

**SPRINGBANK OFF-STREAM RESERVOIR PROJECT
ENVIRONMENTAL IMPACT ASSESSMENT
VOLUME 3C: EFFECTS ASSESSMENT (CUMULATIVE EFFECTS, FOLLOW-UP AND MONITORING)**

Preliminary Follow-up and Monitoring Programs
March 2018

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2.0 PRELIMINARY FOLLOW-UP AND MONITORING PROGRAMS

2.1 INTRODUCTION

The preliminary follow-up and monitoring programs for the Project are described for each Valued Component (VC). The level of detail is commensurate with the nature of the VC, effects and mitigation. For VCs requiring more description, the information is organized by purpose, objectives and actions.

Final follow-up and monitoring plans will rely on approval conditions (both provincial and federal), future refinement of Project planning and design, and the results of ongoing consultation with Indigenous groups and public stakeholders. Final follow-up and monitoring plans will include further details and guidelines for preparing monitoring reports (e.g., number, content, frequency and format).

The remainder of this Introduction section addresses some details of relevance to more than one VC.

2.1.1 Provincial Monitoring Guidelines

Engineering, dam safety and geotechnical monitoring of the Springbank Off-stream Reservoir Project are discussed in Volume 1 – Project Description. During construction, a dam safety management system will be implemented where the following (among others) geotechnical conditions will be monitored:

- rate of earthfill placement and subsequent pore pressure response in the foundation units and lower earthfill layers
- erosion monitoring of the toe of the dam

A Project-specific inspection and monitoring plan will be developed. During operations, sensors in the dams will monitor geotechnical conditions. Surface water and reservoir levels will be monitored through redundant sensors and alarms.

Alberta Transportation includes standard environmental monitoring requirements in their Civil Works Master Specifications (<http://www.transportation.alberta.ca/3804.htm>) and their Environmental Construction Operations (ECO) Plan (<http://www.transportation.alberta.ca/Content/docType245/Production/2017ECOPlanFramework.pdf>) that contractors are required to submit for a project.

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2.1.2 Cumulative Effects

Alberta Transportation has committed to a wide range of mitigation measures and follow-up programs to address residual environmental effects identified in the EIS. Many of these measures will also assist in reducing the Project's contribution to cumulative environmental effects. Cumulative environmental effects are predicted to be not significant for the Project and, in the majority of cases, Project contributions to cumulative effects are low. Alberta Transportation is responsible for mitigating and monitoring the effects of the Project, but is not responsible for monitoring impacts of future projects and activities of other proponents or the impacts of future government regulatory initiatives on regional development.

2.1.3 Opportunities for Participation of Indigenous People in Monitoring

Alberta Transportation will follow government procurement policies and procedure with respect to labour, and goods and services. Alberta Transportation is willing to discuss possible monitoring and economic opportunities with Indigenous groups.

2.2 AIR QUALITY AND CLIMATE

2.2.1 Purpose

As maximum total suspended particulate (TSP) and PM_{2.5} concentrations and dustfall deposition are predicted to be greater than the ambient air quality criteria outside the PDA during construction, an ambient air quality monitoring program will be used to determine TSP concentrations, PM_{2.5} concentrations, and dustfall during construction. The air quality and climate follow-up program will be conducted to validate the success of particulate matter mitigation measures.

2.2.2 Objectives

The objective of the air quality and climate monitoring plan is to confirm that concentrations of PM_{2.5} and TSP are below the 24-hour Alberta Ambient Air Quality Objective of 30 µg/m³ for PM_{2.5} and 100 µg/m³ for TSP, and take corrective action if values are above those regulatory objectives. The objective of the follow-up plan is also to confirm that the measures to mitigate exceedances are effective.

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2.2.3 Actions

Monitoring will be implemented, in conjunction with emissions mitigation, to provide understanding of meteorological conditions, off-site concentrations, and determine whether more rigorous mitigation is needed. 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 PM_{2.5} and TSP concentrations.

During construction, 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.

During post-flood operations, particulate monitoring sites will be established at locations based on the presence of dry surfaces and expected paths of wind-blown materials.

Monitoring will be continuous. Results will be reported to the environmental inspector who will provide the information to the Alberta Transportation Provincial Environmental Coordinator who would initiate action. During post-flood operations, results will go to the Environmental Coordinator for AEP, the Project operator.

