

MUNICIPAL DISTRICT OF TABER

**SOUTHERN REGIONAL STORMWATER MANAGEMENT
PLAN**

**EXECUTIVE SUMMARY
PREPARED FOR AREA MEMBERS OF PARLIMENT**

(1720-049-00)



AUGUST 2019

1.0 INTRODUCTION

The study area is located in southern Alberta, spanning nearly from the western to eastern provincial boundaries. The area 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 Project which includes the St. Mary River, Magrath, Raymond and Taber Irrigation Districts. The St. Mary River Irrigation Project Main Canal, which is the largest single drainage feature of the region begins south of the Town of Magrath in the Pothole creek drainage basin and extends east to the Seven Persons, Bullshead and Ross creek drainage basins which discharges into the South Saskatchewan River in Medicine Hat. The total study area, comprises approximately 8,000 km² of land. A Drawing of this area is shown on the last page of this summary.

The study area varies from west to east geographically. The southwest is predominantly steep, uncultivated terrain. The central and by far largest portion is generally cultivated farmland and undulating prairie. The western portion extends into Cypress County and the western slopes of the Cypress Hills. Climate for the region is classified as semi-arid. Average yearly precipitation ranges between 320mm to 380mm. However, the region is susceptible to high intensity long duration rainfall events.

The Regional Drainage Committee was formed to study this area and develop solutions to the ever increasing stormwater runoff events that are occurring

There are a number of stakeholders which forms the Regional Drainage Committee that are impacted by stormwater runoff within this region including local MD's and Counties (Taber, Cardston, Warner, Lethbridge, 40 Mile, and Cypress), Towns and Villages (Taber, Bow Island, Coaldale, Magrath, and Barnwell), Cities (Medicine Hat), and Irrigation Districts (Magrath Irrigation District, Raymond Irrigation District, St. Mary River Irrigation District, and Taber Irrigation District).

The SMRID Main Canal receives stormwater runoff from approximately 565,000 ha of land in Southern Alberta from the Milk River Ridge in the west to the Cypress Hills in the east. Storm runoff is taxing the irrigation system and creates the risk of the Main Canal failing during a significant runoff event. The SMRID Main Canal has only one outlet to release this stormwater to the Oldman River and South Saskatchewan River systems which is near the end of the 300 km long Main Canal. The Main Canal is designed to deliver water primarily to agricultural producers and as a result capacity becomes smaller as water flows downstream. The SMRID Main Canal also provides water to Towns, Villages, Hamlets, and Domestic users for potable drinking water as well as water for industrial users.

Outside of urban developments, the infrastructure that facilitates stormwater runoff events in the region comprises primarily of works owned and operated by the Irrigation Districts (canals and drains) and by the Counties and MD's (road ditches and culverts). The components of irrigation infrastructure that are of interest in drainage issues are conveyance channels (canals and drains), drain inlet structures, spillways, and reservoirs.

The primary limitation with accepting more stormwater into the SMRID Main Canal is that there are limited options to store or divert the excess water. SMRID reservoirs were designed and are managed to ensure a reliable water source throughout the irrigation season. The reservoirs are usually kept close to full during June when large rainfall events are most likely in order to supply water for irrigation demand in July and August. Once water enters the SMRID Main Canal system there is no means to release water back to the Oldman or South Saskatchewan River before it reaches Sauder Reservoir near Medicine Hat. Runoff water that enters the Main Canal at the western portion of the study area must be conveyed up to 250 Kilometers before it can be released from the Main Canal.

Serious flooding occurred after major snow melt and precipitation events, particularly in the springs of 2010, 2011, 2013, 2014 and 2018. Significant damage occurred, including numerous road and culvert washouts, large tracts of flooded cropland, stranded residences, and a breach of the Seven Persons Reservoir spillway.

2.0 PROPOSED STORMWATER MITIGATIONS

The Southern Regional Storm Water Manage Plan (SRSWMP), completed in 2014, recommended over \$150,000,000 in upgrades throughout Southern Alberta to manage stormwater within the SMRID Main Canal System. The report recommended implementing the following seven projects:

- 1) Horsefly Regional Emergency Spillway
- 2) Sherburne Spillway and Reservoir Expansion
- 3) SMRID Main Canal Drain Inlet Pumping Stations
- 4) Chin Reservoir Expansion
- 5) Sauder Reservoir Spillway
- 6) Murray Reservoir Expansion
- 7) Paradise Creek Dry Dam

2.1 Economic Factors

The SMRID Main Canal supplies irrigation water to approximately 200,000 ha of irrigated farmland in Southern Alberta. Irrigation enables this farmland to produce high value specialty crops such as: Potatoes, Sugar Beets, Sweet Corn, Canola, and Sunflower Seeds. These specialty crops support a significant food processing industry and intensive livestock operations throughout Southern Alberta which includes the following major processors:

- McCain Foods, Cavendish Farms, Lamb Weston (Potatoes)
- Hostess Frito Lay (Corn, Potatoes)
- Rogers Sugar (Sugar Beets)
- Canbra Foods (Canola)
- Bonduelle/Lucerne (Frozen Vegetables)
- Maple Leaf Foods (Hog Processing)
- Sunrise Poultry (Chicken Processing)

In addition to these major food processors the Lethbridge Medicine corridor along Highway 3 supports over 200 Agri-Food Industries which employ thousands of people. The recently opened Cavendish Farms French Fry plant in Lethbridge is the largest industrial facility ever constructed in Lethbridge. This plant relies on potatoes grown between Lethbridge and Medicine Hat which could not be grown in this area without the irrigation system.

