



Saskatchewan!

Economic Analysis

Westside Irrigation Rehabilitation Project

September 2024

Contents

Executive Summary 3

1 Introduction 5

2 Project Definition 10

3 Preliminary Costs 16

4 Anticipated Benefits 18

5 Conclusions 24

Appendices 25

Notice to Reader:

This document has been prepared by KPMG for the internal use of the Water Security Agency ("Client") pursuant to the terms of our engagement agreement with Client (the "Engagement Agreement").

KPMG neither warrants nor represents that the information contained in this document is accurate, complete, sufficient or appropriate for use by any person or entity other than Client or for any purpose other than set out in the Engagement Agreement. This document may not be relied upon by any person or entity other than Client, and KPMG hereby expressly disclaims any and all responsibility or liability to any person or entity other than Client in connection with their use of this document.

The services provided in connection with this engagement comprise an advisory engagement, which is not subject to assurance or other standards issued by the Canadian Auditing and Assurance Standards Board and, consequently no opinions or conclusions intended to convey assurance have been expressed. We have relied on information provided to us by Client. We have not audited or otherwise validated the data. The procedures we carried out do not constitute an audit, and as such, the content of this document should not be considered as providing the same level of assurance as an audit.

The information provided to us by Client was determined to be sound to support the analysis. Notwithstanding that determination, it is possible that the findings contained could change based on new or more complete information. KPMG reserves the right (but will be under no obligation) to review all calculations or analysis included or referred to and, if we consider necessary, to review our conclusions in light of any information existing at the document date which becomes known to us after that date. KPMG is under no obligation in any circumstance to update this document , in either oral or written form, for events occurring after the report has been issued in final form.

Analysis contained in this document includes financial projections. The projections are based on assumptions and data provided by Client. Significant assumptions are included in the document and must be read to interpret the information presented. As with any future-oriented financial information, projections will differ from actual results and such differences may be material. KPMG accepts no responsibility for loss or damages to any party as a result of decisions based on the information presented. Parties using this information assume all responsibility for any decisions made based on the information.

Executive Summary

Context and Background

In 2020, the Government of Saskatchewan (“GOS”) announced a decision to invest in additional planning activities for the Lake Diefenbaker Irrigation Project (“LDIP”). The 2020 announcement defined a vision to achieve 500,000 acres of additional irrigated acres in Saskatchewan through two sub-projects: the Westside Irrigation Project (“WIP”) and the Qu'Appelle South Water Conveyance Project (“QSWCP”). Since then, additional information has continued to become available, including feasibility studies and business cases for evolving project scopes related to the LDIP.

The work completed between 2020 and now included the engagement of a Prime Consultant to progress the project definition and technical analysis, and the engagement of a financial and market analysis advisor. As a result of the activities, the following information has been further defined:

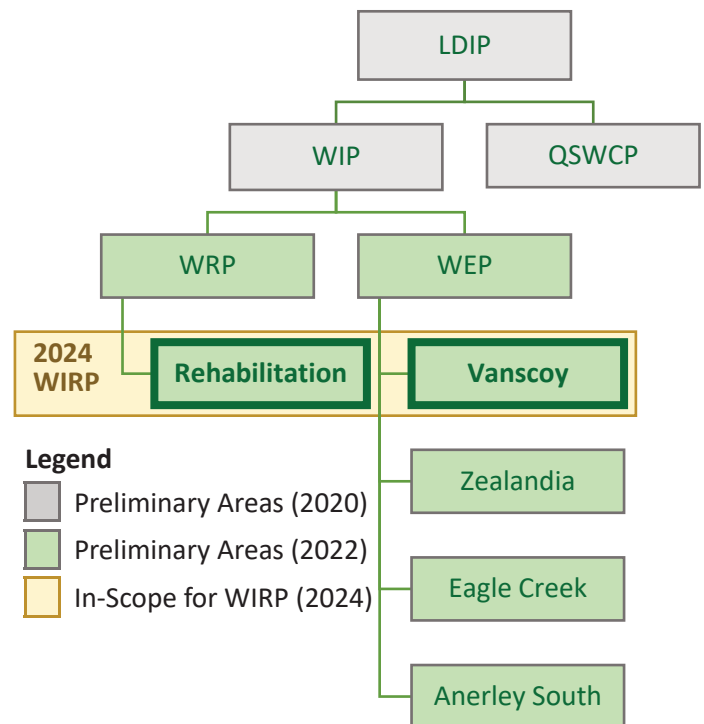
- **Project definition:** Supplemental analysis identified various options or approaches to phasing and sequencing the work, and higher value for money by capitalizing on existing infrastructure (e.g., pump station, canals, etc.).
- **Water availability:** A hydrological model was developed, determining that water withdrawals for the WIP would represent only a marginal impact, which could be further mitigated with the integration of a balancing reservoir.
- **Soil suitability:** The region was confirmed to be well-suited for irrigation based on soil testing and analysis.
- **Costs:** Project costs increased significantly from 2020 to 2023 due to a variety of factors, including cost escalations (as experienced across the industry in general) and supplemental engineering to define scope.
- **Timeline:** The construction timeframe was refined based on feedback gathered through a market sounding process, identified methods to reduce risk, market capacity, availability of water for existing irrigators during the growing season, and to provide additional flexibility related to permitting and uptake.
- **Funding availability:** Federal funding was not available in the proportion and timing desired; and although discussions are ongoing, this limited the overall feasibility for the project to be funded by GOS on its own.
- **Project risks:** Given the availability of new information, the project was reassessed, and the scope was adjusted.

As a result of this important supplemental information, the GOS determined proceeding with the Westside Irrigation Rehabilitation Project (“WIRP”) as the approach that best aligns with its strategic growth objectives.

WIRP Project Definition

The WIRP scope is planned to span northwest of Lake Diefenbaker, irrigating up to 90,000 new acres of land, and increasing the irrigable land in the province by approximately 20%. The major components are anticipated to include:

- **Pumping:** The refurbishment of a major pumping station;
- **Reservoir:** The construction of a balancing reservoir near Conquest to provide off-peak storage and balance water supply;
- **Canal:** The rehabilitation and lining of the existing 45-kilometre west main canal from Lake Diefenbaker to the new reservoir. Current plans also include a possible expansion of the canal northeast of the Conquest reservoir towards the Ardath – Swanson area;



- Distribution: Pressurized and gravity-supported buried pipeline and smaller pump stations to transport water from the west main canal to the edges of producers' fields; and
- Instrumentation Controls, Communication and Reporting: Instrumentation, controls, communications, and reporting devices to connect, operate, and control the major components of the project.

Estimated Benefits

The development of irrigation presents a generational opportunity for Saskatchewan. Irrigation can help to strengthen Saskatchewan's position as a globally trusted source of food and ingredients; increase jobs, investment, and participation of Indigenous businesses, increase the value of exports in Saskatchewan; enhance prairie resilience; support expanded community infrastructure to further contribute to economic growth (e.g., food processing); and fuel growth of Saskatchewan's agri-tech sector to enable sustainability and innovation.

In addition to these qualitative benefits, an analysis of the WIRP's economic impact was conducted by KPMG comparing a 'current state' scenario (continuing without the WIRP) and a 'future state' scenario (with the WIRP). The analysis quantifies estimated direct, indirect, and induced impacts using multipliers from Statistics Canada's input-output modelling. The analysis estimates the current state would result in \$1.9B in Gross Domestic Product ("GDP") over the next 50 years, whereas the WIRP would result in \$7.7B – an incremental increase of \$5.9B. In addition to the GDP impact, \$0.5B in incremental taxes are estimated to be generated, and over 43,000 jobs would be created (9,500 during construction and 750 per year afterward). Approximately 70-80% of these benefits would occur within Saskatchewan, with the remainder occurring throughout the rest of Canada. To the extent that additional food manufacturing investments occur in Saskatchewan directly as a result of this project, the incremental impacts could be even greater, ranging from a GDP impact of as low as \$3.2B without any food manufacturing, to as high as \$8.6B with a more favourable outcome.

Estimated Costs

Total development costs are currently estimated at \$1.15B in real dollars, based on a GOS construction cost estimate presented at a Level 4 accuracy (-30% to +50%). This includes design, construction, and related supporting activities, including the new canal infrastructure from the Conquest reservoir going northeast and past Swanson.

In addition to the one-time costs to develop the infrastructure, the WIRP will require ongoing lifecycle and operating costs. The lifecycle costs for a previous scope were estimated to average 1.7% per year of the total development costs, which would be equal to approximately \$20 million per year. In addition, the operating costs are estimated to be \$4.7M, including both energy (\$2.0M) and non-energy (\$2.7M) at full build-out. All of these cost estimates will continue to be further evaluated and refined as additional information becomes available and decisions are made.

