waterSMART
Water Management Solutions

Agriculture's Water Future

EXAMPLE

SMRID West Site Water Stewardship Plan

Submitted by:
WaterSMART Solutions Ltd.

Submitted to:
St. Mary River Irrigation District

Submitted on:
October 11, 2022

Contents

DRAFT

DRAFT

1. Document Purpose

The St. Mary River Irrigation District (SMRID) water stewardship plan combines the details of current operations, identifies connections to the local community and environment, lists the water related risks and opportunities, and lays out a plan for implementing water stewardship. It contains a section describing the SMRID West Site, how water is used in the operations, ongoing actions that align with water stewardship, and existing water management activities on site and water stewardship activities. The geographic area relevant to the site's operations and the current water stewardship activities are noted.

This water stewardship planning document is developed as part of the Agriculture's Water Future (AWF), Phase III project work, and it is intended to serve as an example for future water stewardship implementers in the agriculture and agri-food sector in Alberta.

This report is also intended to systematically identify the Alliance for Water Stewardship (AWS) Standard criteria that are met by the SMRID West Site. The criteria are highlighted in blue boxes throughout the document.

Appendix A provides the larger watershed context for the SMRID West Site, which includes details of the water availability and water quality in the Oldman River watershed, watershed stakeholders, the regulatory system and water management authorities.

2. Implementer overview

As per the Alberta Irrigation Districts Act, the St. Mary River Irrigation District (SMRID) is one of thirteen irrigation districts in Alberta tasked with conveying water to its members (Government of Alberta, 2021). Members of the SMRID are irrigators, municipalities, industries, or other water users within the boundaries of the district who pay for water delivery from the SMRID infrastructure. All Alberta irrigation districts must comply with water license agreements determined by the Water Act when diverting and utilizing water (Government of Alberta, 2021). All Alberta irrigation districts are governed by boards of elected members who are irrigators within the district (Government of Alberta, 2021).

The SMRID is the largest irrigation district in Alberta and Canada; it extends from the City of Lethbridge to the City of Medicine Hat in southern Alberta and includes member irrigators in Middle Coulee and Vertigris. Through its water licences, the SMRID is allowed to divert a total of 722,000 acre-feet annually, though in practice it typically diverts approximately 65% of this amount (St. Mary River Irrigation District, 2016), with diversions averaging at 64.2% for the 2018-2020 irrigation seasons (St. Mary River Irrigation District, 2020) (St. Mary River Irrigation District, 2019) (St. Mary River Irrigation District, 2018). Water in the SMRID system is diverted via Government of Alberta infrastructure at the St. Mary, Waterton, Jensen and Milk River Ridge reservoirs into the SMRID main canal, and is then further directed downstream through the SMRID infrastructure to users. Figure 1 displays the extent of the SMRID system with the

DRAFT

irrigated acres shown in green.

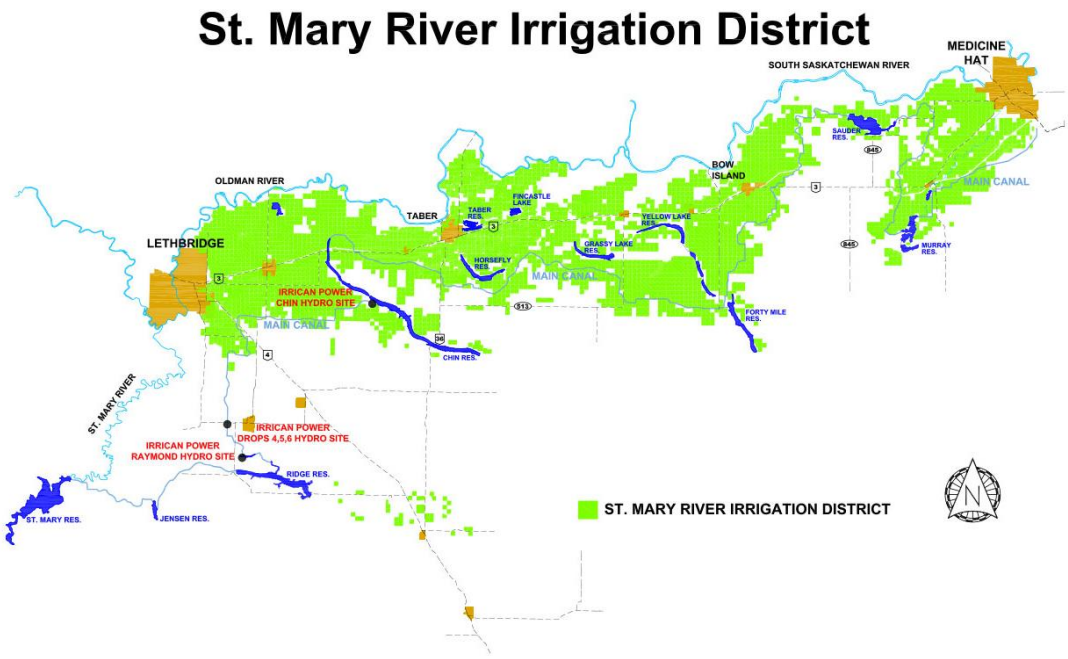

Figure 1. St. Mary River Irrigation District map.

The SMRID uses a variety of infrastructure to direct water for timely delivery to its users (see Section 6 for infrastructure details), as well as infrastructure for water storage and hydro-electric power generation. Water storage aids the SMRID in drought mitigation, which has positive economic implications for the region and its members. Reservoirs owned and operated by the SMRID are also used recreationally and serve as wildlife habitat. The SMRID, along with the Raymond Irrigation District, are members of the Irrigation Canal Power Cooperative Ltd. (IRRICAN Power), which utilizes water conveyance infrastructure to generate hydro-electric power. This power generated through IRRICAN Power is sold to generate funding for the irrigation districts (St. Mary River Irrigation District, 2016).

The SMRID has an organizational goal of improving the infrastructure, water management, and financial security of the district to fulfill their vision statement, which is to "support sustainable communities, environment and agriculture with water" (St. Mary River Irrigation District, 2016).

3. Water stewardship one-page summary

A one-page summary document was drafted in order to articulate the motivation and strategic direction for SMRID in its water stewardship activities. The one-page document was developed through putting the specific SMRID context into the pre-existing one-page summary template table, and then a process of reviewing and refining. The table format of the one-page makes it easy to understand and supports the overall water stewardship plan document, serving as a communication tool.

This one-page document specifies the alignment between water stewardship and the company values and communicates the high-level objectives under each of four specific areas of focus for water stewardship efforts. These areas of focus and high-level objectives include:

1. Watershed context and external engagement:
    - As SMRID operations depend on the water from the Oldman River Watershed, they must work closely with AEP, irrigators, and municipalities, and continue to engage stakeholders in water stewardship planning.
2. Impact mitigation (beyond the fence line)
    - Understand the impact of SMRID's operations.
3. Operational resilience (within the fence line):
    - Continually improve the efficiency and reliability of our infrastructure to provide water security for customers.
4. Internal collaboration (and continuity):
    - Engage all parts of our organization in water stewardship and risk management.

These objectives were used to help identify and align implementable actions to the overall water stewardship goal of SMRID. See section 13 Implementation Plan.

Table 1. Water stewardship one-page summary table.

Commitment statement: In alignment with our vision to support sustainable communities, environment and agriculture with water, the SMRID will implement water stewardship in the West section and improve water management and work with our stakeholders.				
Objective 'buckets'	**Watershed Context and External Engagement**	**Impact Mitigation (beyond the fenceline)**	**Operational Resilience (within the fenceline)**	**Internal Collaboration (and continuity)**
Objectives	The SMRID operation depends on the water from the Oldman River Watershed and the operations work closely with AEP, irrigators, and municipalities. Some water users rely on the SMRID, and others rely on the water that remains in the river. The SMRID will communicate with external organizations and the public in the water stewardship planning.	Understand the impacts of our operations.	Continually improve the efficiency and reliability of our infrastructure to provide water security for our customers	Engage all parts of our organization in water stewardship and risk management
Programs (sub-objectives)	Support sustainable communities by engaging agricultural communities and municipal stakeholder in water stewardship. Acknowledge the impact of the International Joint Commission with key water supply coming from the U.S. upstream, and mitigate risks. Work with other entities in the watershed to improve water security.	Understand impacts of reducing spill water returns to the Oldman River from infrastructure projects. Understand the water quality impacts of our operations.	Comply with regulatory requirements at all times and exceed them where it makes sense for the environment, our operations, and stakeholders.	Enable coordination across departments to maximize the opportunities of water stewardship actions and alignment with our core values and mandate.
Outcomes	The SMRID supports sustainable communities and agriculture within the Oldman River Watershed. The SMRID's water stewardship actions address future water reliability challenges.			

4. Existing standard compliance, memberships, and accreditations as relates to water stewardship

Partner group name	How the partner group promotes water stewardship efforts
Alberta Irrigation Districts Association (AIDA)	The AIDA is the representative body for all Alberta irrigation districts, promoting public education and research on irrigation in Alberta.
Alberta Conservation Association (ACA)	Involvement in ACA Connectivity Project and Ridge Reservoir Habitat Project to improve riparian management and biodiversity ecosystem services.
South East Alberta Watershed Alliance (SEAWA)	SEAWA promotes the Alberta Water for Life strategy to the public and water users in the South East Alberta watershed. An SMRID employee acts on the SEAWA board to promote information distribution about SMRID operations and initiatives.
Canadian Water Resources Association (CWRA)	An SMRID employee acts on the CWRA board.
Oldman Watershed Council	The SMRID is a member organization.
Canadian Dam Association	The SMRID is a member organization.

5. Site and Physical Scope

This section addresses AWS Criterion 1.1 "*Gather information to define the site's physical scope for water stewardship"*

Indicators for Criterion 1.1 include:
"1.1.1: The site's operational boundaries."
"1.1.2: The water sources from which the site draws."
"1.1.3: The locations to which the site returns its discharges."
"1.1.4: The catchments(s) that the site affects(s) and upon which it is reliant."

The Alliance for Water Stewardship (AWS) Standard (v. 2.0) requires that several pieces of information about the implementer's geographic location and water use be defined in order to evaluate the impact of an implementer in a watershed. The *site* and *physical scope* must be identified for each implementer. As

the AWF project is considering the water stewardship practices of several members of an agri-food supply chain, the site boundaries and physical scope of each implementer are taken into account when determining the *project geographic area* of the supply chain (see *Geographic context* subsection in Appendix A: Watershed Context).

5.1 Site

The *site*, as defined by AWS, can be seen below:

> **Site:** For the AWS Standard, the site is the physical area over which the implementing organization owns or manages land and carries out its principal activities. In most cases it is a contiguous area of land but may also include physically separated but nearby areas (especially if in the same catchment) (Alliance for Water Stewardship, 2019).

Due to the size as well as complexity of the operation and impact of the SMRID, the entirety of the SMRID could not be considered to be the *site*. For the AWF project, the western portion of the SMRID (as displayed in Figure 2) is considered the SMRID site.

