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Horsefly Regional Emergency Spillway

Impact Assessment Agency of Canada

Initial Project Description

November 5, 2021

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Abbreviations

%	percent
AAAQO	Alberta Ambient Air Quality Objectives
ACRP	Alberta Community Resiliency Program
ACSW	Alberta Ministry of Culture and Status of Women
AEP	Alberta Environment and Parks
ARIC	Alberta Railway and Irrigation Company
cfu/100 mL	colony forming unit per 100 millilitres
cm^3/s	cubic centimetres per second
CO	carbon monoxide
CO_{2e}	carbon dioxide emissions
CP	Canadian Pacific
DFO	Fisheries and Oceans Canada
DMAF	Disaster Mitigation and Adaptation Fund
EA	environmental assessment
EPEA	*Environmental Protection and Enhancement Act*
ESRD	Alberta Environment and Sustainable Resource Development
FWMIS	Alberta Fish and Wildlife Information System
GHG	greenhouse gas
ha	hectare
HADD	harmful alteration, disruption or destruction
HRA	*Historical Resources Act*
HRIA	Historic Resources Impact Assessment
IA	impact assessment

IAA	*Impact Assessment Act*
IAAC	Impact Assessment Agency of Canada
ICIP	Investing in Canada Infrastructure Program
IDA	*Irrigation Districts Act*
IDP	intermunicipal development plans
km	kilometre
m	metre
M	million
m^3	cubic metre
m^3/s	cubic metre per second
MD	Municipal District
MD of Taber	Municipal District of Taber
mg/L	milligrams per litre
NO_2	nitrogen dioxide
PAS	Palliser Airshed Society
$PM_{2.5}$	particulate matter
ppb	parts per billion
RAP	*restricted activity period*
SARA	*Species at Risk Act*
SMRID	St. Mary River Irrigation District
SO_2	sulphur dioxide
SOMC	species of management concern
SRSMP	Southern Regional Stormwater Management Plan
the Agency	Impact Assessment Agency of Canada
the Project	Horsefly Regional Emergency Spillway Project

TID	Taber Irrigation District
$\mu g/m^3$	micrograms per cubic metre
W4M	west of the fourth meridian

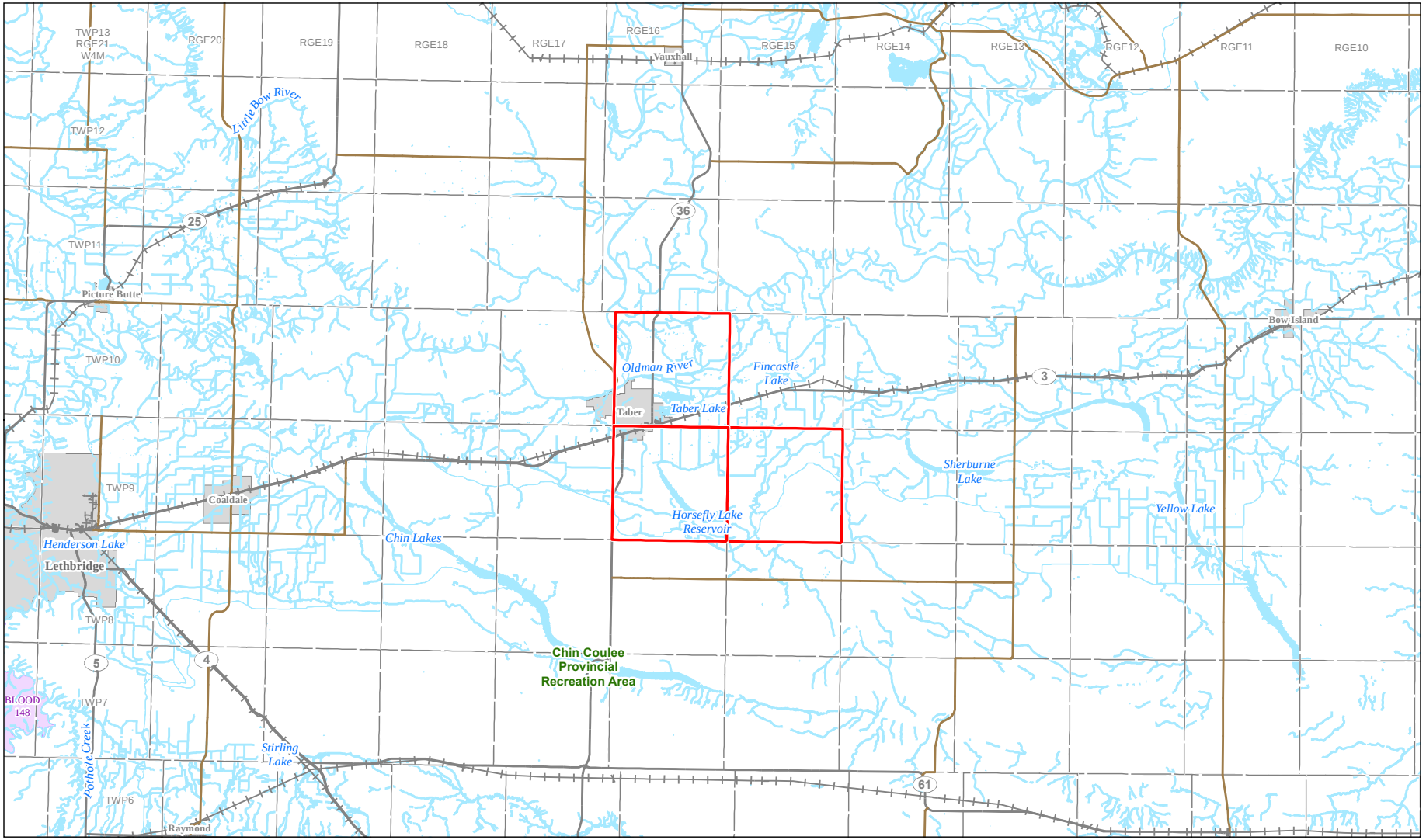
PART A: GENERAL INFORMATION

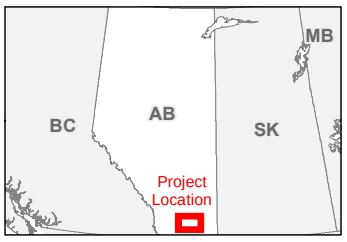
1.0 THE PROJECT'S NAME, TYPE OR SECTOR AND PROPOSED LOCATION

The Municipality of Taber (MD of Taber) is pleased to submit this Initial Project Description of the Horsefly Regional Emergency Spillway Project (the Project). This Initial Project Description has been prepared following the Impact Assessment Agency of Canada's (IAAC) *Guide to Preparing an Initial Project Description and a Detailed Project Description* (IAAC 2020).

The Project will involve upgrading the existing canal system, owned by the Taber Irrigation District (TID) and St. Mary River Irrigation District (SMRID), to collect flood waters, which would normally flow overland towards the Oldman River. Upgrading the existing canal system will prevent flooding of agricultural lands by diverting the water flow directly to the Oldman River. The general location of the Project is shown in Figure 1.1.

The Project is divided into three phases (Figure 1.2): Phase 1, from Taber Lake to the Oldman River; Phase 2, from Horsefly Reservoir to Taber Lake; and Phase 3, from the SMRID Main Canal to Horsefly Reservoir. Photos of all three Phases of the Project are presented in Appendix A.





- Project Area
- Primary Highway
- Secondary Highway
- Railway
- Watercourse
- Provincial Recreation Area/ Natural Area
- Reserve
- Urban Area
- Township
- Waterbody

N

0 5 10 Kilometres
(At original document size of 8.5x11)
1:500,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Data Sources: AltaLIS, NRCAN, Alberta Parks, GeoLogic, NRN, Alberta Government

Stantec

Project Location
T9&10N, R15&16W
Town of Taber

Prepared by SL on 2021-08-16
TR by TQ on 2021-08-16
IR Review by JH on 2021-08-16

Client/Project 110773806-0001 REVA
Client: M.D. of Taber
Project: Horsefly Regional Emergency Spillway

Figure No.
1.1

Title
Horsefly Regional Emergency Spillway Project – Location

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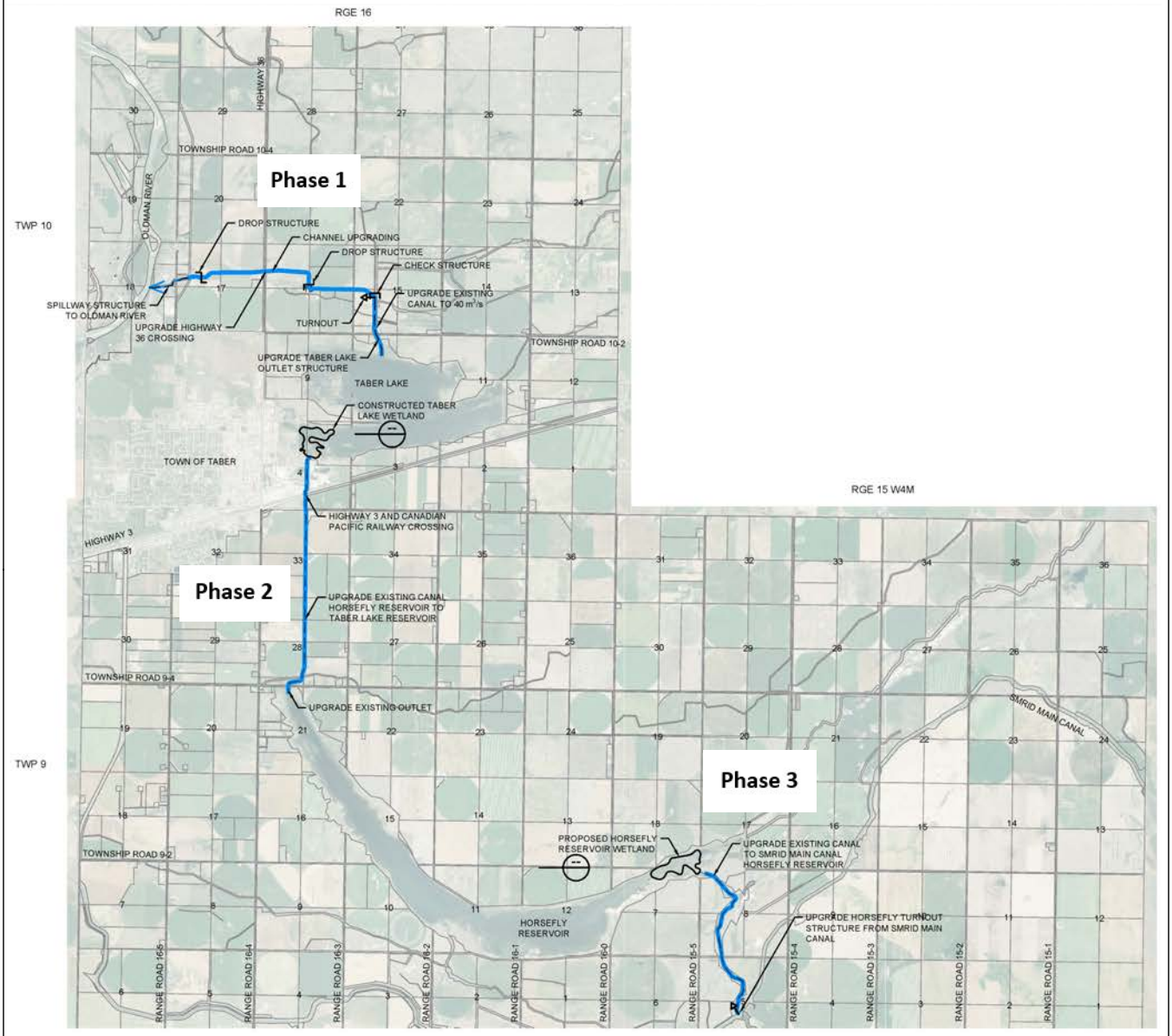

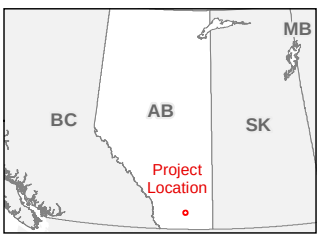

Notes

1. Original figure content provided by MPE Engineering Ltd.

Project Location	Prepared by SL on 2021-06-01
T9&10N, R15&16W	TR by TQ on 2021-06-06
Town of Taber	IR Review by JH on 2021-06-01
Client/Project	10773806-0003 REVA
Client: M.D. of Taber	
Project: Horsefly Regional Emergency Spillway	
Figure No.	
1.**2**	
Title	
Horsefly Regional Emergency Spillway Project – Project Phases	

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2.0 PROPONENT'S NAME AND CONTACT INFORMATION

Name of Project:	Horsefly Regional Emergency Spillway
Name of Proponent:	MD of Taber
Address of Proponent:	4900B 50th Street Taber, Alberta T1G 1T2
Municipal Administrator:	Mr. Arlos Crofts (403) 223-3541
Website	www.mdtaber.ab.ca
Principal Contact Person:	Mr. Arlos Crofts
Environmental Contact Person:	Mr. Jim Howell, Stantec Consulting <personal information removed> jim.howell@stantec.com

3.0 ENGAGEMENT WITH JURISDICTIONS OR AGENCIES

Federal and provincial agencies that have been consulted regarding the Project are listed in Table 3.1.

Table 3.1 Federal and Provincial Agencies Consulted

Agency	Purpose of Consultation	Outcome/Issues Raised
Federal		
Impact Assessment Agency of Canada	Introduction of Project and clarification of Project classification	Project is deemed a Designated Project (June 25, 2021)
Fisheries and Oceans Canada (DFO)	Introduction of Project and DFO requirements	To be contacted.
Infrastructure Canada	Application to Investing in Canada Infrastructure Program (ICIP)	• No *Impact Assessment Act* requirements under Section 82 • Blood Tribe and Métis Nation of Alberta Region 3 to be contacted • $8.8 million (M) grant received for Phase 1 (October 30, 2020)
	Application to Disaster Mitigation and Adaptation Fund (DMAF)	$9.8 M grant received for Phases 2 and 3 (November 23, 2020)

Table 3.1 Federal and Provincial Agencies Consulted

Agency	Purpose of Consultation	Outcome/Issues Raised
Provincial		
Alberta Environment and Parks (AEP)	Submission of Project Summary Table and Disclosure Document	Letter deeming that the Project does not require an environmental impact statement (July 14, 2021)
	Application to Alberta Community Resiliency Program (ACRP) TIER fund	• $7.4 M grant for Phase 1 (November 2019) • $12.9 M grant for Phases 2 and 3 (October 2020)
Alberta Culture and Status of Women (ACSW)	Historical Resources Application for Phase 1	• No *Historical Resources Act* requirements for archaeological resources required • Historic Resource Impact Assessment for palaeontological resources required (May 21, 2021)

The MD of Taber, being the proponent, has discussed the Project internally with the members of the Southern Regional Stormwater Drainage Committee since the committee's establishment in 2013. The MD of Taber is the managing partner of the committee, which includes the MD of Taber, and Lethbridge, Forty Mile, Cypress and Warner counties; the City of Medicine Hat, the towns of Taber, Coaldale and Bow Island; the TID and SMRID; and the Alberta government agencies of AEP, Alberta Agriculture and Alberta Transportation. All are supportive of the Project.

The MD of Taber held three public open houses about the Southern Regional Stormwater Management Plan, of which the Horsefly Regional Emergency Spillway Project is a component, in Coaldale, Taber and Medicine Hat in fall 2014. Summaries of the open houses are presented in Appendix B. The attendees were generally in support of the stormwater management plan with the only concern being water quality if water is pumped into the canals. An open house is planned for fall 2021 in Taber, focusing on the Horsefly component of the overall stormwater management plan.

4.0 ENGAGEMENT WITH INDIGENOUS GROUPS

As directed by Infrastructure Canada in their October 30, 2020, letter (Appendix C), the MD of Taber has contacted the Blood Tribe and the Métis Nation of Alberta Region 3 and provided information on Phase 1 of the Project. The Project notification letters are included in Appendix D.

In discussions, the Métis Nation of Alberta Region 3 indicated that the area along the Canadian Pacific (CP) rail tracks would be the most likely to have artifacts and that if anything was found, ACSW should be informed. A letter from Métis Nation of Alberta Region 3 stating that they have no outstanding concerns with Phase 1 of the Project is included in Appendix D.

A virtual meeting with Mike Oka, Consultation Coordinator of the Blood Tribe/Kainai First Nation was held on June 30, 2021. Mr. Oka expressed the interest of the Tribe in being notified of any chance artifact finds during construction and requested a copy of the Palaeontology HRIA when completed. Mr. Oka will contact ACSW for the report. The Tribe would like the chance to bid on contractor work for the Project. On July 15, 2021, members of the Blood Tribe visited the Project site with members of the Project study team. The Blood Tribe expressed no concerns with the Project.

As suggested by IAAC, the following additional Indigenous groups were contacted by letter on July 21, 2021 describing the Project:

- Treaty 6
  - Samson Cree Nation
  - Louis Bull Tribe
  - Montana First Nation
  - Ermineskin Cree Nation
- Treaty 7
  - Stoney Nakoda Nations (Bearspaw, Chiniki, Wesley)
  - Tsuut'ina Nation
  - Siksika Nation
  - Piikani Nation
- Non-Treaty Nations
  - Foothills Ojibway First Nation

A virtual meeting with Samson Cree Nation was held on September 15, 2021. They expressed no concerns with the Project. A virtual meeting was held with Ermineskin Cree Nation on September 22. They requested a site visit and expressed concern regarding effects on traditional plants and the presence of archaeological sites. On October 15, 2021, members of the Erminskin Cree Nation visited the site with members of the Project study team. The Erminskin Cree Nation expressed concern with effects of the quality of the water entering the Oldman River. As of October 15, 2021, the only other response from the additional Indigenous groups listed has been a telephone message from the Siksika Nation expressing an interest in a site visit. The MD of Taber will respond to any enquiries from the Indigenous groups.

5.0 REGIONAL ASSESSMENTS AND RELEVANT ENVIRONMENTAL STUDIES

There are no known regional assessments under sections 92 or 93 of the *Act* of the area in which the Project is located. There have been several projects in southern Alberta for which environmental studies have been carried out, some of which have study areas that overlap with those of the Project. Some environmental assessments for projects that occur on traditional lands of the Indigenous groups identified in Section 4.0 contain Traditional Land Use studies but these are specific to the project being assessed. The assessment for the Montana Alberta Tie Ltd. transmission line, which runs west of Taber, included Traditional Land Use studies for the Piikani First Nation and Blood Tribe/Kainai First Nation.

6.0 STRATEGIC ASSESSMENTS

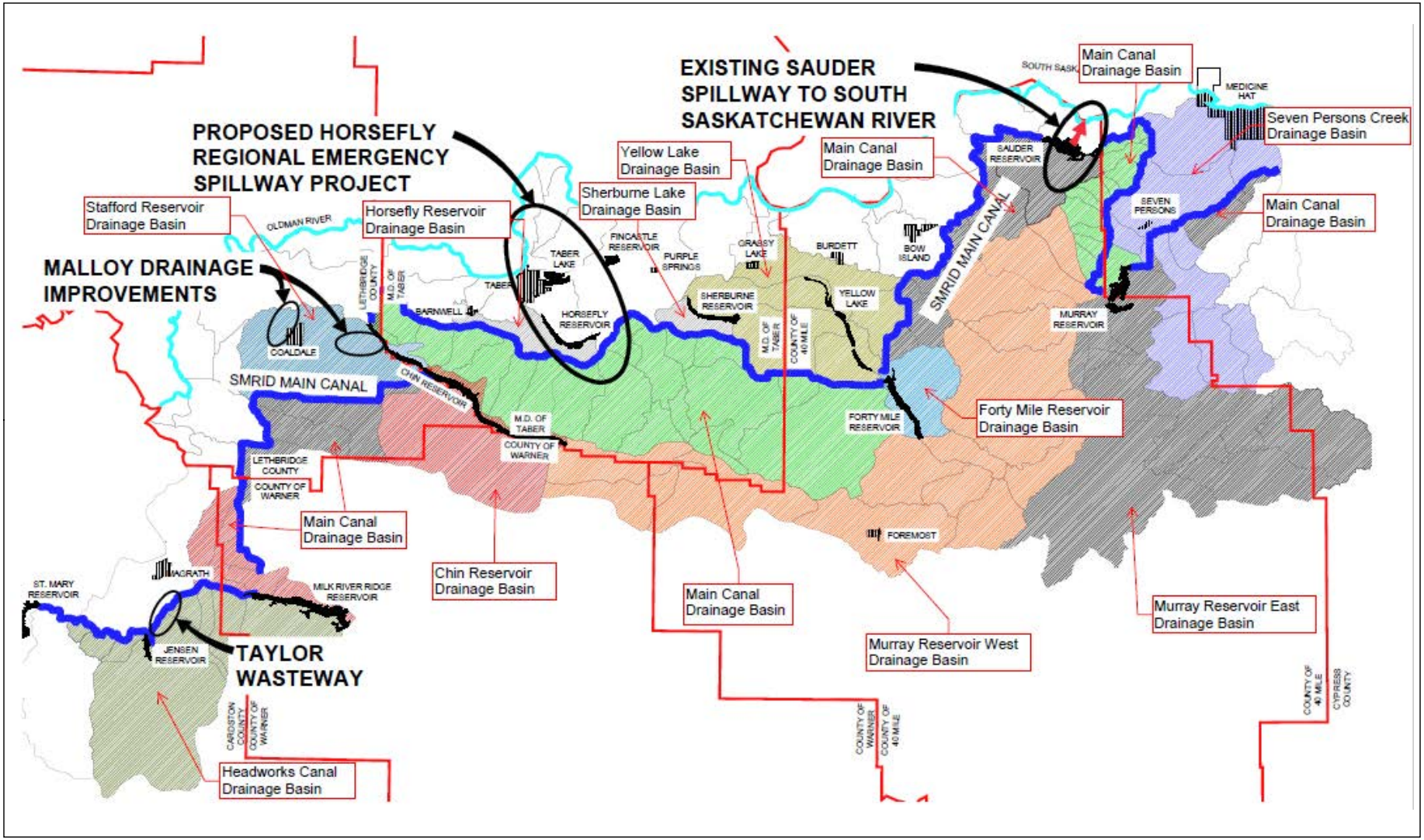
The Strategic Assessment of Climate Change (Government of Canada, 2020) conducted under subsection 95(2) of the *Impact Assessment Act* is applicable to the Project.

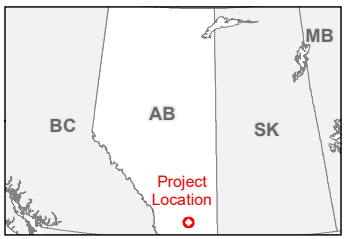
PART B: PROJECT INFORMATION

7.0 PROJECT PURPOSE AND NEED

The Horsefly Regional Emergency Spillway Project is proposed by the Southern Regional Stormwater Drainage Committee to address runoff water associated with extreme weather events in Southern Alberta that drain into existing irrigation infrastructure. During spring runoff, frequent storm events, and/or snow melt events, the irrigation system (which was not designed for drainage) does not adequately handle the volume of runoff water as was experienced during flooding events that occurred in 2010, 2011, 2013, 2014 and 2018. A strategically placed regional emergency spillway to the Oldman River from the SMRID Main Canal provides a solution to increase the flood attenuation capacity of the system. The Project is located near the midway point and major capacity reduction point on the 300 kilometre (km) long SMRID Main Canal system.

The SMRID Main Canal is the largest single drainage feature in the region, receiving stormwater runoff from approximately 565,000 hectares (ha) of land from Milk River Ridge in the west to Cypress Hills in the east. The location of the Main Canal and the drainage basins crossed between St. Mary Reservoir and Medicine Hat are shown in Figure 7.1. The Main Canal is designed to deliver water primarily to agricultural producers but also provides water to towns, villages, hamlets, and domestic users for potable drinking water as well as water for industrial users. The SMRID canals are a gravity flow irrigation system.





Notes

1. Original figure content provided by MPE Engineering Ltd.

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Project Location
T9&10N, R15&16W
Town of Taber

Prepared by SL on 2021-08-16
TR by TQ on 2021-08-16
IR Review by JH on 2021-08-16

Client/Project
110773806-0002 REVA
Client: M.D. of Taber
Project: Horsefly Regional Emergency Spillway

Figure No.
7.1

Title
St. Mary River Irrigation District
Main Canal

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8.0 PHYSICAL ACTIVITIES REGULATION

The *Impact Assessment Act* (*IAA)*, administered by the Impact Assessment Agency of Canada (the Agency), has two regulations that are most applicable to the Project: the *Physical Activities Regulations* and the *Information and Management of Time Limits Regulations*.

The *Physical Activities Regulations* list the activities and types of projects (designated projects) that require an impact assessment. Section 61 of the Regulations states:

> *61. The expansion of an existing structure for the diversion of water from a natural water body into another natural water body, if the expansion would result in an increase in diversion capacity of 50% or more and a total diversion capacity of 10,000,000 m^3/year or more.*

Both Taber Lake and the Horsefly Reservoir are constructed water bodies. The Project is designed to allow the diversion of 9,886,882 cubic metres (m^3). This volume of water would pass through the Project in a 1:100-year flood event. The Project would only be operational during a 1:100-year or larger flood event, since the primary purpose of the canals is to provide water for irrigation purposes. For example, Taber Lake through the Big Bend Canal supplies an area of approximately 8,900 ha with approximately 36,856,000 m^3 of water annually. For floods less than a 1:100-year event, the Project from the Big Bend Canal to the Oldman River would not be used.

The *IAA* also includes, in Section 8, that:

> *8. A federal authority must not exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a designated project to be carried out in whole or in part and must not provide financial assistance to any person for the purpose of enabling that designated project to be carried out, in whole or in part, unless*
>
> *(a) the Agency makes a decision under subsection 16(1) that no impact assessment of the designated project is required and posts that decision on the Internet site; or*
>
> *(b) the decision statement with respect to the designated project that is issued to the proponent of the designated project under section 65 sets out that the effects that are indicated in the report with respect to the impact assessment of that project are in the public interest.*

Section 82 of *IAA* refers to financial assistance for projects on federal lands, however, the Project is not located on federal lands. A letter received from Infrastructure Canada on October 30, 2020 (see Appendix C), confirms this for Phase 1 and states that there are no requirements for an IA under Section 82.

The Agency has determined that because Taber Lake and the Horsefly Reservoir were constructed on former sloughs (as is typical of reservoirs in southern Alberta), they are considered natural water bodies. Although the maximum diversion of water to the Oldman River would be 9,886,882 m^3 during a 1:100-year flood or greater and would only occur during such events, floods greater than a 1:100-year flood could result in over 10,000,000 m^3 of water being released to the Oldman River. As a result, the Agency has deemed the Project to be a designated physical activity, potentially subject to an IA (see Appendix C). An Initial Project Description, followed by a Detailed Project Description will be prepared and submitted to the Agency for their review to determine whether an IA is required. This document is the Initial Project Description of the Project.

9.0 PROJECT ACTIVITIES AND PHYSICAL WORKS

The Project is a three-phase project to prevent flooding of agricultural lands in the Taber area through the upgrading of the irrigation canal system to divert flood waters to the Oldman River. The Project is divided into three phases: Phase 1, from Taber Lake to the Oldman River; Phase 2, from Horsefly Reservoir to Taber Lake; and Phase 3, from the SMRID Main Canal to Horsefly Reservoir. As typical of irrigation reservoirs in Southern Alberta, both the Horsefly Reservoir and Taber Lake are constructed reservoirs located on former sloughs.

The TID commenced irrigating around Taber in 1919. Construction of Taber Lake as part of the system was started in 1939 but stopped because of World War II. The Prairie Farm Rehabilitation Administration constructed the Horsefly Reservoir in 1954. At that time, the construction of Taber Lake was completed, connecting it to the SMIRD Main Canal and extending irrigation north of the Rogers (now Lantic) sugar beet factory. Regular irrigation diversions from the SMRID Main Canal into the Horsefly Reservoir between 2016 and 2021 are shown in Table 9.1.

Table 9.1 Irrigation Diversions from SMRID to the Horsefly Reservoir

Year	Annual Diversions (m^3)
2021	100,851,116
2020	75,670,408
2019	80,529,172
2018	82,922,166
2017	98,284,199
2016	62,629,826

9.1 PROJECT PHASES

The Project activities and physical works are described for each phase.

9.1.1 Phase 1

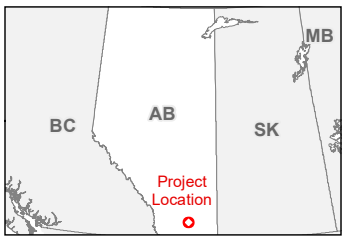
Phase 1 (Figure 9.1) conveys water from Taber Lake, north and west to the Oldman River. The outlet from Taber Lake will be replaced and the first approximately 1,000 metres (m) of the existing canal (the Big Bend Lateral) will be enlarged from a capacity of 7.6 m^3/s to 40 m^3/s primarily by widening the canal. At this location, a check structure will direct water into the Big Bend Canal north for irrigation. From the west of the check structure on the spillway the next 3,500 m of the system west of this point is a constructed earthen drain. The existing drain, which normally carries a small volume of runoff from the adjacent fields, tile drain seepage from Big Bend Canal and leakage through old gates, will be enlarged and widened to carry 40 m^3/s. The final 1,000 m of the spillway will install erosion protection measures and enlarge drainage through a natural coulee to the Oldman River. Access may be required to the Oldman River for completion of the spillway. The appropriate permits and authorizations from DFO will be obtained prior to work commencing within the river. All conditions to the permits and authorizations will be adhered to. A wetland is presently being constructed on the south side of Taber Lake. Three MD of Taber road crossings and a crossing for Highway 36 will also require enlargement.

9.1.2 Phase 2

Phase 2 (Figure 9.2) includes enlarging 5,000 m of existing canals between Horsefly Reservoir and Taber Lake. Concrete control structures and two MD of Taber road crossings will need to be replaced to convey the additional flows. The outlet structure from Horsefly Reservoir will need to be replaced as will the crossing of Highway 3 and the CP Railway line. The wetland currently under construction at Taber Lake will be expanded and enhanced to improve water quality.

9.1.3 Phase 3

Phase 3 (Figure 9.3) includes replacing the turnout structure on the SMRID Main Canal and enlarging 3,500 m of the SMRID-owned canal that delivers water to Horsefly Reservoir. Two drop structures and a MD of Taber road crossing will need to be enlarged to convey the additional flow. The existing wetland at Horsefly Reservoir will be expanded and enhanced to improve water quality.



Notes

1. Original figure content provided by MPE Engineering Ltd.

Stantec

Project Location
T9&10N, R15&16W
Town of Taber

Prepared by SL on 2021-09-27
TR by TQ on 2021-09-27
IR Review by JH on 2021-09-27

Client/Project
110773806-0010 REVA
Client: M.D. of Taber
Project: Horsefly Regional Emergency Spillway

Figure No.
9.1

Title
Phase 1 Proposed Alignment

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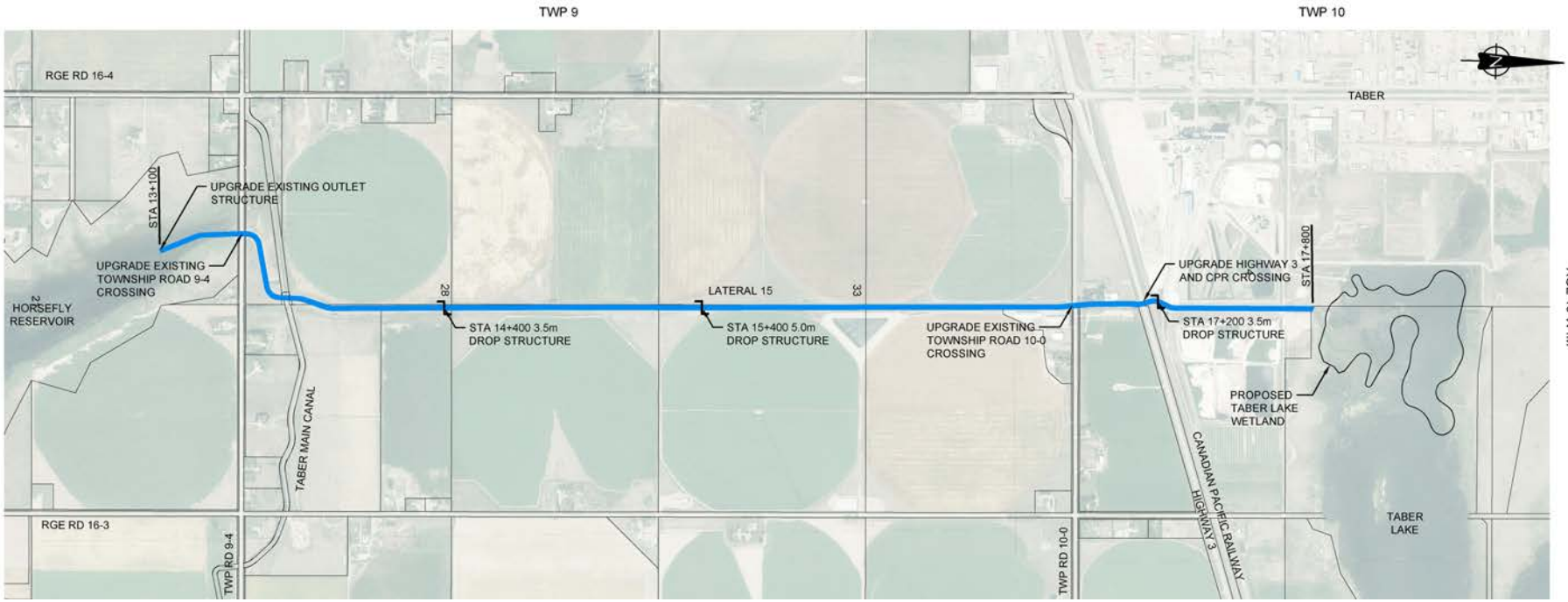

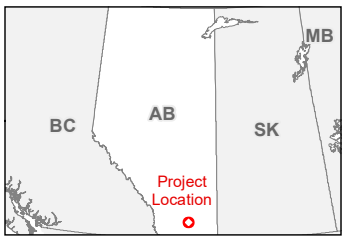

Notes

1. Original figure content provided by MPE Engineering Ltd.

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Project Location
T9&10N, R15&16W
Town of Taber

Prepared by SL on 2021-09-27
TR by TQ on 2021-09-27
IR Review by JH on 2021-09-27

Client/Project 110773806-0009 REVA
Client: M.D. of Taber
Project: Horsefly Regional Emergency Spillway

Figure No.
9.2

Title
Phase 2 Proposed Alignment

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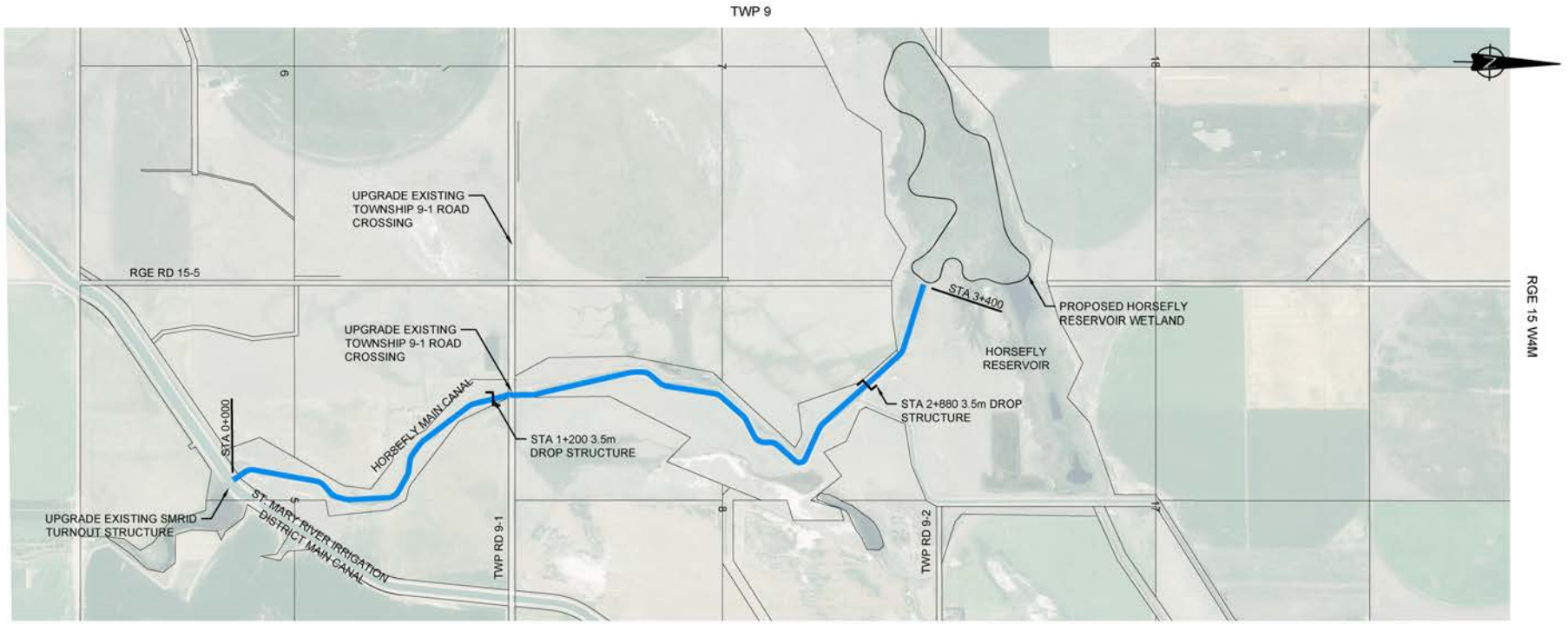

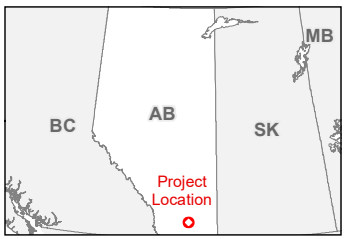

Notes
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Stantec

Project Location
T9&10N, R15&16W
Town of Taber

Prepared by SL on 2021-09-27
TR by TQ on 2021-09-27
IR Review by JH on 2021-09-27

Client/Project
110773806-0008 REVA
Client: M.D. of Taber
Project: Horsefly Regional Emergency Spillway

Figure No.
9.3

Title
Phase 3 Proposed Alignment

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9.2 DESCRIPTION OF PROJECT ACTIVITIES

Project construction, operation and decommissioning are discussed below.

