# APPENDIX C
# MITIGATION MEASURES

# Appendix C MITIGATION MEASURES

Alberta Transportation has an Environmental Management System (EMS) that will be applied to the Springbank Off-stream Reservoir Project. The EMS includes standard environmental monitoring and requires an Environmental Construction Operations Plan (ECO Plan) to be developed by the selected construction contractor using Alberta Transportation's ECO Plan framework (Volume 4, Supporting Documents, Document 4), which is a joint document prepared by Alberta Transportation, the City of Calgary, and the City of Edmonton.

The ECO Plan is a project-specific plan that identifies and mitigates the potential environmental effects of construction, which will include the mitigation measures detailed in the EIA and listed in Table C-1, Table C-2, and Alberta Transportation's *Civil Works Master Specifications for Construction of Provincial Water Management Projects*. The selected construction contractor will be responsible for preparing the ECO Plan specific to the work and the Project site. Alberta Transportation and the Construction Management Consultant will review and approve the ECO Plan before construction begins. The selected construction contractor will ensure the effective implementation of the approved ECO Plan, including the mitigation measures listed in Table C-1.

Implementation of mitigation measures will be triggered by the requirements and processes as detailed in Alberta Transportation's signed and executed Project construction contract documents. These requirements and processes are summarized in Table C-1. The selected contractor will be responsible for carrying out the mitigation measures required during the construction phase of the Project as detailed in the contract specifications. Flood and post-flood mitigation measures will be detailed in the project specific Operations, Maintenance and Surveillance Manual which will be prepared in compliance with Alberta Transportation's Project construction contract specifications and as per the ECO Plan Framework and Checklist (Volume 4, Supporting Documentation, Document 4).

Alberta Transportation will delegate responsibility to its retained Consultant with the task of monitoring and inspecting the contractor's activities to ensure compliance with commitments, policies, auditing and enforcement programs. Consultant inspectors will be on site during all construction activities and expert personnel, such as Qualified Aquatic Environmental Specialists (QAES), will be present to monitor and inspect the contractor's activities and to ensure compliance. Mitigation measures will be inspected daily and any non-compliance issues will be immediately addressed with the contractor and, if required, will be reported to the appropriate Regulatory Agency. The non-compliance activity will be stopped and will not be allowed to recommence until compliance is achieved.

Alberta Transportation also maintains an ECO Plan Audit Program and conducts yearly audits of active projects to ensure conformance to the ECO Plan Framework and Project commitments. As the operator of the Project, Alberta Environment and Parks will be provided an operation, maintenance and surveillance plan developed by Alberta Transportation for the operation of the Project. Alberta Environment and Parks (AEP), will be responsible for the mitigation measures required for the flood and post-flood phases of the Project, summarized in Table C-2.

Alberta Transportation maintains an Erosion and Sediment Control (ESC) Manual (see Volume 4, Supporting Documentation, Document 6), including Environmental Protection Section 01391 specification, as well as Care of Water Section 02240, Turbidity Barriers and Monitoring Section 02234 and Topsoil Placement Section 02910 Clause 3.7 End of Construction Silt Barriers. Any erosion and sediment control utilized by the contractor must be approved in the ESC manual, and will be added within the ECO Plan developed for the Project.

Additionally, Alberta Transportation maintains the following construction specifications that have been used to develop the mitigation measures listed in Table C-1, as follows:

- *Environmental Construction Operations Plan Section 01390 of the Civil Works Master Specifications for Construction of Provincial Water Management Projects* (Volume 4, Supporting Documentation, Document 11)
- *Environmental Protection Section 01391 of the Civil Works Master Specifications for Construction of Provincial Water Management Projects* (Volume 4, Supporting Documentation, Document 12)
- *Turbidity Barriers and Monitoring Section 02242 of the Civil Works Master Specifications for Construction of Provincial Water Management Projects* (Volume 4, Supporting Documentation, Document 10)
- *Care of Water Section 02240 of the Civil Works Master Specifications for Construction of Provincial Water Management Projects* (Volume 4, Supporting Documentation, Document 13)
- *Fish Capture and Release Section 02244 of the Civil Works Master Specifications for Construction of Provincial Water Management Projects* (Volume 4, Supporting Documentation, Document 16)
- *Topsoil and Subsoil Placement Section 02910 of the Civil Works Master Specifications for Construction of Provincial Water Management Projects* (Volume 4, Supporting Documentation, Document 14)
- *Soil Erosion Protection Section 02930 of the Civil Works Master Specifications for Construction of Provincial Water Management Projects* (Volume 4, Supporting Documentation, Document 15)

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3A | 3.4.4 | Air Quality and Climate | Change in ambient air quality:<br>• ambient concentration of criteria air contaminants (CACs) including nitrogen dioxide ($NO_2$), sulphur dioxide ($SO_2$), carbon monoxide (CO), fine particulate matter of 2.5 microns (µm) in diameter or less ($PM_{2.5}$), total suspended particulate (TSP)<br>• ambient concentration of volatile organic compounds (VOCs), PAHs, and metals.<br>• odour from construction activities | • One-way traffic flows on Highway 22 and Springbank Road, to accommodate construction activities, that may result in traffic line-ups and idling will be limited to the extent possible.<br>• Prevent the discharge of atmospheric contaminants from construction operations in accordance with Regulatory Requirements.<br>• Project construction vehicles will be required to meet current emission control standards.<br>• Engines and exhaust systems will be properly maintained. Do not operate equipment, including construction equipment, that shows excessive emissions of exhaust gases until corrective repairs or adjustments are made.<br>• The concentration of sulphur in diesel fuel shall not exceed15 mg/kg | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | Change in ambient air quality:<br>• dustfall | • Suspend dust generating construction activities during periods of excessive winds whereby dust suppression measures are not working adequately.<br>• During dry periods, water will be applied to haul roads and/or disturbed areas to mitigate dust emissions. The application of water will be limited to non-freezing temperatures to prevent icing that can present a safety hazard. Watering is most effective immediately after application, and repeated watering several times a day may be required, depending on surface and meteorological conditions.<br>• Chemical dust suppressants will be applied to haul roads as an alternative option to watering. Chemical dust suppression will be applied on an as-needed basis during high wind conditions or if PM concentrations are in exceedance of the Alberta Air Quality Objectives and if an increase of watering is determined ineffective or unfeasible at the time. Examples of suppressants include chlorides, petroleum products, liquid polymer emulsions, and agglomerating chemicals. These suppressants, if required, will be applied, as per the manufacturer's recommendations, to preclude unintended environmental effects.<br>• In the event of trackout and carryout of soils occurs, conduct road cleaning by manually picking up and sweeping material or by using rotary or vacuum street cleaning vehicles.<br>• Disturbed surfaces will be revegetated promptly following construction to prevent wind erosion and to control dust.<br>• Surfaces of temporary soil and overburden stockpiles will be stabilized during extended periods between usage, by means of vegetating or covering the exposed surfaces.<br>• Use silt fences and other erosion control methods such as mulching and application of tackifiers to prevent soil loss from soil stockpiles due to wind erosion. | | |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | Change in ambient light:<br>• Project lighting can have adverse effects through changes in night time lighting.<br>• Light Trespass – Light output from the project perimeter on vertical surface of receptors<br>• Glare – Horizontal contrast between project lighting and background lighting<br>• Sky Glow – Ratio of upward directed lighting to total lighting | • Lights will be positioned so that the luminaires can be pointed downward with no more than a 10º tilt from the horizontal, so that only the working area is illuminated.<br>• As much as is possible, lighting will be located such that unavoidable light spill off the working area is not directed toward receptors outside the PDA.<br>• Lighting will be located so that the lights are not directed toward oncoming traffic on nearby roads on or off site because of the objectionable nuisance and safety hazard this may present.<br>• Lights will be designed to avoid excessive use of the mobile flood lighting units and reduce potential effects by turning off lighting when they are not required; this will also conserve fuel.<br>• Adherence to lighting design guidelines, such as the CIE, IDA, IES, and the lighting requirements for workspaces as enforced by Labour Canada.<br>• Comply with Occupational Health and Safety Part 12 General Safety Precautions - Lighting. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | Greenhouse Gas Emissions:<br>• release of carbon dioxide ($CO_2$)<br>• release of methane ($CH_4$)<br>• release of nitrous oxide ($N_2O$) | • One-way traffic flows on Highway 22 and Springbank Road, to accommodate construction activities, that may result in traffic line-ups and idling will be limited to the extent possible.<br>• Project construction vehicles will be required to meet current emission control standards.<br>• Engines and exhaust systems will be properly maintained. Do not operate equipment, including construction equipment that shows excessive emissions of exhaust gases until corrective repairs or adjustments are made. Construction vehicle idling times will be reduced to the extent possible in order to reduce emissions, as a best management practice.<br>• Cold starts will be limited to the extent possible to reduce emissions, as a best management practice.<br>• Sulphur content of 15 mg/kg in diesel fuel. The concentration of sulphur in diesel fuel shall not exceed 15 mg/kg. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3A | 4.4.2.2 | Acoustic Environment | Change in existing acoustic environment:<br>• Project construction may result in temporary and localized increases in sound levels | • Residents near to construction noise-generating activities will be notified. Noise abatement barriers may be used to reduce noise levels. If noise abatement barriers are ineffective residents may have to be moved temporarily to alternative accommodation during the construction phase producing the noise.<br>• machinery and factory supplied noise-abatement equipment (e.g., mufflers) will be maintained in good working order<br>• a complaint response procedure will be implemented to address noise complaints should they arise | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3A | 5.4.2.2 | Hydrogeology | Change in groundwater quantity:<br>• groundwater withdrawals for construction dewatering | • Water will be discharged in a manner to avoid erosion using turbidity barriers, containment berms and settling ponds. Dewatering-will be in accordance with the terms and conditions of the *Environmental Protection and Enhancement Act* approval conditions, and *Water Act* approval and the federal *Fisheries Act and Navigable Waters Protection Act*.<br>• A Care of Water Plan will include the use of cofferdams, pumping systems, sumps, pipelines, channels, flumes, drains, and other dewatering works to permit construction of the work in the dry.<br>• TSS levels will be controlled and reduced using silt fences and turbidity barriers to ensure the water quality from care of water system discharges is made equal to or better than the initial water quality. TSS levels will be monitored by carrying out frequent water quality testing.<br>• Construction dewatering will be minimized through diligent construction planning.<br>• Existing water wells within the reservoir footprint will be decommissioned and plugged off to prevent groundwater contamination. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | Change in groundwater quantity:<br>• groundwater seepage into open excavations<br>• groundwater seepage into the diversion channel when dry | Regional-scale effects on groundwater quantity can be mitigated by allowing seepage in the dry diversion channel to infiltrate back into the subsurface, or flow back into the Elbow River via surface water drainage pathways. Silt fences and turbidity barriers will be used as required to control TSS and to ensure the water quality from care of water system discharges is made equal to or better than the initial water quality by carrying out frequent water quality testing. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | Change in groundwater quality:<br>• changes to groundwater quantity or flow patterns that can in turn affect groundwater quality<br>• groundwater contamination related to construction activities | • Water will be discharged in a manner to avoid erosion using silt fences, turbidity barriers, containment berms and settling ponds. Dewatering will be in accordance with the terms and conditions of Environmental Protection and Enhancement Act, Water Act and the federal Fisheries Act and Navigable Waters Protection Act.<br>• A Care of Water Plan will be developed to manage dewatering and discharge of water on the construction site.<br>• At locations where flows from Care of Water operations are discharged into waterbodies, test the water quality at discharge locations and monitor the TSS to ensure the water quality is made equal to or better than the initial water source.<br>• Construction dewatering may be minimized through diligent construction planning.<br>• Regional-scale effects on groundwater quantity can be mitigated by allowing seepage in the dry diversion channel to infiltrate back into the subsurface, or flow back into the Elbow River via surface water drainage pathways. Silt fences and turbidity barriers will be used to control TSS and to ensure the water quality from care of water system discharges is made equal to or better than the initial water quality by carrying out frequent water quality testing. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3A | 6.4 | Hydrology | • Change in hydrological regime beyond the range evident in the historical record. | • All applicable regulatory notifications, permits, and authorizations including the Environmental Protection and Enhancement Act, and Water Act and the federal Fisheries Act and Navigable Waters Protection Act, will be obtained before the start of any instream construction. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | • Change in sediment transport dynamics | • Instream work areas will be isolated from the main river flow by using cofferdams, silt fences and turbidity barriers. TSS will be monitored and measured in conformance with Alberta Transportation's Turbidity and Monitoring specifications.<br>• Clean granular fill with less than 5% fines passing the 80um sieve size will be used for instream work such as cofferdams, causeways, access ramps, Bailey bridges, river channel diversions. Fine grained soils may be used, provided only clean granular fill is exposed to the river at any time during construction and restoration operations.<br>• Sediment and erosion control measures as detailed in Section 8 Aquatic Ecology will be used<br>• Bank and riparian areas disturbed during construction will be reclaimed and re-vegetated. Silt fences, turbidity barriers and riprap materials will be used to prevent future bank erosion.<br>• All applicable regulatory notifications, permits, and authorizations, if required, will be obtained before the start of any instream construction. | | |