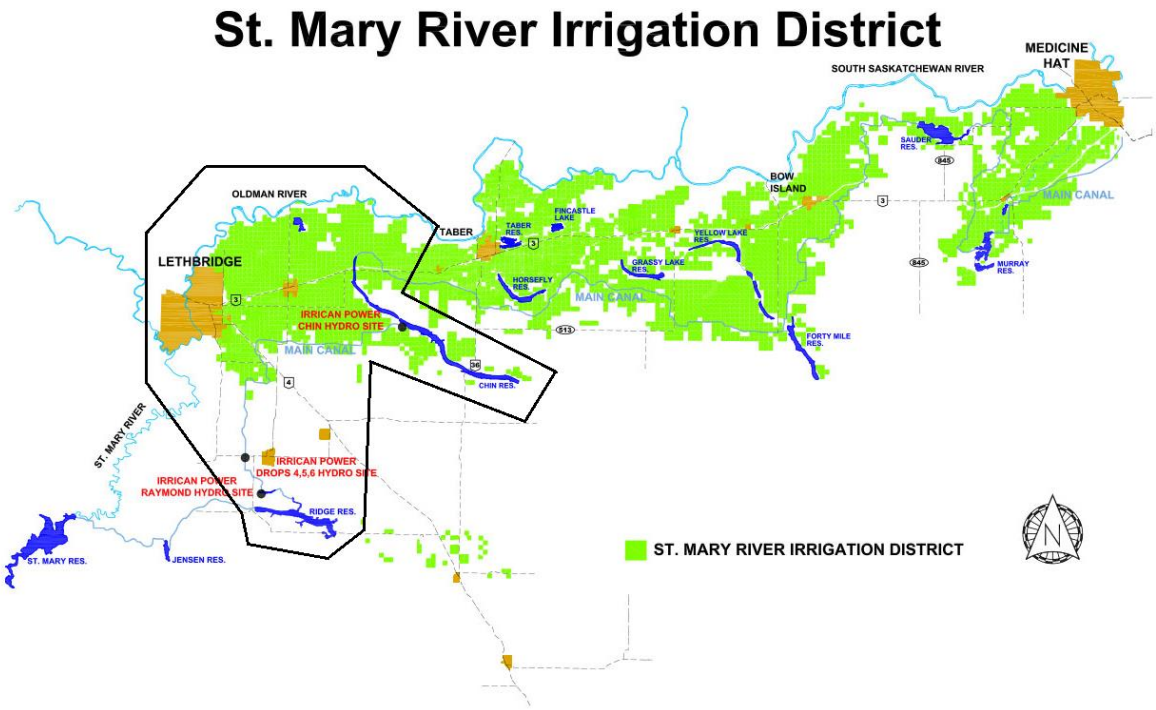

Figure 2. St. Mary River Irrigation District (SMRID) map. The western portion (i.e., the site considered for the AWF project) of the district is outlined in black.

The western portion of the SMRID was considered for the AWF project due to its location, as it is located entirely within the Oldman River subbasin, which is the same subbasin as the other AWF implementer

(see Figure 3 for the location of SMRID infrastructure within subbasin boundaries).

The SMRID receives its water from the Milk River Ridge Reservoir, through requests made to Alberta Environment and Parks (AEP). There is AEP diversion infrastructure located at the Milk River Ridge Reservoir to divert water into the SMRID main canal. The Main Canal infrastructure includes various types of diversion infrastructure, drop structures, canals, pipelines, and reservoirs. Discharge points (known as 'spill points') and drains are located throughout the SMRID system. Spill points are necessary release-points to a canal water delivery system. In the western portion of the SMRID, spill points drain to the Oldman River. Thus, the SMRID West Site, for the purposes of the AWF project, is defined as the SMRID infrastructure extending from Ridge Reservoir to the main canal prior to the Horsefly Reservoir. The "end point" of the SMRID West Site is the SMRID main canal between Chin Reservoir and Horsefly reservoir. All the rest of the SMRID infrastructure and users are considered downstream stakeholders for the activities conducted in the SMRID West Site.

5.2 Physical scope

The implementer's *physical scope*, as defined by AWS, can be seen below:

> **Physical scope:** The land area relevant to the site's water stewardship actions and engagement. It should incorporate the relevant catchment(s) but may extend to relevant political or administrative boundaries. It is typically centered on the site but may include separate areas if the origin of water supply is more distant (Alliance for Water Stewardship, 2019).

The SMRID is reliant on water from the St. Mary, Belly and Waterton rivers, which are tributaries to the Oldman River and some of the natural flow of all three Rivers are diverted to support the SMRID and other irrigation district water demands. All three rivers have at least a portion of their headwaters across the US boarder, in Montana. The quantity of naturally available water in the Oldman River watershed is highly dependant on the snow and rain in the Rocky Mountain headwaters of the watershed. The watershed has also historically experienced flooding and droughts. See, Appendix A: Watershed Context, sub-section: "Water Quantity Context of the Oldman River" for details on the available water. The St. Mary River water quality is influenced by the land uses within its boundaries, including municipal, agricultural, and industrial activities. Concentrations of phosphorous and nitrogen increase in the downstream reaches, however they are within provincial water quality guidelines. See Appendix A: Watershed Context, sub-section "Water Quality" for further information on the water quality in the St. Mary River.

Water from the St. Mary, Belly and Waterton rivers is diverted into the St. Mary and Waterton reservoirs by AEP. To acquire water for the irrigation district, water requests are made by the SMRID to AEP, and water is released from the St. Mary Reservoir into the Milk River Ridge Reservoir, which is then diverted into the SMRID main canal. Due to this reliance on AEP-controlled reservoirs as source water for the SMRID, the physical scope of the SMRID for the AWF project includes these upstream reservoirs, as well as the infrastructure and diversion points within the SMRID West Site (Figure 3).

The Oldman River Watershed can be subdivided into various hydrological unit code (HUC) scales. These subsections show which tributary systems join the mainstem of the river upstream of the implementer, and which are downstream. Below, in Figure 3, the physical scope for the SMRID West Site water stewardship activities is shaded in light blue, and the HUC 8 level watershed boundaries are shown in dark blue. Figure 3 shows that the SMRID West Site covers several HUC 8 watershed boundaries, indicating that there are a variety of stakeholders potentially influenced by SMRID actions, and who may potential influence the SMRID West Site source waters. These stakeholders must be considered when developing the water stewardship plan for the site (see Section 9).

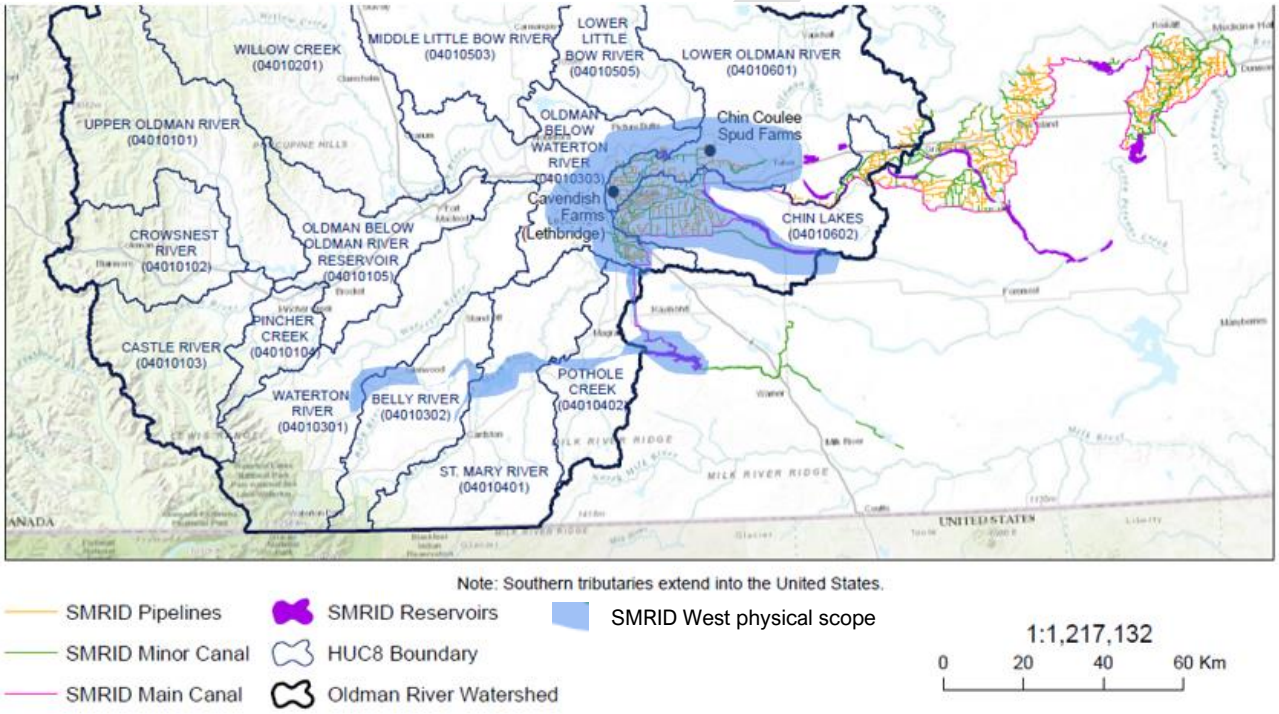

Figure 3. SMRID infrastructure and SMRID West Site boundaries considered in the AWF project. Blue shaded areas show the western SMRID physical scope, which includes upstream source water reservoirs. The boundaries of the Oldman River sub-basin are shown in black.

The physical scope for water stewardship activities of SMRID West Site has been determined through identifying the source of water, the area nearby that could be influenced by the activities of the site, and the places where water is returned to the natural system. The Oldman River receives the spill water from the SMRID West Site, and therefore the portion of the river extending downstream from Lethbridge to the Town of Taber is included in the physical scope. The physical scope extends downstream to ensure environmental areas, other water users and communities are taken into account in the water stewardship activities.

5.3 Project geographic area

The AWF project has one producer consultant and two implementers, one of which is the SMRID West

Site, who are working in concert to implement water stewardship. For the purpose of the project, a geographic area that encompasses the physical scope for both implementers and the producer consultant, has been developed. Figure 4 shows the project geographic area, as well as the major waterways. See Appendix A: Watershed Context, sub-section "Geographic Context" for further description of the project geographic area.