9.2.1 Construction

Project Construction components are as follows:

- Canal enlargement from the SMRID Main Canal to the Oldman River will include stripping, salvage and stockpiling of topsoil, widening the canal to increase capacity, and replacing culverts at local road crossings, Provincial Highways 36 and 3, and a Canadian Pacific Railway crossing for the increased capacity. The channel will have a trapezoidal cross section with a bottom width between 4.0 and 6.0 m, depth between 2.7 m and 3.0 m, and 2.5H:1V side slopes. The channel will have 0.50 m of freeboard.
- Five control structures will be replaced in Phase 1 to increase capacity:
  - The Reservoir Outlet Structure at Taber Lake will be replaced to accommodate the increased spillway flows. The new Taber Lake Outlet structure will be 14.5 m long and 14.3 m wide with three bays, two bays will be controlled with overshot gates and the third bay serving as an intake for a future TID pipeline.
  - An existing check drop structure on the Big Bend Canal requires replacement for the enlarged capacity. The structure will have 1.5 m of drop and be 9.4 m wide and 15.9 m long with two bays equipped with overshot gates to control water levels upstream for existing irrigation pipelines.
  - An existing irrigation turnout will be replaced by a two-bay check drop structure controlled with radial gates. This structure will have 2.5 m of drop and be 9.4 m wide and 20.9 m long. The structure serves to divert flows into the Big Bend Canal during normal operations and is the main control for water that will be diverted to the Oldman River.
  - Two drop structures will be replaced in the existing drain just to the east of Range Road 164A. These drop structures will have 2.0 m of drop and be 9.4 m wide and 18.9 m long. The structures are free overflow with no gates.
- The spillway through the coulee west of Range Road 164A will have a semi natural cross section and riprap will be used to mitigate erosion and stabilize the coulee long term. This more natural look will be less obtrusive than a hard engineering solution such as cast-in-place concrete. The channel will have a cross section 8.0 m wide and 2.0 m deep. Using the existing coulee bed is less obtrusive and more economical than other options.
- Outflow from the Lantic Sugar facility will be diverted around the construction site.
- A cofferdam will be constructed at the confluence of the spillway and the Oldman River; fish salvage will occur behind the cofferdam.
- Control structures in Phases 2 and 3 are still in the preliminary design phase but all inline control structures will need to be replaced for the increased capacity of the spillway. Where required, gates will be installed to provide water levels that are high enough to facilitate irrigation during normal operations.

- All road crossings need to be replaced with either corrugated steel pipes, concrete box culverts, or single span bridges. There are three major crossings: Highway 36, Highway 3, and the Canadian Pacific Railway that all need to be replaced to accommodate the enlarged capacity.
- To control flows into the spillway, the turnout structure at the SMRID Main Canal, will be replaced with a new cast-in-place concrete structure controlled with gates.
- Wetlands are proposed to be constructed where the spillway enters Horsefly Reservoir and Taber Lake to enhance the riparian areas. The wetlands are intended to improve water quality of the reservoirs during normal canal operations. The wetlands will have an area of approximately 20-30 ha.
- Control structures will have chain link fencing and the canals will have barbed wire fencing to control access and for safety purposes.

Construction traffic will be limited to the rights-of-way and easements obtained for the Project. The entire spillway will be fenced along the right-of-way boundaries. Texas gates will be installed at all road crossings. Access control gates will be installed where required. Temporary fencing will be installed during construction, if necessary.

Construction will be carried out by contractors hired through a competitive bidding process by the MD of Taber. Contractors will meet MD construction standards and Alberta Transportation standards for water management projects (Government of Alberta 2017).

Some incidental items related to the construction of the spillway include the relocation of gas line crossings to accommodate the enlarged spillway, and replacement of irrigation delivery points due to enlargement of the existing canals. Highway 3 twinning is also occurring at the same time as the Project and as such the crossing of the Horsefly Spillway will be accommodated into the Highway design.

Post-construction activities will involve clean-up and restoration of the temporary work laydown areas. The stockpiled soil will be used for reclamation. Construction waste will be collected and disposed of at licensed waste facilities.

9.2.2 Operation

During non-flood conditions, the Project will operate as it currently does as a component of the TID canal system. Water will be delivered to the Big Bend Canal, with no water flowing west of the turnout structure to the Oldman River. During 1:100-year event or greater floods, water will be released through the spillway to the Oldman River. The SMRID Main Canal can handle floods up to the 1:100-year event. Timing of water diversion into the spillway will be based on several factors including the capacity and storage in current irrigation reservoirs, forecasted rainfall and snowmelt conditions, and the condition of the SMRID Main Canal downstream of the spillway (i.e., ice in the canal). SMRID and TID will be in contact with AEP and the local municipalities during storm events to determine a coordinated operation. For floods greater than the 1:100-year event, water will continue to be diverted with excess water overtopping the canals and flooding the adjacent lands. Spillway operations will require no storage of materials or solid waste production. All gated control structures in the proposed spillway will be powered by the existing electrical grid system with provisions for portable electrical power in the event of a power outage. All gated control structures will have the capability of being operated remotely.

9.2.3 Decommissioning

The Project components will be part of the TID canal system, which is expected to operate in perpetuity; as such, they are not expected to be decommissioned.

10.0 ESTIMATED MAXIMUM PROJECT CAPACITY

The three phases of the Project and their current and planned capacities are shown in Table 10.1.

Table 10.1 Capacity of Project Phases

Phase	Function	Existing Capacity (m^3/s)	Proposed Capacity (m^3/s)
1	Transfer water from Taber Lake to the Oldman River	7.6*	40
2	Transfer water from Horsefly Reservoir to Taber Lake	7.1	40
3	Transfer water from SMRID Main Canal to the Horsefly Reservoir	28.3	47
NOTE: * Capacity of Big Bend Canal			

The Project would divert water to the Oldman River only during 1:100-year flood events or greater.

Ongoing engineering work on the Project has determined that the system will be designed for a maximum flow of 9,886,882 m^3, which could occur during a 1:100-year flood event.

11.0 PROJECT SCHEDULE

If the Project does not require an Impact Assessment, construction of Phase 1 of the Project is planned to commence in summer 2022 and to be completed by fall 2023. Construction of Phase 2 is scheduled to occur from 2023 to 2025. Construction of Phase 3 is scheduled from 2024 to 2026. Canal enlargement will occur during the non-operational months of the irrigation system, early October to late April. If an Impact Assessment is required, the schedule is expected to be delayed by two years. The Project components are part of the Taber irrigation system, operational since 1919; as such, the Project is expected to operate in perpetuity.

12.0 PROJECT ALTERNATIVES

12.1 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Major flooding occurred in the south Oldman River drainage basin in 2010 and 2011. After major snow melt and precipitation events, significant damage occurred, including numerous road and culvert washouts, tracts of flooded cropland, stranded residences, and a breach of the Seven Persons Reservoir. As a result, the Regional Drainage Committee for municipalities along this drainage basin commissioned the development of a regional stormwater management plan.

12.1.1 Southern Regional Stormwater Management Plan

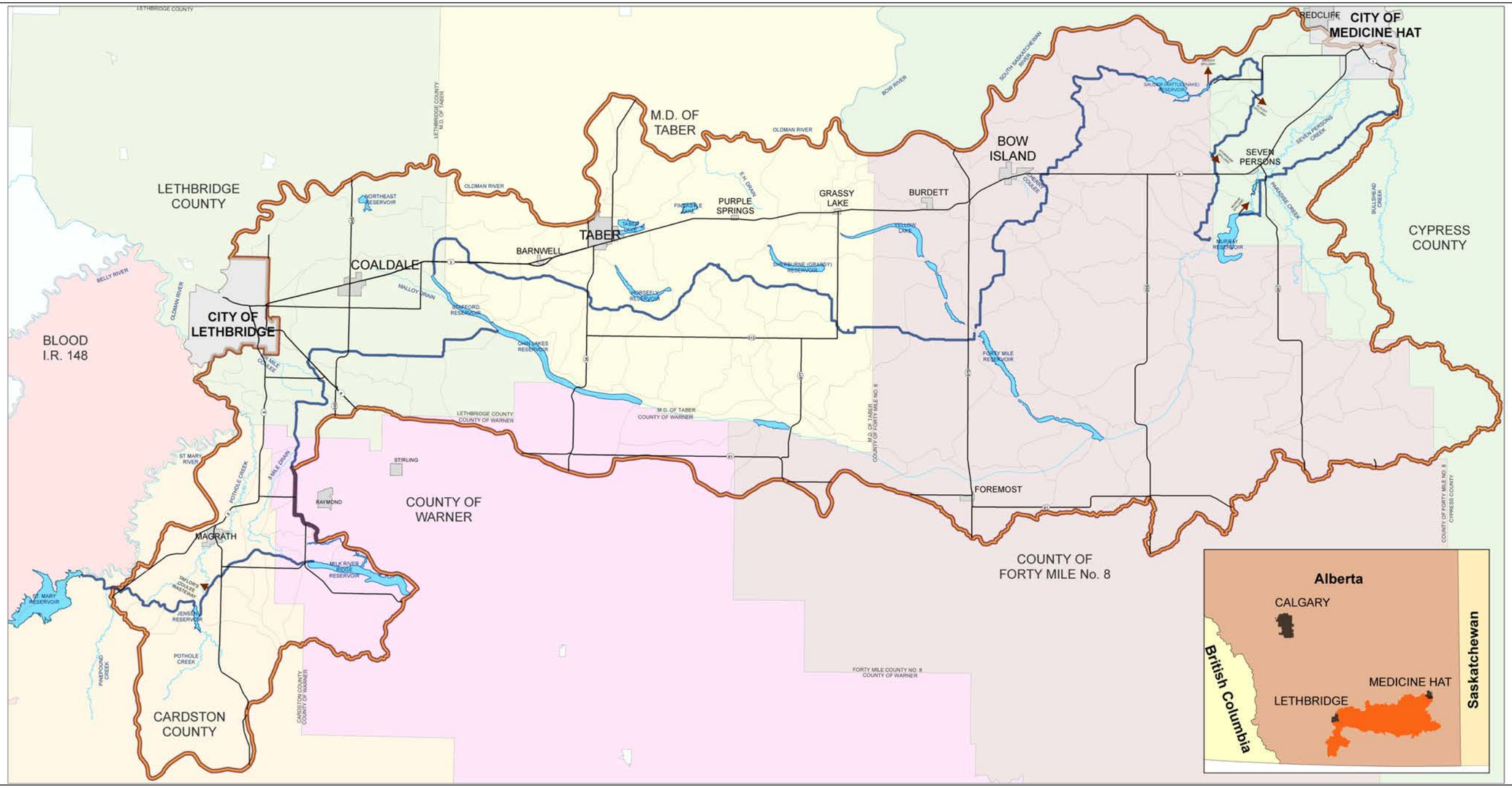
12.1.1.1 Overview

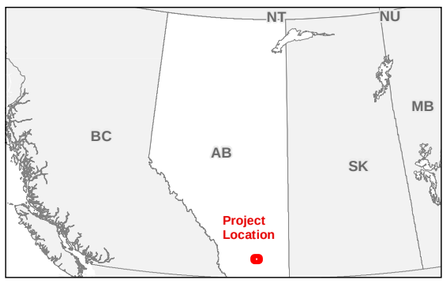
The Southern Regional Stormwater Management Plan (SRSMP) (MPE Engineering Ltd. 2014) examined drainage issues in the south Oldman River drainage basin, focusing on the SMRID Main Canal. Figure 12.1 shows the study area for the SRSMP.

Flood mitigation alternatives along the Main Canal consisted of additional or upgraded diversion spillways and increased reservoir storage.

Modelling was performed to assess the effectiveness of several canal spillway alternatives that divert excess water from the canal, thereby enabling it to accept more runoff where drain inlets are normally closed.

Six hypothetical scenarios under the 1:100-year event were modelled for the SRSMP area along the Main Canal between the Stafford Reservoir and the Seven Persons Creek basin, which flows into South Saskatchewan River at Medicine Hat (Figure 12.1). Table 12.1 describes the options and provides a comparison of their costs and anticipated benefits.





Legend

- SMRID Main Canal
- Lakes & Reservoirs
- Major Rivers & Creeks
- Highways
- Existing Spillways
- Study Area Boundary
- Cities & Towns

Notes

1. Original figure content provided by MPE Engineering Ltd.

Stantec

Project Location
T9&10N, R15&16W
Town of Taber

Prepared by SL on 2021-08-16
TR by JH on 2021-08-16
IR Review by JH on 2021-08-16

Client/Project 110773806 REVA
Client: M.D. of Taber
Project: Horsefly Regional Emergency Spillway
Report: Initial Project Description

Figure No.
12.1

Title
Southern Regional Stormwater Management Plan Study Area

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Table 12.1 Flood Mitigation Options: Costs and Benefits

Region/Scenario	Cost, ($M)	Description	Benefitted Areas
Stafford to Sauder			
Scenario 1 – Construct sufficient additional storage at Chin Reservoir to capture all Main Canal upstream flow; no discharge from Chin Reservoir during storm			
Scenario 1.1 – Chin Reservoir Expansion and Horsefly Spillway	97	Construct canal spill into Horsefly Reservoir to divert all Main Canal flow at this point.	Trapped low land along canal between Stafford and Sauder; Town of Taber; flooded areas southeast of Taber.
Scenario 1.2 – Chin and Sherburne Reservoir Expansion and Horsefly/Sherburne Spillways	98	Construct equal capacity canal spills into Horsefly and Sherburne (Grassy) Reservoirs to divert all Main Canal flow accumulated up to Sherburne (i.e., zero flow in canal just downstream of Sherburne).	Trapped low land along canal between Stafford and Sauder; Town of Taber; flooded areas southeast of Taber.
Scenario 1.3 – Chin Reservoir Expansion and Chin/Horsefly/ Sherburne Spillways	119	Construct equal capacity canal spills into the Oldman River (downstream of Stafford Reservoir) and into Horsefly Reservoir and utilize existing Sherburne Reservoir supply canal to divert additional spill.	Trapped low land along canal between Stafford and Sauder; Town of Taber; flooded areas southeast of Taber.
Scenario 2 - No additional storage is constructed at Chin Reservoir. Instead, a new spillway is constructed downstream of Stafford Reservoir, diverting all flow in the Main Canal at that point into the Oldman River[1] (i.e., zero flow in Main Canal immediately downstream of this spillway.			
Scenario 2.1 – Chin Spillway and Horsefly Spillway	115	Construct canal spill into Horsefly Reservoir to divert all Main Canal flow at this point.	Trapped low land along canal between Stafford and Sauder; Town of Taber; flooded areas southeast of Taber.
Scenario 2.2 – Chin, Horsefly, and Sherburne Spillways	123	Construct equal capacity canal spills into Horsefly and Sherburne (Grassy) Reservoirs to divert all Main Canal flow accumulated up to Sherburne (i.e., zero flow in canal just downstream of Sherburne).	Trapped low land along canal between Stafford and Sauder; Town of Taber.
Sauder to Murray			
Scenario 3 – Replacement Sauder Spillway	13	Construct a larger capacity spillway at Sauder Reservoir, capable of spilling all of the design storm inflow. Downstream, Klaudt, and Stornham spillways are both used to maximum capacity.	Seven Persons Creek flood plain; small area along canal just west of Murray Reservoir.
Scenario 4 – Secondary Sauder Spillway	11		
Seven Persons Creek Basin			
Scenario 5 – Murray Reservoir expansion	25	Increase storage at Murray Reservoir to maintain spill into Seven Persons at no more than 28 m^3/s.	Seven Persons Creek flood plain.
Scenario 6 – Paradise Creek Dam	13	Construct a dry dam capable of capturing all the run-off during the design event.	Mitigates only portion of Seven Persons Creek flow. Possible beneficial use of water stored at dam.

Table 12.1 Flood Mitigation Options: Costs and Benefits

Region/Scenario	Cost, ($M)	Description	Benefitted Areas
All			
Taylor's Coulee Wasteway	15	Construct wasteway	Frees up capacity in Milk River Ridge and Chin Reservoirs. Constructed in 2019.
Pumped Drain Inlets	2	Pump out drain inlets	Trapped low land behind drain inlets. Approximately 20 sites would significantly benefit. Essential for flood mitigation of trapped lows behind canal drain inlets.
NOTE: [1] Inflows to the Oldman and South Saskatchewan rivers from the SMRID Main Canal will typically be less than 10% of the natural river flow (MPE Engineering Ltd. 2014).			

12.1.1.2 Chosen Flood Mitigation Option

In February and March 2018, severe flooding was experienced from Taber to Bow Island due to snow melt. During this event, the SMRID Main Canal was at capacity at the Horsefly Spillway location causing the canal to be breached at several locations and the adjacent farmland to be flooded. Fortunately, repairs were completed prior to the system being required to deliver water for irrigation. The event demonstrated that the construction of the Horsefly Spillway would allow diversion of water from the Main Canal, freeing up downstream capacity to accept additional runoff. The Project would therefore benefit not only SMRID and TID, but multiple rural and urban communities. The Regional Drainage Committee re-prioritized the flood mitigation projects, placing the Horsefly Regional Emergency Spillway at the top (MPE Engineering Ltd. 2018). Additional rationale for prioritizing the Horsefly Regional Emergency Spillway is it is the shortest route from the SMIRD Main Canal to the Oldman River using existing canals and it is at a significant bottleneck on the SMRID Main Canal, providing a greater amount of flood mitigation than diversions further upstream.

12.1.2 Horsefly Emergency Spillway Alternatives

The design of the Horsefly Spillway is ongoing. Alternates to the Project were considered including a spillway channel to the west of the Town of Taber and increasing storage in the Horsefly Reservoir and Taber Lake to store stormwater. Both alternates were eliminated for the following reasons:

- Routing the spillway to the west of the Town of Taber requires routing through a large country residential subdivision and establishing a new corridor for the spillway rather than following an existing canal. Acquiring this land would have been difficult and public opposition was anticipated.
- Increasing the storage in Taber Lake and Horsefly Reservoir is impractical due to their already small size compared to the volume required to be stored. Gaining enough volume was not practicable. The reservoirs are surrounded by urban areas or highly developed agriculture and obtaining land would have been more expensive than the spillway alternative.

Currently the proposed Project is the most economical and technically feasible alternative to reliably convey stormwater from the SMRID Main Canal to the Oldman River.

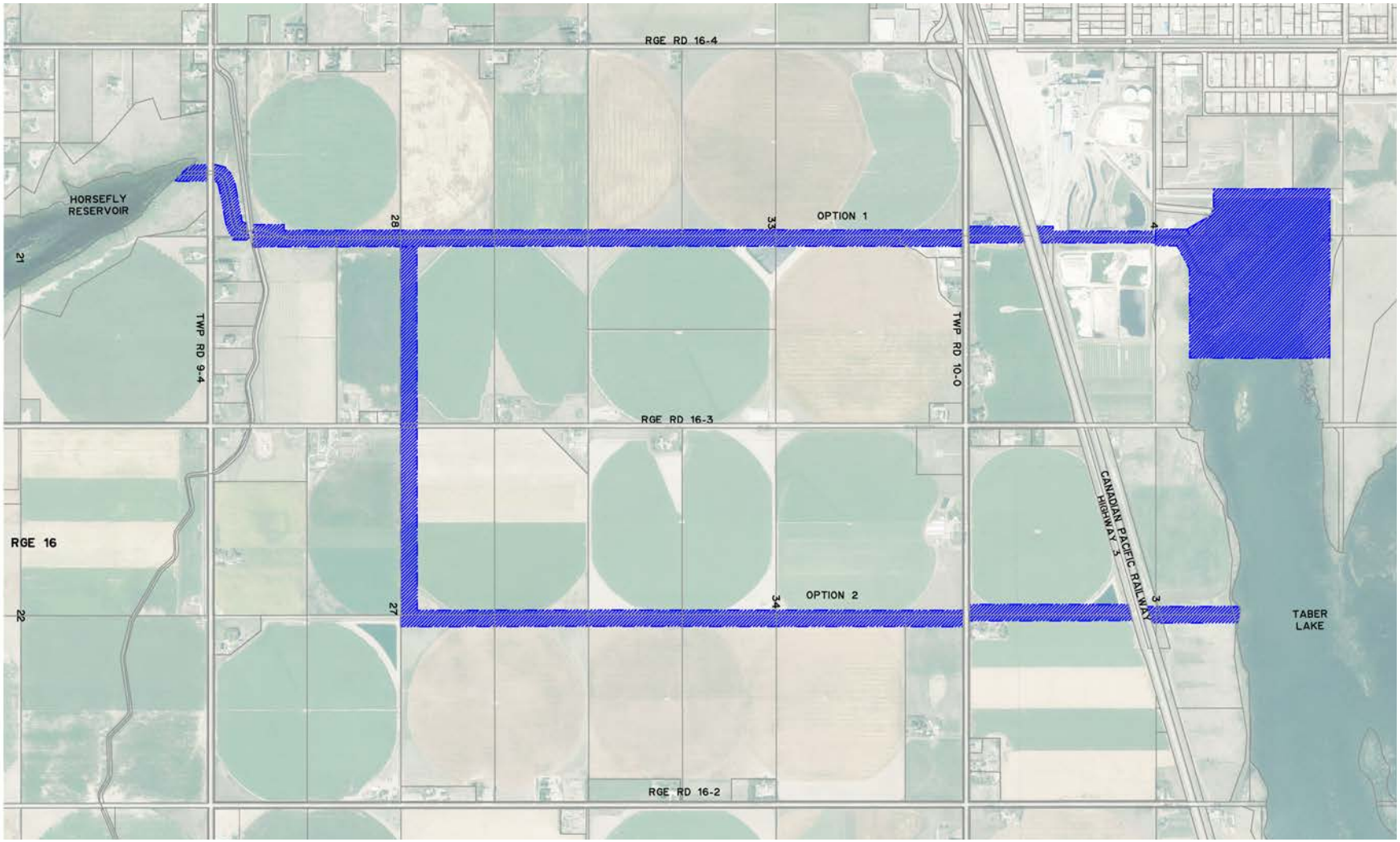
Alternatives have been considered for the Phase 1 alignment in the coulee and alternatives are being considered for the Phase 2 alignment between Horsefly Reservoir and Taber Lake.

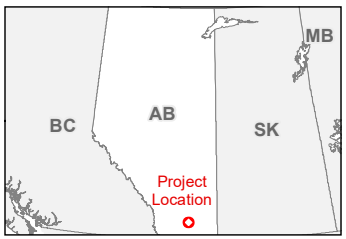
The canal alignment in the coulee considered two primary options. One option would be to route the drain to the north of the coulee and use a concrete chute structure to drop the water to the Oldman River. This option was eliminated fairly early in the design process as the grades to the north of the coulee would require extensive excavation. Ultimately the route through the existing coulee was chosen as it required less excavation and disturbance.

Two options are being considered for the Project alignment between Horsefly Reservoir and Taber Lake (Figure 12.2). Option 1 retains the existing alignment that crosses the Lantic facility; Option 2 runs one mile east of Option 1 and avoids the Lantic facility. Option 2 avoids interaction with the Lantic wastewater ponds and a crossing of the TID main canal; the Canadian Pacific Railway crossing will be simpler with this option. However, it would involve the construction of a new canal. Assessment is ongoing as part of the preliminary design however it is likely both routes have good technical merit and similar environmental effects. The lowest cost option will dictate the design.

12.2 ALTERNATIVES TO THE PROJECT

A regional stormwater management plan is the only feasible means to address the issue of flooding in the basin at a regional scale.





CONSTRUCTION LIMITS

Notes

1. Original figure content provided by MPE Engineering Ltd.

Stantec

Project Location
T9&10N, R15&16W
Town of Taber

Prepared by SL on 2021-09-27
TR by CS on 2021-09-27
IR Review by JH on 2021-09-27

Client/Project
110773806-0011 REVA
Client: M.D. of Taber
Project: Horsefly Regional Emergency Spillway

Figure No.
12.2

Title
Phase 2 Alignment Options

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PART C: LOCATION INFORMATION AND CONTEXT

13.0 GEOGRAPHIC INFORMATION

Phase 1 of the Project is in Sections 10, 15, 16, 17 and 18, Township 10, Range 16, West of the fourth meridian (W4M). Phase 2 of the Project is in Sections 21, 28, 33 Township 9, Range 16 and Section 4, Township 10 W4M. Phase 3 of the Project is in Sections 5, 7, 8 and 18, Township 9, Range 15 W4M. The southern geographic location of the Project and the exit from SMRID Main Canal is Latitude 49° 42' 14.26" N (49.703961) Longitude 112° 00' 14.54" W (-112.004039). The northern geographic location of the Project an outlet to the Oldman River is Latitude 49° 49' 19.25" N (49.822014) Longitude 112° 09' 21.63" W (-112.156008).

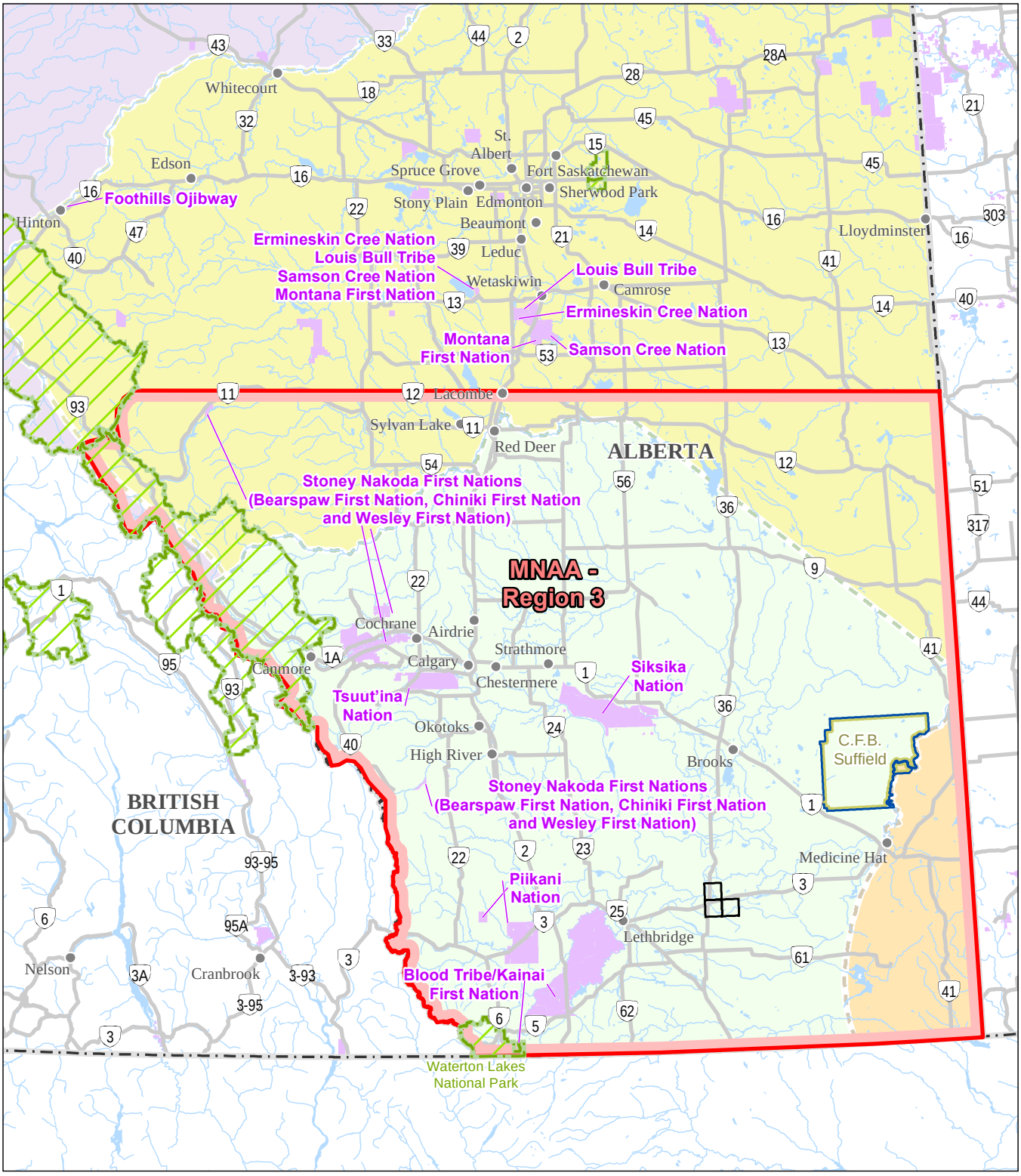
The Project's location is adjacent to the Town of Taber, as shown in Figure 1.2.

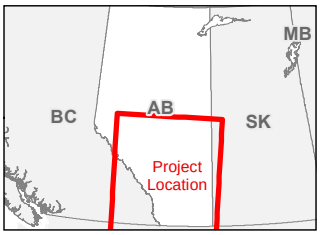
The Project is on private land, mainly utilized for agriculture, and on land belonging to the TID, Town of Taber and Lantic Inc. Most of the land is privately owned and there are residences along the canals. There are 15 residences within 300 m of the existing canal: eight in Phase 1, four in Phase 2 and three in Phase 3.

The Project is located within Treaty 7 and Métis Nation of Alberta Region 3. Figure 13.1 shows the Project in relation to Indigenous groups and nearby federal lands. Table 13.1 presents the distances to reserves of Indigenous groups, as identified by IAAC.

Table 13.1 Distances from the Project to Reserves

Indigenous Group or Organization	Distance from Project Centre (km)
Blood Tribe/ Kainai First Nation	57
Piikani Nation	102
Siksika Nation	99
Tsuut'ina Nation	190
Stoney Nakoda Nations (Bearspaw, Chiniki, Wesley)	228
Samson Cree Nation	334
Louis Bull Tribe	354
Montana First Nation	334
Ermineskin Cree Nation	346
Foothills Ojibway First Nation	546





Project Area
First Nation Reserve
Métis Nation of Alberta Association (MNAA) Region 3
National Park
Suffield Military Base

Treaty Boundary
Treaty 4 (1874)
Treaty 6 (1876)
Treaty 7 (1877)
Treaty 8 (1899)

0 50 100 Kilometres

N

Stantec

Project Location
T9&10N, R15&16W
Town of Taber

Prepared by SL on 2021-08-16
TR by JH on 2021-08-16
IR Review by JH on 2021-08-16

Client/Project 10773806-0008 REVA
Client: M.D. of Taber
Project: Horsefly Regional Emergency Spillway

Figure No.
13.6

Title
Location of Indigenous Groups and Nearby Federal Lands

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Based on discussions with Indigenous peoples to date (October 15, 2021) the Project is not on land used for traditional purposes by Indigenous peoples of Canada. The Project is not on land:

- in a reserve as defined in subsection 2(1) of the *Indian Act*
- First Nation land as defined in subsection 2(1) of the *First Nations Land Management Act*
- land that is subject to a comprehensive land claim agreement or a self-government agreement
- land set aside for the use and benefit of Indigenous peoples of Canada

The nearest federal lands to the Project are Waterton Lakes National Park (136 km from the Project) and the Canadian Forces Base, Suffield (83 km from the Project).

14.0 PHYSICAL ENVIRONMENT

14.1 OVERVIEW

The description of the biophysical setting is taken from Cottonwood Consultants Ltd. (1988).

The physical setting is described in some detail by Beaty (1975). Only one major physical landscape, the Great Plains, is represented in the Project area. It is an area which is underlain by essentially flat-lying rocks. These have been modified extensively by glacial action and are dissected by major river valleys and glacial spillways.

The Great Plains are quite distinct from other landscapes in the Oldman River Region. While large areas are essentially level, there are some areas of strongly rolling terrain.

The Plains owe their surface character primarily to events surrounding glaciation. These surficial features include moraines, glacial lake basins, meltwater channels and spillways, dune fields, eskers and kames, drumlinized terrain, and outwash plains.

Along the stream valleys of the Oldman and South Saskatchewan Rivers, and along glacial spillways such as Chin Coulee, there are local areas of eroded bedrock some of which have a characteristic "badlands" appearance. Massive slumping is found along portions of the Oldman River.

The Plains region is underlain by Tertiary and Cretaceous, marine and non-marine, sandstones and shales of the Paskapoo, Oldman, Bearpaw and Foremost Formations.

The Project area is representative of the Grassland Natural Region, principally the Mixed Grassland Section.

Spear grasses (*Stipa spp*.) and wheat grasses (*Agropyron spp*.) predominate. Plant and animal species in Mixed Grasslands have adapted to a variety of grazing regimes ranging from light to extremely heavy (Wallis 1982). Detailed descriptions of Mixed Grassland vegetation can be found in Coupland (1950).

Inhabitants of these dry grasslands Include typical Mixed Grassland plants and animals. Some areas are important habitat for antelope and provide feeding areas for rare or threatened birds of prey like the ferruginous hawk (*Buteo regalis)* and burrowing owl (*Athene cunicularia)*. Rare plants and animals tend to concentrate in springs, sand plains and sand dunes, badlands, and along the rims of valleys and gullies.

Wetlands are locally numerous, especially in areas of rolling topography and in association with irrigation developments. Most large water bodies are constructed or maintained, including the Horsefly and Chin Reservoirs and Taber Lake. Natural wetlands in the Mixed Grasslands tend to be more alkaline and temporary. Many of these wetlands are important for waterfowl production and migration and support a variety of marsh birds. A few sites provide important shorebird habitat.

Riverside (riparian) woodlands are confined to the Oldman River. Extensive woodlands are very localized. Plains cottonwood (*Populus deltoides*) dominates.