| | | | • Change in channel morphology | • Sediment and erosion control measures as detailed in Volume 3A Section 8 Aquatic Ecology will be used.<br>• Bank and riparian areas disturbed during construction will be rehabilitated and re-vegetated. Silt fences, turbidity barriers and riprap materials will be used to prevent future bank erosion. | | |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3A | 7.4.2.2 | Surface Water Quality | Change in surface water quality:<br>• Change in suspended sediment concentrations | • Instream work areas will be isolated from the main river flow by using cofferdams, silt fences and turbidity barriers. TSS will be monitored and measured for conformance with Alberta Transportation's Turbidity and Monitoring specifications.<br>• Clean granular fill with less than 5% fines passing the 80um sieve size will be used for instream work such as cofferdams, causeways, access ramps, Bailey bridges, river channel diversions. Fine grained soils may be used, provided only clean granular fill is exposed to the river at any time during construction and restoration operations.<br>• Bank and riparian areas disturbed during construction will be rehabilitated and re-vegetated. Silt fences, turbidity barriers and riprap materials will be used to prevent future bank erosion. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | Change in surface water quality:<br>• Change in substance inputs | • Restrict herbicide mixing and loading within 30 m of an open body of water<br>• Identify open bodies of water within the application site<br>• mark or flag of open bodies of water that will not be clearly visible to the applicator<br>• Transport of hazardous materials to and from the Project site, storage, use and disposal will be in accordance with regulatory requirements.<br>• Use of construction equipment that is mechanically sound with no oil leaks, fuel or fluid leaks. Inspect equipment daily and immediately repair any leaks.<br>• Employ persons qualified to handle Construction Equipment fuels and lubricants to perform repairs.<br>• Service vehicles to carry fuel spill clean-up materials.<br>• Use of containment berms and impermeable liners around fuel and lubricant storage tanks.<br>• Maintain a minimum 100 metre setback between stored fuels and lubricants and rivers, streams and surface water bodies. | | |
| 3A | 8.4.3 | Aquatic Ecology | Change in aquatic ecology:<br>• Permanent alteration of fish habitat | • Building material used in watercourses, including concrete, silt fences, turbidity barriers, and containment berms will be used to prevent the release or leaching of substances that may be deleterious to fish into the water.<br>• Activities near water will be planned and completed in the dry and isolated from watercourses to prevent materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, other chemicals or other deleterious materials do not enter the watercourse.<br>• The top substrate from a wetted channel will be stripped and stockpiled for later use as the top layer of reclaimed instream substrate to improve the recolonization rate and maintain average mobile substrate sizes.<br>• Rootwads and large boulders that must been removed will be stored on-site for subsequent placement on reclaimed instream cover or for bank protection.<br>• Fertilization of reclaimed areas in the immediate vicinity of a watercourse will not be allowed unless approved by DFO and AEP.<br>• Streambanks and approach slopes will be revegetated using an appropriate native seed mix or erosion control mix.<br>• Boulders will be added to increase the bed roughness of the channel immediately downstream of the diversion structure, which will increase water depths and reduce velocities.<br>• Boulder V-weir structures will be constructed in the channel downstream of the gates to provide slower velocity and deeper resting zones.<br>• A monitoring program will be undertaken to identify if fish passage is impeded for migratory salmonids or other fish species.<br>• Structures will be designed so that storm water runoff and wash water from the access roads, decks, side slopes, and approaches will be directed into a retention pond or vegetated area to remove suspended solids, dissipate velocity, and prevent sediment and other deleterious substances from entering the watercourse.<br>• Activities near water will be planned and completed in the dry and isolated from watercourses to prevent materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, other chemicals or other deleterious materials do not enter the watercourse. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | • The cleaning and removal of debris and sediment from sediment and erosion control devices will be conducted in a manner that will prevent materials from entering the water body.<br>• Large woody debris pieces such as rootballs and logs over 50 cm in diameter, will be retained and relocated in the river downstream of the structure.<br>• Where debris removal from the structures is required, debris removal will be timed to avoid disruption to sensitive fish life stages (i.e., outside the RAP), unless the debris and its accumulation is immediately threatening to the integrity of the structure or relates to an emergency (i.e., risk of structure failure). | | |
| 3A | 8.4.3 | Aquatic Ecology | Change in aquatic ecology:<br>• Destruction of fish habitat | • Works in water will be timed with respect to the restricted activity periods (RAPs) wherever possible. For the Elbow River, the RAP is May 01 – July 15 and September 16 – April 15. Condition and use of restricted activity periods will be provided within further project permitting and authorization under the *Fisheries Act*. For planning purposes, the Elbow River RAP will be applied as an avoidance and mitigation measure.<br>• Building material used in watercourses, including concrete, will be handled and treated in a manner that prevents the release or leaching of substances that may be deleterious to fish into the water.<br>• Activities near water will be planned and completed in the dry and isolated from watercourses to prevent materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, other chemicals or other deleterious materials do not enter the watercourse.<br>• Activities near water will be planned such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse.<br>• Erosion and sediment control measures will be installed before starting work to prevent sediment from entering the water body.<br>• Erosion and sediment control measures will be ~~regularly~~ inspected daily and maintained during construction.<br>• Erosion and sediment control measures will be repaired immediately if damage occurs.<br>• Non-biodegradable erosion and sediment control materials will be removed once the site is stabilized.<br>• Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site will be implemented such that sediment is filtered out before the water enters a waterbody (e.g., silt fences, turbidity barriers, pumping/diverting water to a vegetated area, constructing a settling basin, or other filtration system).<br>• TSS levels will be controlled and reduced using silt fences and turbidity barriers to ensure the water quality from care of water system discharges is made equal to or better than the initial water quality. TSS levels will be monitored by carrying out frequent water quality testing.<br>• Excavated materials and debris will be stockpiled above the highwater mark and in such a way as they do not enter the watercourse. Silt fences will be used to contain soil erosion.<br>• Clearing of riparian vegetation will be kept to a minimum.<br>• Herbicide use in the immediate vicinity of a watercourse will not be allowed unless approved by DFO and AEP. Weeds will be controlled during construction through multiple measures, such as herbicide, mowing, wicking, and hand picking. After construction, disturbed areas will be stabilized and reclaimed.<br>• Erosion and sediment control measures will be maintained monitored until vegetation has become sufficiently reestablished.<br>• To allow for fish passage and construction of the structures in the dry, the Elbow River will be diverted, and flows will be maintained downstream by the construction of a temporary bypass channel.<br>• Sediment laden dewatering discharge will be pumped into a vegetated area or settling basin to allow sediment to settle out before returning it to the water body. Silt fences, turbidity barriers and clean granular berms will be used to contain the sediment and other deleterious substances and to prevent it from entering a watercourse or water body.<br>• Energy dissipaters will be used at pump outlets to prevent erosion.<br>• The location of any in-stream works will be isolated from the watercourses using silt fences, turbidity barriers and clean granular berms. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | • Isolation materials will be designed to minimize disturbance of the bed and banks of the Elbow River and other watercourses.<br>• Clean granular fill with less than 5% fines passing the 80um sieve size will be used for instream work such as cofferdams, causeways, access ramps, Bailey bridges, river channel diversions. Fine grained soils may be used, provided only clean granular fill is exposed to the river at any time during construction and restoration operations.<br>• Sediment and erosion control devices will be constructed to withstand anticipated flows during construction. If necessary, the outside face of granular berms may be lined with heavy poly-plastic to make them impermeable to water.<br>• Before isolation and dewatering works commence, a qualified environmental professional (QEP) will be retained to obtain applicable permits for relocating fish and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters.<br>• Pump discharge area(s) will be isolated to prevent erosion and the release of suspended sediments downstream. Any sediment build-up will be removed when the work is completed.<br>• Water intakes pipes will be screened to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself. Screens are to comply with DFO's "Freshwater Intake End-of-Pipe Fish Screen Guidelines".<br>• Accumulated sediment and spoil build up within the isolated areas will be removed prior to removal of the isolation barriers.<br>• When removing the isolation barriers, the downstream isolation barriers will be gradually removed first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle prior to removing the upstream isolation materials.<br>• The top substrate from a wetted channel will be stripped and stockpiled for later use as the top layer of reclaimed instream substrate to improve the recolonization rate and maintain average mobile substrate sizes.<br>• Rootwads and large boulders that must been removed will be stored on-site for subsequent placement on reclaimed instream cover or for bank protection.<br>• Fertilization of reclaimed areas in the immediate vicinity of a watercourse will not be allowed unless approved by DFO and AEP.<br>• Streambanks and approach slopes will be revegetated using an appropriate native seed mix or erosion control mix.<br>• Boulders will be added to increase the bed roughness of the channel immediately downstream of the diversion structure, which will increase water depths and reduce velocities.<br>• Boulder V-weir structures will be constructed in the channel downstream of the gates to provide slower velocity and deeper resting zones.<br>• A monitoring program will be undertaken to identify if fish passage is impeded for migratory salmonids or other fish species. | | |
| | | | Change in aquatic ecology:<br>• Death of Fish | • Works in water will be timed with respect to the restricted activity periods (RAPs) wherever possible. For the Elbow River, the RAP is May 01 – July 15 and September 16 – April 15. Condition and use of restricted activity periods will be provided within further project permitting and authorization under the *Fisheries Act*. For planning purposes, the Elbow River RAP will be applied as an avoidance and mitigation measure.<br>• Machinery will arrive on site in a clean condition and be maintained free of fluid leaks, invasive species, and noxious weeds.<br>• Equipment will be inspected, maintained, and repaired immediately, to prevent leaks.<br>• Use construction equipment that is mechanically sound with no oil leaks, fuel or fluid leaks. Inspect equipment daily and immediately repair any leaks. | | |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | • Employ persons qualified to handle Construction Equipment fuels and lubricants to perform repairs.<br>• Service vehicles to carry fuel spill clean-up materials.<br>• Use containment berms and impermeable liners around fuel and lubricant storage tanks.<br>• Maintain a minimum 100 metre setback between stored fuels and lubricants and rivers, streams and surface water bodies.<br>• Stream bank and bed protection methods (e.g., swamp mats, pads) will be used if rutting is likely to occur during access to the bed and shore. Temporary access structures will be used where steep and highly erodible banks are present.<br>• Whenever possible, machinery will be operated on land above the high-water mark in a manner that minimizes disturbance to the banks and bed of the watercourses.<br>• Where instream works are required, non-toxic and biodegradable hydraulic fluids will be used in machinery.<br>• Erosion and sediment control measures will be installed before starting work to prevent sediment from entering the water body.<br>• Erosion and sediment control measures will be ~~regularly~~ inspected daily and maintained during construction.<br>• Erosion and sediment control measures will be repaired immediately if damage occurs.<br>• Non-biodegradable erosion and sediment control materials will be removed once the site is stabilized.<br>• Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site will be implemented such that sediment is filtered out before the water enters a waterbody (e.g., silt fences, turbidity barriers, pumping/diverting water to a vegetated area, constructing a settling basin, or other filtration system).<br>• Excavated materials and debris will be stockpiled above the highwater mark and in such a way as they do not enter the watercourse. Silt fences will be used to contain soil erosion.<br>• Disturbance of the right-of-way (ROWs) approach to water bodies will be minimized.<br>• Clearing of riparian vegetation will be kept to a minimum.<br>• Herbicide use in the immediate vicinity of a watercourse will not be allowed unless approved by DFO and AEP. Weeds will be controlled during construction through multiple measures, such as herbicide, mowing, wicking, and hand picking. After construction, disturbed areas will be stabilized and reclaimed.<br>• After construction, disturbed areas will be stabilized and reclaimed.<br>• Erosion and sediment control measures will be monitored until vegetation has become sufficiently reestablished.<br>• Flows in the Elbow River will be maintained downstream of the project (e.g., bypass channel).<br>• Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site will be implemented such that sediment is filtered out before the water enters a waterbody (e.g., silt fences, turbidity barriers, pumping/diverting water to a vegetated area, constructing a settling basin, or other filtration system).<br>• Sediment laden dewatering discharge will be pumped into a vegetated area or settling basin to allow sediment to settle out before returning it to the water body. Silt fences, turbidity barriers and clean granular berms will be used to contain the sediment and other deleterious substances and to prevent it from entering a watercourse or water body.<br>• Energy dissipaters will be used at pump outlets to prevent erosion.<br>• The location of any in-stream works will be isolated from the watercourses using silt fences, turbidity barriers and clean granular berms.<br>• Isolation materials will be designed to minimize disturbance of the bed and banks of the Elbow River and other watercourses.<br>• Clean granular fill with less than 5% fines passing the 80um sieve size will be used for instream work such as cofferdams, causeways, access ramps, Bailey bridges, river channel diversions. Fine grained soils may be used, provided only clean granular fill is exposed to the river at any time during construction and restoration operations. | | |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | • Sediment and erosion control devices will be constructed to withstand anticipated flows during construction. If necessary, the outside face of granular berms may be lined with heavy poly-plastic to make them impermeable to water.<br>• Before isolation and dewatering works commence, a qualified environmental professional (QEP) will be retained to obtain applicable permits for relocating fish and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters.<br>• Pump discharge area(s) will be isolated to prevent erosion and the release of suspended sediments downstream. Any sediment build-up will be removed when the work is completed.<br>• Water intakes pipes will be screened to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself. Screens are to comply with DFO's "Freshwater Intake End-of-Pipe Fish Screen Guidelines".<br>• Accumulated sediment and spoil build up within the isolated areas will be removed prior to removal of the isolation barriers.<br>• When removing the isolation barriers, the downstream isolation barriers will be gradually removed first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle prior to removing the upstream isolation materials. | | |
| | | | Permanent Alteration of Fish Habitat:<br>• Change in Sediment | • Potential effects of erosion and sedimentation due to stored flood water release will be minimized by controlling the flow through the low-level outlet channel.<br>• Structures will be designed so that storm water runoff and wash water from the access roads, decks, side slopes, and approaches are directed into a retention pond or vegetated area to remove suspended solids, dissipate velocity, and prevent sediment and other deleterious substances from entering watercourses.<br>• Where debris removal from the structures is required, debris removal will be timed to avoid disruption to sensitive fish life stages (i.e., outside the RAP), unless the debris and its accumulation is immediately threatening to the integrity of the structure or relates to an emergency (i.e., risk of structure failure). | | |