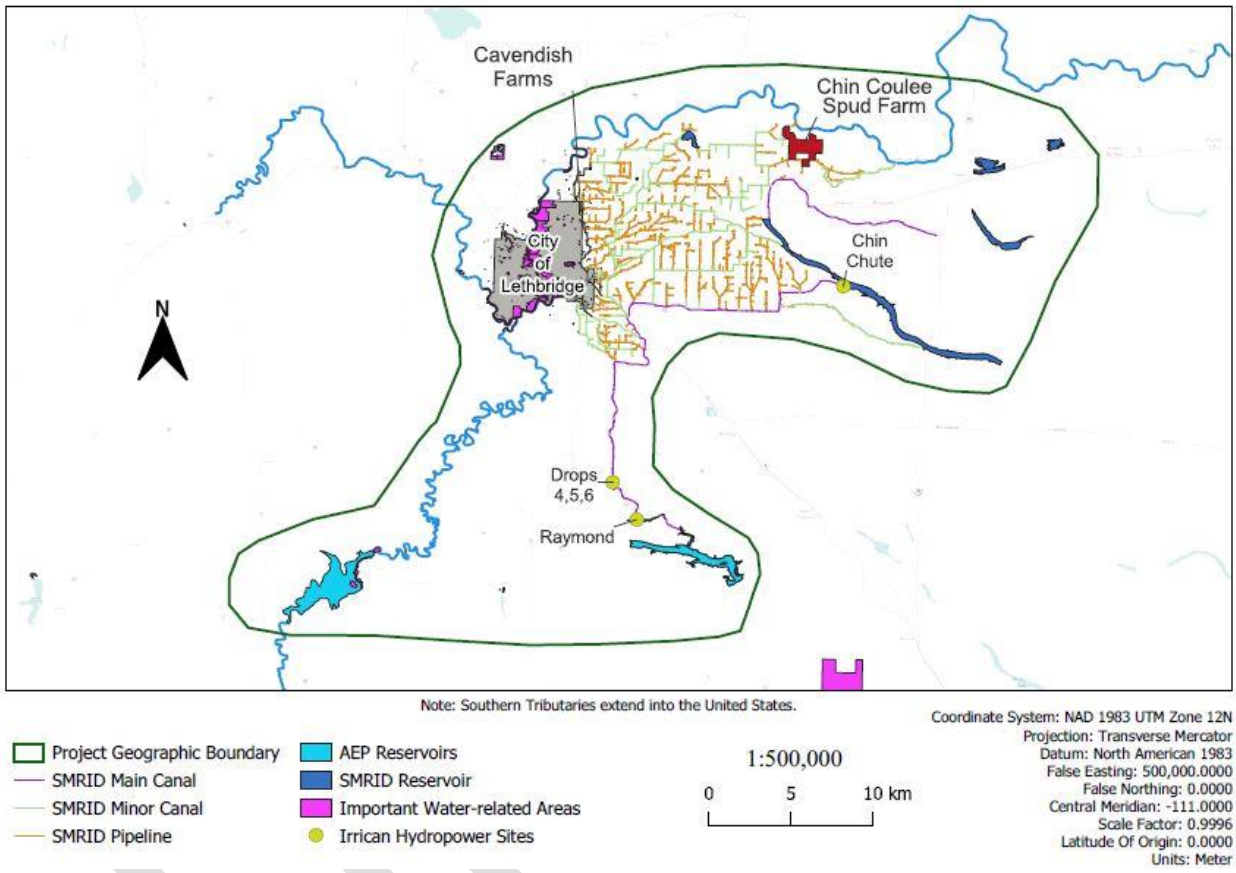

Figure 4. The project geographic area, which includes the physical scope for both AWF project implementers and the producer consultant.

6. Details of site water-related infrastructure

6.1 Water use on site

The SMRID West Site provides irrigation water to a variety of water users, including producers that irrigate over 60 different types of crops (St. Mary River Irrigation District, 2020), industrial facilities, and municipalities. Water is conveyed through a series of canals and pipelines to users and is stored in reservoirs to increase water security for users. Reservoirs within the SMRID West site include Cross Coulee, Raymond Reservoir, Chin Coulee Reservoir, Stafford Reservoir, and North East Reservoir. In addition to their primary purpose for irrigation water, these reservoirs provide recreation opportunities

for local populations, including boating and fishing, as well as wildlife habitat. Irrigation water is also used to support wetlands (Alberta Irrigation Districts Association, 2018).

6.2 Water-related infrastructure

A variety of infrastructure has been built to manage the water that the SMRID delivers to its customers. The main types of SMRID infrastructure are the main canal, canals, pipelines, drop structures, check structures, reservoirs, and dams. The main canal begins where the SMRID's requested water is diverted out of Ridge Reservoir by AEP. This canal is the main artery that carries water throughout the entire district, and has a matrix of canals and/or pipelines flowing out of it. Reservoirs, built off-stream, are built to store or control the SMRID's water supplies. SMRID reservoirs all utilize dams, which serve to direct water from the reservoir elsewhere, such as a stream or diversion canal (St. Mary River Irrigation District).

A series of additional structures aid the SMRID water coordinators and controllers in directing requested water to members. Drop structures (also known as chutes) aid in controlling water's velocity and energy through use of an elevation change to the flow of water. Spillways and check structures also aid in controlling water flow, the former through control of the release of flow from a dam, and the latter by blocking the canal. Screens, Gabion walls and settling ponds are all used to decrease or remove debris from water flowing through canals and pipelines; the size of debris removed depends on the structure used. Turnouts serve to divert water from SMRID infrastructure to a user; the flow of water from a pipeline to a turnout is controlled through use of valves, and gates are used to open and close turnouts. Finally, culverts are used to convey water across roads or other obstacles (St. Mary River Irrigation District).

Table 2: SMRID water-related conveyance infrastructure(Alberta Agriculture, Forestry and Rural Economic Development, 2022).

Conveyance Infrastructure	Length of the conveyance infrastructure (km)
Pipelines – Closed	1003.7
Pipelines – Open	25.9
Membrane-lined canals	64.1
Concrete-lined canals	42.0
Earth canals	457.0
Un-rehabilitated canals	229.2

7. Site water data

This section addresses AWS Criterion 1.3 "*Gather water-related data for the site, including: water balance; water quality, Important Water-Related Areas, water governance, WASH; water-related costs, revenues, and shared value creation.*"

Indicators for Criterion 1.3 considered in this section include:

"1.3.1: Existing water-related incident response plans shall be identified."

"1.3.2: Site water balance, including inflows, losses, storage, and outflows shall be identified and mapped."

"1.3.3: Site water balance, inflows, losses, storage, and outflows, including indication of annual variance in water usage rates, shall be quantified. Where there is a water-related challenge that would be a threat to good water balance for people or environment, an indication of annual high and low variances shall be quantified."

"1.3.4: Water quality of the site's water source(s), provided waters, effluent and receiving water bodies shall be quantified. Where there is a water-related challenge that would be a threat to good water quality status for people or environment, an indication of annual, and where appropriate, seasonal, high and low variances shall be quantified."

"1.3.5 - Potential sources of pollution shall be identified and if applicable, mapped, including chemicals used or stored on site."

"1.3.6 - On-site Important Water-Related Areas shall be identified and mapped, including a description of their status including Indigenous cultural values."

"1.3.7 - Annual water-related costs, revenues, and a description or quantification of the social, cultural, environmental, or economic water-related value generated by the site shall be identified and used to inform the evaluation of the plan in 4.1.2."

"1.3.8 - Levels of access and adequacy of WASH at the site shall be identified."

The SMRID has eight licenses to divert water from the St. Mary, Belly and Waterton rivers, as governed under the Water Act. The total allowable diversion by the SMRID from these three rivers is 880,000 acre-feet (approximately 1.085 million cubic decameters.

Figure 5, below, displays the sequence of reservoirs through the entire SMRID system, and includes total water diversion volumes and storage volume information within SMRID infrastructure at the beginning and end of the 2021 irrigation season.

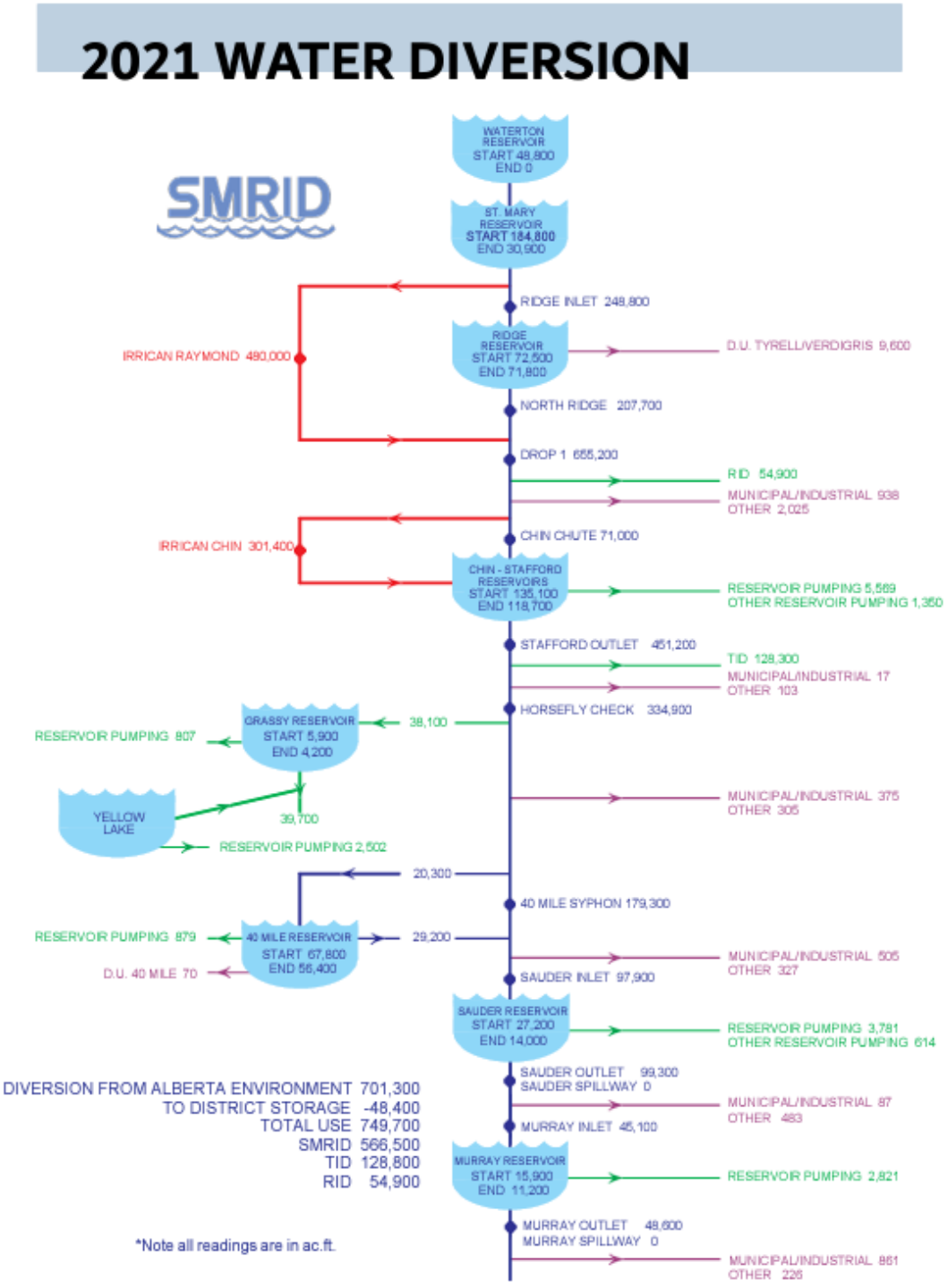

Figure 5. SMRID 2021 Water Diversion(St. Mary River Irrigation District, 2021).

Due to the reliance of irrigation districts such as the SMRID on water controlled by AEP headworks, close communication between the SMRID and AEP is necessary to run the irrigation system for the benefit of the water users and the environment. During the irrigation season, the SMRID and other irrigation

districts in the area meet weekly with AEP to discuss water demand and operations.

The SMRID West Site delivers water to its members as the primary activity of its business. This being the case, water is not only a key input to its business, it is also the central product and service of the SMRID. Therefore, water stewardship planning must be done with a different approach than a company where water is an input to their products.

The SMRID tracks water data through the irrigation infrastructure that they operate to a high granularity of detail. The SMRID uses an intricate system of built-in monitoring and data collection for water flow through all the SMRID operations. This includes water delivery data, reservoir levels, hydro-power generation, as well as water quality data.

7.1 Site Water Balance

The site water balance is intended to help verify that water volumes and flows on the site are reliably measured and accounted for. A simple equation of inflows, outflows and storage on site is used as the basis for the water balance. As the name implies, the equation must balance for the site water balance to be considered complete.

The site water balance equation is:

(Water outflow) = (Water inflow) + (change in storage volume)

The SMRID West Site is a complex system that is not closed to outside influences. Therefore, to create the site water balance, a number of assumptions and generalizations are included.