Riparian areas are typically diverse with habitats ranging from newly-forming sand and gravel bars to low and tall shrub thickets, grassland, open-growth cottonwoods, cottonwoods with a dense shrub understory, and abandoned channel wetlands. These habitats are dependent on major flood events for renewal.

Riparian habitats are some of the most productive breeding bird habitats in the semi-arid plains. About three-quarters of birds occurring in Alberta's Grassland region use riparian habitats for some portion of their life cycle (Wallis 1982). Some uncommon birds like pileated woodpeckers *(Dryocopus pileatus*) are found in these habitats. Colonies of great blue herons (*Ardea Herodias)* nest in a few of the riparian woodlands.

Other valley habitats such as badland outcrops and eroded banks are important for birds of prey including the threatened ferruginous hawk (*Buteo regalis*). The diverse valley environments also support significant deer populations. Widely distributed fish species characterize the area's rivers and reservoirs.

Areas of grassland persist in the Project area, however, most of the native vegetation has been converted to cropland.

There is locally heavy grazing in the grasslands. Heavy grazing is the major disturbance in riparian habitats and few areas of ungrazed or lightly grazed riparian vegetation remain.

14.2 PROJECT ENVIRONMENTAL SETTING

Figure 14.1 presents biophysical considerations in the Project area. The Project footprint is largely on agricultural land under irrigation. The western-most section of Phase 1 is a coulee leading down to the Oldman River. The area north of the coulee was a former landfill used by the Town of Taber. Some landfill waste is present on the north slopes of the coulee.

14.2.1 Air Quality

The Project area falls within an airshed managed by the Palliser Airshed Society (PAS) that collects air quality data using continuous and passive monitoring stations. The annual air reports from PAS describe general air quality within the PAS area by comparing the measured concentrations against the Alberta Ambient Air Quality Objectives (AAAQO).

The maximum measured 1-hour average nitrogen dioxide ($NO_{2)}$ concentrations in the Palliser Airshed region were 49.3, 55.7, and 41.7 ppb in 2018, 2019, and 2020, respectively. The maximum measured annual average NO_2 concentrations were 7.2, 6.8, and 5.6 parts per billion (ppb) in 2018, 2019, and 2020, respectively. All maximum measured NO_2 concentrations were less than the Alberta Ambient Air Quality Objectives (AAAQO) of 159 ppb and 24 ppb for 1-hour and annual average concentrations, respectively.

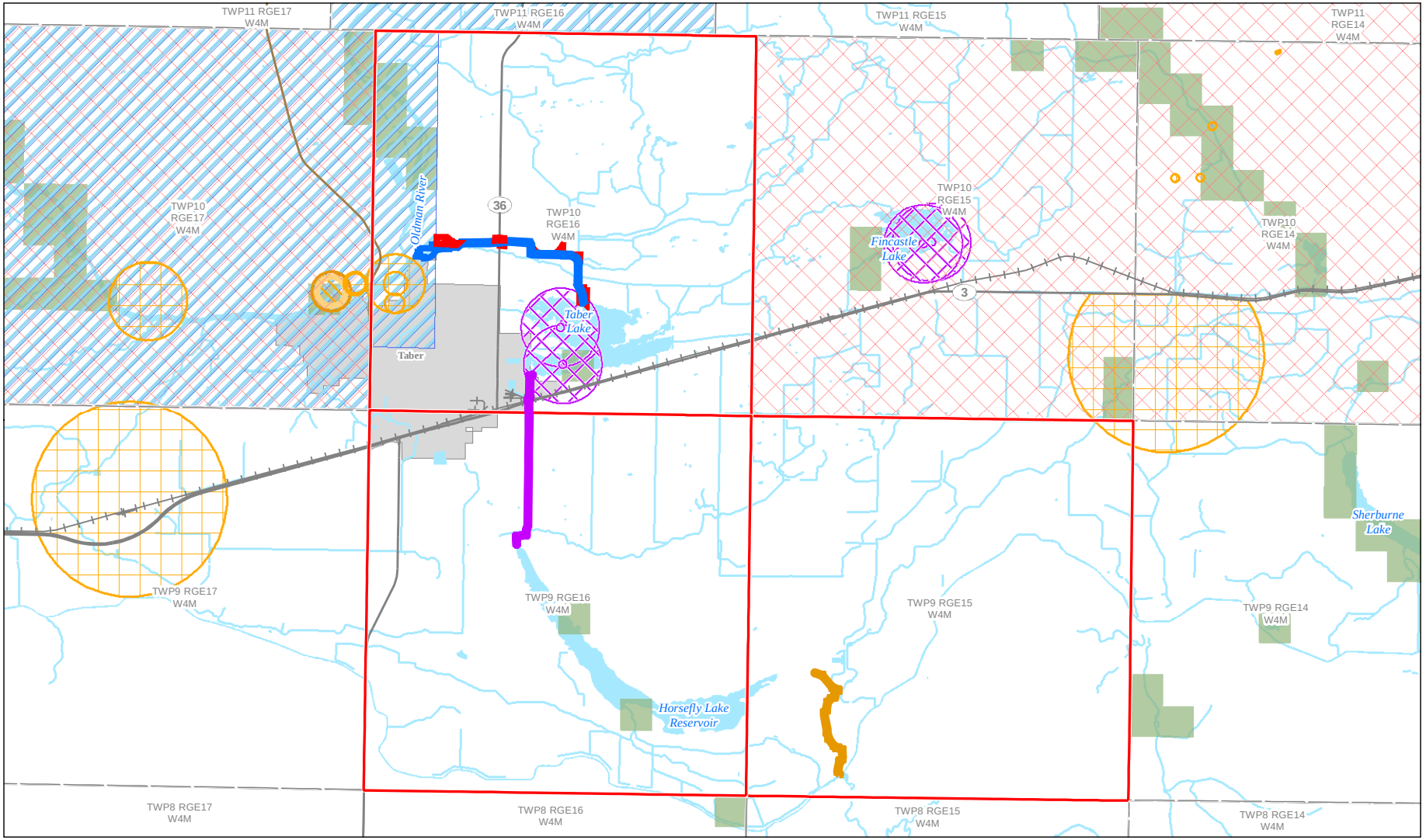
The maximum measured 1-hour particulate matter ($PM_{2.5}$) concentrations within Palliser Airshed regional were less than the AAAQO of 80 micrograms per cubic metre ($\mu g/m^3$) for 2018 but exceeded the 1-hour AAAQO 24 times in 2019 and 25 times in 2020.The maximum measured 24-hour $PM_{2.5}$ concentrations exceeded the AAAQO of 29 $\mu g/m^3$ one time in 2018, five times in 2019, and 18 times in 2020. The 1-hour and 24-hour exceedance events were attributed to wildfire smoke and high wind speed events. The maximum measured sulphur dioxide (SO_2) and carbon monoxide (CO) concentrations from 2018 to 2019 in the airshed were less than 7% of the Alberta air quality objective.

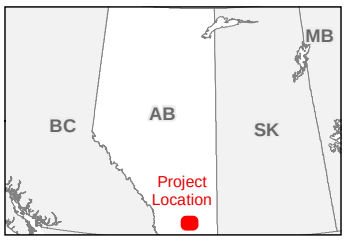
The Project area in general has good air quality when compared to AAAQO. Any exceedance of air quality objectives is attributed to natural causes such as wildfire or high wind speed conditions.

14.2.2 Vegetation and Wetlands

Although the coulee has been disturbed by previous land use activities, native grassland vegetation is present along portions of the coulee. Some native vegetation is also present on the north side of Taber Lake near where the canal joins with Taber Lake. A vegetation and rare plant survey for Phase 1 was conducted on June 22, 2021. There were no rare plants or rare communities found during that survey. A second rare plant and wetland survey of all three phases was conducted in August 2021. Two rare plant species were found: scratchgrass (*Muhlenbergia asperifolia*) and velvet goldenrod (*Solidago mollis*).

There are historical occurrences of one rare plant species, smooth goosefoot (*Chenopodium subglabrum*), located west of the Oldman River approximately one kilometre west of the confluence of the coulee with the Oldman River (ACIMS 2017). This species grows in sandy soil in native grassland. Due to the likely lack of potential habitat for this species, it is unlikely to occur in the vicinity of the Project; however, this species will be searched for during the field surveys for the Project along with other potential rare plant species that could occur in the Project area. There are no other historical occurrences of rare plant species or ecological communities within 5 km of the Project (ACIMS 2017).





- Laydown
- Phase 1 Project Footprint
- Phase 2 Project Footprint
- Phase 3 Project Footprint
- Project Area
- Colonial Nesting Bird
- Provincial ESA (Score >0.189)
- Hibernacula Buffer
- Non-Sensitive Plant Species
- Sensitive Plant Species
- Sensitive Snake Habitat
- Primary Highway
- Secondary Highway
- Railway
- Watercourse
- Township
- Urban Area
- Waterbody

N

0 2,000 4,000 metres

(At original document size of 8.5x11)
1:150,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N

2. Data Sources: AltaLIS, NRCAN, Alberta Parks, GeoLogic, NRN, Alberta Government

3. Constraints: The project area is completely within: White Zone, M.D. of Taber, Treaty 7 (1877), Bird Nesting Zone B3, Burrowing Owl Range, Sensitive Amphibian Range, Sensitive Raptor Range (Prairie Falcon, Golden Eagle, Ferruginous Hawk), Sharp-tailed Grouse

Stantec

Project Location
T9&10N, R15&16W
Town of Taber

Prepared by SL on 2021-08-16
TR by TQ on 2021-08-16
IR Review by JH on 2021-08-16

Client/Project 110773806-0006 REVA
Client: M.D. of Taber
Project: Horsefly Regional Emergency Spillway

Figure No.
14.1

Title
Horsefly Regional Emergency Spillway Project
Biophysical Considerations

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Wetlands could potentially be present along the Project route in either native vegetation areas or cultivated lands. If any wetlands are present, they will be classified according to the Alberta Wetland Classification System (Alberta Government 2015a) and the boundaries delineated according to the Alberta Wetland Identification and Delineation Directive (Alberta Government 2015b) during the vegetation surveys for the Project.

14.2.3 Wildlife

Phase 1 of the Project overlaps provincial sharp-tailed grouse (*Tympanuchus phasianellus*) range, burrowing owl range, sensitive raptor range (for ferruginous hawk, sensitive snake habitat, sensitive amphibian range and the setback buffer for colonial nesting bird habitat (for American white pelican [*Pelecanus erythrorhynchos*] nesting sites in Taber Lake). Phases 2 and 3 overlap sharp-tailed grouse range, burrowing owl range, sensitive raptor range (for ferruginous hawk) and sensitive amphibian range. Phase 2 also intersects the setback buffer for colonial nesting bird habitat (for American white pelican on Taber Lake).

A field survey program was conducted for Phase 1 of the Project in 2021. Surveys for Phases 2 and 3 are scheduled to occur in 2022. The following surveys have been completed for Phase 1:

- Snake hibernacula (April 15-16, 2021, May 1-2, 2021, and May 14, 2021)
- Sharp-tailed grouse lek (April 15-16, 2021 and May 1-2, 2021)
- Waterbird activity (Taber Lake, April 15-16, 2021, and May 1-2, 2021)
- Raptor nest (April 15-16, 2021 and May 1-2, 2021)
- Nocturnal amphibian (May 14, and June 7 and June 14, 2021)
- Burrowing owl (June 8, 2021)
- Breeding bird (May 15 and June 8, 2021)

During the 2021 surveys for Phase 1, four small hibernacula were identified within 500 m of the Project footprint; bullsnake (*Pituophus catenifer*) and/or prairie rattlesnake (*Crotalus viridis*) and snake sheds were found near burrow entrances. Two of the hibernacula burrows are located within the Phase 1 Project footprint. Four active raptor nests were recorded within 1,000 m of the Project footprint, including a ferruginous hawk nest approximately 605 m northeast of the Project footprint, a Swainson's hawk (*Buteo swainsoni*) nest approximately 105 m south of the Project footprint, a red-tailed hawk (*Buteo jamaicensis*) nest within the Project footprint, a great horned owl (*Bubo virginianus*) nest approximately 115 m east of the Project footprint and cliff swallow (*Petrochelidon pyrrhonota*) nests on the cliff along the Oldman River. American white pelicans were observed breeding on a small island in Taber Lake, eight pelicans were observed at the nesting site and approximately 70 additional pelicans were observed on Taber Lake. The nesting colony island is located approximately 860 m south the Phase 1 Project footprint. No sharp-tailed grouse leks, burrowing owl burrows or individual grouse or burrowing owl were observed incidentally or during targeted surveys for these species. Amphibian species of management concern (SOMC) were not detected during Phase 1 nocturnal amphibian surveys. SOMC detected during the breeding bird survey were Swainson's hawk, bald eagle (*Haliaeetus leucocephalus*), American white

pelican, black-necked stilt (*Himantopus mexicanus*), sora (*Porzana carolina*), eastern kingbird (*Tyrannus tyrannus*), bank swallow (*Riparia riparia*) and barn swallow (*Hirundo rustica*). A small mixed-species bank swallow and cliff swallow colony was observed on a cliff face above the Oldman River along the Project footprint boundary. eastern kingbird (*Tyrannus tyrannus*), bank swallow (*Riparia riparia*) and barn swallow (*Hirundo rustica*). Two active mammal dens were observed incidentally during surveys, both are located outside of the Phase 1 Project footprint.

14.2.4 Fish

A review of the Alberta Fish and Wildlife Information System (FWIMS) provided the following historical fish species data:

- Horsefly Lake (Reservoir): northern pike (*Esox lucies*), yellow perch (*Perca flavescens*), white sucker (*Catostomus commersoni*), fathead minnow (*Pimephales promelas*), walleye (*Sander vitreus*), spottail shiner (*Notropis hudsonius*) and lake whitefish (*Coregonus clupeaformis*). No provincially or federally listed fish species are present in the lake.
- Taber Lake: there is no historical fish species data in FWIMS. Anecdotal angling data indicates that northern pike are the most abundant with small numbers of walleye and lake whitefish present. No provincially or federally listed fish species are present in the lake.
- Oldman River (from 10 km upstream to 10 km downstream of outlet): longnose dace (*Rhinichthys cataractae*), shorthead redhorse (*Moxostoma macrolepidotum*), emerald shiner (*Notropis atherinoides*), mountain whitefish (*Prosopium williamsoni*), longnose sucker (*Catostomus Catostomus*), walleye, white sucker, silver redhorse (*Moxostoma anisurum*), yellow perch, spottail shiner, mooneye (*Hiodon tergisus*), mountain sucker (*Catostomus platyrhynchus*), quillback (*Carpiodes cyprinus*), sauger (*Stizostedion canadense*), lake sturgeon (*Acipenser fulvescens*), lake whitefish and burbot (*Lota lota*). Lake sturgeon are provincially as “At Risk”. Sauger is considered sensitive. No other fish species are provincially listed and no fish species are federally listed.

A fisheries field program for all three phases was conducted in September 2021. A fish inventory of Taber Lake found species present consistent with Horsefly Reservoir: northern pike, yellow perch, walleye, spottail shiner, and also brook stickleback (*Culaea inconstans*).

Both Taber Lake and Horsefly Lake are expected to afford good habitat for all life stages of resident fish species and afford excellent overwintering habitat to resident fish. The Oldman River affords fish habitat which is limited by cover and may affect the quality of rearing and spawning habitat for some species. The coulee gradient likely excludes small-bodied fish or weaker swimmers from swimming up the coulee but is not sufficient to act as a barrier to fish passage and is considered fish habitat.

14.2.5 Water Quality

Taber has high quality drinking water. Raw, untreated water is also available, primarily for the major food processing industries, irrigation of the golf course and other green areas. Taber's water supply originates from two sources: from October through April, raw water is pumped from the Chin Reservoir. During May through September raw water is taken from the TID main canal. The Town's wastewater treatment facility was constructed in the early 1980s and is sized for a population of 18,000. The Town also operates an industrial aerated lagoon plant for industrial effluent. Treated effluent can be diverted to the lagoon system to supply the irrigation system for five-quarter sections of farmland. Treated wastewater from the processing of sugar beets at the Lantic facility runs from a pipeline on the southwest corner of Taber Lake for disposal through the coulee into Oldman River. This is a licensed wastewater disposal site.

Water quality data collected throughout Alberta's irrigation districts as part of the Irrigation District Water Quality Project (Agriculture and Agri-Food Canada 2020) rates the water quality of the Taber Irrigation District (site T-S2) and St. Mary River Irrigation District (site SMC-P1) as excellent over the last several years.

The pH averaged from 8.4 to 8.7 indicating that the water was in the basic range. Conductivity averaged from 0.328 to 0.360 ds/m and the concentration of total dissolved solids from 197 to 221 milligrams per litre (mg/L), indicating the presence of lower amounts of solutes. The water was fairly clear with low total suspended solids averaging from 7 to 11 mg/L.

The water was classified as hard averaging from 139 to 141 mg/L, and alkalinity averaged from 118 to 127 mg/L. Bicarbonate, sulfate, calcium, magnesium and sodium were the ions found in the highest concentrations, followed by smaller amounts of carbonate, chloride and potassium. Chloride concentrations were low, averaging less than 3 mg/L.

Fecal coliform counts (*Escherichia coli)* can be highly variable depending on conditions and potential sources such as geese and other wildlife. Fecal coliforms averaged from 98 to 123 colony forming unit per 100 millilitre's (cfu/100 mL) and occasionally exceeded the guideline of 100 cfu/100 mL

Total phosphorus concentrations averaged from 0.042 to 0.056 mg/L and dissolved phosphorus from 0.025 to 0.038 mg/L, indicating that the water was eutrophic. Total nitrogen and Kjeldahl nitrogen concentrations averaged from 0.509 to 0.756 mg/L. Nitrate-nitrite nitrogen concentrations were generally less than the detection limit with occasional concentrations just above detection. Total ammonia concentrations averaged from 0.058 to 0.103 mg/L.

Metals occur naturally in surface waters and their concentrations are usually associated with suspended solids content which was low in the water. Metal concentrations were below guidelines with the exception of the occasional concentration of manganese just above the guideline.

14.3 ENVIRONMENTALLY SIGNIFICANT AREAS

Alberta Parks (2014) scored all quarter sections in the province as to the presence of four environmental criteria:

1. areas that contain rare, unique or focal species
2. areas that contain rare, unique or focal habitat
3. areas with ecological integrity
4. areas that contribute to water quality and quantity

Quarter sections with a score greater than 0.189 are classified as environmentally significant areas. Four such areas have been designated in the Project area: the south side of Taber Lake, a portion of the Oldman River, downstream of the canal outlet, and two areas on Horsefly Reservoir (Figure 14.1).

14.4 TRADITIONAL LAND USE

Traditional Land Use studies have not been conducted specifically for the Project. Such studies were conducted by the Blood Tribe/Kainai First Nation and Piikani First Nation along the Montana Alberta Tie Ltd. transmission line which runs approximately 20 km west of the Town of Taber (AMEC Earth and Environmental 2009, 2010).

The current major economic base of the reserves is agriculture (Blood Tribe/Kainai First Nation) and ranching (Piikani First Nation). Although parts of the regional area continue to be productive for berry picking and the collection of traditional plants, much of the area is disturbed by agricultural cultivation and ranching. Specific sites with stone cairns and rock alignments suggestive of bison jumps continue to be frequented for traditional spiritual practise.

15.0 HEALTH, SOCIAL AND ECONOMICS OF MD OF TABER

The MD of Taber includes the Towns of Taber and Vauxhall, the Village of Barnwell and the Hamlets of Grassy Lake, Hays, Enchant, Johnsons Addition, and Purple Springs. The population of the MD in 2016 (Federal Census) was 7,098, which was an increase of 25% over the preceding two decades (MD of Taber 2019). Most residents (5,762) live in rural areas. The age composition of the MD shows the largest proportion being families with children and youth residing at home. Median household income was $76,544. In the 2016 census, 64% of the population in the Taber region were employed and the unemployment rate was 4.5 %. Approximately 40% of the region were employed in agriculture.

Economic indicators of the MD are agriculture, food processing and energy. The MD is an agriculturally diversified and intensively farmed district, producing a wide variety of crops and livestock (Municipal District of Taber 2015). Farm operations range from large dryland grain farms and grassland leases to productive irrigated farms producing a wide range of valuable crops. Main crops and livestock include

sugar beets, corn, potatoes, hogs, beef, sheep and poultry. The agri-food processing industry in the MD include the Lantic Sugar facility (located in the Town of Taber), and Lamb Weston (french fries). The energy sector includes oil and gas services, and wind farms. Major employers are health care and education, agriculture and agri-processing; and oil and gas/energy.

A summary of the community health profile for the MD of Taber (Government of Alberta 2019) is presented in Table 15.1.

Table 15.1 Health-related Indicators, MD of Taber

Indicators	MD of Taber	Alberta
Population Health Indicators (for Alberta South Zone that includes Taber)		
Obese Adults	23.3%	22.1%
Inactive People	32.0%	22.1%
Demographics		
Population Increase 1988-2018	22.5%	49.1%
Largest Age Group (35-64 years old)	32.9%	40.2%
Children under 17	31.4%	22.4%
Individuals 65 and older	11.5%	12.6%
Social Determinants of Health Indicators		
Proportion of First Nations and Inuit People	0.6%	2.8%
Female lone-parent families	7.7%	11.0%
Proportion of families with an after-tax low-income level	17.2%	15.6%
Most common non-official languages spoken at home in the MD of Taber are German, Germanic languages, Tagalog, Dutch and Spanish		
Chronic Disease Prevalence		
Hypertension was the highest per 100	19.1	20.6
Maternal Health		
Birth rate per 1,000 women	36.3	26.0
Teen birth rate per 1,000 women	15.4	10.6
Sexually Transmitted Infections		
None of the top 5 STI rates in the MD of Taber were higher than the provincial rates.		
Mortality		
Mortality rate per 100,000 population	755.4	699.5
Emergency Service Utilization		
Semi and non-urgent emergency visits accounted for 52.7% of all emergency visits in the MD of Taber in 2017/2018.		
Acute upper respiratory infections, per 100,000 population in 2017 were most common	3,462.3	2,777.5

Table 15.1 Health-related Indicators, MD of Taber

Indicators	MD of Taber	Alberta
Inpatient Service Utilization		
Ischemic heart disease, pneumonia, and diabetes were the top three main reasons for inpatient separations in 2018		
Mental and Behavioral Disorders		
Emergency department visit rate for mental and behavioral disorders per 100,000 population in 2017	403.8	786.9
Primary Health Care Indicators		
Ambulatory care sensitive conditions separation rate per 100,000 population	379.0	360.7
Rate of people with three or more chronic diseases per 100 population	3.4	4.2
Life expectancy at birth	80.6 years	81.2
Access to Health Care Services		
In 2017/2018, ambulatory care visits made up 69.8% of all ambulatory care visits and most to the Chinook Regional Hospital in Lethbridge.		

For most health-related indicators, the MD of Taber numbers are similar to the provincial numbers; exceptions are:

- population increase in the MD between 1988 and 2018 is less than half the provincial average
- the proportion of First Nations and Inuit people in the MD is 0.6% compared to the provincial figure of 2.8%
- the overall birth rate and teen birth rate per 1000 women is 1.4 times the provincial figures
- emergency department visit rate for mental and behavioral disorders per 100,000 population in 2017 was 51% that of the provincial rate

Medical services in the MD include the Taber Hospital, and the Taber and Vauxhall Associate Medical Clinics. The Taber region offers a wide variety of health and wellness services to residents including primary care physicians, dentists, chiropractic services, optometrists, physiotherapy, supportive living facilities, as well as other health and wellness practitioners.

The Taber Equality Alliance Society was incorporated in 2016 to create a safe space in the community for sexual and gender identity minorities and their allies,

The MD of Taber offers several tourism and recreational activities including parks (Taber Confederation Park, MD of Taber Park), golf courses, swimming pools, fishing in the Oldman River and lakes (Horsefly Reservoir, Taber Lake) Taber Irrigation Impact Museum, MD Gun/Archery Range, and MD Motorcross Track.

The Taber and District Community Adult Learning Association has implemented a Temporary Foreign Worker Support Program to help temporary foreign workers in understanding the meaning of regulations and how they will affect them. This includes information and orientation sessions on illness prevention; personal protection; self-care; employee rights and responsibilities; one-on-one support & referrals to meet the basic essential needs of those affected; resources & services to enable temporary foreign workers to exercise their rights; support in areas including but not limited to case management; health and income support referrals; trauma counselling, assistance in applying for benefits; interpretation services; short-term shelter and housing; food, clothing, and transportation for workers in distress.

The construction work force for the Project is estimated at 30 to 40 persons for each phase. Construction workers are expected to be from the area, working from Taber or surrounding communities; construction camps will not be required. During operations, the work force is estimated at two or three persons. Project operations are expected to be carried out by the existing TID staff. During flood events, additional staff will be present to observe Project operations.

PART D: FEDERAL, PROVINCIAL, TERRITORIAL, INDIGENOUS, AND MUNICIPAL INVOLVEMENT AND EFFECTS

16.0 FINANCIAL SUPPORT FROM FEDERAL AUTHORITIES

Approved funding for the Project includes $39 million dollars in funding from the provincial and federal governments, including $8.8 million for Phase 1 through the ICIP by the Government of Canada, and $9.8 million for Phases 2 and 3 from the federal Ministry of Infrastructure and Communities. Phases 1 and 2 will be owned by TID. Phase 3 will be owned by SMRID.

17.0 USE OF FEDERAL LANDS FOR PROJECT

The Project will not be constructed or operated on federal lands.

18.0 JURISDICTIONS THAT HAVE POWERS, DUTIES OR FUNCTIONS IN RELATION TO AN ASSESSMENT OF THE PROJECT'S ENVIRONMENTAL EFFECTS

18.1 FEDERAL REGULATORY REQUIREMENTS

In addition to the current IAAC process under the *Impact Assessment Act*, the Project will be subject to:

- the *Fisheries Act*
- the *Canadian Navigable Waters Act*
- the *Migratory Birds Convention Act*
- the *Species at Risk Act*

18.1.1 *Fisheries Act*

A non-compliance with the *Fisheries Act* could occur if the Project results in any of the following:

- the death of any life stage of fish
- the harmful alteration, disruption or destruction (HADD) of fish habitat
- the introduction of a deleterious substance (for example hydrocarbons from heavy equipment or sediment during construction) into a watercourse or Oldman River to which it is connected
- the alteration of flow that would impede fish migration in a watercourse

If the coulee into which the canal drains supports fish or provides viable habitat for fish and the Project permanently alters a watercourse, an Authorization under Section 35(2) of the *Fisheries Act* would be required. Before DFO will issue an Authorization, an Offsetting Plan would have to be prepared. The plan would involve improving habitat elsewhere to compensate for the loss of habitat in the drainage.

If the coulee does not contain fish or fish habitat, a *Fisheries Act Authorization* would not be required and Fisheries and Oceans Canada (DFO) would issue a *Letter of Advice* for the Project to proceed.

On October 19, 2001, TID received an Authorization under the *Fisheries Act* for the operation and maintenance of the TID. The Project activities involve the maintenance of the TID; however, DFO will be notified of the Project and the MD of Taber will adhere to any additional requirements to the Authorization.

18.1.2 *Canadian Navigable Waters Act*

The *Canadian Navigable Waters Act* protects waters on which the public has the right to travel. Project plans do not include any structure being placed in Oldman River; therefore, a *Navigable Waters Act* application is not expected to be necessary.

18.1.3 *Migratory Birds Convention Act*

Section 6.1 of the *Migratory Birds Regulations* states that without a permit, the disturbance, destruction, or removal of a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or possession of a migratory bird, carcass, skin, nest, or egg of a migratory bird are prohibited. The timing window for construction activities is from September through March. From April through August migratory birds are nesting and fledging; any construction activities during this period require a nest search and species-specific buffer zones around observed active nests.

18.1.4 *Species at Risk Act*

The *Species at Risk Act* (SARA*)* provides regulatory protection and includes prohibitions against the killing, harming, harassment, capture, or taking of species listed as extirpated, endangered, or threatened. The damage and destruction of residence are prohibited under SARA.

Project activities are not anticipated to result in any violations to SARA.

18.2 PROVINCIAL REGULATORY REQUIREMENTS

Provincial regulatory requirements that may affect the Project are those associated with:

- the *Environmental Protection and Enhancement Act* (EPEA)
- the *Natural Resources Conservation Board Act*
- the *Irrigation Districts Act* (IDA)
- the *Water Act*
- the *Historical Resources Act* (HRA)

18.2.1 *Environmental Protection and Enhancement Act*

The EPEA includes the Environmental Assessment (Mandatory and Exempted Activities) Regulation, which lists the types of projects that require an environmental assessment (EA). Under Schedule 1, Mandatory Activities, the construction, operation, or reclamation of (d) a water diversion structure and canals with a capacity greater than 15 m^3/s requires an EA. Under Schedule 2, Exempted Activities (g) the maintenance and rehabilitation of a water management project, including a dike, dam, weir, floodgate, breakwater, drain, groyne, ditch, basin, reservoir, canal, tunnel, bridge, culvert, crib, embankment, headwork, fishway, flume, aqueduct, pipe, pump or measuring weir does not require an EA.

The MD received notice on July 13, 2021, that an EA is not required for the Project (see Appendix C).

18.2.2 *Natural Resources Conservation Board Act*

The *Natural Resources Conservation Board Act*, administered by the Natural Resources Conservation Board, is applicable for a water management project, such as a canal. A water management project is defined as:

i. a project to construct a dam, reservoir, or barrier to store water or water containing any other substance for which an environmental impact assessment report has been ordered, or

ii. a project to construct a water diversion structure or canal capable of conducting water or water containing any other substance for which an environmental impact assessment report has been ordered.

Since the Project does not require an environmental impact assessment, the *Natural Resources Conservation Board Act* does not apply.

18.2.3 *Irrigation Districts Act*

The IDA applies to the structure, governance, powers and duties of the 13 irrigation districts in Alberta. The purpose of the *Act* is to provide for the formation and governance of irrigation districts in order that the management and delivery of water in the districts occur in an efficient manner that provides for the needs of the users. Under 6(1) of the IDA, the purpose of each district is (a) to convey water through the

irrigation works of the district, (b) to divert and use quantities of water in accordance with the terms and conditions of its licence under the *Water Act*, and (c) to construct, operate and maintain the irrigation works of the district. Under 21(2)(b) irrigation districts can issue a Water Conveyance Agreement for the removal of drainage water, stormwater or wastewater from an area. Such an agreement must comply with [21(6)] the requirements, if any, of the *Water Act*, the EPEA and the regulations under those Acts.

18.2.4 *Water Act*

The *Water Act* requires a licence for the diversion of water, such as for a canal. The *Water Act* also includes the *Alberta Dam and Canal Safety Directive*. The Alberta Railway and Irrigation Company (ARIC) obtained a licence to divert water in 1915, an agreement between ARIC and TID in 1919, and a transfer to the TID in 1968. The licence provides the rights to the canal and the diversion of water for irrigation and domestic use. The licence was amended in 1992 to allow the delivery of water for the following purposes: municipal, agricultural, irrigation, commercial, industrial, management of fish, wildlife, habitat enhancement and recreation. The licence did not allow the injection of water into the ground for the purpose of enhancing oil and gas production. Section 6 (1) of the *Water Act* states that the Minister may enter into an agreement regarding terms and conditions with respect to flood control and management. The MD of Taber will request an agreement from the Minister regarding flood control and management.

The *Water Act* requires an authorization for permanent removal of a wetland and a code of practice notification for disturbance to wetlands.

The *Alberta Dam and Canal Safety Directive* states that the construction or major repair for a dam or canal must receive an Authorization from AEP under the *Water Act*. The Project must meet the requirements of the *Alberta Dam and Canal Safety Directive*. If classified as a new canal it will require a detailed description and, as per EPEA, an EA. If classified as a major repair of an existing canal, an EA is not required, although environmental considerations are included in the engineering requirements for an application for an Authorization. The Project will apply for an authorization to repair the existing canal to meet the needs for flood control.

18.2.5 *Historical Resources Act*

Prior to any surficial disturbance on the Project site, an HRA approval must be obtained and a Letter of Clearance issued. The first step is to submit an Historic Resources Application to the ACSW. The Heritage Division will determine if an Historic Resources Impact Assessment (HRIA) is required. The MD of Taber submitted an Historic Resources Application for Phase 1 of the Project on April 16, 2021. An HRA Approval for Phase 1 was received on May 21, 2012 and for Phases 2 and 3 on October 22, 2012 (see Appendix C), which state that an HRIA for archaeological resources is not required, however an HRIA for palaeontological resources in the coulee in Phase 1 is required. The MD of Taber will follow the conditions of the Approval. A palaeontological field survey was conducted in August 2021. A few fossils were found in the coulee. A palaeontological HRIA is in preparation.

18.3 MUNICIPAL REGULATORY REQUIREMENTS

Regulatory requirements from the MD of Taber that may affect the Project are described in Table 18.1.

Table 18.1 Municipal Regulatory Requirements

Bylaw or Policy	Description
Bylaw No. 1771 – Irrigation of Roads Bylaw	Prohibits the escape of irrigation water into or on public highways, roads, or road allowances by irrigation installations on adjacent lands.
Drainage Approval Policy	Addresses any work conducted within a Municipal Right of Way for drainage improvement.
Electrical and Pipeline Road Crossing for Irrigation Purposes Policy	Addresses constructing a water pipeline that crosses a municipal road.
Restricting Access of Public Road Allowance Policy	Addresses temporary occupation or use of a road allowance that will require a closure to the public.

18.4 REGIONAL PLANS AND MANAGEMENT FRAMEWORKS

Table 18.2 lists development plans applicable to the MD of Taber.

Table 18.2 Regional Plans and Management Frameworks Applicable to the MD of Taber

Plan	Description
South Saskatchewan Regional Plan	Uses a cumulative effects management approach to set policy to achieve desired environmental, economic, and social outcomes.
Intermunicipal Development Plans (IDPs)	These plans foster collaboration on planning within municipal jurisdictions. The draft 2021 IDP for the MD of Taber and Town of Taber includes the footprint of the Project. The draft IDP includes the Horsefly Regional Emergency Spillway as a land use.
Municipal Development Plan	The MD of Taber Municipal Development Plan Bylaw No. 1723, adopted in 2004, guides future growth and development in the MD. The plan includes mention of policies to minimize risks to health, public safety, and loss of property from potential hazards such as flooding.
Area Structure Plans	These plans establish the framework for subsequent subdivision and development within the MD and address matters including drainage control.

There are no constraints to Project development identified in any applicable Regional Plan authorized by the *Alberta Land Stewardship Act* of any Management Frameworks established by AEP. In fact, the 2021 draft IDP for the MD of Taber and Town of Taber includes the Horsefly Regional Emergency Spillway as a land use in the area.

PART E: POTENTIAL EFFECTS OF THE PROJECT

19.0 POTENTIAL EFFECTS ON FISH AND FISH HABITAT, AQUATIC SPECIES AND MIGRATORY BIRDS

19.1 OVERVIEW OF ENVIRONMENTAL EFFECTS

The Project is the expansion of an existing irrigation system to provide mitigation for large floods. The expansion consists of enlarging the capacity of the existing canals and drains and associated upgrades to irrigation control structures and road and rail crossings. The Project-environment interactions occur during standard irrigation system upgrades and operations. Construction work on the canal enlargement will take place during the non-operational times which extend from early October to late April.