If the monitoring program indicates that the ground-level TSP concentrations are greater than an ambient air quality objective, then additional mitigation to reduce TSP emissions will be implemented. These could include the suspension of construction activity, increased watering of access roads or the spraying of surfactants during construction; and the spraying of surfactants during post-flood operations.

The details of the monitoring program and the results will be made available to nearby residents.

2.3 ACOUSTIC ENVIRONMENT

2.3.1 Purpose

Noise modelling results indicate noise levels to be non-compliant with certain Health Canada criteria and World Health Organization thresholds during parts of the construction phase. The follow-up program will identify where and when mitigation measures are required and their success.

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2.3.2 Objectives

The objective of the acoustic environment follow-up program is to measure noise levels at selected sites during construction, implement noise mitigation measures, as required, and monitor their success.

2.3.3 Actions

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. 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. 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.

2.4 HYDROGEOLOGY

2.4.1 Purpose

The effects of the Project on groundwater and local water wells has been noted as a concern by landowners in the area and by the Tsuut'ina Nation. A follow-up and monitoring program will validate the results of the hydrogeological modelling and monitor the effects of a flood on groundwater in the LAA.

2.4.2 Objectives

The objective of the hydrogeology follow-up and monitoring program is to determine whether there are changes to the volume or quality of the groundwater in the LAA as a result of construction or operations.

2.4.3 Actions

To monitor for potential effects to groundwater, a selection of domestic water wells outside the PDA but within the LAA will be sampled during dry operations and as soon as practical following a diverted flood. The location of the water wells will be determined based on those sites sampled for the hydrogeological baseline study (see Volume 4, Appendix I, Hydrogeology Baseline Technical Data Report) and with the permission of the well owners. Data collected will include water level and a broad suite of analytical parameters that were analyzed for the groundwater baseline conditions. These parameters include routine major ions, dissolved metals,

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nutrients, various organic parameters including benzene, toluene, ethylbenzene, xylenes (BTEX) and F1 to F2 fraction hydrocarbons, and bacteriological parameters.

Results of the groundwater analysis will be reviewed by AEP. Changes in water quality that cause constituents to exceed Canadian Drinking Water Quality Guidelines will be further investigated and a remediation plan developed.

2.5 HYDROLOGY

2.5.1 Purpose

The effects of the construction of the Project and dry operations on the Elbow River are assessed as negligible and no specific follow-up with respect to hydrological changes are planned.

During diversion of the Elbow River during high-magnitude floods and the release of water from the off-stream reservoir following a flood, there would be changes in suspended sediment transport and channel morphology of the Elbow River. The follow-up program will provide information on those changes.

2.5.2 Objectives

The follow-up program for hydrology will collect data on the changes to the Elbow River and low-level outlet channel following high-magnitude flood events when water is diverted to the off-stream reservoir.

2.5.3 Actions

Following a flood where water is diverted from the Elbow River, channel morphology studies will be implemented on the Elbow River and outlet channel. LiDAR mapping and instream observations of the river and low-level outlet channel will be completed 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. The results will be provided to AEP and to Fisheries and Oceans Canada.

Suspended sediment levels will be monitored following a flood. This will include suspended sediment levels in the Elbow River following the flood but prior to release of water from the reservoir and then following release of the water. The results will be provided to AEP, to Fisheries and Oceans Canada, and to the City of Calgary.

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2.6 SURFACE WATER QUALITY

2.6.1 Purpose

Water quality follow-up and monitoring will be implemented to measure changes in the water quality in Elbow River because of construction and, after a diverted flood, the release of impounded water from the reservoir. Follow-up and monitoring will also confirm success of the erosion and sediment control measures for the Project.

2.6.2 Objectives

The objective of the water quality follow-up and monitoring program is to determine whether the water in the Elbow River downstream of the Project:

- meets or exceeds an implemented water quality objective
- meets or exceeds site-specific water quality guideline for the protection of aquatic life
- contravenes a watershed management target or causes acute or chronic toxicity to aquatic life
- changes the trophic status of a lake or stream

2.6.3 Actions

Suspended sediment concentrations will be monitored upstream and downstream of instream construction activities to identify potential sediment-related effects from construction. 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 would include those from Alberta Transportation's Erosion and Sediment Control Manual (Alberta Transportation 2011) such as use of:

- silt fencing
- continuous perimeter control structures
- storm drain inlet sediment barrier
- straw bale barrier
- energy dissipators
- sediment traps and basins
- slope drains

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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:

- turbidity, conductivity, pH, temperature, and dissolved oxygen (*in situ* measurements, including depth profiles in deeper part(s) of the reservoir)
- total suspended sediment
- major ions
- total and dissolved metals
- nutrients (including total phosphorus, dissolved phosphorus, nitrate, nitrite, and ammonia)
- methylmercury
- hydrocarbons (CCME F1-F4)

The results will be provided to the City of Calgary water services department.

