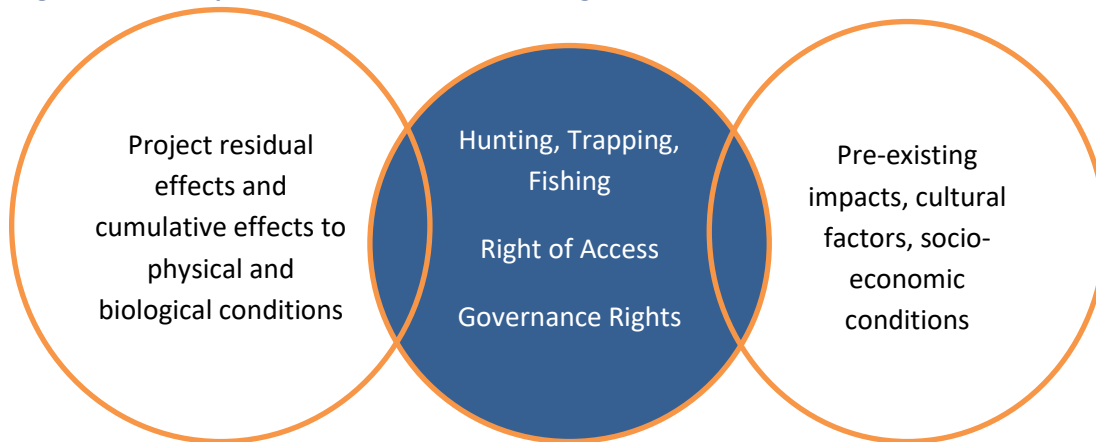
9.2.1 Hunting, Trapping, and Fishing Rights

The Project overlaps the traditional territories of all Treaty 6 and 7 First Nations, Métis, and non-treaty nations potentially affected by this Project who practice their section 35 rights in relation to hunting, trapping and fishing.

The Project's impacts to hunting, trapping and fishing rights includes the consideration of the Project's residual and cumulative effects to the physical and biological conditions of resources. The assessment also considers pre-existing impacts, cultural factors⁶, and socio-economic conditions that support the exercise of each right. Access and governance were identified by multiple Indigenous nations as being incidental to the exercise of rights. As such, access and governance were explicitly identified as rights. Figure 8 provides a visual that describes the framework that was used to assess the impacts on these rights.

⁶ Customs, practices, values and traditions that are connected to and support the right.

Figure 8 Impacts Assessment Visual on Rights



Right of Access

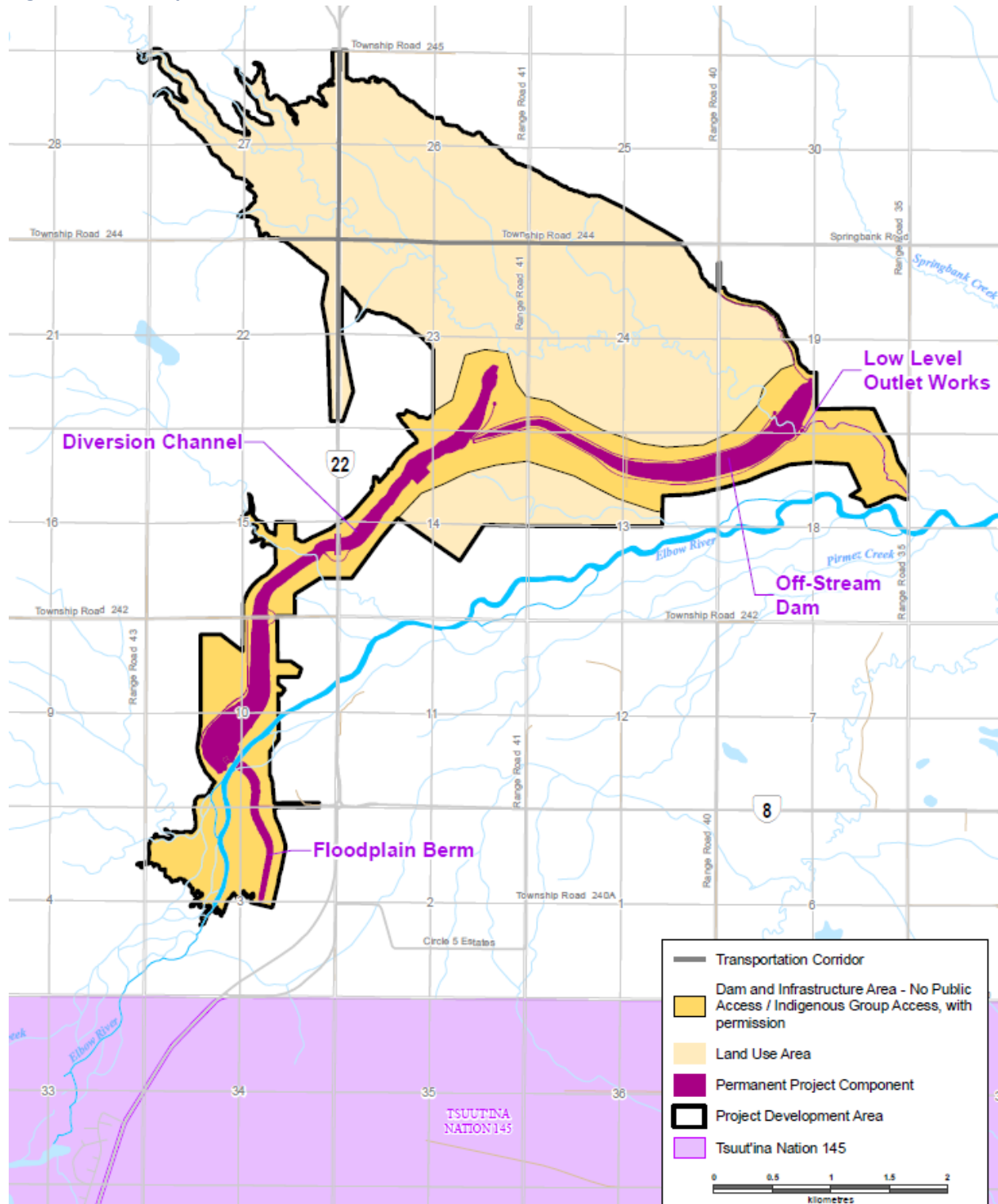
Currently, the exercise of rights is limited to sections along the Elbow River and to areas within the Project Development Area (PDA) where landowners have granted access. The Proponent, being a provincial government entity, will be acquiring the land needed for the Project. Once the private parcels are transferred to the Crown, Indigenous nations would have the right of access throughout the whole PDA.

Access restrictions within the PDA would impact the right of access by affecting the lands available for the exercise of rights. Not only would hunting, trapping, and fishing be affected but also the opportunities to undertake other cultural practices, such as plant harvesting and ceremonies. Multiple Indigenous nations described these practices as integral for maintaining cultural identity, intergenerational knowledge transfer, and language.

Multiple Indigenous nations indicated that the right of access is already hindered within their traditional territories from increased development pressures and predominant private land ownership. Indigenous nations stated that access to the PDA is important for supporting the exercise of rights due to these existing access constraints across the province. In particular, Ermineskin Cree Nation and Piikani Nation indicated that private lands, including those within the PDA, are preferred use areas by many of their members.

The Proponent will provide access and prioritize use for Indigenous nations for areas within the PDA, referred to as the Land Use Area (Figure 9). The Land Use Area involves the majority of the PDA but excludes specific project infrastructure and the immediate surrounding area for safety reasons, such as the floodplain berm, diversion channel, off-stream dam, and low-level outlet works. As flood mitigation would be the primary use of the PDA, access would be restricted during seasonal floods, and flood and post-flood recovery periods.

Figure 9 Proponent's Land Use Area



Several Indigenous nations identified the Elbow River as an important travel route. The Project's in-stream project infrastructure would not likely impact the right of access via the Elbow River. The Proponent will develop a permanent portage route to ensure navigation of the Elbow River can occur

throughout the life of the Project. Cumulative interactions on access with other proposed highway upgrades or the realignments of existing pipelines or utilities are not anticipated.

Taking into account the Proponent's Land Use Plan and permanent portage route, the Agency is of the view that project impacts to the right of access would be adequately addressed.

Governance Rights

Some Indigenous groups expressed that governance over resources within their respective traditional territory is incidental to the exercise of rights. In particular, Samson Cree Nation and Ermineskin Cree Nation stated that environmental stewardship, such as the protection and preservation of wildlife populations and habitats, is an important aspect for ensuring that their exercise of rights continue.

Governance of lands with sacred and cultural sites was also identified as important to ensure continued ability to exercise rights and to maintain a cultural and spiritual connection to the land. Project impacts associated with sacred and cultural sites are described in Section 9.2.2 Rights to Cultural Practice.

Within the Land Use Area, the Proponent is proposing multiple uses, including cultural activities, grazing, and recreational use. Managing these conflicting land uses will be a key aspect to ensuring that cultural activities are prioritized and not impacted by the other uses.

The Project's alteration to the Elbow River's natural flow could have a potential impact on Indigenous water governance. The Elbow River flows through the traditional territories of the majority of Indigenous nations engaged on this Project. Several Indigenous nations stated that the Project would impact the cultural and spiritual value of water, including underground streams or springs, due to its interference with the natural flow of water. Water is recognized as sacred and fundamental for the wellbeing of Indigenous nations and the Earth. Indigenous worldviews represent unique social and cultural relationships with water that inform Indigenous water management and governance.

Stoney Nakoda Nations explained the cultural importance of sand dunes within the Elbow River, noting their oral history (including songs) encompassed the flood plain and sand dunes. The passing down of oral history for Indigenous nations is vital to allow for cultural continuity. Singing is considered a connection to the universe, earth, humans, and life as a sacred origin.

Given that the Project's purpose is to mitigate flood events by diverting flood water into the reservoir, the Agency recognizes that interference with the natural flow of water cannot be avoided. Groundwater and underground streams will be affected to the LAA north of the Elbow River during the flood and reservoir filling but are anticipated to recover within one year. Proposed mitigations for surface water quality, such as settling sediment before release back into the River, will minimize environmental effects caused by the Project. The channel morphology of the River is not expected to significantly change.

The Agency is of the view that, although some Indigenous nations may experience project impacts to the cultural and spiritual value of water, these impacts would be temporary, reversible and infrequent considering that the probability of a design flood event occurring in any given year would be 0.5 percent.

Participation of Indigenous nations in land use and land management decisions in the PDA is a key mitigation for supporting resource governance. The proponent will establish an Indigenous Nations Land Use Advisory Committee to support land management and land use decisions for the Land Use Area within the PDA. The South Saskatchewan Regional Plan under Alberta's Land-use Framework also provides the opportunity for Indigenous nations to support resource governance decisions on a regional scale.

Hunting and Trapping

Overall, the Agency believes that the severity of project impacts on the right to hunt and trap is low and regional in extent, taking into account key mitigation and follow-up measures. The Agency notes that the severity of pre-existing and cumulative impacts to hunting and trapping rights are moderate for some Indigenous nations and that these impacts are expected to be addressed through Alberta's South Saskatchewan Regional Plan.

Physical and Biological Conditions Supporting the Exercise of Rights

The Project's residual and cumulative effects to the physical and biological conditions that support the right to hunt and trap include: altered wildlife movement patterns, the loss and alteration of terrestrial habitat, and increased risk of wildlife mortality.

The Agency acknowledges that the availability and health of preferred species such as elk and other ungulates in the PDA are important conditions to the exercise of rights. Multiple Indigenous nations noted pre-existing impacts to rights related to declines in big game on Crown lands and increased habitat fragmentation from industrial development within their traditional territories. Some Indigenous nations noted that the PDA is valued hunting grounds because of its highly suitable elk habitat and its higher harvesting success compared to other areas.

The Proponent predicted that the Project's residual and cumulative effects would not threaten the viability of wildlife species in the RAA. However, the Agency believes that the severity of impacts to hunting and trapping rights could be higher than anticipated if the Project, in combination with future foreseeable projects, significantly alter movement patterns and critical habitat of preferred species.