| | | | Destruction of Fish Habitat:<br>• Change in Fish Passage | • Maintenance, debris removal on the structure, and on the fish passage structures will occur immediately to accommodate fish passage.<br>• Debris will be cleaned from the structure gates after a flood recedes to allow unimpeded fish passage upstream over the structure. | | |
| | | | Fish Mortality:<br>• Entrainment and Stranding of Fish | • Drainage areas within the reservoir will be graded to reduce stranding of fish during release of stored flood water from the reservoir. | | |
| 3A | 9.4 | Terrain and Soils | Change in terrain stability:<br>• changes in slope conditions or drainage pathways. | • Slope stability visually monitored on infrastructure features such as berms, dam, and diversion channel.<br>• Concrete retaining wall will be designed and constructed as part of the diversion structure to stabilize the Elbow River escarpment.<br>• Do not stockpile materials at slopes steeper than 3H:1V. Grade slopes smooth upon completion to reduce sliding and sloughing.<br>• Channel banks will be seeded and revegetated with native seed or erosion control mix to improve channel bank stability.<br>• Surface drainage patterns will be re-established where possible.<br>• Drainage and erosion control measures (e.g. silt fences) around stockpiles to prevent erosion. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | Change in soil quality and quantity:<br>• change in soil thickness or loss of soil volume.<br>• dust mobilization and deposition could affect the agricultural land capability of receiving soils. | • Strip and stockpile topsoil for future use in the reclamation of disturbed areas.<br>• Topsoil horizons (O, LFH, A) will be salvaged separately and stockpiled for later use from areas intended for disturbance, to prevent admixing of soils.<br>• A topsoil replacement plan will be developed for the reclamation of the various disturbed areas. These areas will be revegetated.<br>• Disturbed areas associated with project components such as the water intake, water retention, water outflow and roads will use previously salvaged topsoil material to promote vegetation re-establishment.<br>• More detail on the planned mitigation for Project effects on soil are provided in the Conservation and Reclamation Plan (C&R Plan) in Volume 4, Appendix D. | | |
| 3A | 10.3.1 | Vegetation and Wetlands | Change in landscape diversity:<br>• Fragmentation of native plant community patches arising from native vegetation clearing | • Restrict construction activities to the approved construction footprint. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | Change in community diversity:<br>• Direct loss or alteration of native vegetation communities, including riparian lands and ecological communities of management concern arising from native vegetation clearing | • Restrict construction activities to the approved construction footprint.<br>• Native areas disturbed by the Project will be reseeded using an Alberta Transportation native custom seed mix. | | |
| | | | Change in community diversity:<br>• Indirect alteration of native communities, including riparian lands and ecological communities of management concern from the introduction or establishment of regulated weeds and invasive species or deposition of dust | • Use a cover crop seed mixture to assist in weed and erosion control on exposed soils where warranted.<br>• All equipment will arrive at the Project site clean and free of soil and vegetative debris.<br>• Monitor topsoil and subsoil piles for weed growth during construction and implement corrective measures (e.g., spraying, mowing, hand-pulling) to avoid growth and establishment of regulated weeds.<br>• Use only Certified No.1 seed.<br>• For control of weeds, a licensed industrial pesticide applicator will be contracted to select and apply all herbicide in compliance with the procedures as outlined in the *Code of Practice for Pesticides*. | | |
| | | | Change in species diversity:<br>• Direct loss of a plant SOMC or traditional use plant species of due to vegetation clearing | • Restrict all construction activities to the approved construction footprint. | | |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | Change in species diversity:<br>• Indirect effects on plant SOMC or traditional use plant species from herbicide application to control the spread of regulated weeds | • Use a cover crop seed mixture to assist in weed and erosion control on exposed soils where warranted.<br>• Do not apply herbicide within 30 m of plant species or ecological communities of management concern, wetland or waterbody. Spot spraying, wicking, mowing, or hand picking are acceptable measures for control of regulated weeds in this area.<br>• A licensed industrial pesticide applicator will be contracted to select and apply all herbicide in compliance with the procedures as outlined in the *Code of Practice for Pesticides*. | | |
| | | | Change in wetland function:<br>• Direct loss or alteration of wetland area or change in wetland type from vegetation clearing or deposition of dust<br>• Direct loss or alteration of surface or groundwater flow patterns | • Reduce the removal of vegetation in wetlands to the extent possible.<br>• Where possible, conduct ground level cutting/mowing/mulching of wetland vegetation instead of grubbing.<br>• Where applicable, in areas not impacted by the permanent Project footprint, if ground conditions are encountered that create potential for rutting, admixing or compaction, minimize ground disturbance by using a protective layer such as matting or biodegradable geotextile and clay ramps or other approved materials between wetland root/seed bed and construction equipment.<br>• A site-specific erosion and sediment control plan will be developed in accordance with Alberta Transportation's Erosion and Sediment Control Manual. An appropriate native seed mix that is suitable for wetlands will be used to reclaim wetland areas. | | |
| | | | Change in wetland function<br>• Indirect loss or alteration of wetland area or wetland type because of vegetation clearing and ground disturbance<br>• Indirect alteration of surface and groundwater flow patterns | • Where possible, direct grading/drainage away from wetlands.<br>• Where there are permanent or temporary access roads, maintain cross drainage to allow water to move freely from one side of the road to the other. | | |
| 3A | 11.4 | Wildlife and Biodiversity | Change in habitat:<br>• Direct habitat loss or alteration including residences of species at risk (SAR) from vegetation clearing.<br>• Indirect loss or reduced habitat effectiveness from sensory disturbance. | • 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.<br>• Pre-construction surveys will be conducted to identify wildlife features (e.g., nests, dens) and appropriate site-specific mitigation developed.<br>• Vegetation removal will be avoided during the Restricted Activity Period (RAP) for nesting migratory birds and raptors. RAPs are primarily based on Environment and Climate Change Canada (ECCC) guidance to avoid risk of incidental take of migratory birds (ECCC 2016). ECCC direction to protect bird nests in the foothills parkland and prairie ecozone of Alberta, with consideration of migratory bird species at risk, is from April 15 to August 31 (Gregoire 2014 pers. comm.). The recommended RAP to avoid destruction and disturbance to raptor nests is from February 15 to August 15 (SRD 2011, ESRD 2013, Government of Alberta 2017b). Therefore, the combined RAP dates to avoid is from February 15 to August 31.<br>• 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 construction activity (e.g., vegetation removal, blasting).<br>• If an active nest or den is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation. (Volume 3A, Section 11), provide setback distances for SOMC with potential to occur in the PDA. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | • Where possible, construction activities during the RAP for the KWBZ identified along the Elbow River (December 15 to April 30) will be avoided or reduced. This will limit potential sensory disturbance to wintering ungulates (ESRD 2015a, Government of Alberta 2017b). If construction activities must occur during this time period, a wildlife mitigation and monitoring plan will be developed in consultation with regulators, which will include monitoring ungulate habitat use and response to human disturbance.<br>• Where possible, lights will be focused internally to the work site to reduce potential sensory disturbance to wildlife in the surrounding habitat.<br>• Temporary work spaces will be reclaimed using native species that are compatible with pre-construction site conditions, as outlined in the reclamation plan. | | |
| | | | Change in movement:<br>• Construction and operation could result in alteration of wildlife movement patterns (daily or seasonal) because of habitat change and sensory disturbance. | • Construction activities will be avoided during the RAP for the KWBZ identified along the Elbow River (December 15 to April 30). This will reduce potential effects on wildlife movement and wintering ungulates (ESRD 2015a). If construction during the RAP cannot be avoided, site-specific mitigation will be developed in consultation with AEP.<br>• The side slopes and bottom of the diversion channel will be vegetated, except under the proposed bridges and at Pirmez Creek. Vegetated areas will provide a more conducive wildlife passage across the channel.<br>• The diversion channel will be built with 3H:1V side slopes, which is within the range that most large mammals (e.g., elk,) are known to traverse (McCorquodale 2003; Frair et al. 2005; Mao et al. 2005; The Bow Corridor Ecosystem Advisory Group 2012).<br>• To maintain ungulate movement within the KWBZ, the floodplain berm will be revegetated with materials conducive for ungulate movement. The section of reinforced concrete (~250 m) closest to the Elbow River will be covered with top soil and seeded with native grasses. The central portion of the floodplain berm includes approximately 550 m of exposed riprap, where sections will be filled with substrate finer than riprap, such as sand, gravel and vegetation to allow for more walkable sections (Austin and Garland 2001; Huijser et al. 2008; Clevenger 2011). The south portion, furthest from the Elbow River, will be a 450 m earthen embankment vegetated with native grasses.<br>• Where fencing is proposed to restrict livestock access to project structures (e.g., diversion channel), wildlife-friendly fencing will be installed to allow ungulate passage. | | |
| | | | Change in mortality risk:<br>• Ground disturbance and vegetation clearing can result in physical destruction of key habitat features (e.g., nests, dens, roosts, hibernacula)<br>• Vehicle and equipment movement and ground disturbance can result in accidental mortality of small, less mobile species or individuals (e.g., amphibians)<br>• Vehicle collisions<br>• Wildlife-human conflict (i.e., removal of nuisance animals) | • Seasonally appropriate surveys will be undertaken to identify key habitat and habitat features (e.g., wetlands, nests) of SOMC before undertaking construction.<br>• 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.<br>• Vegetation removal will be avoided during the RAP for nesting migratory birds and raptors. RAPs are primarily based on ECCC guidance to avoid risk of incidental take of migratory birds (ECCC 2016). ECCC direction to protect bird nests in the foothills parkland and prairie ecozone of Alberta, with consideration of migratory bird species at risk, is from April 15 to August 31 (Gregoire 2014 pers. comm.). The recommended RAP to avoid destruction and disturbance to raptor nests is from February 15 to August 15 (SRD 2011, ESRD 2013, Government of Alberta 2017b). Therefore, the combined RAP dates to avoid is from February 15 to August 31.<br>• 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.<br>• 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 (see Volume 3A, Section 11) for setback buffers specific to SOMC with potential to occur in the PDA).<br>• All construction traffic will adhere to safety, road closure regulations, and other access measures and guidelines for the construction area and associated access roads. | | |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | • Wildlife or livestock 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 (e.g., bears, see Jorgenson 2016).<br>• 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.<br>• 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.<br>• 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.<br>• 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.<br>• Unauthorized vehicles will be prevented from access from public roads by using gates | | |
| | | | • Change in biodiversity | • 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.<br>• Pre-construction surveys will be conducted to identify wildlife features (e.g., nests, dens) and appropriate site-specific mitigation developed.<br>• Vegetation removal will be avoided during the Restricted Activity Period (RAP) for nesting migratory birds and raptors. RAPs are primarily based on Environment and Climate Change Canada (ECCC) guidance to avoid risk of incidental take of migratory birds (ECCC 2016). ECCC direction to protect bird nests in the foothills parkland and prairie ecozone of Alberta, with consideration of migratory bird species at risk, is from April 15 to August 31 (Gregoire 2014 pers. comm.). The recommended RAP to avoid destruction and disturbance to raptor nests is from February 15 to August 15 (SRD 2011, ESRD 2013, Government of Alberta 2017b). Therefore, the combined RAP dates to avoid is from February 15 to August 31.<br>• 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 construction activity (e.g., vegetation removal, blasting).<br>• If an active nest or den is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation. (Volume 3A, Section 11), provide setback distances for SOMC with potential to occur in the PDA.<br>• Where possible, construction activities during the RAP for the KWBZ identified along the Elbow River (December 15 to April 30) will be avoided or reduced. This will limit potential sensory disturbance to wintering ungulates (ESRD 2015a, Government of Alberta 2017b). If construction activities must occur during this time period, a wildlife mitigation and monitoring plan will be developed in consultation with regulators, which will include monitoring ungulate habitat use and response to human disturbance.<br>• 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.<br>• Temporary work spaces will be reclaimed using native species that are compatible with pre-construction site conditions, as outlined in the reclamation plan. | | |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | • Migratory Birds | • To reduce the residual effects of the Project on migratory birds, where possible, temporary workspaces and access roads will be in areas that avoid native vegetation (e.g., shrubland, treed areas, wetlands).<br>• Existing access roads and previously disturbed areas will be used, where feasible.<br>• Where possible, focusing lights on habitats that surround the work site during evening hours will be avoided. This will reduce potential sensory disturbance to migratory birds.<br>• Temporary work spaces will be reclaimed using native species that are compatible with pre-construction site conditions, as outlined in the reclamation plan (Volume 4, Appendix D).<br>• Vegetation removal will be avoided during the RAP for nesting migratory birds and non-migratory birds (e.g., raptors).<br>• 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 measures will be developed as required.<br>• 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. | | |
