SPRINGBANK OFF-STREAM RESERVOIR PROJECT
Debris Deflector - Environmental Assessment Addendum

Prepared for:
Alberta Transportation

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Abbreviations

ACT	Alberta Culture and Tourism
AEP	Alberta Environment and Parks
CEA Agency	Canadian Environmental Assessment Agency
CRA	commercial, recreational, and Aboriginal
EIA	environmental impact assessment
HRIA	historic resources impact assessment
KWBZ	Key Wildlife Biodiversity Zone
LAA	local assessment area
NRCB	Alberta Natural Resources Conservation Board
PDA	project development area
RAA	regional assessment area
RAP	restricted activity period
SOMC	species of management concern
TAG	Technical Advisory Group
the Project	Springbank Off-stream Reservoir Project
TLRU	traditional land and resource use
VC	valued component

1.0 INTRODUCTION

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

As stated in the March 2018 submission of the Environmental Impact Assessment (EIA), the diversion inlet structure and channel were designed to allow for passage of large floating debris and bedload entrained with diverted flood waters. Throughout the Project's design, Alberta Transportation has reviewed the Project for component protection and public safety. Taking this risk-informed approach, Alberta Transportation determined that additional debris management measures should be taken as part of the Project. In addition, Alberta Transportation received concerns regarding debris management during the Indigenous and public engagement programs for the Project including concerns related to debris build up in the reservoir. The proposed debris deflector mitigates these concerns by reducing the potential for large debris entering the reservoir.

Debris management is a common component of flood mitigation projects. For example, flood mitigation measures implemented on the Sawridge Creek Channel to protect the community of Slave Lake includes debris management in the form of a large steel rack structure located within the channel.

The debris deflector will be installed along the west side of Elbow River, at the opening of the diversion channel (Figure 1-1). The structure is an additional Project component that would be located within the project development area (PDA) assessed in the March 2018 EIA. The debris deflector would reduce risks of infrastructure damage and operating failure of Project components including the diversion inlet, diversion channel and off-stream reservoir and dam.

During dry operations, the debris deflector has been designed to remain outside the wetted edge of Elbow River so as to not pose a navigation or public safety hazard. The debris deflector will not be an active component during dry operations.

During flood operations (considered when flows in Elbow River exceed 160 m^3/s), water levels will rise to a height where the debris deflector will be within the current extent of Elbow River. The structure's design excludes large debris from the diversion inlet and promotes its conveyance through the service spillway and down into Elbow River. When operating it is likely that large debris will collect along the debris deflector. As flow rates during a flood change, the operating conditions in the backwater change, and it is anticipated that some of the debris on the deflector will re-enter the river and pass downstream. Once the flood has passed and the diversion gates are lowered to allow normal passage of water into Elbow River, it is anticipated that some of the debris stranded on the deflector will re-enter the river and pass downstream

naturally. Any large debris that remain stranded on the deflector following a flood will be removed as part of post-flood operations maintenance activities.

This document provides an environment assessment addendum of the debris deflector and its associated contribution to the overall Project, as assessed in the March 2018 EIA (Volume 2, Section 2). The assessment follows the same structure and methodology used in the March 2018 EIA. A screening evaluation was undertaken for all 15 Valued Components (VCs) assessed in the March 2018 EIA. The purpose of the screening evaluation was to assess whether the debris deflector would result in potential additional incremental effects on the VC beyond what has already been assessed in the March 2018 EIA. The following VCs were considered to have incremental effects beyond those which were assessed in the March 2018 EIA, and as such were assessed in detail in this environmental assessment addendum.

- aquatic ecology
- wildlife and biodiversity
- traditional land and resource use

A summary of the findings for aquatic ecology, wildlife and biodiversity and traditional land and resource use is provided below.

Aquatic Ecology

Construction of the debris deflector would result in changes to aquatic habitat structure and cover that would result in a loss of 950 m^2 of Class 3 run fish habitat from the footprint of the debris deflector within the channel of Elbow River. This habitat loss is in addition to the 1,854 m^2 lost as a result of the diversion structure infill footprint. The amount of fish habitat destroyed is relatively small compared to the availability of fish habitat remaining in the aquatic ecology local assessment area (LAA). Coarse substrate habitats (runs, pools, and riffles) are abundant throughout Elbow River in the 67 km (approx. 3,100,000 m^2 of available habitat) within the aquatic ecology LAA, and no effect to the sustainability of forage or coarse fish populations is predicted.

The presence of the debris deflector, when inundated, would be expected to have a localized effect on hydraulics along the concrete base of the structure that may result in an alteration of habitat. These changes are anticipated to be within the natural variation of changes in hydraulic conditions in Elbow River and are not predicted to result in an adverse change in habitat use.

The residual effects of the debris deflector on fish habitat and mortality are unlikely to pose a long-term threat to the persistence or viability of a fish species, including Species at risk or fish that support a commercial, recreational, and Aboriginal (CRA) fishery, in the aquatic ecology regional assessment area (RAA). Therefore, the determination of a not significant effect remains unchanged from that presented in the March 2018 EIA.

Wildlife and Biodiversity

Construction activities associated with debris deflector installation have the potential to result in indirect effects due to sensory disturbance (e.g., noise), which can reduce habitat effectiveness in the wildlife LAA. As the debris deflector is located within the PDA and will be constructed at the same time as the diversion structure, the residual effects characterization for change in habitat due to sensory disturbance during flood and post-flood operations is the same as those presented in the March 2018 EIA.

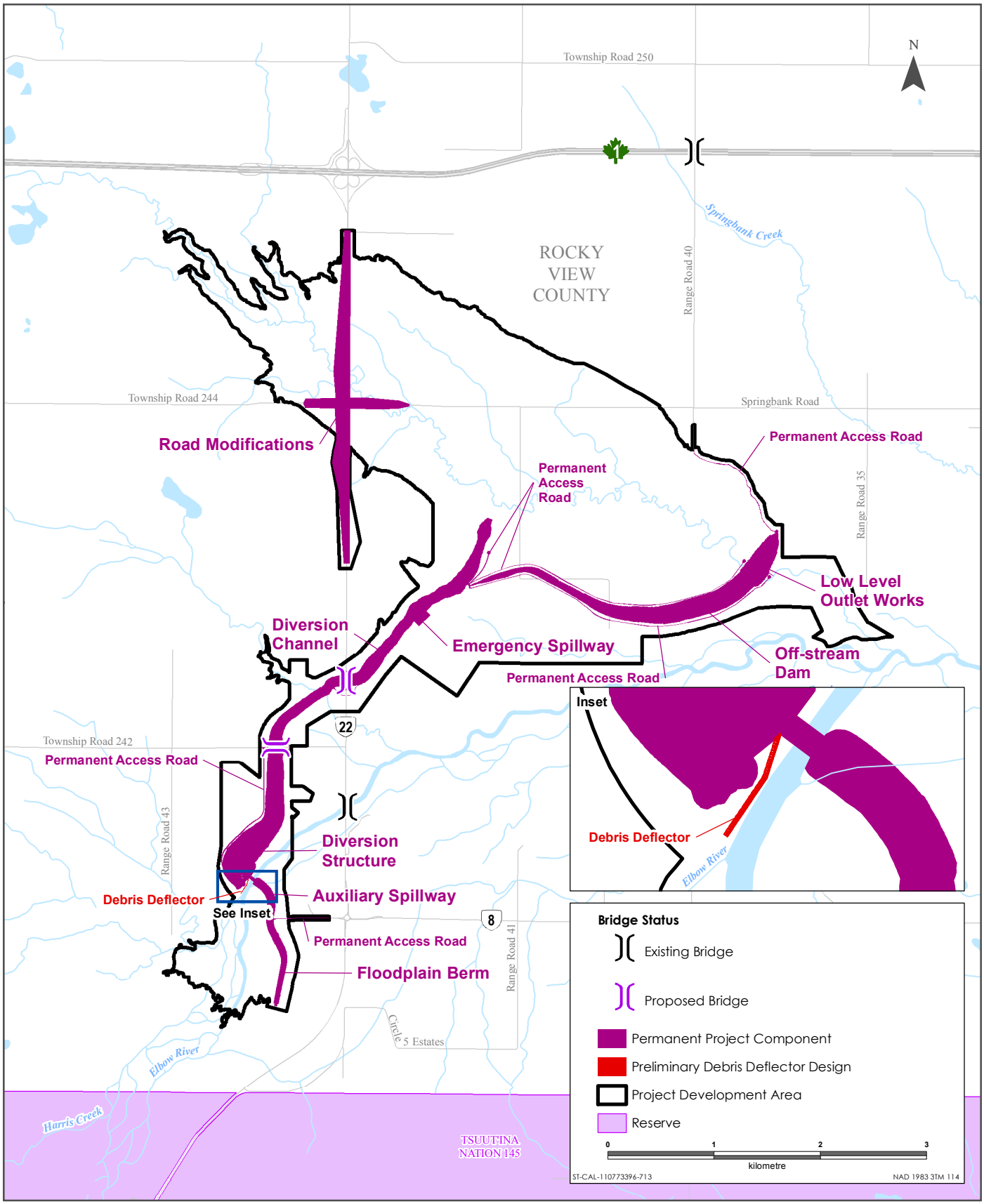
The debris deflector has potential to alter wildlife movement within the Elbow River floodplain; however, the length of the structure suggests the contribution to previously assessed residual effects on wildlife movement is relatively minor. If wildlife encounters the debris deflector, it is expected individual animals would detour around the structure and still be able to access habitat areas on either side of Elbow River, as needed.

