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Water Management Solutions

Agriculture's Water Future Project

A Recommended Template for Water Stewardship at Cavendish Farms (Lethbridge Site)

Submitted by:
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Submitted to:
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WaterSMART Solutions Ltd. (WaterSMART) is pleased to deliver this recommended template of a water stewardship plan for the Cavendish Farms Lethbridge site. This document has been prepared through a collaborative working group process, as part of the Agriculture's Water Future project, which Cavendish Farms is supporting through funding and in-kind contributions of personnel time.

Corporate Commitment Statement

[A statement of commitment to water stewardship should be drafted and signed by Cavendish Farms as part of the water stewardship plan. The statement can include identifying the alignment with the broader corporate values, commitment to the principles of water stewardship, and other relevant specific statements about water resource quantity, quality, and the health of the local watershed and communities. The commitment can speak to the systems that will be used internally to continue to evaluate and improve responsible water use, operations and connections to the local community.

An example of a way to summarize the water stewardship strategy and commitment on one page is shown below in Table 1. This could be used to illustrate and easily communicate the principles in the corporate commitment statement.

The commitment statement would be signed by corporate leadership.]

The summary table below (Table 1) captures the commitment, objectives, and intended outcomes for water stewardship.

Table 1 Water stewardship summary of commitment statement, objectives and outcomes.

Commitment statement: Cavendish Farms Lethbridge Site manages water quantity and quality carefully both on-site and through engagement with stakeholders as a key input to our business and to minimize impacts to the environment.				
Objective 'buckets'	**Watershed Context and External Engagement**	**Impact Mitigation (beyond the fenceline)**	**Operational Resilience (within the fenceline)**	**Internal Collaboration (and continuity)**
Objectives	Operate our facility while recognizing the unique environmental and stakeholder context, challenges, and opportunities of the Oldman River Watershed.	Understand and mitigate the impacts of our operations on the local watershed.	Continually apply water stewardship actions to reduce operational risks and improve resilience.	Coordinate water stewardship across all internal departments to promote meaningful and long-lasting benefits.
Programs (sub-objectives)	Acknowledge the watershed's capacity to meet our operational needs. Actively participate in the local community to inform stakeholders about water management successes and challenges and solicit their input.	Understand and mitigate the impacts from operations on the Oldman River. Support activities to improve water quality throughout the watershed.	Optimize water conservation in operations. Optimize the reuse of water in operations	Regularly review water performance and internal communication. Continue to strengthen corporate and site water accountability.
Outcomes	Cavendish Farms Lethbridge Site's water stewardship actions support the local community, the local aquatic environment, and the resilience of our operations.			

Contents

1. Document Purpose

The Cavendish Farms water stewardship planning document is a report specific to the Lethbridge site of Cavendish Farms. It combines the details of current operations, identifies connections to the local community and environment, lists the water related risks and opportunities, and lays out the plan for implementing water stewardship. It contains a section describing Cavendish Farms Lethbridge Site, how water is used in the operations, and existing water management actions 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 water stewardship work on other Cavendish Farms locations, and for other operation 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 Cavendish Farms Lethbridge Site. The AWS Standard is an internationally recognized and verifiable framework for water stewardship that drives, recognizes, and rewards good water stewards. The criteria are highlighted in blue boxes throughout the document.

Appendix A provides the larger watershed context for the Cavendish Farms Lethbridge Site, which includes details of the water availability and water quality in the watershed, watershed stakeholders, the regulatory system and water management authorities.

2. Implementer overview

Cavendish Farms Lethbridge Site is a potato processing facility where water is primarily used for washing potatoes and to move potatoes through the automated processing line. More moderate amounts of water are used for other parts of the process, such as blanching potato product, removing potato slivers, moving potato peelings, producing steam, and cleaning the conveyor belts and the facility in general. Further details of the process are discussed in Section 5, below. The facility is provided treated municipal water from the City of Lethbridge, and the wastewater leaving the site is sent to the City of Lethbridge wastewater treatment plant.

Water reuse and water efficiency was a key consideration in the design of the Lethbridge facility. The site uses water management systems, including for efficient water reuse, which are at the forefront of the potato processing industry. Additionally, the operations management personnel have particular awareness of, and focus on, improvement in water use efficiency and have taken steps to conserve water in the processing line.

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

Standard/Group/Accreditation	How the membership promotes water stewardship
Member of the Potato Sustainability Alliance	Alliance members are committed to advancing a common vision of potato sustainability and delivering economic, environmental and social outcomes at scale.
Safe Quality Foods (SQF) accredited	Facilities with SQF accreditation adhere to global food safety and quality standards.

4. 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 (as seen in Appendix A: Watershed Context).

4.1 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)

The boundaries of the area managed by Cavendish Farms Lethbridge site are shown in Figure 1. The site geography is flat land, bordered by city roads on three sides, beyond the roads is private agricultural land, and the BASF Canada Inc. to the north. The total site area is approximately **[X]** acres, with the majority of that space being leased out to a local producer, and approximately **[X]** acres being used by the Cavendish Farms facility.

A stormwater pond located in the north-east corner of the site delineated in Figure 2 captures the stormwater from the facility and the parking lot.

Figure 1. Site boundaries of Cavendish Farms Lethbridge Site.

4.2 The physical scope

The site'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 Cavendish Farms Lethbridge Site is situated on the north-east side of the City of Lethbridge, see Figure 2 for the relative location of the site. The City of Lethbridge is in the Oldman River Watershed and sources its municipal water from the Oldman River. The City also returns its treated wastewater to the Oldman

River, and stormwater generally flows into the Oldman River. For further information about the Oldman River Watershed and Cavendish's location within it, please see Appendix A, sub-section "Geographic Context".

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. Please see Appendix A, sub-section: "Water Quantity Context of the Oldman River" for details on the available water.

The Oldman 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. Please see Appendix A, sub-section "Water Quality" for further information on the water quality in the Oldman River.

Figure 2. Location of Cavendish Farms Lethbridge site (yellow rectangle) in relation to the City of Lethbridge and the Oldman River. The city water and wastewater treatment plants are circled in purple.

The physical scope for water stewardship activities of the Cavendish Farms Lethbridge 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 wastewater is returned to the natural system. Because the facility sources its water from the municipal system, and returns wastewater through the municipal wastewater treatment plant, the City of Lethbridge is included in the physical scope. The area around the site is included for more than a kilometer on all sides, and some of the St. Mary River Irrigation District (SMRID) irrigation infrastructure is found directly bordering and passing underneath the site. The mainstem of the Oldman River and riparian areas downstream to the Town of Taber are included to account for the impact of the City's wastewater treatment plant discharge. The physical scope extends downstream to ensure environmental areas and other water users and communities are taken into account in the water stewardship activities.

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 Cavendish Farms Lethbridge Site water stewardship activities is shaded in transparent blue, and the HUC 8 level watershed boundaries are shown in dark blue.