Risks

Key identified risks and areas of focus at this point include evolving project costs as further technical analyses continue to occur; permitting and environmental considerations and approvals; finalizing funding arrangements; supporting the realization of food manufacturing investments; integration with supporting infrastructure; and governance.

Conclusions

The WIRP would be one of the province's largest capital projects in history, as the next step toward the vision for irrigation from the 20th Century. Potential further steps for this project include ongoing analysis and investigation to further define the scope and development strategy, including progressing the design with robust field investigation, continued engagement and consultation, funding availability analysis, sequencing strategy, governance and ownership considerations, advancing project readiness, supporting infrastructure, and capacity-building to expand the labour force.

1 Introduction

1.1 Background & Context

Historical Context

Saskatchewan is known for its valuable agricultural land and as a key source of global food exports. In the early 1900s, the South Saskatchewan River Project was initiated with the vision of flood irrigating 500,000 acres of land and developing hydroelectricity. The Gardiner Dam was constructed from 1958 to 1967, followed by the partial construction of the west main canal and associated pumpstation. These were intended to convey water from Lake Diefenbaker to agricultural producers as far north as Delisle and Asquith. However, the construction of the irrigation infrastructure was halted in 1973. Since then, only a small portion of the partially complete canal and pumping infrastructure have been used for irrigation. Today, after 50 years with minimal maintenance and renewal, the west main canal and control structures require significant rehabilitation and supplementary construction in order to unlock additional irrigation potential.

- **1930s** Major droughts led the GOS and Fed Gov't to identify methods to secure water for SK's inhabitants
- **1958** Signing of the Federal-Provincial agreement, commencing the South Saskatchewan River Project to irrigate 500,000 acres of land
- **1966** Gardiner and Qu'Appelle dams reached substantial completion, following eight years of construction
- **1967** Filling of the reservoir began, with a maximum storage capacity of 9.4 million cubic decameters
- **1968** Partial construction of the west main canal began, along with a pump station intake and substructure
- **1969** The reservoir, now known as Lake Diefenbaker, had fully formed
- **1973** The South Saskatchewan River Project is cancelled, abandoning the partially constructed west main canal
- **1982** The Macrorie Water Users' Association petitioned to gain access to the abandoned canal
- **2006** UMA Engineering prepared a conceptual-level study as the basis for developing the WIP
- **2016** Cascade Earth Sciences prepared an overview of potential scenarios and requirements for the WIP
- **2020** GOS announces LDIP, Engineering Feasibility Study, LDIP Business Case
- **2020** Western Economic Diversification Canada releases report on prairie water and land management
- **2023** A WIP Business Case was prepared for the preliminary 340,000-acre scope of the project
- **2024** The WIRP was announced, focusing on irrigation of 90,000 acres

Work Completed to Date

In 2020, the GOS announced the decision to invest in supplementary planning activities for the LDIP. The 2020 announcement defined a vision to achieve 500,000 acres of additional irrigated acres in Saskatchewan through the WIP and the QSWCP.

Since the announcement, ongoing investment into planning activities have occurred including feasibility studies and business cases for evolving project scopes related to the LDIP. Notably Western Economic Diversification Canada released a report, *Prairie Prosperity: A Vision for the Management of Water Across Saskatchewan and*

the Prairies that recommended, “The Governments of Canada and Saskatchewan should advance the Upper Qu’Appelle Canal and the WIP” thus resulting in the WIRP business case.

The announcement in 2020 was related to investments in preliminary planning activities to validate, refine, and supplement the key attributes of the LDIP, including scope, technical, and cost-related considerations. Since then, subsequent investments in technical, financial, and economic development work have been conducted. These were intended to further understand the LDIP, with an initial focus on the WIP, and to refine and validate studies and analyses related to the WIP that have occurred over the past 50 years. At the time of the announcement, the LDIP had been defined and estimated in these historical studies with the following attributes:

- Construction duration: Requiring approximately ten years of construction.
- Cost estimate: Estimated cost in the range of \$4B (for WIP and QSWCP combined).
- Foundational components: Building upon unique and robust existing infrastructure.
- Economic benefits: Providing value added economic growth in the range of \$40-\$80B over a 50-year period.
- Prioritization: Focus placed on the WIP’s ‘Rehabilitation’ area, assumed to be highly ‘shovel-ready’ with 90% of the current canal in place.

The work completed between 2020 and now included the following activities:

- Engagement of a Prime Consultant to Progress the Project Definition and Technical Analysis: Clifton Associates Ltd., in partnership with Stantec and Associated Engineering, were engaged to complete the overall preliminary engineering design work for the WIP. The services included preliminary engineering design; preliminary geotechnical investigation and agricultural soil suitability assessment; environmental investigations and services; and supporting engagement with First Nations and Métis locals as well as key stakeholders.
- Engagement of a Financial and Market Analysis Advisor: KPMG, in collaboration with Praxis Consulting Ltd., was engaged to develop a Business Case for the WIP. The services included: financial analysis, with consideration of estimated costs and economic benefits; procurement analysis, related to delivery model and funding / financing options; and market analysis to inform economic development and investment attraction opportunities associated with the Project, including engagement with agricultural producers, value-added producers, and construction contractors.

The work of the Prime Consultant and the Financial and Market Analysis Advisor was overseen by a ‘One-Government’ collaborative governance structure. This included input, decision-making, and guidance from the Saskatchewan Water Security Agency, Ministry of Agriculture, Ministry of Trade and Export Development, the Ministry of SaskBuilds and Procurement, and other Project participants. In addition to the Prime Consultant and Financial and Market Advisor, the GOS also advanced planning activities. These included related to Project readiness, Project governance, community engagement, federal engagement, and public engagement.

1.2 Recent Information Gathered

Introduction

The information gathered from these investments and activities between 2021 and 2023 supported the redefinition and refinement of the WIP. As a result of this important supplemental analysis, the GOS decided in 2024 to proceed with additional planning activities related to a redefined version of the WIP. The WIRP includes the complete Rehabilitation area from the Westside Rehabilitation Project (“WRP”), as well as the Vanscoy area from the Westside Expansion Project (“WEP”). Highlighted information learned, from work conducted in 2020 to today, is described below.

Key Considerations

1 Project Definition

Project definition and scope were refined for an achievable delivery approach

Supplemental analysis indicated various options or approaches to phasing and sequencing work related to the WIP. Analysis of options included considerations such as use of existing infrastructure, water source, size, uptake, information availability and power and utility availability. It was confirmed that design, construction, and operations of the key project components (pumping stations, canals, reservoirs, distribution system and instrumentation, controls, communications and reporting) could be completed in a phased approach, achieving a target 340,000 irrigated acres over time.

This phased approach enabled greater flexibility, including as it relates to regulatory approval timelines, market capacity, balancing GOS funding needs, supporting constructability and maximizing water availability for producers, and incorporation of lessons learned from comparator projects.

The current WIRP project will create 90,000 acres of irrigation by capitalizing on the existing pump station, canals, and reservoir, maximizing its value for Saskatchewan taxpayers.

2 Water Availability

Availability of water for the project has been further validated

A hydrological model was developed based on historical data and potential scenarios for the Saskatchewan River Basin. Analysis consistently demonstrated that water was available for the WIP. Withdrawal presented only a marginal change in impacts that could be experienced in a low-flow year. Impacts are further mitigated through the operation of a balancing reservoir. From a hydrological perspective, the WIP also supported positive impacts as it relates to flood reduction, recreational opportunities, and positive ecological opportunities. Given the dynamic nature of water systems, ongoing review and analysis will continue.

3 Soil Suitability

The region was confirmed to be well suited for irrigation to support increased agricultural production

Soil testing and analysis of over 40,000 acres in the region confirmed that it is well suited to irrigation. Eighty six percent (86%) of parcels investigated were suitable for full or partial irrigation, categorized as irrigable, non-

irrigable, partially irrigable, and irrigable with drainage. This soil suitability analysis was reinforced by engagement with producers in the region and GOS existing data / information to support irrigation expansion.

4 Costs

Project related costs have increased based on additional information

Estimated capital, operating and lifecycle costs materially increased from 2020 to today. These increases in costs were due to a variety of factors including cost escalation (as experience in numerous capital projects during this time frame), as well as due to refined project definition. Notably, supplemental analysis refined the scope of complex components such as pumping infrastructure and conveyance channels. This refined analysis also resulted in increased costs associated with operating (especially energy related costs) and ongoing capital renewal investments to sustain infrastructure from those estimated in previous studies.