Failure of the SMRID Main Canal could potentially cut off the ability to irrigate agricultural land. The report “Economic Value of Irrigation in Alberta” by the Alberta Irrigation Projects Association (2015) indicates that irrigated crops are worth an average of \$1,147 per hectare. The loss of irrigation on the SMRID Main Canal would result in direct farm losses of \$230,000,000 and indirect losses to the Alberta economy of \$585,000,000. This report was prepared before the construction of Cavendish Farms and the resulting losses will be significantly higher today.

2.2 Project Implementation

The implementation plan is divided into three phases, with each phase expected to take 10-years to complete. The Horsefly Regional Emergency Spillway and the Sherburne Spillway and Reservoir Expansion will be completed in Phase One. The SMRID Main Canal Drain Inlet Pumping Stations, Chin Reservoir Expansion, and Sauder Reservoir Spillway will be completed in Phase Two. Murray Reservoir Expansion and Paradise Creek Dry Dam will be completed in Phase Three.

2.2.1 Phase 1 (2020-2030)

Horsefly Regional Emergency Spillway and the Sherburne Spillway and Reservoir Expansion were deemed the highest priority projects. Both have a flow capacity of 55 cubic metres per second (cms). The Horsefly Regional Emergency Spillway is proposed to be constructed first as it has the greatest net benefit of the proposed project as it is able to divert excess water out of the Main Canal System directly to the Oldman River. The Horsefly Regional Emergency Spillway will also create additional stormwater capacity in the Main Canal for areas east of the Town of Taber and reduce the reliance on the Sauder Spillway.

The Sherburne Spillway and Reservoir Expansion Project will alleviate flooding in the Bow Island Area and will divert water from entering Forty Mile Reservoir. Water from Sherburne Reservoir can be drained by gravity where all water entering Forty Mile must be pumped.

Together these two spillways provide immediate benefit due to their location in the middle of the Main Canal system, which allows greater flexibility in managing canal water levels during storm events. These projects also protect against drought by allowing upstream reservoirs to be operated closer to FSL and store more water, as currently the reservoirs are operated at lower levels to allow for stormwater storage.

2.2.2 Phase 2 (2030-2040)

Phase 2 consists of converting several key existing Main Canal gravity drain inlets to pumped drain inlets, expansion of Chin Reservoir and the construction of a new spillway at Sauder Reservoir.

The design and topography of the existing drain inlets along the Main Canal mean that they can only be utilized when water levels in the Main Canal drop below the level of the drain inlet. By installing pumps on these structures water can be pumped back into the system regardless of the water levels in the Main Canal which helps alleviate summer rainfall flooding. Construction of the Horsefly and Sherburne spillways will ensure that there is adequate capacity in the Main Canal to accommodate the additional water from these drain inlets.

The Chin Reservoir Expansion will significantly increase the storage capacity of the existing reservoir and will allow the retention of inflows for a 1 in 100-year storm event. This will increase the ability of the Main Canal between Chin Reservoir and Horsefly Spillway to accept more overland drainage. Significant inflows in this reach of the system include the Town of Coaldale and the Malloy Drain. The Chin Reservoir Expansion provides significant flood damage mitigation with the added benefit of storing stormwater that can be utilized for other purposes later on in the year.

The final Phase 2 project is to replace the existing Sauder Spillway which will more than double its capacity. This new spillway will be able to spill additional inflows entering the reservoir during a storm event directly to the South Saskatchewan River. This will minimize flows into Murray Reservoir and Seven Persons Creek which decreases impacts to the City of Medicine Hat.

2.2.2 Phase 3 (2040-2050)

Phase 3 consists of Expansion of Murray Reservoir and construction of a Dry Dam on Paradise Creek. These two project are located upstream of Medicine Hat and are intended to mitigate flooding along Seven Persons Creek through the City Medicine Hat.

Murray Reservoir will be expanded by raising the current dam to allow it to retain more of inflow from its catchment area, and reduce the chances of spillway operation which reduces flows into the Main Canal and Seven Persons Creek downstream of Murray Reservoir.

The Paradise Dry Dam will be constructed on the upper reaches of Paradise Creek to attenuate stormwater flow from Paradise Creek into Seven Persons Creek. The Paradise Dry Dam will not store water permanently but act as a retention facility to reduce flow rates of Seven Persons Creek.