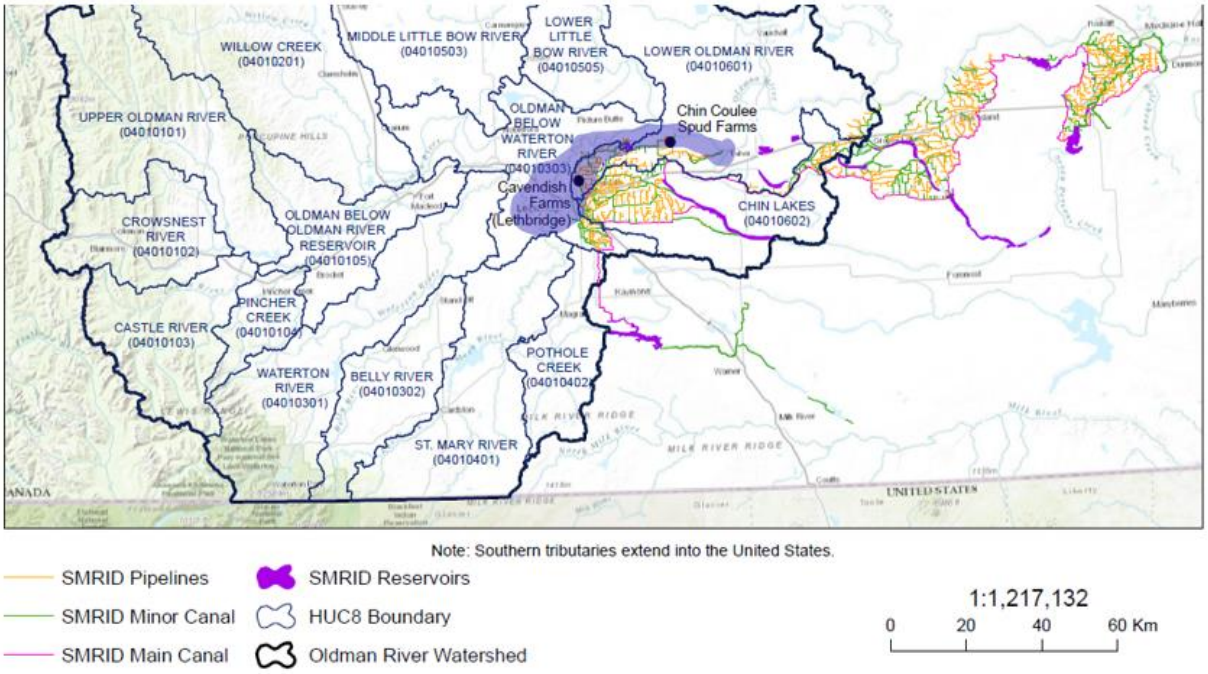

Figure 3. The physical scope for Cavendish Farms Lethbridge site water stewardship activities, shown along with the HUC 8 watershed boundaries.

4.3 Project geographic area

The AWF project has one producer consultant and two implementers, one of which is the Cavendish Farms Lethbridge Site, who are working in concert to implement water stewardship. A geographic area that encompasses the physical scope for both implementers and the producer consultant has been developed for the purpose of the project. Figure **4** shows the project geographic area, as well as the major waterways. Please see Appendix A: Watershed Context, sub-section "Geographic Context" for further description of the project geographic area.

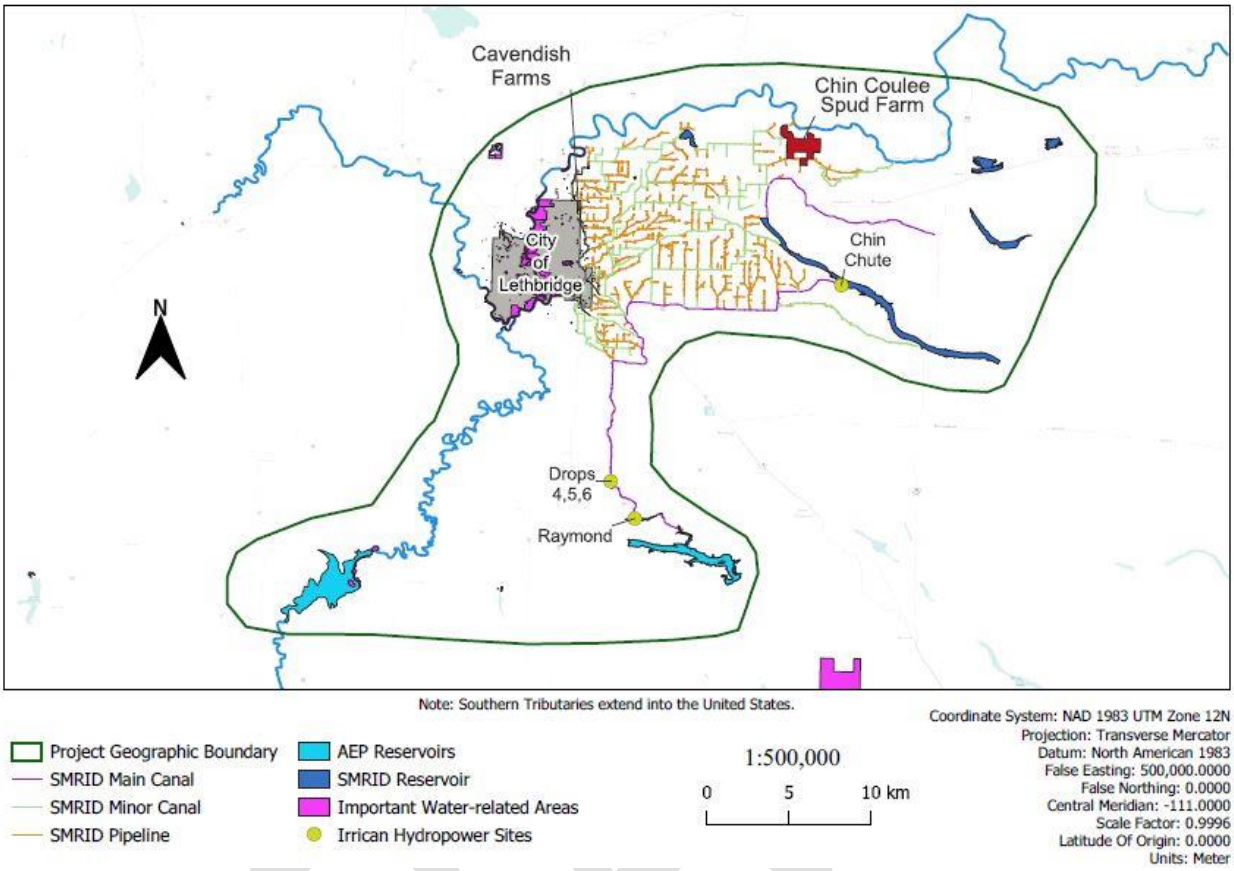

Figure 4. The project geographic area, which includes the physical scope for both AWF project implementers and the producer consultant.

5. Details of site water-related infrastructure

The site water-related infrastructure is most easily described through the separate processes where water is used in the facility. The subsequent sections describe the water use processes and water management on site.

5.1 Water use processes

5.1.1 Processes used to move potatoes with water

Potatoes are delivered to the Cavendish facility and stored temporarily in a series of large, indoor bunkers. When the potatoes are needed, water is sprayed in at the corners of the bunker to carry the potatoes out the drain at the bottom and onto the series of belts that elevate and direct them into the start of the processing line. The water used to move potatoes out of the bunkers collects a large amount of dirt and silt because the potatoes are generally delivered unwashed. This water is captured in the silt pit (see below for details), and then reused for moving potatoes out of the bunkers.

Throughout the processing line, potato products are moved around with the help of water, augers, pumps and conveyer belts in various combinations. The water for moving the potatoes is all treated municipal water after the point where the potatoes are peeled.

5.1.2 Details of washing process

The raw potatoes are cleaned in an auger system using water and friction. The water used for this process is a combination of reused water from the silt pit and treated municipal water. The organic matter is removed using screens, and the wastewater from the washing process goes to the silt pit.

5.1.3 Details of other steps in the potato processing that use water (peeling, boilers, etc.)

The peeling system uses steam to remove the potato skins, therefore a small volume of water is needed for the steam. The dry peel separator removes final debris and skin from potatoes using brushes.

A large metal tank of mild saline water with a pulsed electric field (PEF) sends a current through the water to soften the potatoes in preparation for cutting. This is much more efficient than hot water systems because the PEF does the work, and the water does not need to be heated. Water is reused in this step, thus saving both water and electricity compared to the same processes being done using previous technology.

The potatoes are pumped at high speeds through the cutters using water, which is captured in a tank and reused in this step.

The section of the process that removes the potato fragments and slivers also uses **[X m^3]** of municipal water. Manually shutting off valves for some of the water sprayers has resulted in **[X m^3]** of water conservation in this section without changing the processing speed or results.