The inflows to the SMRID West site are from the Milk River Ridge reservoir, and from precipitation on the open canals and reservoirs, and the land that drains into the canals.

The outflows from the site are to a variety of users who pay for water delivery services from the SMRID, including agricultural, municipal and industrial users (Figure 6). Some water in the SMRID system is also lost to evaporation and seepage, and there is some water that flows out of the system at the spill points, however the SMRID tries to reduce and eliminate the loses from the system and deliver the water to their members.

DRAFT

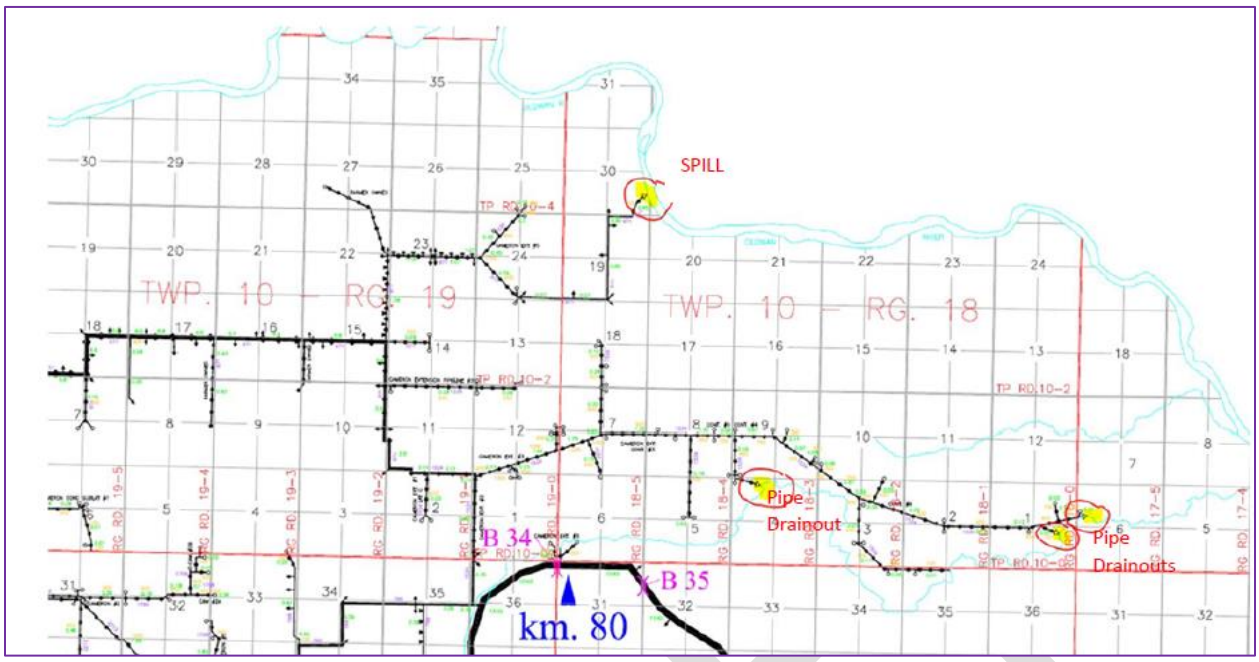

Figure 6: Map of the SMRID system

The inflow and outflow data available for the SMRID West Site are compiled in the table below. The data is compiled for the course of an irrigation season. The main water storage reservoir in the SMRID West Site is operated based on a rule curve that identifies an optimal water level at the beginning and end of the irrigation season, therefore the reservoir is considered a significant factor in the water balance equation.

Table 3 The water balance numbers for the year 2021.

Description	Gross water volume	Considerations or assumptions
Water coming into SMRID West from AEP-Ridge Reservoir	701,300 acre-ft	Total from Figure 5
Water leaving SMRID West to other areas of SMRID	334,900 acre-ft	Flow down the Main Canal at Horsefly check
Water gone to SMRID West members	150,948 acre-ft	Calculated through the water balance equation
Water gone to TID*, RID, industrial, municipal and other uses	199,052 acre-ft	Combining values from Figure 5 for D.U. RID, TID, industrial/municipal and 'other'
Change in storage at Chin Coulee reservoir from start to	-16,400 acre-ft	Difference of values in Figure 5

end of operating season

**Note: The water balance for 2021 is before the 2022 TID and SMRID amalgamation.*

The site water balance equation is:

$$\begin{pmatrix} Water\ outflow \\ to\ SMRID\ West \end{pmatrix} + \begin{pmatrix} Water\ outflow\ to \\ other\ areas\ of\ SMRID \end{pmatrix} = (Water\ inflow) + (Change\ in\ storage\ volume)$$

(150,948 acre-ft) + (533,952 acre-ft) = (701,300 acre-ft) + (-16,400 acre-ft)

7.2 Water Quality Data

Water quality is generally good in the SMRID West Site. Raw irrigation water in the SMRID system is not treated for human consumption and is primarily used for irrigating crops and landscapes. The Government of Alberta has published recommended water quality guidelines to ensure high quality water for crop irrigation and environmental health (Government of Alberta, 2018).

The provincial irrigation water guideline for Total Dissolved Solids (TDS) recommends a maximum of 500-3500 mg/L. This recommended range is crop-specific; For example, strawberry irrigation recommends a maximum of 500 mg/L TDS (Government of Alberta, 2018). Salinity is often described by electrical conductivity and a Sodium Adsorption Ratio (SAR). SAR is a ratio of sodium to calcium and magnesium and has no units. A high SAR therefore indicates that the water has high amounts of sodium compared to calcium and magnesium, and may negatively impact crops and soils. Water quality guidelines for safe irrigation water recommend a SAR ≤ 5, and an electrical conductivity ≤ 1 dS/m (Government of Alberta, 2018).

To protect Alberta's surface water and environment, previous quality guidelines recommended a maximum of 0.05 mg/L of Phosphorus and 1.0 mg/L of Nitrogen; However, these values have been withdrawn as Alberta recognized that background nutrient concentrations vary throughout the province. Guidelines now indicate that Nitrogen and Phosphorus concentrations should be low enough to prevent negative changes to aquatic biodiversity and oxygen levels (Government of Alberta, 2018). Regarding Total Suspended Solids (TSS) in clear waters, guidelines recommend a maximum increase of 25 mg/L from background concentrations for the short term (i.e., 24 hours), and a maximum increase of 5 mg/L from background concentrations for the longer term (i.e., over 24 hours). Narrative guidelines for temperature indicate that changes in temperature should not modify thermal stratification or turnover (Government of Alberta, 2018).

Table 4 provides averages of various water quality measurements at SMRID West Site water quality monitoring stations. It is important to note that this table displays water quality averages over time (2006-2020) and geography (18 sample stations). This data therefore provides a general overview of

DRAFT

SMRID's water quality as part of their extensive water monitoring program.

As described in Table 4, SMRID's average water temperature is 18.34°C, with averages of each site ranging from 17.63-21.65°C. This would indicate that the temperature is stable, and does not modify stratification or turnover, as described by the Provincial guidelines. Average electrical conductivity at the SMRID sampling sites was found to be 0.24 dS/m with a SAR of 0.3. Both parameters are under the maximum recommendations as per the Provincial guidelines, which indicates that SMRID's irrigation water has low salinity and is ideal for crops. TSS was found to be an average of 11.51 mg/L in the SMRID canals, and therefore likely within range of the 5 mg/L change from background concentrations as described in the guidelines. SMRID water has an average of 141.30 mg/L of TDS, which is well below the maximum range of 500-3500 mg/L, indicating high quality water. SMRID sites had an average of 0.33 mg/L of Nitrogen and 0.03 mg/L of Phosphorus, and while guidelines are now narrative, these low concentrations are below the previous maximum recommended levels of 1 mg/L of Nitrogen and 0.05 mg/L of Phosphorus. Overall, this data indicates that SMRID's irrigation water is high quality.

Table 4: Average water quality values for various parameters at SMRID West Site water quality monitoring stations (Alberta Irrigation Districts Association, 2021).

SMRID West	Water Temperature (°C)	Electric conductivity (dS/m)	Sodium adsorption ratio (-)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	[X]
	18.34	0.24	0.30	11.51	141.30	0.33	0.03	[X]

7.3 Annual water-related costs, revenues and value generation

All of the operational and capital costs of the SMRID West site are water-related because the SMRID is a water delivery business. Similarly, the value generation from hydroelectric production, and from member fees paying for water encompass all the revenue for the SMRID. Therefore, this section will not be completed as it would not serve to identify possible water stewardship opportunities because the water-related costs and revenues are equivalent to the total business costs and revenues.

7.4 Potential sources of pollution to nearby and downstream waterways

There are minimal sources of pollution identified to nearby and downstream waterways within the SMRID West site facilities.

7.5 Water-related incident response plans

The site is required to identify any existing emergency response plans that is has that address water-related risks and events. This could also be a general site incident response plan that can be applied to water-related risks and emergencies.

DRAFT

The SMRID has numerous emergency response plans related to water, particularly dam and infrastructure safety.

7.6 Water, Sanitation and Hygiene (WASH)

The drinking water used by employees at the SMRID facilities is filtered and sanitized to meet the strict national government drinking water quality guidelines for human use. All employees have access to safe drinking water and safe and adequate toilets and washroom facilities.

8. Site water risks and opportunities

This section addresses AWS Criterion 1.7 "*Understand the site's water risks and opportunities: Assess and prioritize the water risks and opportunities affecting the site based upon the status of the site, existing risk management plans and/or the issues and future risk trends identified in 1.6.*"

Indicators for Criterion 1.7 considered in this section include*:*
"1.7.1: Water risks faced by the site shall be identified, and prioritized, including likelihood and severity of impact within a given timeframe, potential costs and business impact."
"1.7.2: "Water-related opportunities shall be identified, including how the site may participate, assessment and prioritization of potential savings, and business opportunities."

Understanding the water risks and opportunities for the site is essential to quantifying the value to be gained from water stewardship. By identifying the risks with enough detail to then determine how best to reduce or mitigate them, a site will be able to protect itself from unexpected costs and impacts through the water stewardship implementation work it undertakes.

There are four categories of risk for a site to consider.
Types of risk:

- Operational/physical (e.g. people, assets, infrastructure issues, by virtue of being located where the site is, drought/ flooding)
- Regulatory/legal (e.g. water allocation restrictions, discharge quality)
- Reputational (e.g. pressure from local watershed stakeholders, market share and brand protection)
- Financial (e.g. water costs, customer demands on crop water attributes)

WaterSMART Solutions made an initial educated attempt to categorize risks and opportunities for this AWF project by collaborating with the project team members from SMRID, Working Group members, and

engaged stakeholders in the brainstorming and risk identification process. Through a collaborative process, risks and opportunities were identified that seem relevant to SMRID, to the potato supply chain, and to the Oldman River watershed. Over a series of steps in the project process the risks were grouped, shortlisted, and evaluated.

A general risk matrix (Figure 6) was prepared by WaterSMART for the example exercise of evaluating risks based on the severity and likelihood. It includes these four categories and results in a risk ranking structure with four levels. The list of identified risks were ranked using this example risk matrix. This risk matrix and initial risk and opportunities ranking is an example tool by WaterSMART which SMRID can use moving forward if they so choose.

Later in this document is the Implementation Plan, which outlines ongoing, short-term, and long-term water stewardship actions for the SMRID. Each action corresponds with the relevant risks and opportunities below. This is to ensure that each action addresses risks and opportunities for the SMRID.