The Agency is of the view that the vegetation and wildlife-related mitigation and follow-up measures will minimize the severity of project impacts to rights. These mitigation measures include reclamation of disturbed areas, wildlife rescue, no-work buffer zones around dens and nests, adhering to timing restrictions for construction and maintenance activities, and wetland compensation.

The Agency acknowledges the level of uncertainty of reclamation success in areas substantially affected by sediment deposition following a flood event. For some Indigenous nations, impacts to rights will be severe if the reservoir cannot be reclaimed to predisturbance conditions. The Agency is of the view that monitoring and follow-up programs for reclamation and wildlife after a flood event, which is to include Indigenous nations' participation in these programs, will address this uncertainty.

The Agency understands that Alberta's South Saskatchewan Regional Plan is a means to address pre-existing and cumulative effects to physical and biological resources that support hunting and trapping rights. Multiple Indigenous nations indicated that pre-existing impacts from industrial development

occur within their traditional territory and that increased land use pressures will continue to diminish and alter the physical and biological conditions that support their ability to exercise their rights. The South Saskatchewan Regional Plan under Alberta's Land-use Framework provides Indigenous nations with opportunities to participate and provide input into resource management goals and objectives for the South Saskatchewan Region.

Additional Conditions Supporting the Exercise of Rights

The Project's residual effects to air quality, aesthetics and noise, could cause moderate nuisances and affect the quality of experience to Indigenous land users. These effects are described in Section 9.2.2. Right to Cultural Practice below.

The Agency anticipates negligible changes to socio-economic conditions related to cost of travel, harvesting time, maintaining food security and resource competition between users after taking into account mitigations related to the right of access in the PDA and implementation of the Land Use Plan.

Fishing

Overall, the Agency is of the view that the severity of project impacts on the right to fish is low and localized in extent, taking into account mitigation and follow-up measures. The Agency believes that the severity of pre-existing and cumulative impacts to fishing rights is low to moderate, understanding that there is a general decline in native trout species across the East Slopes of Alberta but that there are provincial recovery efforts underway.

Physical and Biological Conditions Supporting the Exercise of Rights

Impacts on the right to fish could occur from the Project's residual and cumulative effects to fish and fish habitat. These effects include habitat loss and alteration, impediments to fish movement, and fish mortality. The Proponent stated that both project residual and cumulative effects would be minor because the amount of fish habitat affected compared to the availability of fish habitat within the RAA would be small. The Proponent further stated that the long-term persistence and viability of fish species would not be threatened in the RAA.

The Agency is of the view that key mitigation measures, such as an offset plan and a fish rescue protocol, will minimize the severity of the Project's impacts on the right to fish.

The Agency acknowledges that the severity and extent of project and cumulative impacts to fishing rights could be higher than anticipated, understanding that native trout have experienced severe declines in population size and distribution across the East Slopes of Alberta. Known causes of population decline include habitat fragmentation, habitat degradation, reduced water quality and quantity, and invasive species. Climate change also contributes to threatening these native trout populations. Additional information is required for assessing the level of certainty in the severity of pre-existing and cumulative impacts.

The Agency understands that provincial programs such as the Alberta Native Trout Recovery Initiative could address cumulative impacts to fishing rights and that participation of Indigenous nations in planning and advisory councils (i.e., Bow River Basin Council) could further these recovery efforts.

Samson Cree Nation noted that the Project's offset plan includes considerations for Westslope Cutthroat Trout habitat, a fish species of cultural importance to the Indigenous nation.

Additional Conditions Supporting the Exercise of Rights

The Project could impact the right to fish related to cultural beliefs on the treatment of living organisms. Multiple Indigenous nations noted that harm caused to fish from entrainment and stranding of fish in the reservoir is antithetical to natural law.

The Agency is of the view that the level of harm on fish caused by the Project will be minimized. The Proponent will grade the reservoir to prevent stranding of fish during release of stored floodwater and a fish rescue protocol will be developed in consultation with Indigenous nations.

The Project could also impact the right to fish through real and perceived project effects on the safety of fish consumption. Several Indigenous nations stated concerns of methylmercury contamination in fish. The Agency is of the view that a single release event would have negligible risks to human health from exposure to methylmercury in fish harvested from the Elbow River during post-flood operations. The estimated methylmercury concentrations in all flooding scenarios would be below the *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (CCME 2003). No toxicological effects on aquatic life are anticipated as the guideline concentration would not be exceeded.

The Agency recognizes that perceived health effects may persist and result in avoidance behaviour. However, these perceived effects are also dependent on the frequency of Project operation. As the reservoir will only operate when flooding in the Elbow River exceeds 160 cubic metres per second, the Project may not operate for several years at a time. Perceived health effects due to methylmercury exposure in fish will likely be infrequent and are not anticipated to persist after post-flood activities are complete and access to the Land Use Area is reinstated. Key follow-up programs for monitoring water quality and contaminants in fish, along with reporting monitoring results to Indigenous nations, will minimize the perceived safety of fish consumption.

9.2.2 Right to Cultural Practice

As supported under section 35 of the *Constitution Act*, Aboriginal rights include a range of cultural, social, political, and economic rights. The Agency acknowledges that cultural practices are important for safeguarding cultural identity and language, maintaining spiritual connections to the land and sense of place, promoting community well-being, as well as transferring knowledge.

Overall, the Agency is of the view that the severity of project impacts on the right to cultural practice would be low to moderate and varies by Indigenous nation, after taking into account mitigation and follow-up measures.

Project impacts to harvesting wildlife and fish is discussed in Section 9.2.1 of this Chapter.

Plant Harvesting

Multiple Indigenous nations harvest culturally important plants along the Elbow River and within the PDA for medicinal, ceremonial, and sustenance purposes. The Project would affect culturally important plants through vegetation removal during construction, as well as alter habitat from flooding and

sediment deposition following a flood event. Multiple Indigenous nations expressed concerns over the uncertainty in reclaiming disturbed areas back to native grassland and wetlands that would support culturally important plants.

The Agency is of the view that the severity of project impacts to plant harvesting will be minimized by progressively reclaiming disturbed areas using seed mix that is native to the RAA. Opportunities will be given to Indigenous nations to harvest and transplant culturally important plants prior to construction. To address the uncertainty of reclamation success, a follow-up program will be developed to monitor and adaptively manage re-vegetation in the drained reservoir.

Culturally Important Wildlife Species and Water

Multiple Indigenous nations identified culturally important wildlife species that could be found in and travel through the PDA. Among these species are the Grizzly Bear and Bald Eagle. The Agency believes that the project effects to culturally important species will be mitigated by:

- Timing restrictions for construction and maintenance activities in the Key Wildlife and Biodiversity Zone along the Elbow River and for migratory birds;
- Maintaining wildlife movement and migration by installing an underpass under Highway 22;
- Conducting pre-construction wildlife surveys; and
- Establishing no-work buffer zones around dens and nests.

The Proponent has committed to developing a wildlife rescue protocol within the reservoir area in consultation with Indigenous nations and a wildlife remote camera monitoring program to ensure effectiveness of mitigations.

Quality of Experience

The Project's residual effects to air quality, aesthetics, and noise could cause moderate nuisances and affect the quality of experience to Indigenous land users. The Agency recognizes that these nuisances could result in Indigenous peoples not exercising their rights in this area. The Proponent indicated that construction and maintenance activities will avoid key harvesting periods to further minimize these nuisances.

The effects to air quality and noise would be short-term and reversible after construction is complete. Key follow-up programs for monitoring air quality and noise, along with reporting the monitoring results to Indigenous nations, will minimize nuisances and avoidance behaviour. The Proponent will implement a complaint-response protocol to ensure Indigenous nations have the ability to note any changes to air quality and noise, and adaptive mitigations will be put in place to mitigate effects.

The Proponent also committed to establishing a dedicated staging area for cultural activities such as temporary camps and cultural ceremonies. The Agency acknowledges the importance unimpeded access to this staging area for all potentially impacted Indigenous nations. The Agency is of the view that these mitigation and follow-up measures address project impacts to cultural experience.

Physical and Cultural Heritage Resources and Sites of Cultural Importance

In addition to the 22 archaeological sites assessed by the Proponent, the Project could affect additional sites of cultural importance. These sites are associated with cultural activities such as: plant gathering, fishing, hunting, ceremonial and campsites. Additionally, these sites include current and historic travel routes, potential gravesites, and archeological and historical artifacts. Piikani Nation stated that the loss and alteration of these sites are significant to the Nation and, as such, the impacts on the right to cultural practice are significant.

The Agency recognizes that sites which overlap project infrastructure or areas within the reservoir would be permanently lost. It may be possible that some physical features could be recovered prior to disturbance. The Proponent, in consultation with Indigenous nations and Alberta Culture and Tourism, will address procedures to record, analyze, and mitigate the effects of these sites that could not be avoided. The Agency understands that the province, through the *First Nations Sacred Ceremonial Object Repatriation Act, 2000*, would allow for the return of sacred ceremonial objects to all First Nations.

The Proponent will also retain monitors from Indigenous nations during excavation, allow for ceremonies prior to construction, and provide cultural awareness training for all employees associated with the Project. The Agency recognizes that the mitigation measures are unlikely to fully address the impacts on the right to cultural practice given the cultural, spiritual, ceremonial and ancestral importance that these sites have. The Agency has identified as a key mitigation measure that the Proponent provide opportunities for each Indigenous nation to participate in surveys before and during construction, support the gathering of traditional knowledge to verify cultural heritage resources and sites of significance, and communicate with Indigenous nations on project schedules, activities, mitigations and monitoring.

The Agency recognizes the severity of project impacts will vary by Indigenous nation, and that it may be more serious for some. As a generalization, after taking into account mitigation and follow-up measures, the Agency finds that project impacts to cultural practice will result in low to moderate impacts.

9.2.3 Land Rights

Multiple Indigenous nations claim land rights to their respective territory, understanding that Treaties 6 and 7 were eroded by colonial and paternalistic government policies and were never fulfilled. Treaties are interpreted by Indigenous nations as a framework for sharing resources and land. Some Indigenous nations state that pre-existing impacts to land rights have resulted in a diminished and fragmented land base and infringe on the exercise of rights within their traditional territory. Louis Bull Tribe indicated that access to and prioritizing current use activities in the PDA is a means to address and reconcile these impacts.

The Agency recognizes the importance of land rights for cultural survival and for self-determination of Indigenous nations. The Agency is of the view that the Project would compound existing cumulative impacts to land rights. The Agency understands that through the implementation of the Proponent's Land Use Plan, the Proponent will be providing opportunities to build processes and approaches aimed at building deeper collaboration and consensus. The Indigenous Nation Land Use Advisory Committee

will ensure that Indigenous nations have a role in public decision-making to ensure that Indigenous rights, interests, and aspirations are recognized in decision making.

The Project may generate economic and employment opportunities for Indigenous peoples. The Agency encourages the Proponent to work toward finalizing an Indigenous Participation Plan for each affected Indigenous nation.

9.3 Issues to be addressed during the regulatory approval phase

Should the Project proceed, federal authorities with a regulatory role would continue consultation with Indigenous nations after the environmental assessment decision is made. Specifically, the federal authorities will consult Indigenous nations prior to making decisions related to *Fisheries Act* authorizations and *Canadian Navigable Waters Act* approval(s), as appropriate. Comments from Indigenous nations received during the environmental assessment will be shared directly with the federal authorities for their decision-making. As applicable, the decisions by the federal authorities would take into account the outcomes of ongoing consultation with Indigenous nations as well as the consultation record resulting from the environmental assessment.

The Agency recognizes that the Project is subject to approvals under provincial legislation, and that associated regulations, guidelines, and policies provide for the protection of relevant aspects of both the natural and human environments. Consultation by the province, as applicable, on those authorizations will also provide opportunities to Indigenous nations to have their concerns addressed. The provincial Crown has a duty to consult Indigenous nations, as appropriate, prior to making decisions.