19.1.1 Effect Pathways

Potential biophysical effects are those associated with a regular construction project: air emissions, noise, water quality effects, soil excavation, vegetation removal, and fish and wildlife issues. Project pathways for biophysical effects during construction include the following:

- Air quality – Exhaust emissions from construction equipment will emit gases and particles from fossil fuel combustion; surface disturbance will result in fugitive dust emissions
- Noise – Noise levels will increase during construction activities
- Water quality - Surface disturbance may result in suspended sediment concentrations in irrigation water
- Soils – Excavation for canal expansion may cause soil erosion
- Vegetation and wetlands – Surface material stripping for canal expansion will remove vegetation; construction machinery and traffic may destroy vegetation
- Fish – Instream activities may result in fish habitat disturbance or fish mortality
- Wildlife – Canal and drainageway expansion will destroy adjacent wildlife habitat; construction activities could result in wildlife mortality

During non-flood operations, the irrigation system will operate as it presently does. When the Project is in operation during flood conditions, biophysical effects are associated with the discharge of water into the Oldman River. The increased flow of water has the potential to cause fish habitat alteration or destruction, fish mortality, and water quality degradation. However, the river will be in flood conditions at that time and the additional water from the Project is not expected to cause a substantive effect on the river conditions. Peak discharge of the Oldman River during a 1:100-year flood is 3,900 m^3/s; the Project will be adding 40 m^3/s at that time.

Potential socio-economic effects associated with Project construction and operation include disturbance of archaeological and palaeontological sites, and land use changes. Project pathways for socio-economic effects include the following:

- Archaeology and palaeontology – Excavation for canal expansion may disturb archaeological or palaeontological sites
- Land Use – Construction may disrupt existing land use; access issues may arise due to construction traffic; realignment of the canal in Phase 2, if option 2 is chosen, will remove land from current use

19.1.2 Mitigation Measures - Construction

Project construction will be carried out by third-party contractors hired by the MD of Taber. Contractors are required to meet Alberta Transportation standards for water control projects. An Environmental Construction Operations (ECO) Plan (Alberta Transportation, City of Calgary, City of Edmonton 2020) is required prior to commencing construction. The ECO Plan includes a description of potential environmental impacts and controls, hazardous materials and waste management, and environmental emergency procedures specific to the project.

19.1.2.1 Air Quality

Potential air quality effects of the Project will be confined to the construction phase. Mitigation measures include the following:

- Vehicles and equipment will be required to meet emission control standards.
- All work shall be conducted in a manner that minimizes the raising of dust from construction or maintenance operations
- Dust control measures such as watering roads to suppress dust distribution and ceasing operations during periods of high winds will mitigate the distribution of particulate matter during construction activities.
- The concentration of sulphur in diesel fuel shall not exceed 15 mg/kg to comply with Sulphur in Diesel Fuel Regulations.
- Construction vehicle idling times will be reduced to the extent possible in order to reduce emissions, as a best management practice.

19.1.2.2 Acoustic Environment

Noise levels will increase during construction. Mitigation measures include the following:

- Construction machinery and factory-supplied noise abatement equipment (i.e., mufflers) will be maintained in good working order.
- Residents near to construction noise-generating activities will be notified prior to construction.
- Machinery idling will be minimized.

19.1.2.3 Water Quality

Sediment from erosion of the disturbed surface soils during excavations to increase the canal size may be deposited into the canal. Mitigation includes the removal of soil deposited in the canals prior to the irrigation system start up in April.

19.1.2.4 Soils

Soil stripping and excavation to enlarge the canals may result in soil erosion. Mitigation measures include the following:

- Soils excavated during construction will be stockpiled and the piles will be protected by mulching or the application of tackifiers to prevent erosion into the canal.
- Channel banks, berms, dikes and ditches will be seeded and revegetated with an appropriate native seed or erosion control mix to improve stability of these features, unless these features are being stabilized by riprap.
- Erosion and sediment control measures include maintenance of vegetation cover, where possible, long-term, temporary or emergency stabilization of soil, revegetation of disturbed areas, and runoff diversion to prevent undesirable soil movement or soil releases and discharges to the canals.

19.1.2.5 Vegetation and Wetlands

The stripping of surface material and vegetation will remove some vegetation communities from the Project area. Mitigation measures include the following:

- Activities will be restricted to the Project footprint to minimize vegetation loss.
- Applicable setbacks will be applied to all known occurrences of provincially listed Species of Conservation Concern. Seed collection or transplanting will be conducted, in consultation with AEP, if occurrences cannot be avoided.

19.1.2.6 Fish

Work in waterbodies is expected to occur at the outlets of Horsefly Reservoir and Taber Lake. Mitigation of effects on fish and fish habitat will include the following:

- Cofferdams will be used for construction activities at the Horsefly Reservoir and Taber Lake outlets.
- If work is required at the outlet to the Oldman River, DFO will be notified and any requirements from them will be adhered to.
- Instream activities will be scheduled outside Restricted Activity Periods (RAPs) whenever possible. If work is required outside the RAP, an application will be made to AEP.
- Instream work will follow Alberta Water Codes of Practice (Government of Alberta nd)
- Re-fueling of machinery and storage of hydrocarbon products within 100 m from the high-water mark of waterbodies and watercourses will be prohibited.

19.1.2.7 Wildlife

Construction may result in wildlife habitat disturbance or destruction, or mortality, with construction in the coulee having the greatest potential for these to occur. Mitigation measures include the following:

- Activities will be confined to the Project footprint.
- Clearing will not occur between April 1 and August 31 in order to avoid disturbance to nesting birds and other wildlife.
- Treed habitats will be retained where safe and technically feasible to do so.
- To reduce the possibility of vehicle collisions with wildlife, vehicle speed will not exceed posted speed limits and wildlife warning signs will be installed where appropriate.
- Pre-construction surveys will be conducted to identify wildlife features (e.g., nests, dens) and appropriate site-specific mitigation will be developed.

19.1.2.8 Archaeology and Palaeontology

Any conditions to approval from ACSW regarding archaeological and palaeontological sites will be adhered to.

19.1.2.9 Land Use

Construction activities may affect existing land uses. Mitigation measures to avoid this include the following:

- Construction activities and equipment will be managed to avoid damage and disturbance to adjacent properties, structures and operations.
- Channel excavation and disturbance will be limited to defined rights-of-way and access routes.
- Signs directing traffic to detours will be installed during construction to address public safety.
- A traffic management plan will be developed for the construction activities in order to minimize any traffic disruptions.

19.1.3 Mitigation Measures - Operations

There are no specific mitigation measures identified during normal Project operation activities either in non-flood or flood conditions. If effects to the Oldman River fish habitat or fish species are observed during monitoring of flood activities, solutions will be developed in consultation with DFO.

19.1.4 Accidents and Malfunctions

Potential accidents and malfunctions that may occur during Project construction include hazardous material spills, fires and vehicle accidents. The prevention of and response to these events will be discussed in the environmental emergency procedures section of the ECO Plan. Operations during flood conditions could experience overtopping of the canals.

19.1.4.1 Hazardous Material Spills

Hazardous materials are primarily those associated with equipment fuel coolants and lubrication. Spills may occur as the result of improper handling, use, or storage of these materials on-site. Spills could affect soils and vegetation, water quality and wildlife. Incident prevention includes:

- Machinery will arrive on site in a clean condition free of fuel, oil or fluid leaks.
- Refueling of vehicles and equipment will not take place near waterbodies.
- All employees involved in the handling and storage of fuels will have Workplace Hazardous Materials Information System and spill response training.
- Materials required for spill containment and cleanup will be available at all work sites and designated areas. All vehicles will carry materials and equipment for emergency spill containment.

Incident response and mitigation includes:

- All spills will be cleaned up immediately
- A spill kit or sufficient supply of materials for clean-up or spill containment will always be available on site and replenished as needed.
- The Contractor will designate a qualified supervisor(s) as the onsite emergency response coordinator(s) who will be on site at all times that work is undertaken.

19.1.4.2 Fires

Fire may be caused by natural events such as lightning strikes and wildfire, electrically powered Project component malfunction (e.g., outlet channel control structures), equipment malfunction, or anthropogenic activities. In the unlikely event of an accidental fire, effects could be loss of life, air quality degradation, vegetation loss, wildlife habitat and individuals loss, agricultural loss and infrastructure loss. Incident prevention includes:

- Fires or burning will not be allowed on the construction site.
- No activity will be conducted which may cause a fire to spread. Similarly, burning or smoldering matter will not be placed where it may cause a fire to spread.

Incident response and mitigation includes:

- All reasonable steps will be taken in order to prevent a fire from burning out of control or spreading from land owned or occupied for construction purposes.
- In the event that a wildfire is identified where construction activities are taking place, all reasonable attempts will be made in order to extinguish the wildfire. All available equipment, services and labor will be made available for the purposes of wildfire protection operations.
- All construction and related activities taking place in the vicinity of a wildfire will cease until it is safe to resume operations.

19.1.4.3 Vehicle Accidents

Movement of vehicles, equipment and personnel to the Project area could result in collisions resulting in injury or death to humans and wildlife. Incident prevention includes compliance with traffic laws and regulations. Preventative measures to reduce the risk of collisions include signage, traffic control flag persons, road surface controls (e.g., dust suppression), maintaining vehicles and reducing traffic to Taber and the Project area during construction. Response measures may include contacting on-site emergency response personnel or regional emergency services.

19.1.4.4 Overtopping of Canals

The purpose of the Project is to increase the flood attenuation capacity of the SMRID system. Presently, during large flood conditions water from the SMRID Main Canal can overtop the canal and flood the adjacent lands. The Project will allow water from the Main Canal to be diverted to the Horsefly Reservoir and thus to Taber Lake and then to the Oldman River. This will allow the Main Canal to manage more flood waters from upstream and downstream of the Horsefly Reservoir without overtopping. The volume of water diverted from the Main Canal is controlled at the turnout structure (see Figure 9.3). The turnout structure will be closed when the canal from Taber Lake is at capacity (passing 40 m^3/s). With floods greater than the 1:100-year event, flood waters from the Main Canal would then flood the adjacent lands as has occurred without the Project. Failure of the control structure to close could result in overtopping of the Project canals and flooding of the adjacent lands. The environmental effects would be similar to a flood without the Project.

19.1.5 Summary of Effects

The Horsefly Regional Emergency Spillway Project, an upgrading of the existing canal system to increase its flood attenuation capacity, will be constructed using standard irrigation system techniques. The expansion of the canal size will follow Alberta Transportation Water Management Projects Design Guidelines and contractors will be required to prepare and apply an ECO Plan. The implementation of mitigation measures, including those listed in the preceding sections will minimize the environmental effects of the Project. Environmental effects will be concentrated on the construction phase of the Project. Atmospheric emissions will result in temporary air quality effects and noise will increase in the area surrounding construction activities, as occurs with any construction project in the MD of Taber. Vegetation

and soil removal will result in the loss of vegetation communities along the canals and temporary exposure of soil to erosion. Exposed soil surfaces will be reclaimed. Construction will take place during the non-operating conditions of the irrigation system and any soil deposited in the dry canals will be removed. Replacement of control structures on Taber Lake will involve work in the lake but the use of cofferdams and following Alberta Water Codes of Practice will minimize effects on fish and fish habitat. Limited wildlife habitat and mortality effects are expected. Approval requirements from ACSW will address any potential effects on archaeology and palaeontology. Effects on land use will be minimized by restricting work to the Project footprint and implementation of a Traffic Management Plan.

Accidents and malfunctions include hazardous material spills, fire and vehicle accidents. The ECO Plan prepared by construction contractors will include sections on hazardous materials and waste management, and environmental emergency procedures specific to the Project. These sections and a Traffic Management Plan will address accidents and malfunctions.

Flow from the SMRID Main Canal is controlled at the turnout structure at the southern end of the Project. Failure of this structure to close when the Project canals are at capacity or during floods greater than the 1:100-year event may cause the Project canals to be overtopped. The adjacent lands would be flooded similarly to a flood without the Project.

The Project will provide the benefit of flood control; the environmental effects of developing this benefit are not significant.

19.2 FISH AND FISH HABITAT

Effects on fish and fish habitat are expected to be minor to negligible. Project construction will occur along the existing canals and through the coulee, which has fish habitat. At the confluence with the Oldman River, the channel in the coulee will be constructed to have a semi-natural cross section and be 8 m wide and 2 m deep. Construction will take place during the October to April period when the channel has little or no flow in the upper sections but more regular flow in the lower sections with the outflow from the Lantic facility. Flow only occurs in upper sections due to drainage from existing agricultural lands and discharge from seepage collection systems. Outflow from the Lantic facility occurs during processing of sugar beets in the fall and winter months and will be diverted around the site during construction.

The section of spillway at the confluence of the Oldman River will require dewatering and a fish salvage operation will be undertaken as part of the dewatering process. There is no anticipated work within the Oldman River itself.

The discharge of water to the Oldman River will occur during flood conditions. The expected discharge during a 1:100-year flood will be 40 m^3/s at which time the peak discharge of the Oldman River is 3,900 m^3/s. The increase is 0.01% of the peak flow at that time.

Upgrades to the outlet from Taber Lake will require dredging to deepen the channel. A coffer dam will be used to mitigate any effects on fish in the lake. Upgrade to the outlet of Horsefly Reservoir will be carried out in the canal; there will be no work in the reservoir.

19.3 AQUATIC SPECIES

Effects to aquatic species, as defined in subsection 2(1) of the *Species Risk Act* are not anticipated as marine plants are not found in the Project area.

19.4 MIGRATORY BIRDS

Most migratory birds observed during field surveys of the Phase 1 component in 2021 were not on the Project footprint (see Section 14.2.3). Mitigation measures for minimizing Project effects on migratory birds include the following:

- Clearing will not occur between April 1 and August 31 to avoid disturbance to nesting birds
- Treed habitats will be retained where safe and technically feasible to do so.
- To reduce the possibility of vehicle collisions with wildlife, vehicle speed will not exceed posted speed limits and wildlife warning signs will be installed where appropriate.
- Project construction will occur largely during the winter and early spring when the irrigation system is not operational. For any activities occurring during the migratory birds RAP, a qualified wildlife biologist will inspect the site for active nests within seven days prior to the start of the proposed work and appropriate mitigation measures will be developed, as required.

The expansion of existing wetlands on Horsefly Reservoir and Taber Lake may provide additional habitat for waterfowl. Project effects on migratory birds are expected to be negligible to low.

20.0 POTENTIAL EXTRA-PROVINCIAL AND FEDERAL IMPACTS

Environmental changes as a result of the carrying out of the Project are benefits associated with flood control. These will be felt downstream of the Project area to Medicine Hat where the SMRID canal empties into the South Saskatchewan River. Effects will be confined to this area of Alberta and will not occur on federal lands, in a province other than Alberta, or outside Canada.

21.0 IMPACTS TO INDIGENOUS GROUPS INCLUDING TRADITIONAL LAND USE, PHYSICAL AND CULTURAL HERITAGE, AND HISTORICAL, ARCHAEOLOGICAL, PALAEONTOLOGICAL OR ARCHITECTURAL RESOURCES

Portions of the Project area have historic resource values of 4 (contains a historic resource that may require avoidance) or 5 (high potential to contain a historic resource). A pre-contact scatter archaeological site has been identified in the Phase 1 Project footprint. Within 100 m of the Project footprint there are two precontact scatter sites and a precontact campsite. Historic Resources Applications were submitted to ACSW for all three Project phases. ACSW responded on May 21, 2021 and October 22, 2021, stating there were no HRA requirements associated with archaeological resources but that an HRIA is required for palaeontological resources in the Phase 1 coulee (see Appendix C). A palaeontological field survey was conducted in August 2021. A few fossils were found in the coulee. A palaeontological HRIA is in preparation. The MD of Taber will comply to the standard requirements under the HRA and any requirements received as a result of the HRIA.

As shown in Figure 9.1 to Figure 9.3, the Project area is largely agricultural and there is no record of current use of Project lands for traditional purposes by Indigenous groups. Project-related issues identified by Indigenous groups have been the potential for effects on medicinal plants and undiscovered archaeological sites and water quality effects on the Oldman River. Communication with Indigenous groups has not identified any Project effects on physical or cultural heritage, or structures or sites of historical, archaeological, palaeontological or architectural significance to Indigenous peoples.

22.0 IMPACTS TO INDIGENOUS HEALTH, SOCIAL, AND ECONOMIC CONDITIONS

The Project is expected to have minimal effects on the health, social and economic conditions of Indigenous peoples of Canada. The Blood Tribe/ Kainai First Nation expressed no concerns with the Project and requested to be included in the list of bidders for contractor work on the Project. A letter from Métis Nation of Alberta (Region 3) stated that they have no outstanding concerns with Phase 1 of the Project. The MD of Taber will include any Indigenous groups who express interest on the contractor bidding list for the Project.

23.0 GREENHOUSE GAS EMISSIONS ASSOCIATED WITH THE PROJECT

As a requirement for funding from the ICIP, the MD of Taber commissioned RWDI Consultants to conduct a Climate Lens assessment of the Project. The report (RWDI 2020; see Appendix E) assessed the expected total annual direct and indirect net greenhouse gas emissions for the life of the Project, including emissions to 2030, which aligns with the Strategic Assessment of Climate Change requirement to provide an estimate of GHG emissions. The report assumed that current operations of the irrigation canal produced zero baseline emissions and that the Project is assumed to exhibit zero emissions during operation and maintenance activities. A Project lifespan was required for the Climate Lens assessment. RWDI assumed a 100-year operational lifespan commencing with a five-year construction period from 2021 to 2026. Cumulative emissions over the 105 years are predicted to be 5,625 tonnes of carbon dioxide emissions (CO_{2e}), which is attributable to the construction phase. The Project is not expected to affect carbon sinks because additional land will not be cleared for the Project. Although the Project lifetime extends beyond 2050, GHGs after 2050 will be zero, so a net zero plan is not required.

24.0 WASTE AND EMISSIONS GENERATED BY THE PROJECT

The Horsefly Regional Emergency Spillway Project is a flood mitigation project; it does not produce a product. Waste generated during the construction of the Project including metal, wood, plastic and paper and human waste, will be collected and disposed of at licensed disposal facilities. Atmospheric emissions during construction will be those associated with the upgrading of the canals and these are discussed in Section 23.0 and Appendix E. Noise associated with construction activities will be intermittent and short term. Atmospheric emissions and noise during operation and maintenance of the Project will be minimal. Spills or leaks of petroleum products and coolants from construction equipment and vehicles will be cleaned up and disposed of at a licensed disposal facility as will be described in the contractor ECO Plans for the Project.

Potable water for the Town of Taber's is supplied by a pipeline from Chin Reservoir from October through April and from the TID main canal from May through September. The Project does not involve any work on the TID main canal.

25.0 EFFECTS OF CLIMATE CHANGE ON THE PROJECT

Climate change may cause an increase in the frequency and intensity of precipitation and the need for the Project to divert water from SMRID Main Canal to the Oldman River. Modelling of climate change and effects on precipitation and flows of the Oldman River were not conducted for the Project. However, climate trends assessed for the Springbank Off-stream Reservoir Project on the Elbow River (Alberta Transportation 2019a, 2019b) provide some generalizations to effects of climate change on the Project.

The hydrological regime of the Elbow River watershed in Alberta was investigated by Marceau et al. (2014) to determine how climate change might affect it. The study concluded that climate change might cause a decrease in average annual overland flow, baseflow, and streamflow. There may be an increase in evapotranspiration, creating conditions for water scarcity. In addition, an increase in temperature during winter and spring will increase snowmelt and peak river flow, creating an increased flood risk from April to June. Kunkle et al. (2013) found that the probable maximum precipitation values for the Elbow River may increase in the future with a warming climate due to higher levels of atmospheric moisture content. However, the degree of probable maximum precipitation change is uncertain due to the potential climatic effects on storm convergence. Should the probable maximum precipitation increase due to climate change, the probable maximum flood would increase, although it may be offset somewhat from reduced contribution from snowmelt. Although Kunkle et al. suggest a reduced contribution from snowmelt, both studies predict increased flooding with climate change.

Alberta Transportation (2019b) used modelling of the Elbow River to estimate the effect of climate change on flood magnitude and frequency. Results showed climate change projections resulting in an 8% increase in stream flows of a 1:10-year flood and a 12% increase for 1:100 through 1:240-year floods.

Mahat and Anderson (2013) modelled the headwaters of the Oldman River for future climatic conditions in the 2020s, 2050s and 2080s. Their results projected a less than 10% increase in precipitation in winter and a similar amount of precipitation decrease in summer. These changes resulted in up to a 200% increase in winter streamflow in February and up to 63% decrease in summer flow in June. The increase in streamflow is mostly driven by the projected increase in temperature that is predicted to melt winter snow earlier.

Alberta Water Portal Society (2021) address climate change in the Oldman River basin. Citing St-Jacques et al. (2018), they state that climate projections show that more severe droughts may occur in the future due to climate change and that with air temperatures in the basin also projected to continue increasing in the coming decades, the average total yearly precipitation may decrease even further. Other modelling projections show that the warmer temperatures may cause mountain snow to melt during the winter and the winter snow in the mountains to completely melt much earlier in the spring. These changes to the snow in the mountains could result in peak flows in the river occurring earlier than at present.

The studies presented above suggest that late winter and spring flooding in the Project area will have greater volumes and become more frequent in the future.

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APPENDICES

Appendix A PHOTOS

Appendix A Photos
November 5, 2021

Photo 1 Phase 1- Taber Lake Outlet Structure

Photo 2 Phase 1 – Beginning of Channel Drain looking west

Photo 3 Phase 1- Channel Drain looking east; Taber Lake in right background

Photo 4 Phase 1 – Drainage down coulee to the Oldman River

Photo 5 Phase 2 – Horsefly Outlet channel looking north

Photo 6 Phase 2 – Horsefly Canal looking north, Highway 3 crossing in the distance

Photo 7 Phase 3 - Inlet canal from SMRID Main Canal to Horsefly Reservoir

Appendix B SUMMARY OF OPEN HOUSES, 2014

Appendix B Summary of Open Houses, 2014
November 5, 2021

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Proud of our Past... Building the Future

SOUTHERN REGIONAL STORMWATER MANAGEMENT PLAN (SRSWMP)

1

Southern Regional Stormwater Master Plan Open House

- Significant economic development has occurred along the regional corridor linking Lethbridge, Taber, and Medicine Hat over past decades, and development is expected to continue.
- This increase in economic activity has contributed to drainage issues, and land management issues, recent flood events have resulted in a focus on stormwater management.
- A more robust and reliable system is needed to convey drainage water from urban and rural areas safely, and efficiently.

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2

Regional Drainage Committee

A Regional Drainage Committee was established in 2013 to address the drainage problems in the region. The following Municipalities and Organizations are members of the committee.

- **MDs & Counties:** Taber, Cardston, Warner, Lethbridge, 40 Mile, Cypress
- **Cities**: Medicine Hat
- **Towns & Villages**: Taber, Barnwell, Bow Island, Coaldale, Magrath, Raymond, Stirling
- **Irrigation Districts**: SMRID, TID, RID, MID
- **Government Agencies:** Alberta Environment and Sustainable Resources, Alberta Agriculture, Alberta Transportation

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3

Study/Catchment Areas

The study area is located in southern Alberta. It is bounded to the north by the Oldman River and South Saskatchewan River, and extends south and west to include the entire drainage area of the St. Mary River Irrigation District (SMRID) Main Canal, which is the most significant drainage feature of the region. The eastern boundary is defined by the drainage basin of Seven Persons Creek, which discharges into the South Saskatchewan River in Medicine Hat.

The total study area comprises approximately 8,000 km^2 (2,000,000 acres) of land. The table below summarizes the land uses within the study area.

Land Use Type	Area, km^2	Area, Acres	%
Irrigated farmland (Water supplied by an Irrigation District)	1926	475,925	24%
Non-irrigated and private irrigation farmland	5528	1,366,044	61%
Rural roads & highways	162	40,031	2%
Irrigation right-of-way	81	20,015	1%
Reservoirs	83	20,510	1.%
Medicine Hat	42.9	10,600	0.5%
Towns & Villages	35.4	3,748	0.4%
Undeveloped land	750	185,329	9%
Total	8590	2,122,202	

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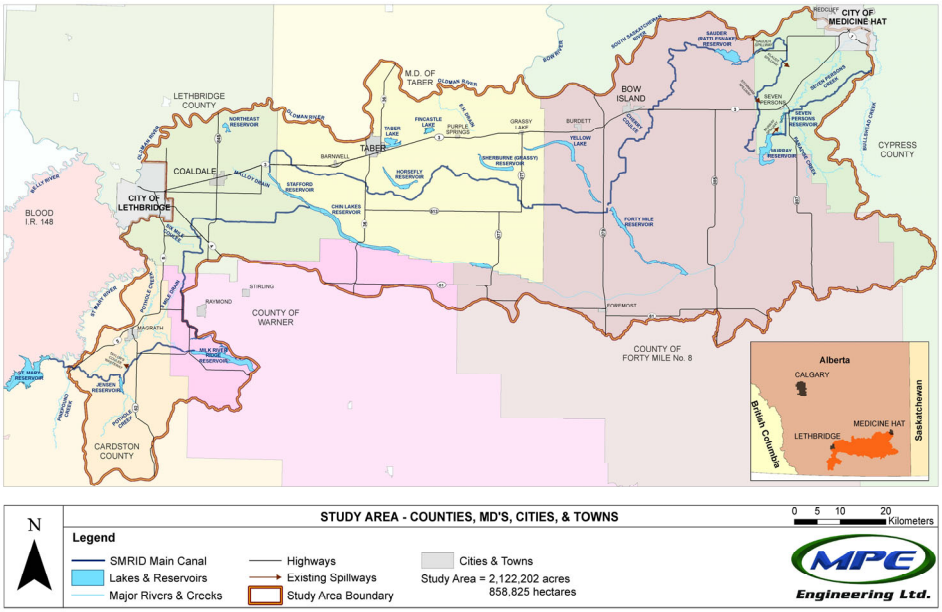
4

Study Area



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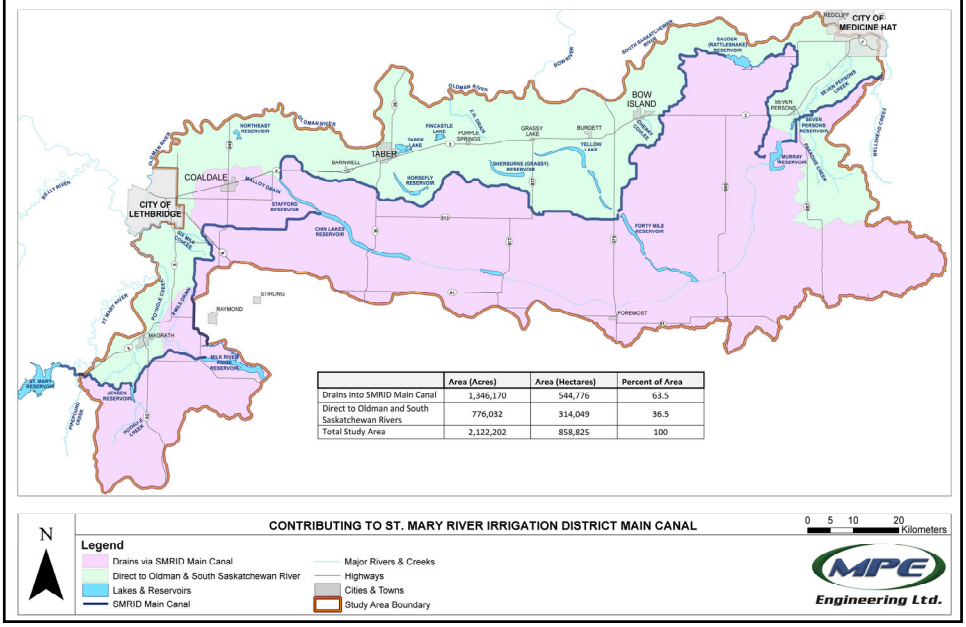
Main Canal Catchment Area



	Area (Acres)	Area (Hectares)	Percent of Area
Drains into SMRID Main Canal	1,346,170	544,776	63.5
Direct to Oldman and South Saskatchewan Rivers	776,032	314,049	36.5
Total Study Area	2,122,202	858,825	100

6

Flooding Events

The problems in 2010 were caused by a 1% (1:100 year) rainfall in the eastern and western portions of the Study Area. In the rest of the area, the rainfall was significantly less, somewhere between a 1:10 and 1:25 year event.

Recorded rainfall in 2011 was well below the magnitude of the 1:100 storm, significant snow melt in conjunction with drainage channel restrictions caused by snow and ice contributed to the overland flooding seen in the study area.

Flooding in June 2013, was primarily limited to Medicine Hat. This flooding was not caused by rainfall in the study area but rather from intense rainfall in the Rocky Mountains and Foothills, which led to high flows in the Bow River basin.

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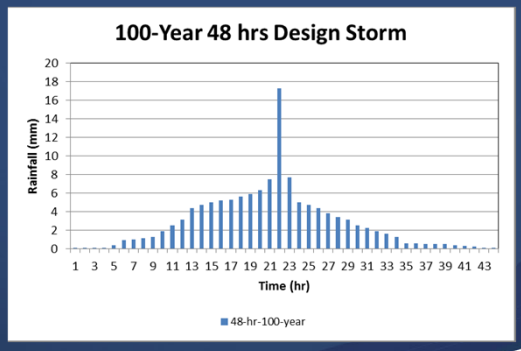
Design Storm

- A 1% (1:100 year) rainfall event was developed from previous rainfall events that have been recorded within the Study Area over the last 50 years.
- The 1% (1:100 year) rainfall event used is 125mm of rain in 48 hours.



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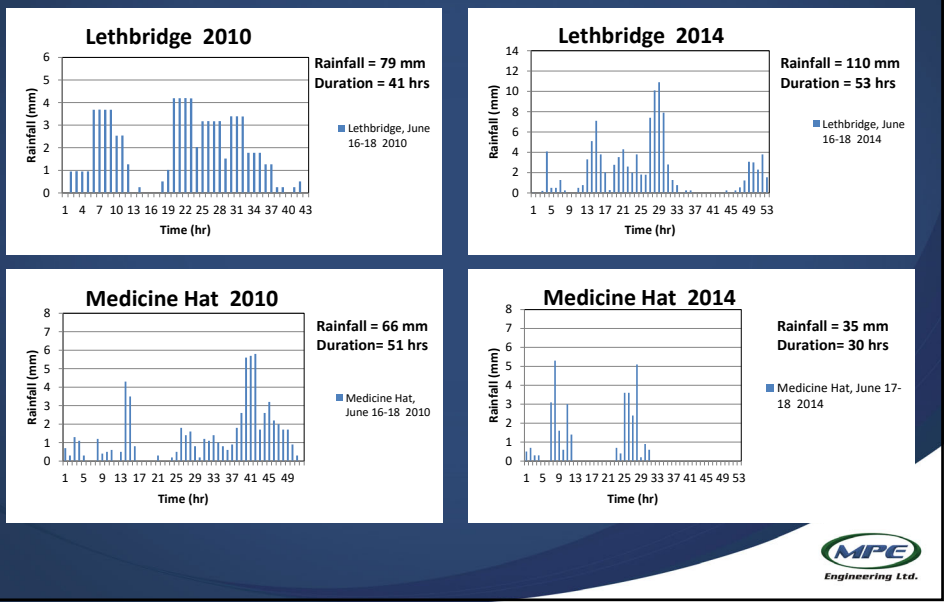
8

June Rainfall Events



9

Recommended Mitigation Options

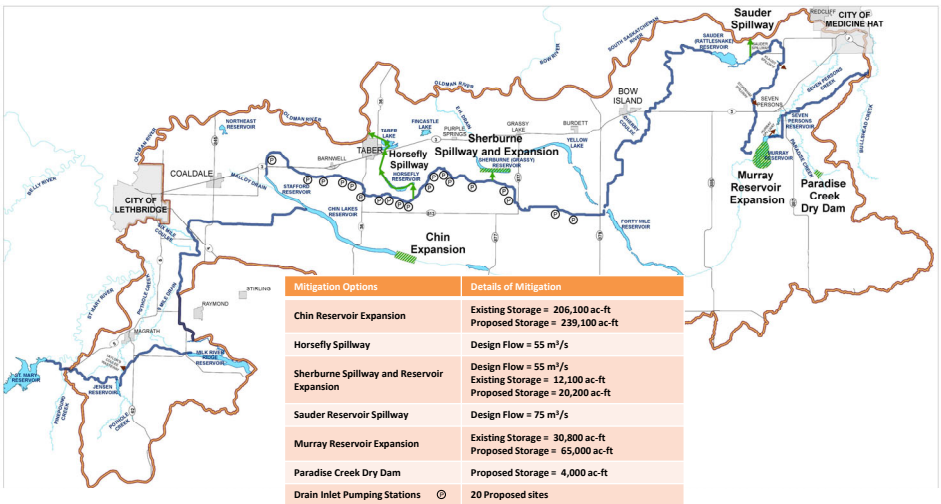
Alternatives for flood mitigation measures along the St. Mary River Irrigation District Main Canal system were investigated with the aid of hydraulic modeling. Mitigation alternatives consisted of additional or upgraded diversion spillways, and increased reservoir storage.

The recommended plan for storm water management improvements consists of the following:

- Expansion of Chin Reservoir, Sherburne Reservoir and Murray Reservoir
- Construction of diversion spillways into Horsefly and Sherburne Reservoirs
- Increase capacity of Sauder (Rattlesnake) spillway
- Construction of dry dam detention facility on Paradise Creek
- Construction of pump-out facilities at flooded sites adjacent to canal

10

Recommended Mitigation Options



Mitigation Options	Details of Mitigation
Chin Reservoir Expansion	Existing Storage = 206,100 ac-ft Proposed Storage = 239,100 ac-ft
Horsefly Spillway	Design Flow = 55 m^3/s
Sherburne Spillway and Reservoir Expansion	Design Flow = 55 m^3/s Existing Storage = 12,100 ac-ft Proposed Storage = 20,200 ac-ft
Sauder Reservoir Spillway	Design Flow = 75 m^3/s
Murray Reservoir Expansion	Existing Storage = 30,800 ac-ft Proposed Storage = 65,000 ac-ft
Paradise Creek Dry Dam	Proposed Storage = 4,000 ac-ft
Drain Inlet Pumping Stations	20 Proposed sites

RECOMMENDED FLOOD MITIGATION PROJECTS

0 5 10 20 Kilometers

N

Legend

- Proposed Drain Inlet Pumps
- Reservoir Expansions
- Recommended Spillways
- Existing Spillways
- SMRID Main Canal
- Major Rivers & Creeks
- Lakes & Reservoirs
- Highways
- Cities & Towns
- Study Area Boundary

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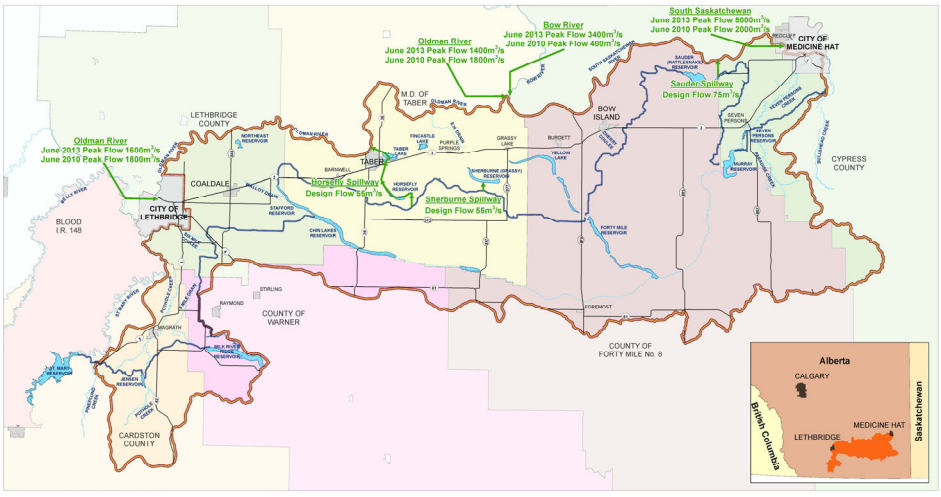
11

River and Spillway Flows



SPILLWAY DISCHARGES & RIVER FLOOD FLOWS

0 5 10 20 Kilometers

N

Legend

- Spillway & River Discharges
- Lakes & Reservoirs
- Major Rivers & Creeks
- Highways
- SMRID Main Canal
- Study Area Boundary
- Cities & Towns

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12

Summary of Mitigation Costs

Mitigation Option		Cost
Chin Reservoir Expansion	$	39,000,000
Horsefly Spillway	$	46,000,000
Sherburne Spillway and Reservoir Expansion	$	13,000,000
Sauder (Rattlesnake) Reservoir Spillway	$	13,000,000
Murray Reservoir Expansion	$	25,000,000
Paradise Creek Dry Dam	$	13,000,000
Drain Inlet Pumping Stations (20 sites)	$	2,000,000
Total	$	151,000,000

13

Contact Information

Please contact the following MPE personnel if you have any further questions or comments regarding the proposed Southern Regional Stormwater Management Plan.