Mortality risk as a result of the debris deflector construction is consistent with that presented in the March 2018 EIA for the Project as a whole. During post-flood operations, debris removal activities might require equipment to move though amphibian habitat along Elbow River or disturb nesting birds in adjacent riparian areas, which might result in abandonment and increased mortality risk. To reduce mortality risk, the same mitigation measures described in the March 2018 EIA during this phase will be applied.

Determination of significance remains unchanged from the March 2018 EIA. With the application of mitigation and environmental protection measures, residual environmental effects on wildlife, including migratory birds, species at risk, biodiversity, and provisions to maintain ungulate movement (which was recommended by Indigenous groups) are predicted to be not significant.

Traditional Land and Resource Use (TLRU)

Construction, flood and post-flood operations of the debris deflector has the potential to affect the availability of traditional resources through changes in aquatic ecology and wildlife and wildlife habitat, which support hunting, trapping and fishing activities. As summarized above the effects of the addition of the debris deflector to aquatic ecology and wildlife and wildlife habitat are anticipated to remain largely the same as those assessed in the March 2018 EIA. Given that the significance conclusions related to aquatic ecology and wildlife and wildlife habitat remain unchanged, it has been concluded that the determination of significance for TLRU also remains unchanged from that presented in the March 2018 EIA. The addition of the debris deflector will not result in the long-term loss of availability of traditional resources, access to traditional resources or areas, or the permanent loss of current use sites or areas in the TLRU RAA. As a result, effects on TLRU are not significant.



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

Debris Deflector Location within the PDA

2.0 DEBRIS DEFLECTOR DESCRIPTION

2.1 OVERVIEW

The debris deflector is a permanent structure comprised of a reinforced concrete foundation measuring approximately 160 m in length, 1.5 m high and approximately 6 m wide. The concrete foundation will support a vertical steel structure comprised of hollow structural tubing, measuring approximately 6 m high. The debris deflector is located across the diversion inlet gates and extends upstream on the west side of Elbow River.

The debris deflector has been added to the design following additional evaluation of risk and is part of the staged approach to debris mitigation in the system. The purpose of the debris deflector is to prevent debris reaching the diversion inlet opening and passing down the diversion channel into the off-stream reservoir. It mitigates the following risks that were identified as being present when allowing debris through the diversion inlet:

- risk of woody debris accumulating at the low-level outlet and affecting post-flood operations
- risk of debris accumulating on the dam's emergency spillway and reducing its capacity, if needed
- risk of debris accumulating in the diversion channel and reducing its capacity during flood operations
- risk of debris accumulating on the diversion inlet gate bays such that it affects operation

Incidentally, the inclusion of the debris deflector means that woody debris will not enter the off-stream reservoir and will not be an added maintenance issue in post-flood operations. This is desirable from an operations perspective and is in accordance with concerns raised during public consultation and Indigenous engagement relating to the debris that is left in the off-stream reservoir after water is released back into Elbow River.

2.2 LOCATION

The debris deflector is located at the diversion inlet gates. The debris deflector will span across the diversion inlet gates and upstream and would be aligned parallel to the banks of Elbow River, along the west side (Figure 2-1). Further hydraulic and structural analysis will be conducted during detailed design to update the alignment, arrangement and structural design.

2.3 ALTERNATIVES CONSIDERED

A risk-informed approach was used to evaluate the following three strategies for mitigation of the following risks:

- **No Additional Debris Management** – typical yearly maintenance would be performed at the structure to remove any minor debris accumulation. Based on model testing, debris directed toward the diversion inlet is expected to pass through the diversion inlet and into the diversion channel. For the analysis, it was assumed that debris that passes into the diversion channel would not pose a risk to dam overtopping. Evaluations indicated that the emergency spillway has sufficient capacity to overcome partial debris blockage (up to 50%).
- **Debris Capture** - This alternative collects large woody debris upstream of the diversion inlet using a series of vertical members spaced at even intervals. Multiple variations were evaluated in the physical model testing. During a flood, debris is expected to accumulate on the vertical members and form a jam. Some debris may pass through or around the structure, as occurred during testing. These singular debris elements would be expected to then pass through the diversion inlet. As debris accumulates on the rack, flow through the structure would diminish and the flow pattern would shift to river right (south) with debris potentially circumventing the right (south) side of the rack.

  Based on model tests, operation of the gates (diversion inlet or service spillway) would be unlikely to clear debris from the structure. Following a flood, a large amount of debris removal from the river is expected. During typical operations, debris removal from the rack would be anticipated more frequently and the presence of the racks within the river channel may pose a threat to public safety related to river navigation. It is assumed that debris entering the diversion channel does not pose a threat to dam overtopping.
- **Debris Deflector** - This alternative promotes passage of debris downstream through the service spillway by constructing a structure comprised of horizontal members mounted to vertical supports. The debris deflector would be aligned parallel to the expected flow vectors, when the dominant flow is through the service spillway, to facilitate the debris movement downstream. Multiple variations were evaluated in the physical model testing. During tests, the debris deflector retained all debris within Elbow River. No debris reached the diversion inlet gates and debris was observed to accumulate at the upstream end of the debris deflector.

The inclusion of a debris deflector was the highest ranked option from the risk-based evaluation. During the design of the diversion inlet, several debris deflection alternatives were evaluated using physical modelling and numerical computer modelling. The shape orientation and key elements of the debris deflector as presented herein was selected from those alternatives. This 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 deflectors effects on flood operations and maintenance.