DRAFT

			Severity of risk			
			Low	Medium	High	Severe
			1	2	3	4
	Operational (people /assets)		minor	moderate	significant	critical failure
	Regulatory /legal		minor	moderate	significant	shut down
	Reputational (public concern)		a few people /minor concern	many people /moderate concern	many public and business influencing people	long term bad reputation
	Financial		<$50,000	>$50,000 to $500,000	>$500,000 to $1,000,000	>$1,000,000 (critical loss)
Likelihood of risk (frequency)	Remote	1				
	Occasional	2				
	Probably	3				
	Urgent/Freque	4				
			Level 1			
		Risk ranking	Level 2			
			Level 3			
			Level 4			

Figure 7 Example matrix for evaluating severity of risks to SMRID West site.

DRAFT

Table 5: Identifying and ranking risks to the SMRID

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Severity (1 to 4)	Priority score
[#]	Water security • Drought and water demand • Worse in warm and dry years • Southern Alberta a semi-arid ecosystem – water availability already limited in this region • Fluctuation in precipitation at the headwaters of the St. Mary, Belly and Waterton rivers	Additional water storage for the SMRID West operation Alberta irrigation modernization, which is expected to result in significantly reduced volumes of water lost to seepage, evaporation and spilling.	**[value]**	**[value]**	**[level]**
[#]	Risks from invasive species • Costs to manage the invasive species • Invasive species (such as zebra mussels) can significantly reduce infrastructure longevity	Public education on the threat of invasive species to local water systems	**[value]**	**[value]**	**[level]**
[#]	Climate change • Changes in precipitation at the headwaters • Volatility – increased risk of both flood and drought • Shift in timing of precipitation, requiring different storage system management and possibly different infrastructure	Additional water storage enables the SMRID to better serve members needs and have more resilience in water shortage periods • Expansion of Chin reservoir is a project currently underway • Alberta irrigation modernization will rehabilitate canals and fit pipelines to modernize the SMRID system, which will increase the efficiency of SMRID water delivery	**[value]**	**[value]**	**[level]**

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Severity (1 to 4)	Priority score
		(through decreases in evaporation and leakage)			
[#]	Decreased reputation and public license for the SMRID and irrigated agriculture • Public views may cause changes in provincial funding for Alberta irrigation districts and the SMRID • Perspective of disproportionate use of public funds (e.g., AIM program funded provincially) and federally financed • Perception of environmental considerations being taken as inefficient (reduction of in-river flow) • Negative publicity from some environmental NGOs	Improved reputation and public license for the SMRID and irrigated agriculture	**[value]**	**[value]**	**[level]**
[#]	Inability of the SMRID systems to handle a large influx of stormwater from a high flow event	An opportunity exists in having live data regarding stormwater volume to enable the SMRID to utilize stormwater in the system • The SMRID could aid in managing serious stormwater events, which could impact SMRID works or neighbours. • SMRID works on its own land to mitigate runoff	**[value]**	**2 [value]**	**[level]**

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Severity (1 to 4)	Priority score
		• If stormwater water quality meets SMRID criteria, water could be pumped back into the SMRID system • Allows SMRID to play a role in flood management • Allows system to capture additional water *(note that this would need to fit within the regulatory system)*			
[#]	Risks from plant growth in-canal • SMRID water treatment in-canal (magnicide) to limit plant growth • Causes issues to irrigation equipment	Use of learnings from RDAR study on algae and aquatic weed control in-canal	**[value]**	**[value]**	**[level]**
[#]	Reliance on water from a transboundary source • The possibility of increased usage of water by the USA from the St. Mary River system (as per the IJC and Transboundary Water Agreements) poses a threat to the operations of the SMRID • The possibility of changes to the IJC (a current study is being undertaken to review the 1921 order) • Transboundary Water Agreements pose a threat to the operations of the SMRID	Involvement in International Joint Commission (IJC) discussions • Advocacy for southern Alberta agricultural sector through collaboration with provincial and federal negotiators • Current discussions planned	**[value]**	**[value]**	**[level]**

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Severity (1 to 4)	Priority score
[#]	Increased severity of project funding approvals		**[value]**	**[value]**	**[level]**
[#]	Water loss from seepage, leakage and evaporation SMRID system • Monitoring data extensive in the SMRID system • Potential impacts to surrounding communities, farmland, or dwellings • Inability to deliver water	Canal rehabilitation and/or replacement with pipeline to limit evaporation and leakage losses SMRID Government of Alberta funded and Canada Infrastructure Bank financed projects currently underway for this work (see Alberta irrigation modernization projects)	**[value]**	**[value]**	**[level]**
[#]	Contamination of the water in the SMRID systems • Oil/gas pipeline break or hazardous material spill affecting SMRID water quality in canals or reservoirs • Contamination of SMRID water via stormwater runoff • Contamination of SMRID water via grazing around reservoirs	An opportunity for almost real-time water quality testing to enable SMRID users to return water to the SMRID system • SMRID works with water users to mitigate runoff • SMRID works on its own land to mitigate runoff • If user's water quality meets SMRID criteria, water could be pumped back into the SMRID system • Allows SMRID to play a role in flood management • Allows system to capture additional water	**[value]**	**[value]**	**[level]**

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Severity (1 to 4)	Priority score
[#]	A risk is the complexity of managing water in a drought and that there isn't a prescribed regulatory process, the regulatory group could 'get it wrong' and result in limited water availability to the implementers • Provincial drought management is not prescriptive • Licence priority in a drought situation – can have supply chain impacts (e.g., if a processor is given priority over a grower)		**[value]**	**[value]**	**[level]**
[#]	The risk is that there is no return on investment for producers implementing water stewardship (the extreme case is the costs of implementation are so high that producers' operations are no longer viable) • Concern – water stewardship practices will be 'top-down' and the burden for implementation will fall on the growers without compensation • Sustainable sourcing demanded by the buyers/market • Must respond to third party organizations that monitor sustainable sourcing	The opportunity is in finding how to make implementation of water stewardship financially beneficial for producers • Should processors pay farmers for sustainable production? • Sustainable sourcing demanded by the buyers/market • Must respond to third party organizations that monitor sustainable sourcing • Provide incentives to the producer	**[value]**	**[value]**	**[level]**

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Severity (1 to 4)	Priority score
	• Provide incentives to the producer				

Table 6: Identifying and ranking opportunities associated with the SMRID

Ranking	Opportunity
[#]	SMRID emergency response plan to hazardous materials contamination and/or oil/gas pipeline break • In the event of an emergency, necessary materials and infrastructure could be close at hand to preserve water quality and ensure water delivery is delayed for as little time as possible
[#]	Incentive for producers using SMRID water to not use all of their allocation • Producers using less of their allocation could mean more water in the SMRID system for distribution • In-canal flow may be more difficult to predict if water use by users is variable • Improve reputation of farming community as water efficient
[#]	Additional hydro-electric/renewable energy generation at SMRID West operation • Ideally, energy stored could be maximized to sell at optimal times (such as winter) • Additional revenue for SMRID operations
[#]	Financial incentives for water stewardship (via markets) • Marketing products adhering to water stewardship standards as premium, therefore selling at a higher price – assumes that increased revenue from sales are distributed throughout the supply chain

Ranking	Opportunity
[#]	Telling the southern Alberta agriculture story • Clean water • World-class infrastructure • Right conditions for potatoes • Communicating what is already being done is an opportunity (to facility staff, the public, regulators, etc.)
[#]	Promoting the ability of irrigation and agriculture to improve the provincial and national GDP • May aid in attracting more processing facilities to Canada, specifically the southern Alberta agricultural corridor

DRAFT

9. Stakeholder Engagement

9.1 Identifying Stakeholders

This section addresses AWS Criterion 1.2 "*Understand relevant stakeholders, their water-related challenges, and the site's ability to influence beyond its boundaries."*

Indicators for Criterion 1.2 considered in this section include*:*
"1.2.1: "Stakeholders and their water-related challenges shall be identified. The process used for stakeholder identification shall be identified."
"1.2.2: "Current and potential degree of influence between site and stakeholder shall be identified, within the catchment and considering the site's ultimate water source and ultimate receiving water body for wastewater."

Stakeholder engagement is an essential part of water stewardship because it involves reaching beyond the fence-line of the site and understanding the concerns, needs and interests of the stakeholders in the area. Stakeholders of the implementers site are groups or entities of people that can be affected by the implementer's activities.

Stakeholder: Any organization, group or individual that has some interest or 'stake' in the implementing organization's activities, and that can affect or be affected by them. The four main categories of stakeholder are: (1) Those who impact on the organization; (2) Those on whom the organization has (or is perceived to have) an impact; (3) Those who have a common interest; (4) Neutral - those with no specific link, but with whom it is relevant to inform. Of most relevance to water stewardship are stakeholders associated with water use and dependency, but engagement should not be limited to these. (Alliance for Water Stewardship, 2019).

The most relevant stakeholders for water stewardship activities are individuals, groups, and entities that share the same water sources. Many issues are interlinked, such as environmental health, community wellbeing, local economy, and the organization's reputation. This means that stakeholder will not be exclusively water users upstream or downstream from the implementer.

It is valuable to understand the water-related challenges from the stakeholders because it can inform the types of stewardship activities that will be beneficial to the catchment and the local communities. It can also help align the implementer with stakeholders to form partnerships for water stewardship work.

The stakeholders were identified in an iterative process of thinking through which organizations are connected to SMRID in terms of water-related activities, and then which individual for each organization could be contacted. The entity that supplies water, and the entity that processes wastewater for the site were added to the list, any major entity that shares the same source of water was considered in terms of

the potential impact from the site, and the organizations that are connected through management of water that is used by the site were considered. Then organizations were added to the list of stakeholders based on the fact that the overall watershed health and water supply were identified as shared water challenges, and also based on what potential water-related risks and impacts from the site were identified. There were also organizations added to the list of stakeholders simply based on their already being engaged as part of the project Working Group.

9.2 Stakeholder engagement tracking

As stakeholder engagement is essential for water stewardship and reaching across the fence-line, SMRID engaged in four different engagement formats with a variety of stakeholder groups. This included Working Group meetings, an in-person focus group, an online discussion via Microsoft Teams, and emailed questions. The objectives of each engagement were to provide understanding for stakeholders to be able to answer questions, understand their perspectives on water-related concerns, and hear suggestions for implementable water stewardship actions that could mitigate those concerns.

Working Group Meetings

Four Working Group meetings were held for the Agricultures Water Future project. The meetings included various discussions of the risks, opportunities, actions, and progress around the SMRID West site water stewardship planning. The Working Group meetings were held October 26th 2021, January 20th 2022, April 12th 2022, and October 19th, 2022.

The Working Group included representatives from the following organizations:

- Cavendish Farms
- Chin Coulee Spud Farm
- Nutrien
- Alberta Irrigation Districts Association
- Potato Growers of Alberta
- Agriculture and Agri-Food Canada
- University of Lethbridge
- Lethbridge College
- City of Lethbridge
- Prairies Economic Development Canada
- Alberta Innovates
- Oldman Watershed Council
- Alberta Agriculture and Forestry
- Lethbridge Economic Development
- Ducks Unlimited
- SCS Global Services
- Canola Council of Canada
- Eastern Irrigation District

DRAFT

- Crop Sustainability Working Group
- Ag for Life
- ARECA

Focus Group

A focus group was held in Lethbridge on March 3, 2022, to bring together stakeholders of the SMRID. The stakeholders in this session included:

- Alberta Irrigation Districts Association
- Alberta Agriculture, Forestry and Rural Economic Development
- Alberta Conservation Association
- The Municipal District of Taber
- Potato Growers of Alberta
- City of Lethbridge
- Lethbridge County

This stakeholder group highlighted several key water-related concerns, the first being a reduction in government support and funding to support water quality and monitoring. Government responsibility in water quality monitoring has decreased over the last few years, as they used to take samples and provide administration and analysis. Much of this responsibility now lies within irrigation districts and AIDA, yet the agricultural sector feels that the government must be more involved to secure public confidence in the data. A second key concern is invasive species within upstream reservoirs, as stakeholders indicated that the boat cleaning and mussel program needs to evolve so there are other stakeholders that can be bonified inspectors. Further concerns include impacts of climate change on water availability and water quality impacts of upstream users (i.e., impacts of upstream coal mining).