MPE Engineering Ltd. Phone: 403 329-3442

Jeff Hust, P.Eng. Phone: 403 317-3634

Email : jhust@mpe.ca

14

Open House #1

Client: M.D. of Taber **File:** N:\17\20\024\OH1.DOC
Project: Southern Regional Stormwater Management Plan
Date: November 24, 2014
Time: 4:00 pm

Attendance: See sign-in sheet attached

Location: Gem of the West Museum - Coaldale

Purpose: 1st of 3 Open Houses for the Public

Distribution:

1.0 Purpose

First of 3 open houses to present Southern Regional Stormwater Management Plan to the public. General comments and concern will be collected and may be incorporated into the final report.

2.0 Comments and Concerns Received

- The scope of the project is hard to grasp and people were generally more interested in local issues.
- Reluctance of Lethbridge County to address culvert installation requests in chronic drainage areas,
- A lot of problems could be addressed by undertaking regarding of small areas and the installation of a few culverts. There does not seem to be any funding available from Lethbridge County to undertake these small projects.
- The County rebuilds roads but does not reinstall culverts in their previous locations and this creates flooding problems,
- Alberta Environment is hard to deal with in regards to Surface Drainage Act. There does not seem to be any enforcement present Alberta Environment only reacts to complaints.
- The Irrigation Districts seem to have their own agenda and do not really listen to landowner concerns or suggestions unless they are very large landowners.
- Neighbours blame each other for local storm water issues.
- Where will project funding come from?
  Provincial Government,
  Will there be long term commitments from local and provincial government?
  How long to get funding for the project?
  Who will spearhead and operate the proposed mitigation works?

- Water Quality including salinity is becoming an issue. Alberta Environment needs to set standards and enforce them.

- Should SMRID be charging a fee to accept drainage water to help fund upgrades?

- Different organizations rend to blame other organizations for flooding and drainage problems. It is refreshing to see cooperation between landowners, MD's, Irrigation Districts, County's, Municipalities and government organizations in trying to find solutions to these flood issues that have been experienced over the past several years.

Open House ended at 7:00 pm

Minutes recorded by: Chris Hust, MPE Engineering

If there are any errors, omissions or discrepancies please contact this office.

Open House #2

Client: M.D. of Taber **File:** N:\17\20\024\OH2.DOC
Project: Southern Regional Stormwater Management Plan
Date: November 25, 2014
Time: 4:00 pm

Attendance: See sign-in sheet attached

Location: Heritage Inn Hotel - Taber

Purpose: 2nd of 3 Open Houses for the Public

Distribution:

1.0 Purpose

Second of 3 open houses to present Southern Regional Stormwater Management Plan to the public. General comments and concern will be collected and may be incorporated into the final report.

2.0 Comments and Concerns Received

- Who is the main beneficiary of this study?
  Beneficiaries from this project include Land Owners, Counties, MD's Irrigation Districts and Municipalities.

- The public is generally unaware of the area that drains into the SMRID system. The public at the meeting could see the need for additional spillways along SMRID system.

- Concerns were expressed regarding the water quality if pumps are used to divert water into the SMRID system. This past year seemed to be worse than other years as the water in the SMRID system was quite dirty for the month of July. Water quality monitoring along SMRID canal and in reservoirs should be increased.

  Replacement of canals with pipelines is common and contributes to the problem of dirty water as the cattails and vegetation acted as a filter in past years. Back filling of natural low areas in recent years also contributes to the water quality problem as the water is moving downstream faster without sufficient time to settle out sediments and other contaminants.

- The public at the meeting liked the Chin Expansion and the Horsefly Spillway options. These options would provide extra capacity in the SMRID system for accepting drainage water and providing extra storage for irrigation use.

- How would the Town Taber drainage get affected?
  Presently the Town pumps water into Taber Lake, the proposed Horsefly Spillway would allow the Town to drain directly into the drain.

- Public is curious about next steps and how funding will be procured for this project getting fund.
  - When will the project implement?
  - Where will project funding come from?
  - How long to get funding for the project?

Open House ended at 7:00 pm

Minutes recorded by: Chris Hust, MPE Engineering

If there are any errors, omissions or discrepancies please contact this office.

Open House #3

Client: M.D. of Taber **File:** N:\17\20\024\OH3.DOC
Project: Southern Regional Stormwater Management Plan
Date: December 1, 2014
Time: 4:00 pm

Attendance: See sign-in sheet attached

Location: Medicine Hat Lodge – Medicine Hat

Purpose: 3rd of 3 Open Houses for the Public

Distribution:

1.0 Purpose

Third of 3 open houses to present Southern Regional Stormwater Management Plan to the public. General comments and concern will be collected and may be incorporated into the final report.

2.0 Comments and Concerns Received

- Concern was expressed regarding the management of extra capacity in the Chin and Sherburne Reservoir Expansion options. Will this extra capacity be reserved for flood management or will it be used for irrigation storage.
- Concerns were expressed regarding the consequence to Medicine Hat if water is spilled into the Oldman and South Saskatchewan rivers. Recorded flood events in past years at Medicine Hat shows the Horsefly and Sauder Spillway options would not have a significant effect on Medicine Hat.
- The Public at the meeting commented that the Horsefly Spillway and Chin and Sherburne Expansions increase the flexibility to store and release drainage water.
- Questions arose about Ross Creek system and if this was included in the study.
- How would the Medicine Hat get benefit from this project?

  Murray Reservoir Expansion option will reduce the peak flood in Seven Person Creek and reduce flooding impacts in Medicine Hat.

  Paradise Creek Dry Dam Option will reduce the peak flood in Paradise Creek and therefore reduce the peak flood in the Seven Persons
- Where will the funding for this project come from?
- Will there be a public consultation process?

Open House ended at 7:00 pm

Minutes recorded by: Shahram Karimi, MPE Engineering

If there are any errors, omissions or discrepancies please contact this office.

Appendix C REGULATORY CORRESPONDENCE

Appendix C Regulatory Correspondence
November 5, 2021

Infrastructure Canada
Ottawa, Canada
K1P 0B6

Our file Notre référence

Project 56626

October 30, 2020

Craig Pittman
Director of Infrastructure, Municipal District of Taber
4900B 50 Street
Taber, AB T1G 1T2
403-223-2541

[Sent via Email]
<email address removed>

Subject: Horsefly Regional Emergency Spillway (Phase 1) – Federal Environmental and/or Impact Assessment Requirements and Consultation Obligations with Canada's Indigenous Peoples

Dear Craig Pittman,

Following the federal Ministerial approval (July 22nd, 2020) of funding for the Horsefly Regional Emergency Spillway (Phase 1; the Project) under the Investing in Canada Infrastructure Project, Infrastructure Canada (INFC) has reviewed all information provided to date on the proposed Project to assess if there are any federal requirements under the *Impact Assessment Act* (IAA). INFC has also reviewed the information provided to determine INFC's obligation to consult with Canada's Indigenous Peoples, including the identification of next steps.

***Impact Assessment Act* Requirements**

Based on the information provided by the Municipal District of Taber for this Project, INFC is of the opinion that this project has no requirements under Section 82 of the IAA.

Note: INFC's understanding is that the Project is not located in whole or in part on federal lands. Should this information change or be incorrect, please inform INFC as soon as possible.

Consultation Obligations with Canada's Indigenous Peoples

Following INFC's review of the information provided to date, INFC has concluded that there is an obligation to consult with Canada's Indigenous Peoples. INFC's intent is to work with project proponents to engage and consult with Indigenous groups that may have a potential interest in the proposed project. At this time, INFC is not aware of any ongoing consultation with Indigenous groups initiated by the Municipal District of Taber. We understand that further discussion will be required with the Municipal District of Taber to better understand what, if any, consultation activities are planned to be undertaken for this Project and to determine if additional consultation activities and accommodation measures should be included in the consultation process to allow INFC to meet its requirements.

INFC therefore requests that the Municipal District of Taber notify the following Indigenous Groups and inform them that INFC will be contributing financial support for this project:

- The Blood Tribe
- Métis Nation of Alberta (Region 3)

For your reference, INFC has provided the contact information for the Blood Tribe, and Métis Nation of Alberta (Region 3), found in Annex 1 and an example template notification letter to Indigenous Groups, found in Annex 2. Please ensure that INFC is copied on the notification letter and confirm if any feedback is received.

INFC will require a summary of communications, including any issues or concerns raised by respective Indigenous groups and an indication of how the Municipal District of Taber has addressed or proposes to address those issues or concerns. An example of a template consultation log and an example of a concerns tracking chart can be found as Annexes 3 and 4, respectively.

Note: All Annexes were provided as attachments in the original email correspondence from INFC dated October 30th, 2020.

Once consultation has started, INFC kindly requests the Municipal District of Taber to provide an update on the status of the project and consultation process to INFC. The update provided should focus on the following information:

- Project schedule, including a confirmation of when site preparation works and construction of the Project are expected to start;
- A summary of any consultation activities conducted or planned by the Municipal District of Taber as part of the Project, including any issues or concerns expressed by the Indigenous groups consulted;
- Any accommodation's being negotiated with Indigenous groups; and
- Implementation of any mitigation measures or compensation measures identified during the consultation process.

Once we have received this information, we will confirm when our consultation obligations have been met.

We would also like to take this opportunity to remind you that the Project may not proceed with site preparation works and construction until INFC can confirm that INFC's obligation to consult with Canada's Indigenous Peoples, have been met.

Note: During these unprecedented times regarding the current COVID-19 pandemic, many consultation officers are operating at minimal capacity or have been closed, which may result in extended timelines with respect to the engagement process.

Should the Municipal District of Taber consider future changes to the nature, scope, design, location or start and completion date of the Horsefly Regional Emergency Spillway (Phase 1) that differ from that which has been provided to date, it is the responsibility of the Municipal District of Taber to immediately notify INFC. The department may then reassess the Project in accordance with the requirements under

the IAA and determine whether an obligation to notify or consult with Canada's Indigenous Peoples arises.

Should you have any comments or questions, please contact Mark Libby by email at mark.libby2@canada.ca with cc to infc.aboriginalconsultenv-consultautochtonesenv.infc@canada.ca or by phone at 343-551-0406.

Sincerely,

<Original signed by>

Jared Bone, R.P.F.
Acting - Sr. Environmental Review and Approval Officer
Aboriginal Consultation and Environmental Services

cc:
Jared Bone, INFC (jared.bone@canada.ca)
Tonya Youngberg, INFC (tonya.youngberg@canada.ca)
Francesca Addante, INFC (francesca.addante2@canada.ca)
INFRAS Alberta ICIP (alberta.icip@gov.ab.ca)

Attachments: Annex 1 – Contact Information for Indigenous Groups – DTC (ICIP)
Annex 2 – Template Letter to Notify Indigenous Groups of Project - DTC (ICIP)
Annex 3 – Indigenous Consultation Communications List Template
Annex 4 – Indigenous Concerns Tracking Chart Template

Impact Assessment Agency of Canada | Agence d'évaluation d'impact du Canada

Prairie and Northern Region
Canada Place
Suite 1145, 9700 Jasper Avenue
Edmonton, Alberta T5J 4C3

Région des Prairies et du Nord
Place Canada
Pièce 1145, 9700 rue Jasper
Edmonton (Alberta) T5J 4C3

June 25, 2021

Jim Howell
Senior Principal
Stantec
200-325 25 Street SE
Calgary, AB, T2A 7H8
jim.howell@stantec.com

Dear Jim Howell,

Thank you for the information regarding the Horsefly Regional Emergency Spillway (the Project) proposed by the Municipal District of Taber provided on November 18, 2020.

As indicated in the Impact Assessment Agency (the Agency) correspondence of June 8, 2021, the proposed Project appears to meet the thresholds in item 61 *Physical Activities Regulations* of the *Impact Assessment Act* for the expansion of an existing structure for the diversion of water from a natural waterbody into another natural water body. As such, the Project is a physical activity designated under the Regulations.

The Agency regards Taber Lake and the Horsefly Reservoir as natural waterbodies since they were naturally occurring waterbodies that were then modified. The Agency understands the diversion capacity will increase from 7 m^3/s to 40 m^3/s which is an increase of the diversion capacity by 50% or more and the subsequent maximum diversion capacity is greater than 10,000,000 cubic metres of water per year.

The first step of the impact assessment process is submitting an Initial Project Description (IPD) to the Agency. The Agency encourages you to submit a draft IPD prior to formal submission. The Agency is available to review the draft IPD alongside the information requirements of the *Information and Management of Time Limits Regulations* and provide feedback to help ensure all the required information is provided. Upon receipt of the formal submission, the Agency conducts a 10 day review to determine if the document meets the requirements of the regulations. Acceptance of the IPD will initiate the 180 calendar day Planning Phase of the impact assessment process.

The Planning Phase is the first of five phases of the impact assessment process. During the first 80 days of this phase, the Agency holds a 20 day public comment period to engage with public, Indigenous groups, provincial jurisdictions, and federal authorities on their views and expertise regarding the Project and if an Impact Assessment is required. Next, the Agency issues a Summary of Issues and the proponent will be required to submit a Detailed Project Description (DPD) that meets the requirement of the Regulations and that addresses the

issues raised. At the end of the 80 days, The Agency makes a determination on whether an Impact Assessment is required. If an IA is required, the next 100 days will consist of the Agency drafting the Tailored Impact Statement Guidelines (TISG) and other plans and hosting a public comment period on these documents.

Additional information regarding the impact assessment process, including IPD requirements, is available here

- * Impact Assessment Process Overview
- * Practitioner's Guide to Impact Assessment
- * Preparing an Initial Project Description

The Agency is available to discuss the Project further. Should the Project or any of the planned activities change, or if you have any further questions, please contact me at iaac.pnr-rpn.aeic@canada.ca AND 780-495-2037.

Sincerely,

Mathieu Dumais
Project Analyst
Impact Assessment Agency of Canada

Environment and Parks

Regulatory Assurance Division
Approvals Unit
2nd Floor, Petroleum Plaza, South Tower
9915 – 108 Street
Edmonton, Alberta T5K 2G8
Canada
Telephone: 780-427-5828
http://www.ea.alberta.ca

July 13, 2021

Mr. Arlos Crofts
Municipal District of Taber
c/o Jim Howell
Stantec Consulting
jim.howell@stantec.com

Dear Mr. Howell:

Further to the letter from Mr. Crofts of July 7, 2021, I wish to advise you that pursuant to Section 44 of the *Environmental Protection and Enhancement Act* (EPEA), I have considered the application of the environmental assessment process to your proposed Horsefly Emergency Spillway Project. This activity is an exempted activity for the purposes of environmental assessment. Therefore, a screening report will not be prepared and an environmental impact assessment report is not required.

Please note that this decision is based on the current information about the project and that I reserve the ability to review this decision should different and/or new information come to light. The Municipal District of Taber should also note that Section 47 of EPEA gives the Minister of Environment and Parks the authority to order the preparation of an environmental impact assessment report under appropriate circumstances, notwithstanding a director's decision to not require an environmental impact assessment report.

I understand you have already submitted the project description to the Impact Assessment Agency of Canada (IAAC) to determine any federal environmental assessment requirements under the *Impact Assessment Act*.

If you have any questions or need further information please contact me at 780-427-9116.

Sincerely,

<Original signed by>

Corinne Kristensen
Director, Regulatory Assurance Section
Environment and Parks
(Designated Director, *Environmental Protection and Enhancement Act*)

cc: Dorothy Lok (AEP)
Melanie Daneluk (AEP)

HRA Number: 4825-21-0013-001
May 21, 2021

Historical Resources Act Approval with Conditions

Proponent: Municipal District of Taber
4900B - 50 Street, Taber, AB T1G 1T2
Contact: Arlos Crofts

Agent: Stantec
Contact: Erin Greenwood

Project Name: **Horsefly Regional Emergency Spillway - Phase 1**

Project Components: Storm Water Management

Application Purpose: Requesting HRA Approval / Requirements

Historical Resources Act approval is granted for the activities described in this application and its attached plan(s)/sketch(es) subject to the following conditions.

<Original signed by>

David Link
Assistant Deputy Minister
Heritage Division
Alberta Culture, Multiculturalism
and Status of Women

SCHEDULE OF CONDITIONS

ARCHAEOLOGICAL RESOURCES

There are no *Historical Resources Act* requirements associated with archaeological resources; however, the proponent must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

PALAEONTOLOGICAL RESOURCES

Conditional *Historical Resources Act* approval is granted relative to palaeontological resources on the understanding that a targeted Historic Resources Impact Assessment will be conducted, as outlined below.

SCHEDULE OF CONDITIONS (continued)

1. The Historic Resources Impact Assessment must target the following locations:

   a) The Oldman River valley walls in 18-10-16-W4M and;

   b) the coulee/spillway between the Oldman River and Range Road 164A (17&18-10-16-W4M).

   Development activities outside of the specified target areas may proceed as planned without further concern for palaeontological resources.

2. The Historic Resources Impact Assessment is to be carried out prior to the initiation of any land surface disturbance activities in the areas listed above, under snow free, unfrozen ground conditions. Should the project require survey under winter conditions, assessment procedures must be discussed in advance with the Royal Tyrrell Museum of Palaeontology.

3. The Historic Resources Impact Assessment for palaeontological resources is 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, Multiculturalism and Status of Women prior to the initiation of any palaeontological field investigations. Please allow ten working days for the permit application to be processed. To obtain contact information for consultants qualified to undertake this work, please consult the list of Alberta Historic Resource Consultants.

4. Results of the Historic Resources Impact Assessment must be reported to Alberta Culture, Multiculturalism and Status of Women and subsequent *Historical Resources Act* approval must be granted before development proceeds in the target areas.

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 Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

HISTORIC STRUCTURES

There are no *Historical Resources Act* requirements associated with historic structures; however, the proponent must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

PROVINCIALLY DESIGNATED HISTORIC RESOURCES

There are no *Historical Resources Act* requirements associated with Provincially Designated Historic Resources; however, the proponent must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

ADDITIONAL COMMENTS

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

SCHEDULE OF CONDITIONS (continued)

Lands Affected: All New Lands

Proposed Development Area:

MER	RGE	TWP	SEC	LSD List
4	16	10	16	6-12
4	16	10	15	3-6,12
4	16	10	17	9-13
4	16	10	18	7-10
4	16	10	10	11,13-14

Documents Attached:

Document Name	Document Type
Project Plans	Illustrative Material

HRA Number: 4825-21-0013-002
October 22, 2021

Historical Resources Act Approval

Proponent: Municipal District of Taber
4900B 50 Street, Taber, AB T1G 1T2
Contact: Arlos Crofts

Agent: Stantec
Contact: Erin Greenwood

Project Name: **Horsefly Spillway Phase 2 and Phase 3**

Project Components: Storm Water Management

Application Purpose: Requesting HRA Approval / Requirements
Amendment or Update to Project Submitted Previously

Historical Resources Act approval is granted for the activities described in this application and its attached plan(s)/sketch(es) subject to Section 31, "a person who discovers an historic resource in the course of making an excavation for a purpose other than for the purpose of seeking historic resources shall forthwith notify the Minister of the discovery." The chance discovery of historical resources is to be reported to the contacts identified within Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources.

<Original signed by>

Martina Purdon
Manager, Regulatory Approvals
and Information Management
Alberta Culture and Status of
Women

Lands Affected: Additional Lands

Proposed Development Area:

MER	RGE	TWP	SEC	LSD List
4	16	9	28	2-3,6-11,14-15
4	16	9	21	14
4	16	10	4	2-3,6-7,9-11,14-16
4	16	9	27	5-6,10-12,14-15
4	16	9	33-34	2-3,6-7,10-11,14-15
4	16	10	3	2-3,6-7,10-11
4	15	9	5	6-7,10-11,13-15

(continued)

4	15	9	8	3-6,10-14
4	15	9	18	1-2
4	15	9	17	4
4	15	9	7	15-16

Documents Attached:

Document Name	Document Type
Phase 2 Project Plans	Illustrative Material
Phase 3 Project Plans	Illustrative Material

Appendix D INDIGENOUS CORRESPONDENCE

Appendix D Indigenous Correspondence
November 5, 2021

Municipal District of Taber

Horsefly Emergency Spillway – Phase 1

March 15, 2021

Chief Roy Fox
Blood Tribe
PO Box 60
Standoff, Alberta
T0L 1Y0

Sent via Email
Subject: Horsefly Regional Emergency Spillway – Phase 1

Dear Chief Roy Fox:

I am writing to notify you that the Municipal District of Taber has been approved for financial support under Infrastructure Canada's (INFC) Investing in Canada Infrastructure Program – to construct Phase 1 of 3 of the Horsefly Regional Emergency Spillway. I am also writing to provide you with information on the proposed project and the provide you with the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Blood Tribe may have with regard to this project.

This project will involve the construction of Phase 1 of the Horsefly Regional Emergency Spillway which includes:

- Upgrading 5,500 meters of existing irrigation canal and drainage ditch between Taber Lake and the Oldman River
- Upgrading existing crossings at Highway 36 and three Municipal District (M.D.) of Taber road crossings
- Construction of a spillway structure to the Oldman River
- Construction of three concrete drop/check structures
- Upgrading the Taber Lake outlet structure

The proposed project is to be constructed in order to prevent a breach of the St. Mary River Irrigation District (SMRID) Main Canal during a significant flood event. Further information on the project can be found in Appendix A.

Prior to proceeding with this project, we would like to know if the Blood Tribe have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns with regard to the proposed project. Furthermore, should you require additional information on the proposed project, please contact Jeff Olitch with MPE Engineering Ltd. by telephone at (403) 329-3442 or by email at jolitch@mpe.ca. I would appreciate hearing back from you by April 30th. If it is not possible to respond within this timeframe, would you kindly contact me to establish a mutually agreed upon timeframe.

I would like to thank you in advance for your consideration to this request and look forward to hearing back from you.

Sincerely Yours,

<Original signed by>

Chief Administrative Officer
Municipal District of Taber

cc:
Simon Tétreault - Section Leader, Environmental Review and Approvals, Quebec-West Region, Indigenous Consultation and Environnemental Services, INFC
Jared Bone, Acting - Senior Environmental Review and Approvals Officer, INFC
Robin Strong, Manager – West Region, INFC
Mike Oka, Consultation Coordinator – Blood Tribe
J.J Shade, TLUOS Coordinator – Blood Tribe
Jack Dunsmore – Municipal District of Taber

Appendix A Additional Information

Horsefly Regional Emergency Spillway - Phase 1

Please consider this notification of a proposed project to upgrade existing irrigation and drainage infrastructure to accommodate stormwater flows along the Horsefly Spillway. The Horsefly Regional Emergency Spillway project involves the diversion of stormwater runoff intercepted by the St. Mary River Irrigation District (SMRID) Main Canal through works owned and operated by the Taber Irrigation District (TID) to the Oldman River. Phase 1 of 3 involves upgrading the existing drainage ditch and irrigation canal from Taber Lake to the Oldman River and the construction of a spillway.

The SMRID Main Canal receives stormwater runoff from approximately 565,000 ha of land in Southern Alberta. Flood events have been occurring more frequently in June when irrigation demand for crops is nearing peak demand, as compared to in the past when snowmelt events were the larger flood risk. This stormwater that falls as rain is taxing the irrigation system and creates the risk of failure of the SMRID Main Canal during a significant runoff event. The SMRID Main Canal has only one outlet to release this stormwater to the river system, near the end of the 300 km long canal near the City of Medicine Hat.

The Horsefly Regional Emergency Spillway project will be constructed in three phases. Phase 1 includes the following:

- Upgrading 5,500 metres of existing irrigation canal and drainage ditch between Taber Lake and the Oldman River
- Upgrading existing crossings at Highway 36 and three Municipal District (M.D.) of Taber road crossings
- Construction of a spillway outlet structure to the Oldman River
- Construction of three concrete drop/check structures
- Upgrading the Taber Lake outlet structure

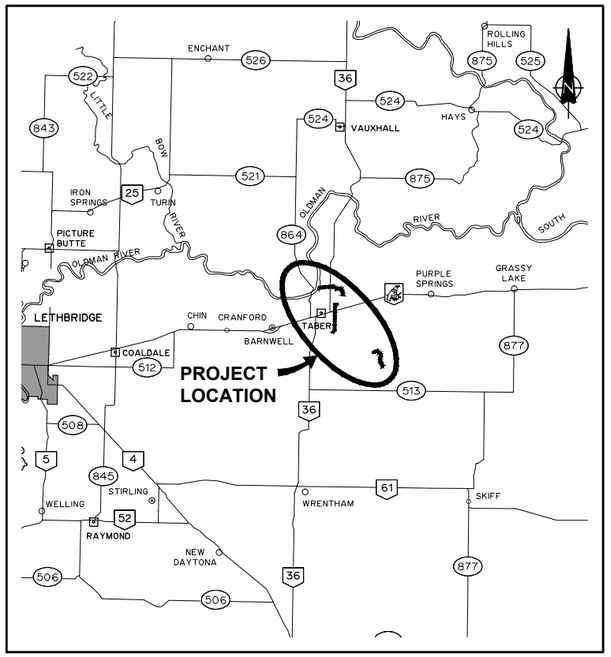
The following three engineering drawings are attached and detail the components of the project:

1. Drawing 1: Cover sheet and project location plan,
2. Drawing 2: Overall site plan,
3. Drawing 3: Phase 1 plan profile.

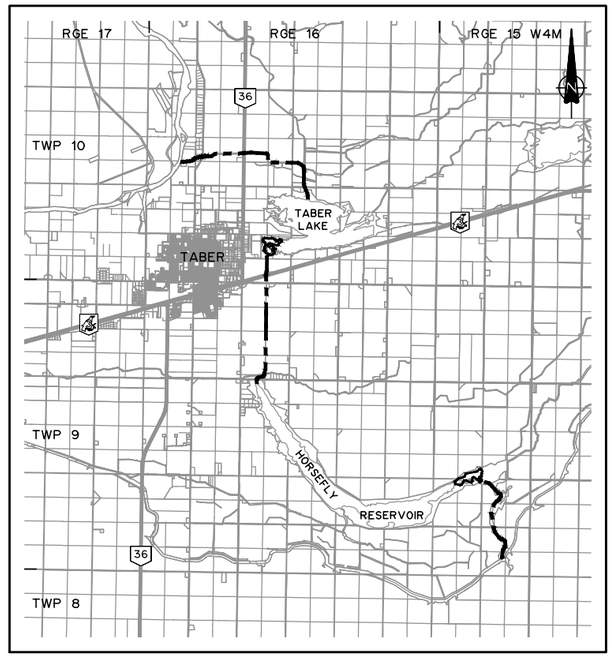
There will be appropriate mitigation measures included in the specifications to minimize any adverse impact to Taber Lake, Oldman River, and the surrounding environment during construction.

If current conditions permit, the project is expected to start July 1, 2022 and be completed by March 31, 2023. We do not anticipate that this work, or the result of this work, will have any adverse impacts on the exercise of treaty rights or traditional uses.

SET _____



LOCATION PLAN



SITE PLAN

LIST OF DRAWINGS

	TITLE PAGE
1	OVERALL SITE PLAN
2	HORSEFLY SPILLWAY PLAN PROFILE

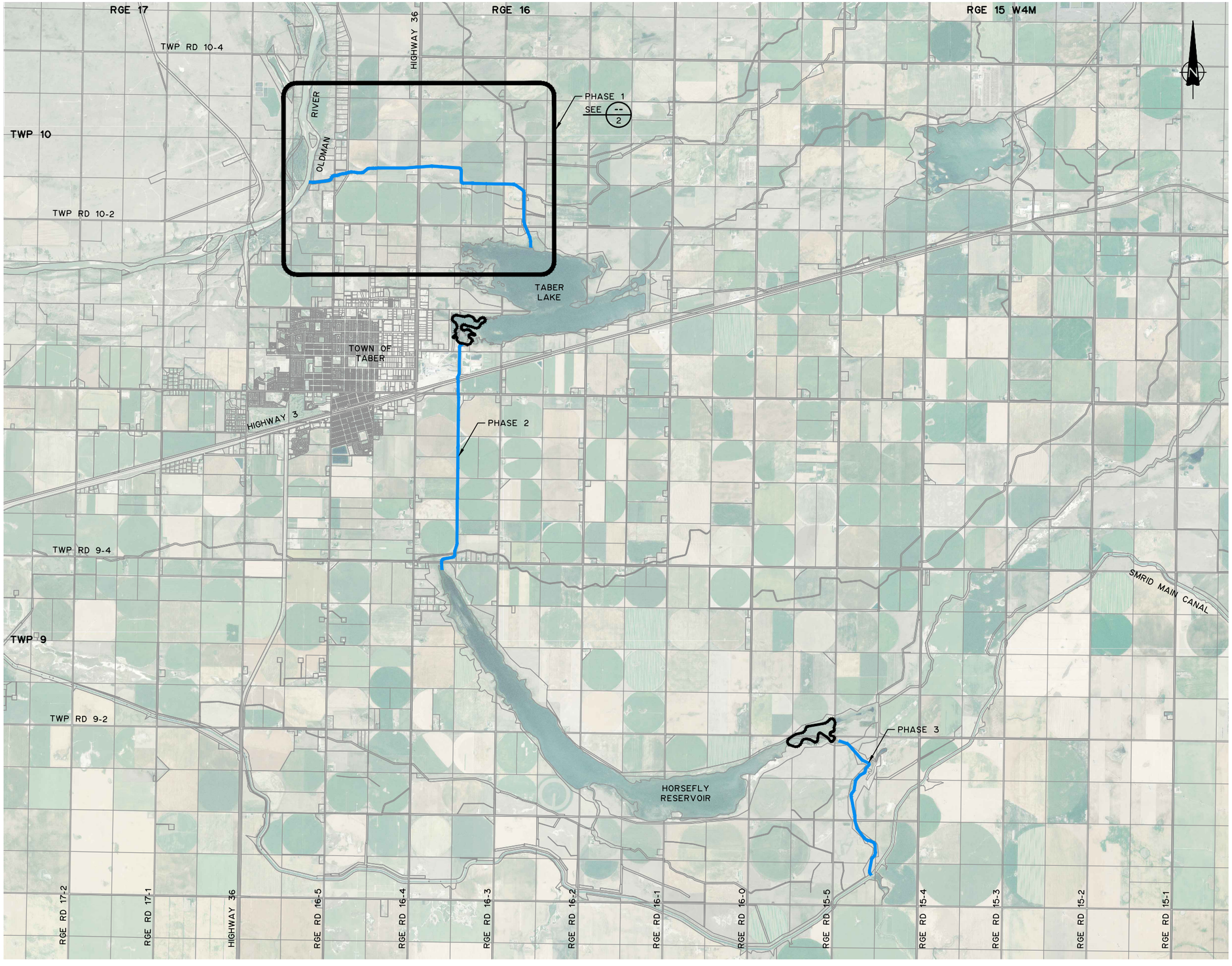
MUNICIPAL DISTRICT OF TABER

HORSEFLY REGIONAL EMERGENCY SPILLWAY

FOR CONSULTATION

1720-054-00

MPE Engineering Ltd.



NOTES:

1. SPILLWAY ALIGNMENT IS BASED ON CURRENT CANAL ALIGNMENTS AND MAY CHANGE DURING DESIGN.
2. HIGHWAY 3 WILL BE RELOCATED IN THE FUTURE. THE EXISTING LOCATION HAS BEEN ASSUMED FOR THIS PROJECT.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

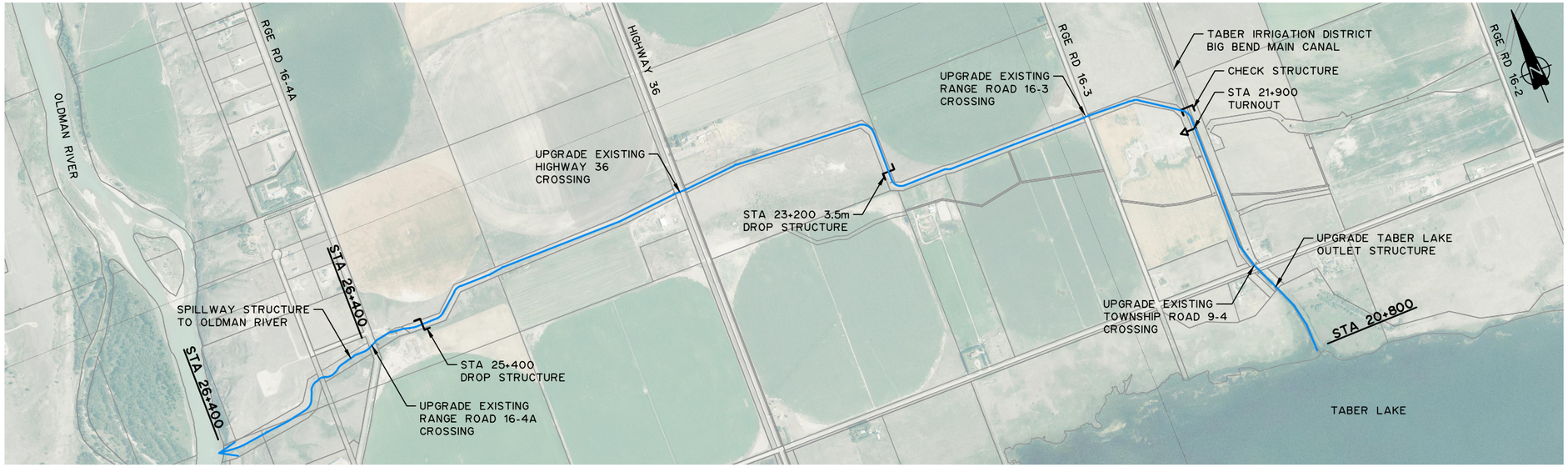
1	21-03-15	FOR CONSULTATION
ISSUE	YY-MM-DD	REVISION

MPE Engineering Ltd.

