Springbank Off-Stream Reservoir Project

Canada Environmental Assessment Act, 2012

Project Description
Executive Summary

April 18, 2016

Prepared for:
Alberta Transportation

Prepared by:
Stantec Consulting Ltd.

Stantec

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1.0 GENERAL INFORMATION AND CONTACTS

1.1 PROJECT'S NAME, NATURE AND PROPOSED LOCATION.

The Springbank Off-Stream Reservoir (SR1) project is a flood mitigation infrastructure to prevent the effects of future extreme flood events, and will be located adjacent to the Elbow River 15 km west of Calgary Alberta.

Alberta Transportation (AT) has prepared a Project Description that complies with the *Prescribed Information for the Description of a Designated Project Regulations,* and the Guide to Preparing a Description of a Designated Project under the *Canadian Environmental Assessment Act, 2012*. This Project Description Summary is prepared to assist in the Canadian Environmental Assessment Agency's (the Agency's) determination on the need for a federal environmental assessment of the Project.

The flooding that affected southern Alberta in June 2013 was unprecedented; affecting thousands of people in the City of Calgary and downstream communities. The effects of this flood event on infrastructure, watercourses and people have raised awareness of the need to be better prepared for extreme weather in the future.

1.2 PROPONENT'S NAME AND CONTACT INFORMATION.

Project name and proponent contact information are provided below:

Name of the designated project: Springbank Off-stream Reservoir Project (SR1)

Name of the proponent: Government of Alberta

Address of the proponent:
3rd Floor Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta
T6B 2X3

Chief Executive Officer:
Syed Abbas. P.Eng.
Alberta Transportation
Project Director, Major Capital Projects Branch
Phone: 780-644-7022
Fax: 780-415-0475
Email: syed.abbas@gov.ab.ca

Principal contact person: Mark Svenson, P.Biol.
Alberta Transportation
Environmental Coordinator, Provincial Transportation
Phone: 780-644-8354
Fax: 780-422-2027
Email: mark.svenson@gov.ab.ca

1.3 RESULTS OF ANY CONSULTATIONS UNDERTAKEN WITH ANY JURISDICTIONS AND OTHER PARTIES INCLUDING ABORIGINAL PEOPLES AND THE PUBLIC

The Alberta government has identified that the five First Nations of Treaty 7 are either potentially affected or may be interested in the Project (see Table 1). Should it be determined that there is a need for a federal environmental assessment, additional Aboriginal Groups would be added.

Table 1 Aboriginal Groups Affected or Interested in the Project

Aboriginal Group	Distance from Project Area	Address
Tsuu T'ina First Nation	South 395 m	9911 Chiila Boulevard, Tsuu T'ina AB, T2W 6H6
Stoney First Nation (Bearspaw, Chiniki and Wesley Bands)	West 16.3 km NW 27.8 km South 61.5 km	P.O. Box 120, Morley AB, T0L 1N0
Siksika First Nation	East 78 km	P.O. Box 1100, Siksika AB, T0J 3W0
Piikani First Nation	South 155 km	P.O. Box 70, Brocket AB, T0K 0H0
Blood Tribe	South 171 km	P.O. Box 60, Standoff AB, T0L 1Y0

The Stoney and Tsuu T'ina First Nations are closest in proximity to the Project Area.

AT engaged the Treaty 7 First Nations early in the consultation process and has sought to provide them with updated information on the Project as it became available. AT has also met with each Nation to further discuss the Project with them, and to listen to their issues and concerns. A summary of the consultation activities that have been undertaken with the Treaty 7 Nations follows.

On August 18, 2014 an initial letter outlining the Project was mailed out to each of the Tsuu T'ina, Stoney, Siksika, Piikani and Blood Nations. This was followed by a notification letter sent to each Nation by registered mail on September 5, 2014.

AT met with representatives of the Stoney First Nation October 20, 2014 to provide them with an overview of the Project. Similar meetings were held with the Siksika First Nation October 27, 2014; the Piikani First Nation November 7, 2014; the Tsuu T'ina First Nation November 13, 2014; and the Blood Tribe November 25, 2014.

Copies of the Draft Environmental Impact Assessment Terms of Reference for the Project, initially distributed by AEP for public comment, were emailed to each of the First Nations on October 23, 2014.

AT emailed an article on the Project to each First Nation in November 2014 for inclusion in each nation's newspaper. AT also emailed updated maps of the Project to the Piikani First Nation on October 26, 2014, and the Blood Tribe November 6, 2014.

On January 20, 2015, notification of public consultation meetings (Open Houses) to be held in Calgary (January 27) and Cochrane (January 28) were emailed to each First Nation as a courtesy.

A Project update was emailed to each of the Tsuu T'ina, Stoney, Siksika, Piikani and Blood Nations on February 9, 2015.

An update, including information about additional public Open Houses to be held at the Pinebrook Golf and Country Club (March 10, 2015) and Bragg Creek (March 17, 2015) was emailed to each First Nation.

A Project status update was emailed to each First Nation on June 15, 2015.

AT is committed to engaging with all potentially affected Indigenous groups throughout the Project consultation process. AT will work with the Treaty 7 Nations to support traditional knowledge and traditional land use studies for inclusion in the EIA.

To date, the following comments have been brought forward during the consultation with the Tsuu T'ina, Stoney, Siksika, Piikani and Blood Nations:

- The Project Area is part of the traditional territory of the First Nations
- The Project will impact treaty rights and traditional use in the Project Area
- There are concerns about the impacts of the Project at the Project site
- There are concerns about how watercourses that flow through their territory and reserve will be managed in the future
- The Stoney First Nation wants an agreement regarding intellectual property and protocol concerns (SIL form)
- The Tsuu T'ina, Siksika, Piikani and Blood First Nations will be requesting capacity funding (to inspect the Project site, and complete a Traditional Use review)

The Blood Nation has sent a formal letter of objection to the Project to the Alberta Minister of Aboriginal Relations.

Non-aboriginal stakeholders who would be or may be potentially affected and/or have expressed an interest in the Project are listed in Table 2. The table also includes consultation with municipal bodies that would be affected by the Project.

Table 2 Stakeholders Who May be Potentially Affected and/or Interested in the Project

Local Landowners, Residents and Occupants	• Landowners, residents and occupants within the Project Area, and in western Springbank directly east of the Project Area
Local and Regional Businesses/Industry	• Alberta Ethane Development Company • Altalink • ATCO Gas • Foothills Pipe Lines Limited • Fortis Alberta • Nova Gas Transmission • Pengrowth Energy Corporation • Plains Midstream Canada ULC • Telus Communications • TransCanada Pipeline Limited • Shaw Communications
Regional Associations	• Bow River Basin Council • Calgary Regional Partnership • Elbow River Watershed Partnership • Springbank Community Planning Association • Alberta Irrigation Projects Association • Pirmez Creek Irrigation Society • Bow River Irrigation District • Western Irrigation District • Kananaskis Improvement District • Calgary Community Associations (Elbow Springs, Discovery Ridge, West Springs, Aspen Woods, Springbank Hill) • WaterSmart
Special Interest Groups	• Calgary River Communities Action Group • Don't Damn Springbank • Water Collaborative • Vulcan County

April 18, 2016

AT has commenced consultation activities in accordance with the Final Terms of Reference issued by AEP February 5, 2015 under the *Environmental Protection and Enhancement Act*.