The blanching section uses municipal water for the boilers. Blanching is a process that removes sugars from the potatoes, and therefore the amount of blanching required is a function of potato quality and end use. A number of factors influence sugar content in potatoes and when managed, reduce the requirement for blanching. This section uses a large amount of water, and the wastewater goes to the municipal water treatment plant. The quality of water throughout the steps after the potatoes are peeled is very important for the quality of the end product.

Water is used for cleaning the floors of the whole facility, and for cleaning the machinery in the processing line.

5.1.4 Details of water reuse systems

Raw receiving area, silt pit and silt removal

The silt system is specifically designed for this facility to reuse as much water as possible in the areas of the processing line that do not require high quality water, in particular, the raw receiving area. The silt pit holds the water that has been used to flush the potatoes out of the bunkers and move them to the

processing line. The dirty water is sent to the silt removal system in the process water room. The silt removal system uses chemical and mechanical systems to remove dirt, which is captured and shipped back to producer's fields. The water is then sent back to the silt pit.

The silt pit reuse has measurable water efficiency and cost saving benefits. When the silt capturing system is not working, the facility uses **[X m^3]** of additional water per day. In addition, the wastewater that is sent to the City of Lethbridge has a high solid content and therefore Cavendish is charged more by the City for treatment services.

Water reuse

There are multiple areas within the processing line where water is reused directly in the same processes until it has accumulated starch or pieces of potato and gets sent to one of the areas of the process water room for treatment.

Starch recovery system

Starch is captured from the water from some areas of the processing line. Removing the starch reduces the load on the eventual water treatment. Although the recovered starch has value on its own, the starch recovery system is used specifically to support the wastewater treatment process. After the starch has been removed, the water is sent back to the cutter area of the processing line.

5.1.5 Details of wastewater treatment

All the water from the processing floor eventually is sent to the onsite wastewater treatment system in the process water room, where it is treated for solids. The system strains out the bits of potato and organic matter, as well as using polymers and flocculants for removing suspended materials. After this wastewater treatment process, the water is sent to the City of Lethbridge wastewater treatment plant. There is no opportunity for water reuse within the facility from the final wastewater treatment step.

5.1.6 Details of outdoor irrigation

The lawn around the facility is currently irrigated with municipal water and is approximately **[X]** acres in size. There are opportunities related to this noted later in this report.

5.1.7 Stormwater management

The building facility, combined with the parking lot, creates a large area of impervious surface. Stormwater management infrastructure on the site includes; **[list of infrastructure]**. The stormwater management system is built to the standard **[identify the standard to which infrastructure is built]**. Development of the Cavendish facility required infrastructure for catch basins, surface run-off, storm ponds, and associated storm connections and facilities. This may have included required easements, a service agreement, and/or an overland flow agreement.

5.2 Additional relevant operations considerations

Natural gas is the main energy input, and therefore a key input to the Cavendish Farms Lethbridge Site overall. The natural gas is conveyed via pipeline to the facility.

The raw and cooked potato waste, including what is strained out of the wastewater, is sold as cattle feed for **[X dollars per tonne]**. Because of this, the chemicals that are used in the wastewater treatment system must meet specific regulatory standards for livestock feed.

The starch that is captured in the starch recovery area is packaged and sold for **[X dollars per tonne]**.

6. 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."

Cavendish Farms Lethbridge Site does not have any water licences. The water it uses comes from the City of Lethbridge and is sourced from the Oldman River under a municipal water licence.

There is an intricate system of built-in monitoring and data collection systems for all aspects of the Cavendish Farms Lethbridge Site facility. The site uses **[X m^3]** of water per day with a breakdown of use for the different processes as follows **[water use volume data].** The site reuses **[X m^3]** of water per day in the following specific areas of the facility **[water reuse volume data]**.

In a standard 24 hour period, when the Cavendish Farms Lethbridge Site is running at current typical capacity, the site pipes in **[X]** m^3 of water from the City of Lethbridge, and sends **[X]** m^3 of wastewater back to the city for treatment. In addition to the water received and discharged, the facility reuses **[X]** m^3 of water each day in the raw receiving and washing area. There is also **[X]** m^3 of water that is reused in the cutting section after starch removal each day.

During the summer growing season, the lawn outside the facility is watered by sprinklers each night. The amount of water used for outdoor irrigation is an average of **[X]** m^3 per day, and **[X]** m^3 per year.

6.1 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)

In addition to the inflow, outflow and storage information described below, evaporation losses and rainwater runoff are factored into the water balance equation.

The outflows at the Cavendish Farms Lethbridge Site are the volume returned to the City of Lethbridge for wastewater treatment, and the evaporative loses from heat and open water in the processing line, and from evaporation and transpiration from the parking lot and the lawn outside.

The water inflows at the site are treated water provided from the City of Lethbridge water treatment plant, and precipitation on the building and grounds outdoors.

There is water storage indoors at the site in multiple points in the processing line, but they are used as part of the water reuse systems and the volumes do not change substantially from day to day, and they will not alter the water balance. The storage volumes will still be accounted for in the water balance equation.

The table below captures the averaged inflow and outflow data for the period of one day.

Description (inflow/outflow)	Gross water volume	Considerations or assumptions
[X X X]	**[X m^3]**	
[X X X]	**[X m^3]**	
[X X X]	**[X m^3]**	
[X X X]	**[X m^3]**	

Site water balance equation:

(**[X m^3 evaporated water]**) + (**[X m^3 wastewater]**) = (**[X m^3 water inflow]**) + (**[X m3 rain water]**)

Figure 5 below shows a map of the site with rough indications of the water coming on site and the water leaving the site. These pathways make-up the water balance for the site.

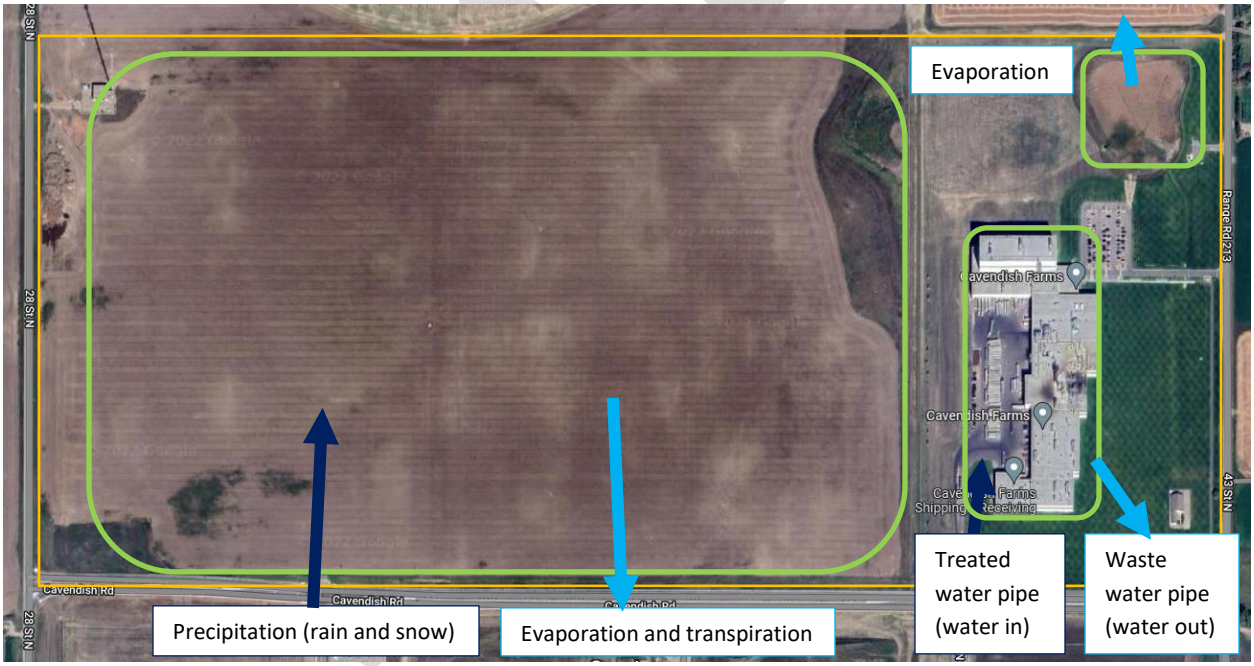

Figure 5. Map of the rough water balance for the site.