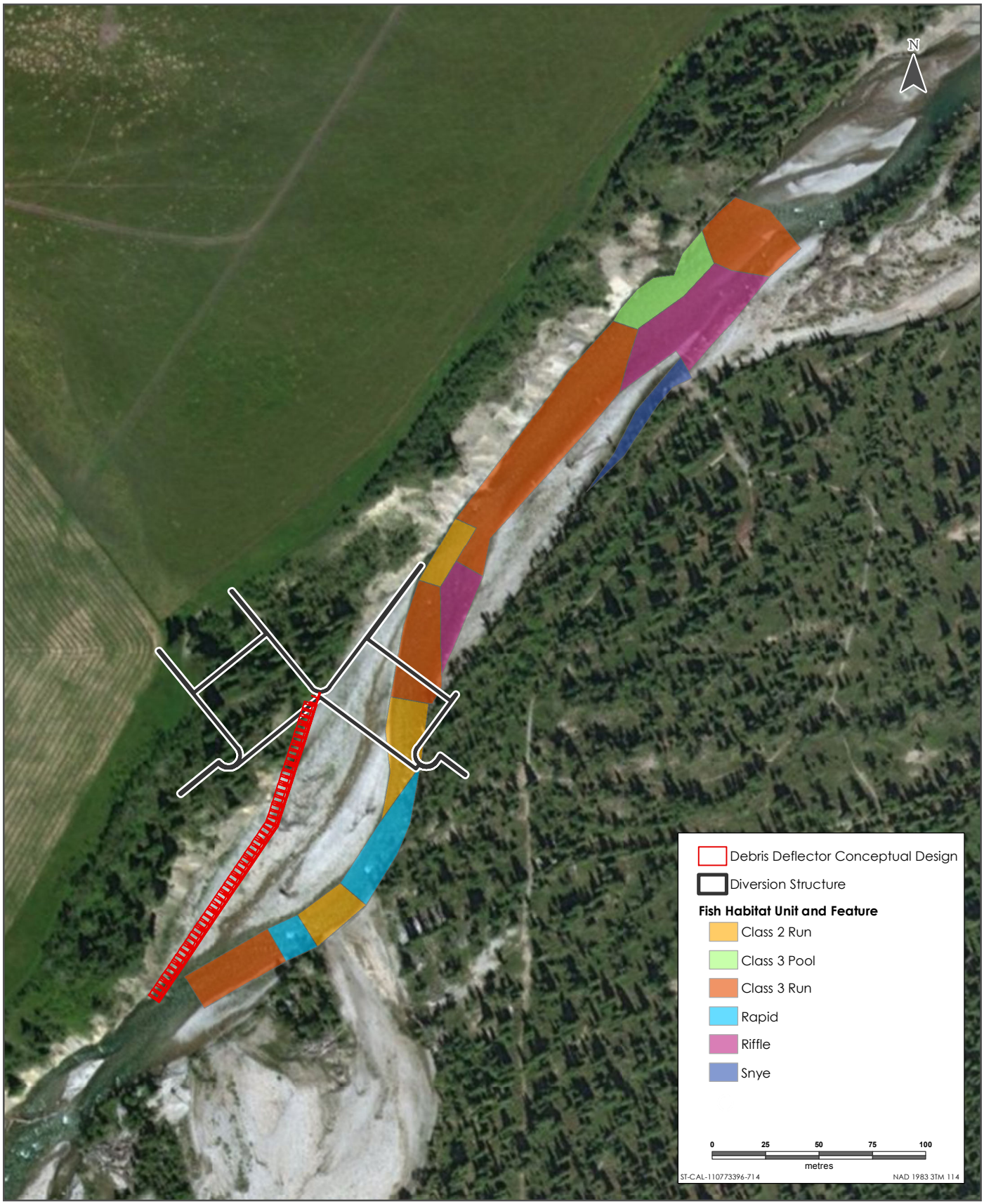
2.4 ENGAGEMENT

Alberta Transportation has received concerns regarding debris collection including the following:

- the potential risk of debris in the diversion channel
- there is a concern about debris blocking the reservoir channel during a flood
- how the accumulation of sediment and debris after a flood will be managed

In response to these concerns, as well as Alberta Transportation's own risk-based evaluation, Alberta Transportation has determined the need for additional debris management measures and has selected the debris deflector as the best option to mitigate safety concerns and debris collection in the off-stream reservoir.

The debris deflector was presented at the Technical Advisory Group (TAG) meeting on May 3, 2018. Information on the debris deflector will be presented at public open houses scheduled for May 22 and 24, 2018. Indigenous engagement for the project is ongoing and the debris deflector will be incorporated in those ongoing engagement activities.



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Debris Deflector Conceptual Design

Stantec

2.5 CONSTRUCTION AND OPERATION

2.5.1 Construction and Dry Operations

The debris deflector will be constructed at the same time as the construction of the diversion inlet and service spillway (March 2018 EIA, Volume 1, Section 3.3.1.1). Construction equipment requirements for the debris deflector are not anticipated to be beyond that which has already been considered as part of the Project (March 2018 EIA, Volume 1, Section 3.3.2). Temporary access and laydown areas for construction have also already been accounted during construction. Environmental protection and waste management will follow the same protocol and will be the responsibility of construction contractors following the guidelines outlined in the March 2018 EIA.

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. The debris deflector will not be an active component during dry operations.

2.5.2 Flood and Post-Flood Operations

During flood operations (considered when flows in Elbow River exceed 160 m^3/s), water levels will rise to a height where the debris deflector will be within the current extent of Elbow River. The structure's design excludes large debris from the diversion inlet and promotes its conveyance through the service spillway and into Elbow River. When operating, it is likely that large debris will collect along the debris deflector. As flow rates during a flood change, the operating conditions in the backwater change, and it is anticipated that some of the debris on the deflector will re-enter the river and pass downstream. Once the flood has passed and the diversion gates are lowered to allow normal passage of water into Elbow River, it is anticipated that some of the debris stranded on the deflector will re-enter the river and pass downstream naturally. Any large debris that remain stranded on the deflector following a flood will be removed as part of post-flood operations maintenance activities.

Debris removal activities will occur outside the restricted activity period (RAP) for instream works of May 1 to July 15 and September 16 to April 15 and for the Key Wildlife and Biodiversity Zone (KWBZ) identified along Elbow River in December 15 to April 30, where possible. If debris removal needs to occur during the bird nesting RAP (March 15 – August 31), as a result of safety considerations, a qualified wildlife biologist will conduct nest searches. If an active nest is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation (see Volume 3A, Section 11, Table 11-10 and Table 11-11). Removal of large debris from the debris deflector will occur through a manual work force, when determined safe to do so.

2.6 SCHEDULE

The debris deflector will be constructed at the same time as the diversion inlet and service spillway (March 2018 EIA, Volume 1, Section 3.3.1.1). Subject to regulatory approvals, the Project is scheduled to be functionally operational (able to accommodate a 1:100 year flood) in 2021 and be completely constructed (able to accommodate the design flood) in 2022.

3.0 SELECTION OF VALUED COMPONENTS

This environmental assessment addendum focuses on valued components (VCs), which are environmental elements of particular value or interest to regulators and other parties and were selected with consideration of the Alberta Environment and Parks (AEP) Terms of Reference, the *Canadian Environmental Assessment Act, 2012* (CEA Agency) Guidelines, and the professional experience of the EIA team. The VCs considered for inclusion within this assessment are the same as those assessed in the March 2018 EIA (Volume 2, Section 5.1.2).

The rationale for selecting each VC is explained in Table 3-1 and further detailed in the applicable VC sections (see Sections 5 through 7).

VCs considered in this assessment addendum are:

- aquatic ecology
- wildlife and biodiversity
- traditional land and resource use

As noted in Table 3-1, VCs not considered in this assessment addendum are:

- air quality and climate
- acoustic environment
- hydrogeology
- hydrology
- surface water quality
- terrain and soils
- vegetation and wetlands
- land use and management
- historical resources
- public health
- infrastructure and services
- employment and economy
- federal lands

For the VCs listed above, an assessment is not completed because the potential effects of the construction and operation of the debris deflector are within the range of effects already predicted and assessed as in the March 2018 EIA.

Table 3-1 Valued Components and Rationale for Inclusion or Exclusion in this Environmental Assessment Addendum

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in this Addendum	Rationale for Inclusion or Exclusion	Section(s) where discussed in this Addendum
Air Quality and Climate	✓	–	Excluded because the debris deflector will add limited incremental air emissions during construction and no emission sources during all other phases of the Project. Additional effects to air quality and climate beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 3) are not anticipated.	Not covered further
Acoustic Environment	✓	–	Excluded because the debris deflector will be constructed at the same time as other Project components and will not add measurably to construction phase equipment noise emissions. The debris deflector will not contain any noise emission sources during all other phases of the Project. Additional effects to noise emissions beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 4) are not anticipated.[1]	Not covered further
Hydrogeology	–	–	Hydrogeology is excluded. The potential for alteration of groundwater quantity and groundwater quality is negligible. The debris deflector will be installed using foundation anchors to approximately 1m below surface. Operation of the debris deflector will not impede groundwater flow. Additional effects to hydrogeology beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 5.0 and Volume 3B, Section 5.0) are not anticipated.	Not covered further

[1] Note that while the acoustic environment has not been assessed further, wildlife and wildlife habitat assessment does include discussion of changes to habitat as a result of sensory disturbance in the context of the debris deflector. The acoustic environment was screened out of further assessment because construction of the debris deflector will not add measurably to noise emissions in relation to human health noise guidelines. However, it is recognized that construction activities may add to sensory disturbance for wildlife.