Consultation activities undertaken to date with respect to the Project include Project notification, meeting with stakeholders, and open houses. These consultation activities included:

- Distribution of a Project introduction by mail to all landowners, occupants, and residents within the area affected by the Project the week of January 12, 2015. The introduction was also mailed or emailed to stakeholders on the stakeholder distribution list. An invitation to open houses in January 2015 was included with the introduction.
- Between November 2014 and March 2015 meetings were held with the Stakeholders and other interested groups. The purpose of these meetings varied, but included provision of information on the Project, potential impacts of the Project on infrastructure, and preliminary engineering.
- Open Houses were held in Calgary at the Mount Royal University on January 27, 2015, and at the Ranche House in Cochrane on January 28, 2015.
- Additional open houses were held at the Pinebrook Golf and Country Club on March 10, 2015, and the Bragg Creek Community Centre March 17, 2015.
- AT met with Bow River Basin Council on March 9 2016
- At met with Calgary River Communities Action Group on February 17, 2016

Key issues raised to date during stakeholder and public consultation include:

- Why this project was selected and not another option like the Maclean Creek Dam
- How the Government of Alberta has approached the planning of this project
- What is the Project Timeline
- What is the Project Cost
- What will the effects be to the upstream communities (the Springbank Community)
- There is not enough information on why this project is proceeding at this point and the decision making process
- How soon can the project be in operation
- When will construction start

It is anticipated that as stakeholder consultation activities continue the key issues may change.

1.4 ENVIRONMENTAL ASSESSMENT AND REGULATORY REQUIREMENTS OF OTHER JURISDICTIONS

Under the *Alberta Environmental Protection and Enhancement Act* the Project requires an Environmental Impact Assessment (EIA). Terms of reference for the EIA were provided by Alberta Environment and Sustainable Resource Development (now Alberta Environment and Parks [AEP])on February 5, 2015. The EIA will form part of AT's application to the Alberta Natural Resources Conservation Board (NRCB). The NRCB will review the EIA, in coordination with AEP and other agencies, and determine if the Project is in the public interest.

Other provincial legislation that applies to the Project includes the *Water Act*, *Public Lands Act*, *Land Stewardship Act*, and *Historical Resources Act*.

The EIA required by AEP is in progress.

2.0 PROJECT INFORMATION

2.1 PROJECT'S CONTEXT AND OBJECTIVES

To help reduce the effects of future extreme flood events, AT is proposing to construct an Off-stream Storage Reservoir, Diversion Structure and Channel, Off-stream Storage Dam, and Outlet Works in Rocky View County, 15 km west of Calgary, approximately 18.5 km upstream of the Glenmore Reservoir. The Project is centred in Section 24 Township 24 Range 4 West of the Fifth Meridian, south of Highway 1 and north of Highway 8 (see Figure 1). The Project will be designed as a dry reservoir (there would be no permanent pool of water in the reservoir). The Project concept considers diverting extreme flood flow from the Elbow River into an Off-stream Storage Reservoir where it would be temporarily contained and later released back into the Elbow River after the flood peak has passed. The reservoir area would be dry before and after the flood event.

In planning and designing SR1, AT's goal is to provide a flood diversion option that has public input on the final design which will reduce social, economic and environmental effects. This will be achieved by an informed design process that includes decision-making through focused and coordinated stakeholder engagement and Aboriginal consultation on the Project.

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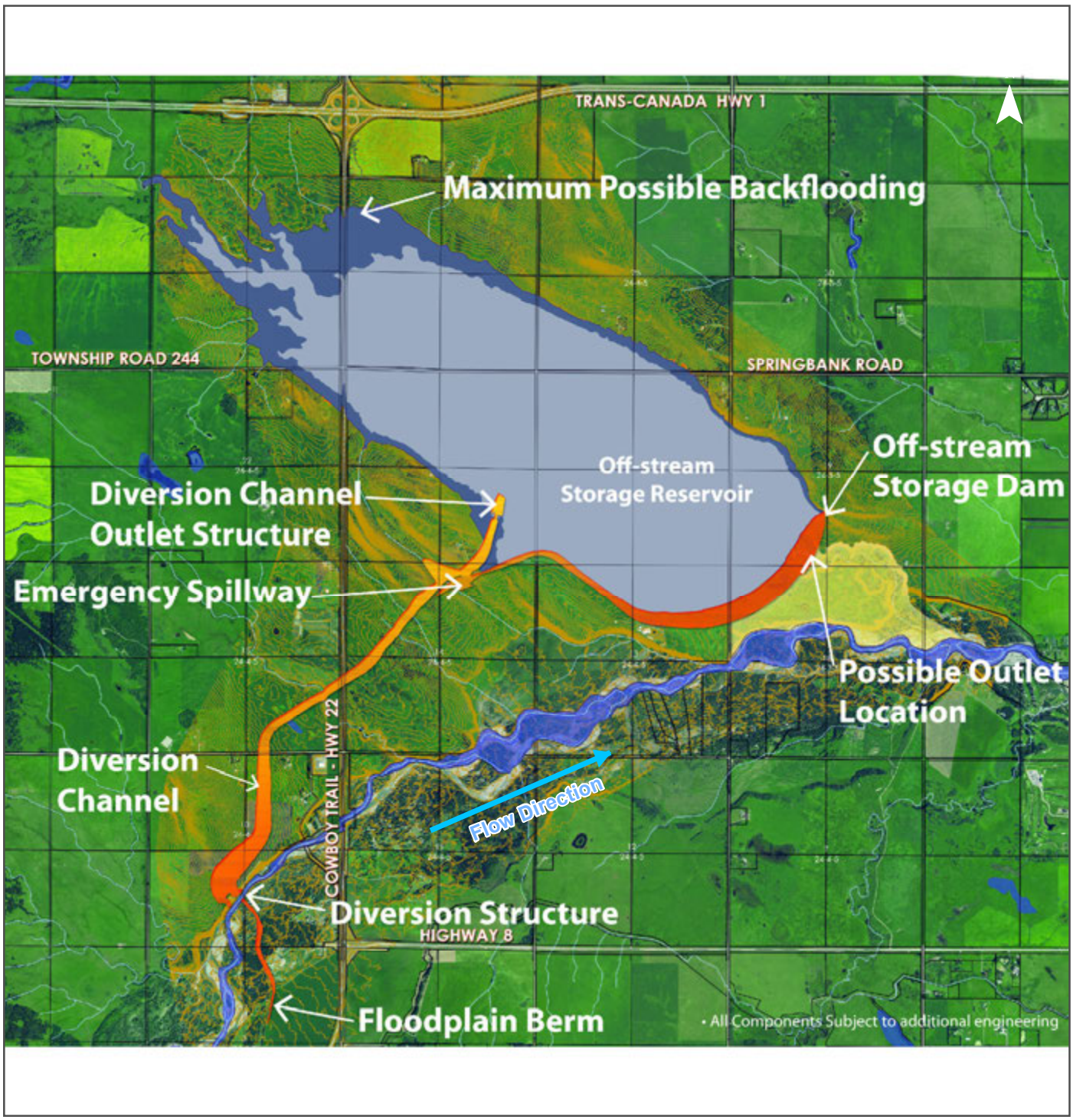

ST-CAL-110773396-308 REVA

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Project Area

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ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT

Figure 1

2.2 DESIGNATED PHYSICAL ACTIVITY

In a letter dated August 14, 2014, the CEA Agency determined that the Project, as described, is a designated project and may require a federal environmental assessment. AT is required to submit a project description to the Agency to inform a decision as to whether an environmental assessment is required. The letter cited paragraph 6 of the Regulations Designating Physical Activities under the *Canadian Environmental Assessment Act* (CEAA 2012) which states:

> *"The construction, operation, decommissioning and abandonment of a new structure for the diversion of 10 000 000 m^3/year or more of water from a natural water body into another natural water body"*

In evaluating the Project and its potential effects, it is important to note the frequency at which SR1 may potentially be operated. The diversion of water greater than 10,000,000 m^3/year would be an exceptional case, confined to extreme flood conditions. The Project is designed to divert water when necessary to reduce flows downstream of Glenmore Reservoir to less than 160 m^3/s, which is the capacity of the low level outlet in Glenmore Dam. Based on records from 1908 through 2013, there have been only ten events that would have necessitated a diversion and only four events that would have required diversion of more than 10,000,000 m^3 (1929, 1932, 2005 and 2013)(see Figure 2 and Table 3).