2.7 AQUATIC ECOLOGY

2.7.1 Purpose

The Project involves the construction of instream structures, the diversion of water from the Elbow River, and the return of diverted water to the river. Mitigation measures have been developed to protect the aquatic environment. The follow-up and monitoring plan is designed to assess the success of the mitigation measures and adjust the mitigation measures, where necessary

2.7.2 Objectives

The objectives of the follow-up and monitoring plan are to assess compliance to regulatory permits and proposed mitigation measures, as well as the effectiveness of the design of Project components and mitigation for the protection of the aquatic environment.

2.7.3 Actions

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.

The following provides further details for each Project phase.

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2.7.3.1 Construction Monitoring

Construction related monitoring will include, but not be limited to:

- annual offset monitoring to assess the condition of habitat offsetting measures and identify potential remediation measures:
 - success of offsetting measures determined by criteria that determine if offsetting is functioning as intended and to identify contingencies if monitoring shows deficiencies
 - 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
- information to be documented during construction includes:
 - written and photo-documented sequence of events during construction
 - changes to design and field-fitting to adapt to unanticipated field conditions (discussed with Fisheries and Oceans Canada if important changes are observed)
 - technical issues that arise and how they are addressed
 - confirmation that offsetting components meet the design requirements
 - confirmation that the terms of the Department of Fisheries and Oceans Authorization are met

Turbidity monitoring will be implemented during instream construction. If sediment release is identified, mitigation to prevent further sediment release will be implemented. 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. 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 (CCME, 2002), and the ESRD Environmental Quality Guidelines for Alberta Surface Waters (ESRD, 2014). 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).

2.7.3.2 Dry Operations Monitoring

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.

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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:

- location and measurements of the structures on the bed and banks
- location and quantity of the vegetation reclamation
- location and measurements of the Fish Passage Mitigation Structure
- fish habitat, abundance, distribution, and benthic invertebrate monitoring in previously sampled reaches (1-12)
- location and measurements of required fisheries offsetting measures

2.7.3.3 Flood/Post Flood Monitoring

In the flood/post-flood phase, monitoring would include:

- stability of fish passage mitigation structure (boulders and riffles) after a flood
- vegetation growth
- measurement of movement of the fish passage mitigation structure
- indicators of channel erosion or deposition in the previously surveyed reaches
- 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

Post-Flood Monitoring of Reservoir Dewatering for Stranded Fish

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.

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.

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.

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Fish Rescue Contingency

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 would be deemed successful if rescue efforts no longer result in captured fish, or the pool is dry, and fish are not observed.

During post-flood reservoir maintenance, areas that had isolated pools may be graded to prevent the isolation of fish in successive flood events.

2.8 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 (Alberta Transportation 2011). Direction for the development and implementation of erosion and sediment monitoring includes:

- adherence to requirements in the "Checklist for Erosion and Sediment Control Plan Development" (Appendix D of Alberta Transportation 2011), which includes:
 - during initial stage, compilation of site information such as construction drawings, soil survey and geotechnical reports, imagery and vegetation maps
 - conducting site visits to identify and document areas of erosion concern and drainage networks
 - based on an analysis of site conditions, identifying best management practices for controlling erosion and sediment, both at source and as measures to reduce volume of surface runoff and entrained sediment load
 - implementation and maintenance of erosion management system
- during subsequent erosion and sediment monitoring programs, documenting findings according to the "Inspection and Maintenance Form" (Appendix D of Alberta Transportation 2011)

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2.9 VEGETATION AND WETLANDS

2.9.1 Purpose

The Project alters native upland vegetation and wetland communities but with no loss of native upland and wetland plant communities, or wetland functions, in the LAA. Follow-up and monitoring of Project effects on vegetation and wetlands will be implemented to determine the effectiveness of mitigation measures to address changes to the vegetation and wetlands and define additional actions that may be needed if mitigation measures were not effective.