5 Timeline

The construction time frame and approach has been refined based on additional information

Feedback obtained through a market sounding process and the refined technical analysis indicated an opportunity to stage or sequence projects to achieve desired project objectives. Notably, reducing risks associated with market capacity, water availability for existing irrigators during the growing season, and providing additional flexibility related to permitting and uptake scenarios.

6 Funding Availability

Federal funding was not available in the proportion and timing desired

When announced in 2020, the GOS assumed that ongoing engagement and discussion with the Government of Canada would progress to support the project. These discussions are ongoing; however, funding commitments have not been made at this time. The availability of additional funding partners remains an important consideration to support the overall economic feasibility of the project.

7 Project Risks

Project scale, complexity, and risks turned out to be greater than the GOS' risk tolerance, and the Project's scale / complexity was no longer aligned with GOS' capacity

As the project has become better understood through the supplemental analysis, key risks have been identified to support the on-time, on-budget high quality delivery of the project. The project represents one of Saskatchewan's largest infrastructure projects in its history and is unique relative to other Canadian irrigation projects (due to pumping requirements versus gravity supplied approaches). Notably, the scale and complexity of pumping (some of the largest pumps in Western Canada), discharge pipelines, soil movement, and power requirements are substantial. For example, the 375 kms of conveyance canals and 1,400 kms of distribution piping is roughly equivalent to the distance from Regina to Kelowna.

Conclusions

As a result of this important supplemental information, proceeding with the WIRP has been identified as the preferred approach. This approach best aligns with GOS' strategic growth objectives.

1.3 Evolution of Irrigation in Saskatchewan

Today, Saskatchewan has over 431,000 irrigated acres, 25% of which are within irrigation districts, with the remainder privately owned and operated.¹ By comparison, Alberta has more than 1,800,000 irrigable acres (and growing). These irrigated acres contribute to outputs at significantly greater rates than dryland acres, with Alberta reporting irrigated acres accounting for 4.4% of farmland and yet more than 25% of primary agricultural sales. In other words, contributing approximately 7x more economic output per acre. Irrigation also advances agricultural production by providing unique advantages; most notably:

- **Increases production yield:** data from Lake Diefenbaker Development Area indicates increased yield by nearly 2 times for common crops such as spring wheat (1.9x), canola (1.8x) and flax (1.2x) when irrigated in a normal year. This means that more crops can be grown on less land, providing more efficient land use, higher productivity of equipment and workforce, and an enhanced ability to meet global demand for food.
- **Enables production of new and higher value crops:** irrigation enables producers to shift their crop rotation, introducing higher value crops such as specialty crops (e.g., corn or potatoes), forage (e.g., to expand livestock production), and pulses (e.g., dry beans). These crops present greater opportunity for value-added production (e.g., processing and manufacturing, resulting in new job creation) as well as greater profitability for producers, businesses, and individuals (directly and indirectly).
- **Provides greater production stability and reduces risk:** Irrigation allows producers more control of soil moisture content, reducing one of the many risks associated with agriculture production. This is particularly critical given weather patterns indicating the likelihood for droughts to be more severe and experienced more often than historically experienced. The stability enabled by irrigation is also critical to achieving value-added activities, which relies on consistent year over year supply of crops to sustain operations (e.g., related industries for sorting, finishing, manufacturing, and packaging). The stability enabled by irrigation also reduces crop insurance claims due to drought.
- **Increases economic activity to invest into other public and private services:** Increases in production means more exports (and associated tax revenues to fund public services), more jobs to fulfill production and downstream or value-added needs, increased tax revenue through enhanced profitability and greater disposable income for businesses and individuals to invest in community activities.

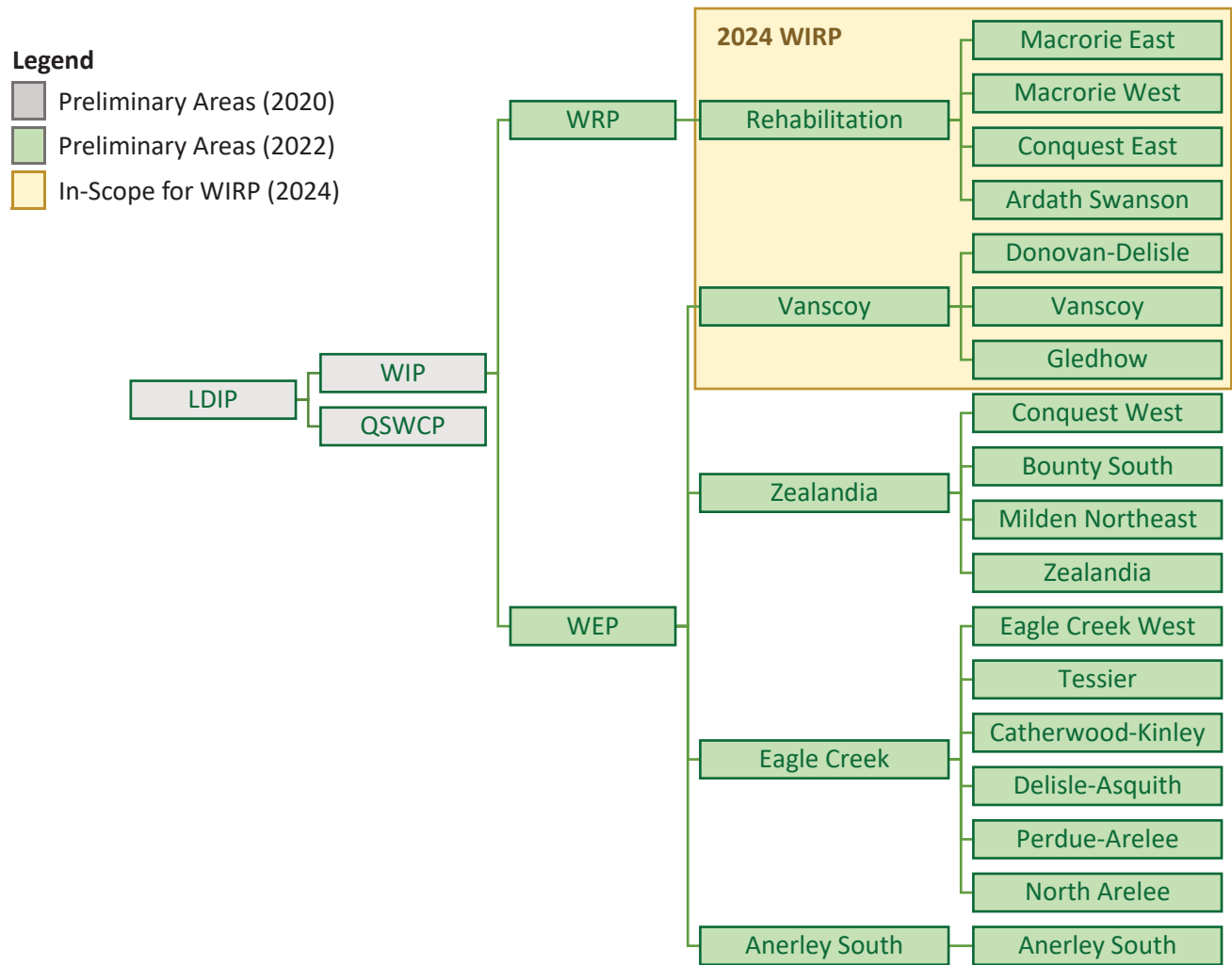
Given that analysis and activities related to the LDIP have occurred for over fifty years, irrigation technology has significantly advanced. Innovations in equipment, operations, construction, agricultural use, and key producer-level inputs (e.g., crop development advances) have also improved the overall efficiency and effectiveness of moving water from source to field and in turn seed to table.

¹ Government of Saskatchewan. *Crops and Irrigation*. Retrieved from: <https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/crops-and-irrigation/irrigation>.