| 3A | 12.4 | Land Use and Management | Change in land use:<br>• Temporary or permanent removal or degradation of property, including agricultural lands<br>• Temporary or permanent change to industrial land uses<br>• Temporary or permanent removal or degradation of lands used for consumptive recreation and livelihood and non-consumptive recreation<br>• Change in access | • Residents, businesses, and recreation organizations who experience direct loss of private land in the PDA will be compensated for their land and improvements.<br>• Alberta Transportation will consult with adjacent landowners and disposition holders in the LAA and notify them of Project construction activities and schedule. Adequate warning will be provided to landowners to allow for management of livestock and other farming operations. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | Change in land use:<br>• Temporary or permanent removal or degradation of property, including agricultural lands<br>• Temporary or permanent change to industrial land uses<br>• Temporary or permanent removal or degradation of lands used for consumptive recreation and livelihood and non-consumptive recreation<br>• Change in access | • Fences and gates (e.g., Texas gate) will be installed where required.<br>• Harassment of livestock and other wildlife will be prohibited by Project workers.<br>• Workers will be prohibited from carrying firearms.<br>• Food waste will be secured in appropriate facilities or vehicles.<br>• Construction activities will follow mitigation measures and guidelines outlined in the Project's ECO Plan to reduce noise, light, and air contaminant emissions in proximity to the Project.<br>• Alberta Transportation is in consultation with operators of utilities in the PDA to discuss retrofitting and relocation of utilities. Alberta Transportation will develop crossing agreements with operators of utilities in the PDA. Alberta Transportation will continue to consult with utility operators in the PDA and LAA regarding rerouting and realignment of utilities on a case by case basis.<br>• Alberta Transportation will implement access management plans, which includes gating approaches to Project access roads to restrict public access to the Project footprint.<br>• Access roads to the Project, including emergency access roads, will remain in place for the life of the Project.<br>• AEP will develop a management plan for the PDA that may allow for recreation in Area A during dry operations. Area A will be naturalized, and access will not be restricted, although development of recreation infrastructure is not planned. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | • AEP will avoid the substantial interference with public navigation of the Elbow River through the following design practices:<br>– As part of construction, a permanent portage will be developed around the in-stream water intake components.<br>– Signs directing traffic to detours will be installed during construction of road realignments and modifications.<br>– Signs will be installed along the existing Elbow River channel and on the dam. Multiple signs will be placed upstream and downstream of the water intake components on both banks of the Elbow River. These signs will warn users on the Elbow River that they are approaching in-stream water intake components and of the associated danger with this infrastructure and to direct them to a portage location. A floating, high visibility boom will be in place upstream and downstream of the water intake components.<br>• Integrated landscape management policies will be implemented in the PDA through management of areas with primary and secondary land uses. Area A will become a conservation area and be naturalized at the completion of construction. Access to Area A will not be restricted; however, access (e.g., parking lots, hiking trails) will not be developed in Area A. Areas B, C, and D will be restricted to public access using barbed wire fencing, gates, and signs indicating “Danger” and “No Trespassing”. Area B and some of Area D will be revegetated at the completion of construction and will remain vegetated through dry operations. Grazing may be permitted on Area C. A management plan for the PDA will be developed by AEP in consultation with land users and the public. | | |
| | | | Change in parks, protected areas, and unique sites or special features:<br>• Temporary or permanent removal or degradation of parks or protected areas<br>• Temporary or permanent removal or degradation of unique sites or special features (e.g., historic sites, heritage rivers, and other designations)<br>• Change in access | • Alberta Transportation will consult with adjacent landowners and disposition holders in the LAA and notify them of construction activities and schedule. Detour signs for traffic and for the Our Lady of Peace Cairn will be installed during construction of road realignments and modifications. Construction activities will follow mitigation measures and guidelines outlined in the Project’s ECO Plan to reduce noise, light, and air contaminant emissions. | Construction | Alberta Transportation |
| | | | Change in Parks and Protected Areas and Unique Site and Special features:<br>• Change in access | • Project design includes armouring of the floodplain berm along the north side and armouring the river bank along parts of the south side, including at the water intake components to prevent flooding outside of the project footprint.<br>• The following signs will be installed:<br>– Multiple warning signs and alarms to draw attention to the signs will be placed along the diversion channel at road crossings and at walking trails; at the emergency spillway; and at the tributary low-level outlet works, along trails leading to the tributary, and at the confluence of the tributary and Elbow River. When alarms are sounding during flood events, including draw down, evacuation of areas around these infrastructure installation is required.<br>– Multiple signs will be placed along Highway 22 to the north and south sides of the project footprint. These signs will advise the public against swimming or using watercraft on the water when present.<br>– Gates and signs will be placed along Springbank road to the west and east of the project footprint and along private residential access roads in Area C. Gates will be closed during all floods. Signs will advise vehicles that the roads are closed and to use an alternate route.<br>• Flood damage to Springbank Road will be repaired, as necessary. | | |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3A | 13.3 | Historical Resources | Loss of or alteration to historical resource site contents or site contexts:<br>• surface or subsurface disturbance due to project activities, including vegetation removal, topsoil removal, borrow activities, excavation, construction, roadwork and covering of sites, rendering them unavailable for future study. | • Standard mitigation measures will be determined by ACT based on their review of the HRIA (Porter 2017).<br>• As required under provincial legislation, should an unexpected find of a significant historical resource occur during construction, ACT will be notified and will determine the appropriate mitigation.<br>• Should any chance find of human remains be made during construction, all construction will immediately cease in the area, the site will be secured and all provincial regulations regarding the chance find of human remains will be followed. If the remains are determined to be of Aboriginal origin the Provincial Government will engage Indigenous groups according to Government of Alberta protocol and guidelines developed in consultation with Indigenous groups. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3A | 14.3 | Traditional Land and Resource Use | • Change in Availability of Traditional Resources for Current Use | • Wetlands are present in the LAA, with most occurring along drainages and adjacent to Elbow River. To the extent possible, wetlands will be avoided (including temporary disturbance). Where avoidance is not possible, disturbance will be minimized.<br>• Permanent project disturbances will result in the permanent clearing of vegetation and wetlands. During the construction phase, areas of temporary disturbance will only have above ground vegetation clearing, leaving the soils intact, though there are some areas of soil disturbance; wetlands will be recontoured and seeded with an approved custom native wetland seed mix. Construction and dry operation of the Project will result in the loss of 31 ha of wetland area in the PDA. However, permanent disturbance of wetland area will be replaced or compensated for in accordance with the Alberta Wetland Policy (see Volume 3A, Section 10.1.1).<br>• No vegetation and wetland land units will be completely lost, and no lasting effects to vegetation and wetlands would be anticipated.<br>• Accordingly, with application of mitigation recommended in the Vegetation and Wetlands section (see Volume 3A, Section 10), no additional mitigation is needed.<br>• Permanent project disturbances will result in the permanent clearing of vegetation and wetlands. During the construction phase, areas of temporary disturbance will only have above ground vegetation clearing, leaving the soils intact, though there are some areas of soil disturbance; wetlands will be recontoured and seeded with an approved custom native wetland seed mix. Construction and dry operation of the Project will result in the loss of 31 ha of wetland area in the PDA. However, permanent disturbance of wetland area will be replaced or compensated for in accordance with the Alberta Wetland Policy (see Volume 3A, Section 10.1.1).<br>• At the end of construction, areas disturbed by construction that are not required for operation and maintenance will be topsoiled and seeded to meet Alberta Environment and Parks reclamation requirements (see Volume 1).<br>• Herbicides will not be applied within 30 m of plant species or ecological communities of management concern, wetland or waterbody. Spot spraying, wicking, mowing, or hand picking will be acceptable measures for control of regulated weeds in this area.<br>• Alberta Transportation will notify Indigenous groups regarding project activities and schedules, including provision of Project maps and design components, and discuss key traditional harvesting periods.<br>• If an active nest or den is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation. Where possible, construction activities during the Restricted Activity Period (RAP) for the KWBZ identified along Elbow River (December 15 to April 30) will be avoided or reduced. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | • Change in Availability of Traditional Resources or Areas for Current Use | • The area along the Elbow River flood plain (Area A) will be accessible for some TLRU activities; this will be a conservation zone with public access and opportunities for low impact recreation.<br>• Alberta Transportation will maintain access to identified current use sites (located outside of the designated construction and project site limits) during construction and operations, including for hunting and fishing and Alberta Transportation will advise Indigenous groups on post-construction access management. | Construction and Dry Operation | N/A |
| | | | • Change in Current Use Sites or Areas | • The disposition of artifacts and provision of GPS coordinates are under the jurisdiction of Alberta Culture and Tourism and not Alberta Transportation. Alberta Transportation will limit disturbance of cultural and spiritual sites and subsurface impacts. Alberta Transportation will follow heritage resource protection methods as mandated by the *Historical Resources Act*. At the request of Indigenous groups, Alberta Transportation will participate in ceremonies (if invited) prior to the start of construction, including making offerings.<br>• Alberta Transportation will commit to adhering to any conditions ACT applies to these sites.<br>• Alberta Transportation will follow current industry best practices and comply with all provincial and federal legislation. Should additional historical resources be encountered during construction, Alberta Transportation will follow current Alberta Culture and Tourism policies and guidelines.<br>• Alberta Transportation will notify Indigenous groups regarding project activities and schedules, including provision of project maps and design components. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | • Change in Access to Traditional Resources or Areas for Current Use | • Area A is a conservation area with public access and opportunities for low impact recreation; limited improvements beyond restoration of areas affected by Project construction.<br>• Area B is the reservoir, which will be owned and operated by AEP and the area will be restricted for operational and safety reasons. The area will also be used for research on flood restoration activities, and monitoring of mitigation and environmental effects. There is limited or no public access.<br>• Area C: has options for grazing through public leases. The land will be publicly owned and privately stewarded, with limitations on improvement to support the primary use as a reservoir.<br>• Area D is the location of project infrastructure. There is no public access and is fenced for public safety and security. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | • Change in Current Use Sites or Areas | • The disposition of artifacts and provision of GPS coordinates are under the jurisdiction of Alberta Culture and Tourism and not Alberta Transportation. Alberta Transportation will limit disturbance, to the extent possible and practical, of cultural and spiritual sites and subsurface impacts. Alberta Transportation will follow heritage resource protection methods as mandated by the Historical Resources Act.<br>• Alberta Transportation will minimize disturbance to cultural and spiritual sites and subsurface impacts, and develop a protocol for recovery, collection, reporting on, and possible repatriation of artifacts found in consultation with Indigenous groups, which could include flagging, fencing, or providing signage of sites to prevent disturbance during construction.<br>• Alberta Transportation will follow heritage resource protection methods as mandated by ACT and verify archaeological results with Indigenous groups.<br>• At the request of Indigenous groups, Alberta Transportation will participate in ceremonies (if invited) prior to the start of construction, including making offerings.<br>• Alberta Transportation will participate in discussions with ACT and Indigenous groups regarding further investigation of identified sites located within the designated construction site boundary.<br>• Alberta Transportation will follow current industry best practices and comply with all provincial and federal legislation. Should additional historical resources be encountered during construction, Alberta Transportation will follow current Alberta Culture and Tourism policies and guidelines.<br>• Alberta Transportation will participate in discussions with Indigenous groups regarding possible monitoring opportunities.<br>• Alberta Transportation will provide Indigenous groups with project maps and design information and preliminary project scheduling. | | |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | • Burial sites located outside of the designated construction site boundary will not be disturbed by construction.<br>• Disturbance of identified burial sites located within the designated construction site boundary will be avoided to the extent possible and practical. Alberta Transportation will participate in discussions with ACT and Indigenous groups regarding possible mitigation options for burial sites located within the designated construction site boundary and particularly within the footprint of structures that will be disturbed by construction.<br>• At the request of Indigenous groups, Alberta Transportation will participate in ceremonies (if invited) prior to the start of construction, including making offerings. | | |
| | | | • Change in Indigenous Commercial Activities | • The Project is located downstream from identified Indigenous commercial activities, including Redwood Meadows Golf and Country Club. Therefore, no interactions are anticipated to occur between the Project and Indigenous commercial activities during construction and dry operation. No mitigation measures have been identified. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3A | 15.4.3 | Public Health | Change to human health:<br>• Vehicles, machinery and equipment used to construct and maintain the Project would generate airborne emissions of criteria air contaminants (i.e., sulphur dioxide, nitrogen dioxide and particulate matter), volatile organic compounds and polycyclic aromatic hydrocarbons. People may inhale these emissions which may affect human health.<br>• Project activities may reduce the area of public land available for country food harvesting, leading to food scarcity<br>• Project construction may result in short-term and long-term increases in the levels of noise from construction equipment and vehicles. People may experience annoyance, stress, sleep disturbance or hearing loss. | • Project construction vehicles will be required to meet current emission control standards.<br>• Engines and exhaust systems will be properly maintained. Do not operate equipment, including construction equipment, that shows excessive emissions of exhaust gases until corrective repairs or adjustments are made.<br>• Suspend dust generating construction activities during periods of excessive winds whereby dust suppression measures are not working adequately.<br>• During dry periods, water will be applied to haul roads and/or disturbed areas to mitigate dust emissions. The application of water will be limited to non-freezing temperatures to prevent icing that can present a safety hazard. Watering is most effective immediately after application, and repeated watering several times a day may be required, depending on surface and meteorological conditions.<br>• Chemical dust suppressants will be applied to haul roads as an alternative option to watering. While chemical dust suppressants can be more effective at controlling fugitive dust than watering; they are also more expensive. Therefore, chemical dust suppression will be applied on an as-needed basis during high wind conditions or if PM concentrations are in exceedance of the Alberta Air Quality Objectives and if an increase of watering is determined ineffective or unfeasible at the time. Examples of suppressants include chlorides, petroleum products, liquid polymer emulsions, and agglomerating chemicals. These suppressants, if required, will be applied, as per the manufacturer's recommendations, to preclude unintended environmental effects. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3A | 16.4.2.2 | Infrastructure and Services | Change in transportation infrastructure and services:<br>• Demand on local transportation infrastructure and services might be affected by Project activities and Project-related population growth. | • Alberta Transportation will consult regularly with Rocky View County to provide project updates, and to identify and address project-related traffic problems and other potential implications for services and infrastructure.<br>• A project specific traffic accommodation strategy will be developed for the Project.<br>• The details of day-to-day road construction management such as detours, signage, flag persons and timing of activities will be set out in traffic accommodation strategies (TAS) that will be developed by the contractor(s) and reviewed and approved by Alberta Transportation. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3A | 17.4 | Employment and Economy | Change in provincial economy:<br>• Project spending would affect local and regional labour forces, populations, and businesses.<br>• Project spending would contribute to municipal, provincial and federal tax revenue.<br>• Provincial and federal gross domestic product (GDP) would also be affected. | • Alberta transportation will adhere to government procurement policies and procedure with respect to labour, and goods and services. | Construction | Alberta Transportation |