3.0 COST ESTIMATES

The stakeholders are actively working to mitigate flooding throughout this area. Completion of the Southern Regional Stormwater Management Plan in 2014 identified 7 phased projects to mitigate flooding risk in the region, the combined project costs were estimated at over \$ 168,000,000 (2020 dollars). Refer to Table 3.1 for the individual project costs.

Table 3.1: Proposed Project Costs

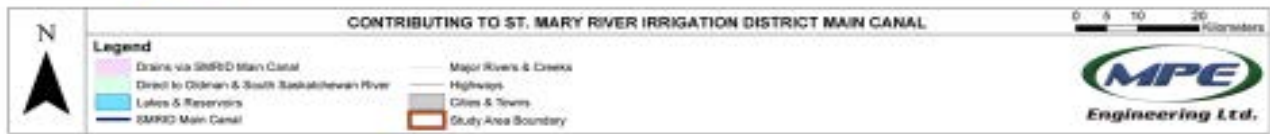
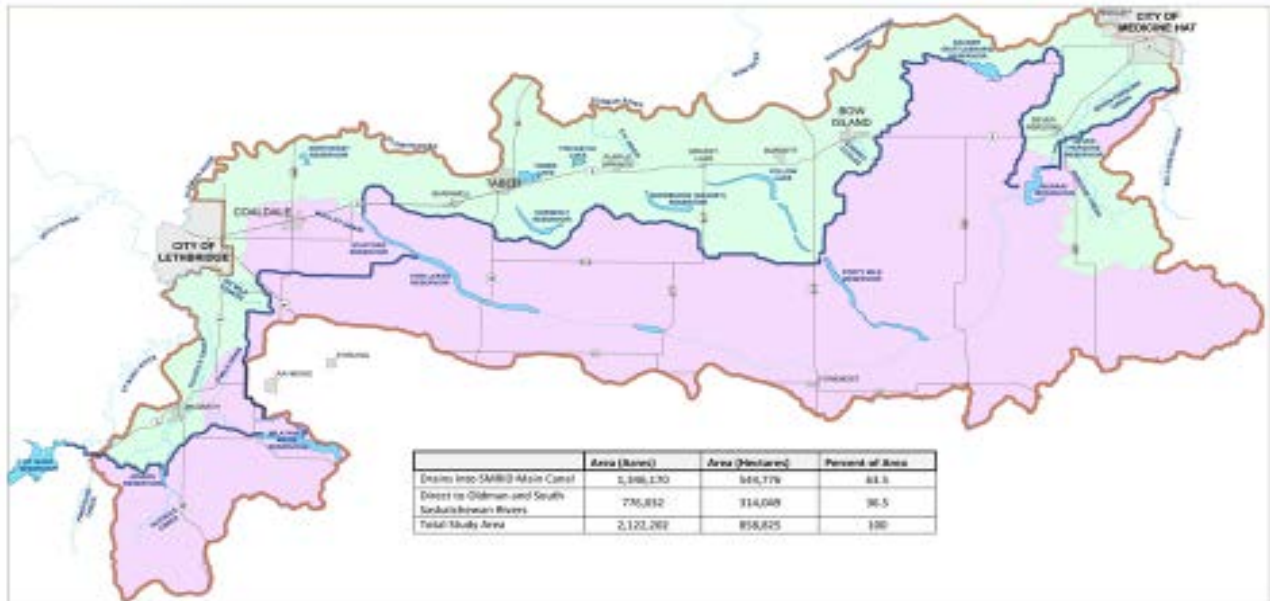
Project		Cost (2020 Dollars)
1	Horsefly Regional Emergency Spillway	\$ 49,000,000
2	Sherburne Spillway and Reservoir Expansion	\$ 15,000,000
3	Main Canal Drain Inlet Pumping Stations	\$ 2,200,000
4	Chin Reservoir Expansion	\$ 34,000,000
5	Sauder Reservoir Spillway	\$ 14,300,000
6	Murray Reservoir Expansion	\$ 29,300,000
7	Paradise Creek Dry Dam	\$ 14,600,000
Total		\$ 168,800,000

As part of the SWMP, an economic analysis (MPE, 2016) was conducted to estimate the value of damage prevented by each project and additional benefits provided by each project (primarily from extra storage volume in the expanded reservoirs). Table 3.2 provides the expected return on investment for each individual project.

Table 3.2: Projected Return on Investments

Project Name	Return on Investment (Damage Mitigation and Additional Benefits)
Horsefly Regional Emergency Spillway	5.3 : 1
Sherburne Spillway and Reservoir Expansion	5.3 : 1
SMRID Main Canal Drain Inlet Pumping Stations	35 : 1
Chin Reservoir Expansion	4.4 : 1
Sauder Reservoir Spillway	5.3 : 1
Murray Reservoir Expansion	6.4 : 1
Paradise Creek Dry Dam	2.8 : 1

Main Canal Catchment Area



Recommended Mitigation Options