6.2 Site water quality data

All of the water used inside the facility is sourced from the municipal water treatment plant and meets the municipal use standard for water quality. Water used in the raw receiving area and initial portion of the processing line is reused many times and collects water quality contaminants as a function of moving

and washing raw potatoes.

The City of Lethbridge has certain water quality requirements for the wastewater they receive from the facility. If the wastewater quality does not meet these requirements the City charges an additional **[$XX.XX]** per cubic meter of wastewater for treatment.

Table 2. Wastewater quality compliance requirements from the City of Lethbridge.

Standard parameter	Accepted level	Description
Biological Oxygen Demand	**[X]**	
Suspended Solids	**[X]**	
Organic Matter	**[X]**	

The City of Lethbridge charges Cavendish for the treated municipal water they use, and for the wastewater that is sent for processing. It is estimated that 5% of the municipal water piped in is lost (evaporation etc.) during processing, and therefore the City charges Cavendish for wastewater treatment of 95% of the volume of municipal water they draw.

Outdoors, the **[list of products]** products are used to maintain the lawn and landscaping. The outdoor maintenance equipment such as lawn-mower and snow removal machine **are [identify fuel or power source]** powered. **[X number]** of stormwater quality samples have been analysed. The results show **[X indicate if any water quality results]** from products used outdoors on the site parking lot and lawn.

6.3 Annual water-related costs, revenues and value generation

The costs of water for operating the Cavendish Farms Lethbridge Site for a day is between **[$X]** and **[$X]**. This is for the treated municipal water supplied by the City, and for wastewater treatment services. The cost for input water alone is an average of **[$X]** per month, or **[$X]** per day.

The total volume of water used for irrigating the lawn varies from **[X m^3]** to **[X m^3]** each growing season, depending on the amount of natural precipitation received. When the treated water from the City of Lethbridge is used, this costs $ **[volume multiplied by $ per cubic meter]** each year.

The costs for water treatment products such as polymers, flocculants, filter inserts, etc., is approximately **[$ X]** each year.

The cost for maintenance of the water reuse, starch removal, and wastewater treatment systems is approximately **[$ X]** each year.

The calculated annual value to Cavendish Farms from having a water treatment system is estimated to

be: $**[((cost of maintaining water treatment system)+(cost for water treatment products)+(cost for shipping solid waste removed from water away))*365)/((cost per cubic meter city water)*1000)*365)]**

No water-related value generated by the site has been identified in terms of social, cultural, environmental or economic services or value.

6.4 Potential sources of pollution

There are minimal sources of pollution on site, the following Table 3 lists the substance, volume and storage facility for each of the potential sources.

Table 3 Potential sources of pollution from the site.

Substance	Volume (lt)	Storage
[specify potential pollutant, e.g. lawn fertilizer or pesticide(s)]	**[X]**	**[Storage room compliant with hazardous substance storage]**
[specify potential pollutant, e.g. machinery cleaning agent]	**[X]**	**[Storage room compliant with hazardous substance storage]**
[specify potential pollutant, e.g. lawn mower fuel, vehicle fuel]	**[X]**	**[Storage room compliant with hazardous substance storage]**

6.5 Water-related incident response plans and plant upsets

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

The operation of the Cavendish Farms Lethbridge site is reliant on adequate quantity and quality of water to operate. If an emergency situation closes the City of Lethbridge water treatment plant or delivery of water from the treatment plant to Cavendish Farms facility is prevented, the operations would cease operations while the situation was being dealt with.

The Cavendish Farms Lethbridge Site has **[list of response plans]** emergency response plan(s). The following provides a breakdown of the different water-related incidents for which there is a response procedure.

Table 4 Water-related incident response procedures for Cavendish Farms Lethbridge site.

Water-related incident	Relevant response plan/	Response action

	procedure	
[XXX]	**[XXX]**	
[XXX]	**[XXX]**	
[XXX]	**[XXX]**	
[XXX]	**[XXX]**	
[XXX]	**[XXX]**	

6.6 Water, Sanitation and Hygiene (WASH)

The City of Lethbridge delivers water treated to the standard for human consumption, therefore the drinking water used by employees at the Cavendish Farms Lethbridge facility meets the strict national government drinking water quality guidelines. All employees have access to safe drinking water, safe and adequate toilets and washroom facilities. As a processor of food, Cavendish Farms follows strict protocols to ensure the health and safety of all employees and products. These protocols are audited on a regular basis.

7. 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)

The project team members from Cavendish, Working Group members, and engaged stakeholders all contributed to the risk identification process and brainstorming work in the AWF project. Risks and opportunities were identified that are relevant to Cavendish Farms Lethbridge, 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 for 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 risk matrix.

			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 6 Matrix for evaluating severity of risks.

Table 5 Risks identified for Cavendish, with priority score and ranking.

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Consequence (1 to 4)	Priority Score
Risk 1 (FF)	Water security • Drought and water availability • Worse in warm and dry years • Southern Alberta a semi-arid ecosystem – water availability already limited in this region	• The opportunity is in communicating with City of Lethbridge and with producers about the potential for drought and planning around what extreme drought would mean for Cavendish operations	3	3	Level 3
Risk 2 (A)	A risk lies in Cavendish not having answers to questions/sustainability requirements from their buyers and losing business as a result • Different buyers may require different metrics/reporting standards, it could be costly and burdensome for Cavendish to meet the many different requirements • Difficult to address and manage across a geographically diverse corporation • The company is increasingly urged towards corporate responsible water use and ESG reporting	There is an opportunity to pre-empt customers requiring unique reporting on sustainable agriculture • Industry demonstrating it is taking initiative and addressing public concerns may get ahead of government imposing regulatory requirements, may even be an opportunity to inform regulations in the future • Sustainable sourcing expectations are already being seen, can be involved helping to define what that should look like for the potato industry • Adaptation of the sector to future sustainable farming practices • Promoting and encouraging regenerative production practices by their potato suppliers • The potential to maintain supplier partnership with big buyers by adhering to sustainability practices	4	2	Level 2

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Consequence (1 to 4)	Priority Score
		• Aid in developing sustainability metrics for the sector, likely through involvement with the PSA			
Risk 3 (E)	Negative public perception of corporate responsibility due to the extent of irrigated lawn at the Cavendish facility	Alternative management of the Cavendish facility lawn presents multiple opportunities. Reducing costs, improving public image, alternative sources of water and conserving water (the lawn currently is watered with municipal potable water) are among the opportunities • Lawn is particularly visible to the public, it is an opportunity to present Cavendish initiatives in sustainability and water stewardship to the public	4	2	Level 2
Risk 4 (AA)	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	There are opportunities in communicating Cavendish's corporate strategy and initiatives regarding climate change and volatility of water availability.	3	2	Level 2
Risk 5 (F)	Perceived or real risk to nearby water quality via runoff from the Cavendish facility	The opportunity for demonstrating responsible water management from the facility grounds by having stormwater	1	1	Level 1

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Consequence (1 to 4)	Priority Score
	• Cavendish lawn and parking lot • Where is drainage managed? • SMRID lateral canal runs through the Cavendish property	management in place • Use the lawn area to create natural nutrient/wastewater treatment (e.g., wetlands) • Align nutrient control on Cavendish Farms facility grounds with applicable BMPs implemented on-farm			
Risk 6 (G)	A risk lies in negative perception from other water users or the public due to high water use at the Cavendish facility in a water-scarce region • Water scarcity is a concern in southern Alberta • Due to the City of Lethbridge's water license priority, the Cavendish facility will likely not experience a water shortage • Facility expansion at the Lethbridge location will need to have water efficiency as a key focus to appeal to stakeholders	An opportunity to expand the relationship between Cavendish Farms and the City of Lethbridge to build on multiple potential opportunities • The balancing of the facility's water reuse and water demand process can be fine-tuned for improved water efficiency • Future discussion regarding facility expansion should factor in public perception of water scarcity issues in the area	2	2	Level 1
Risk 7 (H)	High cost incurred if organic matter unable to be removed from facility wastewater • If wastewater treatment in the facility is not operational, can	Further wastewater treatment at Cavendish Farm's facility • Utilize SMRID infrastructure for appropriate wastewater return (must	3	1	Level 1