2.9.2 Objectives

The objectives of the follow-up and monitoring program are to assess the success of reclamation measures as outlined in Volume 4, Appendix D.

2.9.3 Actions

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.

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.

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.

Soil monitoring will focus on compaction, erosion and areas of poor vegetation growth.

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.

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.

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2.10 WILDLIFE AND BIODIVERSITY

2.10.1 Purpose

The wildlife assessment identifies the potential for changes to wildlife movement during the construction and operation of the diversion channel, floodplain berm, and dam.

2.10.2 Objectives

The objective of the wildlife follow-up and monitoring program is to identify whether permanent features of the Project, such as the diversion channel, act as a barrier to wildlife movement in the LAA, especially for ungulates. The follow-up and monitoring program will be designed to verify predictions made on Project effects to wildlife movement in the LAA during construction and dry operation, monitor wildlife use of the diversion channel during dry operation, and where appropriate determine effectiveness of mitigation to reduce Project effects on wildlife movement. Possible additional mitigation measures include placement of material more conducive for wildlife to move across in vegetated areas in the diversion channel, floodplain berm, and dam.

2.10.3 Actions

A remote camera program will be designed, in consultation with Alberta Environment and Parks (AEP), 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.

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.

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

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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.

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).

2.11 LAND USE AND MANAGEMENT

Land users in the LAA may be affected by temporary changes to access and nuisance noise, light, and air emissions during construction. However, these effects are limited to the construction phase or shorter. Land users in the LAA are not anticipated to be affected during dry operations. Access to areas in the PDA and to the LAA would be affected by 1:100 year and design floods because Springbank Road is anticipated to be flooded by these events. Post-flood operation includes repair of Springbank Road and cleanup and repair, as necessary, in the project area. Given the short-term nature of the effects, no follow-up or monitoring is proposed for land use and management.

2.12 HISTORICAL RESOURCES

2.12.1 Purpose

In a letter dated November 22, 2017, Alberta Culture and Tourism (ACT) outlined the *Historical Resources Act* requirements for the Project. This letter is attached as Attachment A.

2.12.2 Objectives

The objective of the historical resources follow-up and monitoring program is to meet the requires of ACT, as outlined in their letter.

2.12.3 Actions

Results of the follow-up and monitoring program will be submitted to ACT.

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2.12.3.1 Archaeological Resources

Additional studies will address the following locations:

- 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).
- A deep testing program in areas of deep sedimentation. Backhoe testing for legal locations 18 & 19-24-3 W5M (reservoir and low-level 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).

Specific activities are presented in Table 2-1.

Table 2-1 Archaeological Follow-up Activities

Site	Activity
EgPo-71 (school)	If avoidance of this site is not feasible, a Stage 1 hand excavation of 4 m ² will be conducted at shovel test MJ01.
EgPo-132 (isolated find)	If avoidance of this site is not feasible, a Stage 1 hand excavation of 4 m ² will be conducted at shovel test DB11 with additional shovel testing on the associated knoll.
EgPo-135 (scatter)	If avoidance of this site is not feasible, a Stage 1 hand excavation of 4 m ² will be conducted.
EgPo-141 (campsite)	If avoidance of this site is not feasible, a Stage 1 hand excavation of 20 m ² will be conducted, with possibility a Stage II excavation depending on results. Additional shovel testing will be conducted to better define the site limits and artifact distribution.
EgPo-146 (farm)	If avoidance of this site is not feasible, a systematic shovel testing of the barn area and associated lands will be conducted.
EgPo-147 (homestead, ranch)	If avoidance of this site is not feasible, a systematic shovel testing around the historic structures and associated lands will be conducted.
EgPo-149 (homestead)	If avoidance of this site is not feasible, Stage I hand excavation of 10 m ² will be conducted with 1 m ² units at the entrance, adjacent to an exterior wall of the two log cabins, at the outbuilding and at the three unidentified ruins with the remaining 4 m ² at the main house.