9.4 Agency conclusion regarding impacts to Section 35 Rights

Should the Project proceed, the Agency acknowledges that the Project is likely to cause changes to the exercise of rights. This includes, but is not limited to, low severity of impacts on the right to hunt, trap, and fish, and low to moderate in severity on the right to cultural practice.

Taking into account mitigation and follow-up program measures to be included as conditions of approval, the Agency is of the view that the potential impacts of the Project on Aboriginal or Treaty rights would be appropriately mitigated. The application of mitigation and follow-up program measures should allow the continued exercise of Aboriginal and Treaty rights of Indigenous nations in a similar manner as before the Project. However, the Agency recognizes that discussions with each nation regarding accommodations are still ongoing.

10 Conclusions and Recommendations of the Agency

In preparing this report, the Agency took into account the Proponent's EIS, its responses to information requests, and the views of federal authorities, the TAG, Indigenous nations and the public.

The environmental effects of the Project and their significance have been determined using assessment methods and analytical tools that reflect current accepted practices of environmental and socio-economic assessment practitioners, including consideration of potential accidents and malfunctions and cumulative environmental effects.

The Agency recognizes that there are potential residual adverse effects to fish and fish habitat; migratory birds; Indigenous peoples' current use of lands and resources for traditional purposes; physical and cultural heritage and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance to Indigenous peoples; and Indigenous peoples' health and socioeconomic conditions. A discussion of these effects can be found in the corresponding chapters of this EA report.

The Agency concludes that, taking into account the implementation of mitigation measures, the Project is not likely to cause significant adverse residual environmental effects as defined in CEAA 2012. The Agency has identified key mitigation measures and follow-up programs, for consideration by the Minister of Environment and Climate Change, in establishing conditions as part of the Environmental Assessment Decision Statement, in the event that the Project is permitted to proceed.

In addition, it is the Agency's expectation that, for the Project to be carried out in a careful and precautionary manner, all of the Proponent's commitments including mitigations, follow-up and monitoring, as outlined in the Environmental Impact Statement and its supporting documents would be implemented as proposed. Further, it is expected that the Proponent will continue to engage, inform, and communicate with Indigenous nations throughout life of the Project.

Appendices

Appendix A Environmental Effects Rating Criteria

General definitions of criteria used to assess residual effects on each of the valued components (VCs)

Intensity: Indicates the level of disturbance (change) that the studied valued component (VC) would experience. The intensity assessment takes into account the component's ecological context. The intensity can incorporate the concept of the time when the effect would occur, which can refer to a phase of the component's life cycle (migration, reproduction, feeding, etc.) or a period during which a cultural, spiritual or recreational practice by an Indigenous Nation or population would occur (e.g., hunting season).

Extent: Geographical extent of the adverse effects.

Duration: Period of time during which the adverse effects will be felt.

Frequency: Pace at which the adverse effects would occur in a given period.

Reversibility: Likelihood of a valued component recovering from the adverse effects caused by the project.

Significance: The significance of the adverse effects is determined by the combination of the levels assigned to each of the criteria (intensity, extent, duration, frequency and reversibility) for each component. A grid for determining the significance of the residual effects on the components is used for this purpose (see Table 3).

Table 6 Description of Assessment Criteria Ratings for Significance

| Assessment Criterion | Low | Moderate | High |
|-------------------------------|--|---|--|
| Geographic Extent | Site-specific within project development area (PDA) | Local within the local assessment area (LAA) | Regional within the regional assessment area (RAA) |
| Duration | Short-term or temporary Effects that occur within the construction phase or only after flood and post flood operations (<3 years) | Medium-term Residual effects that extend to one or two generations or recovery cycles of the environmental component For current use of lands and resources for traditional purposes: effect lasts less than one generation of land users (< 25 years) | Long-term Residual effects that extend for more than two generations or recovery cycles of the environmental component For current use of lands and resources for traditional purposes: effect last for more than one generation of land users (> 25 years) |
| Frequency | Once Occurs once during any phase of the Project. | Intermittent Occurs occasionally or at intermittent intervals during one or more phases of the Project. | Continuous Occurs continuously during one or more phases of the Project. |
| Reversibility | Reversible Reversible within the lifetime of the Project. | Partially reversible Partially reversible within the lifetime of the Project. | Irreversible Irreversible, persisting indefinitely. |
| Ecological and Social Context | Taken into account when considering the key criteria in relation to particular valued components, as the context may help better characterize whether adverse effects are significant. For example, information on the context is useful when it reveals: <ul style="list-style-type: none"> • a unique characteristic of the area (e.g., proximity to federal lands, ecologically critical areas); • unique values or customs of a community that influence the perception of an environmental effect (including cultural factors); or • a valued component that is important to the functioning of an ecosystem, ecological community or community of people. | | |

Table 7 Description of Magnitude Rating by VC

| Valued Component | Rating for Magnitude | | |
|-----------------------|--|--|---|
| | Low | Moderate | High |
| Fish and fish habitat | <p>Little to no effect on fish health or fish habitat in the receiving environment.</p> <p>In the case of fish species at risk:⁷ The effects would not disrupt the maintenance <u>or</u> management <u>or</u> recovery of one or more of these species.</p> | <p>Measurable effect on fish health or fish habitat in receiving environment, but would not likely result in changes to the regional status of fish health and populations.</p> <p>In the case of fish species at risk: Effects on these species are anticipated, BUT measures (offsetting or protective) could be taken to avoid disrupting the maintenance <u>or</u> management <u>or</u> recovery of one or more of these species.</p> | <p>Measurable effect on fish health or fish habitat in the receiving environment, which could result in changes to the regional status of fish health and populations.</p> <p>In the case of fish species at risk: Effects on these species are anticipated AND no measures (offsetting or protective) could be taken to reduce the effects.</p> |
| Migratory birds | <p>Little to no effects on migratory birds or unique migratory bird habitats.</p> <p>In the case of migratory bird species at risk: The effects would not disrupt the maintenance <u>or</u> management <u>or</u> recovery of one or more of these species.</p> | <p>Measurable effect on migratory birds or unique migratory bird habitats, but would not likely change the status of the regional populations or availability of unique habitats.</p> <p>In the case of migratory bird species at risk: Effects on these species are anticipated, BUT measures (offsetting or protective) could be taken to avoid disrupting the maintenance <u>or</u> management <u>or</u> recovery of one or more of these species.</p> | <p>Measurable effect on the majority of migratory birds or unique migratory bird habitats which would result in changes to the status of regional populations or availability of unique habitats.</p> <p>In the case of migratory bird species at risk: Effects on these species are anticipated AND no measures (offsetting or protective) could be taken to reduce the effects.</p> |
| Federal lands | <p>Little to no negative effects to federal lands</p> | <p>Effects to federal lands are anticipated, BUT measures could be taken to offset effects.</p> | <p>Effects on federal lands are anticipated AND no measures could be taken to reduce the effects.</p> |

⁷ Species listed under Schedule 1 of the *Species at Risk Act*

| Valued Component | Rating for Magnitude | | |
|--|--|--|---|
| | Low | Moderate | High |
| Health socio-economic conditions of Indigenous peoples | <p>Risk to health of Indigenous peoples: The potential effects on physical <u>or</u> mental health are related to exposure to contaminant levels well below applicable standards and criteria for the protection of physical health <u>or</u> to low-level disturbances (noise, light, vibrations, odours, dust).</p> <p>OR Contaminant management and mitigation measures would make it possible to minimize repercussions on air, water, soil and food quality and quality of life.</p> <p>Perceived risk to health and safety that could be caused by project-related environmental changes is low for people and social groups affected by the project.</p> <p>Risk to socioeconomic conditions⁸: The area is not commonly used for activities. The effects would cause few changes to behaviours required for carrying out activities and their economic impact.</p> | <p>Risk to health of Indigenous peoples: The potential effects on physical <u>or</u> mental health are related to exposure to contaminant levels below applicable standards and criteria for the protection of physical health BUT are moderate nuisances (noise, light, vibrations, odours, dust).</p> <p>AND The residual effects on air, water, soil, and food quality, as well as quality of life will persist despite contaminant management and mitigation measures.</p> <p>The persons or social groups that would be affected by the project perceive a moderate risk to their health or safety that could be caused by project-related environmental changes, BUT mitigation and compensation measures could be put in place.</p> <p>Risk to socioeconomic conditions: The effects would lead to changes in the behaviours required for carrying out activities BUT carrying out activities would not be compromised in the most commonly used areas.</p> | <p>Risk to health of Indigenous peoples: The potential effects on physical <u>or</u> mental health are related to exposure to contaminant levels above applicable standards and criteria for the protection of physical health <u>or</u> are high-level nuisances (noise, light, vibrations, odours, dust).</p> <p>AND The residual effects on air, water, soil, and food quality, as well as quality of life will persist despite contaminant management and mitigation measures.</p> <p>The persons or social groups that would be affected by the project perceive a high risk to their health or safety that could be caused by project-related environmental changes AND no mitigation and compensation measures could be put in place.</p> <p>Risk to socioeconomic conditions: The effects would lead to noticeable changes in the behaviours required for carrying out activities, such that the activity would be compromised or no longer possible.</p> |

⁸ Definition: all social and economic conditions required for the continuation of activities undertaken by the population affected by the environmental changes caused by the project (e.g., jobs, education, facilities, housing, infrastructure, community social services and physical community infrastructure, medical and social services, or recreational services and facilities).

| Valued Component | Rating for Magnitude | | |
|--|---|--|---|
| | Low | Moderate | High |
| Current use ⁹ of lands and resources for traditional purposes ¹⁰ by Indigenous peoples | <p>The effects would alter the conditions of traditional practices¹¹ in a manner resulting in few changes to current use.</p> <p>OR</p> <p>The effects involve few changes to behaviour, allowing current Indigenous use to continue, in preferred ways or locations.</p> | <p>The effects would alter the conditions of traditional practices without compromising current use.</p> <p>OR</p> <p>Some behaviours would be modified, but current Indigenous use would not be compromised.</p> | <p>The effects would alter the conditions of traditional practices in a manner resulting in changes that would compromise current use.</p> <p>OR</p> <p>Current Indigenous use would no longer be possible in accordance with preferred ways or would be compromised in the only suitable, available or most preferred locations.</p> |
| Physical or cultural heritage and historical, archaeological, paleontological or architectural sites or structures of importance | <p>The effects do not much alter the characteristics of the unique nature of an element of the natural or cultural heritage or of a structure, site or thing of historical, archeological, paleontological or architectural significance.</p> <p>OR</p> <p>Access to or use of an element of the natural or cultural heritage or of a structure, site or thing of importance would not be altered for users.</p> | <p>The effects would alter some characteristics of the unique nature of an element of the natural or cultural heritage or of a structure, site or thing of historical, archeological, paleontological or architectural significance, BUT would not compromise its integrity.</p> <p>OR</p> <p>Access to or use of an element of the natural or cultural heritage or of a structure, site or thing would be altered BUT would not be compromised for users.</p> | <p>The effects would lead to the loss of the characteristics of the unique nature of an element of the natural or cultural heritage or of a structure, site or thing of historical, archeological, paleontological or architectural significance, such that its integrity would be compromised.</p> <p>OR</p> <p>The effect would prevent users from accessing or using an element of the natural or cultural heritage or a structure, site or thing of historical, archeological, paleontological or architectural significance.</p> |

⁹ In the context of an environmental assessment, “current use” refers to the manner in which land and resource use may be affected in the course of the life cycle of a proposed project. “Current use” includes active use by Indigenous peoples at the time of the environmental assessment and uses that are likely to occur in a reasonably foreseeable future provided that they have continuity with traditional practices, traditions or customs. Furthermore, uses that may have ceased due to external factors and should also be considered if they can reasonably be expected to resume once conditions change.

¹⁰ Traditional purposes typically relate to activities that are integral to a community’s way of life and culture and have continuity with historic practices, customs and traditions of the community.

¹¹ A “practice” is a way of doing something that is common, habitual or expected, generally related to activities that are integral to a community’s way of life and culture and offer continuity with historic practices.
“Conditions of practice” are baseline conditions for the practice of activities. Examples of these are quantity or quality of available resources and access to the area.