| | | | Change in regional labour force:<br>• Employment, expenditures, and population growth related to industrial development can result in positive and adverse effects.<br>• Adverse economic effects might occur when the labour, goods, and services required for a project exceed the existing capacity, potentially leading to supply issues and cost increases (e.g., wage inflation).<br>• Provincial economic effects are the primary means by which the Project would deliver benefits. | • Alberta transportation will adhere to government procurement policies and procedure with respect to labour, and goods and services. | Construction | Alberta Transportation |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | Change in regional economy:<br>• Local, regional, and provincial businesses would benefit from project and consumer-related spending. | • Alberta transportation will adhere to government procurement policies and procedure with respect to labour, and goods and services. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3A | 18.1 | Federal Lands | Air Quality and Climate | • Mitigation measures for air quality and climate are provided in Volume 3A, Section 3; no additional mitigation measures beyond those identified are required specifically for federal lands. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | 18.2 | Federal Lands | Acoustic Environment | • Mitigation measures for acoustic environment are provided in Volume 3A, Section 4; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.3 | Federal Lands | Hydrogeology | • Mitigation measures for hydrogeology are provided in Volume 3A, Section 5; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.4 | Federal Lands | Hydrology | • Mitigation measures for hydrology are provided in Volume 3A, Section 6; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.5 | Federal Lands | Surface Water Quality | • Mitigation measures for surface water quality are provided in Volume 3A, Section 7; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.6 | Federal Lands | Aquatic Ecology | • Mitigation measures for fish and fish habitat are provided in Volume 3A, Section 8; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.7 | Federal Lands | Terrain and Soils | • Mitigation measures for terrain and soils are provided in Volume 3A, Section 9; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.8 | Federal Lands | Vegetation and Wetlands | • Mitigation measures for vegetation and wetlands are provided in Volume 3A, Section 10; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.9 | Federal Lands | Wildlife and Biodiversity | • Mitigation measures for wildlife and biodiversity are provided in Volume 3A, Section 11; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.10 | Federal Lands | Land Use and Management | • Mitigation measures for land use and management are provided in Volume 3A, Section 12; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.11 | Federal Lands | Historical Resources | • Mitigation measures for historical resources are provided in Volume 3A, Section 13; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.12 | Federal Lands | Traditional Land and Resource Use | • Mitigation measures for land use and management are provided in Volume 3A, Section 14; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.13 | Federal Lands | Public Health | • Mitigation measures for public health are provided in Volume 3A, Section 15; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.14 | Federal Lands | Infrastructure and Services | • Mitigation measures for infrastructure and services are provided in Volume 3A, Section 16; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.15 | Federal Lands | Employment and Economy | • Mitigation measures for employment and economy are provided in Volume 3A, Section 17; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| 3C | 1.3.2 | Cumulative Effects | • Changes to the Environment | • No additional Project mitigation measures specific to cumulative effects are proposed. | All Project Phases | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3C | 2.2.3 | Follow-up and Monitoring | Air Quality and Climate | • Monitoring will be implemented in conjunction with emissions mitigation to provide understanding of meteorological conditions and offsite concentrations, and determine the need for more rigorous mitigation. Monitoring will include visual observation of increased particulate matter and dust and the installation and operation of an Environmental Beta Attenuation Monitor (EBAM) to measure ambient PM2.5 and TSP concentrations.<br>• During the construction phase, the monitoring equipment will be placed at two locations along the road between the diversion channel excavation work and the dam construction site. Monitoring equipment will also be placed adjacent to the borrow source, if it is used. The exact locations of the monitoring stations will be determined following the detailed construction plan developed by the construction contractor.<br>• Monitoring will be continuous, and results will be reported to the Environmental Inspector during the construction phase who will pass them on to the Alberta Transportation Provincial Environmental Coordinator who will initiate action. During the post-flood phase, results will go to the Environmental Coordinator for Alberta Environment and Parks, the Project operator.<br>• If the monitoring program indicates that the ground-level TSP concentrations are greater than an ambient air quality objective, then additional mitigations to reduce TSP emissions will be implemented. These include the suspension of construction activity, increased watering of access roads or the spraying of surfactants, during the construction phase; and the spraying of surfactants during the post-flood phase.<br>• The details of the monitoring program and the results will be made available to nearby residents. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3C | 2.3.3 | Follow-up and Monitoring | Acoustic Environment | • Continuous sound level monitoring will be conducted at active construction sites. The monitoring equipment will be positioned at the nearest receptor(s) to the construction activity.<br>• Alberta Transportation will establish a call-in number for noise complaints and notify residents in the LAA of this number. If complaints are received, noise level information will be provided to the complainant and whether Health Canada or World Health Organization guidelines are exceeded.<br>• All complaints will be addressed by Alberta Transportation's Environmental Coordinator. Mitigation measures, which may include the use of sound barriers or adjustment of construction timing, will be implemented. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3C | 2.4.3 | Follow-up and Monitoring | Hydrogeology | • There are no proposed follow-up or monitoring programs during the construction phase of the Project. | Construction | N/A |
| 3C | 2.5.3 | Follow-up and Monitoring | Hydrology | • There are no proposed follow-up or monitoring programs during the construction phase of the Project. | Construction | N/A |
| 3C | 2.6.3 | Follow-up and Monitoring | Surface Water Quality | • Suspended sediment concentrations will be monitored upstream and downstream of instream construction activities to identify potential sediment-related effects from construction.<br>• Monitoring will include daily visual inspections for signs of sediment influx. If such occurrences are noted, the source of the sediment will be investigated by the environmental inspector and actions to prevent further influx will be implemented. Mitigation measures will include those from Alberta Transportation's Erosion and Sediment Control Manual. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3C | 2.7.3 | Follow-up and Monitoring | Aquatic Ecology | • During construction, turbidity monitoring will be conducted following Alberta Transportation's Special Provision on Turbidity. Compliance monitoring will include regular monitoring of sediment and erosion control measures to reduce potential effects on the aquatic environment. After construction is complete, an as-built survey will be conducted to measure the final footprint of the Project in fish habitat.<br>• annual offset monitoring to assess condition of habitat offsetting measures and identify potential remediation measures:<br>– success of offsetting measures determined by criteria that determine if offsetting is functioning as intended and to identify contingencies if monitoring shows deficiencies<br>– integrated into supervision and monitoring of the Project; at least one qualified environmental professional will be on-site during the start-up and at critical periods of construction<br>• Information to be documented during construction includes:<br>– written and photo-documented sequence of events during construction<br>– changes to design and field-fitting to adapt to unanticipated field conditions (discussed with Department of Fisheries and Oceans if significant changes)<br>– technical issues that arise and how they are addressed<br>– confirmation that offsetting components meet the design requirements<br>– confirmation that the terms of the Department of Fisheries and Oceans Authorization are met<br>• Turbidity monitoring will be implemented during instream construction. If sediment release is identified, mitigation to prevent further sediment release will be implemented.<br>• Specific mitigation will be determined based on the characteristics of a potential release and site conditions at the time of the incident, but could include stopping work, slowing work, and/or installation of silt curtains.<br>• A sediment release monitoring plan will be developed in accordance with Alberta Ministry of Transportations' Special Provision: Use in Tenders that Involve Instream Work, the CCME Guidelines for the Protection of Freshwater Aquatic Life, and the ESRD Environmental Quality Guidelines for Alberta Surface Waters.<br>• Turbidity levels in both upstream and downstream locations will be collected using a turbidity meter. Exceedances of established criteria will be reported to Alberta Environment and Park's Energy and Environmental Emergency or Complaints number (1-800-222-6514).<br>• A post-construction report will be provided to Department of Fisheries and Oceans at the completion of construction that will outline the as-built condition of the offsetting measures. In addition to a photographic log, as-built engineer drawings, and construction monitoring, post- construction measurements will include:<br>– location and measurements of the structures on the bed and banks<br>– location and quantity of the vegetation reclamation<br>– location and measurements of the Fish Passage Mitigation Structure<br>– fish habitat, abundance, distribution, and benthic invertebrate monitoring in previously sampled reaches (1-12)<br>– location and measurements of required fisheries offsetting measures | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3C | 2.8 | Follow-up and Monitoring | Terrain and Soils | • The Terrain and Soils follow-up program will consist of erosion and sediment monitoring developed as part of the construction contractor's permanent erosion and sediment control plan for the project, required under Alberta Transportation's Erosion and Sediment Control Manual. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3C | 2.9.3 | Follow-up and Monitoring | Vegetation and Wetlands | • Monitoring during construction will be the responsibility of the contractor and included as part of the Project-specific ECO plan. Such monitoring includes inspection that topsoil stripping and soil storage follows the procedures outlined in Volume 4, Appendix D.<br>• To avoid growth and establishment of regulated weeds, topsoil and subsoil piles will be monitored for weed growth during construction and corrective measures (e.g., spraying, mowing, hand-pulling) will be implemented where necessary.<br>• Shortly after construction, monitoring will be focused on assessing the rate of establishment of a healthy vegetation cover, and the quick recognition and mitigation of soil erosion.<br>• Deficiencies identified during monitoring inspections will be addressed by applying supplementary mitigation measures, such as hydroseeding and the application of tackifiers in areas that may be at risk of wind erosion. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3C | 2.10.3 | Follow-up and Monitoring | Wildlife and Biodiversity | • During the Project construction phase, six remote cameras will be deployed along the Elbow River in the same locations as used in pre-construction baseline surveys to provide relative comparisons of change. Three of these remote cameras will be placed upstream and three downstream of the diversion structure, and will monitor wildlife movement in the KWBZ for a minimum of one year during the estimated 3-year construction period.<br>• A wildlife biologist will visit the cameras every four months during construction and operation to change out memory cards and batteries, and check on the overall status of equipment (e.g., positioning, weather related malfunctions, animal or human tampering of equipment). | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3C | 2.11 | Follow-up and Monitoring | Land Use and Management | • There are no proposed follow-up or monitoring programs during the construction phase of the Project. | Construction | N/A |
| 3C | 2.12.3 | Follow-up and Monitoring | Historical Resources | • Results of the follow-up and monitoring program will be submitted to ACT.<br>• Additional studies for archaeological resources will address the following locations:<br>– Gap areas requiring assessment: NE 10-24-4 W5 (Diversion Channel), NW 10-24-4-W5M (Diversion Channel), E 1/2 15-24-4 W5M (Diversion Channel), and 4, 5 & 12-23- 24-4 W5M (Highway 22).<br>– A deep testing program in areas of significant sedimentation. Backhoe testing for Legal locations 18 & 19-24-3 W5M (Reservoir and Outlet Channel), NW 13-24-4 W5M (Reservoir and Dam), SE 15-24-4 W5M (Diversion Channel), 24-24-4 W5M (Reservoir), and SE 27-24-24-W5M (Reservoir).<br>• Additional studies for palaeontological resources will consist of the following:<br>– Diversion complex: Palaeontological construction monitoring will be conducted during excavation of bedrock for the diversion inlet.<br>– Diversion channel: A palaeontological construction monitoring program will be conducted wherever at least 4 m of bedrock will be excavated (including emergency spillway).<br>– A palaeontological field evaluation will be conducted of the tributary that will receive emergency spillway flows.<br>– Off-stream reservoir: A palaeontological deep testing program will be conducted, in conjunction with archaeology, for any areas that may have deep Holocene sedimentation, especially around the existing small drainages.<br>– Low-level outlet: Deep testing for palaeontological resources will be conducted along the outlet tributary. Depending on the findings of the deep testing program, a palaeontological construction monitoring program at the site may be required. If the outlet is used to drain the reservoir, a post-impact assessment along the tributary will be conducted.<br>– Highway 22: If it is necessary to excavate additional bedrock for the new road alignment, palaeontological construction monitoring will be conducted.<br>– Utilities: If open cut methods are used, a palaeontological construction monitoring program will be implemented for the three pipelines in Sections 10 and 15-24-4-W5M that will be re-located under the diversion channel. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3C | 2.13 | Follow-up and Monitoring | Traditional Land and Resource Use | • No follow-up or monitoring is proposed with respect to traditional land and resource use beyond what has been identified for other VCs. | Construction | N/A |
| 3C | 2.14 | Follow-up and Monitoring | Public Health | • There are no proposed follow-up or monitoring programs during the construction phase of the Project. | Construction | N/A |
| 3C | 2.15 | Follow-up and Monitoring | Infrastructure Services | • There are no proposed follow-up or monitoring programs during the construction phase of the Project. | Construction | N/A |
| 3C | 2.16 | Follow-up and Monitoring | Employment and Economy | • There are no proposed follow-up or monitoring programs during the construction phase of the Project. | Construction | N/A |
