APPENDIX IR425-1 DRAFT WILDLIFE MITIGATION AND MONITORING PLAN

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT
RESPONSE TO NRCB AND AEP SUPPLEMENTAL INFORMATION REQUEST 1, JULY 28, 2018

Appendix IR425-1 Draft Wildlife Mitigation and Monitoring Plan
May 2019

Stantec

SPRINGBANK OFF-STREAM RESERVOIR PROJECT
Draft Wildlife Mitigation and Monitoring Plan

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Abbreviations

AEP	Alberta Environment and Parks
AVC	animal-vehicle collisions
CEAA	Canadian Environmental Assessment Agency
ECO	Environmental Construction Operations
ECCC	Environment and Climate Change Canada
KWBZ	key wildlife and biodiversity zone
LAA	local assessment area
PDA	Project development area
RAA	regional assessment area
RAP	restricted activity period
SARA	*Species at Risk Act*
SOMC	species of management concern
TLRU	traditional land and resource use
TUS	Traditional Use Study
WMMP	Wildlife Mitigation and Monitoring Plan

1.0 INTRODUCTION

This document describes the draft Wildlife Mitigation and Monitoring Plan (WMMP) for construction and operation of the Springbank Off-stream Reservoir Project (the Project). Based on the EIA conclusions, and associated regulatory and legislative requirements, mitigation and monitoring of wildlife and wildlife habitat will be undertaken.

This draft WMMP is based on assumed regulatory requirements for approvals and authorizations specific to the Project; however, additional explicit monitoring details will be determined after approval conditions are provided.

1.1 GOALS AND OBJECTIVES

The draft WMMP has been developed to meet Section 10 (Monitoring) of the provincial Terms of Reference for the Springbank Off-stream Reservoir Project (ESRD 2015) as well as Section 8 (Follow-Up and Monitoring Programs) of the federal Guidelines for the Preparation of an Environmental Impact Statement (CEAA 2016) including follow-up monitoring requirements under Canadian Environmental Assessment Agency's (CEAA's) Operational Policy Statement (*Follow-up Programs under the Canadian Environment Assessment Act, CEAA 2011*).

The goals of the draft WMMP link predicted Project effects to mitigation, mitigation objectives to monitoring, and monitoring results to adaptive management actions. To achieve the goals, specific measurable objectives have been nested underneath each goal.

- Goal 1 is to reduce changes in wildlife habitat, wildlife movement and mortality risk by applying mitigation to reduce predicted effects.
  - Objective 1a is to reduce direct habitat loss.
  - Objective 1b is to reduce indirect habitat loss.
  - Objective 1c is to reduce change in wildlife movement.
  - Objective 1d is to reduce change in mortality risk.
- Goal 2 is to monitor effectiveness of mitigation designed to reduce changes in wildlife movement and mortality risk.
  - Objective 2a is to monitor wildlife use and movement at Project components including the diversion channel, Highway 22 bridge over the diversion channel, floodplain berm, and wildlife friendly fencing to evaluate the effectiveness in maintaining wildlife movement in the LAA.
  - Objective 2b is to monitor the implementation and effectiveness of mitigation to reduce changes in mortality risk and track and determine cause of wildlife mortality associated with the Project.

- Goal 3 is to Adapt mitigation designed to reduce changes in wildlife movement and mortality risk, as necessary, based on monitoring outcomes.
  - Objective 3a is to adapt mitigation if wildlife are not crossing over or under Project components as predicted.
  - Objective 3b is to adapt mitigation if wildlife mortality as a result of contact with Project components or vehicles is not meeting targets.

2.0 REGULATIONS, APPROVALS AND GUIDELINES

This draft WMMP meets the terms and conditions of the anticipated approval by Alberta Environment and Parks (AEP) and the Canadian Environmental Assessment Agency (CEA Agency) for the Project. The approval conditions will define the scope of the draft WMMP once they are available.

2.1 PROVINCIAL AGENCY RESPONSIBILTIES AND REPORTING REQUIREMENTS

2.1.1 Construction and Dry Operations

Alberta Transportation will be responsible for final development of the WMMP and implementation during the construction phase and for a period of three years post-construction during the dry operations phase of the Project. After that, AEP Operations will implement the WMMP during dry operations. The reporting requirements (i.e., number of reports, timing) will be determined following Project approval.

2.1.2 Flood and Post-Flood Operations

AEP Operations will be responsible for implementing the WMMP during both flood and post-flood operation phases of the Project. The reporting requirements (i.e., number of reports, timing) will be determined following Project approval.

3.0 REGULATORY, INDIGENOUS AND PUBLIC STAKEHOLDER INPUT

Engagement with stakeholders, including landowners, municipalities, infrastructure companies and others has been ongoing since the fall of 2014. Alberta Transportation's engagement with Indigenous groups also began in 2014 and with the five Treaty 7 First Nations in accordance with The Government of Alberta's Guidelines on Consultation with First Nations on Land and Natural Resource Management (2014) and the First Nation Consultation Plan approved by the Aboriginal Consultation Office (ACO).