Table 8 Decision Tree for Determining Overall Significance of a Residual Effect

| Magnitude* | Geographic Extent | Duration | Frequency | Reversibility | Significance | | |
|------------|-------------------|---------------------------|----------------------------|-------------------------------|-------------------------------|----------------------------|--------------------|
| Moderate | Site-specific | Short-term or medium-term | Once or Intermittent | Any Level of Reversibility | Not Significant | | |
| | | | Continuous | Fully or Partially Reversible | Not Significant | | |
| | | Long-term | Any Level of Frequency | Irreversible | Not Significant | | |
| | | | Once or Intermittent | Fully or Partially Reversible | Not Significant | | |
| | Local | Short-term | Continuous | Any Level of Frequency | Irreversible | Significant | |
| | | | | Once or Intermittent | Any Level of Reversibility | Not Significant | |
| | | Medium-term or long-term | Intermittent or Continuous | Once | Fully or Partially Reversible | Not Significant | |
| | | | | Once or Intermittent | Any Level of Reversibility | Not Significant | |
| | | Regional | Medium-term | Intermittent or Continuous | Continuous | Any Level of Reversibility | Significant |
| | | | | | Once | Any Level of Reversibility | Not Significant |
| | | | Long-term | Any Level of Frequency | Once | Any Level of Reversibility | Significant |
| | | | | | Intermittent or Continuous | Any Level of Reversibility | Significant |
| High | Site-specific | Short-term or medium-term | Any Level of Frequency | Any Level of Reversibility | Not Significant | | |
| | | | Any Level of Frequency | Fully or Partially Reversible | Not Significant | | |
| | Local | Any Duration | Any Level of Frequency | Irreversible | Significant | | |
| | | | | Any Level of Frequency | Fully or Partially Reversible | Not Significant | |
| | Regional | Any Duration | Any Level of Frequency | Any Level of Frequency | Irreversible | Significant | |
| | | | | Any Level of Frequency | Any Level of Reversibility | Significant | |

*All effects of low magnitude were considered not significant, regardless of other criteria