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Consequence (1 to 4)	Priority Score
	have a high cost incurred to the plant for additional municipal treatment.	adhere to SMRID return water guidelines) • Increased wastewater treatment on-site to decrease costs of returning wastewater to the City of Lethbridge and to increase water reuse • Use of Cavendish wastewater for irrigation of local greenspaces? • Use of process wastewater for crop irrigation (this is done in Manitoba). Water storage and transportation would need to be determined.			
Risk 8 (C)	Sustainability data collection programs from multiple buyers may be intensive and highly demanding for producers, causing producers to exit the market and reducing Cavendish's supplies Producers may have difficulties complying due to the resources necessary for data collection	An opportunity lies in better using existing sustainability documentation from producers' operations • Ensures that producers can comply with future regulations and buyer demands • May allow producers and Cavendish to engage in long-term contracts with suppliers and buyers • Current data gathered could be used to develop sustainability metrics for the sector • Alignment of sustainability documentation gathered throughout the sector could create on-farm and processing efficiencies	1	1	Level 1

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Consequence (1 to 4)	Priority Score
Risk 9 (D)	A risk of water lost through leakage in the Cavendish system • This risk can take the form of not addressing water efficiency concerns from external parties There is a risk of paying unnecessary extra cost for water	There is an opportunity to increase water efficiency at the Cavendish Farms Lethbridge facility • The Lethbridge site facility has extensive water measurement in place throughout the processing line, there are currently further opportunities to incentivise increasing efficiency • There is an opportunity to have one or more positions that 'care' about efficiency and established KPIs related to water efficiency specifically • Draw on knowledge of water treatment reuse from PEI facilities • Reduction of water use would also result in a reduction in costs	2	1	Level 1
Risk 10 (I)	Risk to processing line operations and end-product quality if municipal water not of adequate quality • May cause delays in processing or additional costs if water quality provided to Cavendish facility degrades	•	1	4	Level 1
Risk 11 (BB)	A risk is the complexity of managing water in a drought and that there isn't a prescribed regulatory process, the regulatory group could	•	1	3	Level 1

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Consequence (1 to 4)	Priority Score
	'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)				
Risk 12 (DD)	The risk is that there is minimal 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, potentially in partnership with another entity	1	4	Level 1

Ranking	Risk	Associated opportunity	Likelihood (1 to 4)	Consequence (1 to 4)	Priority Score
	Provide incentives to the producer				

Table 6 Identified opportunities for Cavendish, not associated with a risk.

Ranking	Opportunity
Opp 13 (B)	Supporting all of Cavendish Farms' suppliers to implement on-farm nutrient control, thus allowing Cavendish to claim water stewardship across their suppliers and processing • Identify farm-level BMPs as they pertain to water stewardship • Streamlined BMP implementation and documentation for grower's convenience in reporting • Certain controls, if documented correctly, could align with carbon credit programs
Opp 14 (CC)	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
Opp 15 (EE)	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.)

Ranking	Opportunity
Opp 16 (GG)	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

8. Stakeholder Engagement

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.

8.1 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."

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.

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 stakeholders were identified in an iterative process of thinking through which organizations are connected to Cavendish 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.

8.2 Stakeholder Engagement Tracking

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 stakeholder engagement is essential for water stewardship and is best done in an iterative process, Cavendish 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 Cavendish Farms Lethbridge site water stewardship planning. The Working Group meetings were held October 26th 2021, January 20th 2022, April 12th 2022, and October 19 2022.

The Working Group included representatives from the following organizations:

- Cavendish Farms
- St. Mary River Irrigation District
- 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
- 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 Lethbridge Cavendish processing plant. The stakeholders in this session included:

- Cavendish Farms
- SMRID
- 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.
9. Improving inspection program for upstream reservoirs.

Online Meeting

An online meeting was held on March 31 via Microsoft Teams for those who could not make it to the focus group, and it included two stakeholder organizations. 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

Four stakeholder organizations responded to the outreach email, providing their responses to the questions and highlighting their concerns. **[Include a summary of the points from the email responses]**

9. 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 overallocated 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.

9.1 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.

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 the big picture		**2 votes**		
Improving inspection program for upstream reservoirs (i.e., modernise inspection program)		**1 vote**		

10. 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 (IWRAs), and the definition according to AWS.

Site:

The Cavendish Farms Lethbridge Site does not have any natural water bodies on the site itself. The description of Important Water-Related Areas in the Alliance for Water Stewardship Standard was used to determine if the nearby and onsite water bodies qualify as Important Water-Related Areas. It was determined that the pipeline carrying the SMRID lateral canal underground beneath the Cavendish Farms Site (Figure 7) is of economic importance and is linked to many other water users, therefore it is an Important Water-Related Area. The other water features on site are drainage ditches and a stormwater pond which are not considered of significant environmental, cultural, economic or community value and are therefore not Important Water-Related Areas.

Figure 7 Map showing approximate location of underground SMRID water pipeline.

Project Geographic Area:

The IWRAs in the Project Geographic Area were identified through research and stakeholder engagement. Research into ecologically important areas in the Oldman River watershed was done by examining the state of the Watershed Report, provincial government maps of ecologically sensitive areas, and the maps of parks and conservations areas. A published study specifically on Indigenous history and values and the Traditional Knowledge and uses for areas in the City of Lethbridge was reviewed (The Blackfoot Confederacy of Alberta in association with Arrow Archaeology Ltd., 2017). See Appendix A: Watershed Context for more details on the research results.

The Working Group members were asked to identify IWRAs that they were aware of on the site, in the bigger Project Geographic Area, as well as the Oldman Watershed as a whole. The Working Group identified the following list of IWRAs (note some of these are duplications or overlap due to the way responses were submitted):

- Castle Provincial Park
- Cottonwood forests
- Chin Reservoir
- All AEP reservoirs
- All Irrigation District reservoirs
- Eight Mile lake
- Oldman River
- Saint Mary River
- Saint Mary reservoir
- Hellen Schuler Nature Reserve
- Henderson Lake
- City of Lethbridge water treatment facilities
- Lethbridge Coulee
- Park Lake
- Raymond Reservoir
- Northeast reservoir

The report “Traditional Knowledge and Use Assessment, City of Lethbridge” included the following maps identifying historical site locations and select plant locations identified in the assessment (The Blackfoot Confederacy of Alberta in association with Arrow Archaeology Ltd., 2017). These maps clearly show that the river valley and coulees of the Oldman River as it goes through Lethbridge are important for local Indigenous Peoples. The majority (but not all) of the historical sites are in the river valley, and the important plants that are specified in the map are primarily located along the river or in the coulees.