Table 3-1 Valued Components and Rationale for Inclusion or Exclusion in this Environmental Assessment Addendum

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in this Addendum	Rationale for Inclusion or Exclusion	Section(s) where discussed in this Addendum
Hydrology	–	–	Hydrology is excluded. The potential for alteration of surface flow during normal river conditions by the debris deflector is limited as the structure will be installed close to bankfull. The presence of debris deflector, when inundated during floods below the 1:10 year flood, would be expected to have a localized effect on hydraulics along the concrete base of the structure. These changes are anticipated to be within the natural variation of changes in hydraulic conditions in Elbow River. During a flood, the Project's purpose is to alter the hydrology of the river and the debris deflector would contribute to that. Additional effects to hydrology beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 6 and Volume 3B, Section 6) are not anticipated.	Not covered further
Surface water quality	–	–	Surface water quality is excluded. The debris deflector will be constructed at the same time as the other "in river" components within isolation. During dry operations and flood operations, the debris deflector would act in the same manner as the diversion structure in relation to surface water quality. Additional effects to surface water quality beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 7 and Volume 3B, Section 7) are not anticipated.	Not covered further
Aquatic Ecology	✓	✓	Aquatic ecology is included because the debris deflector will add incrementally to the Project footprint within the aquatic environment resulting in additional fish habitat loss.	Section 5

Table 3-1 Valued Components and Rationale for Inclusion or Exclusion in this Environmental Assessment Addendum

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in this Addendum	Rationale for Inclusion or Exclusion	Section(s) where discussed in this Addendum
Terrain and Soils	–	–	Terrain and soil is excluded. The debris deflector is located within the PDA. Additional effects to soils and terrain beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 9 and Volume 3B, Section 9) are not anticipated.	Not covered further
Vegetation and wetlands	–	–	Excluded because the debris deflector is located within the PDA. No further vegetation clearing is anticipated to be required that has not already been assessed. Additional effects to vegetation and wetlands beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 10 and Volume 3B, Section 10) are not anticipated.	Not covered further
Wildlife and biodiversity	✓	✓	Wildlife and wildlife habitat are included because the debris deflector will add incrementally to the Project components and construction activities affecting wildlife movement around the diversion structures and sensory disturbance.[2]	Section 6
Land use and management	–	–	Excluded because the debris deflector will be located immediately adjacent to the proposed Project components, within the PDA. The existence of the debris deflector will not impede recreational traffic (kayaks etc.) on Elbow River. Additional effects to land use and management beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 12 and Volume 3B, Section 12) are not anticipated.	Not covered further

[2] Note that while the acoustic environment VC has not been assessed further, the wildlife and wildlife habitat assessment does include discussion of changes to habitat as a result of sensory disturbance in the context of the debris deflector. The acoustic environment was screened out of further assessment because construction of the debris deflector will not add measurably to noise emissions in relation to human health noise guidelines. However, it is recognized that construction activities may add to sensory disturbance for wildlife.

Table 3-1 Valued Components and Rationale for Inclusion or Exclusion in this Environmental Assessment Addendum

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in this Addendum	Rationale for Inclusion or Exclusion	Section(s) where discussed in this Addendum
Historical resources	✓	–	Excluded because the debris deflector will be located immediately adjacent to the proposed Project components, within the PDA. debris deflector. Mitigation and/or construction monitoring required by Alberta Culture and Tourism (ACT), based on historic resources impact assessments (HRIAs), will be completed. After implementation of the required mitigation measures there are no residual effects predicted.	Not covered further
Traditional land and resource use	✓	✓	Traditional land and resource use is included because the debris deflector has the potential to affect the availability of traditional resources through changes in fish and fish habitat and wildlife and wildlife habitat, which support hunting, trapping and fishing activities.	Section 7.0
Public health	✓	–	Excluded because the debris deflector will add limited additional activities and infrastructure during construction, dry operations, and post-flood operations. Additional effects to public health beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 15 and Volume 3B, Section 15) are not anticipated.	Not covered further
Infrastructure and services	✓	–	Excluded because the debris deflector will add limited additional activities during construction of the Project components and will not increase construction demands for infrastructure and services. Additional effects to infrastructure and services beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 16 and Volume 3B, Section 16) are not anticipated.	Not covered further

Table 3-1 Valued Components and Rationale for Inclusion or Exclusion in this Environmental Assessment Addendum

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in this Addendum	Rationale for Inclusion or Exclusion	Section(s) where discussed in this Addendum
Employment and economy	✓	–	Excluded because the debris deflector will add limited additional activities during construction. Additional effects to employment and economy beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 17 and Volume 3B, Section 17) are not anticipated.	Not covered further
Federal lands	–	–	Excluded because the debris deflector will not be located on federal lands and additional effects to federal lands beyond those which have already been assessed (March 2018 EIA, Volume 3A, Section 18 and Volume 3B, Section 18) are not anticipated.	Not covered further

NOTES:
✓ Indicates an identified interaction or valued component in this environmental assessment addendum
– Indicates no identified interaction or valued component in this environmental assessment addendum

4.0 ASSESSMENT METHODS

This environmental assessment addendum was completed following the assessment methods outlined in Volume 2 of the March 2018 EIA. A summary of the assessment steps is provided below.

- **Steps 1 through 4: Scoping of the Assessment** – Scoping of the assessment includes the selection of VCs and the rationale for their selection; influence of consultation and engagement on the scoping of the VC; selection of the environmental effect(s); description of measurable parameters; description of temporal and spatial boundaries; and identification of benchmarks that are used to determine the significance of environmental effects. The VCs selected, rationale for selection, environmental effects, measurable parameters and spatial and temporal boundaries are the same as those detailed in the March 2018 EIA. The debris deflector is located within the PDA; see Figure 1-1.
- **Step 5: Existing Conditions** – Existing environmental conditions are established for the VC. In many cases, existing conditions implicitly include those environmental effects that may have been or may be caused by other past or present projects or activities that have been or are being carried out.
- **Step 6: Assessment of Project Environmental Effects** – Project environmental effects are assessed. The assessment includes descriptions of how an environmental effect will occur or how the Project will interact with the environment; mitigation and environmental protection measures proposed to reduce or eliminate the environmental effect; and characterization of the residual environmental effects: the environmental effects that remain after mitigation has been applied. The effects are assessed for construction and dry operations.
- **Step 7: Assessment of Cumulative Environmental Effects** – Cumulative environmental effects are identified in consideration of other past, present or reasonably foreseeable future projects or activities that have been or will be carried out. A review of potential interactions is completed to determine if an assessment of cumulative environmental effects is required (i.e., there is potential for an interaction) for that specific Project environmental effect that interacts with those of other projects or activities that have been or will be carried out. The residual environmental effects of the Project in combination with other projects or activities that have been or will be carried out are then evaluated for cumulative effects, including the contribution of the Project to those cumulative effects.
- **Step 8: Determination of Significance** – The significance of Project-related residual effects and residual cumulative environmental effects are then determined, in consideration of the significance criteria.
- **Step 9: Follow-up** – Follow-up measures to verify the environmental effects predictions or to assess the effectiveness of mitigation, as well as any required monitoring, are recommended, where appropriate and applicable.

- **Step 10: Summary** – The environmental effects on the VC are summarized.
- **Step 11: Assessment of Potential Accidents and Malfunctions** – The effects of accidents and malfunctions on each VC are assessed.
- **Step 12: Assessment of the Effects of the Environment on the Project** – The effects of local conditions and natural hazards on the Project are assessed.

5.0 ASSESSMENT OF POTENTIAL EFFECTS ON AQUATIC ECOLOGY

5.1 SCOPE OF ASSESSMENT

5.1.1 Potential Effects, Pathways and Measurable Parameters

Potential effects on aquatic ecology as a result of the construction and operation of the debris deflector are a permanent alteration of fish habitat, destruction of fish habitat and potential death of fish. Potential effects, effect pathways and the measurable parameters used to characterize and assess effects on aquatic ecology were the same as those considered in the March 2018 EIA (see Volume 3A, Section 8.1.3.2, Table 8-1).