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
|----------|---|---|---|--|
| A | Alternative Means | | | |
| A1 | Tsuut'ina Nation | Concern that McLean Creek alternative was not adequately reviewed as a feasible option and did not consider additional benefits of flood mitigation on downstream communities, including Tsuut'ina Reserve 145. | <p>The Proponent has completed multiple benefit/cost analyses to determine which project they would select as the preferred option.</p> <p>The Proponent provided an updated 2019 Benefit/Cost Analysis to fairly account for and compare the difference in protection of property between the McLean Creek option and the Project (additional benefits have been included primarily in the area of Bragg Creek and Redwood Meadows). The construction cost opinions for both projects were estimated by the design professionals for the Project and the McLean Creek Option and consistent with practices for the current level of design advancement. The ratios would be 1.37 for the Project and 1.41 for the McLean Creek option, mainly due to the benefits of the Project being realized five years earlier than the McLean Creek option.</p> | Based on Indigenous and public concerns, the Agency requested an updated benefit/cost analysis comparing the Project and the McLean Creek option to ensure updated costs and benefits were considered in determining the preferred option. The Agency is satisfied with the Proponent's assessment of the McLean Creek option, including its updated 2019 Benefit/Cost Analysis, as well as of the Tri-River Joint Reservoir and Micro-Watershed Impounding Concept options. |
| A2 | Tsuut'ina Nation, Stoney Nakoda Nation, Montana First Nation, Ermineskin Cree Nation, | Concerned over lack of consultation on the Project and project alternatives by the Proponent and the provincial and federal Crown. | <p>The Proponent is continuing to work with Indigenous nations to respond to and address their project concerns. The Proponent has committed to ongoing engagement with Indigenous nations throughout the life of the Project.</p> <p>The Proponent indicated that the Project has gone through a rigorous selection process and is the preferred option for a variety of environmental, technical, economic, and timing reasons. The Proponent noted that they are open to discussing the response</p> | <p>Under CEAA 2012, environmental assessments do not review projects in the early planning stages. As per the EIS guidelines, Proponent must engage with Indigenous nations to support the effects assessment of the Project, which is not limited to discussing concerns and collecting information regarding alternatives.</p> <p>Based on its review of the EIS and other information, the Agency is satisfied that the Proponent has sufficiently assessed alternative means of carrying out the Project for the purposes of assessing the environmental effects of the Project under CEAA 2012.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
|----------|--|--|---|---|
| | Kainai First Nation | | with Indigenous nations that have outstanding concerns on this matter. | The Agency notes the importance of continued engagement with Indigenous nations throughout the life of the Project. |
| A3 | Stoney Nakoda Nation | Concerned that alternatives did not consider options on the Bow River and that the Project would not have the design capacity to protect Calgary from flooding. | The scope of Project focuses on flood mitigation within the Elbow River watershed. The reservoir is designed to provide 77,771,000 m ³ of active flood storage and would help reduce the effects of future extreme floods on infrastructure, watercourses, and people in the City of Calgary and downstream communities. Flows more than the diversion capacity would pass the diversion structure and be stored within Glenmore Reservoir, up to its allocated flood storage capacity of 10,000,000 m ³ . Higher gates are proposed at the Glenmore Dam. The total storage capacity of 87,771,000 m ³ provided by the system (i.e. the off-stream reservoir and the Glenmore Reservoir) exceeds the amount of water that overtopped Glenmore Dam during the 2013 flood and caused damage from overland flooding downstream. | The Agency is satisfied that the Project is designed to meet its purpose of flood mitigation in the City of Calgary and downstream communities. |
| B | Fish and Fish Habitat | | | |
| B1 | Tsuut'ina Nation, Stoney Nakoda Nations, Montana First Nation, Samson Cree Nation, Ermineskin Cree Nation, | Concerns regarding the Project's effects to fish, fish habitat, fish movement, fish mortality. Requested that the Proponent's assessment include effects to fish spawning (including bull trout) and overwintering areas, westslope cutthroat trout habitat recovery, and the spread of Whirling disease. | The Proponent predicted that residual effects to fish habitat, mortality risk, and health and that the Project would alter approximately 5,400 square meters of the bed and banks of the Elbow River at the planned gate structures, debris deflector, and immediately downstream. A fish offset plan will be developed in consultation with Fisheries and Oceans Canada and Indigenous nations. The Proponent will rescue fish stranded during the construction of the by-pass channel and develop a fish rescue plan for post-flood operations, in consultation with regulators and Indigenous nations. | Taking into account the implementation of the mitigation measures described by the Proponent and identified by the Agency and Fisheries and Oceans Canada, the Agency is of the view that the Project is not likely to cause significant adverse effects on fish and fish habitat or fish population. The Agency recommends, for consideration in the Minister's Decision Statement, follow-up and monitoring measures to evaluate the accuracy of the predictions related to fish and fish habitat and to determine the effectiveness of mitigation measures. |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
|----------|---|---|---|--|
| | Kainai First Nation | | The Proponent stated that project residual effects would not affect the viability and persistence of regional fish populations. | |
| B2 | Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation | Concerns regarding the Project's effects to fish and fish habitat from changes in groundwater, hydrology/channel morphology, water quality (including methylmercury) and temperature. | <p>The Proponent predicted that increased turbidity by the flood waters could cause short-term increases in sediment load which could result in short-term, localized adverse effects on surface water quality and aquatic ecology, including fish habitat.</p> <p>The Proponent also stated that flooding of upland areas could lead to increased nutrient concentrations and lead to eutrophication, which would have undesirable effects on fish health.</p> <p>The Proponent will implement a sediment release monitoring plan in accordance with Alberta Transportation Special Provision: Use in Tenders that Involve Instream Work, the CCME Guidelines for the Protection of Freshwater Aquatic Life, and the Government of Alberta's Environmental Quality Guidelines for Alberta Surface Waters. Furthermore, the Proponent will collect turbidity levels both upstream and downstream of the Project and report any exceedances of established criteria to the appropriate provincial or federal regulatory authorities.</p> | <p>The Agency is of the view that project residual effects to fish and fish habitat from the change in water quality during a flood is anticipated to be of low magnitude, temporary and localized to areas where the outlet channel meets the Elbow River. The Project is not anticipated to affect temperature and dissolved oxygen in the Elbow River.</p> <p>Taking into account the implementation of the mitigation measures described by the Proponent and identified by the Agency and Fisheries and Oceans Canada, the Agency is of the view that the Project is not likely to cause significant adverse effects on fish and fish habitat or fish population.</p> <p>The Agency recommends, for consideration in the Minister's Decision Statement, follow-up and monitoring measures to evaluate the accuracy of the predictions related to fish and fish habitat and to determine the effectiveness of mitigation measures.</p> |
| C | Migratory Birds and Species at Risk | | | |
| C1 | Tsuut'ina Nation, Ermineskin Cree Nation, | Concerns regarding the Project's effect to migratory birds from habitat loss and species effectiveness (nesting, breeding, brood rearing). | The Proponent stated that temporary workspaces and access roads will avoid wildlife features and native vegetation (shrublands, treed areas, wetlands) that contain potential habitat for migratory birds and wildlife species at risk. | The Agency is of the view that the Project is not likely to cause significant adverse effects on migratory birds, after taking into account the proposed key mitigation measures and follow-up measures to be included in the conditions of approval. |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
|----------|---|---|--|--|
| | Kainai First Nation | Requested that the Proponent implement mitigations such as wetland replacement <i>vis á vis</i> the Alberta Wetland Policy, minimizing window between nest survey, and vegetation clearing. | <p>The Proponent will reclaim temporary workspaces and conducting pre-construction surveys to identify appropriate site-specific mitigations. The Proponent notes that migratory bird nests present in the reservoir area during flood operations will be flooded but that efforts will be undertaken to rescue and relocate nests to the extent possible before operations. The Proponent will compensate for wetland loss according to the Alberta Wetland Policy.</p> <p>The Proponent has committed to involving Indigenous nations in monitoring and reclamation.</p> | The Agency is of the view that habitat loss would result in alterations to migratory bird movement and reductions in migratory bird abundance, but not at the population level. |
| C2 | Samson Cree Nation | Concerns regarding the Proponent's assessment of effects to species of importance due to inaccurate detection rates for sensitive species, such as amphibians and yellow rail. | <p>The Proponent identified rationale for the selected survey timing and methods, including corrections for survey dates for yellow rail.</p> <p>The Proponent will conduct pre-construction surveys in the appropriate season prior to start of construction and will be taking appropriate actions to anticipate potential flooding events and planning to rescue and relocate amphibians, where possible.</p> <p>Surveys will be conducted at previously identified wildlife features (i.e., raptor stick nests, wetlands) that might require mitigation. Wildlife features and mitigation measures for each feature will be included in the project-specific Environmental Construction Operations Plan (ECO Plan) and wildlife monitoring plan.</p> | <p>The Agency notes the importance of pre-construction surveys and the implementation of the proposed setback distances for chance finds of species at risk habitat or features. The Agency recognizes that the flooding of the reservoir will result in adverse effects to the little brown myotis and amphibian species at risk and their habitats.</p> <p>Taking into account the Proponent's proposed mitigation measures described in Section 7.3.3 of this report, the Agency is of the view that the Project is not likely to cause adverse effects on species at risk.</p> |
| D | Indigenous Peoples - Current Use of Lands and Resources for Traditional Purposes | | | |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
|----|---|--|---|---|
| D1 | Louis Bull Tribe, Piikani Nation, Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation | <p>Concerns regarding that access will be restricted in the PDA, resulting in the cumulative loss of lands within their traditional territory. Stated that the area is currently used by multiple Indigenous nations by permission of landowners.</p> <p>Stated that access restrictions to the PDA will affect current use, physical and cultural heritage, and health and socio-economic conditions, and the exercise of Aboriginal and treaty rights.</p> <p>Concerns regarding access by water from the Project's effects on navigation along the Elbow River.</p> | <p>The Proponent acknowledges that Indigenous nations currently use land and resources to areas where access have been granted by private land owners.</p> <p>The Proponent committed to maintaining access and prioritize use for First Nations within the Land Use Area as per the <i>Updated Draft Guiding Principles and Direction for Future Land Use</i> (Land Use Plan).</p> <p>The Proponent will also establish a First Nations Land Use Advisory Committee to guide and facilitate the implementation of the principles of the Land Use Plan.</p> <p>The Proponent has committed to developing and maintaining a portage route where navigation on the Elbow River is adversely affected by project components.</p> | <p>The Agency is of the view that residual effects on access for current use would be localised, low in magnitude during construction/dry operations but high in magnitude during flood and post-flood periods. The high magnitude of residual effects on access caused by flooding is long-term until access in the Land Use Area can safely resume. The Agency recognizes that the occurrence of residual effects would be infrequent given the low likelihood of a large flood.</p> <p>The Agency is satisfied that the Proponent has addressed project effects on access on the Elbow River. The Proponent will consult with Transport Canada on the establishment and maintenance of the portage route.</p> <p>The Agency recommends, for consideration in the Minister's Decision Statement, that the Proponent establish a land use advisory committee that includes opportunities for participation from all Indigenous nations engaged in the federal environmental assessment, including Métis.</p> |
| D2 | Piikani Nation, Tsuut'ina Nation, Ermineskin Cree Nation, and Kainai First Nation | <p>Concerns regarding the accuracy of the Proponent's assessment of effects to current use.</p> <p>Requested that the Proponent use adequate sources, baseline data, and site specific information for its assessment.</p> | <p>In response to concerns raised, the Proponent sought to further engage Indigenous nations to collect baseline information for its assessment on current use.</p> <p>The Proponent also funded the collection of baseline data through traditional land and resource use (TLRU) studies.</p> <p>Additional information was collected regarding: the presence and distribution of traditional resources and current use areas within the PDA, LAA and RAA; the</p> | <p>Should the Project proceed, the Agency proposes that the Proponent continue its engagement with Indigenous nations to support the gathering of traditional knowledge provided for the duration of the Project to inform changes to and/or include additional mitigation measures, as necessary.</p> <p>The Agency agrees that the proposed mitigation and follow-up measures to be included as conditions of approval will minimize project effects to current use.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
|----|---|---|---|---|
| | | | relative importance of the resources; preferred use areas; and access to the areas and resources. | The Agency recommends, for consideration in the Minister's Decision Statement, that a follow-up program involving vegetation and wildlife monitoring and Indigenous participation in post-flood recovery efforts for the PDA be developed for verifying project effects and for implementing adaptive management measures as required. |
| D3 | Piikani Nation | <p>Concerns regarding project effects to current use in relation to soils and terrain.</p> <p>Requested that additional soil surveys be conducted.</p> | <p>The Proponent provided additional information regarding soil profiles classified in the LAA and details on sampling and analysis.</p> <p>The Proponent proposed specific mitigation measures for soil quality and quantity for the construction and dry operations phase of the Project, including: monitoring slope stability, erosion control, soil salvage and stockpiling, and revegetation.</p> <p>The Proponent concluded that changes in soil and terrain conditions would not affect current use because disturbed areas will be reclaimed. The Proponent will include species of cultural importance in the reclamation planning.</p> | The Agency is satisfied with the Proponent's assessment on soils and acknowledges that the Proponent has committed to implementing a terrain and soils follow-up program that will consist of erosion and sediment monitoring. |
| D4 | Piikani Nation, Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation | <p>Concerns regarding the loss of traditionally harvested plant species and preferred harvesting areas.</p> <p>Requested that the Proponent's assessment include traditional knowledge and that species-specific mitigations be developed for plant species of cultural importance.</p> | <p>The Proponent conducted vegetation surveys within the PDA as well as funded Traditional Land and Resource Use Studies to identify traditional plant harvesting areas and culturally important plant species in the PDA.</p> <p>The Proponent included and represented Indigenous and community knowledge or issues and concerns within the vegetation assessment.</p> | <p>The Agency agrees that the proposed mitigation and follow-up measures to be included as conditions of approval will minimize project effects to plants of cultural importance.</p> <p>The Agency recommends, for consideration in the Minister's Decision Statement, that the Proponent provide opportunities for each Indigenous nation to participate in pre- and during construction surveys, which would allow for the harvest and transplant, as appropriate, of culturally important plants.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
|----|--|--|---|---|
| | | <p>Concerned about cumulative effects on vegetation and wetlands in the region.</p> | <p>Proposed mitigation measures, such as reclamation, will avoid or minimize potential effects on traditional plant species.</p> <p>Engagement with Indigenous groups is ongoing and will guide monitoring and revegetation plans. Traditional use plant species will be included in revegetation plans.</p> <p>Indigenous nations will be involved in decision-making regarding the management of the Land Use Area through the participation in the First Nations Land Use Advisory Committee.</p> | |
| D5 | <p>Louis Bull Tribe, Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation</p> | <p>Concerns regarding the successful recovery of vegetation types being affected (grassland and wetland) to support traditional plants and harvesting.</p> | <p>The Proponent identified varying effects to plant species based on their tolerance for anaerobic conditions. The Project's effect to vegetation types would be site specific and partially reversible, as areas cleared during construction will be revegetated. However, habitat types in the LAA would be modified.</p> <p>After a flood-event, vegetation conditions will be evaluated to determine if appropriate plant cover and desired plant species are present or are re-establishing in the reservoir. Loss of vegetation types due to flooding would be site specific, intermittent, and partially reversible as natural vegetation regrowth and revegetation will occur.</p> <p>Effects will be assessed further during revegetation monitoring with results provided to the relevant regulatory agencies. Indigenous groups will be involved in revegetation planning.</p> <p>Trees will be allowed to naturally re-establish. Because no logging in planned and natural recovery will be</p> | <p>The Agency is of the view that the Proponent has adequately addressed concerns raised by Indigenous nations on reclamation.</p> <p>The Agency recommends, for consideration in the Minister's Decision Statement, that the Proponent:</p> <ul style="list-style-type: none"> • Provide opportunities for each Indigenous nation to participate in pre- and during construction surveys, which would allow for the harvest and transplant, as appropriate, of culturally important plants. • Reclaim non-native plant areas to equivalent baseline land functions after construction and during post flood operation. • Develop a follow-up program to verify the success of natural re-vegetation occurring in the drained reservoir and to develop and implement additional mitigation measures as required. |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
|----|---|--|--|--|
| | | | <p>allowed, a forest management plan should not be required.</p> <p>Monitoring of weeds will be part of construction and operations of the Project and monitoring plans will be developed pending Project approval.</p> | |
| D6 | Samson Cree Nation, Ermineskin Cree Nation, Kainai First Nation | Concerns about project effects to fish related to current use, including fishing sites and species of cultural importance. | <p>The Proponent undertook studies, surveys, and modelling to assess project effects to fish and identify associated mitigation measures (outlined in Chapter 7.1).</p> <p>The Proponent undertook engagement with Indigenous groups to understand existing conditions for fish and fish habitat, fishing sites, and species of cultural importance.</p> <p>The Proponent acknowledges residual potential effects to fish, fish habitat, and fishing from changes in access, habitat and water quality and concludes these effects are adverse but not significant. The Proponent concluded that the residual effects on fish would not pose a threat to the long-term persistence and viability of species in the RAA.</p> <p>The Proponent identified mitigation and monitoring measures related to Indigenous fisheries and fishing, including the establishment of a First Nations Land Use Advisory Committee and the inclusion of Indigenous monitors.</p> | <p>The Agency is of the view that the Project is not likely to cause significant adverse effects on fish and fish habitat, including aquatic species at risk, after taking into account the mitigation and follow-up measures to be included in the conditions of approval.</p> <p>While the Agency anticipates residual effects to fish and fish habitat, the Project will require a <i>Fisheries Act</i> authorization and additional mitigation and offsetting measures as a part of the regulatory process to ensure effects to fish and fish habitat are being appropriately mitigated or offset.</p> <p>The Agency notes the importance of robust follow-up and monitoring, including timely post-flood fish rescue, to ensure mitigation measures minimize adverse project effects on fish and fish habitat. The Proponent has committed to including Indigenous nations in the development and implementation of the fish rescue plan.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
|----|--|---|---|--|
| D7 | Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation and Samson Cree Nation | <p>Concerns regarding the Proponent's assessment of effects to culturally important wildlife species.</p> <p>Request that the Proponent assess species-specific effects to culturally important species and that species-specific mitigation be applied.</p> | <p>The Proponent applied a habitat based approach using representative species to assess potential project effects on species of management concern (SOMC) and species of cultural importance.</p> <p>The Proponent presented species-specific effects to culturally important species, including: Elk and other ungulates, Grizzly bear, coyote, small mammals, song birds, water and wading birds, birds of prey, and game birds.</p> <p>The Proponent committed to pre-construction surveys to confirm wildlife presence and for developing species-specific mitigations. These mitigations may include temporary delays in construction, placing a timing and distance set back buffer around wildlife features, and creating a wildlife friendly underpass on Highway 22. A wildlife salvage protocol will be developed.</p> | <p>The Agency is satisfied with the Proponent's assessment on culturally important wildlife species and have considered key wildlife mitigation measures as conditions of approval.</p> <p>The Agency notes that some mitigation and follow-up measures for species of cultural importance apply to the assessment on migratory birds (Chapter 7.2) and Species at Risk (Chapter 7.3).</p> <p>The Agency believes that the Proponent's commitment to establishing an Indigenous Nations Land Use Advisory Committee would serve an important role for verifying project effects to culturally important species and for implementing adaptive management measures as required.</p> |
| D8 | Tsuut'ina Nation, Stoney Nakoda Nation, Montana First Nation, Samson Cree Nation, Ermineskin Cree Nation, Kainai First Nation, Piikani | <p>Concern that wildlife mitigations proposed by the Proponent are inadequate, particularly for wildlife movement.</p> <p>Request that the Proponent develop habitat offsets for habitat loss; wildlife friendly fencing and crossings; and overpasses to mitigate effects to movement and habitat fragmentation.</p> <p>Recommend that Indigenous nations participate in implementing wildlife</p> | <p>The Proponent stated that the long-term persistence and viability of wildlife are unlikely to be affected from habitat loss and alteration caused by the Project, taking into account the proposed mitigation measures such as: wetland compensation in areas of wetland loss, reclamation of disturbed areas, an underpass on Highway 22, and wildlife friendly fences.</p> <p>Additional mitigation measures such as overpasses and habitat offsets were not deemed necessary. The Proponent stated some uncertainty over how ungulates and other wildlife would respond to Project structures but believes that large mammals can and will likely move around Project structures during dry operations if they do not cross over them. Similarly, during flood and post-flood operations, the Proponent stated that flood waters might be a temporary barrier to mammal and</p> | <p>The Agency is satisfied with the Proponent's proposed mitigation measures for wildlife and have considered key wildlife mitigation measures as conditions of approval.</p> <p>The Agency believes that the Proponent's commitment to establishing an Indigenous Nations Land Use Advisory Committee would serve an important role for verifying project effects to culturally important species and for implementing adaptive management measures as required.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| | Nation, Tsuut'ina Nation, Kainai First Nation | mitigation measures and monitoring. | <p>amphibian movement; however, whether animals such as elk and grizzly bear cross flood waters or go around them will depend on the amount of water in the reservoir.</p> <p>The Proponent committed to involving Indigenous groups in monitoring, including pre-construction surveys and opportunities for wildlife rescue prior to flooding. A monitoring program using remote cameras will be designed to identify whether permanent features of the Project, such as the diversion channel, act as a barrier to wildlife movement, especially for ungulates.</p> | |
| D9 | Montana First Nation | Concerns regarding the Proponent's ability to adhere to restricted activity periods for wildlife species of cultural importance. | <p>The proponent stated that due to year-round construction, restricted activity periods (RAPs) for migratory bird, raptor, and key wildlife and biodiversity zones may overlap.</p> <p>If the RAP for migratory bird and raptors cannot be avoided, then a qualified wildlife biologist would inspect the site for active nests within seven days of the start of construction activity (e.g., vegetation removal, blasting). If an active nest or den is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation.</p> | <p>The Agency is satisfied with the Proponent's proposed mitigation measures for wildlife and have considered key wildlife mitigation measures as conditions of approval.</p> <p>The Agency notes that some mitigation and follow-up measures for species of cultural importance apply to the assessment on migratory birds (Chapter 7.2) and Species at Risk (Chapter 7.3).</p> |
| D10 | Montana First Nation, Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation | <p>Concerns regarding the Project's effects to ungulate winter range, including a key wildlife and biodiversity zone for elk.</p> <p>Concerns regarding the effects to elk, such as changes to elk distribution and populations, due to increased fragmentation, loss of winter</p> | <p>The Proponent stated that major components of the Project such as the diversion channel may act as semi-permeable barriers to elk movement.</p> <p>The Proponent will mitigate barriers to ungulate movement by designing structures to allow elk to physically cross (e.g., appropriate side-slope angles, vegetating the structures and covering up riprap with conducive material for crossing). The magnitude of residual Project effects on elk movement are therefore predicted to be moderate.</p> | <p>The Agency is satisfied with the Proponent's proposed mitigation measures for elk and have considered key wildlife mitigation measures as conditions of approval.</p> <p>The Agency believes that the Proponent's commitment to establishing an Indigenous Nations Land Use Advisory Committee would serve an important role for verifying project effects to culturally important species and for implementing adaptive management measures as required.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| | | <p>ungulate habitat, and overall changes to movement.</p> | <p>The Proponent stated that elk are known to habituate to other human activities if human and physical disturbances are relatively constant and predictable; therefore, it is likely that they would habituate to these structures over time.</p> <p>The Project will reclaim temporary work spaces using native species, which will reduce the direct loss of high and moderate suitability elk feeding habitat within the construction area. Existing areas of lower suitability habitat such as crop and hayland that occur within the off-stream reservoir are expected to become tame pasture over time, which may increase the quality and quantity of elk habitat during dry operations.</p> <p>The proponent stated that the Project would not threaten the long-term persistence or viability of elk in the RAA (i.e., there is substantial habitat for elk in the RAA).</p> <p>The Proponent has committed to involving Indigenous groups in wildlife and reclamation monitoring programs.</p> | |
| D11 | <p>Montana First Nation, Samson Cree Nation</p> | <p>Concerns regarding the Project's effects to Grizzly Bears, a species of cultural importance.</p> <p>Concerns that the Proponent's modelling of effects to grizzly bear and mitigation measures were inadequate.</p> | <p>The Proponent state that mitigations strategies for Grizzly Bear aligns with the grizzly bear recovery objectives identified by Alberta Environment and Parks (2016) including: review of the Bear Smart Program; enhancement of the public outreach and education including the engagement of Indigenous nations in planning; delivery and evaluation of programs; and improvement of program coordination (i.e. inter-jurisdictional cooperation).</p> | <p>The Agency is satisfied with the Proponent's proposed mitigation measures for Grizzly Bear and have considered key wildlife mitigation measures as conditions of approval.</p> <p>The Agency believes that the Proponent's commitment to establishing an Indigenous Nations Land Use Advisory Committee would serve an important role for verifying project effects to culturally important species and for implementing adaptive management measures as required.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| E | Physical and Cultural Heritage; Sites of Importance | | | |
| E1 | Kainai First Nation, Tsuut'ina Nation, and Piikani Nation | Concerns related to experiential values and the cultural and spiritual importance of water. | <p>The Proponent designed the project to facilitate natural river flow patterns to the extent possible and mitigate against extreme flooding downstream.</p> <p>The Proponent acknowledges that mitigation of physical effects may not mitigate effects spiritual and cultural effects. The Proponent plans to maintain continuous connection and engagement with each Indigenous nation to work toward addressing these ongoing concerns.</p> <p>Mitigation measures developed by Indigenous nations include opportunities for ceremony pre-construction, cultural awareness training to contractors prior to construction developed and delivered by Indigenous nations.</p> | <p>The Agency recognizes that interference with the natural flow of water cannot be avoided given the Project's design and purpose. The Agency is of the view that, although some Indigenous nations may experience project impacts to the cultural and spiritual value of water, the likelihood of flood events are low in frequency and that the impact to the cultural and spiritual value of water is temporary and reversible.</p> <p>Should the Project proceed, the Agency proposes that the Proponent continue its engagement with Indigenous nations to support the gathering of traditional knowledge provided for the duration of the Project to inform changes to and/or include additional mitigation measures, as necessary. The Agency also proposes that the Proponent work toward addressing these ongoing concerns by finalizing an Indigenous Participation Plan for each affected Indigenous nation.</p> |
| E2 | Tsuut'ina , Stoney Nakoda Nation, Montana First Nation, Samson Cree Nation, Ermineskin Cree Nation, Kainai First Nation, Métis | <p>Concerns regarding adverse effects to cultural heritage resources and sites of importance, including gravesites, harvesting sites, Springbank Creek, and the site of first church.</p> <p>Concerns that these cultural heritage resources and sites would be affected by sediment deposition, loss of access, and destroyed by project construction and/or flooding.</p> | <p>Proponent indicates that standard mitigation measures will be determined by Alberta Culture and Tourism based on their review of the Historical Resource Impact Assessment.</p> <p>The Proponent undertook engagement with Indigenous groups, including the funding of traditional land and resource use studies to support a more full understanding of potential effects to sites of importance.</p> <p>Additional mitigation measures include opportunities for ceremony and retaining monitors from Indigenous nations during pre- and during construction. The Proponent, in consultation with Indigenous nations and Alberta Culture and Tourism, will address procedures to</p> | <p>The Agency agrees with the Proponent's assessment of residual effects to physical and cultural heritage resources and sites of significance. However, the Agency acknowledges that some sites of importance and cultural heritage resources would be permanently lost, altered, or inaccessible and that the requirements mandated under the Alberta <i>Historical Resources Act</i> may not fully mitigate or protect these sites and resources.</p> <p>To minimize Project effects to sites of importance, the Agency recommends, for consideration in the Minister's Decision Statement, that a follow-up program be developed prior to construction to support the gathering of traditional knowledge to verify cultural heritage resources and sites of significance and</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| | Nation of Alberta – Region 3 | | record, analyze, and mitigate the effects of these sites that could not be avoided. | <p>communicate with Indigenous nations on project schedules, activities, mitigations, and monitoring.</p> <p>The Agency is satisfied with the Proponent's proposed mitigation measures for cultural heritage resources and sites of significance and have considered these mitigation measures as conditions of approval.</p> |
| E3 | Tsuut'ina Nation, Stoney Nakoda Nation, Samson Cree Nation, Ermineskin Cree Nation | <p>Concerns that the Project would adversely affect cultural, intrinsic and spiritual values that support traditional practices, knowledge transmission, and spirituality within and surrounding the project area.</p> <p>Requested that appropriate mitigation measures be applied, including developing offset plans.</p> | <p>The Proponent acknowledged that the cultural experience/experiential values are best identified by Indigenous nations themselves. The proponent has engaged with potentially affected nations since 2014 to collect information, including funding traditional use studies.</p> <p>The Proponent considered recommendations and measures regarding cultural experience/experiential values by Indigenous nations in assessing residual environmental effects. However, the proponent acknowledges that mitigation of physical effects may not mitigate effects spiritual and cultural effects.</p> <p>The Proponent committed to establishing a dedicated staging area that would allow current use activities such as temporary camps and cultural ceremonies.</p> <p>The Proponent plans to maintain continuous connection and engagement with each group to work toward addressing these ongoing concerns.</p> | <p>The Agency believes that the Proponent's commitment to establishing a dedicated staging area and an Indigenous Nations Land Use Advisory Committee would serve an important role for addressing project effects to culture.</p> <p>Should the Project proceed, the Agency proposes that the Proponent continue its engagement with Indigenous nations to support the gathering of traditional knowledge provided for the duration of the Project to inform changes to and/or include additional mitigation measures, as necessary. The Agency also proposes that the proponent work toward addressing these ongoing concerns by finalizing an Indigenous Participation Plan for each affected Indigenous nation.</p> |
| F | Indigenous Peoples – Health and Socio-Economic Conditions | | | |
| F1 | Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation | Concerns regarding limited access to areas where country foods are available and actively harvested, which could lead to food scarcity if there is a high dependency on the affected land area for food. | <p>The Proponent gathered information and identified concerns on Indigenous health and country foods through its engagement program.</p> <p>The Proponent concluded that the Project would have negligible effects to human health through the consumption of country foods such that the Project will</p> | Taking into account the implementation of the mitigation measures to be included as conditions of approval, the Agency is of the view that the Project is not likely to cause significant adverse effects on Indigenous peoples' physical health. |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| | | Concerns regarding project related effects to human health due to changes in air quality and noise. Particular concern about health effects due to dust from the reservoir post-flood. | <p>not introduce chemicals into the environment that could bioaccumulate or bioconcentrate in edible tissues. The Proponent has applied conservative assumptions that country foods harvesting occurred throughout the PDA.</p> <p>The Proponent notes that noise may be generated during construction and that this would be limited to appropriate hours of operation and permissible levels for human health. Noise effects from construction may adversely affect quality of experience in the areas surrounding project infrastructure in the short term.</p> <p>Mitigation measures for health and socio-economic conditions include providing access for and prioritizing use by First Nations in the PDA, maintaining navigation of the Elbow River through the development of a portage route, and opportunities for Indigenous nations for relocating medicinal and ceremonial plants prior to construction. Revegetation will mitigate dust effects from sediment deposition in the reservoir after a flood and tackifiers could be applied as necessary.</p> | <p>The Agency recommends follow-up program measures to evaluate the accuracy of predictions related to Indigenous health and to determine the effectiveness of the proposed mitigation measures.</p> <p>The Agency recognizes that Indigenous nations could perceive a moderate risk to their physical health or safety caused by project-related environmental changes, including the uptake of methylmercury into fish, but mitigation and compensation measures could be put in place. Perceived risk to health may lead to changes in behaviours or practices required for carrying out activities, such as fishing. Participation in monitoring and follow up measures would help further reduce perceived risk to health and safety.</p> |
| F2 | Tsuut'ina Nation, Samson Cree Nation, Ermineskin Cree Nation, Kainai First Nation | Concerns regarding Project effects to drinking water quality (incl. methylmercury) and availability from both groundwater and surface water resources. | <p>The Proponent undertook additional groundwater studies and modelling to better predict anticipated changes to drinking water quality and availability in groundwater wells.</p> <p>The Proponent concluded that the project effects to groundwater will not be significant. To verify predicted effects, the Proponent will develop and implement a Draft Groundwater Monitoring Plan.</p> <p>The Proponent stated that surface water quality would be below the Canadian drinking water quality guidelines for total mercury of 1 µg/L. As such, there would be no</p> | <p>Taking into account the implementation of the mitigation measures to be included as conditions of approval, the Agency is of the view that the Project is not likely to cause significant adverse effects on Indigenous peoples' physical health.</p> <p>The Agency recommends follow-up program measures to evaluate the accuracy of predictions related to Indigenous health and to determine the effectiveness of the proposed mitigation measures.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| | | | <p>risks to human health from exposure to methylmercury in fish. Surface water monitoring and fish tissue monitoring will be implemented to verify predictions.</p> <p>The Proponent will decommission and plug existing water wells within the reservoir footprint and will issue advisories on drinking water and fish consumption if total mercury and methylmercury concentrations in the Elbow River and in fish exceed thresholds.</p> <p>The Proponent will include Indigenous groups in monitoring efforts.</p> | |
| F3 | Tsuut'ina Nation | Concerns regarding project effects to Tsuut'ina Nation's Redwood Meadows Golf and Country Club and future economic developments caused by the Project, including contaminants carried by air and water and impeded access. | The Proponent concluded that operation of the diversion structure will not result in flooding of Tsuut'ina Nation's lands and therefore will not directly impact the mentioned areas of concern. The Proponent and Tsuut'ina Nation have indicated that they have come to an agreement with respect to the Project. | The Agency is satisfied with the Proponent's response to Tsuut'ina Nation's concerns. |
| F4 | Stoney Nakoda Nation | Concerns regarding the Project's effects additional travel costs and time to practice traditional activities due to the change in available resources. | <p>The Proponent will finalize a Land Use Plan that outlines how access and use will be prioritised for First Nations in the PDA. The Proponent will also establish a First Nations Land Use Advisory Committee to support land management decisions for the PDA as well as a dedicated staging area for cultural activities.</p> <p>Mitigation measures specific to resource availability are outlined in Chapter 7.4 of this report.</p> | <p>The Agency believes that the Proponent's commitment to establishing a dedicated staging area and an Indigenous Nations Land Use Advisory Committee would serve an important role for addressing project effects to socio-economic conditions of Indigenous peoples.</p> <p>The Agency recommends, for consideration in the Minister's Decision Statement, that the Proponent establish a land use advisory committee that includes opportunities for participation from all Indigenous nations engaged in the federal environmental assessment, including Métis.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| F5 | Samson Cree Nation, Kainai Nation, and Stoney Nakoda Nation | <p>Concerns regarding the project's indirect effects to Indigenous nations' food security, cultural continuity, and economic conditions.</p> <p>Requested that the Proponent assess the role of country foods in supporting the physical, mental and spiritual health of Indigenous peoples, and community well-being.</p> | <p>The Proponent considered project activities that may reduce the area of public land available for country food harvesting and potential effects to food scarcity.</p> <p>The Proponent identified interests raised by Indigenous peoples in pursuing economic opportunities associated with the Project but no commitments are made in this regard.</p> <p>The Proponent stated positive effects on the regional economy and employment are anticipated but the distribution of these benefits with respect to Indigenous peoples were not discussed.</p> <p>The Proponent stated that the PDA will allow for future use by Indigenous nations through its Land Use Plan. It is anticipated that the Project would enhance opportunities for Indigenous nations to exercise rights and cultural practices.</p> | <p>The Agency proposes that the Proponent support cultural programming within Indigenous nations to strengthen the transmission of Indigenous ways of life and cultures to current and future generations, as outlined in Chapter 7.5 of this report.</p> <p>The Agency proposes that the Proponent ensure the purposeful inclusion of Indigenous nations in the economic benefits of the Project, including training, employment and contracting opportunities as specified in Chapter 7.5 of this report.</p> <p>The Agency believes that the Proponent's commitment to establishing a dedicated staging area and an Indigenous Nations Land Use Advisory Committee would serve an important role for addressing project effects to socio-economic conditions of Indigenous peoples.</p> <p>The Agency recommends, for consideration in the Minister's Decision Statement, that the Proponent establish a land use advisory committee that includes opportunities for participation from all Indigenous nations engaged in the federal environmental assessment, including Métis.</p> |
| G | Federal Lands | | | |
| G1 | Tsuut'ina Nation, Stoney Nakoda Nation | <p>Concerns regarding the Proponent's assessment of effects to federal lands.</p> <p>Requested that federal lands be chosen as a separate valued component (VC) in the assessment as other VCs overlap only a portion of the</p> | <p>The Proponent assessed project effects to reserve lands where portions of the spatial boundaries of VCs overlap with reserve lands.</p> <p>The Proponent undertook engagement with Indigenous nations to understand the current state of the environment and traditional knowledge.</p> | <p>The Agency is satisfied that the Proponent has adequately considered the effects of the Project on federal lands and that the proposed mitigation measures and follow-up activities address the potential effects of Project on federal lands.</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| | | Tsuut'ina and Stoney Nakoda Nations reserve lands. Specifically, project effects to federal lands should include effects to the Elbow River's hydrology, aesthetics, noise, air quality, traditional resources (fish, elk migration), drinking water (groundwater), cultural use patterns, cultural and historic value, and navigation. | <p>The Proponent predicted no anticipated residual effects on Stoney Nakoda Nations reserve lands. Residual effects to Tsuut'ina reserve lands were negligible. The Proponent and Tsuut'ina Nation have indicated that they have come to an agreement with respect to the Project.</p> <p>The Proponent will continue to engage with each affected Indigenous nation in the monitoring of project effects.</p> | |
| H | Accidents and Malfunctions | | | |
| H1 | Tsuut'ina Nation | Concerns regarding potential affects to Tsuut'ina Reserve 145 due to potential accidents and malfunctions and backflooding. Concerns regarding remediation costs should project effects to the Tsuut'ina Reserve 145 occur. | <p>The Proponent indicated that the maximum spatial area of backwater effect (i.e., heightened water elevation in Elbow River upstream of the diversion structure) is within the PDA and would not reach Tsuut'ina Reserve 145.</p> <p>The Proponent stated that the dam would be designed to the highest standards established by the Canadian Dam Association by classifying the dam as an "Extreme" consequence structure. Dam failure or breach would be unlikely and have a very low probability. The Proponent would have contingency plans in place to manage malfunctions and breaches, should they occur.</p> | <p>The Agency is satisfied with the proponent's response and does not anticipate backwater effects to reach Tsuut'ina Reserve 145.</p> <p>The Agency understands that the Proponent would take reasonable measures to minimize the probability of accidents and malfunctions. The Agency is of the view that most accidents and malfunctions, particularly those that could potentially result in serious environmental effects, are unlikely to occur and, with proper preparation, response, and mitigation measures, could be managed and dealt with sufficiently.</p> |
| H2 | Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation | Concerned about contamination of groundwater (drinking water) resources from potential pipeline ruptures. | The Proponent stated that pipeline ruptures could occur with a third party pipeline retrofitting or re-location or a rupture of a third party pipeline during flood operations. Spill clean-up could occur in the diversion channel or within the reservoir to contain the spill locally and to prevent proliferation of the oil contaminated water throughout the reservoir. If a rupture occurs during release, the low-level outlet gates would be closed to contain the contaminated water within the reservoir and allow spill clean-up. | <p>The Agency requested further information about the extent and magnitude of pipeline ruptures should they occur during flood operations and the potential for groundwater contamination. The Agency is satisfied with the Proponent's response and consideration of potential groundwater contamination from pipeline ruptures.</p> <p>The Agency notes the importance of the implementation of the key mitigation measures</p> |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| | | | The Proponent stated that there would be low likelihood of released product reaching groundwater. Effects from high vapour pressure products would be small due to high volatilization to air. The Proponent committed to physically recovering the product and remediating the soil to protect groundwater quality. | identified for accidents and malfunctions, including that prior to any retrofitting or re-location activities, pipeline operators will execute emergency preparedness plans to reduce the potential for rupture. |
| H3 | Tsuut'ina Nation Ermineskin Cree Nation, Kainai First Nation | Concerns regarding dam capacity and safety, including cumulative effects from other project failures. | <p>The Proponent stated that the dam would be designed to the highest standards established by the Canadian Dam Association by classifying the dam as an "Extreme" consequence structure. Dam failure or breach would be unlikely and have a very low probability.</p> <p>The reservoir is designed to provide 77,771,000 cubic metres of active flood storage. The design capacity is 25 percent greater than the diversion discharge required to mitigate for the 2013 design flood. The Proponent would have contingency plans in place to manage malfunctions and breaches, should they occur.</p> | <p>The Agency is of the view that the Project is not likely to cause significant adverse effects due to accidents and malfunctions due to design and preventative features of the project and the mitigation and follow-up program measures identified by the Proponent.</p> <p>The Agency recommends, for consideration in the Minister's Decision Statement, that the Proponent develop an accident and malfunction response plan prior to construction that includes the types, location, and quantities of all substances expected to be stored; a description of the types of accidents and malfunctions that could occur; and the measures to be implemented in response to each type of accident and malfunction to mitigate any adverse environmental effects.</p> |
| I | Effects of the Environment on the Project | | | |
| I1 | Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation | Concerns regarding the change in future flood intensity due to climate change. The Project should consider climate change in the design capacity and in anticipating flood risk. | <p>The Proponent offered additional explanation regarding the design flood capacity relative to anticipated climate change needs and frequency of use.</p> <p>The Proponent considered historical precipitation and climate data to model potential flooding, but noted that climate change could result in floods of greater magnitude than anticipated. However, the design capacity of the Project is 25% greater than the diversion discharge required to mitigate for the design flood (2013 event).</p> | The Agency is satisfied with the Proponent's response and acknowledges that the Proponent added an extra 12 percent increase in peak flow rate over the current design flood and a 25 percent safety factor in the design diversion rate to accommodate for higher future flood intensities. |
| J | Cumulative Effects | | | |