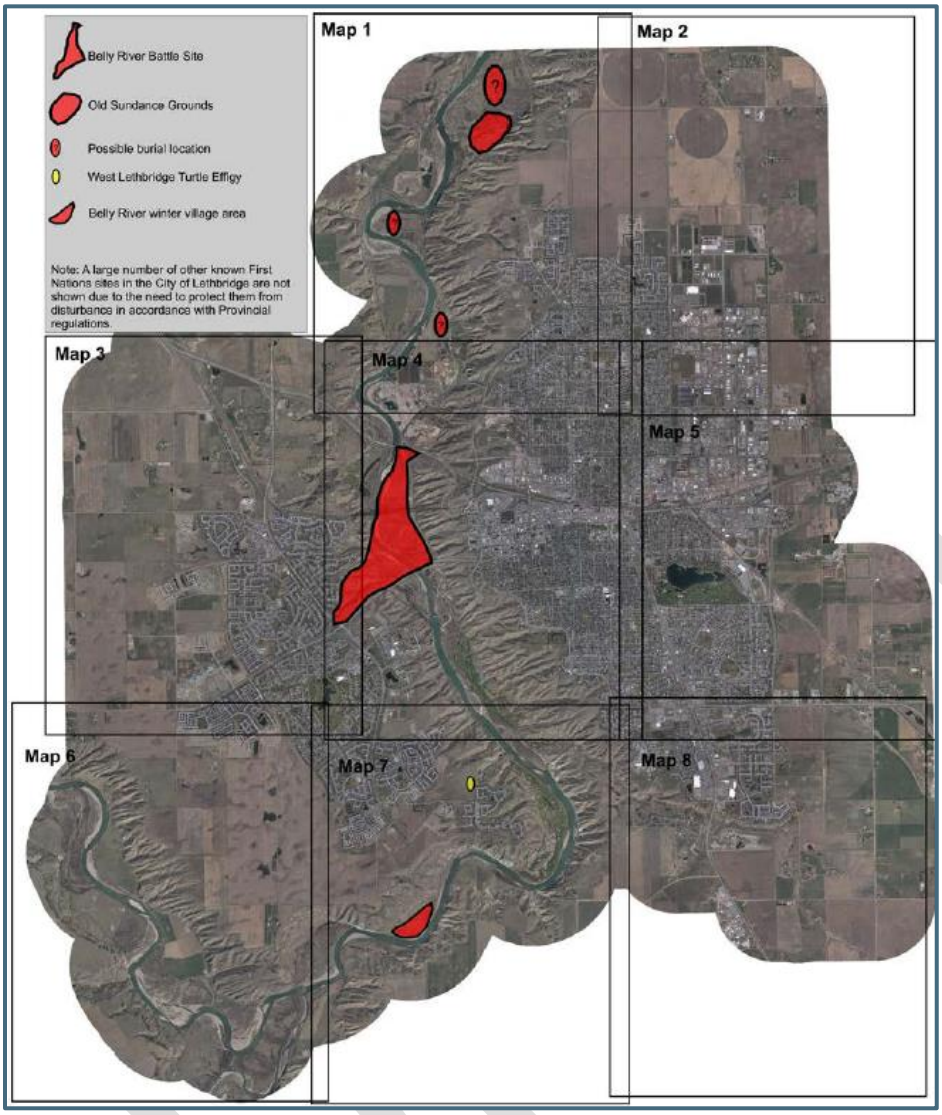

Figure 8 Historical site locations from the Traditional Knowledge and Use Assessment, City of Lethbridge (The Blackfoot Confederacy of Alberta in association with Arrow Archaeology Ltd., 2017).

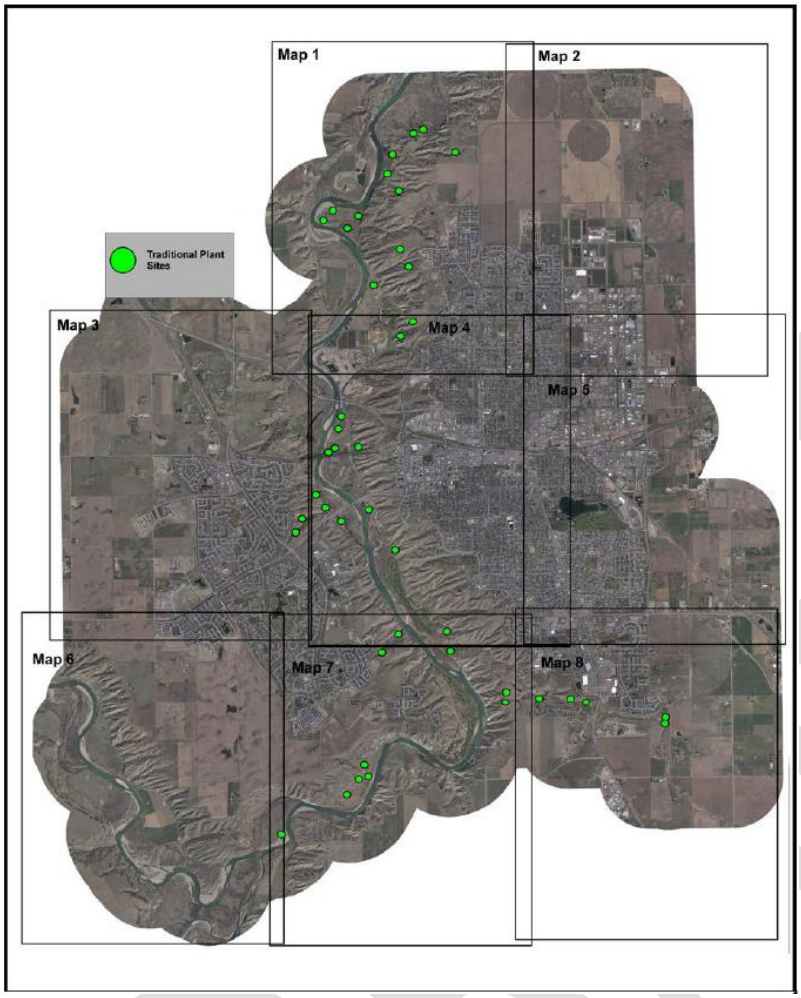

Figure 9 Select plant locations from the Traditional Knowledge and Use Assessment, City of Lethbridge (The Blackfoot Confederacy of Alberta in association with Arrow Archaeology Ltd., 2017).

A GIS map of the local parks was acquired an overlaid on the Project Geographic Area map () to highlight where there are IWRAs within the boundary of the Project Geographic are, and how close they are to the Implementers sites.

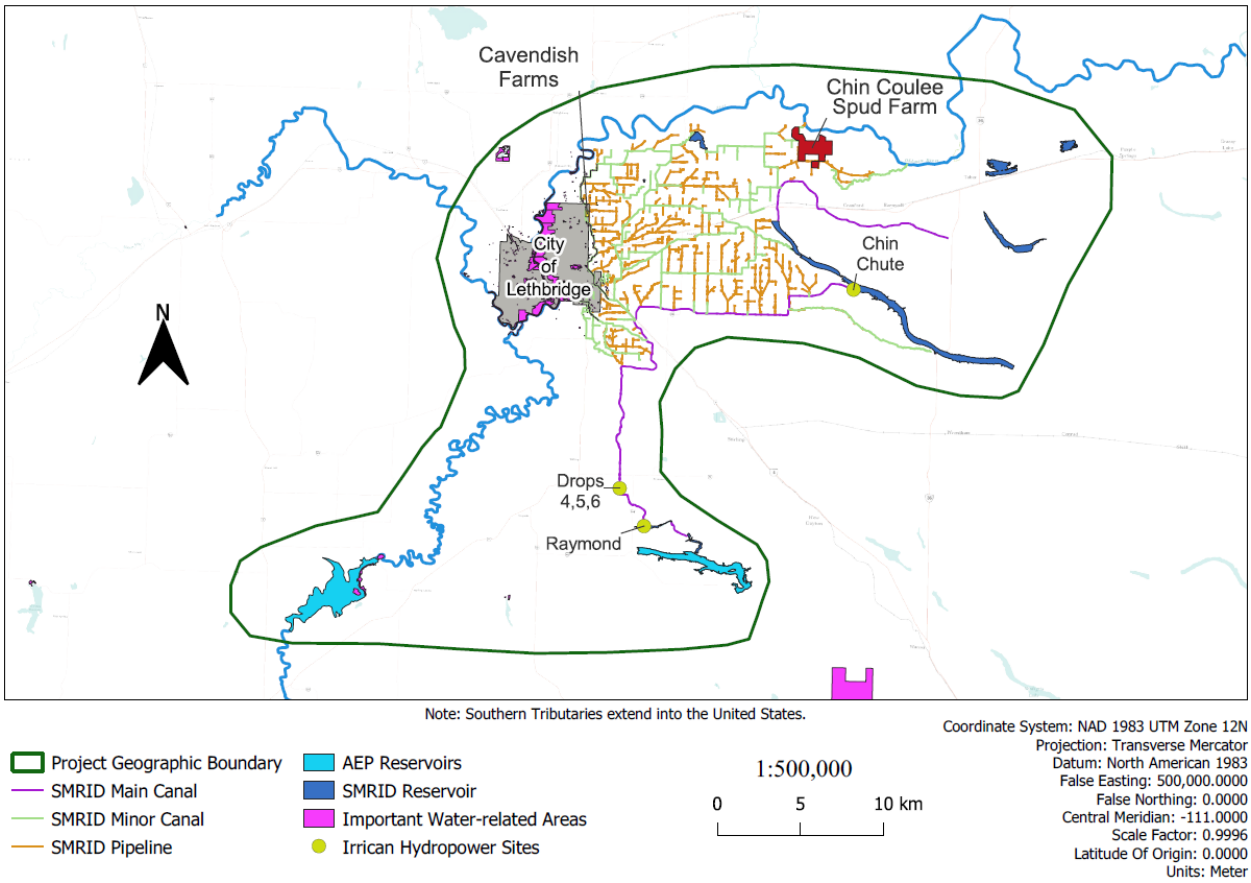

Figure 10 Map displaying the defined Project Geographic area and the Important Water-related Areas in pink colour.