3.1 GROUPS ENGAGED

Table 3-1 lists the Indigenous groups that have been engaged on the Project.

Table 3-1 Indigenous Groups Identified for Engagement

Indigenous Group or Organization	Distance from Project
Treaty 7 Nations	
Tsuut'ina Nation	619 m
Stoney Nakoda Nations (Bearspaw First Nation, Chiniki First Nation, and Wesley First Nation)	28 km
Siksika Nation	78 km
Piikani Nation	144 km
Kainai First Nation (Blood Tribe)	170 km
Treaty 6 Nations	
Ermineskin Cree Nation	204 km
Louis Bull Tribe	207 km
Montana First Nation	194 km
Samson Cree Nation	198 km
Other	
Foothills Ojibway	No Reserve
Ktunaxa Nation	180 km
Métis Nation of Alberta, Region 3	N/A
Métis Nation British Columbia	N/A

3.1.1 Issues Identified

Issues, concerns and recommendations related to effects of the Project were reported by Indigenous groups through the Indigenous engagement program.

Engagement with the Indigenous groups potentially affected by the Project is ongoing and will continue as the Project progresses. Alberta Transportation will review Traditional Use Study (TUS) reports as they are made available by Indigenous groups. Relevant Traditional Land and Resource Use (TLRU) information, concerns, and recommendations received after the EIA has been filed will be used for project planning and implementation purposes, where applicable.

Generally, issues and concerns related to effects of industrial development on wildlife and wildlife habitat, as reported by Indigenous groups through the review of Project-specific and publicly-available TLRU information, include:

- loss or disturbance of wildlife habitat, including potential disturbance to important wildlife habitat features such as nests, dens, mineral licks, calving areas, springs and ungulate winter ranges
- effects of sensory disturbance on wildlife
- increased habitat fragmentation and alterations of wildlife migration and movement patterns
- potential for animal-vehicle collisions (AVC) due to increased access and a lack of wildlife crossings, including associated intangible effects on the transmission of traditional knowledge
- increased wildlife mortality
- effects on biodiversity

3.1.2 Economic Opportunities

Alberta Transportation is committed to Indigenous participation in the Project, including training, employment and contracting opportunities. Alberta Transportation is preparing an “Indigenous Participation Plan” for the Project. The goal of this Plan is to create training and contracting opportunities with interested Indigenous groups potentially affected by the Project. Alberta Transportation aims to obtain Indigenous comment and feedback on the draft Plan, the final draft of which will identify how that feedback has been incorporated, as appropriate.

4.0 PROJECT DESCRIPTION

The Project consists of the construction and operation of an off-stream reservoir to divert and retain a portion of Elbow River flows during a flood. The diverted water will be released back to Elbow River in a controlled manner after the flows in Elbow River decrease sufficiently to accommodate the release of water from the reservoir. The off-stream reservoir will not hold a permanent pool of water.

4.1 PROJECT COMPONENTS

The primary Project components are:

- a diversion structure on the main channel and floodplain of Elbow River
- a diversion channel to transport partially diverted floodwater into the reservoir
- an off-stream dam to temporarily retain the diverted floodwater
- a low-level outlet in the dam to return retained water through the existing unnamed creek and back to the river when AEP Operations determines conditions are appropriate.

4.2 PROJECT PHASES

4.2.1 Construction

The Project is scheduled to be functionally operational (able to accommodate a 1:100-year flood event) for floods after two years of construction and be completely constructed (able to accommodate the design flood) after three years of construction.

4.2.2 Dry Operations

Dry operation refers to Project operation between floods. During dry operation, the diversion inlet gates will close, and the service spillway gates will open. The outlet structure will remain open to carry the flow of the unnamed creek over which the dam will be built. The outlet gate system and its operation will be checked according to a routine maintenance schedule to be developed by AEP Operations.

The associated access roads, emergency spillway and reservoir will be inspected at the same time and repaired, if necessary. The maintenance schedule will also include inspections of the diversion structure and the river channel upstream of it, the maintenance building, the floodplain berm, and the auxiliary spillway. Repairs and debris management will be completed.