In additions, the diverted water would be temporarily stored (estimated time, 45 days) for return to the Elbow River following the flood event.

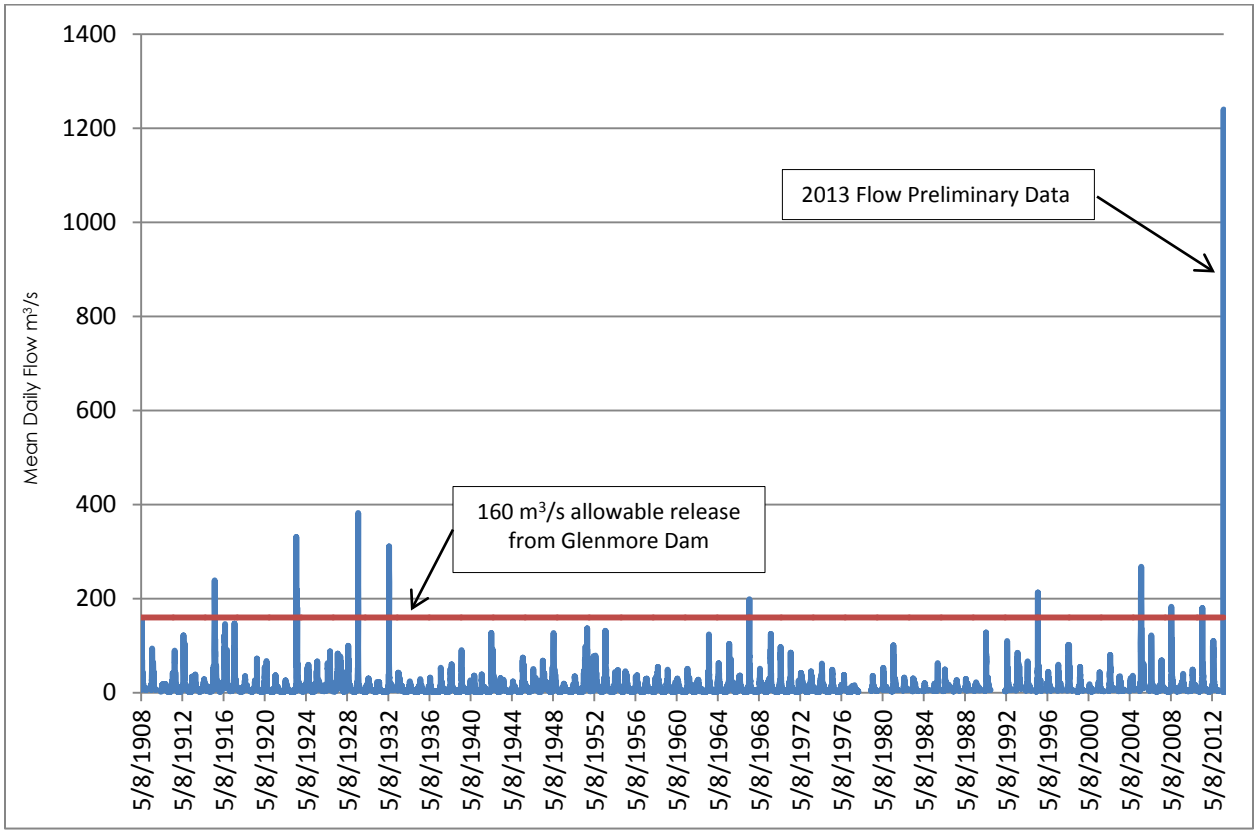


Figure 2 Daily Historic Flow Series on the Elbow River (Combined Station)

Table 3 Historic Flood Events that Exceeded Design Objectives of 160 m³/s

Event Year	Peak Total Inflow (m³/s)	Peak SR-1 Diversion Rate (m³/s)	Duration of SR-1 Diversion (hours)	Peak SR-1 Stage (m)	Peak SR-1 Storage (dam³)	Peak Storage Provided by Glenmore (dam³)
1915 (avg. daily)	239	79	44	1,196.1	7,483	-
1923 (avg. daily)	219	59	48	1,195.2	4,872	-
1929 (avg. daily)	382	221	60	1,201.1	23,448	-
1932 (avg. daily)	311	151	75	1,201.3	24,412	-
1967 (avg. daily)	199	38	17	1,191.4	1,264	-
1995 (avg. daily)	213	52	20	1,192.3	2,047	-
2005	338	178	77	1,198.3	13,494	-
2008	183	0	0	-	0	-
2011	180	0	0	-	0	-
2013	1,240	480	64	1,209.3	70,623	9,471

2.3 DESCRIPTION OF PHYSICAL WORKS AND STRUCTURES

The Project consists of the construction and operation of an Off-stream Storage Reservoir, a Diversion Structure located at the Elbow River, a Diversion Channel to transport diverted floodwater into the reservoir, an Off-stream Storage Dam to contain the diverted floodwater, and Outlet Works to return the stored water back to the river following a flood. Project components also include any re-alignments and/or modifications needed to protect roads from flooding during the use of the storage reservoir. The reservoir area would be dry before and after the flood event.

All Project components would be developed on land owned or acquired by the Government of Alberta.

A summary of each of the components can be found in Table 4. These physical works would be constructed by AT, and owned and operated by AEP. All components of the Project are designed to manage floodwaters equivalent to the 2013 flood event. At full supply level (FSL) the Off-stream Storage Reservoir would cover approximately 789 ha.

A conceptual overview of the Project and its components can be seen in Figure 3. Conceptual illustrations of the Project are presented in Figures 4, 5 and 6.