5.2 EXISTING CONDITIONS

Existing conditions for aquatic ecology, including fish and fish habitat, are provided in the March 2018 EIA, Volume 3A Section 8.2.

5.3 PROJECT INTERACTIONS WITH AQUATIC ECOLOGY

Table 5-1 identifies, for each potential effect, the physical activities associated with the debris deflector that might interact with aquatic ecology, including fish and fish habitat and result in the identified environmental effect. These interactions are indicated by check marks and are discussed in Section 5.5 in the context of effect pathways, standard and project-specific mitigation, and residual effects. A justification for no interaction (no checkmark) is provided following the table.

Table 5-1 Project-Environment Interactions with Aquatic Ecology

Project Phase	Potential Effects		
	Permanent alteration of fish habitat	Destruction of fish habitat	Death of Fish
Construction and dry operations of the debris deflector	✓	✓	✓
Flood and post-flood operations of the debris deflector	✓	-	✓
NOTES: ✓ Potential interaction - No interaction			

The operation of the debris deflector is not expected to have associated habitat destruction but may result in a temporary alteration of fish habitat through the change in debris movement and change in hydraulic conditions in the river or a death of fish if stranded between the debris deflector and the diversion gates.

5.4 MITIGATION

Mitigation measures for aquatic ecology related to the debris deflector, during all phases, would remain consistent with what was presented in the March 2018 EIA, Volume 3A, Section 8.4.3; Volume 3B Section 8.2.2.2; and summarized in Volume 4, Appendix C. In addition, the surface around the base of debris deflector and behind the structure will be graded to prevent pooling of water and subsequent stranding of fish that may utilize the debris deflector as velocity cover during floods.

5.5 ASSESSMENT OF RESIDUAL EFFECTS ON AQUATIC ECOLOGY

5.5.1 Permanent Alteration of Fish Habitat

The construction of the debris deflector will require instream works. However, the structure is located within the PDA and will be constructed within the same timeframe and in stream isolation as the diversion inlet and service spillway. As a result, the assessment of potential effects associated with the construction, specifically the diversion inlet and service spillway, are predicted to be the same for the debris deflector (see Volume 3A, Section 8.4.4.1).

During dry operations, the debris deflector will not be within standing water and will therefore not create residual effects on fish habitat. Because the footprint of the debris deflector extends into the area that will be inundated during floods below the 1:10 year flood, there will be a change in hydraulics along the concrete base of the structure that may result in an alteration of habitat, potentially increased depth, and water velocity. These changes are anticipated to be within the natural variation of changes in hydraulic conditions in Elbow River and are not predicted to result in an adverse change in habitat use.

During flood operations, large debris may be caught on the debris deflector and prevented from moving downstream in Elbow River. Without replacement of the debris into the river channel, this could result in a decrease in habitat complexity downstream of the diversion structure. The concrete base and debris trapped on the deflector may induce scour pools to form, creating deeper water along the debris deflector that would result in direct and indirect alteration of fish habitat during flood and post-flood operations.

In post-flood operations, debris on the deflector may impede fish passage in Elbow River. However, the debris would be of temporary nature and removed from the structure, as such effects on upstream movement of fish during post-flood operations is not anticipated. Given the infrequency of diversion, and with the implementation of mitigation measures, the construction

and the flood operations of the debris deflector is not predicted to result in residual effects on aquatic ecology.

5.5.2 Destruction of Fish Habitat

Construction of the debris deflector would result in changes to habitat structure and cover that would result in a loss of 950 m^2 of Class 3 run fish habitat from the footprint of the debris deflector within the channel of Elbow River. The amount of fish habitat removed is relatively small compared to the availability of fish habitat remaining in the aquatic ecology LAA. Coarse substrate habitats (runs, pools, and riffles) are abundant throughout Elbow River in the 67 km (approx. 3,100,000 m^2 of available habitat) within the LAA, and no effect to the sustainability of forage or coarse fish populations is predicted (Volume 3A, Section 8.4.4.1).

The habitat lost from the debris deflector would be generally suitable for trout species for forging, including mountain whitefish, brown trout, and rainbow trout adults and juveniles. Mitigation for fish passage, including boulder clusters and v-weirs, would be constructed downstream of the diversion structure gates, and would include features that mimic natural fish habitats in cobble bed rivers, such as those altered during the construction of the debris deflector (Volume 3A, Section 8.4.4.1).

5.5.3 Death of Fish

During construction, potential harm to fish can be mitigated through project design (e.g., reducing instream work areas), reducing instream works, using pump screening designed to protect fish at pump flow rates (DFO 1995), implementing a fish rescue plan in isolated work areas, and using sediment and erosion control measures. After mitigation measures are implemented (as outlined in Volume 3A, Section 8.4.3; Volume 3B, Section 8.2.4.2; and Volume 4, Appendix C), it is not predicted that fish mortality (including eggs), or reductions in fish health, would occur at a level that affects the abundance or distribution of fish or reduces the productivity and sustainability of a CRA fishery.

During flood and post flood operations, the debris deflector may act as velocity refugia for fish in Elbow River and at the inlet of the diversion channel. There is no certainty whether the debris deflector would increase or reduce fish entrainment in the diversion channel. With the diversion channel and reservoir mitigations and monitoring, the potential for mortality of fish entrained in the diversion is not predicted to change with the addition of the debris deflector.

The addition of the debris deflector would not result in the death of fish that would threaten the long-term persistence or viability of aquatic species of management concern in the aquatic ecology RAA because of proposed mitigation during the construction phase. During dry operations, the debris deflector will not contribute to or influence the recruitment dynamics that are currently and naturally present in Elbow River without the structure in place.

5.5.4 Summary of Project Residual Effects

Project residual effects on aquatic ecology remain unchanged from those presented in the March 2018 EIA, Volume 3A (Section 8.4.4.4, Table 8-8) and Volume 3B (Section 8.2.5, Table 8-2).

5.6 ASSESSMENT OF CUMULATIVE EFFECTS ON AQUATIC ECOLOGY

The March 2018 EIA concluded that the contribution of the Project to cumulative effects on aquatic ecology, when considered in a regional context with existing and future projects and activities, is expected to be minor because the amount of fish habitat permanently altered or lost is relatively small compared to the availability of fish habitat remaining. The debris deflector does result in the loss of an additional 950 m^2 fish habitat within the channel of Elbow River. However, this is still considered minor in relation to the availability of fish habitat remaining in the aquatic ecology LAA (approx. 3,100,000 m^2). As such, the construction and operation of the debris deflector does not change the assessment of cumulative effects on aquatic ecology from the March 2018 EIA, Volume 3C, Section 1.2.4 (construction and dry operations) and Section 1.3.5 (flood and post-flood operations).

5.7 DETERMINATION OF SIGNIFICANCE AND PREDICTION CONFIDENCE

Determination of significance remains unchanged from that presented in the March 2018 EIA, Volume 3A, Section 8.5 and Volume 3B, Section 8.3 (i.e., not significant effects). The residual effects on fish habitat and mortality are unlikely to pose a long-term threat to the persistence or viability of a fish species, including species at risk or fish that support a CRA fishery, in the aquatic ecology RAA.

Prediction confidence is high, associated with the effectiveness of proposed mitigation.

5.8 FOLLOW-UP AND MONITORING

The debris deflector will be included within the follow-up and monitoring programs proposed for aquatic ecology that are presented in the March 2018 EIA, Volume 3C, Section 2 and summarized in Volume 4, Appendix C.

6.0 ASSESSMENT OF POTENTIAL EFFECTS ON WILDLIFE AND BIODIVERSITY

6.1 SCOPE OF ASSESSMENT

6.1.1 Potential Effects, Pathways and Measurable Parameters

Construction and dry operation of the debris deflector has the potential to affect wildlife and wildlife habitat, as well as biodiversity including species at risk through reduced habitat effectiveness (i.e., sensory disturbance). The debris deflector also has potential to increase mortality risk during construction as well as affect wildlife movement during dry operations.