4.2.3 Flood Operations

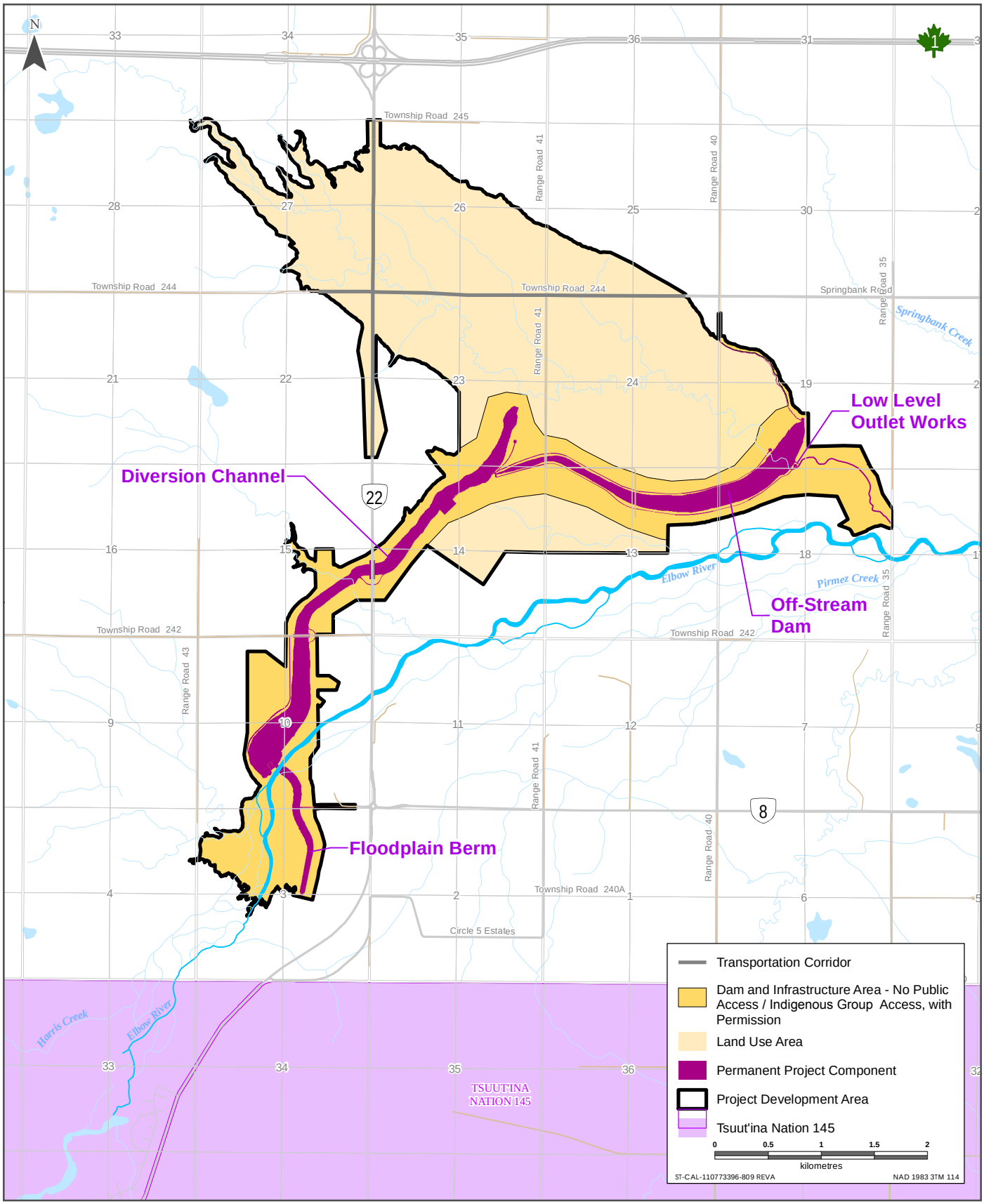
AEP Operations will be in communication with the City of Calgary Glenmore Dam operators in advance of and during the flood season each year. The need for flood operations will be determined through this communication, which will be informed by forecasted and measured flows on Elbow River at the diversion structure and upstream. AEP Operations staff, in communication with the City of Calgary Glenmore dam operators, will decide on when to open the diversion gates to commence diversion of flood water flows into the off-stream reservoir.

4.2.4 Post-Flood Operations

During post-flood operations, the diversion inlet gates are closed and the service spillway gates are open (lowered to the riverbed). The gates of the outlet structure would be opened to allow the floodwater retained in the reservoir to drain through the low-level outlet into the unnamed creek and then into Elbow River. The outlet structure gates will remain open after the reservoir has drained.

4.3 PREFERRED END LAND USE

Since filing the EIA, a draft post-construction land use document for the Project has been created. This document provides the draft principles of future land use for the Project, which was developed through the engagement process and includes feedback received by First Nations and stakeholders. The principles apply to the land use area (LUA) outlined in yellow in Figure 4-1. The primary use of all lands within the PDA, including the LUA, is for flood mitigation. In light of the primary use, the safety of anyone with access or land users will be an overriding factor.



Sources: Base Data - Government of Canada. Thematic Data - Government of Alberta

Land Use Area within the PDA

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5.0 WILDLIFE OVERVIEW AND BASELINE CONDITIONS

The following sections provide a summary of baseline wildlife and wildlife habitat conditions and potential Project effects. See Volume 3A, Section 11 for further detail.

5.1 BASELINE CONDITIONS

The wildlife LAA occurs in the Foothills Parkland natural subregion in Alberta, which is characterized by rolling topography with hills and comprising rough fescue grasslands, willow shrublands, and aspen woodlands (Natural Regions Committee 2006). The wildlife LAA overlaps an identified Key Wildlife and Biodiversity Zone (KWBZ) along Elbow River (ESRD 2015) and the grizzly bear Support Zone identified in the draft *Alberta Grizzly Bear Recovery Plan* (AEP 2016). The wildlife LAA occurs within sharp-tailed grouse (*Tympanuchus phasianellus*) and sensitive raptor ranges for bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus*) and prairie falcon (*Falco mexicanus*) (AEP 2018).