This focus group then brainstormed and prioritized potential actions to address water stewardship and sustainability. The actions, prioritized from high to low, include:

1. Leveraging government support and funding for water quality and quantity monitoring.
2. Creating and formalizing opportunities for communication regarding water stewardship and water management in agriculture.
3. Communicating, and educating on farm level best management practices.
4. Working with end users to develop standards and to communicate the credibility of these standards publicly.
5. Companies to develop pages on their websites that specifically address sustainability and stewardship practices.
6. Collaboratively agree on one climate change projection model for planning purposes.
7. Buyers need to implement and support standard methods for purchase.
8. Implementing regional data collection to report on the big picture, of where and how water is used for irrigation throughout Southern Alberta. Increased data collection would aid in

DRAFT

sustainability reporting for irrigation.

9. Improving inspection program for upstream reservoirs.

Online Meeting

An online meeting was held on March 31 via MS Teams for those who could not make it to the focus group, and it included [redacted] and the [redacted]. Stakeholders identified water related concerns to be enough water supply for all users, especially enough to support fish and other aquatic species in the river. Actions identified to address these concerns included ensuring river instream flow objectives, wetland restoration and conservation, improving water use efficiency, defining sustainability, and encouraging more collaborative discussions regarding the balance of agriculture and environmental protection. A key action to addressing instream needs is improving water use efficiency, which includes irrigation moving towards high- and low-pressure pivots, producers diversifying their crops, and instrumentation that allows producers to understand exactly when to irrigate.

Email Correspondence

Several stakeholder groups were invited over email to provide their perspectives to the same questions of water related concerns and potential mitigation actions. On March 28, 2022, the following groups were contacted:

- Raymond Irrigation District
- Lethbridge North Irrigation District
- Trout Unlimited
- Pulse Growers of Alberta
- Alberta Wheat Commission
- Alberta Sugar Beet Growers
- Government of Alberta (a Fisheries Biologist)
- Town of Taber

The [redacted] responded to the outreach email on April 8, 2022, and highlighted their concern for water quality. As [redacted] receives water from Chin Reservoir and the TID main canal, they are concerned with the amount of organics in canal water. To mitigate this water quality issue, [redacted] feels that they would receive higher water quality if they received water from Chin Reservoir all-year round. With higher quality water they would require less chemicals to treat algal blooms. [redacted] suggested that to support water stewardship in the Oldman River watershed, all municipalities, counties, and Municipal Districts must be involved to ensure the watershed's health and allocate funds to maintain that health.

The [redacted] responded on April 5, 2022 and highlighted their concerns for sufficient water supply to provide adequate irrigation for crops, along with their ability to capture and store water. To mitigate these water supply concerns, [redacted] suggests increasing the number and expansion of reservoirs, increase funding for AEP to expand snowpack monitoring, and being vigilant in defending the

DRAFT

IJC water agreement as it stands. Other water related concerns include maintaining high quality water in Alberta and restricting aquatic invasive species that may impact recreation, irrigation, and potable water transportation. To mitigate water quality concerns, [redacted] suggests careful review of future industrial expansions, and increase government funding for AEP water quality monitoring in Alberta's rivers, lakes, reservoirs, and canals. To mitigate invasive species, it is necessary to have a strict monitoring program and more boat checks with cleaning stations. [redacted] believes that improvement of water stewardship includes participating in water quality monitoring programs, undertaking water conservation projects, and increasing efficiency of diverted water use.

The [redacted] responded on April 12, 2022 to highlight their water related concerns of efficient water use, water supply for irrigation, the amount of flood irrigation that is still being used, leaking ditches creating alkaline soils, and potato plant wastewater management. To mitigate these concerns, the [redacted] suggests that the government allow more water for irrigation from upstream reservoirs, increase oversight of irrigation boards to ensure water is being used efficiently and strategically, invest in more low-pressure pivots, and invest in irrigation pipelines instead of open ditches. The [redacted] highlighted a number of actions for water stewardship, including bringing back government assistant programs to offer rebates on upgrading irrigation equipment, decreasing irrigation during rain events, decreasing irrigation canal leakage, replacing ditches with pipelines, and educating producers on water efficiency techniques.

[redacted] responded on April 14, 2022 with a detailed email of concerns and suggested concrete actions. They identified a concern for the amount of fish losses from getting into irrigation canals and dying at the end of the irrigation season. Dams and weirs fragmenting fish habitat is noted as a concern. A significant concern is invasive species and the impacts to the aquatic ecosystems. Climate change was also noted as a concern, particularly in combination with water demands where the concern is climate change may create additional challenges for meeting instream flows and water quality needs for ecosystems. Stream and riparian habitat degradation in the headwaters was noted as a concern, particularly for native trout species. [redacted] stated that generally they support the following approaches to mitigate the water-related challenges; on-the-ground restoration work, education and awareness initiatives to draw attention to issues, science-based decision making, and regulatory tools to conserve and protect water resources. They also support increasing water efficiency in irrigation, as well as development of crops that are less water intensive. The suggested direct water stewardship actions for this project are to partner with [redacted] in habitat rehabilitation projects, partner with local academic institutions on related research projects, and explore solutions to fish entrainment in irrigation canals.

DRAFT

10. Shared water challenges

This section addresses AWS Criterion 1.6 "*Understand current and future shared water challenges in the catchment, by linking the water challenges identified by stakeholders with the site's water challenges.*"

Indicators for Criterion 1.6 considered in this section include*:*
"1.6.1 - Shared water challenges shall be identified and prioritized from the information gathered," and "1.6.2 - Initiatives to address shared water challenges shall be identified."

As is identified in Appendix A: Watershed Context, the Oldman River Watershed experiences high water demands relative to the annual volume of water naturally available. For years when there is less precipitation than usual and lower natural water supply, there may not be sufficient water for all water users to withdraw their full amount. Water use is managed by the provincial government through a water licencing system that uses priority numbers, the more senior licences have prior right to withdraw their water allocation when there is water scarcity. The relative demand in the Oldman River Watershed is high and the government no longer accepts applications for new surface water licences. The most commonly discussed shared water challenge is water scarcity or drought.

Much of the geographic region of the Oldman River Watershed is arid and experiences hot, dry summers (see Appendix A: Watershed Context). Most of the agricultural water users in the region are experienced in managing limited water availability and changing their operations in drier years, however economic impact is still felt and there is still significant concern about extreme events and multi-year droughts as these have very significant negative impacts.

The stakeholder engagement process identified a variety of shared water challenges. The following are the primary shared water challenges:

Impact of climate change on water availability. Changing timing and volume of water available due to changes in natural precipitation (snow and rain).

Impact of climate change and the high water demands compounding stress on the ecosystems. There are concerns that climate change may create additional challenges for meeting instream flow and water quality needs for southern Alberta rivers, and therefore the health of river ecosystems (and connected ecosystems) will be negatively impacted.

Reduced government support for water quality monitoring. Lack of government support for streamflow monitoring stations and water quality monitoring programs results in very limited data for all forms of planning and water management.

Oldman watershed closed to new licences. The fact that the basin is fully allocated (Alberta

DRAFT

Environment, 2006)and there are no more surface water licences being issued is a shared water challenge.

Threat of invasive species. Invasive species can cause significant damage to ecosystems, native species populations, irrigation infrastructure, water treatment infrastructure, recreation, etc.

Water quality impacts of upstream users. Increasing sedimentation, contaminants, or factors that increase water temperature upstream negatively impact downstream uses.

Wetland restoration and conservation. Wetlands are considered valuable natural areas providing many services and loss of these areas is an ongoing challenge in the watershed.

Meeting instream objectives in the river and ensuring water in the river for ecosystem needs. There are minimum flow objectives for the Oldman River and its tributaries that are not always met, which is a challenge for aquatic and riparian ecosystems and species.

Increase of organics in water, and algae blooms. Increasing nutrients and organics in the water bodies leads to water quality problems, including algae blooms, which are difficult to manage.

10.1 Opportunities and actions

The stakeholder engagement focus group (March 3rd) discussed shared water challenges, then they identified the opportunities and actions to respond to those challenges, and then voted on the ideas list to prioritize them. The focus group brainstormed and prioritized actions to address water stewardship and sustainability. Table 7 below captures the results of that exercise.

DRAFT

Table 7. Stakeholder focus group prioritized actions to address water stewardship and sustainability.

Priority items	Government and Municipal	Industry Associations	Conservation Groups	Implementers
Leveraging government support and funding for water quality and quantity monitoring	**2 votes**	**2 votes**	**1 vote**	**1 vote**
Creating and formalizing opportunities for communication regarding water stewardship and water management in agriculture	**3 votes**		**1 vote**	**1 vote**
Communicating, and educating on, farm level best management practices		**2 votes**		**2 votes**
Working with end users to develop standards and to communicate the credibility of these standards publicly	**2 votes**	**1 vote**		
Companies to develop pages on their websites that specifically address sustainability and stewardship practices (e.g., "Sustainability FAQ")	**1 vote**		**1 vote**	
Collaboratively agree on one climate change projection model for planning purposes	**1 vote**			**1 vote**
Buyers need to implement and support standards methods for purchase		**1 vote**		**1 vote**
Implementing regional data collection to report on water use		**2 votes**		
Improving inspection program for upstream reservoirs (i.e., modernise inspection program)		**1 vote**		

11. Important Water-Related Areas

This section addresses AWS Criterion 1.3 "*Gather water-related data for the site, including: water balance; water quality, Important Water-Related Areas, water governance, WASH; water-related costs, revenues, and shared value creation.*"

Indicators for Criterion 1.3 considered in this section include:
"1.3.6: On-site Important Water-Related Areas shall be identified and mapped, including a description of their status including Indigenous cultural values."

Please see Appendix A: Watershed Context (page 15) for an introduction to Important Water-Related Areas, and the definition according to AWS.