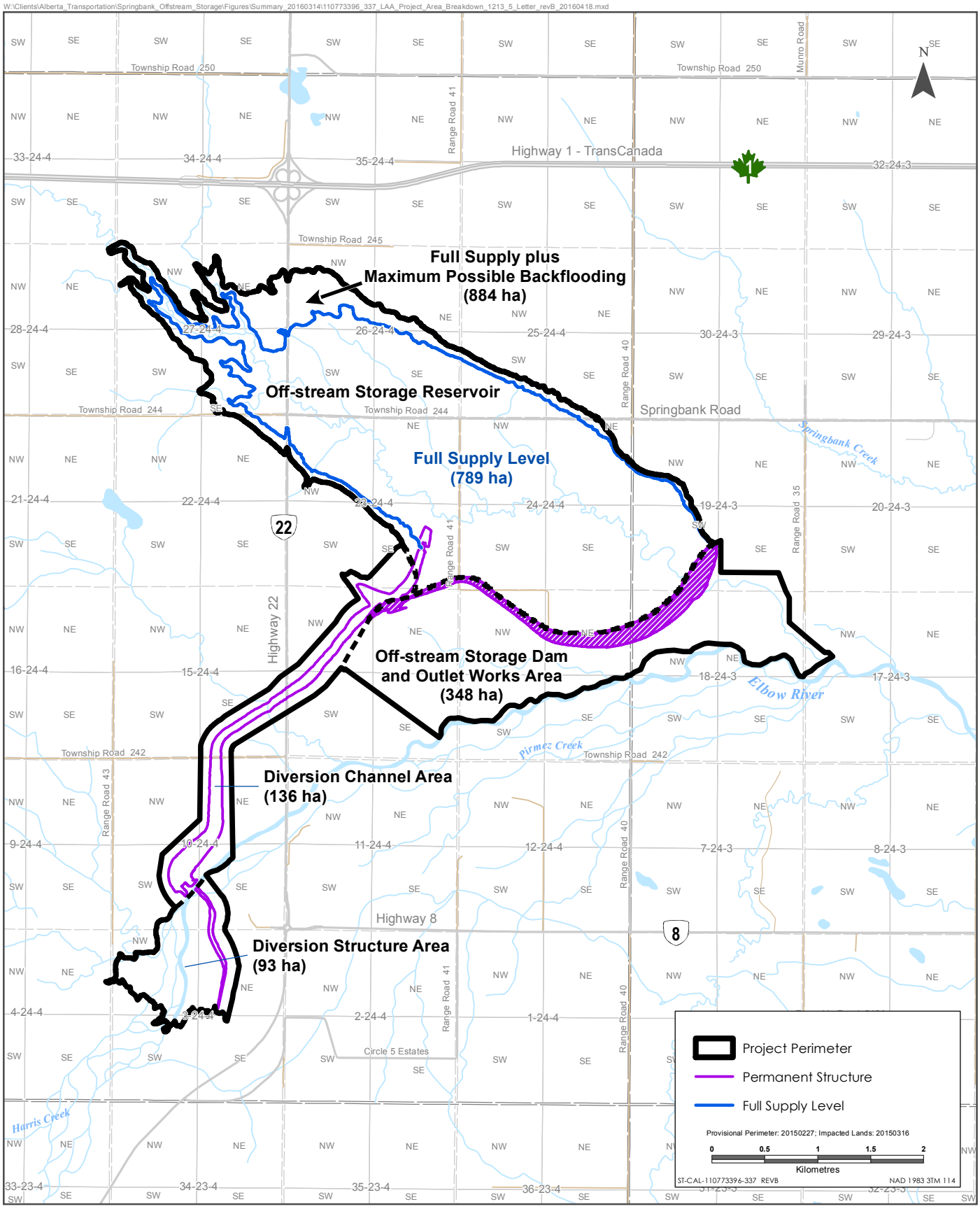
Table 4 Components of the Proposed Development

Component[1]	Description[1]
Off-stream Storage Reservoir	A natural basin that will be used to hold floodwater. • Storage capacity at top of dam: 104,600,000 m^3 • Design flood storage capacity: 70,200,000 m^3 • Maximum depth: 25 m • Surface area at top of dam: 884 ha (includes backflooding area) • Surface area at design storage capacity (at FSL): 789 ha
Diversion Structure	A group of three structures that work together to divert floodwater into the diversion channel. Includes: • Diversion Inlet: Gated concrete structure – 46 m long, 11 m high and 33 m wide – Discharge capacity: 600 m^3/s • Sluiceway / Service Spillway: Gated concrete structure – 43 m long, 11 m high and 33 m wide • Floodplain Berm: embankment of earth – 1,200 m long, 51 m wide and 7.5 m high
Diversion Channel	A channel used to carry floodwaters from the Elbow River to the storage reservoir. • Length: 4,700 m • Design carrying capacity: 600 m^3/s • Bottom width: 24 m • Side slopes: 3:1 • Water depth at 600 m^3/s: 6.4 m
Off-stream Storage Dam	An embankment of earth used to hold floodwater in the reservoir. • Crest Length: 3,960 m • Structure height: 27 m • Maximum base width: 205 m • Side slopes: 3:1
Outlet Works[2]	Includes gates, the structure, the channel, and related appurtenances. The final design of the Outlet Works is subject to further assessment of floodwater release thresholds and additional engineering assessment and design
Road Realignments/ Modifications[2]	Realignment and/or raising the height of the road surface of Highway 22 and Springbank Road

NOTES:

[1] values are approximate and subject to change prior completion of final design

[2] design work has not been completed



Sources: Base Data - ESRI, Natural Earth. Thematic Data - ERBC

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

SR1 Springbank Off-Stream Reservoir
Project Components

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SR1 OFF-STREAM RESERVOIR - GOVERNMENT OF ALBERTA

Figure 3

Figure 4 **Looking Northeast towards Diversion Structure, Diversion Channel, Storage Reservoir and Off-stream Storage Dam Locations**

Figure 5 **Looking Southeast towards Storage Reservoir, Off-stream Storage Dam and Diversion Channel Locations**

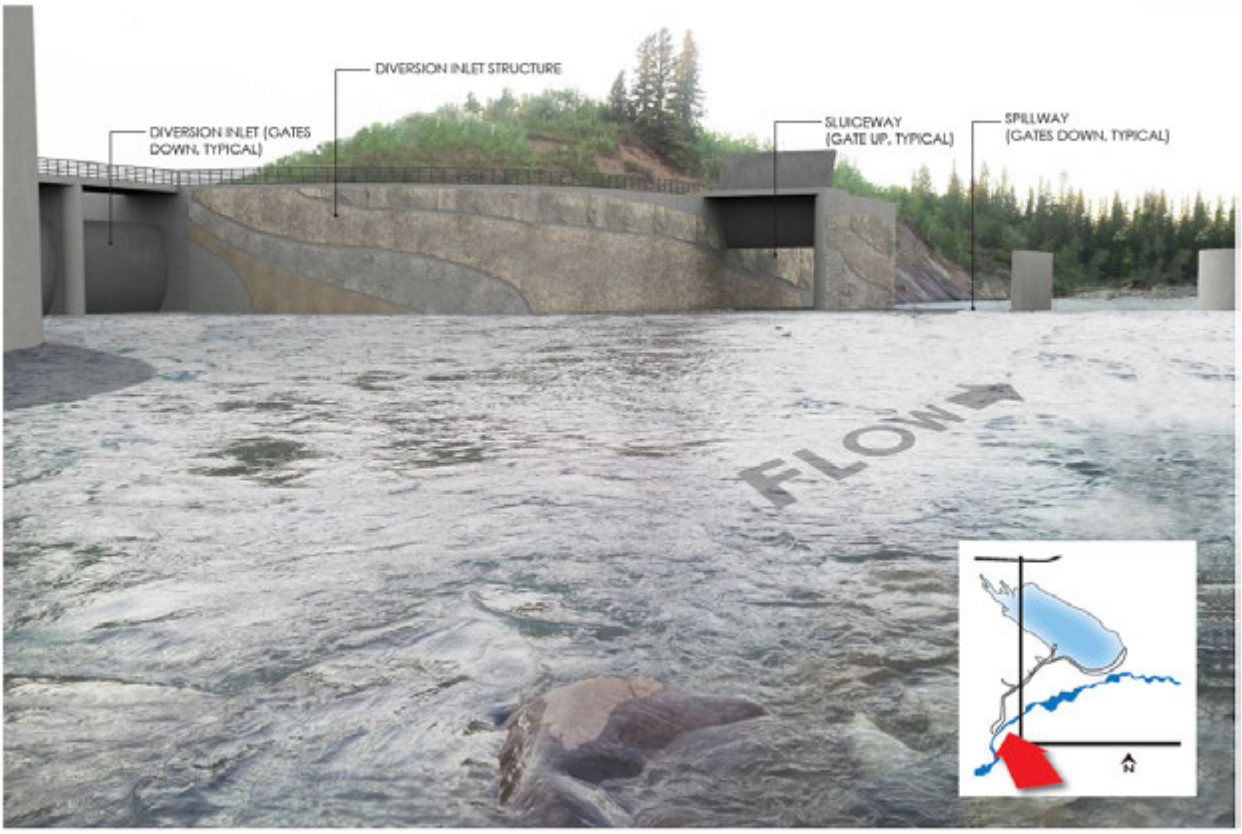


Figure 6 Diversion Structure

2.4 DESCRIPTION OF ACTIVITIES

Construction of the Project would include:

- Temporary laydown/stockpile areas set up near the Diversion Structure, and within the Reservoir area, to support construction of the SR1. A worksite trailer and employee parking area would be located in each area. All material and equipment would be removed from the laydown/stockpile areas at the end of construction.
- Borrow material excavated from the Storage Reservoir area may be required to support construction of the dam. Any excavated areas would be re-graded to improve drainage towards the Outlet Works in the dam, and the topsoil would be replaced and re-seeded; otherwise the existing vegetative cover would be kept in place.
- For the Diversion Structure: a gated concrete Sluiceway and Service Spillway would be constructed within the bed of the Elbow River. The Diversion Inlet would also be made of concrete but with steel gates and wing walls built on either side of the structure. A Floodplain Berm and Floodplain Berm Emergency Spillway would be constructed of material excavated from the Diversion Channel.
- The Diversion Channel would be constructed primarily through excavation. Some areas will utilize fill to contain the channel when crossing low-lying areas.
- Material excavated from the Diversion Channel would be used to support construction of the Diversion Structure and Off-stream Storage Dam.
- An internal drainage system, as well as instrumentation would be incorporated within the dam during construction.
- The dam would be seeded with native grasses.
- The Outlet Works would be installed through the dam to allow floodwater from the Storage Reservoir to be released through the outlet structure back into the Elbow River.
- A gravel maintenance and access road would be built along the Diversion Channel to access the Diversion Structure. This road would connect to the local road network.
- Road improvements, such as realignment, raising the roadway vertical profile, and/or a combination of the two may be required to protect Highway 22 and Springbank Road. In addition, a new bridge would need to be constructed where Highway 22 would cross the Diversion Channel.

Operation of the Project would involve:

- The diversion of up to 600 m^3/s of water during a flood event (depending on flood intensity and capacity of Glenmore Reservoir). Water flow exceeding 600 m^3/s would continue down the Elbow River. During non-flood periods, the Elbow River would flow through the Diversion Structure.
- Observation and monitoring of the flow of floodwater in the Diversion Channel as it is carried to the Off-stream Storage Reservoir during flooding. Following a flood event, debris within the Diversion Channel would be removed and erosion control measures would be repaired. During non-flood periods, the Diversion Channel would be periodically monitored for erosion or other damage and repaired as necessary.

- Monitoring of the fill rate and volume of the Off-stream Storage Reservoir during a flood event. Floodwater stored in the reservoir would be released after the flood event has passed. Any debris or sediment left behind in the reservoir would be evaluated for appropriate control or mitigation and then addressed.
- Closing the gates in the Outlet Works during a flood event to keep water behind the dam. Following the flood event, the gates or valves of the Outlet Works would be opened and the reservoir would be drained through the outlet to the Elbow River. During non-flood periods, the Outlet Works would remain open to maintain the stream flow of a small tributary over which the dam would be built. Routine inspections of the Off-stream Storage Dam, as well as any maintenance necessary for the grass covering the dam, would occur during non-flood periods.
- Release of stored floodwater through the Outlet Works to the Elbow River following the flood event. It is estimated that it may take 30 to 45 days to drain the storage reservoir. During normal operations, the flow of water from the small tributary would continue to the river. Routine inspections would be conducted on the Outlet Works.
- Monitoring local roads to determine the effects of flooding.

2.5 WASTES AND WASTE MANAGEMENT

Emissions, discharges or wastes that may be generated during construction and operations of the SR1 include:

- No continuous air emissions. Intermittent air emissions would consist of products of hydrocarbon combustion (running engines) and particulate matter.
- Noise emissions primarily related to the use of heavy equipment and trucks during the construction of the Project components.
- Stormwater and water from small watercourses that drain into the Diversion Channel and the Storage Reservoir would be released to the Elbow River via the Outlet Works. Sediments picked-up by these waters during and following construction activities have the potential to be deposited in the Elbow River. Implementing Alberta Transportation's standard construction practices would mitigate this potential.
- Domestic sewage from the worksite trailers located at each of the temporary laydown/stockpile areas. This waste would be collected in a septic holding tank at each site and periodically disposed at a licenced disposal facility.
- Solid waste which would be either recycled or disposed of through licenced waste disposal companies at licenced facilities.

A waste management plan would be developed for the Project as part of the Environmental Construction Operations Plan required by AT for the Project.

The potential for liquid discharges resulting from accidents and malfunctions could occur during Project construction and operation. The potential environmental effects from accidents and malfunctions, as well as mitigation, will be assessed in the environmental assessment.

2.6 PROJECT PHASES AND SCHEDULE

A general Project schedule is provided in Table 5.

Table 5 Project Schedule

Key Project Phase	Proposed Project Schedule
Environmental Impact Assessment	14 to 16 months
Land Acquisition	14 to 18 months
Regulatory Review Process	12 to 24 months
Cabinet Approval	2 to 6 months
Procurement	2 to 3 months
Construction	18 to 24 months
Operations	in perpetuity
Decommissioning and Abandonment	This flood mitigation reservoir would be a permanent installation and would not be decommissioned

3.0 PROJECT LOCATION

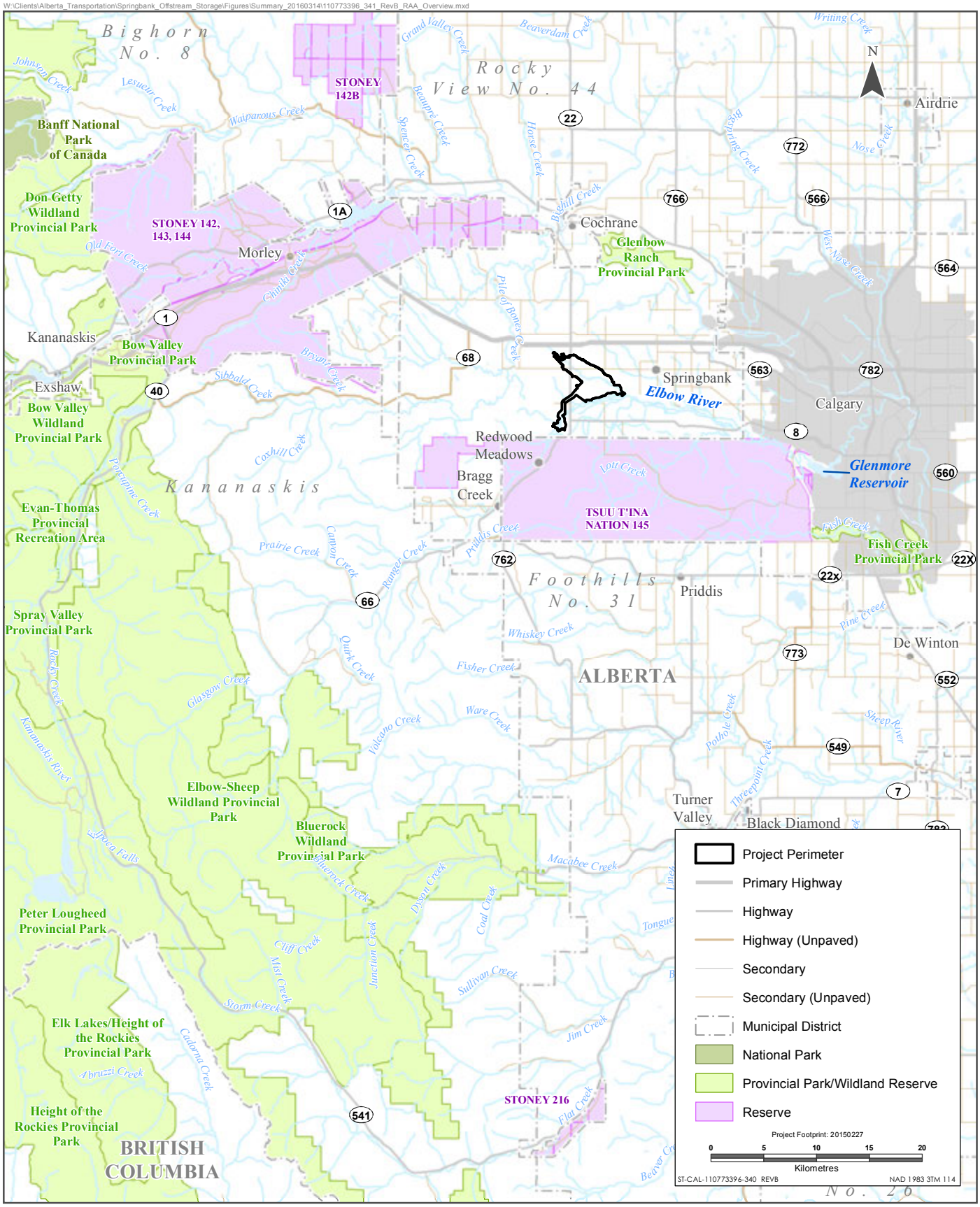
The Project is located 15 km west of the City of Calgary, in Rocky View County (Figure 7).