2 Project Definition

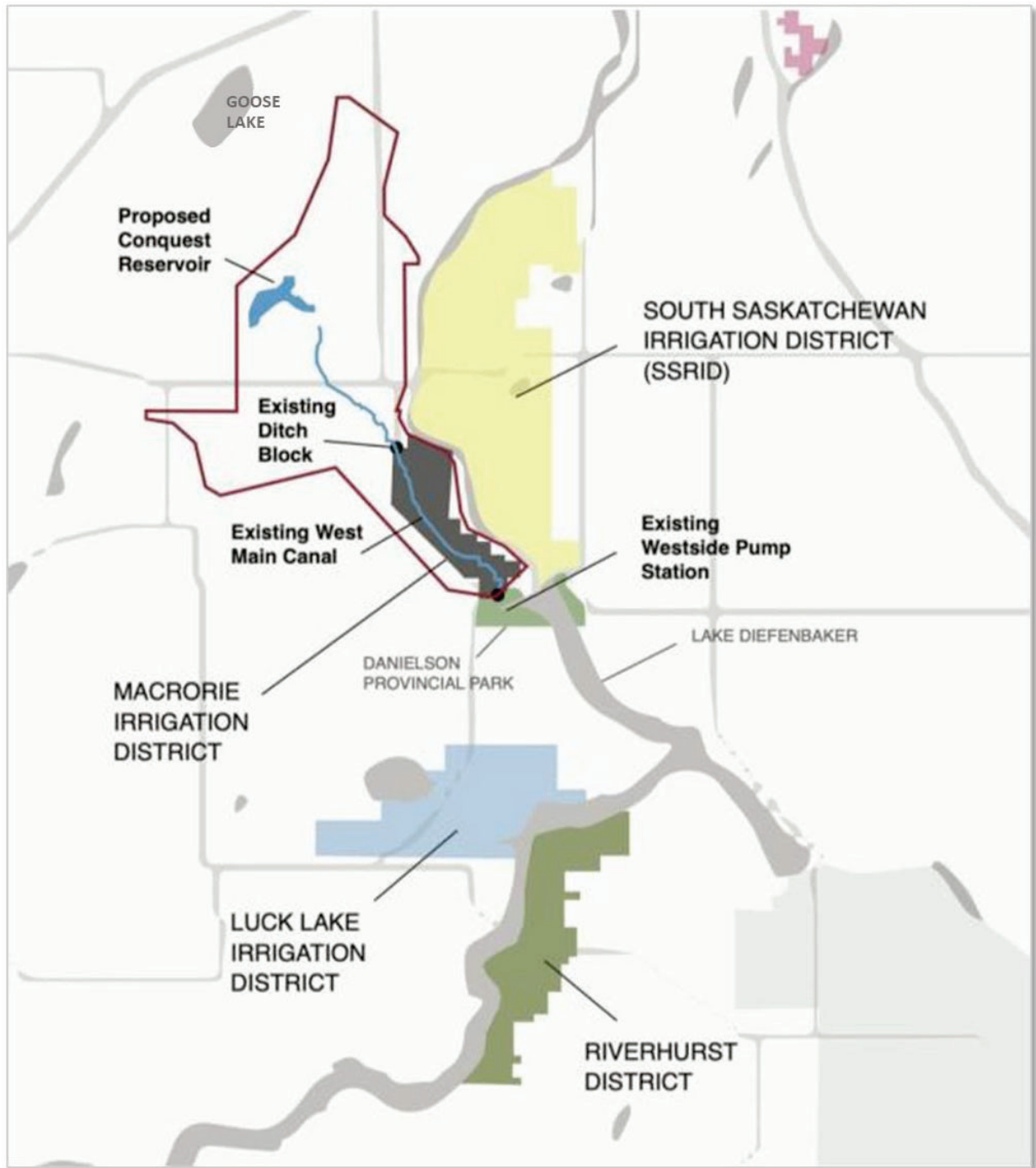
2.1 Introduction

The LDIP has an objective of achieving 500,000 acres of additional irrigated acres. The preliminary areas within the full LDIP include both the original WIP and QSWCP. The WIP was preliminarily divided into two areas: The WRP and the WEP. The defined scope for the WIRP includes the full Rehabilitation project area from the WRP, along with the Vanscoy area from the WEP. Based on information gathered from additional planning and validation activities between 2020 to 2024, the GOS has defined the WIRP scope to include the initial works to support the vision for full LDIP. The graphic illustrates the areas and interdependencies within the LDIP, indicating which components are currently considered in-scope.



2.2 Geographic Area

The WIRP scope spans across numerous 'Potential Development Areas' including Macrorie East, Macrorie West, Conquest East, and Ardath Swanson (from the 2020 Rehabilitation area), and Donovan-Delisle, Vanscoy, and Gledhow (from the 2020 Expansion area). The area of legacy infrastructure within these areas can provide irrigation to up to 90,000 acres of land. A visual summary of the WIRP scope is provided below.



2.3 Major Components

The WIRP prioritizes rehabilitation of legacy infrastructure as a prerequisite to investing in expansion. It is critical that existing infrastructure and systems are rehabilitated in advance of broader investments in distribution infrastructure to enable an extended project lifecycle of 50+ years.

As part of work conducted from 2021 through 2023, supplemental review of existing infrastructure was completed. Given the age, condition, and current standards, significant rehabilitation of current infrastructure would be required to achieve the Project's objectives. Based on preliminary technical studies and currently known information there are five major components that make up the WIRP scope of work. The initial work defined below involves a higher level of investment and effort for specific areas whereas the secondary components will require further investigation and definition, anticipated to be embedded throughout design and delivery of the primary components.

Primary Components



Pumping Station

Rehabilitation of the existing main pump station in Coteau Bay, involving refurbishment of a large concrete substructure, expansion of pumping equipment, and consideration of inflow and outflow mechanisms to enable the movement of water.



West Main Canal

Rehabilitating and lining the existing west main canal, from the Coteau Bay Pumping Facility to Conquest (approximately 45 kilometers). The west main canal would be designed to support a range in flow capacity from approximately 30 cubic metres per second.



Balancing Reservoir

Constructing one balancing reservoir near Conquest. The main purpose of the reservoir is to provide off-peak storage that supports the balance of water supply and irrigation demand—reducing the required capacity of the supply.

Secondary Components



Distribution System

Distribution infrastructure including a combination of both pumped and gravity systems. The project would involve further analysis to determine the number of pumped and gravity systems for the scope area. Activities for the distribution work may include construction of secondary canal structures and installation of pressurized buried pipeline, which will provide distribution to approximately 90,000 acres.



Instrumentation, Controls, Communications, and Reporting (ICCR)

The ICCR would include a range of infrastructure to connect, operate and control the other major components of the project.

Primary Scope Definition

The major components are described further below, with **bold, green font** used to highlight the key assumed scope as informed by analysis that occurred between the 2020 WIP and the 2024 WIRP.

Pumping Station

The water conveyance would begin with rehabilitating the pumping facility located along the northwest shore of Lake Diefenbaker. Approximately 400 metres from the Coteau Creek valley, in a narrow inlet, is an existing pumping station intake and substructure. These were constructed prior to the 1972 suspension of construction. The substructure was not used until 1982, when the Macrorie Irrigation District installed the existing small pumps in the east wet well enclosed in the small metal building.



Figure 1: Deterioration of the pump station's substructure

The maximum capacity that could be achieved by upgrading the current facility is approximately 30 cubic meters per second (m^3/s), which is not enough to support the full WIP, but would be sufficient to meet the needs of the WIRP to complete the upgrades.

The preliminary plan by the GOS' Project Team is to renew the existing facility at an estimated cost of under \$30 million and upgrade / expand the pumping station.

Existing Westside Main Canal

The west main canal was also partially constructed in the 1969 – 1973 period to serve as the main system for future development on the west side of the South Saskatchewan River. The portion of the constructed canal is approximately 45 kilometres in length, but it was abandoned and did not convey irrigation water until 1982, when the Macrorie Water Users' Association petitioned to gain access to it. Although it was originally designed for a capacity of $21 \text{ m}^3/\text{s}$, the canal is only used for conveyance and storage to supply water to pumping units along the west main canal installed by members of the Association. Seepage control measures that were proposed in the original design were never installed, resulting in a seepage-affected area beginning to appear on the downslope side of the canal shortly after it received water.



Figure 2: An existing portion of the West Main Canal, showing encroaching vegetation, intense slope, and a lack of lining

According to the work done in 2020, the canal needs rehabilitation and lining. Further, recent rehabilitations of existing canals in similar condition, such as the M1 Canal, supplied by the Eastside Pump Station, shows that

rehabilitation costs are generally similar to construction costs for new canals of the same size. The canal would also need to be enlarged to support the full scope of the WIP. The image on the right shows the recently rehabilitated M1 Canal out of Lake Diefenbaker, servicing the South Saskatchewan River Irrigation District (SSRID) and Saskatoon Southeast Water Supply (SSEWS) featuring appropriate lining, improved access, and a reduced slope for ease of construction access.