11.1 Site

Name of IWRA and description	Location	Value or factors of importance	Status	Any water-related risks
Cross Coulee Reservoir	Beginning of SMRID system	Economic value	Good working condition	Invasive species, riparian damage and sedimentation
Raymond Reservoir	Beginning of SMRID system	Economic value	Good working condition	Invasive species, riparian damage and sedimentation
North-East Reservoir	Central to SMRID West distribution	Economic value	Good working condition	Invasive species, riparian damage and sedimentation
Chin Reservoir	Key storage for central and east SMRID	Economic and community value	Good working condition	Invasive species, riparian damage and sedimentation
Stafford Reservoir	Storage for central and east SMRID	Economic value	Good working condition	Invasive species, riparian damage and sedimentation

11.2 Project Geographic Area

Name of IWRA and description	Location	Value or factors of importance	Status	Any water-related risks
Oldman River		Community, economic, environmental	Fair[1]	
St. Mary River		Community, economic, environmental	Fair[1]	
St. Mary Reservoir	Upstream water source for SMRID	Community, economic, environmental	Good	
City of Lethbridge water treatment and wastewater treatment facilities	Lethbridge	Community, economic, environmental	Good working order	
Lethbridge Coulee	Lethbridge	Community, economic, environmental	Fair	
Hellen Schuler Nature Reserve	Lethbridge	Community, economic, environmental	Good	
Henderson Lake	Lethbridge	Community, economic	Good	
Park Lake	North-west of Lethbridge	Community, economic, environmental	Good	

[1] From the Oldman River State of the Watershed Report (Oldman Watershed Council, 2010)

DRAFT

12. Indirect Water Use by site

This section addresses AWS Criterion 1.4 "*Gather data on the site's indirect water use, including: its primary inputs; the water use embedded in the production of those primary inputs the status of the waters at the origin of the inputs (where they can be identified); and water used in out-sourced water-related services.*"

Indicators for Criterion 1.4 considered in this section include:
"1.4.1 - The embedded water use of primary inputs, including quantity, quality and level of water risk within the site's catchment, shall be identified."
"1.4.2 - The embedded water use of outsourced services shall be identified, and where those services originate within the site's catchment, quantified."

The AWS Standard directs water stewards to think through and begin to understand the reliance on water quality and quantity that arises in their suppliers and key input products. The indirect water use is referring to water used in the creation, processing and transportation of goods and services supplied to the site. It is increasingly recognized as good practice for an operation to understand their indirect water use to some extent, and the importance of water through the agriculture supply chain is a central principal for the AWF project overall. Involving multiple, connected supply chain members as implementers in water stewardship within the project inherently incorporates indirect water use.

Indirect Water Use: Water used in a site's supply chain representing that used in the manufacturing and provision of all products and services, excluding water used on site. In effect, it is the sum of 'embedded water' of all products and services (Alliance for Water Stewardship, 2020).

Primary Input: The materially important products or services that a site consumes to generate the products or services it provides as its primary function (Alliance for Water Stewardship, 2019). A larger component of materials, ingredients or services used at the site to produce its principal outputs (products or services). It does not include supplies for 'one-off' constructions or services such as for infrastructure or buildings (Alliance for Water Stewardship, 2020).

AWS guidance suggests that primary inputs should include any externally procured goods or services that account for over 5 per cent of the total weight of the goods generated, or 5 per cent of the costs of a site (Alliance for Water Stewardship, 2020).

The list of primary inputs to the SMRID West site is below:

- **[list of primary inputs and relevant details]**

13. Implementation Plan

Water stewardship is aligned with the vision of the St. Mary River Irrigation District (SMRID), which is "supporting sustainable communities, environment and agriculture with water." Water is central to everything the SMRID does, and the quality and reliability of the water supply is a key commitment to its members. As such, the SMRID recognizes that they have a role as water stewards and management of the water in their system impacts many other water users in the watershed.

13.1Throughout this section the water stewardship actions are categorized in alignment with the four water stewardship objectives in Table 1. Water stewardship one-page summary table. As well, each action has one or more potential metrics identified. These metrics have been developed from an initial brainstorming process only. If the SMRID chooses to conduct monitoring and reporting on their water stewardship actions, internally or externally, they will likely determine the exact metrics to be used through an internal, strategy-based decision-making process.

The last column in each of Table 8, Table 9, and Table 10 links to Section 8: Site water risks and opportunities of this document. The process of identifying and ranking the water-related risks and opportunities for SMRID enables the implementation actions to be chosen based on their ability to mitigate risks or leverage opportunities. The 'Risks and Opportunities' column in the tables supports that consideration.

Water stewardship activities are part of the SMRID operations in a variety of ways, many are described in Table 8.

Table 8. Water stewardship to date and ongoing activities.

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Target	Costs	Benefits	Risks and Opportunities
Current Action 1	Close coordination with the provincial government entities responsible for estimating the water available each year, and the operator responsible for water management infrastructure in the Oldman River Watershed.	Ongoing	Watershed context and external engagement Internal collaboration	Metrics: - Key individual contact number and email identified. - Average number of times per week during the irrigation season communication (email or phone) between parties is conducted. **[insert target here]**	Minimal costs.	Aids in planning for water use in the year ahead and encourages strong relationships.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Current Action 2	Supporting increasing efficiency of water use in SMRID infrastructure and among the	Ongoing	Operational resilience	Metrics: - Averaged water withdrawals per acre irrigated decreases	Costs are in updating infrastructure	Less water is lost to spill, seepage and evaporation. This	**[link to identified ranked risk or**

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Target	Costs	Benefits	Risks and Opportunities
	membership.			over time, **[insert target here].** - Ratio of pipelines relative to canals increases, **[insert target here].**	and supporting water efficiency research.	increases water available for irrigators and creates a positive public perception.	**opportunity in Table 5 and Table 6]**
Current Action 3	Coordination and collaboration with AEP, landowners, local municipalities, municipal districts, and watershed councils regarding stormwater management, flooding, and water stewardship.	Ongoing	Watershed context and external engagement Operational resilience Internal collaboration	Metrics: - Number of watershed meetings attended each year, **[insert target here].**	Minimal costs.	Increased ability to plan for storm events. Commitment to the watershed and relationships. Allows SMRID to understand what is happening around the watershed and how they may be affected.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Current Action 4	Working with recreational groups regarding use of the reservoirs, including designing and running an educational campaign for the risks from invasive species to the watershed and how to limit their spread**.**	Ongoing	Watershed context and external engagement	Metrics: - Number of recreational users aware of water protection efforts, **[insert target here].** - Number of public individuals directly engaged, **[insert target here].**	Costs associated with creating an educational campaign.	Working with the public creates a positive perception and helps decrease the spread of invasive species.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Current Action 5	Participating in the design and implementation of information campaigns to increase the understanding of irrigation and irrigation water use.	Ongoing	Watershed context and external engagement	Metrics: - Number of viewers of online information, **[insert target here].**	Costs from time required to design and implement a program.	Create a positive public perception.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Target	Costs	Benefits	Risks and Opportunities
Current Action 6	Monitor various water quality parameters, compilation of the data and reporting the results, ensuring water quality risks are being watched on a regular basis.	Ongoing	Impact mitigation	Metrics: - Number of water quality samples taken per year - Unit chemical/ L water (e.g., micrograms of nitrogen per litre of water) - Change in water quality parameter of interest over time due to change in practice	Minimal cost.	Support public understanding of water quality in the watershed as reports are public.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Current Action 7	Support research into water quality monitoring, including piloting new technologies for real-time water quality testing for SMRID system, neighbours, and water users (e.g., working with Roshan Water Solutions testing their system of water quality monitoring devices appropriate for real-time water quality testing for SMRID system, neighbours, and water users.	Ongoing	Impact mitigation Operational resilience	Metrics: - Number of new technology units tested in the SMRID system, **[insert target here].**	The costs on investing in R&D for water quality monitoring.	Enable landowners to pump water into the SMRID canal system if it meets quality standards, thereby SMRID provides a service and water is managed better in the whole system. Be able to better understand the water quality in the system.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

13.1 Process of identifying implementation actions

SMRID identified water-related risks to their operation through a brainstorming process with the support of stakeholders and other experts through a Working Group session. This process took into consideration the watershed context and potential direct and indirect impacts to the SMRID, and the impacts the SMRID West site could have on other users. With this same group of people, the SMRID brainstormed opportunities for improvements and partnerships related to water. The identified risks and opportunities were combined into a list, because in many instances an identified risk had a corresponding opportunity already articulated. The list of risks and opportunities was reviewed, refined and streamlined to ensure that the way each was articulated was clear and relevant to the SMRID operations.

The list of risk and opportunities was used to identify actions, which would be the basis for this implementation plan. One, or a series of, action(s) was identified for each risk and opportunity, which formed a large list of potential actions that address water stewardship and sustainability. For each potential water stewardship action, a high-level assessment of costs and benefit was completed. The cost and benefits were added to the list of actions, to enable some comparison between the actions. The actions list was sorted by the timeline of feasible implementation. The immediate and short-term actions are listed in Table 9 below, and long-term actions are in Table 10.

DRAFT

13.2 Implementation actions

The list of actions in Table 9 will be implemented by SMRID as part of this water stewardship initiative.

The potential metrics and targets in the fifth column of Table 9 are included as examples for SMRID, they were developed through a preliminary brainstorming process.

Table 9. Short term implementation actions

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Targets	Costs	Benefits	Start and End Date	Risks and Opportunities
Short Term 1	Participate in a collaborative drought simulation exercise with other water users.	This year – A drought simulation exercise to be held on June 10 with AIDA and other IDs and MDs.	Watershed context and external engagement Operational resilience	Metrics: - Participate in a drought simulation exercise, **[insert target here].**	The time associated with engaging in water management discussions. The financial cost will depend on what form of engagement is determined to be valuable.	Demonstration of commitment to the community. Improve water security.	Start: May 15th 2022 End: June 15th 2022	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Short Term 2	Have a conversation related to water quality parameters that are already monitored. Discuss if there are parameters to watch regarding potential threats to people or the environment. Understand from the government what direction the water quality monitoring program is heading in.	This year – need to connect with Janelle Villeneuve and Alberta Agriculture to get a better understanding of the data and where this is going.	Impact mitigation	Metrics: - Organize and complete one or more conversations with key individual(s) at government departments, **[insert target here].**	Minimal cost.	Gain more value and wider benefit from water quality data that is already being collected.	Start: July 2022 End: January 2023	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Short Term 3	Implement riparian care and invest in control	Part-Complete – SMRID has	Operational resilience	Metrics: - Number of	The costs associated with	Demonstration of a commitment to the	Building on	**[link to identified**

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Targets	Costs	Benefits	Start and End Date	Risks and Opportunities
	structures for stability and planting (e.g., in partnership with ACA?).	committed funding, allowing ACA to apply for additional funding related to riparian care and control structures. This will include wetlands, fencing, and other initiatives (check with Paul who is leading this project)		discrete wetland and riparian areas that are improved, **[insert target here].** - Amount of acres of area of riparian zone improved or protected, **[insert target here].**	investing in riparian care and control structures	local aquatic environment. Reduced water quality issues in SMRID-managed water and downstream	previous work on a site by site basis	**ranked risk or opportunity in Table 5 and Table 6]**
Short Term 4	Invest to replace SMRID canals with pipelines to reduce water evaporation and seepage losses.	Part -Complete – Several specific canals have been converted to pipelines in the West portion of SMRID between 2020 and the end of 2022 (for the timing of this AWF project review)	Operational resilience	Metrics: - Dollars spent on shared infrastructure repairs (e.g., dams, pipelines, canals) - Kilometers of canal converted to pipeline, **[insert target here].**	The costs associated with transitioning from canal to pipeline and ongoing maintenance costs.	Reduction in water losses from seepage and evaporation following the transition to pipeline. Reduction of the risk of hazardous materials spilling into the open canal and causing water quality concerns. Water savings and efficiency could lead to irrigation expansion and an increase of irrigable	Start: 2020 End: unknown	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Targets	Costs	Benefits	Start and End Date	Risks and Opportunities
						land.		
Short Term 5	Support initiatives with partner entities to plan and invest in stormwater management infrastructure to mitigate the impacts from major stormwater events.	Part-Complete – SMRID is participating in the Horsefly Regional Emergency Spillway Project through buying land and purchasing right-of-way for the project.	Watershed context and external engagement Operational resilience	Metrics: - Progress from design and contracting toward construction of the Horsefly Regional Emergency Spillway.	The costs associated with buying land and right-of-way.	Investing in stormwater management infrastructure projects will protect SMRID's infrastructure and water.	Start: 2020 Construction commencing 2022 End: Unknown	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Short Term 6	Support research and conversations with irrigation equipment and technology manufacturers (e.g. pivot companies) to potentially improve water use efficiency.	Part-complete –	Operational resilience	Metrics: - Organize and complete one or more conversations with key individuals, **[insert target here].**	Cost of investing in equipment.	Potential benefits include less water demand, less spill water, and overall less water needing to go through the SMRID system. Ability to have more detailed information about the water in the system. Ability to cut down of 'water poaching'. Ability to demonstrate to the public the collective commitment of irrigators to use	Start: End:	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Targets	Costs	Benefits	Start and End Date	Risks and Opportunities
						water responsibly.		
Short Term 7	Provide guidance and support specific irrigation representative to the International Joint Commission watershed-level discussions regarding transboundary water management.	This year– support participants of stakeholder meetings with IJC task force.	Watershed context and external engagement	Metrics: - Number of conversations with Richard Philips to support him, **[insert target here].**	The time required to engage is discussions.	Strengthen international relationships. Have an opportunity to be aware of and possibly provide input in decisions about upstream water supply management. Mitigate water supply risk.	Start: July 2022 End: Unknown	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Short Term 8	Develop and roll-out an online system (like an app) for SMRID members to order water.	This year	Operational Resilience	Metrics: - Completion of the new online system. - Number of water users successfully on the system.	Cost of developing the online system	Improve the service to members of SMRID.	Start: 2021 End: 2022	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

13.3 Roadmap for potential future water stewardship actions

The list of actions in Table 10 are the water stewardship actions that will not be completed within the short-term, but are being considered in multi-year planning and budgeting process.