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| J1 | Tsuut'ina Nation, Stoney Nation, Nakoda Nation, Ermineskin Cree Nation, Siksika Nation | Concerns regarding the proponent's cumulative effects assessment methodology. The Proponent did not carry forward all potential residual effects into the cumulative effects assessment and assessed cumulative effects in the construction and dry operation phases separately from the flood and post-flood phases, which may result in an underestimation of effects. | The Proponent indicated that the Project has a very different active operational profile which only occurs at unpredictable times for flood operations and post-flood operations and lacks predictability and uncertainty in the intensity of operation. Thus, the assessment considers cumulative effects for construction and dry operations separate from flood and post-flood operations. The Proponent is of the view that the information remains adequate to understand the nature of potential cumulative effects. | <p>The Agency has evaluated the Proponent's approach and conclusions for the cumulative effects assessment and requested additional information to enable the Agency's understanding of the level of uncertainty in the Proponent's analyses.</p> <p>The Agency's assessment of cumulative effects is found in Chapter 8.4 of this report. The Agency has considered the potential effects of the Project in combination with other projects and activities that have been or will be carried out, and is of the opinion there are overlapping areas of environmental effects of existing infrastructure and the proposed Project. The Agency is of the view that the Project would not likely cause significant adverse cumulative effects on current use of lands and resources for traditional purpose and that the proposed measures would mitigate cumulative effects. The Agency notes the effectiveness of the proposed mitigation relies on ongoing Proponent consultation with Indigenous nations in adequately prioritising Indigenous land use and decision-making regarding the Land Use Area.</p> |
| J2 | Tsuut'ina Nation, Stoney Nation, Nakoda Nation, Ermineskin Cree Nation, Kainai Nation, Siksika Nation | <p>Concerned that cumulative effects of the Project in combination of past, current, and future foreseeable projects including the Bragg Creek mitigation project would exacerbate flood effects on surrounding and downstream communities.</p> <p>Concern that the assessment to Elbow River hydrology (fluvial morphology) and surface water</p> | <p>The Proponent anticipated minimal change to river water velocity and elevation to occur due to the Bragg Creek Flood Mitigation Project and no overlapping cumulative effects from the flood mitigation proposed at Redwood Meadows. Additionally, the backwater effects of the Springbank Off-Stream Reservoir Project are contained within the PDA so no overlap is anticipated.</p> <p>The Proponent concluded that there is no overlap of relevant effects as there are no interactions with past, present or reasonably foreseeable future activities.</p> | The Agency is satisfied that the Proponent has considered this issue after responding to additional information requests. Recognizing that some uncertainty remains with the extent and magnitude of the cumulative effects to hydrology, the Agency considers that these effects are unlikely after taking into account the implementation of proposed mitigation measures by the Proponent and proposed conditions by the Agency. |