Figure 3: The M1 Canal from Lake Diefenbaker, recently rehabilitated to modern standards (including a lining comprised of rubber and rocks and a reduced slope to enable improved construction access)

The west main canal currently serves only 3,200 acres with irrigation water.

The WIRP scope will involve activities such as expanding, rehabilitating, and lining the existing west main canal, from the Coteau Bay Pumping Facility to Conquest (approximately 42 kilometres), completing the final three kilometers of canal to the Conquest Reservoir, and the design and installation of appropriate control structures, drain inlets, cross drains, and wasteways. Current plans also include a possible expansion of the canal northeast of the Conquest reservoir towards the Ardath–Swanson area.

The wasteways would be installed along the canal to enable safe discharge of surplus flows that can enter a canal through local runoff or surge flows due to unscheduled or scheduled shutdowns of the pump stations and deliveries along the canal. The wasteways are preferred at locations where the canal capacity decreases significantly (i.e., major pump stations or delivery points) and generally spaced approximately 15 kilometres apart. Automated check structures would be placed at the appropriate locations to maintain constant water levels, particularly during low flow periods.

Balancing Reservoirs

According to the 2020 Feasibility Study, balancing reservoirs north of Conquest will offer advantages in capital savings and operational efficiencies for the WIP, including:

- Reducing peak-pumping capacity and main canal supply system capacity;
- Receiving surplus water following runoff events or unscheduled shutdowns;
- Significantly reducing the travel time to certain parts of the system and providing better management of water / service to users; and
- Providing multi-use opportunities, such as water-based recreation and wetlands enhancement.

The WIRP scope involves constructing one balancing reservoir at Conquest.

Secondary Scope Definition

Distribution

Along the west main canal would be smaller pump stations and gravity turnouts, which would supply water to the distribution system, which in turn would supply water to individual land parcels and other users. Numerous pump stations – smaller in size and capacity than the main pump station – would be installed along the west main canal. These would be used to pump water through the distribution system, which in turn would supply water to the individual land parcels. According to the 2020 Feasibility Study, a single pump station can service an area that is generally between 3,500 to 6,500 acres.

The distribution system would include pressurized, buried pipelines to distribute water.



Control Systems

A fully automated supervisory control and data acquisition system would be an essential part of the project. The system would ensure the most efficient and environmentally friendly management of water to manage the movement of water from the pumping facilities, through dozens of kilometres of canals and several-hundred kilometres of buried pipelines. The proposed automation would include local controllers at all main structures and the reservoirs, data acquisition points, pump stations, and diversions. Each of the local controllers would perform automatic control as a standalone system, and a communications network would link the sites to a central control facility. An operator could make set point changes and receive alarm information using a computer system, within the control facility.

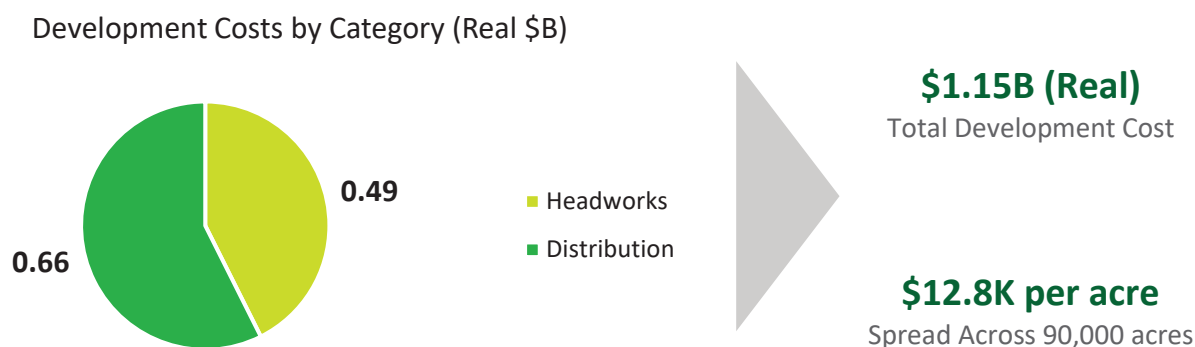
Automated control and data acquisition systems would be used to control the flow of water on the existing portion of the west main canal and anticipated that design would consider future expansion.

3 Preliminary Costs

3.1 Development Costs

Development costs focus on the one-time design, construction and related development costs associated with building infrastructure. As project design progresses and additional project-specific information is available, the estimated cost is expected to be further defined.

Total development costs at this time are estimated to be \$1.15B (2023 real dollars). This is based on a construction cost estimate presented at an accuracy of a Level 4 (-30% to +50%) estimate, along with an allowance for design, construction, administration, environmental, and permitting costs. Headworks costs include the supply, delivery, installation, and/or construction of materials and infrastructure such as canals, pipes, and pumps that are used to transport water from its source (like a river or reservoir) to the irrigation site. Distribution costs are associated with the system that delivers water from the main conveyance / headworks infrastructure to the individual fields. This does not include on-farm development costs (pumps, pivots, machines, electrical facilities, etc.). The total estimated one-time development costs are summarized below.



3.2 Lifecycle Costs

In addition to the one-time development costs, the assets will require major maintenance / rehabilitation at some point in the future. Some of the components have shorter lifespans and will require replacement or renewal sooner (e.g., control systems, security cameras, etc.), whereas other components have longer lifespans of 50-75+ years (e.g., pipes, concrete slabs, etc.).

Based on a preliminary analysis conducted by Clifton in 2021, the average annual lifecycle cost, based on the estimated service of components and the replacement cost, was estimated to be equal to ~1.5% of the total development costs or ~1.7% of the hard costs. Given the potential to bundle replacements and/or defer activities, there are likely to be some years with no lifecycle costs, and other years with significant investments in renewal. Assuming a similar ratio of lifecycle costs to development costs would be equivalent to an annualized average cost of \$19.5M or \$216 per acre on average, although this would typically vary over time and increase in general as the assets age. Additional analysis will be required in the future to further define the estimated lifecycle costs in alignment with the adjusted scope of the WIRP. These cost estimates will be further evaluated and refined as additional information becomes available and decisions are made.

3.3 Operating and Maintenance Costs

Beyond the initial development and lifecycle costs, there is anticipated to be ongoing operating costs associated with energy and overhead of operating the infrastructure (e.g., canal operations and minor maintenance, administrative costs, power, etc.).

- **Non-energy:** The annual non-energy costs were estimated to be \$30.41 per acre by Clifton, based on the closest comparable Saskatchewan-based irrigation district – the South Saskatchewan River Irrigation District. This is equivalent to \$2.7M (2022 real dollars) annually at full build-out for the WIRP with 90,000 acres.
- **Energy:** These costs, primarily for pumping, are assumed to be \$22.70 per acre based on benchmarking analysis conducted in the past for the full WIP. Based on that analysis, power costs are estimated to be approximately \$2.0M (2022 real dollars) annually at full build-out for the WIRP.

Type	Cost per Acre (\$)	Total Annual Cost
Energy	22.70	\$2.0M
Non-Energy	30.41	\$2.7M
Total	53.11	\$4.7M

In total, operating costs are therefore estimated to be \$4.7M annually, or approximately \$53 per acre at full-build out (i.e., when all 90,000 acres are irrigated). These cost estimates will continue to be evaluated and refined as additional information becomes available and decisions are made.

4 Anticipated Benefits

4.1 Qualitative Benefits

The development of Irrigation projects presents a generational opportunity for Saskatchewan. The following benefits have been identified and defined that could be achieved or enabled through the project.

1. **Irrigation investment helps transform Saskatchewan's economy into a globally trusted source of food and ingredients, in addition to other commodities**
 - Potential increases of revenue and yield of at least 50%, dependent on crop, when the land has been irrigated relative to dryland.
 - Opportunity to expand production of high-value crops that require irrigation such as potatoes and forage (to expand and increase livestock production).
 - Enhance and maintain consistency in production, potentially saving billions from production losses in case of future drought conditions, which are expected to occur more frequently.
 - Potential reduction in crop insurance risk due to increased stability.
 - Potential increase in Saskatchewan's reputation as a reliable/dependable supplier.
2. **Increased local jobs, investment, participation of Indigenous businesses, value of exports, and prairie resilience:** As described later in this document, the WIRP project is estimated to increase (incremental) GDP by \$5.9 billion (real) over 50 years and provide incremental employment of 43K+ in-person years or 850+ jobs annually.
3. **Expanded awareness of opportunities for agri-food processing in Saskatchewan and increased investment:** Similar jurisdictions have experienced significant increases in investment in value-added activities following irrigation expansion. Based on the quantitative analysis, it is estimated that the WIRP alone will increase food processing in SK by approximately 4% (+6 food processors). This means more jobs and investment in Saskatchewan.
4. **Engagement and Participation of Indigenous Businesses:** This development presents Indigenous communities with economic development opportunities. These include participation in planning, design, and construction phases. Additionally, supporting agricultural production, enhancing value through processing, and supporting the industry ecosystem through business services and utilities.
5. **Municipalities investing in community infrastructure (e.g., transportation and wastewater systems) to further enable economic growth (e.g., food processing):** It is anticipated that industry and community development would support expanded community infrastructure, such as water and waste wastewater systems.
6. **Participation and growth of Saskatchewan's agri-tech sector to enable sustainability and innovation:** Future project design and engineering activities may consider opportunities to integrate technology into the construction and operations of the irrigation infrastructure enhancing the safety, sustainability and efficiency of the irrigation systems for producers, communities and operators.