Table 10: Long-term implementation actions

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Targets	Costs	Benefits	Risks and Opportunities
Long Term 1	Collaborate with other water users to optimise drought management operations and drought mitigation approaches. Engaging with the SSROM model project. As new data and modeling are available, SMRID will suggest changes to their drought management plans.	Long term	Watershed context and external engagement	Metrics: - Participation in collaborative planning sessions, **[insert target here].** - Number of other water users that the SMRID collaborates with, **[insert target here].** - Availability of water supply deficit forecast, **[insert target here].**	The time associated with engaging in water management discussions. The financial cost will depend on what form of engagement is determined to be valuable.	Demonstration of commitment to the community. Improve water security.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Long Term 2	Encourage and support producers in development of water stewardship planning. Membership with SMRID and AIDA allows for increased water stewardship as they aid in public communications and stakeholder engagement on behalf of producers.	Long term	Watershed context and external engagement	Metrics: - Number of SMRID members demonstrating water stewardship, **[insert target here].** - Percent increase in average per-acre water use efficiency over time **[insert target here].** - Number of stakeholders engaged.	Minimal costs.	Demonstration of commitment to water stewardship.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Targets	Costs	Benefits	Risks and Opportunities
Long Term 3	Design and take part in a public education campaign telling the Southern Alberta agriculture story, partner with other organizations to extend the reach of the campaign. Specifically communicating what is already being done, responsible water use and water stewardship throughout the supply chain, and collaborative planning for water scarcity.	Long term	Watershed context and external engagement	Metrics: - Number of public individuals reached, **[insert target here].** - Number of public individuals directly engaged **[insert target here].**- Number of partner organizations.	Cost and time associated with planning and running a public education campaign	Improving public trust in agriculture. Improving relationships with other organizations. More public recognition of SMRID as a responsible and good corporate citizen.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Long Term 4	Design and take part in a campaign targeting various levels of governments (local, domestic and foreign…) promoting the ability of irrigation and agriculture to improve the provincial and national GDP of Canada. Partner with other organizations to do this.	Long term	Watershed context and external engagement	Metrics: - Number of meetings attended, **[insert target here].** - Change in government or other funding over time for sustainable agriculture projects (e.g., for irrigation infrastructure improvements)	Cost and time associated with planning and running a promotional campaign.	Improving economic opportunities for ag and agri-food sector in Alberta.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Long Term 5	For overall basin water security, invest or support initiatives preserving and developing headwaters/upstream natural infrastructure like wetlands, support protecting and restoring upstream ecosystem	Long Term	Operational resilience	Metrics: - $ spent on shared natural infrastructure - Acres of restored wetlands (area and total number) - Improved Riparian Health Assessment Score	The costs will depend on what type of upstream natural infrastructure is chosen. This may take the form of funding NGOs that	Demonstrate a commitment to the aquatic ecosystem and water stewardship overall. Improve water security.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Targets	Costs	Benefits	Risks and Opportunities
	services.				already do this work.		
Long Term 6	Investigate the potential for solar panels covering open canals to reduce evaporation and weed growth. If investigation indicates benefits of solar panels/solar infrastructure, then implement the solar/installation	Possible long-term on smaller laterals that are not converting to pipeline	Operational resilience	Metrics: - Change/ improvement in weed growth and water quality parameters over time. - Financial benefit (in offset cost or in direct revenue) from electricity generation.	$ for conducting a study. Costs of solar infrastructure (frames, panels, electricity lines and systems).	Benefits are knowing the extent of cost and benefits. The actual implementation would have benefits including reduction in water loss through evaporation (water efficiency and being water conscious), and increasing profits from energy production ($ for SMRID), and less cost of magnicide and less impact on water quality from using magnicide to control weed growth.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Long Term 7	Evaluate stormwater impacts to SMRID canals in high flow events (source, quality, quantity, ownership) and understand how the SMRID can help manage high flow-events for the benefit of the watershed overall (beyond the Horsefly Regional Emergency Spillway. This would likely be other project recommended by the SA Regional Drainage	Long-term	Operational resilience	Metrics: - Amount of stormwater runoff (volume). - Number of water quality samples taken during storm events. - Comparative analysis of flood areas across SMRID geography and identified cause.	The staff time required to assess stormwater impacts, or $ for a study to be done.	Better understanding of impacts from stormwater.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Targets	Costs	Benefits	Risks and Opportunities
	Committee.						
Long Term 8	Develop and test water-related emergency response plan(s) based on risks identified in risk assessment and emergency response plans needed.	Long Term	Operational resilience	Metrics: - Number of emergency response plans. - Number of emergency drills/tests done each year.	The staff time required.	Have a proactive response plan prepared in the event of an emergency to quickly mitigate the impact.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Long Term 9	Invest in a new storage reservoir, or expansion of existing storage, to support mitigation of the impacts of droughts and enable flood event mitigation	Planning and design stage underway for Chin reservoir expansion.	Operational resilience	Metrics: - Regulatory approvals. - Progress toward construction of the Chin reservoir expansion.	Costs of investing in a storage reservoir.	Invest in a new storage, or expansion of existing storage, to support mitigation of the impacts of droughts and flooding.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Long Term 10	Identify locations along the SMRID West canals where hydro power production is an opportunity to generate renewable energy and an additional income source Complete cost-benefit assessment of installing hydro-power production infrastructure. Invest in additional hydropower generation	Long term	Operational resilience	Metrics: - Financial benefit (in offset cost or in direct revenue) from electricity generation) - Amount of new hydropower generating capacity (kWh).	The time required to identify locations. Cost of constructing new infrastructure and managing and maintaining it. Potential risk of negative view of	Increased power production is an opportunity for additional revenue.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

Identifier	Action	Status	Water Stewardship Objectives	Potential Metrics and Targets	Costs	Benefits	Risks and Opportunities
	stations.				hydropower.		
Long Term 11	Partner with RDAR to research new systems for managing aquatic weed growth. Potentially implement new system for managing aquatic weed growth based on findings from RDAR study. SMRID has initiated a partnership for algae and aquatic weed growth monitoring study with U of A.	Initiated – completion likely long term.	Watershed context and external engagement	Metrics: - Change/ improvement in weed growth and water quality parameters over time. - Financial benefit (in reduced cost for herbicide treatment relative to capital cost for new system)	Minimal cost.	Magnicide H is an expensive herbicide the SMRID uses to treat algae. This research would help look for alternative options for algae treatment, or identifying the most efficient way to use Magnicide H. This would reduce SMRID's costs related to this herbicide.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**
Long Term 12	Complete preliminary risk assessment to quantify risks of potential emergencies (e.g. pipeline break, or hazardous material spills). Evaluate what water-related incident response plans do not already exist or which need to be updated. The SMRID has Engineering and Technical Services team members dedicated to dam safety. They identify risks, potential emergencies, and evaluate water-related incident response plans.	Initiated – completion likely long term.	Operational resilience	Metrics: - Number of emergency response plans updated or newly drafted. - Number of emergency events per year. - $ spent on emergency preparedness, e.g., shared infrastructure repairs.	Time associated with completing risk assessment.	Meet the AWS criteria, and know which incident response plans are not on hand.	**[link to identified ranked risk or opportunity in Table 5 and Table 6]**

DRAFT

14. Bibliography

Agriculture and Agri-Food Canada. (2000). *Irrigation and Salinity.*

Agriculture and Forestry Alberta. (2020). *Alberta Irrigation Information 2020.* Government of Alberta.

Alberta Agriculture, Forestry and Rural Economic Development. (2022). *Alberta irrigation information 2021.*

Alberta Environment. (2006). *Approved Water Management Plan for the South Saskatchewan River Basin (Alberta).*

Alberta Irrigation Districts Association. (2018). *Quick Facts*. Retrieved from Alberta Irrigation Districts Association: https://aipa.ca/theme/common/news_launch.cfm?itemid=2

Alberta Irrigation Districts Association. (2021, June 6). Alberta Irrigation District Water Quality Data Tool. Retrieved from www.idwq.ca

Alliance for Water Stewardship. (2019). International Water Stewardship Standard version 2.0.

Alliance for Water Stewardship. (2020). *AWS Standard 2.0 Guidance.*

Government of Alberta. (2018). *Environmental Quality Guidelines for Alberta Surface Waters.* Edmonton, Alberta: Water Policy Branch, Alberta Environment and Parks.

Government of Alberta. (2021, June 2). Alberta Irrigation Districts Act. Alberta: Alberta Queen's Printer.

International Joint Commission. (2020). *Role of the IJC*. Retrieved from International Joint Commission: https://www.ijc.org/en/who/role

Oldman Watershed Council. (2010). *Oldman River State of the Watershed Report.* Lethbridge: Oldman Watershed Council. Retrieved from https://oldmanwatershed.ca/publications-list/state-of-the-watershed.

St. Mary River Irrigation District. (n.d.). SMRID District Vocabulary and Structures. In *SMRID Training Manual.*

St. Mary River Irrigation District. (2016). *About us*. Retrieved from St. Mary River Irrigation District: https://www.smrid.com/about-us/

St. Mary River Irrigation District. (2016). Irrican. Retrieved from https://www.smrid.com/irrigation-rehabilitation-priorities/irrican/

St. Mary River Irrigation District. (2016). *Vision, Mission and Values*. Retrieved from St. Mary River Irrigation District: https://www.smrid.com/vision-and-mission/

St. Mary River Irrigation District. (2018). SMRID 2018 Financial Statement and Annual Report.

St. Mary River Irrigation District. (2019). SMRID 2019 Financial Statement and Annual Report.

St. Mary River Irrigation District. (2020). *SMRID 2020 Financial Statement and Annual Report.*

St. Mary River Irrigation District. (2021). *2021 Annual Report.*

Town of Taber. (n.d.). Utilities. Retrieved from https://www.taber.ca/town-services/utilities

15. Appendix A: Watershed Context

DRAFT