There is potential suitable habitat for 86 wildlife species of management concern (SOMC), including 54 birds, 26 mammals, three amphibians and three reptiles, 19 of which are species at risk (SAR) listed on Schedule 1 of the Species at Risk Act (SARA) and 12 which are listed in the Alberta *Wildlife Act*. The wildlife LAA is dominated by an agricultural landscape (48.3%), which includes tame pasture (27.3%), annual cropland (11.3%) and hayland (9.7%). Although these land cover types provide relatively low habitat suitability for most SOMC, there are native vegetation communities in the LAA that provide relatively higher habitat suitability for wildlife including grassland (8.8%), shrubland (8.4%), mixed forest (6.1%), broadleaf (deciduous) forest (5.2%), coniferous forest (5.0%), and wetlands (6.4%).

Wildlife field surveys were conducted in 2016 and included surveys for amphibians, rail, breeding birds, raptor nests, waterfowl, and large mammals (remote camera and winter tracking). During the breeding bird survey, 79 bird species were recorded. Eight of those species are SOMC: olive-sided flycatcher (*Contopus cooperi*), western wood-pewee (*Contopus sordidulus*), alder flycatcher (*Empidonax alnorum*), least flycatcher (*Empidonax minimus*), eastern kingbird (*Tyrannus tyrannus*), bank swallow (*Riparia riparia*), Cape May warbler (*Setophaga tigrina*), and Baltimore oriole (*Icterus galbula*). Mixed forest habitat contained the highest breeding bird species richness, followed by shrubland and broadleaf forest habitat. Similarly, breeding bird density was highest in mixed forest and broadleaf forest. Clay-colored sparrow (*Spizella pallida*), house wren (*Troglodytes aedon*) and savannah sparrow (*Passerculus sandwichensis*) had the highest densities in the LAA. In total, 16 waterbird species were observed in the LAA, with mallard (*Anas platyrhynchos*) as the most observed species. Several raptor stick and platform nests were observed in the LAA, some of which were occupied by red-tailed hawk (*Buteo jamaicensis*), osprey (*Pandion haliaetus*), and bald eagle.

During amphibian surveys (nocturnal acoustic and diurnal visual), an estimated 52 boreal chorus frogs (*Pseudacris maculata*) and 26 wood frogs (*Rana sylvatica*) were detected. No amphibian SOMC were observed. Ten sora (*Porzana carolina*) were observed within the LAA during systematic broadcast rail surveys and seven were observed incidentally. No yellow rail (*Coturnicops noveboracensis*) or Virginia rail (*Rallus limicola*) were detected.

Nine medium-to-large mammal species were recorded during the remote camera survey. White-tailed deer (*Odocoileus virginianus*) were the most commonly detected species (n=2,433), followed by elk (*Cervus canadensis*) (n=796). Winter tracking surveys conducted during 2015 and 2017 showed similar results where deer were encountered most frequently, followed by coyote and elk. Overall, wildlife track counts were higher along Elbow River compared to other areas surveyed in the LAA. Grizzly bear (*Ursus arctos*) and cougar (*Felis concolor*) were also detected along Elbow River during the remote camera survey. Site surveys by Indigenous groups, land owner observations, and government studies have also confirmed the presence of grizzly bears in the LAA. TUS reports by Indigenous groups have described various locations of high suitability habitat for elk in the LAA, including calving grounds within the off-stream reservoir.

5.2 POTENTIAL PROJECT EFFECTS

The components and activities that may interact with wildlife and wildlife habitat during construction are:

- clearing
- channel excavation
- water diversion construction
- dam and berm construction
- road construction
- bridge construction
- lay down areas
- borrow extraction
- reclamation

During dry operations and post-flood operations, there is potential for maintenance activities to interact with wildlife and wildlife habitat.

5.2.1 Change in Habitat

Construction, dry operations, flood and post-flood operations have the potential to affect wildlife and wildlife habitat through direct habitat loss or alteration, including residences of SAR species. These disturbances will result from vegetation clearing and other ground disturbance activities, as well as indirect loss or reduced habitat effectiveness from sensory disturbance. During flood and post-flood operations, wildlife habitat will be temporarily inaccessible during reservoir filling and post-flood operations in the PDA.

5.2.2 Change in Movement

The Project could result in alteration of wildlife movement patterns (daily or seasonal) because of habitat change and sensory disturbance during construction, as well as the presence of permanent Project components (e.g., diversion channel, floodplain berm, off-stream dam). The extent to which these Project components are perceived as hindrances (i.e., permeable, semi-permeable) or impermeable barriers would vary by wildlife species, location within the PDA (e.g., riparian, upland) and project design features (e.g., use of rip-rap, slope gradient). During flood and post-flood operations, water contained in the off-stream reservoir and diversion channel has the potential to act as a semi-permeable barrier that might temporarily hinder terrestrial wildlife movement in the LAA.