| 3D | 1.5.3 | Accidents and Malfunctions | Fire | • The ECO Plan will provide emergency procedures to prevent and respond to potential incidents that may impact the environment.<br>• Contractors will develop fire protection procedures as part of their ECO Plans to address fire prevention and emergency response on site during cleanup activities. Onsite personnel will be trained in fire prevention, including proper disposal of hot or burning material and designated smoking areas, and response.<br>• Equipment and project components will be maintained to applicable standards in order to reduce the likelihood of malfunction resulting in fire and explosion. Flammable material will be stored following Alberta Labour guidance.<br>• Access roads constructed to the PDA and in the PDA (e.g., along the top of the dam) will be permanent for the life of the Project and allow for access to the PDA by firefighters during all phases of the Project. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3D | 1.5.4 | Accidents and Malfunctions | Hazardous Materials Spill | • Worker health, safety, and environment training will include spill prevention and response procedures.<br>• All workers will be required to have Workplace Hazardous Materials Information System (WHMIS) training.<br>• Equipment will be operated and maintained to applicable standards to reduce the likelihood of a spill.<br>• To reduce the potential for a spill during transportation to and from the site, transport of hazardous materials to and from the Project site, storage, use and disposal will be in accordance with regulatory requirements, and hazardous materials associated with the Project will be in compliance with the *Transportation of Dangerous Goods Act*.<br>• The ECO Plan will provide emergency procedures to prevent and respond to potential incidents that may impact the environment.<br>• The ECO Plan will identify every hazardous material to be stored on site by the Contractor and all sub-contractors, along with material-specific handling, containment, storage and disposal procedures. The storage location(s) of hazardous material will be identified on a site diagram included within the plan. Examples of hazardous materials and associated handling procedures include:<br>– Diesel fuel – designated refueling areas will be established at least 100 m from a water body. Fuel will be stored in a double walled tank located on an impervious tray with the capacity to hold 110% of the stored liquid volume. On-site fueling will follow best management practices which will be detailed in the ECO Plan. Fire extinguishers will be located at all refueling stations and no smoking signs will be erected. Spill kits will be available at all refueling stations and on all vehicles and workers will be trained in their use.<br>– Lubricating oil – lubricating oil will be stored in a fire proof containment locker and clearly labelled. When lubricating oil is used the Contractor will provide secondary containment with capacity to hold 110% of the stored liquid volume. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3D | 1.5.5 | Accidents and Malfunctions | Vehicle Accident | • Alberta Transportation will also consult regularly with Rocky View County to provide project updates, and to identify and address project-related traffic problems and other potential implications for services and infrastructure.<br>• All workers will be required to work in a safe manner and complete health, safety, and environment training.<br>• Project-related vehicles will be required to follow traffic rules such as speed limits and weight restrictions and federal and provincial highway regulations. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| 3D | 1.5.6 | Accidents and Malfunctions | Pipeline Rupture | • Prior to any retrofitting or re-location activities, pipeline operators will execute emergency preparedness plans to reduce the potential for rupture.<br>• The ECO Plan will provide emergency procedures to prevent and respond to potential incidents that may impact the environment. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor / Third Party Pipeline Operators |
| 3D | 2.3.2 | Effects of the Environment on the Project | Extreme and Normal Weather Conditions:<br>• Precipitation and Flooding<br>• Tornadoes<br>• Climate Change | • In the event of adverse weather during construction, dry operations, and post-flood operations, contractors will implement contingency measures and emergency preparedness plan and stop work if conditions are unsafe.<br>• Site-specific drainage control measures and erosion and sediment control measures will be employed during construction to mitigate effects of precipitation and flooding within the PDA. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |
| | | | | • An emergency spillway is included in the design in case the diversion channel becomes obstructed with debris. A debris management program will also be implemented during all phases of Project operation. This program will include measures such as debris removal in the Elbow River at the diversion structure, upstream of the diversion structure, and within the off-stream reservoir. | All Phases | Alberta Transportation/Construction Management and the selected Construction Contractor<br>Owner/Operator (Alberta Environment and Parks) |
| | | | | • In the event of a tornado, contractors will implement contingency measures and emergency preparedness plan and stop work if conditions are unsafe. Damage to infrastructure caused by tornadoes will be repaired.<br>• The Project is designed to mitigate effects of climate change on flood operations, including extreme precipitation events and increased risk of seasonal flooding. The emergency spillway is designed to operate if the capacity of the off-stream reservoir is exhausted and the diversion inlet structure is still open. | All Phases | Alberta Transportation/Construction Management and the selected Construction Contractor<br>Owner/Operator (Alberta Environment and Parks) |
| | | | | • Contractors will develop fire protection procedure as part of the Project's ECO Plan, to address fire prevention and emergency response procedures on site during construction, dry operations maintenance activities, and post-flood operations cleanup activities.<br>• Onsite personnel will be trained in fire prevention, including proper disposal of hot or burning material and designated smoking areas, and response.<br>• Equipment and project components will be maintained to applicable standards in order to reduce the likelihood of malfunction resulting in fire and explosion. Flammable materials will be stored following regulatory requirements. | Construction | Alberta Transportation/Construction Management and the selected Construction Contractor |

**Table C-1 List of Mitigation Measures for the Construction and Dry Operation Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | External Conditions:<br>• Wildfires<br>• Seismic Events | • Onsite personnel will be trained in fire prevention, including proper disposal of hot or burning material and designated smoking areas, and response.<br>• Equipment and project components will be maintained to applicable standards in order to reduce the likelihood of malfunction resulting in fire and explosion. Flammable materials will be stored following regulatory requirements.<br>• Access roads constructed to the PDA and in the PDA (e.g., along the top of the dam) will be permanent for the life of the Project and allow for access to the PDA by firefighters during all phases of the Project.<br>• Damage to Project infrastructure caused by wildfires during dry operations and post-flood operations will be repaired. | Dry Operation, Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| NOTES:<br>N/A – not applicable | | | | | | |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3B | 3.2.2 | Atmospheric Environment | Air Quality - Fugitive Dust | • A primary mitigation for wind erosion in the reservoir will be the re-establishment of vegetation cover (e.g., native grasses) after reservoir draining. Natural revegetation success, however, is not assured, given initial high moisture contents and reduced energy input in the autumn.<br>• Should wind erosion occur and natural revegetation prove to be ineffective, a tackifier will be applied where required. Tackifiers are a sprayable erosion control product that bonds with the soil surface and creates a porous and absorbent erosion resistant blanket that can last for up to 12 months.<br>• Areas of sediment deposition as a result of flood water storage within the reservoir where wind erosion may be an issue will be either seeded with native plant species and/or the application of a tackifier to reduce erosion potential. AEP will have an Operation, Maintenance and Surveillance Plan for the Project, which will include sediment stabilization and debris removal requirements will be provided. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| | | | Air Quality - Odours | • There are no Project specific mitigation measures for odours during flood or post-flood operations. | Flood and Post-flood | N/A |
| | | | Change in Carbon Sequestration Capacity | • Re-establishment of the vegetation cover on the deposited sediment will mitigate the temporary loss of carbon sequestration capacity. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3B | 4.2.2 | Acoustic Environment | Change in Acoustic Environment:<br>• reservoir sediment partial clean up<br>• channel maintenance<br>• road and bridge maintenance | • During the post-flood phase, inspections will be conducted using light trucks, although some heavy equipment may be mobilized to site if it is needed for debris removal. | Flood and Post-Flood | Owner/Operator (Alberta Environment and Parks) |
| 3B | 5.2 | Hydrogeology | Change in groundwater quantity | • No specific mitigation for the temporary increases in groundwater quantity are presented.<br>• Existing water wells within the reservoir footprint will be decommissioned and plugged off to prevent groundwater contamination and to prevent flood waters from infiltrating nearby water wells | Flood and Post-Flood | Owner/Operator (Alberta Environmental and Parks) |
| 3B | 6.4 | Hydrology | • Change in hydrological regime beyond the range evident in the historical record<br>• Change in sediment transport dynamics<br>• Change in channel morphology | • No specific mitigation measures are presented, because the purpose of the Project is to mitigate downstream flood damage; therefore, the change in hydrological interactions, including sediment transport dynamics and channel morphology during flood and post-flood operations are intentional and required.<br>• Stored flood waters will be released through the low-level outlet gated structure back into the Elbow River in a controlled manner to avoid downstream flood damage. | Flood and Post-Flood | Owner/Operator (Alberta Environment and Parks) |
| 3B | 7.4 | Surface Water Quality | Chang in surface water quality:<br>• change to suspended sediment and suspended sediment associated parameters<br>• change to water temperature and dissolved oxygen<br>• methylmercury release | • No specific mitigation measures are presented, because the Project is a mitigation for downstream flood damage, these interactions are a result of natural functions and fluctuations within the watershed. | Flood and Post-Flood | N/A |
| 3B | 8.2 | Aquatic Ecology | Permanent Alteration of Fish Habitat:<br>• Change in Contaminates | • Potential contaminant-related effects will be mitigated through project design (e.g., road water runoff management), implementing a spill containment and response plan, using appropriate sediment and erosion control measures, limiting the use of and following best management practices for herbicides and fertilizers in the dry reservoir or near waterbodies, and using non-toxic biodegradable hydraulic fluids in equipment for any required instream works.<br>• Activities near water will be planned and completed in the dry and isolated from watercourses to prevent materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, other chemicals or other deleterious materials do not enter the watercourse. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | Permanent Alteration of Fish Habitat:<br>• Change in Sediment | • Potential effects of erosion and sedimentation due to stored flood water release will be minimized by controlling the flow through the low-level outlet channel.<br>• Structures will be designed so that storm water runoff and wash water from the access roads, decks, side slopes, and approaches are directed into a retention pond or vegetated area to remove suspended solids, dissipate velocity, and prevent sediment and other deleterious substances from entering watercourses.<br>• Where debris removal from the structures is required, debris removal will be timed to avoid disruption to sensitive fish life stages (i.e., outside the RAP), unless the debris and its accumulation is immediately threatening to the integrity of the structure or relates to an emergency (i.e., risk of structure failure). | | |
| | | | Destruction of Fish Habitat:<br>• Change in Fish Passage | • Maintenance, debris removal on the structure, and on the fish passage structures will occur immediately to accommodate fish passage.<br>• Debris will be cleaned from the structure gates after a flood recedes to allow unimpeded fish passage upstream over the structure. | | |
| | | | Fish Mortality:<br>• Entrainment and Stranding of Fish | • Drainage areas within the reservoir will be graded to reduce stranding of fish during release of stored flood water from the reservoir. | | |
| 3B | 9.2 | Terrain and Soils | • Change to terrain stability | • Drawdown of stored flood waters will be conducted in a controlled manner to avoid soil erosion and to maintain slope stability.<br>• Slope stability inspection and monitoring will be conducted on the structures to detect and repair any sloughs or failures.<br>• Repair and re-armour as required the channel banks to stabilize slopes where flood diversion flows have caused erosion.<br>• Seed and revegetate the channel banks with native seed or erosion control mix to improve bank stability where flood diversion flows has caused erosion of the vegetation. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| | | | Change to soil quality and quantity:<br>• Soil Drainage Regime<br>• Change in Soil Nutrient Properties<br>• Change in Agricultural Land Capability class | • There is no planned mitigation of higher calcium carbonate content in soil and higher pH. Time periods are likely too short to allow any measurable removal of free carbonates through leaching. Therefore, pH can be expected to remain constant for the time periods considered. This would not be critical to plant community function because many prairie upland and wetland plant communities would not be limited by this pH range.<br>• Infrastructure such as the diversion channel will contain additional elements that are designed to slow flow velocity and turbulence. The design of the Diversion Channel outfall into the reservoir includes energy dissipation blocks to control flows and reduce erosion. The low-level outlet outfall into the waterbody that returns the flood waters back into the Elbow River will have erosion protection and energy dissipation blocks.<br>• Riprap materials to prevent erosion will be installed on the diversion channel side slopes in critical areas such as outside curves, and on the water face of the off-stream Storage Dam.<br>• Riprap will be installed where the diversion channel enters the reservoir, to reduce flow velocity and limit soil erosion.<br>• Use of native or agronomic plant species (grass, legumes) will be used in reclaimed areas to maintain a strong sod-layer that will contribute to erosion prevention.<br>• In areas of the reservoir where sediment deposition may make surfaces susceptible to wind erosion, application of a tackifier may be used to mitigate soil erosion.<br>• Agronomic or native seed species may be included with the tackifier to provide longer-term stability to the soils.<br>• Soil testing of the deposited sediment will be conducted after any flood event, if required. | | |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | Change in wetland function:<br>• Direct loss or alteration of wetland area or change in wetland type from vegetation clearing or deposition of dust<br>• Direct loss or alteration of surface or groundwater flow patterns | • Reduce the removal of vegetation in wetlands to the extent possible.<br>• Where possible, conduct ground level cutting/mowing/mulching of wetland vegetation instead of grubbing.<br>• Where applicable, in areas not impacted by the permanent Project footprint, if ground conditions are encountered that create potential for rutting, admixing or compaction, minimize ground disturbance by using a protective layer such as matting or biodegradable geotextile and clay ramps or other approved materials between wetland root/seed bed and construction equipment.<br>• A site-specific erosion and sediment control plan will be developed in accordance with Alberta Transportation's Erosion and Sediment Control Manual. An appropriate native seed mix that is suitable for wetlands will be used to reclaim wetland areas. | | |
| | | | Change in wetland function<br>• Indirect loss or alteration of wetland area or wetland type because of vegetation clearing and ground disturbance<br>• Indirect alteration of surface and groundwater flow patterns | • Where possible, direct grading/drainage away from wetlands.<br>• Where there are permanent or temporary access roads, maintain cross drainage to allow water to move freely from one side of the road to the other. | | |