The Project would overlap with several existing features in the Project Area (see Figure 8), including:

- Highway 22 and Springbank Road
- Several operating and abandoned or inactive pipelines
- A power transmission line
- Environmentally significant areas
- Sections of historic interest

The nearest First Nation Reserve is the Tsuu T'ina Nation (Treaty 7) on Indian Reserve 145, located 395 m south of the Project perimeter (see Figure 8). The Stoney Nation (Treaty 7) is also close to the Project. The Stoney Nation has three reserve areas; Indian Reserves 142, 143 and 144; 142B; and 216. These reserves are located approximately 16.3 km west, 27.8 km northwest, and 61.5 km south of the Project respectively.

The closest federal land is Banff National Park, approximately 53 km northwest of the Project (see Figure 9).



Regional Area

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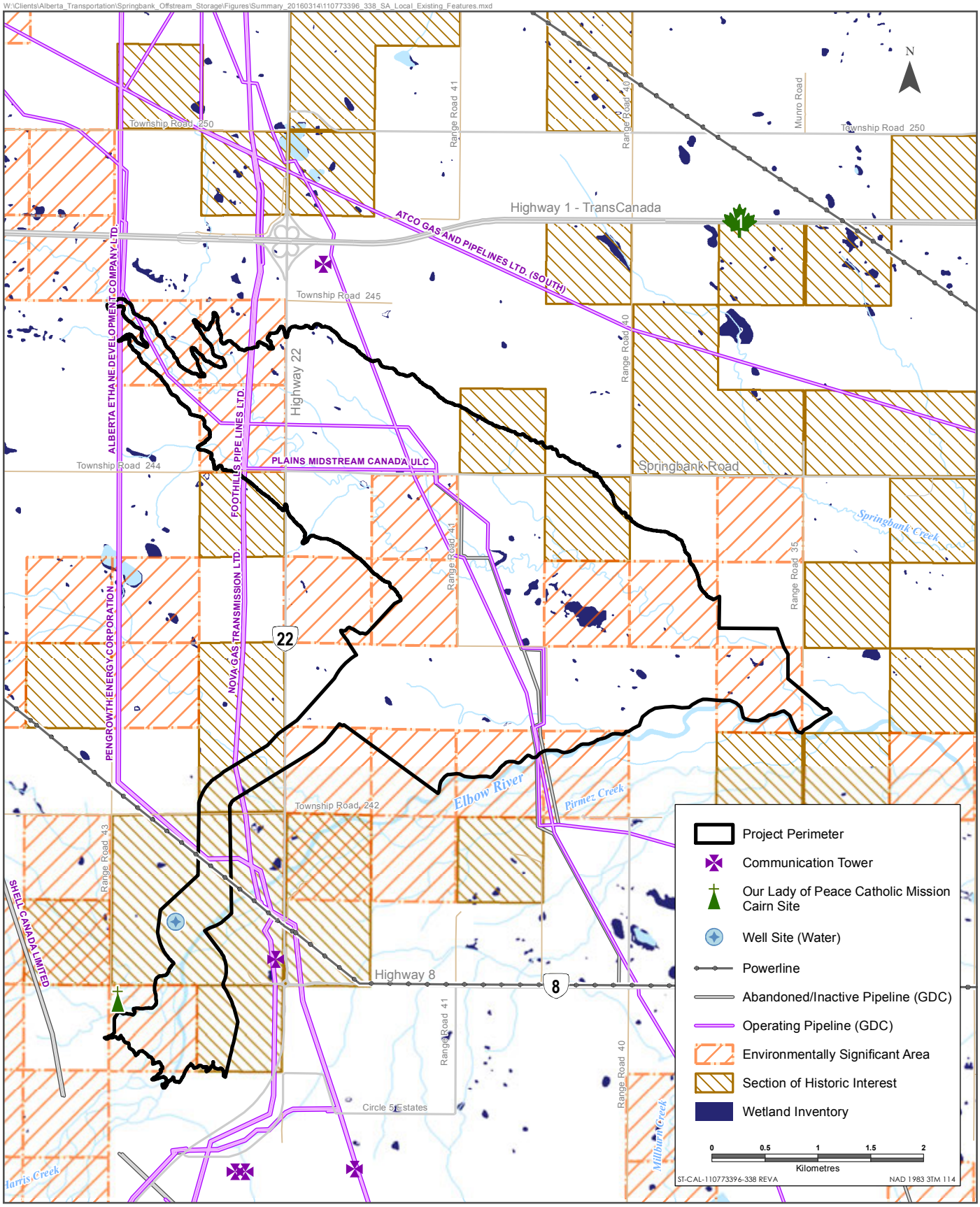
ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESEVOIR PROJECT

Figure 7



Sources: Base Data - ESRI, Natural Earth. Thematic Data - ERBC

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Existing Features and Area of Environmental Interest within the Project Area