5.2.3 Change in Mortality Risk

Ground disturbance and vegetation clearing during construction and post-flood operations can result in physical destruction of key habitat features (e.g., nests, dens, roosts). Vehicle and equipment movement and ground disturbance can result in accidental mortality of small, less mobile species or individuals (e.g., amphibians), and vehicle collisions with larger animals. Wildlife-human conflict (i.e., removal of nuisance animals) can also increase mortality risk for wildlife.

The Project is predicted to increase wildlife mortality risk in the off-stream reservoir during a flood. Whether the risk is low or moderate depends on the species and magnitude of the flood. Most of the flooded area would encompass wetlands and reclaimed vegetation that might be suitable breeding habitat for amphibians and ground-nesting migratory birds, respectively. Rising flood waters in the off-stream reservoir would remove migratory bird residences (e.g., nests) and young (e.g., eggs, nestlings, or fledglings), change the conditions required for amphibian larvae to develop, and introduce predatory fish that can prey on amphibians (e.g., eggs, larvae, or adults). For large mammals (e.g., elk and grizzly bear), mortality risk would be less because of their mobility to avoid floods.

During post-flood operations, maintenance activities might potentially result in a small increase in mortality risk due to a rise in traffic volume in the LAA for maintenance crews to travel to and from the Project area, thereby increasing the risk of animal-vehicle collisions.

6.0 MITIGATION

The objectives of the mitigation measures are to ensure that sensitive wildlife and wildlife habitat features (e.g., nests, wetlands) are properly identified to avoid or reduce potential Project effects.

6.1 CONSTRUCTION

The objectives of the construction mitigation measures are to identify sensitive wildlife features (e.g., nests, dens, roosts, hibernacula) and avoid or reduce potential Project effects from ground disturbance on wildlife habitat. Key mitigation measures that would be implemented are listed in Table 6-1. The environmental inspector (or designate) will follow established industry best management practices and will evaluate effectiveness of mitigation during construction.

Table 6-1 Key Mitigation Measures During Construction to Reduce Potential Effects on Wildlife and Wildlife Habitat

Potential Effect	Mitigation Objective	Mitigation Measure
Change in habitat	• Reduce direct habitat loss or alteration including residences of species at risk (SAR) from vegetation clearing.	• Where possible, temporary workspaces and access roads will be in areas that avoid wildlife features and native vegetation (e.g., shrubland, treed areas, wetlands). Existing access roads and previously disturbed areas will be used, where feasible. • Pre-construction surveys will be conducted to identify wildlife features (e.g., nests, dens) and appropriate site-specific mitigation developed. • Temporary work spaces will be reclaimed according to the Vegetation Plan.
	• Reduce indirect loss or reduced habitat effectiveness from sensory disturbance.	• Where possible, focusing lights on habitats that surround the work site during evening hours will be avoided. This will reduce potential sensory disturbance to wildlife.

Table 6-1 Key Mitigation Measures During Construction to Reduce Potential Effects on Wildlife and Wildlife Habitat

Potential Effect	Mitigation Objective	Mitigation Measure
Change in movement	• Reduce change in wildlife movement (daily or seasonal) because of habitat change and sensory disturbance.	• Construction activities will be avoided during the Restricted Activity Period (RAP) for the Key Wildlife and Biodiversity Zone (KWBZ) identified along Elbow River (December 15 to April 30). This will reduce potential effects on wildlife movement of wintering ungulates (ESRD 2015). If construction during the RAP cannot be avoided, site-specific mitigation will be developed in consultation with AEP. • Sections of side slopes and bottom of the diversion channel, and side slopes of the floodplain berm and off-stream dam will be vegetated. Vegetated areas will provide a more conducive material for wildlife to move across. • The diversion channel and off-stream dam will be built with side slopes of 3H:1V, and 3.5H:1V respectively. • Where fencing is proposed around the PDA, wildlife-friendly fencing will be installed to allow ungulate passage (except for fencing around the diversion structure control building).
Change in mortality risk	• Reduce mortality risk (i.e., physical destruction of key habitat features [e.g., nests, dens, roosts, hibernacula]) due to: – ground disturbance and vegetation clearing,	• Pre-construction surveys will be conducted to identify wildlife features (e.g., nests, dens) and appropriate site-specific mitigation developed. • Identified wildlife features will be avoided during construction activities, as identified by the appropriate signage and/or fencing. The Environmental Inspector(s) or designate and Wildlife Resource Specialist(s) will recommend the appropriate setback distance for identified wildlife features. • Vegetation removal will be avoided during the RAP for nesting migratory birds and raptors. The recommended RAP to avoid destruction and disturbance to migratory bird and raptor nests is from February 15 to August 31 (SRD 2011, ESRD 2013, Gregoire 2014 pers. Comm, GOA 2018, ECCC 2018). • If vegetation removal is scheduled to occur within the RAP for migratory birds and raptors, a qualified wildlife biologist will inspect the site for active nests within seven days of the start of the proposed vegetation removal or ground disturbance and appropriate mitigation developed. • If an active nest or den is found, it will be subject to a recommended setback buffer and site-specific mitigation measures developed in consultation with regulators. • If previously unidentified listed or sensitive wildlife species or their site-specific habitat (e.g., dens, nests are identified during construction), then the occurrence will be reported to the environmental inspector(s) or designate.