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| | | did not consider projects and activities upstream of the proposed Project. | The Proponent indicated that potential benefits in terms of reduced flood risk are expected for downstream communities, including Siksika Nation. The magnitude of this benefit is approximated as a 17% reduction in volume flow rate through the Siksika lands during a design flood. | |
| K | Impacts to Rights | | | |
| K1 | Piikani Nation, Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation, Samson Cree Nation, Montana First Nation | <p>Concerns regarding impacts to rights from construction and operation of the Project as a whole.</p> <p>Requests traditional knowledge be collected and that site visits be conducted to evaluate the Project's potential impacts on their rights.</p> <p>Concerns regarding the insufficiency of Proponent engagement. Requests further discussion on mitigation measures related to impacts to rights.</p> | <p>The Proponent furthered engagement with Indigenous nations, provided additional funding for Traditional Land and Resource Use Studies and supported site visits to help Indigenous nations understand potential project-specific impacts to rights.</p> <p>In response to the Agency's Information Requests, the Proponent identified areas of disparity between Indigenous nations' comments and concerns and its own views and discussed a path forward to address the disparity. The Proponent agreed to ongoing engagement on mitigation measures.</p> <p>Mitigation measures related to valued components identified in the EIS also serve to mitigate impacts to rights. Notable mitigation measures include: establishing a First Nations Land Use Advisory Committee to support the implementation of the Land Use Plan; retaining Indigenous monitors pre- and during construction; providing opportunities for ceremony pre-construction; providing a First Nations staging area for temporary camps and ceremonies; and providing access and prioritizing use for First Nations in the PDA.</p> | <p>The Agency proposes that the Proponent continue its engagement with Indigenous nations to support the gathering of traditional knowledge for the duration of the Project to inform changes to and/or include additional mitigation measures, as necessary. The Agency also proposes that the Proponent works toward addressing ongoing concerns by finalizing an Indigenous Participation Plan for each affected Indigenous nation.</p> <p>The Agency acknowledges that the Project will cause changes to the exercise of rights. Taking into account mitigation and follow-up program measures to be included as conditions of approval, the Agency is satisfied that the potential impacts of the Project on Aboriginal or Treaty rights are appropriately mitigated. The application of mitigation and follow-up program measures should allow the continued exercise of Aboriginal and Treaty rights of Indigenous nations in a similar manner as before the Project.</p> <p>To ensure that rights are impacted as minimally as possible, the Agency recommends, for consideration in the Minister's Decision Statement, that the Proponent establish a land use advisory committee that includes opportunities for participation from all Indigenous nations engaged in the federal environmental assessment, including Métis.</p> |