4.2 Quantitative Benefits

Work to date has assessed the influence of increased crop production expenditures on GDP, employment, and taxes, using the 90,000-acre irrigation project as a case study. These multipliers represent GDP impact and employment generated across the industry due to enhanced crop production in Saskatchewan. They are based on the potential processing mix in Saskatchewan and the contributions made to the provincial and broader Canadian economies. In addition to the changes in crop expenditure, the analysis also considers the economic impact of value-added investments due to irrigation.

These multipliers, while subject to change across production years, serve as a benchmark for similar production years and as an indicator of the irrigation project's impact on the local economy. Both Saskatchewan and Canadian multipliers are provided, with the latter covering a broader geographic area. These multipliers interpret how a dollar of new spending in one industry affects output, GDP, employment, taxes, and other economic metrics. They estimate the total effects a change in activity may have on the economy, which could be triggered by new construction projects, public spending, policy adjustments, or other factors. Please refer to 'Quantitative Analysis Assumptions' in the Appendix for detailed assumptions and definition of terms.

Analysis Approach

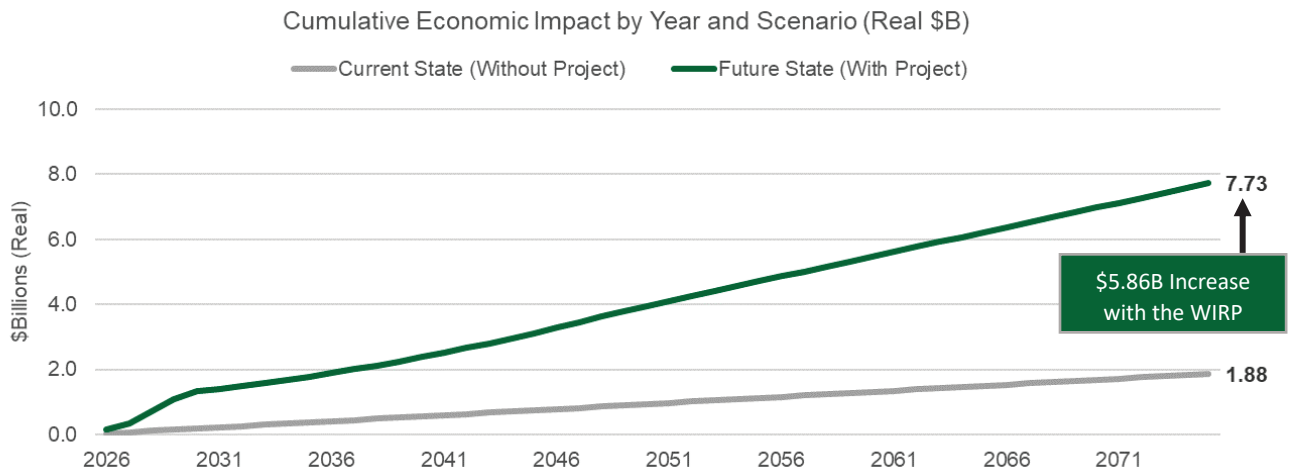
To calculate the economic impact, two scenarios were analyzed by KPMG. The first is a 'Current State' scenario whereby the existing dryland activities are assumed to continue to occur in the WIRP region. This is used as a base case, against which a hypothetical WIRP can be compared. This scenario includes the expenditures associated with growing dryland agriculture in the existing region (e.g., seeds, fertilizer, labour, etc.). The second scenario is a 'Future State' scenario that considers the estimated expenditures for the project. This includes the initial capital costs (e.g., engineering and construction of the canals, pumping stations, earthworks, other professional services, etc.), the operating costs (energy and non-energy), on-farm equipment necessary to irrigate fields, operating costs for the farms (e.g., seeds, fertilizer, labour, etc.), and estimated increases in food manufacturing (e.g., processing) that are assumed to be directly resulting from the project.

Resulting Quantitative Benefits

Incremental Economic Impact

The table and chart below illustrate the estimated economic impact associated with the current and future state scenarios over the 50-year analysis period, indicating that the WIRP is estimated to drive \$5.9B in incremental GDP impact. This is the difference between the total GDP if the WIRP were to never occur (\$1.9B) and the estimated GDP assuming the WIRP does occur (\$7.7B). In addition, the WIRP is estimated to generate an incremental increase of \$0.5B in taxes and 43K person-years of employment (jobs) over the 50-year analysis period, which is equivalent to over 850 additional jobs per year, on an annualized basis.

<i>All of Canada</i>	<i>Current State (without the project)</i>	<i>Future State (with the project)</i>	<i>Difference (incremental increase)</i>
Financial			
GDP Impact (\$B)	1.88	7.73	5.86
Taxes (\$B)	0.17	0.71	0.53
Employment			
Total Jobs (K)	9.2	52.4	43.2
Annualized Jobs (#)	183	1,048	864



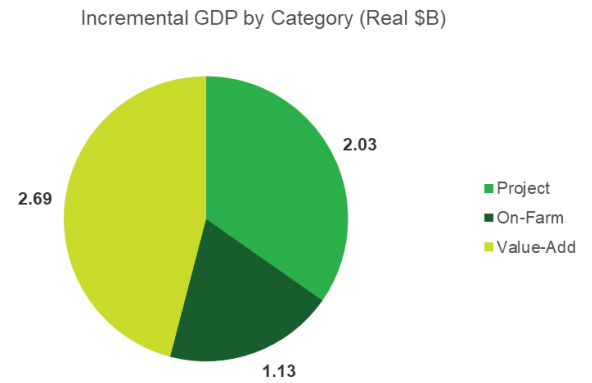
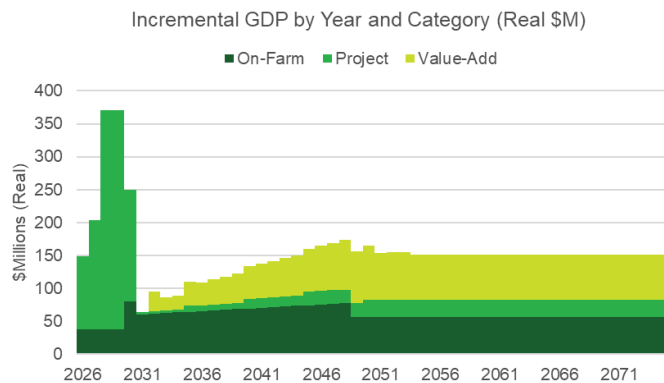
Benefits from Construction and Operations

The table below shows the incremental impact from the WIRP during construction and after its completion. During construction, it is estimated to create a \$1.11B impact on GDP, generate \$0.14B in tax revenue, and create 9.5K jobs additional jobs (an average of 1.9K jobs over the assumed five-year development period). During the operating period, it is estimated to create a \$4.75B impact on GDP, generate \$0.39B in taxes, and create 33.7K additional jobs (an annualized average of 750 new jobs per year, which would not exist without the WIRP).

<i>Incremental Impact</i>	<i>WIRP Development (Building the Infrastructure)</i>	<i>Operations (Annual) (Once the WIRP is Operating)</i>
GDP Impact	\$1.1B in GDP Impact	\$4.8B in GDP Impact
Taxes	\$0.1B in Taxes	\$0.4B in Taxes
Total Jobs	9.5K Person-Years of Employment	33.7K Person-Years of Employment
Average Annualized Jobs	1,900 Jobs per Year (5 Years)	750 Jobs per Year (45 Years)

Key Drivers

The charts below show the key drivers for the \$5.86 billion in incremental GDP estimated for the Future State scenario. The categories include the construction and operations of the WIRP's infrastructure (the **"Project"**), the incremental on-farm irrigation equipment and OpEx (**"On-Farm"**), and the CapEx and OpEx that are estimated to be driven directly by the increase in irrigation (**"Value-Add"**), as described in the Value-Add Scenarios section.