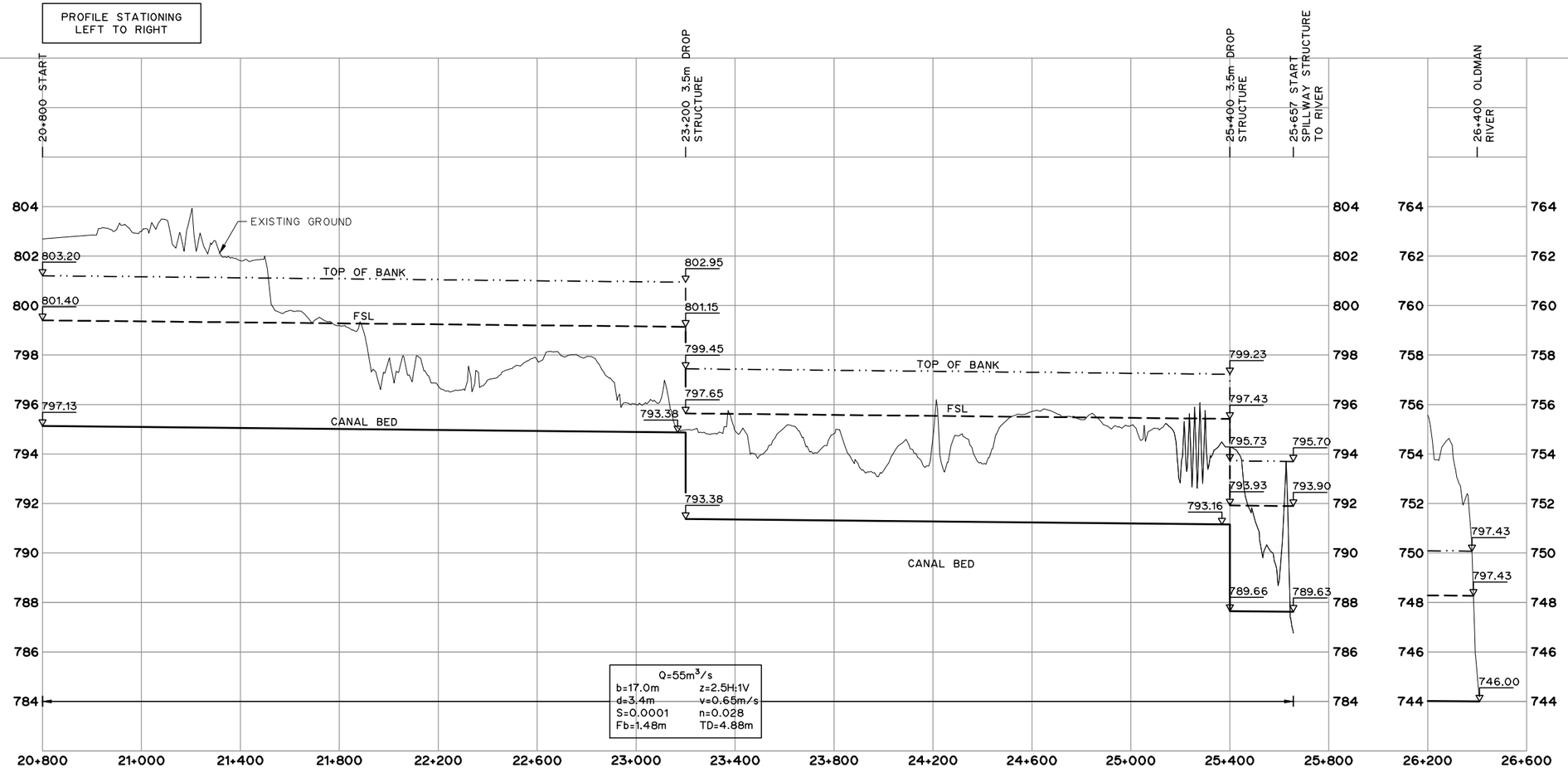
MUNICIPAL DISTRICT OF TABER

HORSEFLY REGIONAL EMERGENCY SPILLWAY
OVERALL SITE PLAN

DESIGNED	J.W.H.	JOB	1720-054-00
DRAWN	R.B.H.	SCALE	1:75 000
DATE	MARCH 2021	DRAWING	1



PROFILE STATIONING
LEFT TO RIGHT



NOTES:

1. SPILLWAY ALIGNMENT IS BASED ON CURRENT CANAL ALIGNMENTS AND MAY CHANGE DURING DESIGN.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

ISSUE	YY-MM-DD	REVISION
1	21-03-15	FOR CONSULTATION

MPE Engineering Ltd.

MUNICIPAL DISTRICT OF TABER

HORSEFLY REGIONAL EMERGENCY SPILLWAY

PHASE 1 PLAN PROFILE

STA 20+800 TO STA 2+657

DESIGNED	J.W.H.	JOB	1720-054-00
DRAWN	R.B.H.	SCALE	H1:20 000 V1:200
DATE	MARCH 2021	DRAWING	2

Métis Nation of Alberta
A strong Métis Nation embracing Métis rights
(780) 455-2200 | 1-800-252-7553 | www.albertametis.com
11738 Kingsway NW | 100 Delia Gray Building | Edmonton, AB | T5G 0X5
Métis Rights and Accommodation

JUNE 4, 2021

Municipal District of Taber
ATTN: Jeff Olitch
Project Manager
4900B – 50th Street
Taber, AB T1G 1T2
TEL: <personal information removed>
Fax: (403) 223-1799
<email address removed>

[Sent Via Email]

Re: Municipal District of Taber – Horsefly Regional Spillway Phase 1

Dear Mr. Jeff Olitch,

With respect to the project notification (the "Notification") dated March 15, 2021, for the project known as **Municipal District of Taber – Horsefly Regional Spillway Phase 1 Project** received by the Métis Nation of Alberta ("MNA") Region 3 Consultation Office ("RCO") from your organization, the Regional Consultation Committee ("RCC") has reviewed the project and made the following determination(s):

Based on the final review by the RCC, the proposed project as described in the Notification:

☐ is unlikely to have negative or adverse impacts on the aboriginal rights, claims, and interests, or the historical and contemporary practices related thereto, of the Métis Nation within Alberta and its citizens. Accordingly, the ***RCC HAS NO OUTSTANDING CONCERNS*** with respect to the project proceeding as detailed in the Notification.

☒ may have negative or adverse impacts on the aboriginal rights, claims, and interests, or the historical and contemporary practices related thereto, of the Métis Nation within Alberta and its citizens. Those concerns were communicated to your organization and have been subsequently mitigated or accommodated to the satisfaction of the RCC. Accordingly, the ***RCC HAS NO OUTSTANDING CONCERNS*** with respect to the project proceeding as detailed in the Notification.

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☐ will have specific and identifiable negative or adverse impacts on the aboriginal rights, claims, and interests, or the historical and contemporary practices related thereto, of the Métis Nation within Alberta and its citizens. Those concerns were detailed in the RCC Notice of Objection with respect to this project and communicated to your organization and the associated regulator. Those concerns have been subsequently mitigated or accommodated to the satisfaction of the RCC. Accordingly, the ***RCC HAS NO OUTSTANDING CONCERNS*** with respect to the project proceeding as detailed in the Notification.

☐ will have specific and identifiable negative or adverse impacts on the aboriginal rights, claims, and interests, or the historical and contemporary practices related thereto, of the Métis Nation within Alberta and its citizens. Those concerns were detailed in the RCC Notice of Objection with respect to this project and communicated to your organization and the associated regulator. Those concerns have still not been mitigated or accommodated to the satisfaction of the RCC. Accordingly, the ***RCC OBJECTS TO THE PROJECT PROCEEDING*** and has directed the RCO to engage legal counsel in order to protect the interests of the Métis Nation with respect to the project.

The above-mentioned possible impacts for the Project identified and associated request is that the MNA Region 3 Consultation Office be notified if including but not limited to any artifacts, grave sites, medicinal plants, etc. are uncovered during this work.

Thank you for engaging with the MNA as part of your engagement and consultation process. We trust that your organization will continue to strive to fulfill best practices in its engagements and consultations with Indigenous peoples, including the Métis Nation within Alberta. The MNA and respective RCOs will be pleased to assist your organization in conducting engagements and consultations regarding any activities and projects undertaken or proposed to be undertaken in Alberta. The staff in the RCO look forward to working with you to achieve mutual success by offering a standardized and streamlined consultation process through the MNA single point of access.

Where additional meetings are required with respect to this project, they may be scheduled by contacting the respective RCO(s). To assist you in that regard, the RCO Contact List is attached to this letter.

Sincerely,

<Original signed by>

Nicole Shepherd
Region 3 Consultation Coordinator
Métis Nation of Alberta

/for

Lawrence Gervais
President
Métis Nation of Alberta Region 3

/encl.

MNA Region 1 Consultation Office	**Cheryl Gordon - Consultation Coordinator** P.O. Box 1350 10104 – 102 Avenue Lac La Biche, AB T0A 2C0 (780) 623-3039 Office (780) 623-2733 Fax <email address removed> **Consultation Notification Email:** MNAR1notifications@metis.org
MNA Region 2 Consultation Office	**Ashley Shaw - Consultation Coordinator** 5102 – 51 Street Bonnyville, AB T9N 2H1 (780) 826-7483 Office <email address removed> **Consultation Notification Email:** MNAR2notifications@metis.org
MNA Region 3 Consultation Office	**Nicole Shepherd - Consultation Coordinator** 1415 28th Street NE Calgary, AB T2A 2P6 (403) 569-8800 Office (403) 569-8959 Fax <email address removed> **Consultation Notification Email:** MNAR3notifications@metis.org
MNA Region 4 Consultation Office	**TBD** **Consultation Notification Email:** MNAR4notifications@metis.org
MNA Region 5 Consultation Office	**Walter Andreeff, BSc – Consultation & Climate Leadership Coordinator** 353 Main Street NW Slave Lake, AB T0G 2A3 (780) 849-4654 Office <email address removed> **Consultation Notification Email:** MNAR5notifications@metis.org
MNA Region 6 Consultation Office	**Garrett Tomlinson, LLM (cand.) – Regional Consultation Coordinator** 9621 90 Ave Peace River, AB T8S 1G8 (780) 624-4219 Office (780) 624-3477 Fax <email address removed> **Consultation Notification Email:** MNAR6notifications@metis.org

Municipal District of Taber
Horsefly Regional Emergency Spillway

July 21, 2021

Kaylyn Buffalo
Samson Cree Nation
PO Box 159
Maskwacis, Alberta
T0C 1N0

Sent via Email

Subject: Horsefly Regional Emergency Spillway

Dear Kaylyn Buffalo:

I am writing to notify you that the Municipal District of Taber has been approved for financial support under Infrastructure Canada's (INFC) Investing in Canada Infrastructure Program – to construct the Horsefly Regional Emergency Spillway. I am also writing to provide you with information on the proposed project and then provide you with the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Samson Cree Nation may have regarding this project.

Major Components of the Horsefly Regional Emergency Spillway Project include:

- Upgrades to 14,000 metres of existing irrigation canal and drainage ditch between the St. Mary River Irrigation District (SMRID) Main Canal and the Oldman River,
- Upgrades to existing crossings at Highway 3, Highway 36, Canadian Pacific Rail (CPR), and six local roads,
- Upgrades to the Taber Lake outlet structure, Horsefly Reservoir outlet structure, and Horsefly turnout on the SMRID Main Canal,
- Construction of eight concrete drop/check structures,
- Construction of a spillway outlet structure to the Oldman River,
- Construction of wetlands at Horsefly Reservoir and Taber Lake.

The proposed project is to be constructed to prevent a breach of the St. Mary River Irrigation District (SMRID) Main Canal during a significant flood event. Further information on the project can be found in Appendix A.

Prior to proceeding with this project, we would like to know if the Samson Cree Nation have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns regarding the proposed project. Furthermore, should you require additional information on the proposed project, please contact Jeff Hust with MPE Engineering Ltd. by telephone at (403) 329-3442, by email at jhust@mpe.ca, or by mail at:

MPE Engineering Ltd.
#300, 714 – 5 Avenue S,
Lethbridge, Alberta, T1J 0V1

I would appreciate hearing back from you by August 30th. If it is not possible to respond within this timeframe, would you kindly contact me to establish a mutually agreed upon timeframe.

I would like to thank you in advance for your consideration to this request and look forward to hearing back from you.

Sincerely Yours,
<Original signed by>

Arlos Crofts
Chief Administrative Officer
Municipal District of Taber

cc:
Simon Tétreault - Section Leader, Environmental Review and Approvals, Quebec-West Region, Indigenous Consultation and Environmental Services, INFC
Jared Bone, Acting - Senior Environmental Review and Approvals Officer, INFC
Robin Strong, Manager – West Region, INFC
Jack Dunsmore – Municipal District of Taber
Kyra Northwest, Traditional Land Use Lead – Samson Cree Nation

Appendix A Additional Information

Horsefly Regional Emergency Spillway

Please consider this notification of a proposed project to upgrade existing irrigation and drainage infrastructure to accommodate stormwater flows along the Horsefly Spillway. The Horsefly Regional Emergency Spillway project involves the diversion of stormwater runoff intercepted by the St. Mary River Irrigation District (SMRID) Main Canal through works owned and operated by the SMRID and Taber Irrigation District (TID) to the Oldman River.

The SMRID Main Canal receives stormwater runoff from approximately 565,000 ha of land in Southern Alberta. Flood events have been occurring more frequently especially in June when irrigation demand for crops is nearing peak demand, as compared to the past when snowmelt events represented a larger flood risk. This stormwater that falls as rain is taxing the irrigation system and creates the risk of failure of the SMRID Main Canal during a significant runoff event. The SMRID Main Canal only has one outlet to release this stormwater to the river system, near the end of the 300 km long canal near the City of Medicine Hat into the South Saskatchewan River.

The Horsefly Regional Emergency Spillway project will be constructed in three phases.

Phase 1 includes the following:

- Upgrading 5,500 metres of existing irrigation canal and drainage ditch between Taber Lake and the Oldman River,
- Upgrading existing crossings at Highway 36 and three Municipal District (M.D.) of Taber road crossings,
- Construction of a spillway outlet structure to the Oldman River,
- Construction of three concrete drop structures,
- Upgrading the Taber Lake outlet structure.

Phase 2 includes the following:

- Upgrading 5,000 metres of irrigation canal between Horsefly Reservoir and Taber Lake,
- Upgrading existing Highway 3, Township Road 94, Township Road 100, and Canadian Pacific Rail (CPR) crossings,
- Construction of a wetland at Taber Lake to improve water quality,
- Construction of three concrete drop structures,
- Upgrading the existing Horsefly Reservoir outlet structure.

Phase 3 includes the following:

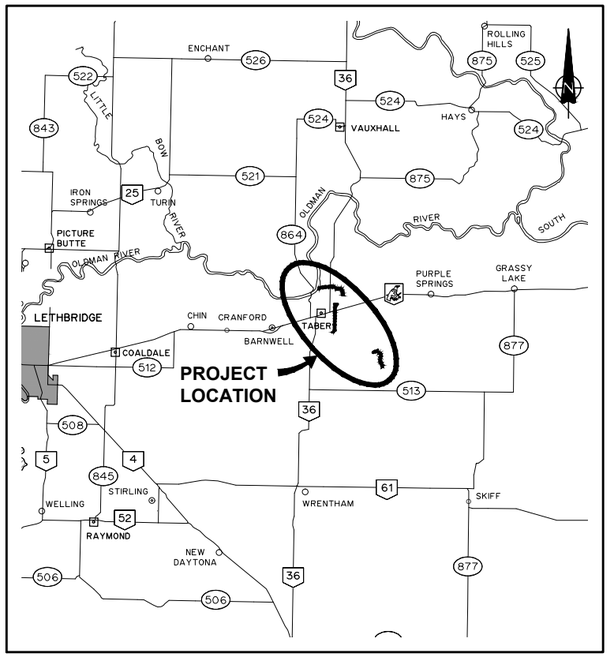
- Upgrading 3,500 metres of irrigation canal between the SMRID Main Canal and Horsefly Reservoir,
- Upgrading existing Township Road 91 crossing,
- Construction of two concrete drop structures,
- Upgrading the SMRID turnout structure,
- Construction of a wetland at Horsefly Reservoir to improve water quality.

The following five drawings are attached and detail the components of the project:

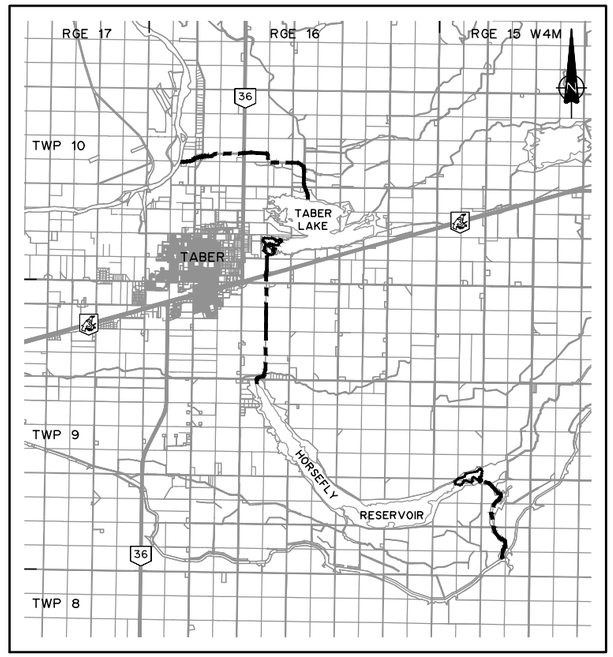
1. Drawing 1: Cover Sheet and Project Location Plan,
2. Drawing 2: Overall Site Plan,
3. Drawing 3: Phase 1 Plan Profile,
4. Drawing 4: Phase 2 Plan Profile,
5. Drawing 5: Phase 3 Plan Profile.

There will be appropriate mitigation measures included in the contract specifications to minimize any adverse impact to Horsefly Reservoir, Taber Lake, Oldman River, and the surrounding environment during construction. All work will take place on private land, there are now federal or crown lands within the project area.

If current conditions permit, Phase 1 is expected to commence July 1, 2022, and be completed by March 31, 2023. Phases 2 and 3 will follow subsequently. We do not anticipate that this work, or the result of this work, will have any adverse impacts on the exercise of treaty rights or traditional uses.



LOCATION PLAN



SITE PLAN

SET _____

LIST OF DRAWINGS

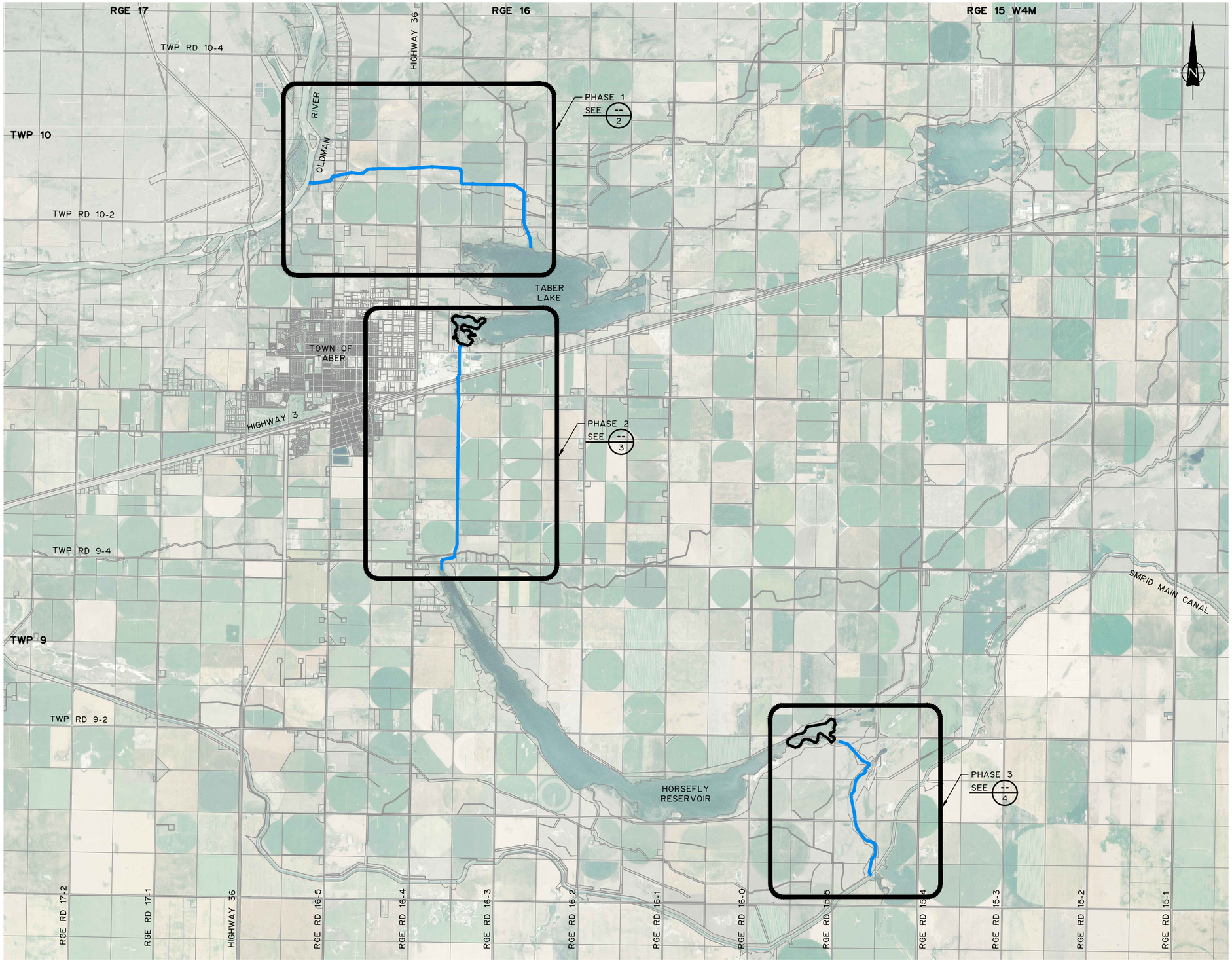
MUNICIPAL DISTRICT OF TABER

HORSEFLY REGIONAL EMERGENCY SPILLWAY

FOR CONSULTATION

1720-054-00

MPE Engineering Ltd.



NOTES:

1. SPILLWAY ALIGNMENT IS BASED ON CURRENT CANAL ALIGNMENTS AND MAY CHANGE DURING DESIGN.
2. HIGHWAY 3 WILL BE RELOCATED IN THE FUTURE. THE EXISTING LOCATION HAS BEEN ASSUMED FOR THIS PROJECT.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 22"x34" FORMAT DRAWINGS

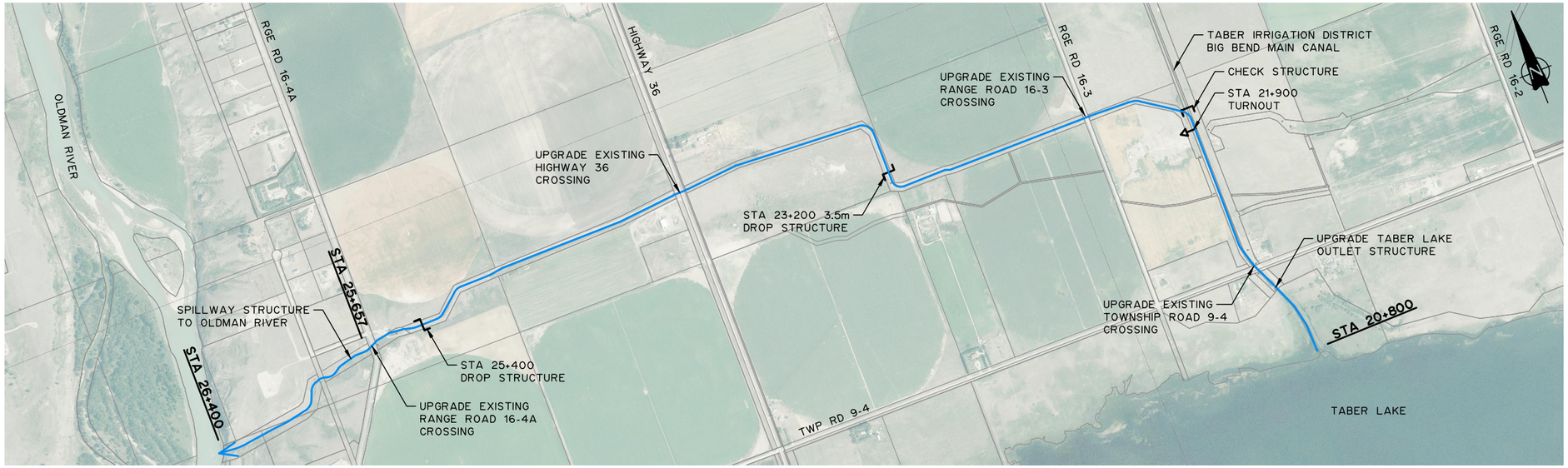
1	21-07-21	FOR CONSULTATION
ISSUE	YY-MM-DD	REVISION

MPE Engineering Ltd.

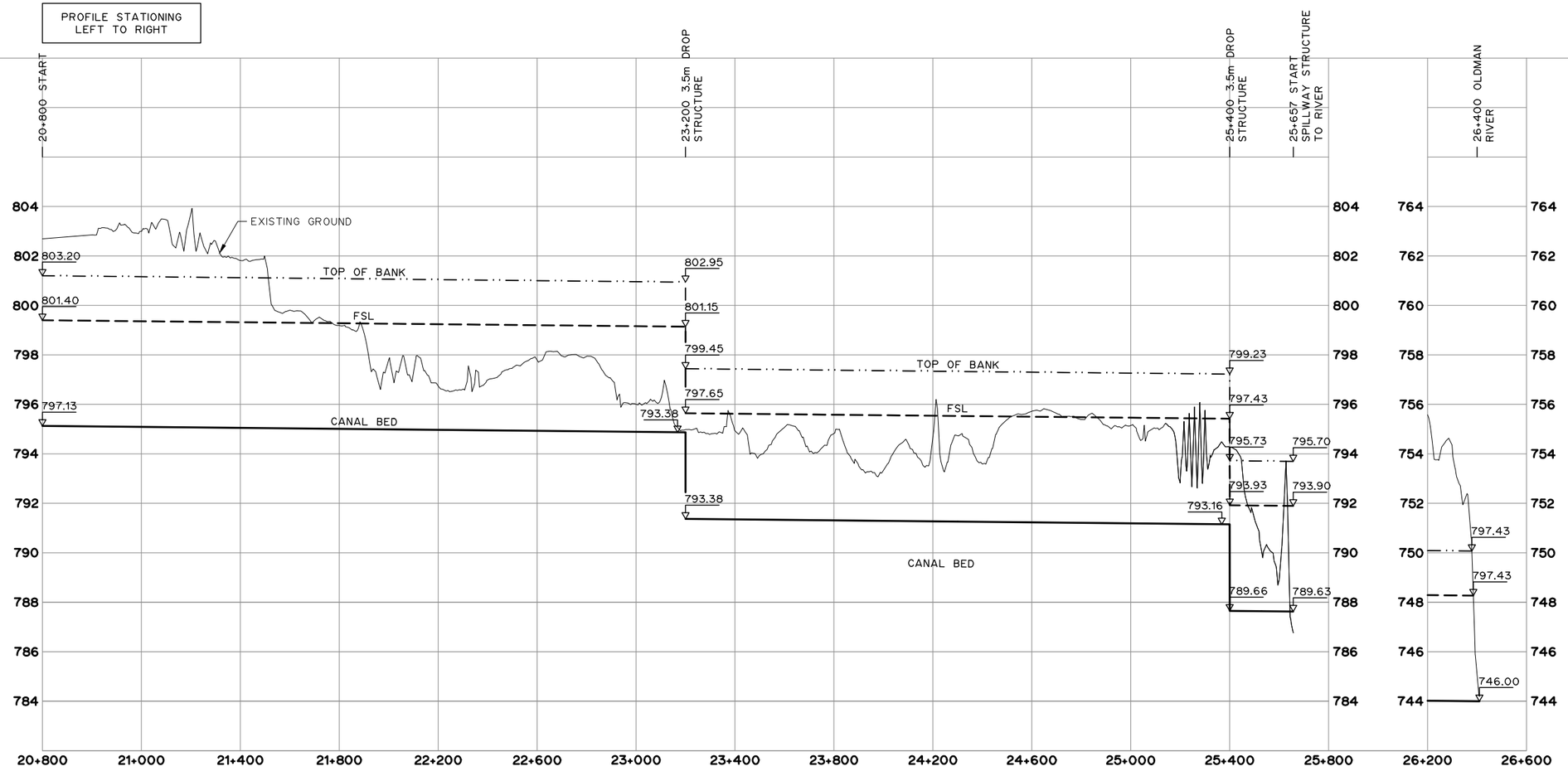
MUNICIPAL DISTRICT OF TABER

HORSEFLY REGIONAL EMERGENCY SPILLWAY
OVERALL SITE PLAN

DESIGNED	J.W.H.	JOB	1720-054-00
DRAWN	R.B.H.	SCALE	1:75 000
DATE	JULY 2021	DRAWING	1



PROFILE STATIONING
LEFT TO RIGHT



NOTES:

1. SPILLWAY ALIGNMENT IS BASED ON CURRENT CANAL ALIGNMENTS AND MAY CHANGE DURING DESIGN.
2. DESIGN FLOW= 40m³/s.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

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1	21-07-21	FOR CONSULTATION

MPE Engineering Ltd.

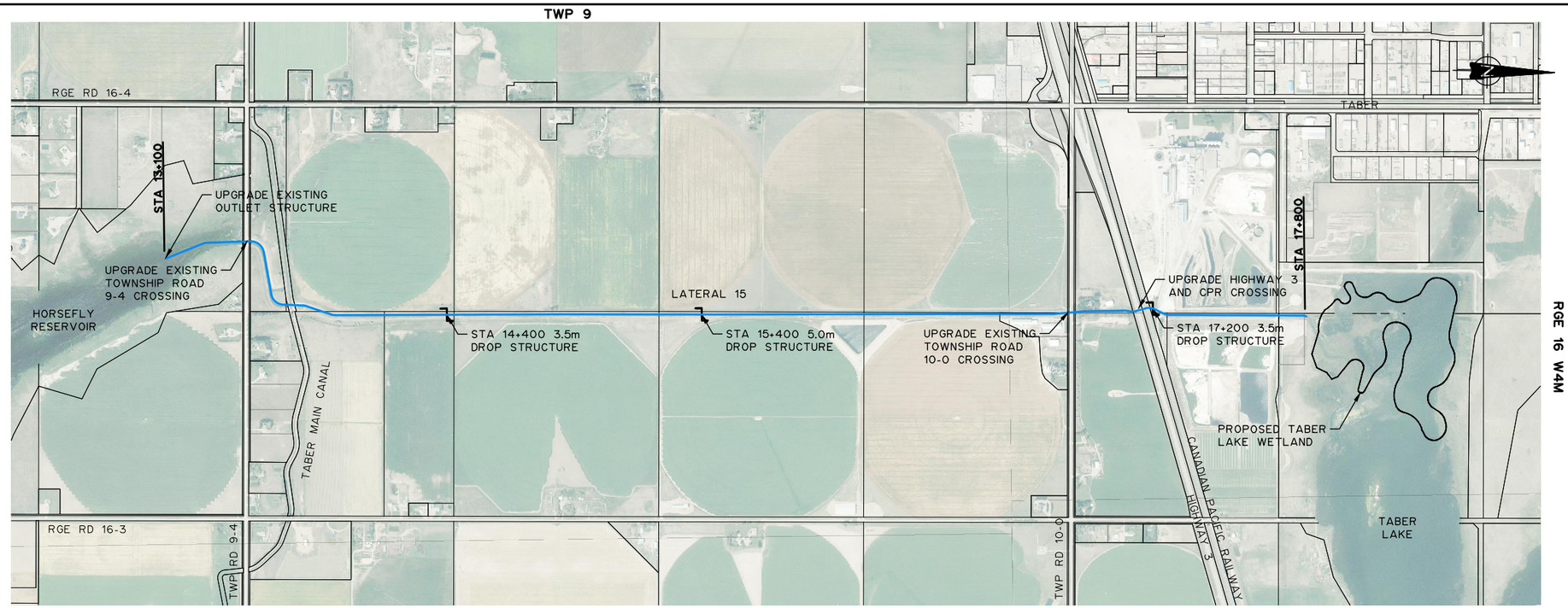
MUNICIPAL DISTRICT OF TABER

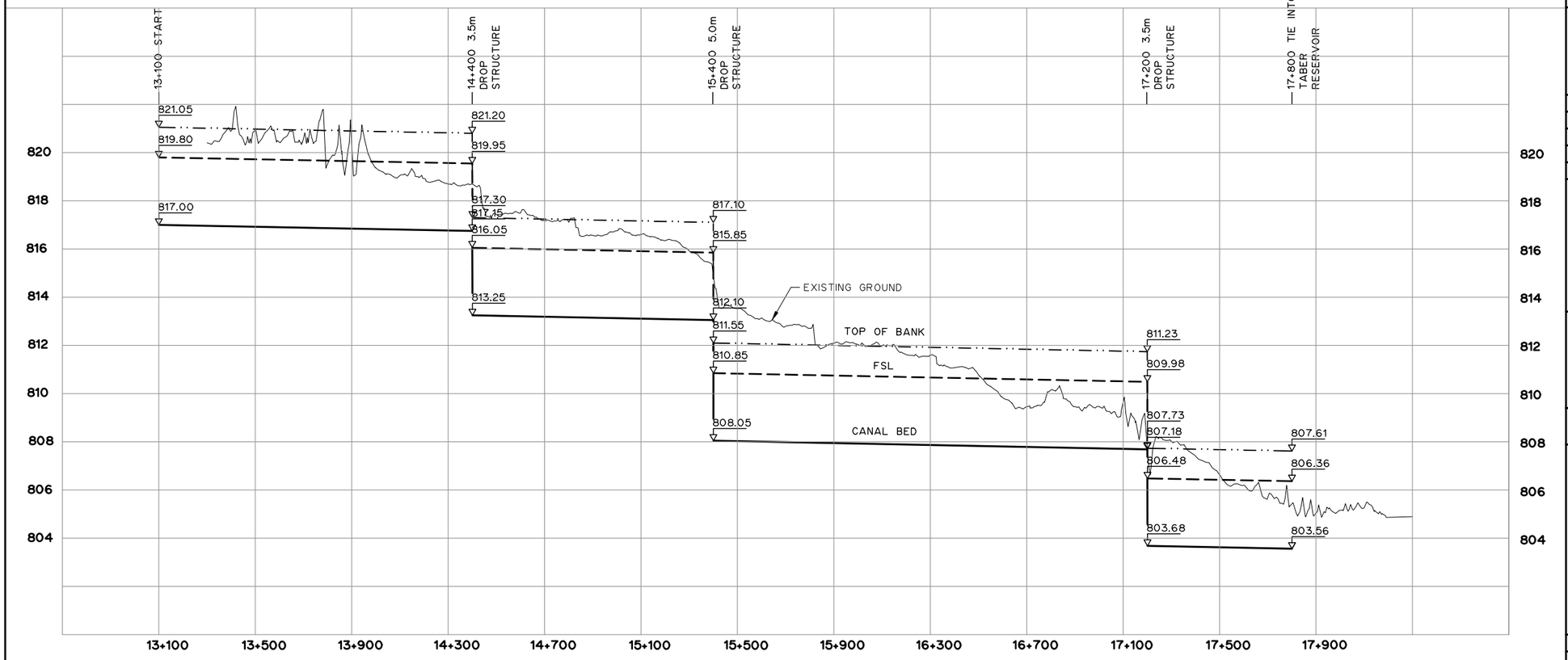
HORSEFLY REGIONAL EMERGENCY SPILLWAY

PHASE 1 PLAN PROFILE

STA 20+800 TO STA 2+657

DESIGNED	J.W.H.	JOB	1720-054-00
DRAWN	R.B.H.	SCALE	H1:20 000 V1:200
DATE	JULY 2021	DRAWING	2





NOTES:

1. SPILLWAY ALIGNMENT IS BASED ON CURRENT CANAL ALIGNMENTS AND MAY CHANGE DURING DESIGN.
2. DESIGN FLOW= 40m^3/s.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 22"x34" FORMAT DRAWINGS

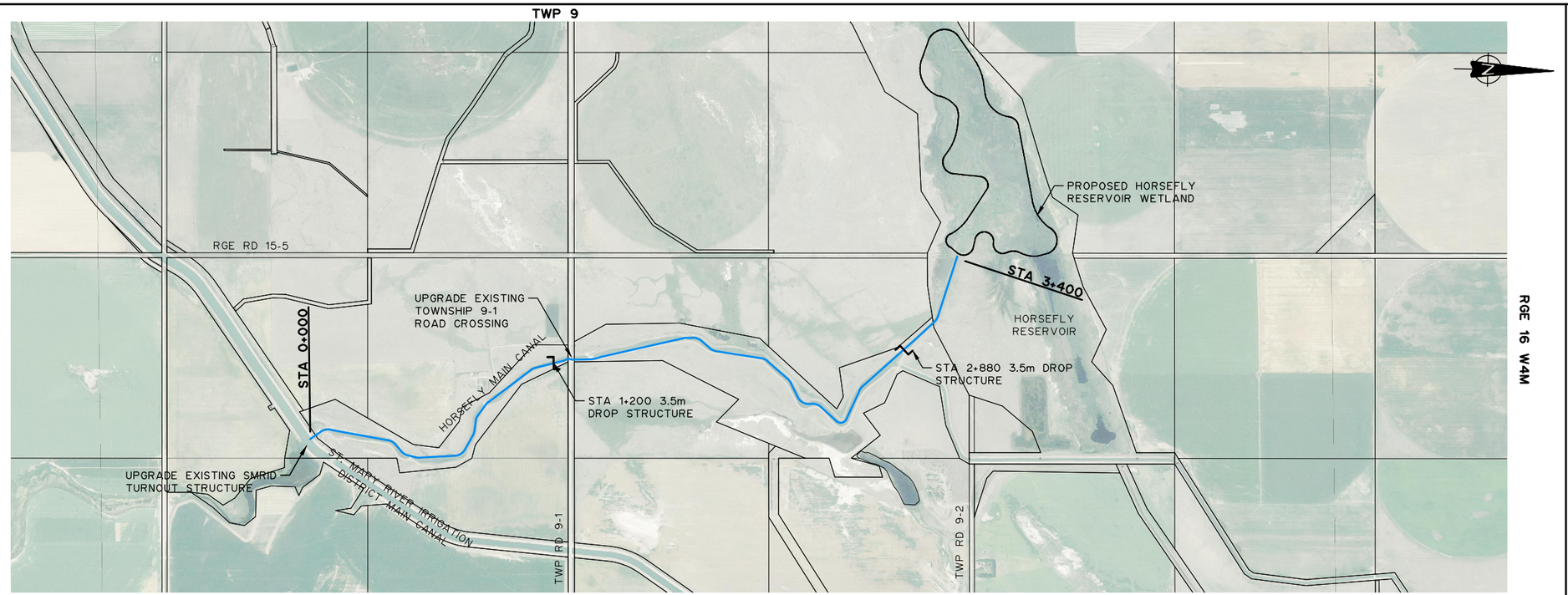
ISSUE	YY-MM-DD	REVISION
1	21-07-21	FOR CONSULTATION

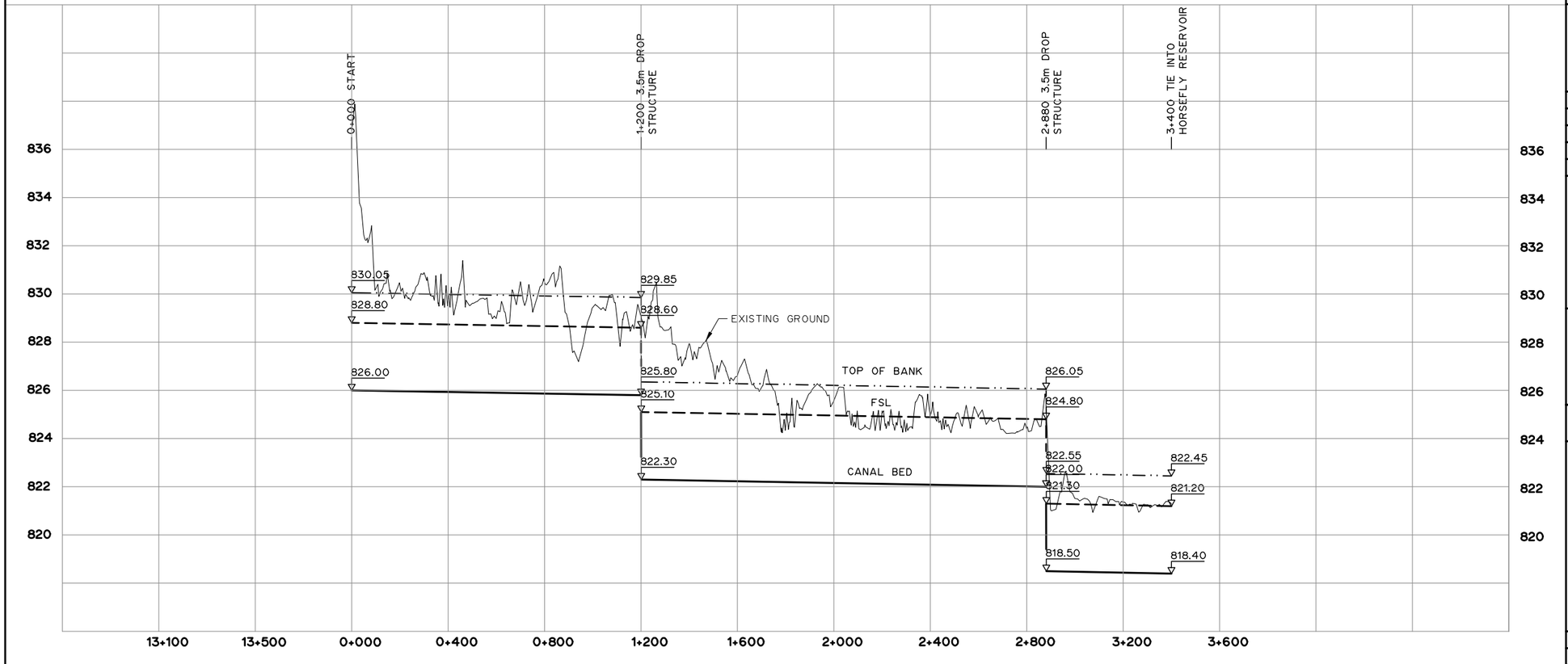
MPE Engineering Ltd.