| 3B | 10.1.1 | Vegetation and Wetlands | • Change in Plant Community Diversity<br>• Change in Species Diversity<br>• Change in Wetland Functions | • Maintenance activities will be restricted to the reservoir footprint to reduce the area of disturbance during post-flood operations.<br>• All equipment will arrive at the Project site clean and free of soil and vegetative debris.<br>• Areas of sediment deposition where wind erosion may be an issue may be hydroseeded with native plant species and a tackifier to reduce erosion. An operation and maintenance plan for the reservoir will be developed that will include sediment stabilization and debris removal.<br>• Where sediment cleanup is required to maintain hydrological function of the Project, graded soil material will be directed away from adjacent wetlands. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3B | 11.3 | Wildlife and Biodiversity | • Change in Habitat | • Maintenance activities will be restricted to the reservoir footprint to reduce the area of disturbance during post-flood operations.<br>• If sediment partial cleanup and debris removal in the off-stream reservoir occurs more than seven days following reservoir draining, and during the Restricted Activity Period (RAP) for nesting migratory birds and raptors, nest searches will be conducted by qualified wildlife biologists. If an active nest or den is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation.<br>• Maintenance activities will be reduced as much as possible in the Key Wildlife and Biodiversity Zone (KWBZ) identified along the Elbow River from December 15 to April 30. This will reduce potential sensory disturbance to wintering ungulates (ESRD 2015a).<br>• Weed propagation will be reduced by using appropriate equipment cleaning protocols.<br>• Areas of sediment deposition where wind erosion might be an issue will be hydroseeded with native plant species to reduce erosion potential. AEP will have an operation and maintenance plan for the reservoir that will include sediment stabilization and debris removal. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| | | | • Change in Movement | • The side slopes and bottom of the diversion channel will be vegetated, except under the proposed bridges and at Pirmez Creek. Vegetated areas will provide a more conducive wildlife passage across the channel.<br>• Post-flood infrastructure maintenance will be temporary, and the duration will be reduced as much as possible.<br>• Post-flood maintenance will be localized and occur only during daylight hours. | | |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | • Change in Mortality Risk | • The diversion channel will be built with 3H:1V side slopes, which is within the range that most large mammals (e.g., elk,) are known to traverse (McCorquodale 2003; Frair et al. 2005; Mao et al. 2005; The Bow Corridor Ecosystem Advisory Group 2012).<br>• The side slopes and bottom of the diversion channel will be vegetated, which will provide a more conducive material to help facilitate wildlife escape from rising flood waters or when swimming across the channel.<br>• Restrict all post-flood maintenance activities to the approved Project footprint and reduce the area of disturbance during operations. All maintenance traffic will adhere to safety and road closure regulations.<br>• If post-flood maintenance in the off-stream reservoir occurs more than seven days following reservoir draining, and during the RAP for nesting migratory birds and raptors, nest searches will be conducted by qualified wildlife biologists to reduce potential mortality risk to birds attempting to nest in the area.<br>• If an active nest or den is found, it will be subject to a provincial or federal disturbance setback buffer and site-specific mitigation (see Volume 3A, Section 11).<br>• Do not harass or feed wildlife. Store waste in wildlife-proof containers and provide wildlife awareness training to all staff on site.<br>• 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.<br>• 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.<br>• Unanticipated wildlife issues encountered during flood and 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. | | |
| | | | • Change in Biodiversity | • Project-specific mitigation measures recommended for change in habitat will work together to reduce effects on biodiversity. As such, there are no additional mitigation measures recommended to reduce potential Project effects on biodiversity during floods. | | |
| | | | • Change in Wildlife health | • The off-stream reservoir will be seeded only if there are dust issues.<br>• If revegetation is not successful, a tackifier or sprayable erosion control product will be applied within the off-stream reservoir to reduce wind erosion. | | |
| 3B | 12.2 | Land Use and Management | Change in Land Use:<br>• Change in access | • Integrated landscape management policies will be implemented in the project footprint, which will allow for management of flood waters in the off-stream reservoir during floods. A management plan for the PDA will be developed by AEP in consultation with land users and the public.<br>• Project design includes armouring of the floodplain berm along the north side and armouring the river bank along parts of the south side, including at the water intake components to prevent flooding outside of the PDA.<br>• The following signs will be installed:<br>– Areas B, C, and D will be restricted to public access using wildlife-friendly fencing, gates, and signs indicating “Danger” and “No Trespassing”.<br>– Multiple signs will be placed upstream and downstream of the water intake components on both banks of the Elbow River. These signs will warn users on the Elbow River that they are approaching the diversion structure with associated dangers and direct them to a portage location. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | – Multiple warning signs and alarms to draw attention will be placed along the diversion channel at road crossings and at walking trails; at the emergency spillway; and at the tributary low-level outlet works, along trails leading to the tributary, and at the confluence of the tributary and Elbow River. When alarms are sounding during flood events, including the release of water from the off-stream reservoir, evacuation of areas around these infrastructure components will be implemented.<br>– Multiple signs will be placed along Highway 22 to the north and south sides of the PDA. These signs will advise the public against swimming or using watercraft on the water when it is present in the diversion channel or off-stream reservoir.<br>– Gates and signs will be placed along Springbank Road to the north, west and east of the PDA. Gates will be closed during all floods. Signs will advise vehicles that the roads are closed and to use an alternate route.<br>• Flood damage to Springbank Road will be repaired, as necessary.<br>• Gated approaches into the PDA will be constructed to restrict public access.<br>• Access roads into the PDA, including emergency access roads, will remain in place for the life of the Project for repair activities during post-flood operations and for access to the PDA for emergency vehicles during flood and post-flood operations.<br>• Inspection and maintenance of all infrastructure will occur regularly during post-flood operation. Post-flood cleanup will include removal of debris and other material that may interfere with the flow of the tributary. Further mitigation measures such as re-seeding areas that have been inundated and repairing areas where soil has eroded may be implemented depending on the results of inspection after flooding events. | | |
| | | | Change in Parks and Protected Areas and Unique Site and Special features:<br>• Change in access | • Project design includes armouring of the floodplain berm along the north side and armouring the river bank along parts of the south side, including at the water intake components to prevent flooding outside of the project footprint.<br>• The following signs will be installed:<br>– Multiple warning signs and alarms to draw attention to the signs will be placed along the diversion channel at road crossings and at walking trails; at the emergency spillway; and at the tributary low-level outlet works, along trails leading to the tributary, and at the confluence of the tributary and Elbow River. When alarms are sounding during flood events, including draw down, evacuation of areas around these infrastructure installation is required.<br>– Multiple signs will be placed along Highway 22 to the north and south sides of the project footprint. These signs will advise the public against swimming or using watercraft on the water when present.<br>– Gates and signs will be placed along Springbank road to the west and east of the project footprint and along private residential access roads in Area C. Gates will be closed during all floods. Signs will advise vehicles that the roads are closed and to use an alternate route.<br>• Flood damage to Springbank Road will be repaired, as necessary. | | |
| 3B | 13.2 | Historical Resources | • Loss of or alteration to historical resource site contents or site contexts | • Since project-specific environmental effects on historical resources are continually mitigated to the standards established by ACT, after implementation of the required avoidance and mitigation measures stipulated for construction and dry dam operations (Volume 3A, Section 13), and Aboriginal consultation, there are no residual environmental effects to historical resources within the PDA from flood and post flood operations. | Flood and Post-flood | N/A |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3B | 14.2 | Traditional Land and Resource Use | • Change in Availability of Traditional Resources for Current Use | • In addition to applicable mitigation measures discussed in Volume 3A, Section 14.3.2, mitigation measures discussed in the various biophysical and socio-economic VC sections in relation to flood and post-flood operation will reduce or eliminate effects on the availability of traditional resources for current use, and reduce or eliminate effects on conditions that may prohibit or deter current use.<br>• As of March 16, 2018, Indigenous groups have not recommended mitigation measures related to changes in availability of traditional resources for current use during flood and post-flood operation.<br>• Project-specific recommendations made by Indigenous groups that do not pertain directly to potential effects of the Project on TLRU are discussed in the discussion of the Indigenous engagement program in Volume 1, Section 7. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| | | | • Change in Access to Traditional Resources or Areas for Current Use | • Mitigation measures discussed in the land use VC section in relation to flood and post-flood operation will reduce or eliminate effects on access to traditional resources or areas for current use in Area A (see Volume 3B, Section 12).<br>• As of March 16, 2018, Indigenous groups have not recommended mitigation measures pertaining to access to traditional resources or areas for current use during flood or post-flood operations.<br>• Project-specific recommendations made by Indigenous groups that do not pertain directly to potential effects of the Project on TLRU are discussed in the discussion of the Indigenous engagement program in Volume 1, Section 7. | | |
| | | | • Change in Current Use Sites or Areas | • Alberta Transportation will follow current industry best practices and comply with all provincial and federal legislation. Should additional historical resources be encountered, Alberta Transportation will follow current Alberta Culture and Tourism policies and guidelines.<br>• Changes in current use sites or areas will also be mitigated through applicable mitigation measures presented in Volume 3A, Section 14.3.4. Project-specific recommendations that do not pertain directly to potential effects of the Project on TLRU are discussed in the Indigenous engagement section in Volume 4, Appendix B. | | |
| | | | • Change in Indigenous Commercial Activities | • The Project is located downstream from identified Indigenous commercial activities, including Redwood Meadows Golf and Country Club. Therefore, no interactions are anticipated to occur between the Project and Indigenous commercial activities during flood and post-flood operation. No mitigation measures have been identified. | | |
| 3B | 15.4.2 | Public Health | Change to human health:<br>• Change to drinking water quality | • Mitigation measures with regards to air quality are already described in the Air Quality and Climate VC (Section 3.0, Volume 3B). These mitigations include re-establishing vegetation cover (e.g., native grasses) of the reservoir after it has been drained. This would be a naturally occurring process that would not require any human intervention. However, if natural re-vegetation is too slow or otherwise unsuccessful within the 6 months after a flood event, a tackifier will be applied when and where required to prevent wind erosion. Tackifiers are a sprayable erosion control product that bonds with the soil surface and creates a porous and absorbent erosion resistant blanket that can last for up to 12 months.<br>• The Glenmore Water Treatment Plant can manage high concentrations of TSS to produce safe drinking water. There are no mitigation measures recommended for the protection of public health with respect to water quality or country food quality. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3B | 16.2.2.2 | Infrastructure and Services | Change in Transportation Infrastructure and Services | • Road modifications will protect roadways and reduce effects on transportation infrastructure and services during a flood event and post-flood operations.<br>• A project specific traffic accommodation strategy will be developed for the Project.<br>• AEP will consult regularly with Rocky View County to provide flood updates, and to identify and address project-related traffic problems during flood and post-flood operations.<br>• After floodwaters have receded sufficiently, affected roadways and bridges will be inspected and repaired, if required.<br>• Following a design flood, it is estimated that the truck-haul traffic volumes created by the trucking of sediment and debris will be well within the capacity of the existing road infrastructure, or the future infrastructure in place at the time of the flood. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3B | 17.3.1.4 | Employment and Economy | Effects on Employment and Economy:<br>• Financial cost of floods | • The Project provides a benefit because it reduces the likelihood of flooding. The Project itself is a mitigation measure for flooding effects from Elbow River. | Flood and Post-flood | N/A |
| 3B | 18.1 | Federal Lands | Air Quality and Climate | • Mitigation measures for air quality and climate are provided in Volume 3B, Section 3; no additional mitigation measures beyond those identified are required specifically for federal lands. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| | 18.2 | Federal Lands | Acoustic Environment | • Mitigation measures for acoustic environment are provided in Volume 3B, Section 4; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.3 | Federal Lands | Hydrogeology | • Mitigation measures for hydrogeology are provided in Volume 3B, Section 5; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.4 | Federal Lands | Hydrology | • No mitigation measures for changes to hydrology during flood and post-flood are proposed as the purpose of the Project is to actively modify hydrology. | | |
| | 18.5 | Federal Lands | Surface Water Quality | • Mitigation measures for surface water quality are provided in Volume 3B, Section 7; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.6 | Federal Lands | Aquatic Ecology | • Mitigation measures for fish and fish habitat are provided in Volume 3B, Section 8; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.7 | Federal Lands | Terrain and Soils | • Mitigation measures for terrain and soils are provided in Volume 3B, Section 9; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.8 | Federal Lands | Vegetation and Wetlands | • Mitigation measures for vegetation and wetlands are provided in Volume 3B, Section 10; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.9 | Federal Lands | Wildlife and Biodiversity | • Mitigation measures for wildlife and biodiversity are provided in Volume 3B, Section 11; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.10 | Federal Lands | Land Use and Management | • Mitigation measures for land use and management are provided in Volume 3B, Section 12; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.11 | Federal Lands | Historical Resources | • Mitigation measures for historical resources are provided in Volume 3B, Section 13; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.12 | Federal Lands | Traditional Land and Resource Use | • Mitigation measures for TLRU are provided in Volume 3B, Section 14; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.13 | Federal Lands | Public Health | • Mitigation measures for public health are provided in Volume 3B, Section 15; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.14 | Federal Lands | Infrastructure and Services | • Mitigation measures for infrastructure and services are provided in Volume 3B, Section 16; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |
| | 18.15 | Federal Lands | Employment and Economy | • Mitigation measures for employment and economy are provided in Volume 3B, Section 17; no additional mitigation measures beyond those identified are required specifically for federal lands. | | |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3C | 1.3.2 | Cumulative Effects | Changes to the Environment | • No additional Project mitigation measures specific to cumulative effects are proposed. | All Project Phases | Owner/Operator (Alberta Environment and Parks) |