The following is the list of IWRAs within the 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]	

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

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	
Cross Coulee Reservoir	Irrigation reservoir	Economic value	Good working condition	Invasive species, riparian damage and sedimentation
Raymond Reservoir	Irrigation reservoir	Economic value	Good working condition	Invasive species, riparian damage and sedimentation
North-East Reservoir	Irrigation reservoir	Economic value	Good working condition	Invasive species, riparian damage and sedimentation
Chin Reservoir	Irrigation reservoir	Economic value	Good working condition	Invasive species, riparian

				damage and sedimentation
Stafford Reservoir	Irrigation reservoir	Economic value	Good working condition	Invasive species, riparian damage and sedimentation

11. 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 Cavendish Farms Lethbridge site is below:

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

12. Implementation Plan

Cavendish Farms Lethbridge site is committed to responsible water use, has already taken into consideration water use efficiency on the site and has engaged in some water stewardship activities as a company. The site uses water management systems, including for efficient water reuse, which are at the forefront of the potato processing industry. Additionally, the operations management personnel have particular awareness of, and focus on, improvement in water use efficiency and conserving water in the processing line. Specific actions that have been done to date or are ongoing are listed in Table 8.

Many diverse water stewardship actions were identified through the AWF project work, see section 12.1 for a description of how they were identified. The water stewardship actions have been sorted into those that are already ongoing as part of SMRID operation (Table 8), and the short-term and long-term actions for the future (Table 9 and Table 10).

Throughout this section the water stewardship actions are categorized in alignment with the four water stewardship objectives The summary table below (Table 1) captures the commitment, objectives, and intended outcomes for water stewardship.

Table 1 Water stewardship summary of commitment statement, objectives and outcomes. As well, each action has one or more potential metrics identified. These metrics have been developed from a preliminary brainstorming process only. If Cavendish 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 7: Site water risks and opportunities of this document. The process of identifying and ranking the water-related risks and opportunities for Cavendish Farms Lethbridge site 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.

Table 8 Water stewardship to date and ongoing activities

Identifier	Action	Status	Water Stewardship Objectives	Metrics and target	Costs	Benefits	Risks and Opportunities
Current Action 1	Cavendish is an active member in the Potato Sustainability Alliance (PSA). The PSA hears from potato-growers about on-farm practices, encouraging on-farm improvements, and defining metrics that demonstrate sustainability for potatoes. Some farm level Best Management Practices related to water stewardship have been identified by the PSA, including having a whole farm soil and water management	Ongoing	Watershed Context and External Engagement	Metrics: - PSA meetings attended each year, **[insert target]**. - Number of producers Cavendish spoke with regarding BMPs related to water, **[insert target]**.	Membership fee, time required for participation.	Members of the PSA are committed to advancing a common vision of potato sustainability and delivering economic, environmental, and social outcomes at scale. Farm level BMPs and water stewardship activities are observed	Risk 2 Table 5 and Opp B Table 6

Identifier	Action	Status	Water Stewardship Objectives	Metrics and target	Costs	Benefits	Risks and Opportunities
	plan and minimizing nutrient and pesticide runoff through timing and location of application.					throughout the supply chain, which can be demonstrated in marketing activities.	
Current Action 2	The Lethbridge site uses water management systems in its operation, including water reuse, to improve water use efficiency. A significant amount of water is reused daily, resulting in measurable cost savings.	Ongoing	Operational Resilience Internal Collaboration	Metrics: - Average volume of water reused each day **[insert target]**.	Minimal costs as this is based on the facility design.	Cost savings related to water reuse efficiency.	Risk 9 and 7, Table 5
Current Action 3	Key operations personnel at the Lethbridge site have taken initiative regarding improvements in water use efficiency and water conservation in the process line. For example, by turning off specific water sprayers and turning down the rate of water at points in the process line where less water performs the same function.	Ongoing	Operational Resilience Internal Collaboration	Metrics: - Water use per unit product produced, **[insert target]**. - Volume of water saved each day based on small processing line efficiencies, **[insert target]**.	Minimal costs.	Cost savings related to water use efficiency and water conservation.	Risk 9, Table 5
Current Action 4	As a member of the PSA, Cavendish Farms actively supports extensive research and development work into varieties of potatoes that are optimally water efficient.	Ongoing	Watershed Context and External Engagement Operational Resilience	Metrics: - Dollars spent annually on this type of R&D, **[insert target]**.	Time and costs associated with research and development support.	Water conservation throughout the supply chain, which can be demonstrated in marketing activities.	Risk 1, Table 5
Current	Cavendish Farms have established the use of key performance indicators (KPIs) on	Ongoing	Internal Collaboration	Metrics: - Water use per	Minimal cost.	Provides data and information regarding	Risk 9, Table 5

Identifier	Action	Status	Water Stewardship Objectives	Metrics and target	Costs	Benefits	Risks and Opportunities
Action 5	water use. Water use per unit of finished product is reported internally by each facility, on a monthly basis.			unit product produced, **[insert target]**.		water use, which can be used as a basis for water efficiency.	
Current Action 6	Cavendish Farms maintains ongoing relationships with various levels of governments (local, domestic and foreign), promoting the ability of irrigation and agriculture to improve the provincial and national GDP of Canada.	Ongoing	Watershed Context and External Engagement Impact Mitigation	Metrics: - Number of email/phone or meetings with government representatives in a year **[insert target]**.	Time associated with building relationships.	Improving economic opportunities for ag and agri-food sector in Alberta.	Opp 16, Table 6
Current Action 7	Have the water quality of municipal water entering the plant tested and reported annually in compliance with the food safety program.	Ongoing	Impact Mitigation	Metrics: - Annual water quality reports produced, **[insert target]**.	The cost of testing and analysis.	Better understand water quality in the facility.	Risk 10, Table 5

12.1 Process of identifying implementation actions

Cavendish Farms 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 Cavendish's water supply, and the impacts the Cavendish Farms site could have on other users. With this same group of people, Cavendish brainstormed opportunities for improvements and partnerships related to water. The identified risks and opportunities were combined and listed in Table 5 Risks identified for Cavendish, with priority score and ranking. Table 5 and Table 6 (see section 7, Site water risks and opportunities), 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 Cavendish 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 section 12.3, Roadmap for future water stewardship actions.