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| | | | | Any new information brought to the Agency's attention during the consultation on this report would be incorporated into this report prior to its finalization. |
| K2 | Tsuut'ina Nation, Stoney Nakoda Nation, Samson Cree Nation, Ermineskin Cree Nation, Kainai Nation | <p>Concerns regarding the Proponent's methodology for assessing impacts to rights which only focused on bio-physical effects to the environment.</p> <p>Requests that the impacts to rights assessment include culture, governance, traditional knowledge, regional context, cumulative effects, and Indigenous perspectives on conditions of use.</p> <p>Example methodology for assessing impacts to rights was provided as a suggested path forward for the Proponent: <i>Methodology for Assessing potential Impacts on the exercise of Aboriginal and treaty Rights of the Proposed Frontier Oil Sands Mine.</i></p> | <p>The Proponent applied bio-physical valued components, including specific resources (e.g. fish, wildlife, plants, and physical sites, trails, harvesting areas cultural and spiritual sites) and observable activities (e.g. hunting, trapping, fishing, harvesting) to assess potential environmental effects and impacts to rights.</p> <p>The Proponent acknowledged that the project impacts to rights are best identified by Indigenous nations themselves and has engaged with potentially affected nations since 2014 to collect information, including funding traditional use studies.</p> <p>The Proponent sought to gather information from the perspective of Indigenous nations and considered information about cultural importance, experiential values, and intangible values, where that information has been provided by Indigenous nations.</p> <p>The Proponent noted that the suggested impacts to rights methodology was considered for context purposes but was not adopted as this was specifically made for the Frontier Oil Sands Mine and not all aspects of the methodology relate to the Springbank Off-Stream Reservoir Project.</p> | <p>The Agency's methodology considered all available information in its assessment, including submissions from each Indigenous nation impacted by the Project.</p> <p>The Agency's methodology on the impacts to rights included: Indigenous views on conditions of use, the Project's residual and cumulative effects to the physical and biological conditions of resources, pre-existing impacts, cultural factors¹², and socio-economic conditions that support the exercise of each right. Access and governance rights were also included in the assessment.</p> <p>The Agency acknowledges that each Indigenous nation is unique in its exercise of rights and that project impacts will vary by Indigenous nation. The Agency will share nation-specific impact assessments with Indigenous nations to ensure that it has effectively responded to concerns.</p> |

¹² Customs, practices, values and traditions that are connected to and support the right.

| # | Group | Comment or Concern | Summary of Proponent's Response | Agency Response |
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| K3 | Samson Cree Nation | Concerns about the scoping of rights in the Proponent's assessment and that it should consider incidental rights granted by Treaty, including practices required to ensure the continued exercise of rights. For example, environmental conservation/stewardship, protection and preservation of healthy fish and wildlife populations and habitats, and sustaining the livelihood of the lands and resources. | <p>The Proponent focused its assessment of potential impacts to rights on impacts to hunting, fishing, and trapping, not consideration of rights incidental to those granted in treaties, and considers the exercise of rights in the project area to be limited given the lands are currently privately held.</p> <p>The Proponent gathered Indigenous groups' views on potential impacts to rights as well as potential effects to Indigenous peoples from changes to the environment, and presented opportunities to engage Indigenous nations in monitoring associated with environmental stewardship.</p> | <p>The Agency considered views expressed by Indigenous nations to inform the scope of assessment on Aboriginal and Treaty rights (section 35 rights). The scope of section 35 rights is outlined in Chapter 9 of this report and includes governance rights, such as environmental management, that are incidental to section 35 rights.</p> <p>The Agency recognizes that the Proponent will conduct additional engagement throughout the life of the Project to better understand impacts to rights.</p> |
| K4 | Samson Cree Nation, Kainai Nation, Stoney Nakoda Nation | Concerns about the loss and destruction of wildlife habitat, resulting in adverse impacts to rights. | <p>The Proponent undertook engagement with Indigenous nations to collect traditional knowledge about species of cultural importance. The Proponent identified mitigation measures for wildlife mortality risk, habitat, and movement that applies to culturally important species.</p> <p>The Project would also result in increased risk in wildlife mortality and habitat loss from direct vegetation removal associated with construction and grading. Habitat quality and function would also be altered during flood and post-flood operations from reservoir filling and from the sediment left behind following reservoir draining. A design flood would result in a high magnitude effect on wildlife habitat because more than 10 percent of upland and wetland habitat would be temporarily affected.</p> <p>The Proponent anticipated that the amount of wildlife habitat directly and indirectly affected is relatively small compared to the availability of wildlife habitat</p> | <p>The Agency acknowledges that the Proponent applied a conservative assessment on the Project's effects on culturally important species and their habitat. In its assessment of impacts to rights, additional factors including access, cumulative effects, pre-existing impacts, cultural factors, and governance, were considered.</p> <p>The Agency believes that the severity of project impacts on the right to hunt and trap is low and regional in extent, taking into account key mitigation and follow-up measures and imposed conditions by the Agency.</p> |

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| | | | remaining in the RAA. The long-term persistence and viability of traditionally harvested wildlife species are unlikely to be affected. | |
| K5 | Louis Bull Tribe, Piikani Nation, Tsuut'ina Nation, Ermineskin Cree Nation, and Kainai First Nation | Concerns about pre-existing and cumulative impacts to rights within their traditional territories, stating that their exercise of rights are already constrained due to growing development pressures and fragmentation. | <p>The Proponent engaged with Indigenous nations to understand how the Project potentially impacts rights and traditional uses, including offering and funding site visits, workshops, and other meetings.</p> <p>The Proponent indicated that future projects and activities, combined with the Project's predicted cumulative effects on availability of traditional resources for current use and access to traditional resources or areas for current use, are not anticipated to critically reduce or eliminate current use from the RAA.</p> | <p>The Agency considered pre-existing and cumulative impacts to rights in its assessment (Chapter 9).</p> <p>The Agency is of the view that the severity of pre-existing and cumulative impacts to hunting and trapping rights are moderate for some Indigenous nations and that these impacts are expected to be addressed through the South Saskatchewan Regional Plan under Alberta's Land-use Framework planning process. The Agency believes that the severity of project impacts on the right to hunt and trap is low and regional in extent, taking into account key mitigation and follow-up measures as conditions of approval.</p> |
| K6 | Piikani Nation, Tsuut'ina Nation, Ermineskin Cree Nation, Kainai First Nation, Samson Cree Nation, and Montana First Nation | Concerns regarding all inputs (meetings, workshops, site visits, and traditional land and resource use studies) were not considered and therefore potential environmental effects were not adequately characterized. Traditional use studies and Indigenous knowledge are critical to understanding wildlife baseline biodiversity conditions and determining potential residual effects. | <p>Since the presentation of the March 2018 EIS, the Proponent has undertaken further engagement with Indigenous groups, funding TLRU studies, and integrated results into IR responses and other plans. The Proponent collected information for each valued component to reflect available Indigenous and community knowledge gained from a combination of resources such as literature review, consultation, field programs and engagement efforts. As Indigenous knowledge or issues and concerns were made available the Proponent included or represented them within the EIS and information request responses.</p> <p>The Proponent is committed to continued engagement with Indigenous peoples, including through monitoring and decision-making regarding the Land Use Area.</p> | <p>The Agency acknowledges the concern and is satisfied with the Proponent's response.</p> <p>The Agency received and incorporated Traditional Land Use studies, various comments, and/or Indigenous knowledge from all Indigenous nations engaged on the Project.</p> |
| K7 | Tsuut'ina Nation, Montana | Concerns regarding financial constraints for independently assessing Project effects to | The Proponent provided funding to conduct traditional use studies by all Indigenous nations who requested funding. These nations include: Kainai First Nation, | The Agency supports Indigenous participation through its Participant Funding Program. Funds were made available to reimburse eligible expenses of the |

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| | First Nation, Stoney Nakoda Nation, Ermineskin Cree Nation | reserve lands, traditional territory, rights and interests, and addressing information gaps in the EIS. | <p>Siksika Nation, Piikani Nation, Tsuut'ina Nation, Stoney Nakoda Nations, Ermineskin Cree Nation, Louis Bull Tribe, Montana First Nation, and Metis Nation of Alberta - Region 3.</p> <p>To date, the Proponent has approved \$1.21 million in funding to Indigenous nations in pre-planning work for the project, which included funding through Traditional Use Studies (TUS) agreements with provisions for training and capacity development, where requested.</p> | <p>Indigenous nations that participated in the review process. Indigenous nations were allocated a total of \$769,490.00 through this program, including additional funding to participate in the Technical Advisory Group.</p> <p>The Agency acknowledges that funds are not always sufficient to cover the work required to gather information and accurately assess potential effects to reserve lands, traditional territory, rights and interests, and addressing information gaps.</p> <p>The Agency also acknowledges that while the Project may generate economic and employment opportunities for Indigenous peoples, there have been no specific commitments made by the proponent. Therefore, the Agency identifies a need for the proponent to ensure the purposeful inclusion of Indigenous nations in the economic benefits of the project, including training, employment and contracting opportunities as specified in chapter 7 of this report.</p> |
| K8 | Piikani Nation | Recommend the Proponent align with existing provincial plans like the South Saskatchewan Regional Plan and engage with the Indigenous Wisdom Advisory Panel to contribute to the assessment of effects of the Project and development of mitigation measures, monitoring, and follow up programs. | The Proponent stated that the South Saskatchewan Regional Plan is meant to guide on a broad scale at a regional level not at a project specific level, thus it was not incorporated into the assessment of effects. The Proponent does align with aspects of the plan, including its commitment to consult with Indigenous nations before making land use decisions that may adversely affect treaty rights and traditional uses. The proponent has committed to ongoing consultation and engagement. The proponent will be creating an Indigenous Land Use Advisory Committee which will meet on a regular basis to guide and facilitate the implementation of the principles of the Land Use Plan and support the exercise of Treaty rights and traditional uses in the Land Use Area. | <p>The Agency is satisfied with the proponent's response.</p> <p>The Agency recommends, for consideration in the Minister's Decision Statement, that the Proponent establish a land use advisory committee that includes opportunities for participation from all Indigenous nations engaged in the federal environmental assessment.</p> |

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| | | | <p>The proponent did not engage with the Indigenous Wisdom Advisory Panel since the mandate of the panel is "The [IWAP] will not be expected to provide advice on the merits of government policy and plans outside of those influencing the Chief Scientist's mandate; political, economic or regulatory design or decision making; or consultations with stakeholders or the public."</p> | |