| 3C | 2.2.3 | Follow-up and Monitoring | Air Quality and Climate | • During the post-flood phase, particulate monitoring sites will be established at locations based on the presence of dry surfaces and expected paths of wind-blown materials. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3C | 2.4.3 | Follow-up and Monitoring | Hydrogeology | • To monitor for potential effects to groundwater, a selection of domestic water wells outside the project footprint but within the LAA will be sampled during dry operations and as soon as practical following a diverted flood.<br>• The location of the water wells will be determined based on those sites sampled for the hydrogeological baseline study (see Volume 4, Appendix I) and with the permission of the well owners.<br>• Data to be collected will include water level and the broad suite of analytical parameters as were analyzed for the groundwater baseline conditions in Volume 4, Appendix I. These include routine major ions, dissolved metals, nutrients, various organic parameters including benzene, toluene, ethylbenzene, xylenes (BTEX) and F1 to F2 fraction hydrocarbons, and bacteriological parameters.<br>• Results of the groundwater analysis will be reviewed by Alberta Environment and Parks. Changes in water quality that cause constituents to exceed Canadian Drinking Water Quality Guidelines will be further investigated and a remediation plan developed. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3C | 2.5.3 | Follow-up and Monitoring | Hydrology | • Following a flood event where water is diverted from the Elbow River, channel morphology studies will be implemented on the Elbow River and outlet channel.<br>• LiDAR mapping and instream observations of the River and outlet channel will be carried out both prior to release of water from the reservoir and after such a release. The results will be analyzed and compared to modelling results presented in Volume 3B, Section 6.4.4 of the EIA. The results will be provided to Alberta Environment and Parks and to Fisheries and Oceans Canada.<br>• Suspended sediment levels will be monitored following a flood event. This will include suspended sediment levels in the Elbow River following the flood but prior to release of water from the reservoir and following release of the water. The results will be provided to Alberta Environment and Parks, to Fisheries and Oceans Canada, and to the City of Calgary. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3C | 2.6.3 | Follow-up and Monitoring | Surface Water Quality | • Following a flood that results in the diversion of water to the reservoir and prior to discharge from the reservoir, water samples will be collected at the low-level outlet channel and analyzed for:<br>– turbidity, conductivity, pH, temperature, and dissolved oxygen (in situ measurements, including depth profiles in deeper part(s) of the reservoir)<br>– total suspended sediment<br>– major ions<br>– total and dissolved metals<br>– nutrients (including total phosphorus, dissolved phosphorus, nitrate, nitrite, and ammonia)<br>– methylmercury<br>– hydrocarbons (CCME F1-F4)<br>• The results will be provided to the City of Calgary water services department. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3C | 2.7.3 | Follow-up and Monitoring | Aquatic Ecology | • Follow-up monitoring during dry operations will include monitoring of: vegetation re-growth, reclamation and effectiveness of post-construction sediment and erosion controls; erosion on ditches, slopes, and watercourse banks; and of fish passage over the diversion structure. Details of fish passage success criteria will be developed with regulatory agencies.<br>• In the flood/post-flood phase, monitoring will include:<br>– stability of fish passage mitigation structure (boulders and riffles) after a flood<br>– vegetation growth<br>– measurement of movement of the fish passage mitigation structure | Dry Operation/ Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| | | | | – indicators of channel erosion or deposition in the previously surveyed reaches<br>– during draining of the reservoir, monitoring will be undertaken to identify isolated pools and the potential that fish may become stranded; if potential fish stranding is identified, further action will be determined to reduce potential mortality of fish<br>• Monitoring will be undertaken in the reservoir appropriate for conditions; e.g., use of a drone to identify isolated pools, by crews in shallow draft boats (e.g., airboats, light rafts with oars and jet motor, kayaks), or by crews on foot if the depth and substrate conditions are safe to wade in.<br>• Isolated pools will be identified, marked, and a determination by a Qualified Aquatic Environmental Specialist (QAES) will be made as to whether there are stranded fish in the pool that require rescue and relocation to secure habitats in the Elbow River. When the water has been fully drained, the low-level outlet canal will also be surveyed to identify isolated pools where fish might be stranded.<br>• Monitoring will be undertaken at a frequency that allows for successful fish rescue based on environmental conditions, including ambient air temperature and the rate of the receding water level.<br>• In the case that fish are identified in the pools, a fish rescue contingency plan will be initiated. Fish rescues in isolated pools will be undertaken using seine nets, minnow traps, and backpack electrofishing, or with tote barge or boat based electrofishing if the pool is too deep to wade safely. The fish rescue will be deemed successful if rescue efforts no longer result in captured fish, or the pool is dry, and fish are not observed.<br>• During post-flood reservoir maintenance, areas that had isolated pools may be graded to prevent the isolation of fish in successive flood events. | | |
| 3C | 2.9.3 | Follow-up and Monitoring | Vegetation and Wetlands | • Following a flood which results in the diversion of water to the reservoir, and after the draining of the reservoir, the area covered with sediment may be sprayed with surfactants to reduce the effects of wind erosion. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3C | 2.10.3 | Follow-up and Monitoring | Wildlife and Biodiversity | • A remote camera program will be designed, in consultation with Alberta Environment and Parks, to identify whether the diversion channel acts as a barrier to wildlife movement during dry operations, especially for ungulates, and determine the effectiveness of mitigation implemented throughout the diversion channel. This will include monitoring along the Elbow River to determine if wildlife use of the Key Wildlife and Biodiversity Zone (KWBZ) has been affected by the construction and operation of the Project. Although the specific details and design of the remote camera program will be determined with AEP, the following describes the basis of a preliminary approach.<br>• During the Project dry operation phase, a total of 14 remote cameras will be deployed in the wildlife LAA and monitor wildlife movement for at least one-year post-construction. The six remote cameras along the Elbow River will remain at the same locations as during the construction phase. Four remote cameras will be deployed soon after completion of project construction, and placed at the same locations as pre-construction baseline surveys near Highway 22 (i.e., near the raised portion of the highway at the north end of the wildlife LAA). An additional four remote cameras will be installed along wildlife friendly fencing at the edge of the diversion channel at crossable sections where there is vegetation. Remote cameras at the diversion channel will be spaced approximately 1 km apart.<br>• A wildlife biologist will visit the cameras every four months during construction and operation to change out memory cards and batteries, and check on the overall status of equipment (e.g., positioning, weather related malfunctions, animal or human tampering of equipment). | Dry Operation/Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3C | 2.11 | Follow-up and Monitoring | Land Use and Management | • There are no proposed follow-up or monitoring programs during the flood and post-flood phase of the Project. | Flood and Post-flood | N/A |
| 3C | 2.12.3 | Follow-up and Monitoring | Historical Resources | • There are no proposed follow-up or monitoring programs during the flood and post-flood phase of the Project. | Flood and Post-flood | N/A |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3C | 2.13 | Follow-up and Monitoring | Traditional Land and Resource Use | • No follow-up or monitoring is proposed with respect to traditional land and resource use beyond what has been identified for other VCs. | Flood and Post-flood | N/A |
| 3C | 2.14 | Follow-up and Monitoring | Public Health | • There are no proposed follow-up or monitoring programs during the flood and post-flood phase of the Project. | Flood and Post-flood | N/A |
| 3C | 2.15 | Follow-up and Monitoring | Infrastructure Services | • There are no proposed follow-up or monitoring programs during the flood and post-flood phase of the Project. | Flood and Post-flood | N/A |
| 3C | 2.16 | Follow-up and Monitoring | Employment and Economy | • There are no proposed follow-up or monitoring programs during the flood and post-flood phase of the Project. | Flood and Post-flood | N/A |
| 3D | 1.5.1 | Accidents and Malfunctions | Off-stream Reservoir Dam Failure or Breach | • In the event of failure or breach of the dam, AEMA and CEMA will enact emergency response procedures and disaster recovery programs.<br>• Water retained in the reservoir will be released through the low-level outlet, which has been designed to drawn down the reservoir from maximum capacity in 42 days, per United States Bureau of Reclamation dam safety guidelines (CITE). The low-level outlet channel gate is electrically powered; if an electrical failure or malfunction occurs, the gate can be operated manually. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3D | 1.5.2 | Accidents and Malfunctions | Diversion Structure Failure or Breach | • The service spillway is designed to pass debris during flood operations and will be monitored.<br>• If the diversion inlet gates do not open because of electrical failure or malfunction, floodwaters are designed to overtop the auxiliary spillway as opposed to flooding the Elbow River upstream of the diversion structure.<br>• All electrically-powered components within the diversion structure will have backup generators to power them and could be manipulated manually to resolve issues, if required.<br>• All components of the Project will be tested annually before flood season and identified issues will be resolved.<br>• Should failure or malfunction of the service spillway gates or diversion inlet gates occur, causes will be investigated, and mitigation action taken.<br>• Should overtopping of the auxiliary spillway occur, the spillway will be inspected during post-flood operations for structural damage.<br>• Should a failure or breach of the auxiliary spillway occur, emergency response procedures will be implemented to address public safety concerns and mitigate damage to infrastructure and services during flooding. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3D | 1.5.3 | Accidents and Malfunctions | Fire | • Contractors will develop fire protection procedures as part of their ECO Plans to address fire prevention and emergency response on site during cleanup activities. Onsite personnel will be trained in fire prevention, including proper disposal of hot or burning material and designated smoking areas, and response.<br>• Equipment and project components will be maintained to applicable standards in order to reduce the likelihood of malfunction resulting in fire and explosion. Flammable material will be stored following Alberta Labour guidance. | Dry Operation/Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3D | 1.5.4 | Accidents and Malfunctions | Hazardous Materials Spill | • Worker health, safety, and environment training will include spill prevention and response procedures.<br>• All workers will be required to have Workplace Hazardous Materials Information System (WHMIS) training.<br>• Equipment will be operated and maintained to applicable standards to reduce the likelihood of a spill.<br>• To reduce the potential for a spill during transportation to and from the site, transport of hazardous materials to and from the Project site, storage, use and disposal will be in accordance with regulatory requirements, and hazardous materials associated with the Project will be in compliance with the *Transportation of Dangerous Goods Act*.<br>• The ECO Plan will provide emergency procedures to prevent and respond to potential incidents that may impact the environment.<br>• The ECO Plan will identify every hazardous material to be stored on site by the Contractor and all sub-contractors, along with material-specific handling, containment, storage and disposal procedures. The storage location(s) of hazardous material will be identified on a site diagram included within the plan. Examples of hazardous materials and associated handling procedures include:<br>– Diesel fuel – designated refueling areas will be established at least 100 m from a water body. Fuel will be stored in a double walled tank located on an impervious tray with the capacity to hold 110% of the stored liquid volume. On-site fueling will follow best management practices which will be detailed in the ECO Plan. Fire extinguishers will be located at all refueling stations and no smoking signs will be erected. Spill kits will be available at all refueling stations and on all vehicles and workers will be trained in their use.<br>– Lubricating oil – lubricating oil will be stored in a fire proof containment locker and clearly labelled. When lubricating oil is used the Contractor will provide secondary containment with capacity to hold 110% of the stored liquid volume. | Dry Operation/Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3D | 1.5.5 | Accidents and Malfunctions | Vehicle Accident | • Alberta Environment and Parks will also consult regularly with Rocky View County to provide project updates, and to identify and address project-related traffic problems and other potential implications for services and infrastructure.<br>• All workers will be required to work in a safe manner and complete health, safety, and environment training.<br>• Project-related vehicles will be required to follow traffic rules such as speed limits and weight restrictions and federal and provincial highway regulations. | Flood/Post-flood | Owner/Operator (Alberta Environment and Parks) |
| 3D | 1.5.6 | Accidents and Malfunctions | Pipeline Rupture | • In the event of a pipeline rupture, it will be the responsibility of the third-party operator of that pipeline to contain the rupture and cleanup any contaminated soils or water in accordance with applicable guidelines.<br>• Should a rupture result in contamination of the water within the off-stream reservoir, contaminated water will be held within the reservoir and not released is back to the Elbow River until applicable guidelines were met. | Flood/Post-flood | Owner/Operator (Alberta Environment and Parks) / Third Party Pipeline Operators |

**Table C-2 List of Mitigation Measures for the Flood and Post-Flood Phase of the Project**

| Vol. | Section | Valued Component | Potential Environmental Effect and Effect Pathway | Mitigation Measure | Project Phase | Responsible Agent |
|---|---|---|---|---|---|---|
| 3D | 2.3.2 | Effects of the Environment on the Project | Extreme and Normal Weather Conditions:<br>• Precipitation and Flooding<br>• Tornadoes<br>• Climate Change | • An emergency spillway is included in the design in case the diversion channel becomes obstructed with debris. A debris management program will also be implemented during all phases of Project operation. This program will include measures such as debris removal in the Elbow River at the diversion structure, upstream of the diversion structure, and within the off-stream reservoir. | Dry Operation/Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| | | | | • In the event of a tornado, contractors will implement contingency measures and emergency preparedness plan and stop work if conditions are unsafe. Damage to infrastructure caused by tornadoes will be repaired.<br>• The Project is designed to mitigate effects of climate change on flood operations, including extreme precipitation events and increased risk of seasonal flooding. The emergency spillway is designed to operate if the capacity of the off-stream reservoir is exhausted and the diversion inlet structure is still open. | Dry Operation/Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |
| | | | External Conditions:<br>• Wildfires<br>• Seismic Events | • Onsite personnel will be trained in fire prevention, including proper disposal of hot or burning material and designated smoking areas, and response.<br>• Equipment and project components will be maintained to applicable standards in order to reduce the likelihood of malfunction resulting in fire and explosion. Flammable materials will be stored following regulatory requirements.<br>• Access roads constructed to the PDA and in the PDA (e.g., along the top of the dam) will be permanent for the life of the Project and allow for access to the PDA by firefighters during all phases of the Project.<br>• Damage to Project infrastructure caused by wildfires during dry operations and post-flood operations will be repaired. | Flood and Post-flood | Owner/Operator (Alberta Environment and Parks) |

NOTES:
N/A – not applicable