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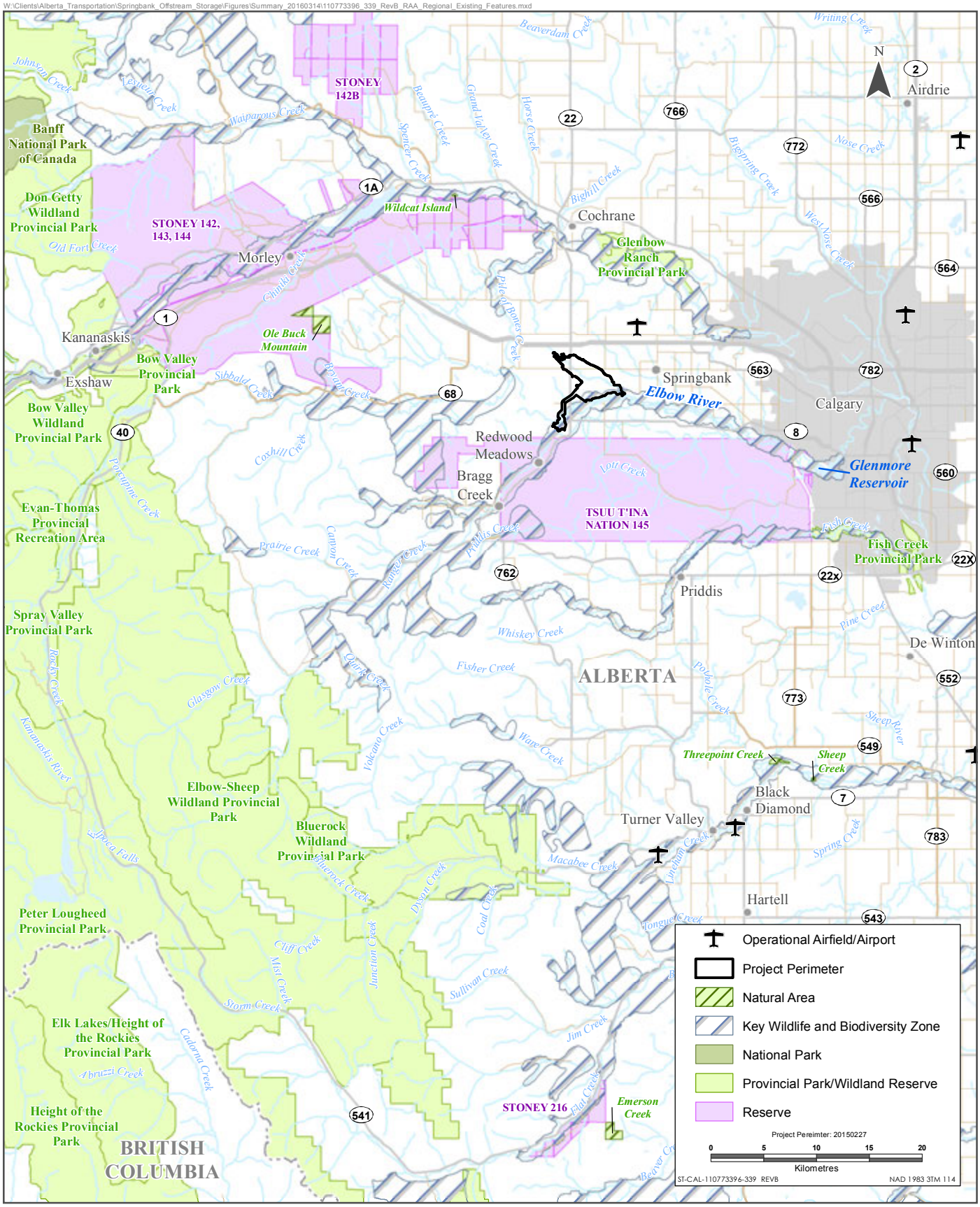
ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESEVOIR PROJECT

Figure 8



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

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Existing Features within the Regional Area

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ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESEVOIR PROJECT

Figure 9

The Project Area lies within land use districts identified by the Rocky View County Land Use Bylaw (Bylaw C-4841-97). Rocky View County's Land Use Bylaw outlines the types of development allowed in each land use district and provides planning guidance for development in those areas.

Most land in the Project Area is privately owned and used for ranching and farming. There are six farmsteads, eight residential areas and four agricultural areas within the Project Area. There are also three regions within the Project Area that are designated as either 'direct control' or 'public service' lands; these lands are owned by local organizations that operate summer camps at these properties.

The Project may require access to, use of, or the exploration, development, and production of lands and resources currently used for traditional purposes by aboriginal peoples. While most of the Project will be constructed on land that has been privately owned since the late 1880s, construction activities within the in the Elbow River may affect how First Nation's utilize the river and its resources at or downstream of the Project Area.

4.0 FEDERAL INVOLVEMENT

No federal lands would be used for the purpose of carrying out the Project, nor does the Project include any proposed or anticipated federal financial support.

Outside of the Physical Activities Regulations under the *Canadian Environmental Assessment Act, 2012*, there are no confirmed federal legislative or regulatory requirements (including any federal permits, licences or other authorizations) applicable to the Project. An authorization under the *Fisheries Act* may be required.

5.0 ENVIRONMENTAL SETTING

5.1 SOILS AND TERRAIN

The Project area is a glaciated landscape composed of till, glaciolacustrine (glacial lake) and glaciofluvial (glacial river) deposits. These deposits have been dissected by the modern Elbow River and tributaries. The Elbow River valley consists of a sand and gravel floodplain bordered by river terraces. Soils in the Project area vary from regosols developed on the sands and gravels of the floodplain, gleysols on poorly drained uplands and black chernozems on the well-drained uplands.

5.2 HYDROGEOLOGY

The deposition of river sands and gravels over glacial deposits in the Elbow River valley resulted in formation of an alluvial aquifer, an important source of groundwater for the river and local residents. The alluvial aquifer provides temporary storage for water from the Elbow River during floods, and then releases that water back to the river. Groundwater from the alluvial aquifer is essential in maintaining baseflow of the Elbow River. Yields for the Elbow River alluvial aquifer range from 2-8 L/sec.

5.3 VEGETATION

The Project Area is located in the Foothills Parkland Natural Subregion of Alberta. The rolling topography in this subregion has resulted in a mosaic of plant communities, three of which are dominant within the landscape: foothills rough fescue grasslands, beaked willow shrublands, and aspen groves. Disturbed areas within the subregion are largely a result of rangeland management as well as oil and gas development. While native prairie grasslands dominated by foothills rough fescue have been converted into crops or pasture, agricultural practices are limited in this subregion by the short, cool growing season.

Riparian areas are mainly restricted to the banks of the Elbow River. Lentic wetlands (areas of still water) are scattered throughout the Project Area with a major concentration along the shallow valley where the proposed dry reservoir would be located.

5.4 WILDLIFE

A review of wildlife species and the presence of available wildlife habitat indicate that a total of 76 wildlife species of management concern (SOMC) (60 bird, 11 mammal, 3 amphibian and 2 reptile species) may occur (breed, migrate, winter and/or reside) in the vicinity of the Project Area. Twelve of these SOMC are listed as "special concern", "threatened" or "endangered" under Schedule 1 of the federal *Species at Risk Act*.

During consultation, landowners in the Project Area indicated occasional sightings of grizzly bears in the area. Grizzly bears are one of the SOMC, and are designated as a species of special concern and are listed provincially as an at risk species.

A literature search revealed no sensitive amphibian ranges, important bird areas, provincially protected areas, ecological reserves, wilderness areas, wildland provincial parks, wilderness parks, provincial parks, natural areas, heritage rangelands, or provincial recreation areas in the Project Area. A portion of the Project Area along the Elbow River contains a provincial Key Wildlife and Biodiversity Zone considered to be key winter ungulate habitat.

5.5 SURFACE WATER AND AQUATIC ENVIRONMENT

The Project is within the Elbow River Watershed, which is part of the Bow River Basin. The Elbow River flows eastward from Elbow Lake in the eastern slopes of the Canadian Rockies to the City of Calgary, where it flows into the Glenmore Reservoir and then merges with the Bow River.

The main watercourses in the Project Area are the Elbow River and three of its north bank tributaries. In addition to these streams, a number of smaller tributaries and ephemeral draws extend into the Elbow River in the Project Area. There are no lakes in the Project Area.

The Elbow River serves as a direct drinking water source to approximately 1 in 6 Albertans and supports recreational, agricultural, urban and rural developments.

The Elbow River contains a variety of valued fish species including brook trout, brown trout, bull trout, burbot, cutthroat trout, mountain whitefish, rainbow trout, white sucker, longnose sucker, and mountain sucker. Gravel spawning beds for trout species, or scoured pools that provide high quality overwintering habitat to fish, are present in the Elbow River

The Elbow River is a Class C watercourse with restricted activity periods of May 1 to July 15 and September 16 to April 15. These are the time periods during which fish migration, fish spawning, egg incubation, fry emergence or early fry development are likely to occur.