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2.12.3.2 Palaeontological Resources

Additional studies will consist of the following:

- construction monitoring will be conducted during excavation of bedrock for the diversion inlet.
- construction monitoring program will be conducted wherever at least 4 m of bedrock will be excavated (including emergency spillway).
- field evaluation will be conducted of the tributary that will receive emergency spillway flows.
- deep testing program will be conducted in the off-stream reservoir, in conjunction with archaeology, for any areas that may have deep Holocene sedimentation, especially around the existing small drainages.
- deep testing program will be conducted along the low-level outlet. Depending on the findings of the deep testing program, a palaeontological construction monitoring program at the site may be required. When the low-level outlet is used to drain the reservoir, a post-impact assessment along the tributary will be conducted.
- construction monitoring will be conducted if it is necessary to excavate additional bedrock for the new road alignment.
- construction monitoring program will be implemented, if open cut methods are used for the three pipelines in Sections 10 and 15-24-4-W5M that will be re-located under the diversion channel.

2.13 TRADITIONAL LAND AND RESOURCE USE

The Project is to be located on what is currently private land. Access to most of the area will be restricted once the Project is constructed. As such, no follow-up or monitoring is proposed with respect to traditional land and resource use beyond what has been identified for other VCs.

2.14 PUBLIC HEALTH

Follow-up and monitoring with respect to public health is accomplished by follow-up and monitoring for air quality, acoustic environment and water quality.

2.15 INFRASTRUCTURE AND SERVICES

Flood and post-flood operations during a design flood would affect existing roadways, but residual adverse effects on transportation infrastructure and services are of low magnitude and not significant. As such, no follow-up or monitoring is proposed.

**SPRINGBANK OFF-STREAM RESERVOIR PROJECT
ENVIRONMENTAL IMPACT ASSESSMENT
VOLUME 3C: EFFECTS ASSESSMENT (CUMULATIVE EFFECTS, FOLLOW-UP AND MONITORING)**

Preliminary Follow-up and Monitoring Programs
March 2018

2.16 EMPLOYMENT AND ECONOMY

The Project would not materially affect labour supply and demand in the LAA during construction or dry operations because the available labour force greatly exceeds the workforce requirements. The Project is expected to have a largely beneficial effect on commercial businesses operating in the LAA because of opportunities associated with project spending. While there is potential for adverse effects due to competition for available labour and cost of labour supply, this effect is predicted to be negligible because of the large available workforce in the LAA. The Project is predicted to have a beneficial effect on the provincial economy as a result of increased GDP and government revenue associated with construction expenditures. As the Project will therefore have a net economic benefit during post-flood operations, no follow-up or monitoring is proposed for employment and economy.

2.17 REFERENCES

Alberta Transportation. 2011. Erosion and Sediment Control Manual – June 2011.

CCME (Canadian Council of Ministers of the Environment). 2002. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Total Particulate Matter. Available at: <http://ceqg-rcqe.ccme.ca/download/en/217>. Accessed: May 2016.

ESRD. 2014. Environmental Quality Guidelines for Alberta Surface Waters. Water Policy Branch, Policy Division. Edmonton. 48pp.

**SPRINGBANK OFF-STREAM RESERVOIR PROJECT
ENVIRONMENTAL IMPACT ASSESSMENT
VOLUME 3C: EFFECTS ASSESSMENT (CUMULATIVE EFFECTS, FOLLOW-UP AND MONITORING)**

Attachment A Historical Resource Act Requirements for the Springbank Off-Stream Reservoir
March 2018

**Attachment A HISTORICAL RESOURCE ACT REQUIREMENTS
FOR THE SPRINGBANK OFF-STREAM
RESERVOIR**

Historical Resources Act Requirements

Proponent: Alberta Transportation
2nd Floor, Twin Atria Building, 4999-98th Avenue, Edmonton, AB T6B 2X3

Contact: Mr. Mark Svenson

Agent: Stantec Consulting Ltd.
Contact: Meaghan Porter

Project Name: Springbank Off-stream Reservoir

Project Components: Reservoir
Dam
Other - diversion&outlet infrastructure; road&utility work

Application Purpose: Requesting HRA Approval / Requirements

Pursuant to Section 37(2) of the *Historical Resources Act*, a Historic Resources Impact Assessment is required for all or portions of those activities described in this application and its attached plan(s)/sketch(es). The Historic Resources Impact Assessment is to be conducted in accordance with the instructions outlined in the following schedule.