MUNICIPAL DISTRICT OF TABER

HORSEFLY REGIONAL EMERGENCY SPILLWAY
PHASE 2 PLAN PROFILE
STA 13+100 TO STA 17+800

DESIGNED	J.W.H.	JOB	1720-054-00
DRAWN	J.L.O.	SCALE	H1:20 000 V1:200
DATE	JULY 2021	DRAWING	3





NOTES:

1. SPILLWAY ALIGNMENT IS BASED ON CURRENT CANAL ALIGNMENTS AND MAY CHANGE DURING DESIGN.
2. DESIGN FLOW= 47m^3/s.

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1	21-07-21	FOR CONSULTATION

MPE Engineering Ltd.

MUNICIPAL DISTRICT OF TABER

HORSEFLY REGIONAL EMERGENCY SPILLWAY
PHASE 3 PLAN PROFILE
STA 0+000 TO STA 3+600

DESIGNED	J.W.H.	JOB	1720-054-00
DRAWN	J.L.O.	SCALE	H1:20 000 V1:200
DATE	JULY 2021	DRAWING	4

Appendix E GREENHOUSE GAS MITIGATION ASSESSMENT

Appendix E Greenhouse Gas Mitigation Assessment
November 5, 2021

Suite 1000, 736—8 Avenue SW
Calgary, AB T2P 1H4
Canada

Tel: +1.403.232.6771
Fax: +1.403.232.6762
E-mail: solutions@rwdi.com

March 27, 2020

Jeff Hust
MPE Engineering
#300, 714 – 5 Avenue S
Lethbridge, Alberta
Email: <email address removed>

Re: MPE Engineering LTD. – Horsefly Spillway - Greenhouse Gas Mitigation Assessment
RWDI Reference No. 2002604

Dear Mr. Hust,

MPE Engineering Ltd. and the Southern Regional Drainage Committeeretained RWDI AIR Inc. to provide a greenhouse gas (GHG) mitigation assessment for the Horsefly Spillway Project located near Taber, Alberta. The subject of the assessment was the expected total annual direct and indirect greenhouse gas emissions for each year from the starting year of the Project to both the end of its useful life, and to 2030. The report was prepared in accordance with Climate Lens, General Guidance, Version 1.2, September 6, 2019.

We trust that the information provided in this report meets your requirements for your funding through Investing in Canada Infrastructure Program (ICIP). Should you have any questions, please contact me directly by telephone at (403) 619-3480, or by email at Matthew.Endsin@rwdi.com. We appreciate the opportunity to have worked with you on this assessment.

Yours very truly,

RWDI AIR Inc.

<Original signed by>

Matthew Endsin, M.Sc., P.Biol.
Project Manager

FINAL REPORT

MUNICIPAL DISTRICT OF TABER – HORSEFLY REGIONAL EMERGENCY SPILLWAY

TABER, ALBERTA

DISASTER MITIGATION AND ADAPTATION FUND
GREENHOUSE GAS MITIGATION ASSESSMENT

RWDI #2002604

MARCH 27, 2020

SUBMITTED TO

Jeff Hust, P.Eng.,
Water Resources Manager | MPE Engineering Ltd.
<email address removed>

MPE Engineering Ltd
#300, 714 – 5 Avenue S
Lethbridge, Alberta | T1J 0V1

T: <personal information removed>
C: <personal information removed>

SUBMITTED BY

Matthew Endsin, M.Sc., P.Biol.
Project Manager
<email address removed>

Russ Lewis, P.Eng., M.Eng.
Signing Engineer – Climate Lens
<email address removed>

RWDI AIR Inc.
Consulting Engineers & Scientists
Suite 1000, 736-8 Avenue SW
Calgary, AB, T2P 1H4
Canada

T: 403.232.6771 I ext. <personal information removed>
F: <personal information removed>

ATTESTATION OF COMPLETENESS

I/we the undersigned attest that this GHG Mitigation Assessment was undertaken using recognized assessment tools and approaches (i.e., ISO 14064-2: Specification with guidance at the project level for quantification, monitoring, and reporting of greenhouse gas emissions reductions or removal enhancements and complies with the General Guidance and any relevant sector-specific technical guidance issued by Infrastructure Canada for use under the Climate Lens.

Prepared by: Joyce Funk, P.Eng., M.Sc.
[Name and credentials]

<Original signed by>

[Signature] March 27, 2020
[Date]

Attested by*: Russ Lewis, M.Eng., P.Eng..
[Name and credentials]

<Original signed by>

[Signature] March 27, 2020
[Date]

*GHG Mitigation Assessments must be prepared, or at a minimum validated by, a qualified party (e.g., a licensed professional engineer **or** a professional GHG accounting specialist certified under the ISO 14064-3 or 14065 standard).

Document Control for Report Template

CLIMATE LENS MITIGATION ASSESSMENT					
RWDI AIR INC. VVP	DOCUMENT CODE:	TEMPLATE ISSUED:	VERSION:	VERSION ISSUED:	PAGE:
	JOB-FRM-026	2019-10-09	1.0	2019-10-09	n/a

Statement of Limitations

The contents of this report are strictly confidential and are intended solely for the use of the MPE Engineering Ltd. ("the Client") and Municipal District of Taber in connection with the assessment of the greenhouse gas emissions of the Project (as defined herein) during the specified periods and may not be relied upon by any other person or entity for any other purpose whatsoever, without the prior written consent of RWDI AIR Inc. ("RWDI"). This Report is given as of the date hereof, and RWDI disclaims any obligation or undertaking to advise any person of any change in fact or applicable law which may come to our attention after the date hereof.

This Report includes calculations of direct and indirect emissions for Project components that are not yet under construction using limited data provided by the Client. While we have used accepted methodology to limit the number of uncertainties as much as possible in accordance with the Climate Lens General Guidance, ISO 14064-2, and other applicable documents, there are an infinite number of combinations of changes in environmental conditions, regulations, new scientific insights and technologies, and other factors that can occur which can have an impact on GHG emissions; as such, no study or investigation is capable of predicting with full certainty the exact amount of GHG emissions in any given future project.

In relying on the contents of this Report it is understood that the reader does so with complete knowledge and approval of its limitations.

EXECUTIVE SUMMARY

The Horsefly Regional Emergency Spillway project (the Project) is a proposed strategically placed regional emergency spillway to the Oldman River from the St. Mary River Irrigation District (SMRID). The proposed spillway project is 14 km long and located near the midway point of the SMRID Main Canal system to divert water from the SMRID Main Canal and transport via Taber Irrigation District (TID) works to the Oldman River near the Town of Taber, Alberta with an estimated project cost of approximately $47 million. As proposed, the spillway would allow additional drainage to be conveyed in the irrigation system that by its inherent design has less capacity in the downstream portions of the system.

The Municipal District (MD) of Taber has applied for funding through the Green Infrastructure stream of the Investing in Canada Infrastructure Program (ICIP) for the Horsefly Regional Emergency Spillway (the Project). The funding has been approved, however, before the release of funding a Climate Lens assessment is required to be completed. To satisfy this requirement, MPE Engineering has requested RWDI to complete the assessment, including this greenhouse gas (GHG) mitigation assessment. The major components of the proposed Project include the following components:

- Upgrades to the Horsefly turnout on the SMRID main canal.
- Upgrades to 3,500 meters of irrigation canal between the SMRID main canal and Horsefly Reservoir.
- Upgrades to 5,000 meters of irrigation canal between Horsefly Reservoir and Taber Lake.
- Upgrades to 5,500 meters of irrigation canal and drainage ditch between Taber Lake and the Oldman River.
- Upgrades to the existing crossings at Highway 3 and Highway 36.
- Upgrades to the existing Canadian Pacific Rail (CPR) crossing.
- Upgrades to the existing MD of Taber road crossings.
- Construction of 7 concrete drop structures.
- Construction of a concrete spillway outlet structure to the Oldman River.
- Construction of wetlands at Horsefly Reservoir and Taber Lake to improve water quality.
- Automation and controls to monitor flow through the proposed works.

The current operation (baseline) and maintenance activities for the future Horsefly Spillway project are assumed to produce zero baseline emissions. Similarly, the Project emissions are also assumed to exhibit zero emissions for the operation and maintenance activities. There were no confirmed pumps or other equipment that consumed power or fuel for the baseline, project operation, and maintenance emissions. The expected lifespan of the new Project is assumed to be 100 years; therefore, the Project lifespan inclusive of construction is assumed to be 105 years from the start of construction of the Project to the end of the lifespan of the constructed Project in 2126 (estimated in 2026 plus 100 years). The construction phase of the Project is anticipated to occur from September 2021 until approximately April 2025. Thus, the first full year with the Project fully implemented will be 2026.

1 The Total Project cost-per-tonne of CO_2e is based on total Project cost provided by MPE Engineering divided by the project total net change in emissions. Note the Project cost is subject to change and is not a finalized cost estimate.

Cumulative emissions of the baseline scenario are predicted to be 0 tonnes of CO_2e over 105 years. Greenhouse gas emission sources and sinks associated with the Project considered construction activities and operation and maintenance activities. Annual Project emissions in 2030 are predicted to be 0 tonnes CO_2e as all construction will be completed. The cumulative emissions of the Project scenario are predicted to be 5,625 tonnes of CO_2e over 105 years. Annual net increase in emissions between the baseline and Project emissions is predicted to be 0 tonnes of CO_2e in 2030. The net increase in cumulative emissions of the Project is predicted to be 5,625 tonnes of CO_2e over 105 years.

Based on the Project budget supplied by MPE Engineering, the total project cost-per-tonne of CO_2e *increase*[1] is $8,708 over the total Project asset life of 105 years. The federal dollars per GHG emissions[2] in 2030 is $0 per tonne of CO_2e, as there were no baseline or project emissions in 2030.

1 The Total Project cost-per-tonne of CO_2e is based on total Project cost provided by MPE Engineering divided by the project total net change in emissions. Note the Project cost is subject to change and is not a finalized cost estimate.

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LIST OF APPENDICES

1 INTRODUCTION / PROJECT OVERVIEW

1.1 Project Overview

RWDI AIR Inc. ("RWDI") was retained by MPE Engineering Ltd. (referred to herein as "the Client") to provide a greenhouse gas (GHG) mitigation assessment for the Horsefly Regional Emergency Spillway project located near the Town of Taber, Alberta (the "Project"). The purpose of the program is to improve management of water surplus from rainfall and snowmelt that may exceed the capacity of the St. Mary River Irrigation District Main Canal (SMRID). The program increases the flood attenuation capacity of the system and is intended to protect infrastructure from damage due to excess water. This project represents Phase 1 of 7 identified by the Southern Regional Stormwater Management Plan (SRSMP). The project consists of constructing an 14 km long, 55 m^3/s capacity spillway sourced from the SMRID Main Canal and discharging to the Oldman River.

The assessment services are for the Project's useful lifetime from 2021 through 2126 in accordance with Climate Lens, General Guidance, Version 1.2, September 6, 2019 (Infrastructure Canada, 2019) (the "Guidance") and ISO 14064-2. This report provides an assessment of the expected total annual direct and indirect net greenhouse gas emissions for each year from the start year of the Project to the end of its useful life as well as to 2030 and includes an attestation that the assessment conforms to the general and sector-specific technical guidance provided by Infrastructure Canada and aligns with the relevant assessment standard (i.e., ISO 14064-2). Total cost per tonne of CO_2e is based on the eligible cost in connection to the Investing in Canada Infrastructure Program (ICIP) provided by MPE Engineering; all activities included as part of the budget were considered in order to calculate the net GHG emissions associated with the Project.

Background information pertaining to the Project is presented in **Table 1**.

Table 1: Assessment Summary

General Information	
Project Proponent's Name	MPE Engineering Ltd.
Project Proponent's Address	#300, 714 – 5 Avenue S, Lethbridge, Alberta | T1J 0V1
Primary Contact	**Jeff Hust** 403.317.3634 jhust@mpe.ca
Project Title	Municipal District of Taber – Horsefly Regional Emergency Spillway
Project Location(s)	Near the Town of Taber, Alberta. LSD location – Section 21-09-16 W4M Geo-Coordinates – 49º43'0.5.7"N112º03'56.3"W
Project Description	The Project involves the a strategically placed spillway to the Oldman River from the St. Mary River Irrigation District (SMRID) Main Canal. This will provide an increase to the flood attenuation capacity of the system. The Horsefly regional emergency spillway is located near the midway point (and bottleneck) of the 300km long system. This Project is located to protect water/wastewater, transportation, and public infrastructure from repeated damage; it will create a 14 km long emergency spillway to divert water from the SMRID main canal to the Oldman River near the Town of Taber, Alberta.

1.2 Assessor Qualifications

Acceptable mitigation assessments must be conducted by a qualified assessor (i.e., a professional engineer or a GHG accounting professional with suitable GHG quantification training or expertise.

RWDI AIR Inc. is accredited as an ISO 14065 Greenhouse Gas Verification Body by the American National Standards Institute (ANSI), which is a member of the IAF. A copy of our certificate of accreditation can be made available upon request. In addition, several team members have completed ISO 14064-3 training.

An attestation was provided at the beginning of this report by a professional engineer, who has completed ISO 14064-3 training.

1.3 Assessment Team Members

The team for this assessment engagement is summarized in **Table 2**.

Table 2: Assessment Team

Role	Name & Credentials	Title	Email
Project Manager	Matthew Endsin, M.Sc., P.Biol.	Project Manager	Matthew.Endsin@rwdi.com
Team Leader	Christian Reuten, Ph.D., ACM	Technical Director	Christian.Reuten@rwdi.com
Team Member(s)	Joyce Funk, P.Eng., M.Sc. Trudi Trask, P.Eng.	Senior Engineer Air Quality Specialist	Joyce.Funk@rwdi.com Trudi.Trask@rwdi.com
Signing Engineer	Russ Lewis, P.Eng., M.Eng.	Technical Director Principal	Russ.Lewis@rwdi.com
Technical Expert	N/A	N/A	N/A

1.4 Assessment Schedule

This assessment was carried out according to the schedule presented in **Table 3**.

Table 3: Assessment Schedule

Task	Date
Assessment kickoff meeting	February 25th, 2020
Site Visit	N/A
Completion of Assessment Procedures	March 24th, 2020
Signing Engineer Review	March 25th, 2020
Delivery of Draft Assessment Report	March 27th, 2020
Delivery of Final Assessment Report	March 30th, 2020

2 METHODOLOGY

RWDI's quantification process follows the principles outlined in Climate Lens General Guidance (Infrastructure Canada, 2019) identified in both the ISO 14064-2 standard and the GHG Protocol for Project Accounting:

- **Relevance**: The levels of accuracy and uncertainty associated with the quantification process should reflect the intended use of the data and the objectives of a project. As such, projects in the Climate Change Mitigation sub-stream should strive for higher levels of accuracy and lower levels of uncertainty;
- **Completeness**: All primary and all significant secondary effects should be estimated;
- **Transparency**: All assumptions, methods, calculations, and associated uncertainties should be explained;
- **Accuracy**: Estimates and calculations should be unbiased, and uncertainties should be reduced as far as practical. Calculations should be conducted in a manner that minimizes uncertainty;
- **Conservativeness**: Where there are uncertainties, the values used to quantify GHG emissions should err on the side of underestimating potential reductions; and
- **Consistency**: All data, methods, criteria, and assumptions shall be applied consistently to ensure meaningful comparisons between the baseline and project scenario.

Further fundamental information on this assessment is presented in **Table 4**.

Table 4: Assessment Fundamentals

Assessment Fundamentals	
Reporting Program	Infrastructure Canada Climate Lens
Quantification Protocol(s)	Infrastructure Canada Climate Lens General Guidance, Version 1.2 – September 6, 2019
Assessment Objective	Provide an estimation of net increase or reduction of GHG emissions as well as an estimation of cost-per-tonne of CO_2e using the Climate Lens Guidance pertaining to the Project, presented fairly in accordance with program criteria.
Level of Assurance	Achieving the overall objective of this assessment involves executing quantification procedures designed to generate evidence that is sufficient and appropriate to provide a basis for our opinion with a **limited level of assurance**.
Program Criteria	Generating sufficient and appropriate evidence to support our assessment will involve executing quantification procedures in accordance with the following criteria: • Infrastructure Canada Climate Lens; • The Greenhouse Gas Protocol for Project Accounting; and, • ISO 14064-2 Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of Greenhouse Gas Emission Reductions or removal Enhancements*. *Should any discrepancies exist between ISO and regulatory criteria, the regulatory criteria shall take precedence.
Assessment Scope	The quantification assesses the baseline and future operations and equipment within the inventory boundary as well as calculations and supporting information used to quantify the greenhouse gas emissions to be reported under the Climate Lens.

2.1 Boundaries of the Assessment

The assessment boundaries are listed in **Table 5**.

Table 5: Boundaries of Assessment

Boundaries of the Assessment	
Project Baseline	Baseline emissions are assumed to be zero
Project Milestone	2030
Project Useful Lifetime	2126
Organizational Boundary	Municipal District of Taber
Geographical Boundary	LSD location – Section 21-09-16 W4M Geo-Coordinates – 49o43'0.5.7"N112o03'56.3"W Municipal District of Taber, Taber, Alberta
Operational Boundary	Direct (scope 1) emissions from the Project case, which includes the construction emissions.

The mitigation assessment assesses the Project components across the construction (excluding supply chain) and operations and maintenance (O&M) phases. Following Climate Lens Guidance (Infrastructure Canada 2019), the assessment does not seek to estimate construction emissions associated with the asset's future major rehabilitative maintenance or decommissioning.

2.2 Greenhouse Gases Considered

Table 6 lists the GHG sources and sinks that were considered in this assessment, including their formulae, global warming potentials from the most recent National Inventory Report (ECCC 2019), and a description of main emission sources or a rationale for excluding the GHG.

Table 6: Greenhouse Gases Considered

Greenhouse Gases Considered			
GHG	**Formula**	**100-Year GWP**	**Description of Sources / Justification for Exclusion**
Carbon Dioxide	CO_2	1	CO_2 emissions are expected from onsite mobile equipment used in the construction phase of the project.
Methane	CH_4	25	CH_4 emissions are expected from onsite mobile equipment used in the construction phase of the project.
Nitrous Oxide	N_2O	298	N_2O emissions are expected from onsite mobile equipment used in the construction phase of the project.
Sulphur Hexafluoride	SF_6	22,800	No significant emissions of SF_6 are expected.
Nitrogen Trifluoride	NF_3	17,200	No significant emissions of NF_3 are expected as part of this Project.
Hydrofluorocarbons	HFCs	-	No significant HFCs emissions are expected as part of this Project.
Perfluorocarbons	PFCs	-	No significant emissions of PFCs are expected as part of this Project.

2.3 Emission Scopes

Table 7 lists the emission scopes that were considered in this assessment and the Project-related sources or changes in GHG emissions.

Table 7: Emission Scopes

Emission Scopes		
Scope	**Source/Sinks of Greenhouse Gas**	**Project-related Sources/Changes**
Scope 1	Construction Project Activities	Diesel fuel~~ed~~ used in on-site mobile equipment, generators, heaters and light plants used for Project construction phase.
Scope 2	Purchased electricity	None expected
	Purchased steam	None expected
	Purchased heat / cooling	None expected
Scope 3	Impacts on land use / population density	Additional capacity of spillway and expansion of wetlands will reduce flooding and impacts to agricultural lands. Not expected to have a significant impact on greenhouse gas emissions.
	Impacts on traffic / personal vehicle travel	No changes expected
	Expected shifts in fuel sources for electricity	No changes expected
	Downstream electricity consumption	No changes expected

2.4 Data Collection and Calculation Procedures

Data was provided to the Assessment Team by MPE Engineering Ltd. upon request in the following documents:

1. Copy of Horsefly Spillway Equipment List.xlsx
2. DMAF-Expression.of.Interest.Form.Horsefly Spillway.2019.pdf
3. EOI Addendum Form.ICIP.HorseflySpillway.pdf
4. Horsefly Emergency Spillway Preliminary Engineering.2018.09.28.pdf
5. HorseflySpillway.Cash Flow Estimate.2019.01.23.pdf
6. ICIP Application Entire Project Buildout.pdf
7. R01 Regional Drainage Implementation Plan 2019 - with Comments.pdf
8. South Region SWMP Study.FINAL.pdf
9. authenticating-professional-work-products.pdf
10. Bylaw No. 1691 - Records Retention & Disposition.pdf
11. ICIP Project Application - Green Stream Feb 4, 2020.docx
12. XCG - Design Storm Development - 2012.pdf
13. RE Horsefly spillway Climate Lens.msg
14. RE MPE Climate Lens assessment - useful life.msg

Additional information based on phone discussions and email correspondence with MPE's project engineer aided in estimating the construction emissions. This included information regarding description of the construction phases and processes, mobile equipment used in various construction activities, estimated operating hours of the mobile equipment and duration of equipment use.

The Assessment Team assumed that all of the above documents:

1. are authentic, accurate, and complete; and
2. where applicable, have been prepared in accordance with applicable laws, regulations, standards, policies, procedures, etc.

Nothing in our review of these documents suggested that the documents did not meet the above assumptions. Data comprised of fuel usage tracking sheets, Project descriptions including budget and timelines, construction drawings, maps, and asset life spans.

Calculations are provided in **Appendix B**. The assessment team calculated construction emissions for the Project components to determine annual CO_2e emissions. A cost per tonne of CO_2e was then calculated based on the provided budgets per Project component.

2.4.1 Uncertainty Assessment

Uncertainties associated with the GHG mitigation assessments were assessed similar to the way that risks are assessed in the context of GHG assertions. The intention of the uncertainty assessment is to provide transparency with respect to potential deviations of the estimated GHG emissions from true (unknown) baseline and Project emissions.

RWDI completed a qualitative uncertainty assessment, which summarizes the parameters used, data acquisition, processing, and emission calculations for each emission source and sink, and comments on the associated uncertainties. The uncertainty assessment is presented in **Table 8**.

Table 8: Qualitative Notes for Data Management Systems and Controls

Emissions Source	Parameters	Data Acquisition Equipment, Sampling Frequency, Analytical Method	Data Processing and Tracking	Emissions Calculations	Management Policies and Practices	Uncertainty / Risk
Construction Sources (Project Emissions)						
Diesel Combustion in on-site mobile equipment, generators, light plant and heaters.	"Volume of diesel fuel combusted by onsite mobile equipment Horse Power Rating of Mobile Equipment Operational Hours of Mobile Equipment Brake-specific fuel consumption (BFSC) Density of Diesel Fuel CO_2, CH_4, N_2O default emission factors for Diesel Fuel. CO_2 default emission factor for Bio-Diesel. Note: Alberta Regulation 19/2010 made effective January 1st, 2012, fuel suppliers were required to incorporate 5% renewable fuel content for gasoline and 2% for diesel. This will be accounted for in RWDI calculations.	"The amount of diesel consumed by onsite mobile equipment in the project case will be estimated based on information provided by MPE Engineering. Information such as details of the construction process and estimate of the number of mobile equipment and hours of operation expected for constructing the project components. Emission factors, assumed Tier 4 (where applicable) off-road diesel equipment in Table A6-13 of Part 2 of the NATIONAL INVENTORY REPORT 1990–2017. Diesel Emission Factors: CO_2 = 2681 g/L CH_4 = 0.073 g/L N_2O = 0.227 g/L (over 19kW); N2O = 0.022 g/L (under 19 kW); Bio Diesel Emission Factor: CO_2 = 2472 g/L BSFC is the in-use adjusted brake-specific fuel consumption. These values were taken from Table A4 in ""https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf"""	"An estimate for diesel consumption from on-site equipment during the construction phase is based on knowledge and information provided by MPE. MPE provided an estimate for the number of hours, equipment type, horsepower and number of each type of mobile equipment to be used to perform earth moving, concrete works and road/rail crossings to accommodate the spillway construction. Data provided by MPE were transcribed by RWDI into their calculation spreadsheet to calculate construction emissions for the Project.	"Emissions were calculated in RWDI's in-house calculation spreadsheet. Construction emissions were calculated by taking the diesel fuel used in the mobile equipment and the emission factors. The diesel fuel was determined by applying the BSFC factor, horsepower of mobile equipment, density of Diesel and operating hours. Note that 2% of the biodiesel emissions (CO2 portion only) was excluded from the total emissions. This is consistent with the required regulations for Diesel fuel used in Alberta. "	"RWDI has a robust Management System that includes policies and procedures pertaining to RWDI's GHG Verification and Validation Program (VVP). These policies and procedures can also be applied to GHG assessments. The Management System Policy provides guidelines on roles and responsibilities, quality assurance, the validation / verification process, assessment approach, and document control, amongst other things. Stemming from the guidance in this policy, RWDI has created templates for various aspects of the VVP including information gathering forms, calculation sheets, reports and organizational tools. These templates were used as a basis to complete this assessment."	"The construction emissions are based on information provided by MPE. This information is based on knowledge of the project manager in regard to planned construction activities and processes involved in earth moving, concrete works and road/rail crossings to accommodate the spillway construction. There is some uncertainty in the estimation of the construction emissions since the construction for the project has not occurred. Thus, the estimation of emissions is based on a forecasted assumption."

2.4.2 Site Visit

There are no explicit site-visit requirements in Climate Lens General Guidance (Infrastructure Canada, 2019) or ISO 14064, parts 2 and 3. Project validations may include site visits as part of the validation plan to reduce validation risk as per ISO 14064-3:2019.

For the current Project assessment, the circumstances did not warrant a site visit. RWDI does not expect to reduce the uncertainties associated with the GHG mitigation assessment by visiting the Project site.

2.4.3 System-Level Assessments

2.4.3.1 Primary Data and Records

The team's assessment of primary data and records is detailed in the Quantification Plan in **Appendix A**.

2.4.3.2 Greenhouse Gas Information Management System

MPE Engineering and Municipal District of Taber records are maintained as described in the Data and Record Retention section below. MPE Engineering and Municipal District of Taber appear to have an organized system for filing their GHG related documents and other records pertaining to the planning and construction activities. MPE Engineering was also able to obtain and provide all documents requested by the Assessment Team.

2.4.3.3 Data and Record Retention

Retention of records of the Municipal District of Taber are governed by By-law 1691 which establishes procedures for the management of records for the Municipal District of Taber. The by-law is applicable to all employees of the Municipal District of Taber and requires that records be maintained in accordance with the records management manual, as well as applicable laws and provincial, national, or international standards adopted by the Municipal District of Taber.

Records used for the purpose of the application, the Climate Lens Assessment, and records generated through the construction of the Project will need to be maintained in accordance with the requirements defined through the contract with ICIP.

2.4.4 Quantification Plan and Procedures

Based on the relative contribution of GHG emission sources and sinks, the available information, and the uncertainty assessment, the assessment team designed an initial quantification plan. The initial quantification plan was modified as needed throughout the assessment process when issues were identified, or new information was obtained. The resulting final quantification plan, including details of the quantification procedures carried out, is presented in the Quantification Plan in **Appendix A**.

In summary, quantification procedures consisted of a desktop review of data and documentation to assess the completeness, level of detail, and reliability of primary data; and a determination of appropriate emissions quantification methodologies based on available data and the requirements of the regulation.

Quantification procedures also included interviews with MPE Engineering by phone and email, as well as follow-up requests for clarification or further documentation.

2.4.5 Emissions Calculations

The baseline case was assumed to be zero for this Project. The Project consists of construction emissions associated with the reconstruction and upgrade of the existing Horsefly Regional Emergency Spillway. There were no emissions from operation and maintenance of the Project after completion.

2.4.5.1 Construction

Construction emissions consists of diesel fuel combustion in on-site mobile equipment, generators, heaters and light plants. Various types of mobile equipment are used for different construction activities, such as site clearing, earth moving and concrete work. Mobile equipment includes excavators, rock movers, graders, packers, dozer, haul dump trucks, zoom-boom, concrete trucks and tunnel casing pullers. Other diesel-powered equipment included generators, light plants and in-line heaters. RWDI discussed and obtained information from MPE Engineering regarding the construction process, type of mobile equipment used and estimate for mobile equipment operational hours, which were used in estimating the construction emissions. The diesel fuel volume consumption was based on the BSFC (brake-specific fuel consumption), density of diesel fuel, horsepower rating for mobile equipment and the estimated operating hours. The construction emissions were then calculated using the diesel volume, corresponding diesel and bio-diesel default emission factors and global warming potentials.

Note that as of January 2012, fuel suppliers in Alberta are required to incorporate 5% renewable fuel content for gasoline and 2% for diesel. Thus, 2% of the biodiesel emissions (CO_2 portion only) were excluded from the total construction emissions.

Emission factors for diesel and biodiesel consumption were obtained from Table A6-13 of Part 2 of the National Inventory Report 1990-2017. Emission factors were assumed to be Advanced Control (Tier 4 and above) and based on Off-road Diesel Vehicles. Detailed sample calculations are provided in **Appendix B**.

2.4.5.2 Operations & Maintenance

Greenhouse gas emissions from operations and maintenance of the Horsefly Regional Emergency Spillway Project were assumed to be zero for the baseline and Project case. There was no equipment used (i.e. pumps, powered equipment) in the baseline or project case based on the preliminary data provided.

2.5 Exclusions from the Assessment

Emissions attributable to sources that will not be altered as part of the Project have not been included in the baseline scenario or Project scenario. For example, road traffic emissions have not been included because they are not expected to change significantly due to the implementation of the Project components. Other emissions that were not included are as follows:

- Land use changes include Canal excavation, raising of the canal bank and wetland creation. The land use changes were considered; however, a quantitative analysis of the emission impact of the land use impact was not performed due to the following reasons:

- The overall GHG balance associated with changes in vegetation tends to be smaller than the uncertainties associated with estimation of other emissions, particularly from construction emissions. That observation holds even when the construction emissions are spread over several decades and conservatively high estimates of GHG emissions from vegetation changes are assumed.
- Uncertainties for estimating GHG emissions or uptake from land-use changes are expected to be particularly large for this proposed project. The uncertainties lie mainly around the emission factors and the management of the wetlands.
- Very detailed spatial and temporal information would be needed and is not available.

2.6 Assumptions

The following assumptions were made regarding future operations:

- Some of the Project structures may have electrically actuated gates that are likely solar powered as part of the spillway. This information was provided by MPE Engineering. Thus, it was assumed that no emissions would be produced from this component.
- The construction phase associated with upgrading the canal was assumed to be about one month of construction for every kilometer, as suggested by MPE Engineering. For example, the upgrade of the SMRID main canal to the Horsefly reservoir consists of an additional extension of 3.5 kilometers. Thus, it was assumed that this would result in 3.5 months of work.
- Estimated construction emissions associated with the concrete work was based on an estimate for the construction of a concrete drop structure. The work associated with the construction of the concrete spillway structure to the Oldman river was assumed equal to about 1.5 times the work of a concrete drop structure. This was suggested by MPE Engineering.

3 BASELINE SCENARIO

The baseline scenario was assumed to be zero. The assessment did not identify any equipment or operations that resulted in the production of emissions.