Table 6-1 Key Mitigation Measures During Construction to Reduce Potential Effects on Wildlife and Wildlife Habitat

Potential Effect	Mitigation Objective	Mitigation Measure
Change in mortality risk (cont'd)	– Vehicle and equipment movement Animal-vehicle collisions.	• All construction traffic will adhere to safety, road closure regulations, and other access measures and guidelines for the construction area and associated access roads. • If construction activities occur within 100 m of an amphibian SOMC breeding wetland during the breeding season (approximately May 1 to September 30), install silt fencing 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. • Unauthorized vehicles will be prevented from access from public roads by using gates.
	– Reduce wildlife-human conflict (i.e., removal of nuisance animals).	• Wildlife will not be harassed or fed. • Waste will be stored in wildlife-proof containers and wildlife awareness training will be provided to staff on site to reduce human-wildlife conflict/ • Personnel will not be permitted to have dogs at the construction site. Firearms are not permitted in project vehicles or on the construction footprint, or at associated project facilities. • Incidents with wildlife will be reported to an Alberta Transportation representative. Sightings of species of interest will be reported to the environmental inspector(s) or designate. Protection measures might be implemented and the sighting will be recorded. • Unanticipated wildlife issues encountered during construction will be discussed and resolved by the environmental inspector(s) or designate, wildlife resource specialist(s), and the responsible regulatory agencies, if necessary.

6.2 DRY OPERATIONS

There will be no direct habitat loss and minimal sensory disturbance (e.g., occasional maintenance activities) during dry operations. The dry operations phase has limited potential to result in increased direct mortality risk because there will be no ground disturbance (e.g., vegetation clearing) during maintenance activities as well as substantially less human activity and vehicle traffic compared to the construction phase. The reduction in onsite activity will reduce the likelihood of Project-related wildlife mortality and wildlife-human conflict compared to the construction phase. Therefore, the main objectives of the dry operations mitigation measures are to reduce potential Project effects to wildlife from reduced habitat effectiveness from sensory disturbance and from major Project components (e.g., diversion channel, floodplain berm, off-stream dam) that may alter or reduce wildlife movement. Key mitigation measures that will be implemented are listed in Table 6-2.

Table 6-2 Key Mitigation Measures During Dry Operations to Reduce Potential Effects on Wildlife and Wildlife Habitat

Potential Effect	Mitigation Objective	Mitigation Measure
Change in habitat	• Reduce indirect loss or reduced habitat effectiveness from sensory disturbance.	• Restrict maintenance activities to the PDA where possible and use existing access roads. • Unauthorized vehicles will be prevented from access from public roads by using gates.
Change in movement	• Reduce potential barrier effects due to Major Project structures (diversion channel, floodplain berm, off-stream dam) as a result of habitat change and sensory disturbance.	• Sections of side slopes and bottom of the diversion channel, and side slopes of the floodplain berm and off-stream dam will be vegetated. Vegetated areas will provide a more conducive material for wildlife to move across. • The diversion channel and off-stream dam will be built with side slopes of 3H:1V, and 3.5H:1V respectively. • Where fencing is proposed around the PDA, wildlife-friendly fencing will be installed to allow ungulate passage (except for fencing around the diversion structure control building).
Change in mortality risk	• Reduce animal-vehicle collisions.	• All operations vehicles will adhere to speed limits and other access measures and guidelines for associated access roads.

6.3 FLOOD OPERATIONS

Due to safety concerns during reservoir flooding, there are no mitigation measures recommended for flood operations to reduce wildlife mortality risk in the off-stream reservoir. Salvage of eggs and nestlings in the off-stream reservoir immediately before flooding will not be possible because it is a safety concern to do so. Similar to migratory birds, salvage of amphibian species at risk in the off-stream reservoir immediately before flooding is a safety concern and will not be done.

6.4 POST-FLOOD OPERATIONS

The objectives of the post-flood operations mitigation measures are to reduce potential Project effects on wildlife and wildlife habitat from sensory disturbance during post-flood maintenance activities, reduce mortality risk from ground disturbance to wildlife during sediment and debris management in the PDA, and maintain wildlife movement in the LAA. Key mitigation measures that will be implemented are listed in Table 6-3.

Table 6-3 Key Mitigation Measures During Post-Flood Operations to Reduce Potential Effects on Wildlife and Wildlife Habitat

Potential Effect	Mitigation Objective	Mitigation Measure
Change in habitat	• Reduce indirect loss or reduced habitat effectiveness from sensory disturbance.	• Maintenance activities will be restricted to the PDA to reduce the area of disturbance during post-flood operations. • During maintenance activities in the off-stream reservoir, all semi-permanent and permanent waterbodies should be avoided within 100 m of the reservoir (GoA 2018), where appropriate. 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. • Maintenance activities will be reduced as much as possible in the KWBZ identified along Elbow River from December 15 to April 30 (ESRD 2015).
Change in movement	• Reduce change in movement due to post-flood operations due to habitat change and sensory disturbance.	• Side slopes of the diversion channel will be revegetated (if required) as part of post-flood maintenance to provide a more conducive material for wildlife to move across or out of the channel. • Post-flood infrastructure maintenance will be temporary and the duration will be reduced as much as possible. • Post-flood maintenance will be localized and occur only during daylight.