David Link
Assistant Deputy Minister

SCHEDULE OF REQUIREMENTS

ARCHAEOLOGICAL RESOURCES

Pursuant to Section 37(2) of the *Historical Resources Act*, additional studies are to be conducted on behalf of the proponent by an archaeologist qualified to hold an archaeological research permit within the Province of Alberta. A permit must be issued by Alberta Culture and Tourism prior to the initiation of any archaeological field investigations. Please allow ten working days for the permit application to be processed.

1. The following *Historical Resources Act* conditions are based on the results of Historic Resources Impact Assessment studies carried out by Stantec Consulting Ltd. under Archaeological Research Permit No. 16-012.
2. The Historic Resources Impact Assessment is to be carried out prior to the initiation of any land surface disturbance activities under snow-free, unfrozen ground conditions. Should the project require field studies under winter conditions, directions in the [Archaeological Survey Information Bulletin: Winter Conditions](#) must be followed.

SCHEDULE OF REQUIREMENTS (continued)

3. The additional studies must address the following locations:

- Gap areas requiring assessment include 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).
- A deep testing program is required in areas of significant sedimentation. Backhoe testing is required 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).

4. Site-specific conditions and approvals are itemized below.

SITE	HRV	SITE DESCRIPTION	CONDITIONS/APPROVAL
EgPo-67	0	scatter, campsite	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-69	0	campsite	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-71	4	dwelling, school	This site requires avoidance or additional studies. If avoidance is not feasible, then the requirements are as follows: <ul style="list-style-type: none"> • Stage I hand excavation of 4 square metres at shovel test MJ01.
EgPo-132	4	isolated find	This site requires avoidance or additional studies. If avoidance is not feasible, then the requirements are as follows: <ul style="list-style-type: none"> • Stage I hand excavation of 4 square metres at shovel test DB11. • additional shovel testing of the associated knoll.
EgPo-133	0	isolated find	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-134	0	campsite	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-135	4	scatter >10	This site requires avoidance or additional studies. If avoidance is not feasible, then the requirements are as follows: <ul style="list-style-type: none"> • Stage I hand excavation of 4 square metres.
EgPo-136	0	historic feature,	There are no further <i>Historical Resources Act</i>

SCHEDULE OF REQUIREMENTS (continued)

		scatter >10	requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-137	0	isolated find	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-138	0	historic feature, scatter >10	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-139	0	campsite	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-140	0	isolated find	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-141	4	campsite	<p>This site requires avoidance or additional studies. If avoidance is not feasible, then the requirements are as follows:</p> <ul style="list-style-type: none"> • Stage I hand excavation of 20 square metres with possibility of Stage II depending on results. If appropriate material is found in good context a radiocarbon date should be obtained. • Additional shovel testing to better define the site limits and artifact distribution.
EgPo-142	0	campsite	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-143	0	scatter >10	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-144	4	scatter >10	There are no further <i>Historical Resources Act</i> requirements for this site relative to the current project. If additional development occurs in the area, further assessment may be required.
EgPo-145	4	isolated find	There are no further <i>Historical Resources Act</i> requirements for this site relative to the current project. If additional development occurs in the area, further assessment may be required.

SCHEDULE OF REQUIREMENTS (continued)

EgPo-146	4	farm	This site requires avoidance or additional studies. If avoidance is not feasible, then the requirements are as follows: <ul style="list-style-type: none"> • Systematic shovel testing of the barn area and associated lands.
EgPo-147	4	homestead, ranch	This site requires avoidance or additional studies. If avoidance is not feasible, then the requirements are as follows: <ul style="list-style-type: none"> • Systematic shovel testing around the historic structures and associated lands.
EgPo-148	0	historic feature, ranch	There are no further <i>Historical Resources Act</i> requirements for this site relative to current or future projects. Development may proceed in the area of this site.
EgPo-149	4	homestead	This site requires avoidance or additional studies. If avoidance is not feasible, then the requirements are as follows: <ul style="list-style-type: none"> • Stage I hand excavation of 10 square metres with 1 square metre units at the entrance, adjacent to an exterior wall of the two log cabins, at the outbuilding and at the three unidentified ruins with the remaining 4 square metres at the main house.
EgPo-150	4	campsite	There are no further <i>Historical Resources Act</i> requirements for this site relative to the current project. If additional development occurs in the area, further assessment may be required.