4 ESTIMATED PROJECT EMISSIONS

The Project scenario considers an emissions trajectory based on the construction phase and expected start-up of the Project. For this assessment, only emissions that are projected to change due to the Project relative to the baseline have been considered. The Project emissions include emissions from diesel consumed in on-site mobile equipment, generators, heaters and light plants during the construction phase of the Project.

RWDI discussed and obtained information from the MPE Engineering regarding the construction process, types of mobile equipment used and estimates for mobile equipment operational hours, which were used in estimating the construction emissions. Construction of the new project is planned to commence in 2021 and expected to finish by the end of 2025. Construction emission calculations were previously described in Section 2.4.5.1. and these emissions were allocated based on the proposed timeline. **Table 9** provides annual and cumulative construction emissions over the Project lifetime

Table 9: Estimated Project Scenario Annual and Cumulative Construction Emissions (in tonnes CO_2e) over the Project Lifetime

Year	Annual Emissions	Cumulative Total Emissions
2021	-	-
2022	200	200
2023	2,029	2,229
2024	2,041	4,270
2025	1,355	5,625
2026	-	5,625
2027	-	5,625
...	-	5,625
2126	-	5,625
Lifetime Annual Average / Cumulative	53.6	5,625

5 ESTIMATED NET INCREASE OR REDUCTION IN EMISSIONS

The assessment team predicted the net change in GHG emissions based on the calculations described in the preceding report sections. **Table 10** presents the net change for the Project annually over the asset life of the Project.

Table 10: Net Change in Emissions and Reductions/Removals (in tonnes CO_2e)

Year	Total Net Project Scenario Emissions and Removals (A)	Total Net Baseline Scenario Emissions and Removals (B)	Total Net Change in Emissions and Removals (A-B)
2021	-	-	-
2022	200	-	200
2023	2,029	-	2,029
2024	2,041	-	2,041
2025	1,355	-	1,355
2026	-	-	-
2027	-	-	-
...	-	-	-
2126	-	-	-
Lifespan Totals	5,625	-	5,625

6 OTHER POTENTIAL MITIGATION MEASURES

6.1 Options for Avoidance of Impacts

This is an optional component that was not completed for this assessment.

6.2 Options for Mitigation of Impacts

This is an optional component that was not completed for this assessment.

7 ESTIMATED COST-PER-TONNE

A project cost per tonne of CO_2e emitted was calculated based on the net difference in emissions between the baseline scenario and Project scenario. The cost considered was tabulated based on the Project budget provided by MPE Engineering. It is estimated that this Project will cost $8,708 / tonne CO_2e of GHG emissions. This large value reflects the relatively low GHG emission emissions compared to the extent of the infrastructure costs. It should be kept in mind that the intent of this Project is not to minimize the cost of GHG mitigation. The federal dollars per GHG emissions in 2030 is $0 per tonne of CO_2e.

8 CONCLUSIONS

The purpose of the program is to improve management of water surplus from rainfall and snow melt that may exceed the capacity of the St. Mary River Irrigation District Main Canal. The program increases the flood attenuation capacity of the system and is intended to protect infrastructure from damage due to excess water. This project represents Phase 1 of 7 identified by the Southern Regional Stormwater Management Plan. The project consists of constructing an 14 km long, 55 m3/s capacity spillway sourced from the SMRID Main Canal and discharging to the Oldman River

Annual Project emissions associated with construction activities in 2030 were predicted to be 0 tonnes CO_2e. Cumulative emissions of the Project scenario associated with construction activities were predicted to be 5,625 tonnes of CO_2e over the 105-year Project lifetime. Annual net increase in emissions between the baseline and Project emissions was predicted to be 0 tonnes of CO_2e in 2030, and the net increase in cumulative emissions from the Project was predicted to be 5,625 tonnes of CO_2e over the 105-year Project lifetime.

A net increase of GHG emissions is expected from the Project over its lifespan. The main reason for the net increase of emission was due to the fact that there were no baseline emissions. Based on the Project budget supplied by MPE Engineering, the cost-per-tonne of CO_2e *increase* is $8,708 over the total Project asset life of 105 years. The federal dollars per GHG reductions in 2030 is $0 per tonne of CO_2e.

This assessment is based on the data provided for the Project scheduled to be constructed over the 2021 thru 2025-year period. It is our opinion that the estimated baseline and Project emissions demonstrate that the expected net increase in cumulative emissions from the Project are due to the construction phase and that there were no baseline emissions.

9 BIBLIOGRAPHY / REFERENCES

9.1 Global Warming Potentials

Table 91: GWP from National Inventory Report 1990-2017 (ECCC 2019), Part 1, Table 1-1.

GHG	Formula	100-Year GWP
Carbon Dioxide	CO_2	1
Methane	CH_4	25
Nitrous Oxide	N_2O	298
Sulphur Hexafluoride	SF_6	22,800
Nitrogen Trifluoride	NF_3	17,200
Hydrofluorocarbons (HFCs)		
HFC-23	CHF_3	14,800
HFC-32	CH_2F_2	675
HFC-41	CH_3F	92
HFC-43-10mee	$CF_3CHFCHFCF_2CF_3$	1,640
HFC-125	CHF_2CF_3	3,500
HFC-134	CHF_2CHF_2	1,100
HFC-134a	CH_2FCF_3	1,430
HFC-143	CH_2FCHF_2	353
HFC-143a	CH_3CF_3	4,470
HFC-152	CH_2FCH_2F	53
HFC-152a	CH_3CHF_2	124
HFC-161	CH_3CH_2F	12
HFC-227ea	CF_3CHFCF_3	3,220
HFC-236cb	$CH_2FCF_2CF_3$	1,340
HFC-236ea	CHF_2CHFCF_3	1,370
HFC-236fa	$CF_3CH_2CF_3$	9,810
HFC-245ca	$CH_2FCF_2CHF_2$	693
HFC-245fa	$CHF_2CH_2CF_3$	1,030
HFC-365mfc	$CH_3CF_2CH_2CF_3$	794
Perfluorocarbons (PFCs)		
Perfluoromethane	CF_4	7,390
Perfluoroethane	C_2F_6	12,200
Perfluoropropane	C_3F_8	8,830
Perfluorobutane	C_4F_{10}	8,860
Perfluorocyclobutane	$c\text{-}C_4F_8$	10,300
Perfluoropentane	C_5F_{12}	9,160
Perfluorohexane	C_6F_{14}	9,300
Perfluorodecalin	$C_{10}F_{18}$	7,500
Perfluorocyclopropane	$c\text{-}C_3F_6$	17,340

9.2 References

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APPENDIX A:
FINAL QUANTIFICATION PLAN

Appendix A: Quantification Plan

The quantification plan and procedures are presented for each source in **Table A.1**

Table A.1: Quantification Plan and Procedures

Emissions Source	Scope	Emissions Sub-Source	Quantification Uncertainty	ID	Quantification Procedures		
					Baseline	2030	Annual Cost
Construction	Scope 1	Onsite mobile diesel equipment	Will there be a change in emissions from onsite mobile equipment during the construction phase of the Project?	1.1	Confirm that no activities would take place onsite in the baseline scenario.	The construction Emissions will be estimated based on information provided by the MPE. Information such as details of the construction process and estimate of the number of mobile equipment and hours of operation expected for constructing the project components. Calculate associated annual CO_2e emissions as of 2030.	Using data provided by MPE., predict diesel consumption by onsite mobile equipment during the construction phase of for the project phase. Calculate associated annual CO_2e emissions for the asset life of the project.
	Scope 2	Purchased electricity	Will there be a change in emissions from purchased electricity during the construction phase of the Project?	2.1	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
	Scope 3	Impacts on traffic / personal vehicle travel	Will there be a change in emissions from traffic during the construction phase of the Project?	3.1	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
		Expected shifts in fuel sources for electricity	Will there be a change in emissions from changing sources for electricity during the construction phase of the Project?	3.2	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
Operational and Maintenance	Scope 1	Carbon Sequestration	Will there be a change in emissions from planting trees and other vegetation in the Project?	4.1	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
	Scope 2	Purchased electricity	Will there be a change in emissions from purchased electricity during the O&M phase of the Project?	4.2	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
		Purchased steam	Will there be a change in emissions from purchased electricity during the O&M phase of the Project?	5.1	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
		Purchased heat / cooling	Will there be a change in emissions from purchased steam during the O&M phase of each Project component?	5.2	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
		Purchased heat / cooling	Will there be a change in emissions from purchased heating/cooling during the O&M phase of each Project component?	5.3	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
	Scope 3	Impacts on land use / population density	Will there be a change in emissions from impacts on land use or population density during the O&M phase of each Project component?	6.1	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
		Impacts on traffic / personal vehicle travel	Will there be a change in emissions from impacts on traffic during the O&M phase of each Project component?	6.2	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
		Expected shifts in fuel sources for electricity	Will there be a change in emissions from shifts in fuel sources during the O&M phase of each Project component?	6.3	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.
		Downstream electricity consumption	Will there be a change in emissions from shifts in downstream electricity consumption during the O&M phase of each Project component?	6.4	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.	None expected - confirm assumption based on information provided by MPE.

APPENDIX B:
DETAILED EMISSIONS CALCULATIONS

Appendix B.1 Construction Information Received

Table B.1.1 Equipment - EPA Description

Equipment Type	Model	EPA Equipment Description[1]	Load Factor [1]
Concrete Pump		Diesel Pumps	0.43
Concrete Trucks		Diesel Cement and Mortar Mixers	0.43
Dozer	Cat D6	Diesel Crawler Tractor/Dozers	0.59
Excavator1	Cat 349 Excavator	Diesel Excavators	0.59
Excavator2	John Deere 300 LC	Diesel Excavators	0.59
Generator	Cat XQ20	Diesel Generator Sets	0.43
Graders	Cat 120 Motor Grader	Diesel Graders	0.59
Heaters	Flagro 400	Diesel Other Construction Equipment	0.59
Light Plant		Diesel Signal Boards/Light Plants	0.43
Packer	Cat CS64B	Diesel Rollers	0.59
Rock Movers	Volvo A30G	Diesel Off-Highway Trucks	0.59
Side Dump Haul Trucks		Diesel Dumpers/Tenders	0.21
Tunnel Casing Puller		Diesel Other Construction Equipment	0.59
Zoom-boom	Cat TL943D	Diesel Rough Terrain Forklifts	0.59

Notes:

[1] EPA descriptions and Load Factors taken from Appendix A in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf"

Table B.1.2 Horsefly Spillway Earth moving - Equipment Specifications and Operational Factors

Equipment Type	Model	Power (kW)[1]	Horse Power [1]	Number of Equipment [1]	Load Factor [2]	Duration (Months) [1]	Working Days/Month (Days) [1], [3]	Hours per day [1]	Total Hours
Excavator1	Cat 349 Excavator	302	405.0	3	0.43	1	21	9	567
Rock Movers	Volvo A30G	265	355.4	9	0.43	1	21	9	1,701
Graders	Cat 120 Motor Grader	93	124.7	1	0.59	1	21	9	189
Packer	Cat CS64B	98	131.4	1	0.59	1	21	9	189
Dozer	Cat D6	161	215.9	2	0.43	1	21	9	378
Side Dump Haul Trucks		260	348.7	4	0.59	1	21	9	756

Notes:

[1] Power rating, number of equipment, duration (months, days/month, and hours per day) provided by MPE in Copy of Horsefly Spillway Equiptment List.xlsx

[2] Load Factor assumed equal to EPA defaults, taken from Appendix A in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf"

[3] This is equipment required for 1 month of work equal to 1 kilometer

Table B.1.3 Horsefly Spillway Concrete work - Equipment Specifications and Operational Factors

Equipment Type	Model	Power (kW)[1]	Horse Power [1]	Number of Equipment [1]	Load Factor [2]	Duration (Months) [1]	Working Days/Month (Days) [1]	Hours per day [1]	Total Hours
Excavator2	John Deere 300 LC	166	222.6	2	0.59	1.5	21	9	567
Rock Movers	Volvo A30G	265	355.4	1	0.59	2	21	9	378
Packer	Cat CS64B	98	131.4	1	0.59	2	21	9	378
Zoom-boom	Cat TL943D	82	110.0	1	0.59	2	21	9	378
Generator	Cat XQ20	20	26.8	1	0.43	3	21	9	567
Light Plant		10	13.4	2	0.43	3	21	9	1,134
Heaters	Flagro 400	1.725	2.3	2	0.59	1	21	9	378
Concrete Trucks		260	348.7	1	0.43	-	10	9	90
Concrete Pump		260	348.7	1	0.43	-	10	9	90

Notes:

[1] Power rating, number of equipment, duration (months, days/month, and hours per day) provided by MPE in Copy of Horsefly Spillway Equiptment List.xlsx

[2] Load Factor assumed equal to EPA defaults, taken from Appendix A in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf"

Table B.1.4 Horsefly Spillway Country Road Crossings - Equipment Specifications and Operational Factors per Crossing

Equipment Type	Model	Power (kW)	Horse Power [1]	Number of Equipment [2]	Load Factor [4]	Working Days/Month (Days) [2]	Hours per day [2]	Total Hours
Excavator2	John Deere 300 LC	166	222.6	1	0.59	4	9	36
Packer	Cat CS64B	98	455	1	0.59	4	9	36

Notes:

[1] Power rating, number of equipment, duration (months, days/month, and hours per day) provided by MPE in Copy of Horsefly Spillway Equiptment List.xlsx

[2] Load Factor assumed equal to EPA defaults, taken from Appendix A in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf"

Table B.1.5 Horsefly Spillway Highway/Railway Crossings - Equipment Specifications and Operational Factors per Crossing

Equipment Type	Model	Power (kW)[1]	Horse Power [1]	Number of Equipment [1]	Load Factor [2]	Duration (Months) [1]	Working Days/Month (Days) [1]	Hours per day [1]	Total Hours
Excavator2	John Deere 300 LC	166	222.6	1	0.59	1.0	21	9	189
Packer	Cat CS64B	98	455	1	0.59	1.0	21	9	189
Tunnel Casing Puller		160	14.1	1	0.43	0.5	21	9	95

Notes:

[1] Power rating, number of equipment, duration (months, days/month, and hours per day) provided by MPE in Copy of Horsefly Spillway Equiptment List.xlsx

[2] Load Factor assumed equal to EPA defaults, taken from Appendix A in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf"

Table B.1.6 Equipment Factor and Fuel Consumption Data

Horsepower Range (hp)	BSFC [1] (Lb/hp-hr)	BSFC (grams/hp-hr)
0-100	0.408	185
101-750	0.367	166

[1] BSFC is the in-use adjusted brake-specific fuel consumption. These values were taken from Table A4 in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf"

Table B.1.7 Horsefly Spillway Earth moving - Equipment Fuel Use

Equipment Type	Horse Power [1]	Load Factor [2]	Total Equipment-Hours	BSFC (g/hp-h)[3]	Fuel Consumption (g)[4]	Fuel Consumption (L) [5]	
Excavator1	405.0	0.43	567	166	16,437,138	19,568	19568.0211
Rock Movers	355.4	0.43	1,701	166	43,269,949	51,512	51511.84361
Graders	124.7	0.59	189	166	2,315,072	2,756	2756.038086
Packer	131.4	0.59	189	166	2,439,538	2,904	2904.212177
Dozer	215.9	0.43	378	166	5,841,897	6,955	6954.638844
Side Dump Haul Trucks	348.7	0.59	756	166	25,888,977	30,820	30820.21085

Notes:

[1] Power rating, number of equipment, duration (months, days/month, and hours per day) provided by MPE in Copy of Horsefly Spillway Equiptment List.xlsx

[2] Load Factor assumed equal to EPA defaults, taken from Appendix A in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf"

[3] BSFC is the in-use adjusted brake-specific fuel consumption. These values were taken from Table A4 in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf"

[4] Diesel Density was assumed to be 840 g/L at 15C. See reference "https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00127.html".

[5] Diesel Density was assumed to be 840 g/L at 15C. See reference "https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00127.html".

Table B.1.8 Horsefly Spillway Concrete work - Equipment Fuel Use

Equipment Type	Horse Power [1]	Load Factor [2]	Total Equipment-Hours	BSFC (g/hp-h)[3]	Fuel Consumption (g)	Fuel Consumption (L) [4]
Excavator2	222.6	0.59	567	166	12,396,837	14,758
Rock Movers	355.4	0.59	378	166	13,193,421	15,706
Packer	131.4	0.59	378	166	4,879,076	5,808
Zoom-boom	110.0	0.59	378	166	4,082,493	4,860
Generator	26.8	0.43	567	185	1,210,162	1,441
Light Plant	13.4	0.43	1,134	185	1,210,162	1,441
Heaters	2.3	0.59	378	185	95,476	114
Concrete Trucks	348.7	0.43	90	166	2,246,219	2,674
Concrete Pump	348.7	0.43	90	166	2,246,219	2,674

Notes:

[1] Power rating, number of equipment, duration (months, days/month, and hours per day) provided by MPE in Copy of Horsefly Spillway Equiptment List.xlsx

[2] Load Factor assumed equal to EPA defaults, taken from Appendix A in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf"

[3] BSFC is the in-use adjusted brake-specific fuel consumption. These values were taken from Table A4 in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf"

[4] Diesel Density was assumed to be 840 g/L at 15C. See reference "https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00127.html".

Table B.1.9 Horsefly Spillway Country Road Crossings - Equipment Fuel Use

Equipment Type	Horse Power [1]	Load Factor [2]	Total Equipment-Hours	BSFC (g/hp-h)[3]	Fuel Consumption (g)	Fuel Consumption (L) [4]
Excavator2	222.6	0.59	36	166	787,101	937
Packer	455.0	0.59	36	166	1,608,784	1,915

Notes:

[1] Power rating, number of equipment, duration (months, days/month, and hours per day) provided by MPE in Copy of Horsefly Spillway Equiptment List.xlsx

[2] Load Factor assumed equal to EPA defaults, taken from Appendix A in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf"

[3] BSFC is the in-use adjusted brake-specific fuel consumption. These values were taken from Table A4 in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf"

[4] Diesel Density was assumed to be 840 g/L at 15C. See reference "https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00127.html".

Table B.1.10 Horsefly Spillway Highway/Railway Crossings - Equipment Fuel Use

Equipment Type	Horse Power [1]	Load Factor [2]	Total Equipment-Hours	BSFC (g/hp-h)[3]	Fuel Consumption (g)	Fuel Consumption (L) [4]
Excavator2	222.6	0.59	189	166	4,132,279	4,919
Packer	455.0	0.59	189	166	8,446,116	10,055
Tunnel Casing Puller	14.1	0.43	95	185	106,034	126

Notes:

[1] Power rating, number of equipment, duration (months, days/month, and hours per day) provided by MPE in Copy of Horsefly Spillway Equiptment List.xlsx

[2] Load Factor assumed equal to EPA defaults, taken from Appendix A in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf"

[3] BSFC is the in-use adjusted brake-specific fuel consumption. These values were taken from Table A4 in "https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf"

[4] Diesel Density was assumed to be 840 g/L at 15C. See reference "https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00127.html".

Table B.2.1 Construction Emissions Factors

Equipment Type	Diesel Emission Factors (g/L)[1]			Biodiesel Emission Factors (g/L)[1]	Biodiesel Percentage
	Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	(%)
	1	25	298		
Off-road diesel <19kW	2681	0.073	0.022	2472	2%
Off-road diesel >=19kW, Tier 1-3	2681	0.073	0.022	2472	2%
Off-road diesel >=19kW, Tier 4	2681	0.073	0.227	2472	2%

Notes:

[1] Emission factors, assumed Advanced Control (Tier 4 and above) in Table A6-13 of Part 2 of the NATIONAL INVENTORY REPORT 1990–2017.

Table B.2.2 Construction Emissions Factors

Equipment Type	Horse Power [1]	Emission Factors (g/L)			
		Diesel CO_2	CH_4	N_2O	Biodiesel CO_2
Concrete Pump	349	2681	0.073	0.227	2472
Concrete Trucks	349	2681	0.073	0.227	2472
Dozer	216	2681	0.073	0.227	2472
Excavator1	405	2681	0.073	0.227	2472
Excavator2	223	2681	0.073	0.227	2472
Generator	27	2681	0.073	0.227	2472
Graders	125	2681	0.073	0.227	2472
Heaters	2	2681	0.073	0.022	2472
Light Plant	13	2681	0.073	0.022	2472
Packer	131	2681	0.073	0.227	2472
Rock Movers	355	2681	0.073	0.227	2472
Side Dump Haul Trucks	349	2681	0.073	0.227	2472
Tunnel Casing Puller	14	2681	0.073	0.022	2472
Zoom-boom	110	2681	0.073	0.227	2472

Notes:

[1] Power rating provided by MPE.

Table B.2.3 Horsefly Spillway Earth moving - Monthly Emissions

Equipment Type	Fuel Consumption (L)	Emission Factors (g/L)				Monthly Emissions (tonnes/month)[1]			
		Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	Diesel CO_2	CH_4	N_2O	Biodiesel CO_2
Excavator1	19,568	2681	0.073	0.227	2472	51.41	0.0014	0.0044	0.97
Rock Movers	51,512	2681	0.073	0.227	2472	135.34	0.0038	0.0117	2.55
Graders	2,756	2681	0.073	0.227	2472	7.24	0.0002	0.0006	0.14
Packer	2,904	2681	0.073	0.227	2472	7.63	0.0002	0.0007	0.14
Dozer	6,955	2681	0.073	0.227	2472	18.27	0.0005	0.0016	0.34
Side Dump Haul Trucks	30,820	2681	0.073	0.227	2472	80.98	0.0022	0.0070	1.52
Total						**300.87**	**0.01**	**0.03**	**5.66**

Notes:

[1] This is equipment required for 1 month of work equal to 1 kilometre

Table B.2.4 Horsefly Spillway Earth moving - Total Emissions

Project Component	Length (km)	# of months[1]	Total Emissions (tonnes/month)				
			Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	Total GHG Emissions (t CO_2e)
SMRID Main Canal to Horsefly Reservoir	3.5	3.5	1,053.06	0.03	0.09	19.82	1080.90
Horsefly Reservoir to Taber Lake	5	5.0	1,504.37	0.04	0.13	28.31	1544.15
Taber Lake to Oldman River	5.5	5.5	1,654.81	0.05	0.14	31.14	1698.56
Total	**14**	**14**	**4,212.24**	**0.12**	**0.36**	**79.26**	**4,323.62**

Notes:

[1] 1 month of work equal to 1 kilometre

Table B.2.5 Horsefly Spillway Concrete work - Emissions per structure

Equipment Type	Fuel Consumption (L)	Emission Factors (g/L)				Emissions per structure (tonnes)[1]			
		Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	Diesel CO_2	CH_4	N_2O	Biodiesel CO_2
Excavator2	14,758	2681	0.073	0.227	2472	38.78	0.0011	0.0034	0.73
Rock Movers	15,706	2681	0.073	0.227	2472	41.27	0.0011	0.0036	0.78
Packer	5,808	2681	0.073	0.227	2472	15.26	0.0004	0.0013	0.29
Zoom-boom	4,860	2681	0.073	0.227	2472	12.77	0.0004	0.0011	0.24
Generator	1,441	2681	0.073	0.227	2472	3.79	0.0001	0.0003	0.07
Light Plant	1,441	2681	0.073	0.022	2472	3.79	0.0001	0.0000	0.07
Heaters	114	2681	0.073	0.022	2472	0.30	0.0000	0.0000	0.01
Concrete Trucks	2,674	2681	0.073	0.227	2472	7.03	0.0002	0.0006	0.13
Concrete Pump	2,674	2681	0.073	0.227	2472	7.03	0.0002	0.0006	0.13
Total						**129.99**	**0.00**	**0.01**	**2.45**

Notes:

[1] This is equipment required for 1 concrete drop structure or 1/2 the concrete spillway

Table B.2.6 Horsefly Spillway Concrete work - Total Emissions

Project Component	Number (km)	Equivalent Number[1]	Total Emissions (tonnes/month)				
			Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	Total GHG Emissions (t CO_2e)
Install 3.5 m Concrete Drop Structure							
SMRID Main Canal to Horsefly Reservoir	2	2	259.99	0.01	0.02	4.89	266.67
Horsefly Reservoir to Taber Lake	2	2	259.99	0.01	0.02	4.89	266.67
Taber Lake to Oldman River	2	2	259.99	0.01	0.02	4.89	266.67
Install 5.0 m Concrete Drop Structure							
Horsefly Reservoir to Taber Lake	1	1	129.99	0.00	0.01	2.45	133.34
Concrete Spillway Structure to Oldman River	1	1.5	194.99	0.01	0.02	3.67	200.00
Total	**8**	**9**	**1,104.94**	**0.03**	**0.09**	**20.79**	**1,133.35**

Notes:

[1] As per Equipment list provided by MPE, equipment times were provided per concrete drop structure, with Oldman River spillway to require 1.5 time the equipment use and twice as long to complete. (Coms with T. Guan March 12, 2020)

Table B.2.7 Horsefly Spillway Country Road Crossings - Emissions per Crossing

Equipment Type	Fuel Consumption (L)	Emission Factors (g/L)				Emissions (tonnes)			
		Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	Diesel CO_2	CH_4	N_2O	Biodiesel CO_2
Excavator2	937	2681	0.073	0.227	2472	2.46	0.0001	0.0002	0.05
Packer	1,915	2681	0.073	0.227	2472	5.03	0.0001	0.0004	0.09
Total						**7.49**	**0.00**	**0.00**	**0.14**

Table B.2.8 Horsefly Spillway Country Road Crossings - Total Emissions

Project Component	Number	Total Emissions (tonnes/month)				
		Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	Total GHG Emissions (t CO_2e)
M.D. of Taber Road Crossings	6	44.96	0.00	0.00	0.85	46.15
Total	**6.0**	**44.96**	**0.00**	**0.00**	**0.85**	**46.15**

Table B.2.9 Horsefly Spillway Highway/Railway Crossings - Emissions per Crossing

Equipment Type	Fuel Consumption (L)	Emission Factors (g/L)				Emissions (tonnes)			
		Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	Diesel CO_2	CH_4	N_2O	Biodiesel CO_2
Excavator2	4,919	2681	0.073	0.227	2472	12.93	0.0004	0.0011	0.24
Packer	10,055	2681	0.073	0.227	2472	26.42	0.0007	0.0023	0.50
Tunnel Casing Puller	126	2681	0.073	0.022	2472	0.33	0.0000	0.0000	0.01
Total						**39.67**	**0.00**	**0.00**	**0.75**

Table B.2.10 Horsefly Spillway Highway/Railway Crossings - Total Emissions

Project Component	Number	Total Emissions (tonnes/month)				
		Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	Total GHG Emissions (t CO_2e)
Highway 3 Crossing	1	39.67	0.00	0.00	0.75	40.72
Highway 36 Crossing	1	39.67	0.00	0.00	0.75	40.72
CP Rail Crossing	1	39.67	0.00	0.00	0.75	40.72
Total		**119.02**	**0.00**	**0.01**	**2.24**	**122.15**

Table B.3.1 Project Emissions

Project Component		Total Emissions (tonnes/month)				
		Diesel CO_2	CH_4	N_2O	Biodiesel CO_2	Total GHG Emissions (t CO_2e)
Earth moving	SMRID Main Canal to Horsefly Reservoir	1,053.06	0.03	0.09	19.82	1,080.90
	Horsefly Reservoir to Taber Lake	1,504.37	0.04	0.13	28.31	1,544.15
	Taber Lake to Oldman River	1,654.81	0.05	0.14	31.14	1,698.56
Concrete work	SMRID Main Canal to Horsefly Reservoir	259.99	0.01	0.02	4.89	266.67
	Horsefly Reservoir to Taber Lake	389.98	0.01	0.03	7.34	400.01
	Taber Lake to Oldman River	259.99	0.01	0.02	4.89	266.67
	Taber Lake Outlet Structure	194.99	0.01	0.02	3.67	200.00
Highway/Railway Crossings		119.02	0.00	0.01	2.24	122.15
Country Road Crossings		44.96	0.00	0.00	0.85	46.15
Total		**5,481.17**	**0.15**	**0.47**	**103.14**	**5,625.27**

Appendix B.4 Anticipated Project Construction Timeline [1]

Project	Total Cost ($)	Cash flow cost per year for all phases											
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
Construction													
SMRID Main Canal to Horsefly Reservoir	$ 6,607,000					$ 6,607,000							$ 6,607,000
Horsefly Reservoir to Taber Lake	$ 9,557,000				$ 9,557,000								$ 9,557,000
Taber Lake to Oldman River	$ 8,173,000			$ 8,173,000									$ 8,173,000
Highway and Rail Crossings	$ 1,567,000			$ 522,333	$ 1,044,667								$ 1,567,000
M.D. of Taber Road Crossings	$ 1,253,000			$ 626,500	$ 417,667	$ 208,833							$ 1,253,000
Taber Lake Outlet Structure	$ 7,312,000		$ 7,312,000										$ 7,312,000
Other Project Costs (no emissions)	$ 14,516,000	$ 6,458,000	$ 2,040,600	$ 1,988,400	$ 1,988,400	$ 2,040,600							$ 14,516,000
Total Project	$ 48,985,000	**$ 6,458,000**	**$ 9,352,600**	**$ 11,310,233**	**$ 13,007,734**	**$ 8,856,433**	$ -	$ -	$ -	$ -	$ -	$ -	**$ 48,985,000**

Notes

[1]As per Table 20: Phase 1 (2020-2030) Cash Flow Breaksown in 2020 Dollars, MPE Engineering Ltd., "Muncipal District of Taber - Southern Regional Stormwater Management Plan - Project Implementation Plan", Oct 2019 with dates adjusteed by 1 year as guided by MPE.

Project	Construction Start	Construction End	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total	Baseline Emissions (t CO_2e)	Project Emissions (t CO_2e)
Construction																
SMRID Main Canal to Horsefly Reservoir	2025	2025	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%	n/a	1,347.57
Horsefly Reservoir to Taber Lake	2024	2024	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	100%	n/a	1,944.15
Taber Lake to Oldman River	2023	2023	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	n/a	1,965.23
Highway and Rail Crossings	2023	2024	0%	0%	33%	67%	0%	0%	0%	0%	0%	0%	0%	100%	n/a	122.15
M.D. of Taber Road Crossings	2023	2025	0%	0%	50%	33%	17%	0%	0%	0%	0%	0%	0%	100%	n/a	46.15
Taber Lake Outlet Structure	2022	2022	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	n/a	200.00
Total			**0.00**	**200.00**	**2,029.03**	**2,040.97**	**1,355.27**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5,625.27**	**0.00**	**5,625.27**

Project Construction Emission Calculations:

A. GHG Emissions from Mobile Equipment (tonnes CO_2e) =

$$Diesel\ Fuel\ Consumption\ (kL) \times \left[\left(Diesel\ CO_2\ Emission\ Factor\ \left(\frac{kg}{kL}\right) \times CO_2\ GWP\right) + \left(Diesel\ CH_4\ Emission\ Factor\ \left(\frac{kg}{kL}\right) \times CH_4\ GWP\right) + \left(Diesel\ N_2O\ Emission\ Factor\ \left(\frac{kg}{kL}\right) \times N_2O\ GWP\right)\right]$$

where Diesel Fuel Consumption (Liters) =

$$Brake\ Specific\ Fuel\ Consumption\ \left(\frac{lb}{hp.hr}\right) \times \frac{453.6\ grams}{lb} \times Diesel\ Density\left(\frac{liter}{840\ gram}\right)$$

$$\times horse\ power\ of\ Equipment\ \times Operating\ Hours\ of\ Mobile\ Equipment$$

$$\times Equipment\ Load\ Factor$$

$B.$ $GHG\ Emission\ Reduction\ from\ Planting\ Trees\ \ (\ tonnes\ CO_2e) =$

$Assumptions\ made\ were\ as\ follows$:

- 50% of the dry mass of a tree is carbon
- 20% of tree biomass is below ground level in roots (120% is used)
- Plant Areas estimated based on information provided by McElhanney (Project 12462 Phibbs Transit Exchange-Landscaping-IFT BCBid.pdf)

$$GHG\ Emission\ Reduction\ per\ Tree\ (tonnes\ CO_2e)$$

$$= Tree\ Dry\ Biomass\ (kg) \times 50\%\ (Carbon\ \%) \times \frac{44.01\ \frac{Gram\ CO_2}{Gram\ mole\ CO_2}}{12.01\ \frac{Gram\ C}{Gram\ Mole\ C}} \times 120\%$$

$$\times\ Number\ of\ trees$$

Where, Tree dry biomass (kg)

$$= \left(Coefficient\ a\ \times Diameter\ Breast\ Height\ (cm^3)\right)^{coefficient\ b}$$

$Sample\ Calculation\ for\ Western\ Red\ Cedar$:

$$= 119\ kg \times 0.50 \times 3.664 \times 1.2\ \times 21\ trees\ \times \frac{tons}{1000\ kg}$$

$$= 5.5\ CO_2\ Tonnes$$

$$Annual\ Emission\ Reduction = 5.5\ CO_2\ Tonnes\ \div 30\ Years\ (Project\ life\ Span)$$

$$= 0.18\ \ CO_2\ Tonnes\ \ per\ year$$

$C.$ $GHG\ Emission\ Reduction\ from\ Planting\ Other\ Vegetation\ \ (\ tonnes\ CO_2e) =$

$Assumptions\ made\ were\ as\ follows$:

- 35% of the green mass of a tree is water and 65% is solid dry mass
- 50% of the dry mass of a tree is carbon

- Plant Load was taken from Table 26 from "'FLL_greenroofguidelines_2018.pdf' and assumed to be 10.0 kg/m^2.
- Plant Areas estimated based on information provided by McElhanney (Project 12462 Phibbs Transit Exchange-Landscaping-IFT BCBid.pdf)

$$GHG\ Emission\ Reduction\ from\ Other\ Vegetaion\ in\ Project\ case\ (tonnes\ CO_2e)$$
$$= Load\ \left(\frac{kg}{m^2}\right) \times Plant\ Area\ (m^2) \times \frac{Tonnes}{1000\ kg} \times 65\%\ (dry\ mass)$$
$$\times 50\%\ (Carbon\ \%) \times \frac{44.01\ \frac{Gram\ CO_2}{Gram\ mole\ CO_2}}{12.01\ \frac{Gram\ C}{Gram\ Mole\ C}}$$

$$= 10.0\ \left(\frac{kg}{m^2}\right) \times 586\ m^2 \times \frac{Tonnes}{1000\ kg} \times 0.65 \times 0.50 \times 3.664 = 6.98\ CO_2\ Tonnes$$

$\boldsymbol{D.\ Traffic\ Emissions\ (tonnes\ CO_2e) =}$

$$Bus\ Emission\ in\ the\ Project\ Case\ (tonnes\ CO_2e)$$
$$= Annual\ Estimated\ Bus\ Passengers\ \times Transit\ Emission\ Factor$$

$$= 738{,}866\ Annual\ bus\ passenger\ \times \frac{320\ gram\ CO2e}{Boarded\ Bus\ Passenger} \times \frac{kg}{1000\ grams} \times \frac{Tons}{1000\ kg}$$
$$= 236.4\ CO_2\ Tonnes$$

$$Personal\ Vehicle\ Emissions\ in\ the\ Baseline\ Case\ (tonnes\ CO_2e)$$

$$= Annual\ Estimated\ Single\ Occupant\ Drivers\ \times Trip\ Distance\ (round\ trip) \times Fuel\ Economy$$
$$\times Light\ duty\ Vechicle\ (Gasoline\ Fueled)\ Emission\ Factor$$

Personal Vehicle Emissions in the Baseline Case ($tonnes\ CO_2e$) =

$$= 507{,}815\ Annual\ Single\ Occupant\ Drivers\ \times \frac{24.81\ kilometers}{Trip} \times \frac{9.2\ Liters}{100\ kilometer} \times \frac{2317\ grams}{Liter}$$
$$\times \frac{kilograms}{1000\ grams} \times \frac{Tons}{1000\ kg} = 2865\ CO_2e\ Tonnes$$