Table 6-3 Key Mitigation Measures During Post-Flood Operations to Reduce Potential Effects on Wildlife and Wildlife Habitat

Potential Effect	Mitigation Objective	Mitigation Measure
Change in mortality risk	• Manage vehicle and equipment movement and ground disturbance to reduce accidental mortality of small, less mobile species or individuals (e.g., amphibians). • Reduce animal-vehicle collisions.	• Manage post-flood maintenance activities to the required areas and reduce the area of disturbance. All maintenance traffic will adhere to safety and road closure regulations. • If maintenance activities in the off-stream reservoir occur more than seven days following reservoir draining, and during the RAP for nesting migratory birds and raptors, nest searches will be conducted. If an active nest or den is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation.
	• Reduce wildlife-human conflict (i.e., removal of nuisance animals).	• Do not harass or feed wildlife. Store waste in wildlife-proof containers and provide wildlife awareness training to all staff on site. • Report sightings of project-specific species of interest to the environmental inspector(s) or designate. Protection measures might be implemented and the sighting will be recorded. • If previously unidentified listed or sensitive wildlife species or their site-specific habitat (e.g., dens, nests) are identified during maintenance operations, report to the environmental inspector(s) or designate. • Unanticipated wildlife issues encountered during post-flood operations will be discussed and resolved by the environmental inspector(s) or designate, wildlife resource specialist(s), and the responsible regulatory agencies, if necessary.

7.0 MITIGATION MONITORING

Mitigation monitoring will be implemented to monitor the effectiveness of mitigation designed to reduce predicted changes in wildlife habitat, wildlife movement and mortality risk. Mitigation monitoring for changes in habitat will focus on the amount (in hectares) of direct habitat loss during each construction year. Mitigation monitoring for changes in mortality risk will focus on the construction phase and will include metrics such as the number of animal-vehicle collisions during construction within the LAA (i.e., Highway 8, Springbank Road) as well as the number of reported wildlife–human conflicts and number of nuisance animals removed from the Project site. Monitoring of migratory bird and raptor nests is not recommended as monitoring can increase mortality risk of the birds through stress and increased risk of predation due to human scent. However, nests will be checked during estimated fledging dates to confirm if a nest is no longer occupied before construction may begin within the distance setback.

The wildlife assessment as part of the EIA concluded that the permanent Project components will result in residual effects on wildlife movement in the LAA, but they are unlikely to pose a long-term threat to the persistence or viability of a wildlife species in the RAA. The EIA explicitly recognized the uncertainty related to wildlife movement and how various species might respond to the diversion channel, floodplain berm and off-stream dam during dry operations. To determine whether Project components are a barrier to wildlife movement and evaluate the effectiveness of mitigation measures, a remote camera monitoring program will be developed. Details of the remote camera monitoring program are provided in the next section.

7.1 CONSTRUCTION AND DRY OPERATIONS

7.1.1 Remote Camera Monitoring Program

7.1.1.1 Objectives

The wildlife assessment identified potential changes in wildlife movement during the construction and operation of the diversion channel, floodplain berm and off-stream dam. Specifically, the assessment described how each of these structures may impede or alter wildlife movement, especially of large mammals (e.g., deer, elk) known to occur in the LAA. The purpose of the remote camera monitoring program described below is to gather information related to potential Project effects on ungulate habitat use and movement, including other large mammals such as grizzly bear, and evaluate the effectiveness of mitigation measures.

7.1.1.2 Study Design

The remote camera monitoring program will be developed to assess wildlife use and movement (e.g., crossing success) in the LAA using a before-after study design. Relative abundance (e.g., photographic rate) or occupancy will be used to compare baseline data with remote camera data collected during construction and post-construction phases. The program will determine whether large mammals use and cross permanent Project structures, as well as use the diversion channel to travel under the Highway 22 bridge to examine effectiveness of mitigation measures.

The study design will include details on how survey sites were chosen and the camera protocols such as camera model and deployment details (i.e., number of cameras and placement). A wildlife biologist will visit the cameras every four months during construction and the first year of dry operations to change out memory cards and batteries and check the overall status of equipment (e.g., positioning, weather related malfunctions, animal or human tampering of equipment).

Limitations of the study design will be discussed including but not limited to spatial and temporal scales, probability of detection (i.e., potential bias with non-random camera placement), camera model, trigger time and detectability of a species or individual based on size, movement speed, curiosity or wariness, and the possibility of camera failure (Fisher and Burton 2012; Popescu et al. 2012; Caravaggi et al. 2017; Steenweg et al. 2017). Images collected by cameras may also be incomplete and may affect inferences on the behaviour of wildlife (Caravaggi et al. 2017).