PALAEONTOLOGICAL RESOURCES

Pursuant to Section 37(2) of the *Historical Resources Act*, additional studies are to be conducted on behalf of the proponent by a palaeontologist qualified to hold a palaeontological research permit within the Province of Alberta. A permit must be issued by Alberta Culture and Tourism prior to the initiation of any palaeontological field investigations. Please allow ten working days for the permit application to be processed.

1. The following *Historical Resources Act* conditions are based on the results of Historic Resources Impact Assessment studies carried out by Stantec Consulting Ltd. under Palaeontological Research Permit No. 16-069.
2. Diversion complex: A palaeontological construction monitoring program is required during excavation of bedrock for the diversion inlet. There are no further requirements for the spillways or berm.

SCHEDULE OF REQUIREMENTS (continued)

3. Diversion channel: A palaeontological construction monitoring program is required wherever at least 4 m of bedrock will be excavated (including emergency spillway). Field evaluation by a professional palaeontologist is required for the tributary that will receive emergency spillway flows. Depending on the results of this evaluation, a deep testing program for buried Quaternary palaeontological resources may be required.
4. Off-stream reservoir: A deep testing program, in conjunction with archaeology, is required to investigate any areas that may have deep Holocene sedimentation, especially around the existing small drainages.
5. Low-level outlet: Further evaluation is required in the form of deep testing along the outlet tributary, which may have buried Quaternary palaeontological resources along the tributary valley. Depending on the findings of the deep testing program, a palaeontological construction monitoring program may be required. If the outlet is used to drain the reservoir, a post-impact assessment along the tributary is also required.
6. Highway 22: If the road is re-aligned through the project area, the existing bedrock exposure should be left intact and not reclaimed to maintain its use as a reference section for the Brazeau-Coalspur contact. If it is necessary to excavate additional bedrock for the new road alignment, palaeontological construction monitoring is required.
7. Utilities: If open cut methods are used, a palaeontological construction monitoring program is required for the three pipelines in Sections 10 and 15-24-4-W5M that would be re-located under the diversion channel. Once plans are available for the location of pipelines that must be moved outside of the off-stream storage dam footprint, they must be submitted to Alberta Culture and Tourism for review. No further work is required for the powerline relocations.
8. No further work is required for the location of the off-stream storage dam, Springbank Road/Township Road 244, or Township Road 242.

ABORIGINAL TRADITIONAL USE SITES

There are no Historical Resources Act requirements associated with Aboriginal traditional use sites of a historic resource nature; however, the proponent must comply with standard conditions under the Historical Resources Act, which are applicable to all land surface disturbance activities in the Province.

HISTORIC STRUCTURES

Pursuant to Section 37(2) of the *Historical Resources Act*, additional studies are to be conducted on behalf of the proponent by a qualified historic resource consultant.

1. Additional documentation of historic structures is required prior to any development-related impact to these structures. These structures are located at the Copithorne homestead (10-13-24-4-W5M), Val Vista Ranch (16-24-24-4-W5M), and the Vaudin Homestead/Moose Hill Ranch (15-3-24-4-W5M).
2. Historic resource consultants undertaking the documentation are to comply with the requirements for recording historic structures outlined in the [Requirements for Recording Historic Structures](#).
3. Additional site-specific requirements and approvals are itemized below.

SITE	HRV	SITE DESCRIPTION	CONDITIONS/APPROVAL
HS 107157	N/A	well shed	The documentation completed for this site is considered to be acceptable, and there are no further requirements

SCHEDULE OF REQUIREMENTS (continued)

			for this site.
HS 107159	N/A	cabin	Documentation will be sufficient when an update form for HS 88048 has been completed.
HS 107158	N/A	granary	The documentation completed for this site is considered to be acceptable, and there are no further requirements for this site.

PROVINCIALY DESIGNATED HISTORIC RESOURCES

There are no Historical Resources Act requirements associated with Provincially Designated Historic Resources; however, the proponent must comply with standard conditions under the Historical Resources Act, which are applicable to all land surface disturbance activities in the Province.

SPECIAL CONDITIONS

1. In addition to any specific conditions detailed above, the proponent must abide by all [Standard Conditions under the *Historical Resources Act*](#).

Lands Affected: All New Lands

Proposed Development Area:

MER	RGE	TWP	SEC	LSD List
5	4	24	3,10,13-15,22-28	
5	3	24	17-19	

Documents Attached:

Document Name	Document Type
illustrative material	Illustrative Material