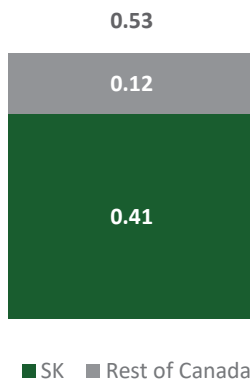
Economic Benefits by Region

The charts below illustrate that 75% of the GDP impact, 77% of the taxes generated, and 71% of the jobs created are estimated to occur within SK, with the remainder to occur throughout the Rest of Canada.

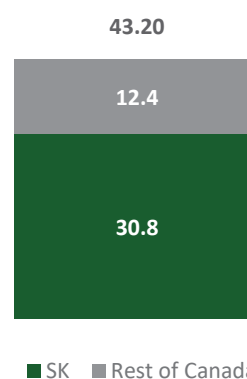
GDP (\$B) by Region



Taxes (\$B) by Region



Jobs (K) by Region



Value-Add Scenarios

The economic impact scenario assumes that an increase in the irrigable area in Saskatchewan partially influences investments in value-add (i.e., food manufacturing businesses). Currently, there are approximately 430,000 irrigable acres in Saskatchewan, so the 90,000-acre WIRP would increase the total irrigable area by 21%.²

As of 2023, there were 128 small food manufacturing businesses (5-99 employees), 12 medium (100-499 employees), and one large (500+ employees), according to Statistics Canada.³ Industries in the food manufacturing sub-sector transform livestock and agricultural products into products for intermediate or final consumption (e.g., grain / oilseed milling, dairy product manufacturing, bakeries / tortilla manufacturing, etc.).⁴

While increased availability of irrigation would likely contribute to increased food manufacturing, due to more reliable sources and quantities of food, there are many other factors that would influence industries in this sub-sector to select a location (e.g., tax incentives, transportation, cost of utilities, etc.). As a result, increasing irrigation in Saskatchewan by 21% is unlikely to lead to a direct 21% increase in food manufacturers. Alberta and Saskatchewan coincidentally have similar ratios of food manufacturing businesses to irrigable acres. (Alberta has 3.7x Saskatchewan's irrigable area, and 3.1x the combined quantity of small, medium, and large food manufacturers). However, more populous provinces such as Ontario, British Columbia, and Quebec have far more food manufacturing businesses than Saskatchewan and Alberta, despite having fewer irrigable acres, so there are reasons beyond only the agricultural inputs that drive investments.

For the purpose of this illustrative analysis, the base case assumes that an increase in irrigation represents 20% of the reason that a food manufacturer's location decision in the prairies, with the remaining 80% of the decision assumed to be due to the other factors described above (e.g., tax incentives, transportation networks, cost of utilities, etc.). As a result, the 21% increase in irrigation from the WIRP is assumed to drive a 4.2% increase in food manufacturing over the 45-year analysis period (21% increase in irrigation x 20.0% assumed probability

² Government of Saskatchewan. *Crops and Irrigation*. Retrieved from: <https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/crops-and-irrigation/irrigation>.

³ Statistics Canada. *Businesses – Canadian Industry Statistics – Food Manufacturing (NAICS Code 311)*. Retrieved from: <https://ised-isde.canada.ca/app/ixb/cis/businesses-entreprises/311>.

⁴ US Bureau of Labor Statistics. *Industries at a Glance: Food Manufacturing*. Retrieved from: <https://www.bls.gov/iag/tgs/iag311.htm>.

weighting). Given the sensitivity of this assumption to the total economic impact over time, the table below illustrates the impact of changes to this assumption.

	Pessimistic Case	Base Case	Optimistic Case
Key Assumptions			
Increase in Irrigation	20.9%	20.9%	20.9%
Impact on Value-Add Investment	0.0%	20.0%	40.0%
Assumed Increase in Food Manufacturers	0.0%	4.2%	8.4%
Probability-Weighted Increase Assumed in Food Manufacturers			
Small	-	5.35	10.69
Medium	-	0.50	1.00
Large	-	0.04	0.08
Resulting Incremental Economic Impact – National			
GDP (\$B)	3.17	5.86	8.55
Taxes (\$B)	0.30	0.53	0.77
Jobs (K)	25.1	43.2	61.3

Risks & Mitigations

Key identified project risks are described below, along with mitigation strategies.

Risk	Description	Potential Mitigation
Project Cost	Risk that Project costs change as planning progresses.	▪ Robust upfront planning, including advancing technical analysis and design to further refine costs and validate the project is economically viable and technically feasible
Permitting and Environmental	Risk that permits, approvals, and / or land acquisition is not completed in alignment with scope and schedule.	▪ Consideration as part of governance and operating model ▪ Refined delivery plan (five subproject areas to one project area) provides additional risk mitigation with defined decision- gates and off ramps ▪ Ongoing engagement and discussions with key stakeholders and Indigenous rightsholders
Funding	Risk that funding is not available to meet Project requirements.	▪ Refined delivery plan, one project area over an extended 20-year development phase could spread cash flow / funding needs over a longer timeframe ▪ Involvement of funding partners ▪ Lessons learned related to costs and benefits can be reflected from early subprojects to later subprojects
Value-Add Investments	Risk that value-add activities do not come to fruition.	▪ Development of market strategy to support investment attraction and economic development ▪ Analysis of competitiveness and consideration of policy levers or incentives ▪ Focus on 'ecosystem development' to diversify overall attraction efforts, including in advance of completion
Supporting Infrastructure	Risk that supporting infrastructure will not be available to meet Project needs.	▪ Ongoing engagement and discussion with utilities, municipalities, and related entities ▪ Proactive crossing planning and execution ▪ Ongoing communication related to the Project
Governance	Risk that there is limited capacity to support Project planning, design, and construction.	▪ 'One-Government' approach to leverage expertise from across Ministries and Crowns ▪ Clear roles and responsibilities ▪ Recruitment and retention of key skills for continuity

5 Conclusions

5.1 Key Findings

Investment into irrigation through WIRP is set to diversify Saskatchewan's economy, bolstering its position as a globally trusted source of food and other commodities. The development costs for the WIRP are estimated to be \$1.15 billion, with the project covering 90,000 irrigable acres. This results in a development cost of approximately \$12.8K per irrigable acre. Over a 50-year period, the lifecycle costs for maintenance and renewal are estimated to be \$900 million, averaging approximately \$20 million annually in real dollars.⁵

Operating costs, which include maintenance but exclude power costs, are estimated to be \$30 per acre, based on the South Saskatchewan River Irrigation District. Power costs are estimated to be \$23 per acre, based on preliminary power estimates by Clifton in the previous scope of work, now adjusted for the current scope.

The WIRP is expected to bring significant economic benefits over the 50-year analysis period. The value-added benefits are projected to incrementally increase the national GDP by \$5.8B, with \$4.4B of that estimated to occur within Saskatchewan. The project is also expected to create over 30,000 jobs in the province and an additional more than 12,000 across the country. As for taxes, the WIRP is estimated to generate approximately \$530M in municipal, provincial, and federal taxes over the 50-year analysis period, helping to offset the initial development costs. Furthermore, a probability-weighted analysis was conducted, determining that the WIRP could directly contribute to over \$380M in additional capital investment from private food processors once irrigation becomes more active, as there is a high correlation between irrigated acres and the number of small and medium food processors across the prairie provinces (Alberta, Saskatchewan, and Manitoba).

Risks associated with the WIRP can be attributed to the project cost, permitting and environmental, value add investment, supporting infrastructure and governance. Mitigation for these risks can be managed through thorough planning and analysis, market strategy, ongoing engagement, and clear responsibilities of those involved in the project.

5.2 Potential Next Steps

Potential next steps for this project include further analysis and investigation to further define the scope and development strategy. Decision making is required to confirm next steps which may include:

- **Progressing design including robust field investigation** to further refine cost estimates and proactively mitigate risks. Decisions will need to be made to determine the subsequent steps and design activities.
- **Engagement and consultation** including with Indigenous rights holders, landholders, communities, contractors, producers, investors, etc.
- **Funding availability analysis** including federal, provincial and producer contributions under various scenarios.
- **Strategy and planning** for sequencing, permitting, approvals, land acquisition and procurement related activities.
- **Governance and ownership**, including consideration of decision making across the project lifecycle.
- **Advancing project readiness**, policy program and process development and market engagement.
- **Capacity-building to expand the labour force** to meet project development and operational needs.