5.6 LAND USE AND MANAGEMENT

The Project Area lies entirely on lands in Rocky View County. The nearest major urban centre is the City of Calgary. Springbank, a rural community, lies between the City of Calgary and the Project Area. The Hamlet of Bragg Creek and the Townsite of Redwood Meadows are also nearby communities, located along the Elbow River southwest of the Project Area. The Tsuu T'ina Nation Indian Reserve is located to the south of the Project Area.

The primary land use in the immediate vicinity of the Project Area is ranching. Other land uses includes country residential and agricultural holdings. There are also sections of land in the Project Area used by Scouts Canada and the Kiwanis Club of Calgary for private recreational camps.

Several pipeline and utility rights-of–way cross the Project Area. The pipelines carry a variety of substances including high pressure and low pressure product, natural gas and sour gas.

5.7 AIR QUALITY

The Project is located in a rural setting, where ranching and farming are the primary activities, and air emission sources are generally limited to local and highway traffic, vehicle use and refueling and residential heating. Airborne particulate matter (dust) generated from traffic travelling on dry gravel roads is one of the predominant sources of air pollutants in the Project Area. Wind blowing across these same roads can also increase the ambient amount of dust in the air and can relocate concentrations of dust downwind.

5.8 HISTORICAL RESOURCES

5.8.1 Archaeology

Twelve historical resource studies have been conducted within the vicinity of the Project Area, resulting in the identification of 10 archaeological sites. All ten of these sites currently have been assigned a low heritage value by Alberta Culture and Tourism but do identify the historical activity in the area.

There are 20 historic structure sites located within the Project Area. Historic structures are structures that may be standing or partly standing, and are thought to predate 1960. One of these structures, the Our Lady of Peace Roman Catholic Mission, a protected provincial historic resource is located close to the Diversion Structure and channel component of the Project.

The Tsuu T'ina Nation Indian Reserve is located to the south of the Project Area. The Tsuu T'ina are members of Treaty 7, which was signed in 1877. The Project Area also has a relatively early history of Euro-Canadian settlement, in the late 1880s. The area was originally part of the Cochrane Ranch, and this, combined with its proximity to the railroad and the City of Calgary, made the area attractive for early settlement by ranching families.

5.8.2 Paleontology

Geological units in the Project include the Brazeau, Coalspur and Paskapoo formations. All units are fossiliferous and the Paskapoo Formation contains numerous early mammal sites in the Calgary and Cochrane areas. There are no previously recorded fossil localities within the Project Area and no lands with provincial historical resource values for palaeontology.

6.0 ENVIRONMENTAL EFFECTS

Alberta Transportation is experienced in planning and constructing major projects in a manner that reduces environmental effects. AT has a comprehensive environmental management system and has developed numerous practices and procedures to identify environmental risks and protect the environment throughout the design, implementation, and operation of projects.

The effects of the Project on the environment are being evaluated during the Environmental Impact Assessment which is in progress. As Project planning proceeds, mitigation and restoration measures will be identified to offset or reduce the environmental effects of the Project. These measures will include:

- Use of the Environmental Construction Operations (ECO) Plan developed by AT in conjunction with the Cities of Calgary and Edmonton
- Implementation of AT's Standard Construction Practices
- Use of Best Management Practices
- The input of environmental information to the design of the Project

The Project has the potential to affect changes on the environment, some of which can affect fish and fish habitat, listed aquatic species and migratory birds; all environmental components that come under federal jurisdiction.

Construction of the Project near the Elbow River or the lower reaches of some of the rivers tributaries may affect fish habitat at and around the Diversion Structure, Diversion Channel, Off-stream Storage Dam, and Outlet Works. If gravel spawning beds for salmonids or scoured pools that provide high quality overwintering habitat for fish are present, they could be lost or altered when parts of the Diversion Structure are installed within the Elbow River channel or when construction activities occur within tributaries. Other areas of fish habitat within or downstream of the Project Area have the potential to become degraded during construction due to sediments being washed into the river where they could settle over sensitive fish habitat such as spawning beds. However, the potential for habitat degradation due to sediment release will be minimized through the implementation of mitigation measures as detailed in AT's standard construction practices.

During operations, the Diversion Structure may alter the river downstream of the Project by changing the bed load movement and river channel modification that would occur under natural conditions. To reduce this effect, the Sluiceway of the Diversion Structure has been designed to allow for the passage of bedload; however the volume and velocity will differ from natural conditions. Fish and fish habitat surveys will be undertaken to confirm potential effects and provide information for mitigation design.

Fish migration in the Elbow River may be disrupted for a portion of the construction period in the Project Area as the Diversion Structure is installed within the river channel. To reduce and mitigate this potential effect, the Diversion Structure would be installed during periods of least risk to fish species (e.g. the winter months). Once operational, there is the possibility that the Diversion Structure could be a barrier for the passage of some fish species during low flow periods as fish that migrate during low flow periods may not be able to swim past the structure. The diversion structure would be designed to reduce potential restrictions to fish movement.

Accidental spills of fuel or other compounds from equipment working in or near the Elbow River or its tributaries could affect fish and fish habitat. Construction techniques would include best practices which incorporate measures to limit the potential for accidental events.

During operations, some fish upstream of the Diversion Structure will be carried by the floodwater into the Off-stream Storage Reservoir and become temporarily stranded as the reservoir is drained.

Construction activities related to the realignment or modification of Highway 22 have the potential to affect fish and fish habitat in the Elbow River and the lower reaches of its tributaries through the erosion of sediment and accidental spills of leaks of fuel or other compounds from the construction equipment. However, due to the distance of the road construction activities from the watercourses, and AT's standard construction practices, it is considered unlikely that these activities would affect fish or fish habitat.

Construction of the Diversion Channel and the Off-stream Storage Dam also has the potential to cause the loss or alteration of wetland habitat that may be used by migratory birds but the extent of change would be limited through the use of wetland mitigation hierarchy (avoid, minimize, compensate).

The collection of water in the Storage Reservoir during an extreme flood event would inundate areas of land along the small tributary in the Off-stream Storage Reservoir. This could result in the loss of migratory bird nests within the reservoir during the flood.

Water stored in the reservoir would also temporarily reduce the availability of waterfowl wetland habitat in the Project Area.

Sediment and debris left behind following the release of floodwater from the Off-stream Storage Reservoir may reduce the availability of wetlands in the reservoir for one or more seasons depending on the depth of material left behind.

Greenhouse gases associated with the Project will be restricted to emissions from vehicles and machinery during Project construction and from maintenance and inspection vehicles during project operation.

In the EIA, the Project will be evaluated for potential effects on environmental components that come under the provincial jurisdiction, including wetlands, riparian areas, rare plants, raptors, ungulate habitat, surface water and water quality, air quality and historical resources.

The Project is not anticipated to cause any changes to federal lands within, or in the vicinity of, the Project Area, nor any adverse environmental affects outside of Alberta.

The Project has the potential to affect how the First Nations' utilize the Elbow River and its resources at, or downstream of, the Project Area, although this potential is considered very low as the Project will only be operated during major flood events. The Project may also affect any archaeological resources which have not been previously identified along or adjacent to the banks of the Elbow River, in the Project Area. The Project will be evaluated for potential effects on Aboriginal Peoples and their resources when the Project footprint and operational information are finalized. This evaluation will be included in the EIA.

The Project is not anticipated to cause any changes in the environment that would adversely affect federal lands or lands outside of Alberta.