7.1.1.3 Camera Placement

During the construction phase, six remote cameras will be deployed along Elbow River in the same locations as used in pre-construction baseline surveys to provide relative comparisons of change. Three of these remote cameras would be placed upstream and three downstream of the diversion structure and would monitor wildlife movement in the KWBZ for a minimum of one year during the estimated 3-year construction period.

During dry operations, approximately 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 Elbow River would remain at the same locations as during the construction phase. Four remote cameras would be deployed at the same locations as pre-construction baseline surveys near Highway 22 (i.e., near the raised portion of Highway 22) following construction. At least four additional remote cameras will be installed along wildlife friendly fencing at the edge of the diversion channel at crossable sections, as well as at the Highway 22 bridge underpass. The final number and location of remote cameras will be confirmed following discussion with regulators and Indigenous groups. Remote cameras at the diversion channel will be spaced approximately 1 km apart.

7.1.1.4 Data Analysis

To determine if Project components affect wildlife movement in the LAA, data would be compared with data collected during baseline surveys. Individuals detected by remote cameras would be identified to species as well as age and sex class, when possible. Relative abundance would be measured by first identifying independent events, defined as any image or series of images of the same animal or group of animals and ends after the animal or group of animals has left the image for greater than two minutes. To estimate relative abundance (i.e., photographic rate), data would be standardized by summing the count for each species over all independent events and dividing by the number of days the camera was active and calculated as the number of detections per 100 camera-days. Species richness (total number of species recorded) would be also be compared among camera stations.

To determine whether large mammals use and cross permanent Project components, as well as use the diversion channel to travel under the Highway 22 bridge, crossing success rates will be calculated for each structure as the total number of occasions an individual animal (or group) walks over or through a structure divided by the total number of occasions that animal (or group) approached the structure (i.e., number of individuals that enter the frame of the camera).

7.1.1.5 Results

The results will summarize each species detected, photographic rate or site occupancy for each species, and the crossing frequencies at permanent Project components to measure the effectiveness of mitigation.

7.1.1.6 Reporting Requirements

A report detailing the monitoring results will be provided to AEP by December 31 of the monitoring year. This information will also be made available to interested Indigenous groups and public stakeholders. The report will contribute to adaptive management strategies to address the effectiveness of mitigation related to wildlife movement.

7.2 POST-FLOOD OPERATIONS

7.2.1 Wildlife Habitat Assessment

7.2.1.1 Objectives

The draining of the off-stream reservoir will result in post-flood sediment being left in the off-stream reservoir, which would cover vegetation and reduce habitat suitability for wildlife. The time for wildlife habitat to return to baseline conditions (i.e., dry operations) following a flood event would depend on the magnitude of the flood. The objectives of the wildlife habitat assessment survey would be to identify and rate habitat that may support the occurrence of SOMC, identify and map habitat features of potential importance to wildlife, and incidentally record observations of all wildlife, especially SOMC.

7.2.1.2 Methods

The post-flood wildlife habitat assessment would be conducted following release of water from the off-stream reservoir. At least two visits would be conducted: one immediately after draining when it is safe to enter the off-stream reservoir, and another conducted the following spring to assess vegetation growth and its potential for wildlife habitat. During the survey, each land cover type in the affected area of the off-stream reservoir would be evaluated for habitat suitability for key individual SOMC or species groups using knowledge of each SOMC's or species group's seasonal habitat requirements. For example, wetlands can provide breeding habitat for northern leopard frog as well as nesting habitat for sora, while native prairie can provide nesting habitat for grassland songbirds. Forests provide habitat for raptors and forest songbirds. The habitat assessment would be conducted along a series of transects selected from pre-existing maps to be representative of local habitat diversity, or by dividing the area into discrete segments and covering each of them as thoroughly as possible on foot.

There are opportunities to involve Indigenous groups in the post-flood wildlife habitat assessment. Engagement with Indigenous groups is currently ongoing to determine specific opportunities.

7.2.1.3 Results

Results of the post-flood wildlife habitat assessment will include a description of existing habitat conditions (i.e., suitability) for each key SOMC or species group as well as a summary of SOMC observations. The information gathered in this survey could also provide information to develop recommendations for site-specific mitigation measures or species-specific surveys (e.g., amphibian, rail).

7.2.1.4 Reporting Requirements

A final report summarizing the results of the post-flood wildlife habitat assessment would be provided to AEP by December 31 of the monitoring year. This information will also be made available to interested Indigenous groups and stakeholders.

8.0 ADAPTIVE MANAGEMENT

Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs (Walters 1986; Walters and Holling 1990). An adaptive management approach will be applied to this draft WMMP focusing on the remote camera monitoring program and mitigation to reduce residual effects related to wildlife movement in the LAA. Specifically, results of the remote camera monitoring program will provide the necessary data to evaluate the effectiveness of mitigation measures related to wildlife movement and provide opportunities to adjust and improve mitigation, as required. For example, adjustments could be made to wildlife-friendly fencing design and location as well as materials used to fill riprap along sections of the diversion channel or floodplain berm. Evaluation details and a plan for further mitigation or revegetation will be documented in monitoring reports.

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