Potential effects, effect pathways and the measurable parameters used to characterize and assess effects on wildlife and biodiversity were the same as those considered in the March 2018 EIA, Volume 3A, Section 11.1.4, Table 11-3.

6.2 EXISTING CONDITIONS FOR WILDLIFE AND BIODIVERSITY

Existing conditions for wildlife and biodiversity, are provided in the March 2018 EIA, Volume 3A, Section 11.2.

6.3 PROJECT INTERACTIONS WITH WILDLIFE AND BIODIVERSITY

Table 6-1 identifies, for each potential effect, the physical activities associated with the debris deflector that might interact with wildlife and biodiversity and result in the identified environmental effect. These interactions are indicated by check marks and are discussed in detail in Section 6.5 in the context of effect pathways, standard and project-specific mitigation, and residual effects. A justification for no interaction (no checkmark) is provided following the table.

There is no potential for the debris deflector to interact with wildlife health during construction or dry operations, nor during flood or post-flood operations because there is no effects pathway relating the debris deflector to methylmercury production or contaminant exposure. Therefore, the potential effect of the debris deflector on wildlife health is not assessed further.

Changes in habitat are related to sensory disturbance only. Loss of habitat as a result of the debris deflector have already been captured in the March 2018 EIA, Volume 3A Table 11-16, Table 11-19, and Attachment A, Table A-1). These tables provide a summary of change in habitat for species of management concern (SOMC) associated with broad landcover types, key indicators, sora as well as Project residual effects on migratory birds and species at risk, respectively. As such, changes in habitat related to habitat loss are not discussed further.

Table 6-1 Project-Environment Interactions with Wildlife and Biodiversity

Project Phase	Potential Effects				
	Change in habitat	Change in movement	Change in mortality risk	Change in biodiversity	Change in Wildlife Health
Construction and dry operations of the debris deflector	✓	✓	✓	✓	-
Flood and post-flood operations of the debris deflector	✓	✓	✓	✓	-
NOTES: ✓ Potential interaction - No interaction					

6.4 MITIGATION

Mitigation measures for wildlife and biodiversity related to the debris deflector, during all phases, would remain consistent with what was presented in the March 2018 EIA, Volume 3A, Section 11.4; Volume 3B, Section 11.3; and summarized in Volume 4, Appendix C.

6.5 ASSESSMENT OF RESIDUAL EFFECTS ON WILDLIFE AND BIODIVERSITY

6.5.1 Change in Habitat

Construction activities associated with debris deflector installation have the potential to result in indirect, temporary effects due to sensory disturbance (e.g., noise), which can reduce habitat effectiveness in the wildlife LAA. The potential for sensory disturbance would occur primarily during the construction phase when increased noise levels associated with heavy machinery (i.e., debris deflector installation), and increased levels of human activity occur in the PDA and LAA.

Because the debris deflector is located completely within the PDA, and will be constructed within the same timeframe as the division inlet and service spillway, the same site-specific mitigation for wildlife habitat features identified during pre-construction surveys would also be implemented to reduce the residual effects associated with construction. Potential sensory disturbance is expected to decrease during dry operations when the levels and frequency of human disturbance would be reduced.

Although the debris deflector would not result in any measurable change in habitat during a flood, any post-flood maintenance and clean-up activities required because of debris stranding on the deflector have the potential to affect wildlife habitat for SOMC including migratory birds

and species at risk through sensory disturbance (i.e., removal of debris that might be trapped in the debris deflector). As noted in Section 2.5.2, after a flood, it is anticipated the majority of debris will return to the river system as the water returns to normal flow levels. Debris remaining stranded on the debris deflector would be removed. To reduce potential sensory disturbance to wildlife, the following mitigation will be implemented:

- Debris removal activities will occur outside the RAP for nesting migratory birds and raptors (March 15 to August 31) as well as for the KWBZ identified along Elbow River (December 15 to April 30).
- If debris removal needs to occur during the bird nesting RAP (i.e., if the debris represents a safety hazard to users of the river), a qualified wildlife biologist will conduct nest searches. If an active nest is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation (see Volume 3A, Section 11, Table 11-10 and Table 11-11).

The residual effects characterization for change in habitat due to sensory disturbance during flood and post-flood operations is the same as those presented in the March 2018 EIA, Volume 3A, Table 11-17.

6.5.2 Change in Movement

Construction of the debris deflector has potential to create a physical barrier or sensory disturbance that might hinder wildlife movement for amphibians and mammals (e.g., ungulates and bears) including key indicators in the wildlife LAA. Although construction activities have the potential to temporarily alter wildlife movement for SOMC in the short-term, longer term effects on wildlife movement (e.g., deer and elk) might occur during dry operations when the debris deflector is present. Specifically, construction of the debris deflector will extend approximately 100 m beyond the diversion inlet, which might result in an incremental hindrance (physical barrier) on wildlife movement. The debris deflector is less likely to affect movement of birds, but it may provide potential perching opportunities on the vertical posts, brackets or cross brace.

Although the debris deflector has potential to alter wildlife movement within the Elbow River floodplain, the length of the structure suggests the contribution to previously assessed residual effects on wildlife movement is predicted to be relatively minor (see March 2018 EIA, Volume 3A, Section 11.4.3). If wildlife encounters the debris deflector, it is expected individuals will be re-routed around the structure where they will still be able to access habitat areas on either side of Elbow River, as needed.

The residual effects characterization for wildlife movement during construction and dry operations for the debris deflector is the same as those presented in the March 2018 EIA, Volume 3A, Table 11-14.

The presence of the debris deflector during flood operations has limited potential to affect wildlife movement as animals will likely be avoiding the area during that time. However, post-

flood maintenance activities (i.e., large debris removal) have potential to create temporary sensory disturbance, which might affect ungulate movement or other wildlife SOMC (e.g., grizzly bear) travelling along Elbow River. However, mitigation will reduce potential temporary sensory disturbance on wildlife movement.

The residual effects characterization for change in movement during flood and post-flood operations for the debris deflector is the same as those presented in the March 2018, EIA, Volume 3B, Table 11-17.

6.5.3 Change in Mortality Risk

Construction of the debris deflector has the potential to increase mortality risk to wildlife (e.g., nests) due to vegetation removal and ground disturbance in upland temporary work spaces as well as in-stream activities (i.e., amphibians). The same mitigation measures to reduce mortality risk during construction and dry operations will also be applied with the debris deflector, and these measures are described in the March 2018 EIA, Volume 3A, Section 11.4.4.2. Overall, mortality risk to wildlife during construction of the debris deflector would be reduced because of pre-construction surveys as well as implementation of other mitigation such as adherence to RAPs and setback distances.

The debris deflector during 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 on-site activity would reduce the likelihood of project-related wildlife mortality and wildlife-human conflict (e.g., grizzly bears), compared to the construction phase.

The residual effects characterization for mortality risk during construction and dry operations of the debris deflector is the same as those presented in the March 2018 EIA, Volume 3A, Table 11-14.

There is limited potential for the debris deflector to result in direct mortality risk to wildlife during a flood. During post-flood operations, however, debris removal activities might require equipment to move though amphibian habitat along Elbow River or disturb nesting birds in adjacent riparian areas, which might result in abandonment and increased mortality risk. To reduce mortality risk, the same mitigation measures described during this phase will be applied (Volume 3B, Section 11.4.3.2 of the March 2018 EIA).

The residual effects characterization for mortality risk during flood and post-flood operations of the debris deflector is the same as those presented in the March 2018 EIA, Volume 3B, Table 11-17.

6.5.4 Change in Biodiversity

Construction and dry operations of the debris deflector will not change the assessment related to change in biodiversity (March 2108 EIA, Volume 3A, Section 11.4.5). Similarly, the debris deflector will not change the assessment related to biodiversity during flood and post-flood operations (March 2018 EIA, Volume 3B, Section 11.3.5).

6.5.5 Summary of Project Residual Effects

Project residual effects on wildlife and biodiversity remain unchanged from those presented in the March 2018 EIA, Volume 3A, Section 11.4.6, Table 11-14 and Volume 3B, Section 11.3.7, Table 11-17.