12.2 Implementation actions

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

Table 9. Short term implementation actions

Identifier	Action	Status	Water Stewardship Objectives	Metrics and target	Costs	Benefits	Start and End Date	Risks and Opportunities
Short Term 1	Build a relationship between Cavendish and the City of Lethbridge around water stewardship interest and collaboration.	Cavendish and the City had an initial meeting. Need to continue discussions.	Watershed Context and External Engagement	Metrics: - Emails and phone calls exchanged by the right people in both organizations, **[insert target]**. - Number of meetings held, target **[insert target]**.	The costs will depend on what types of collaboration and opportunities are identified. (e.g. collaboration on a public campaign will take staff time and advertising money).	A stronger relationship with City of Lethbridge (benefits in opportunities). Positive image amount the public of Lethbridge, recognition as a responsible and good corporate citizen. Reduced cost of water.	**[insert start and end date]**	Risk 6, Table 5
Short Term 2	Cavendish receives a proposal and supports a local watershed non-profit group to do an upstream watershed stewardship project such as riparian restoration.	Not started	Watershed Context and External Engagement	Metrics: - number of riparian areas restored, **[insert target]**. - number of non-profit partners, **[insert target]**.	The funding amount provided based on the proposal received. Potentially time associated with being involved.	Demonstrate a commitment to the aquatic ecosystem and water stewardship overall. Improve water quality in the watershed. Build relationships within the watershed.	**[insert start and end date]**	Risk 5, Table 5
Short Term 3	Designate a staff position at Cavendish Farms Lethbridge that has ownership over actively improving water use efficiency and promote successes.	Planned for his year – The Billion Litre Project will be moving forward with this designated staff position	Operational Resilience	Metrics: - number of staff positions designated, **[insert target]**.	The cost of staff time/position focused on water use efficiency and promotion activities.	Having one individual dedicated to water use efficiency would ensure targets are met and momentum is maintained to drive the associated actions forward.	**[insert start and end date]**	Risk 9, Table 5
Short	Switch from municipal	Initiated, in	Operational	Metrics:	Possible cost for	Switch to using SMRID	**[insert start**	Risk 3,

Identifier	Action	Status	Water Stewardship Objectives	Metrics and target	Costs	Benefits	Start and End Date	Risks and Opportunities
Term 4	water supply to SMRID water to irrigate the Cavendish Farms Lethbridge facility lawn. Reduce the overall cost of water use on site.	the preliminary design and pricing stage within Cavendish	Resilience	- percent of water for irrigating the lawn supplied by SMRID, **[insert target]**.	minimal diversion infrastructure/pump, contracting time for the agreement between parties	water saves costs because the water per unit volume is cheaper (this would be direct dollar cost saving).	**and end date]**	Table 5
Short Term 5	Engage in and support discussions regarding watershed stewardship and planning.	Planned for this year – Engage in an annual stakeholder meeting and the SSROM project.	Watershed Context and External Engagement	Metrics: - number of watershed engagement meetings attended each year, **[insert target]**.	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.	**[insert start and end date]**	Risks 11 and 1, Table 5

12.3 Roadmap for 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	Metrics and target	Costs	Benefits	Risks and Opportunities
Long Term 1	Offer support (e.g., financial, training, etc.) to producers for specific BMPs related to water stewardship.	Not started	Watershed Context and External Engagement	Metrics: - Average water use and nutrients applied per unit of potatoes received, **[insert target]**.	This will depend on what types of financial support or training would be offered. The cost and time associated with developing one or more training programs, promoting and offering it on an ongoing basis. The cost of offering financial support would include the money itself as well as the administration of applications and dispersing funds, and any promotion	This is one of the most likely actions to achieves bottom-up sustainability from the producer level. Cavendish is more likely to be able to advertise their product ethical sourcing if they support their producers.	Opp 13, Table 6
Long Term 2	Participate 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	Not started	Watershed Context and External Engagement	Metrics: - number of public engaged (web view etc.), target **[insert target]**. - number of organization partners, **[insert target]**.	Time associated with participating in a public education campaign.	Improving public trust in agriculture. Improving relationships with other organizations. More public recognition of Cavendish as a responsible and good corporate citizen.	Opp 15, Table 6

Identifier	Action	Status	Water Stewardship Objectives	Metrics and target	Costs	Benefits	Risks and Opportunities
	throughout the supply chain, and collaborative planning for water scarcity.						
Long Term 3	Set up a water quality monitoring system or process at the Cavendish facility. Water quality of municipal water entering the plant, and wastewater quality leaving the plant.	Not started	Impact Mitigation	Metrics: - frequency of water monitoring, **[insert target]**. - amount of TSS in wastewater, **[insert target]**.	The cost of setting up the equipment and resources required to monitor water quality. If the equipment is all in place already, then the only cost is staff time to develop the process and monitor/data management regularly.	Better understand water quality changes in the facility. Able to report on water quality for water stewardship initiatives.	Risk 10, Table 5
Long Term 4	Create a wastewater treatment process on site for water being sent to City of Lethbridge.	Not started	Impact Mitigation	Metrics: - percent of wastewater treated, **[insert target]**. – amount of TSS in wastewater, **[insert target]**.	Cost of investing in water treatment process and operation.	$ savings for the wastewater treatment (costs paid to City of Lethbridge). Improve the water quality that is being sent to the City of Lethbridge. Improve relationship with City of Lethbridge.	Risk 7, Table 5
Long Term 5	Look at and continue assessment of alternate approaches to use the lawn space which demonstrate water conservation.	Not started	Operational Resilience	Metric: - Cubic meters of water conserved, target **[insert target]**.	Costs dependent on the form this action takes, could be only the capital cost of replacing the lawn with preferred.	Not watering the lawn saves costs ($ for 34,500m3 water), eliminates cost of paying person to mow the lawn, reduces water use (being water	Risk 3, Table 5

Identifier	Action	Status	Water Stewardship Objectives	Metrics and target	Costs	Benefits	Risks and Opportunities
						conscious), and improves public image of not wasting water. Convert lawn area to natural wastewater treatment saves costs of water and also wastewater ($ paid to Lethbridge), and improves public image of not wasting water (if public communication makes it clear).	
Long Term 6	Evaluate the stormwater impacts of the Cavendish Farms Lethbridge site. Based on the evaluation results, identify and implement beneficial stormwater management actions. This may link with another action.	Not started	Impact Mitigation Operational Resilience	Metrics: - Change in water quality parameter of interest over time due to change in practice , **[insert target]**.	The cost and time associated with developing a stormwater management plan. The potential capital costs of stormwater infrastructure if identified in the plan.	Better management of stormwater quantity and quality concerns. Benefits will be observed by Cavendish and also downstream water users that collet stormwater (e.g. SMRID)	Risk 5, Table 5
Long Term 7	Evaluate what water-related incident response plans do not yet exist for the Cavendish Farms Lethbridge site and	Not started	Impact Mitigation Operational Resilience	Metrics: - number of incident risk scores reduced through planning, **[insert target]**.	Minimal cost.	Meet the AWS criteria, and know which incident response plans are not on hand.	Risk 5, Table 5

Identifier	Action	Status	Water Stewardship Objectives	Metrics and target	Costs	Benefits	Risks and Opportunities
	develop them.						
Long Term 8	Achieve AWS certification as a means of demonstrating to buyers that good stewardship is being done	Application not yet submitted, but review of water stewardship is started through this project/report.	Internal Collaboration	Metric: - AWS Standard certification achieved, **[insert target]**.	The cost of one or more staff responsible for documentation of meeting the criteria of the AWS standard. This would likely be a permanent position because maintaining AWS certification requires annual monitoring and reporting.	Benefits associated with water stewardship should be naturally observed. Certification by an internationally recognized standard can be used in marketing activities to demonstrate commitment to sustainability.	Risk 2, Table 5
Long Term 9	Document and share best practices of water use efficiency, wastewater treatment, and water reuse across all Cavendish facilities	Connected to the Billion Litre Project.	Internal Collaboration	Metric: - Percent of Cavendish site locations engaged and receiving BMP documents, **[insert target]**.	Very low cost, it just takes the time for staff to prepare the document and send it and then for the rest of staff to read it or have a 'lunch and learn' or something.	Benefit is that water management best practices (e.g. water savings) enjoyed at Lethbridge facility can translate to savings for other facilities	Risk 8 and 9, Table 5

13. Bibliography

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

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

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.

The Blackfoot Confederacy of Alberta in association with Arrow Archaeology Ltd. (2017). *Traditional Knowledge and Use Assessment, City of Lethbridge.*

14. Appendix A: Watershed Context