6.6 ASSESSMENT OF CUMULATIVE EFFECTS ON WILDLIFE AND BIODIVERSITY

Construction and operation of the debris deflector does not change the assessment of cumulative effects on wildlife and biodiversity from the March 2018 EIA, Volume 3C, Section 1.2.7 (construction and dry operations) and Section 1.3.8 (flood and post-flood operations).

6.7 DETERMINATION OF SIGNIFICANCE AND PREDICTION CONFIDENCE

Determination of significance remains unchanged from the March 2018 EIA. With the application of mitigation and environmental protection measures, residual environmental effects on wildlife, including migratory birds, species at risk, biodiversity, and provisions to maintain ungulate movement (which was recommended by Indigenous groups) are predicted to be not significant. The residual effects on change in habitat, movement, and mortality risk are unlikely to pose a long-term threat to the persistence or viability of a wildlife species including migratory birds and species at risk in the wildlife RAA.

Prediction confidence remains moderate and unchanged from the March 2018 EIA, Volume 3C, Section 1.

6.8 FOLLOW-UP AND MONITORING

The debris deflector will be included within the follow-up and monitoring programs proposed for wildlife and biodiversity are presented in the March 2018 EIA, Volume 3C, Section 2 and summarized in Volume 4, Appendix C.

7.0 ASSESSMENT OF POTENTIAL EFFECTS ON TRADITIONAL LAND AND RESOURCE USE

7.1 SCOPE OF THE ASSESSMENT

7.1.1 Potential Effects, Pathways and Measurable Parameters

Potential effects, effect pathways and the measurable parameters used to characterize and assess effects on TLRU were the same as those considered in the March 2018 EIA, Volume 3A, Section 14.1.3.2, Table 14-1.

7.2 EXISTING CONDITIONS FOR TRADITIONAL LAND AND RESOURCE USE

Existing conditions for traditional land and resource use are provided in the March 2018 EIA, Volume 3A, Section 14.2.

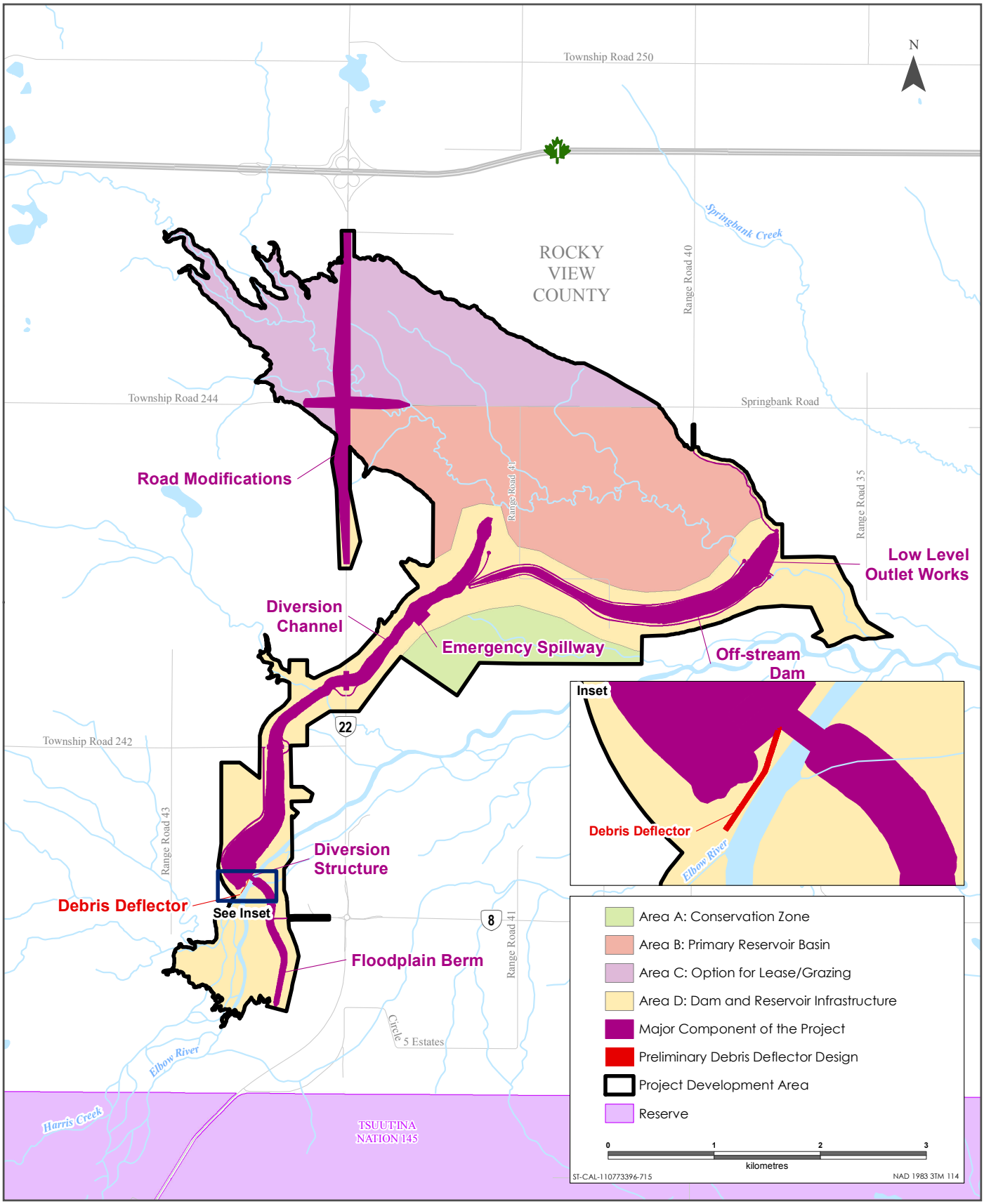
7.3 PROJECT INTERACTIONS WITH TRADITIONAL LAND AND RESOURCE USE

Table 7-1 identifies, for each potential effect, the physical activities associated with the debris deflector that might interact with TLRU and result in the identified environmental effect. These interactions are indicated by check marks and are discussed in detail in Section 7.5 in the context of effect pathways, standard and project-specific mitigation, and residual effects. A justification for no interaction (no checkmark) is provided following the table.

Table 7-1 Project-Environment Interactions with Traditional Land and Resource Use

Project Phase	Potential Effects		
	Change in availability of traditional resources for current use	**Change in access to traditional resources or areas for current use**	**Change in current use sites or areas**
Construction and dry operations of the debris deflector	✓	-	-
Flood and post-flood operations of the debris deflector	✓	-	-
NOTES: ✓ Potential interaction - No interaction			

No additional effects on current use sites or areas or access to traditional resources or areas for current use, other than those assessed in the March 2018 EIA, are anticipated as a result of the debris deflector addition. The debris deflector will be constructed within the PDA, specifically within Area D which will be inaccessible to the public for safety and security purposes (see Figure 7-1). Temporary access and laydown areas for construction are accounted for in the March 2018 EIA, which assumes that current use sites or areas located within the area of permanent structures and the off-stream reservoir would be permanently removed as a result of construction (Volume 3A, Section 14.3.4). The debris deflector will not restrict navigation along Elbow River. Overall, the debris deflector will not create any additional access restrictions or effects on current use sites and areas that have not already been considered in the March 2018 EIA.



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

Post-construction Land Use in the PDA

7.4 MITIGATION

Mitigation measures for traditional land and resource related to the debris deflector, during all phases, would remain consistent with what was presented in the March 2018 EIA, Volume 3A, Section 14.3; Volume 3B, Section 14.2; and summarized in Volume 4, Appendix C.

7.5 ASSESSMENT OF RESIDUAL EFFECTS ON TRADITIONAL LAND AND RESOURCE USE

7.5.1 Change in Availability of Traditional Resources for Current Use

Project-specific traditional use studies, the Indigenous engagement program for the Project, and the literature review identified traditionally harvested species within the Project area, and Indigenous groups raised concerns and identified potential effect pathways related to changes in the availability of traditional resources for current use (March 2018 EIA, Volume 3A, Sections 14.2.4 and 14.3.2).

Should construction, flood, and post-flood operations of the debris deflector result in changes in fish and fish habitat and wildlife and wildlife habitat, which support hunting, trapping and fishing activities, then the potential for effects to the availability of traditional resources exist. The potential effect of the debris deflector on fish and fish habitat and wildlife and wildlife habitat are concluded to be limited and do not change the findings of the March 2018 EIA. The potential effects are described in Sections 5 and 6, respectively of this assessment addendum and summarized below.

The debris deflector will be located within the PDA; therefore, the amount of wildlife habitat potentially affected due to construction of the debris deflector is the same as presented in the March 2018 EIA. Construction of the debris deflector will extend approximately 100 m beyond the diversion inlet, which might result in an incremental hindrance on wildlife movement, particularly for ungulates such as deer and elk. However, the length of the structure suggests the contribution to previously assessed residual effects on wildlife movement is relatively minor. Mortality risk to wildlife during construction would be reduced because of pre-construction surveys and implementation of other relevant mitigation. The incremental increase in sensory disturbance associated with construction of the debris deflector is not anticipated to result in additional effects on wildlife and wildlife habitat than those assessed in the March 2018 EIA. Sensory disturbances will occur primarily during the construction phase and will decrease during dry operations. With the addition of the debris deflector, residual effects to wildlife and wildlife habitat during dry operations are anticipated to remain largely the same as those assessed in the March 2018 EIA.

Construction of the debris deflector has the potential to affect fish through alteration of habitat, modifications to flow, barriers to fish passage, and stranding and impingement of fish. The construction of the debris deflector will require instream works; however, the structure will be

located within the PDA and no new area beyond what is assessed in the March 2018 EIA is required. Potential harm to fish will be mitigated through project design, and it is unlikely that fish mortality (including eggs), or reductions in fish health, would occur at a level that affects the abundance or distribution of fish or reduces the productivity and sustainability of a CRA fishery. During dry operations, the debris deflector will not be within standing water and will therefore not create residual effects on fish and fish habitat.

Residual effects on wildlife and fish have the potential to affect TLRU activities that are supported by these resources, including hunting, fishing and trapping, as well as have corresponding effects on the consumption of country foods by Indigenous groups. Appropriate conditions for current use entail more than the availability of traditional resources and this assessment addendum acknowledges that Indigenous groups may choose not to pursue TLRU activities near the Project for a variety of personal, practical, aesthetic, and spiritual reasons, including lack of existing access. Construction of the debris deflector could create sensory disturbances (i.e., noise) that may deter Indigenous land users from harvesting traditional resources in areas near the Project. The debris deflector will be constructed in tandem with the diversion inlet and service spillway, and the incremental increase in noise arising from construction activities is not anticipated to result in additional sensory disturbance effects than those already considered in the March 2018 EIA.

The residual effects characterization for change in availability of traditional resources for current use during construction and dry operations remain unchanged from those presented in the EIA, Volume 3A, Table 14-8.

Post-flood maintenance and clean-up activities (i.e., debris removal) have the potential to affect wildlife through sensory disturbance and increased mortality risk; however, mitigation measures will be implemented to reduce effects (see Section 6.4). The debris deflector will not result in a measurable change in wildlife habitat or movement during flood or post-flood operations.

During flood operations, large debris may be caught on the debris deflector and prevented from moving downstream in Elbow River, which may decrease habitat complexity downstream of the service spillway. The debris deflector may act as velocity refugia for fish in Elbow River; however, the mortality of fish entrained in the diversion should not change with the addition of the debris deflector. During post-flood operations, debris on the deflector may impede fish passage in Elbow River. However, the debris would be of temporary nature and removed from the structure, as such effects on upstream movement of fish during post-flood operations is not anticipated. With the implementation of mitigation measures (see Section 5.4), the flood and post-flood operations of the debris deflector is not expected to reduce the abundance or distribution of fish or reduce the productivity and sustainability of a CRA fishery.

Noise during post-flood maintenance and clean-up activities (i.e., debris removal) will be minor and incremental and is not anticipated to result in additional sensory disturbance effects than those already considered in the March 2018 EIA.

The residual effects characterization for availability of traditional resources for current use during flood and post-flood operations remain unchanged from those presented in the March 2018 EIA, Volume 3B, Table 14-2.

7.5.2 Summary of Project Residual Effects

Project residual effects on TLRU remain unchanged from those presented in the March 2018 EIA, Volume 3A, Section 14.3.6, Table 14-8 and Volume 3B, Section 14.2.6, Table 14-2.

7.6 ASSESSMENT OF CUMULATIVE EFFECTS ON TRADITIONAL LAND AND RESOURCE USE

Assessment of construction and operations of the debris deflector does not change the assessment of cumulative effects on TLRU from the March 2018 EIA, Volume 3C, Section 1.2.9 (construction and dry operations) and Section 1.3.10 (flood and post-flood operations).

7.7 DETERMINATION OF SIGNIFICANCE AND PREDICTION CONFIDENCE

Determination of significance remains unchanged from that presented in the March 2018 EIA, Volume 3A, Section 14.4 and Volume 3B, Section 14.3. The addition of the debris deflector will not result in the long-term loss of availability of traditional resources, access to traditional resources or areas, or the permanent loss of current use sites or areas in the TLRU RAA. As a result, effects on TLRU are determined to be not significant.

Prediction confidence remains moderate and unchanged from the March 2018 EIA, Volume 3A, Section 14.6 and Volume 3B, Section 14.4.

7.8 FOLLOW-UP AND MONITORING

The debris deflector will be included within the follow-up and monitoring programs proposed for TLRU are presented in the March 2018 EIA, Volume 3C, Section 2 and summarized in Volume 4, Appendix C.

8.0 ACCIDENTS AND MALFUNCTIONS

The March 2018 EIA identified the following accidents and malfunction scenarios which have the potential to occur during project activities:

- **off-stream dam failure or breach** — uncontrolled release of retained water from the off-stream dam as a result of piping, slumping or overtopping failure of the dam and subsequent inundation of downstream areas
- **diversion structure failure or breach** — failure or breach of the service spillway, auxiliary spillway, or floodplain berm during flood operations as a result of electrical or design failure of the diversion structure
- **fire** — an explosion or fire, including wildfires
- **hazardous materials spill** — spills of fuel or other chemicals used on site, or during transportation to site during construction; or, from third parties using the roads during dry operations or flood operations
- **vehicle accident** — vehicle collision because of traffic to and from site and the operation of equipment on-site
- **pipeline rupture** — rupture of pipelines located in the project development area (PDA)

The addition of the debris deflector does not the affect the scope or assessment conclusions for the accident and malfunction scenarios presented in Volume 3D of the March 2018 EIA.

9.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Eight environmental conditions that could affect the Project were assessed in the March 2018 EIA: precipitation and flooding, climate change, slope instability, erosion, subsidence, wildfires, seismic events, and tornadoes. These environmental conditions could affect personnel, equipment, and schedule during Project construction and functionality of the dam during operations. Design measures are incorporated into the Project to mitigate risks of environmental conditions affecting the Project. Contingency plans and emergency response measures would be implemented in the event of adverse and extreme weather or seismic events. With project design and the implementation of response measures, potential residual effects of the environment on the Project are limited to climate change and damage to infrastructure because of wildfires, seismic events, and tornadoes.

The addition of the debris deflector does not alter the conclusions presented in the March 2018 EIA Volume 3D, Section 2.

10.0 CONCLUSIONS

This environmental assessment addendum has focused on the potential interactions of selected VCs with the construction and operation of the debris deflector, in the context of overall effects as determined in the March 2018 EIA. The findings of this environmental assessment addendum are that the effects of the addition of the debris deflector do not alter the conclusions of the March 2018 EIA.

11.0 REFERENCES

DFO. 1995. Freshwater intake end-of-pipe fish screen guideline. Communications Directorate, Department of Fisheries and Oceans, Ottawa, Ontario. 27 pp. Available at: http://www.dfo-mpo.gc.ca/Library/223669.pdf.