⁵ Analysis period includes an assumed five-year construction period and a 45-year operating period.

Appendices

- A. Summary Infographic
- B. Producer-Focused Summary
- C. Quantitative Benefits Assumptions

WIRP | Westside Irrigation Rehabilitation Project

PROJECT SUMMARY

Reliable moisture will unlock tremendous potential for agriculture and businesses in Saskatchewan. Irrigation supports the growth of diverse, high-value crops and increases employment, business attraction, investment, and value-added processing.



Adding up to **90,000 acres** of irrigable land, increasing irrigation in SK by **21%**



Creating **\$5.9B** in economic (GDP) impact with **\$4.4B** occurring in SK



Creating **9,500 jobs** during construction
and an **average of 750 per year** afterward

THE WIRP IS THE NEXT STEP TOWARD THE VISION THAT INITIALLY CREATED LAKE DIEFENBAKER.



PROJECT DEFINITION

Supplemental analysis indicated that 90,000 acres would be feasible by capitalizing on existing infrastructure to maximize value for money.



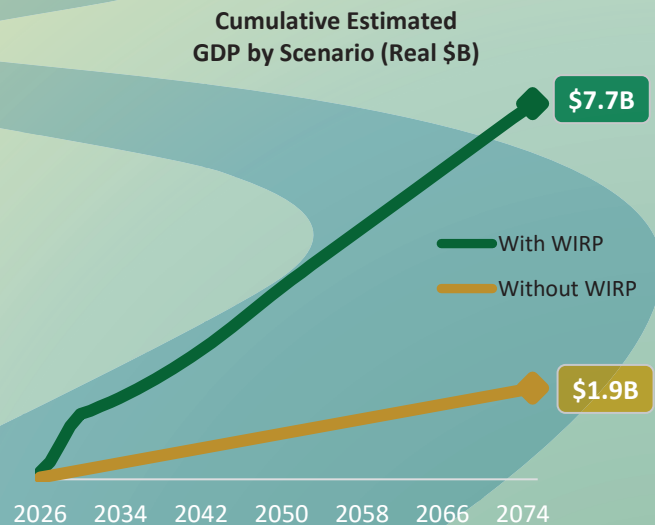
SOIL SUITABILITY

Supplemental soil testing and analysis confirmed that the region is well-suited for irrigation, reinforced by further engagement and with the GOS' data.



SEQUENCING APPROACH

Feedback obtained through a market sounding process identified potential to reduce risk and increase market capacity by staging / sequencing the projects.



RISKS & MITIGATIONS

Risks are being identified and mitigated relating to costs, permitting and environmental considerations, the realization of value-add investment, supporting infrastructure, funding, and governance considerations.

QUALITATIVE BENEFITS

In addition to quantitative economic benefits, irrigation can help to transform SK's economy, offers opportunities for participation among Indigenous businesses, and supports SK's agri-tech sector.

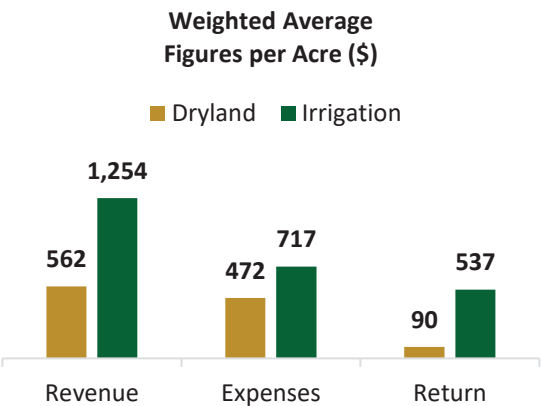
DEVELOPMENT COSTS

The one-time development costs are preliminary estimated to be \$1.15B (real dollars) to rehabilitate the pumping station, canal, balancing reservoir, distribution system, and instrumental / controls.

Appendix B | Producer-Focused Summary

The following tables summarize the benefits producers gain from additional acres of irrigation in Saskatchewan. Based on the current crop mix, dryland crops produce average revenues of \$562 per acre with expenses of \$472, resulting in an average profit of \$90 per acre. Converting to irrigation would enable weighted average returns of \$1,254, with expenses of \$717, resulting in a profit of \$537 per acre. Therefore, irrigation offers nearly 6x higher average profitability.

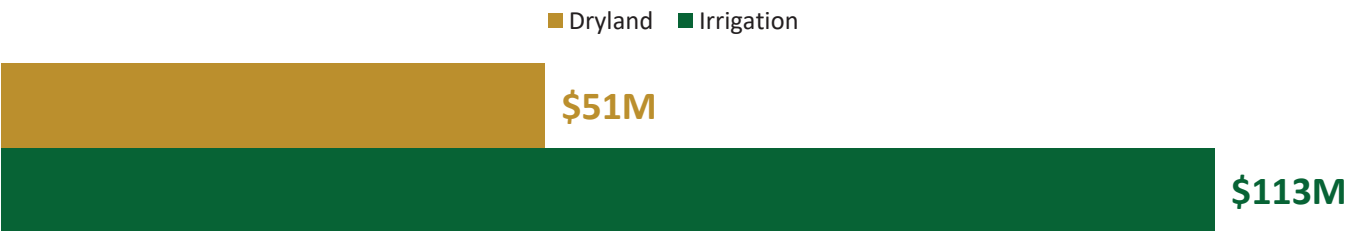
The increase in revenue is driven not only by an increase in yields for existing crops, as shown in the table below, but also a producers’ ability to produce additional specialty crops with irrigation, such as flax, black beans, and potatoes.



Crop Variety	Price (\$)	Dryland		Irrigated	
		Yield	Total Revenue (\$)	Yield	Total Revenue (\$)
Wheat	11.77 /bushel	39.7	467	85.0	1,000
Malt Barley	6.45 /bushel	57.9	373	100.0	645
Canola	16.06 /bushel	42.8	687	60.0	964
Peas	17.00 /bushel	43.8	745	55.0	935
Flax	15.00 /bushel	N/A	N/A	40.0	600
Black Bean	0.62 /bushel	N/A	N/A	2,700.0	1,674
Alfalfa	100.00 /bushel	N/A	N/A	4.0	400
Potato	630.00 /ton	N/A	N/A	12.0	7,560
Red Lentil	0.30 /bushel	1,807.8	542	2,000.0	600

As shown in the chart below, based on the assumed proportions of crops in the current state (dryland) and future state (90,000 acres irrigated), it is estimated that total output in revenue for the WIRP region will more than double from \$51M today to \$113M at full build-out (in real dollars).

Total Annual Revenue Potential for the WIRP by Scenario At Full Build-Out (90,000 Acres)



Appendix C | Quantitative Benefits Assumptions

The following tables describe the key inputs and assumptions used to illustrate estimate the quantitative benefits.

General Assumptions

Input	Value	Note / Rationale
TIMING		
Analysis duration (years)	50	Analysis assumption
Analysis start year	2026	Analysis assumption
SCOPE		
Area (acres)	90,000	As defined by Water Security Agency
Uptake rates (%)	Year 1: 10% Years 2-19: 5%	Begins when the construction reaches substantial completion and ends when 90,000 total acres are irrigated

Project Assumptions

Input	Value	Note / Rationale
ONE-TIME DEVELOPMENT COSTS		
Total one-time CapEx (\$B)	1.15	Value options workshop; information provided by GOS
<i>Hard (%)</i>	1.00	In alignment with the proportions estimated for the full WIP
<i>Soft (%)</i>	0.15	In alignment with the proportions estimated for the full WIP
Cost allocation by year	2026: 10% 2027: 15% 2028: 30% 2029: 30% 2030: 15%	Analysis assumption
SUSTAINING CAPEX / LIFECYCLE COSTS		
Annual allowance by asset age (% of hard costs)	Years 0-4: 0.0% Years 5-9: 0.5% Years 10-14: 1.0% Years 15-20: 1.5% Years 20+: 2.0%	Based on preliminary analysis in 2022 by Clifton showing a total annualized cost that is equivalent to approximately 1.5% of the direct costs over the life of the asset; assumed to increase gradually over time as the assets age
OPERATING EXPENSES		
Energy OpEx (\$/acre)	22.70	Assumes operation of Westside Pumping Station (WPS) and distribution pumping stations using the 2022 estimates from Clifton and adjusted for the reduced irrigable area
<i>Fixed (%)</i>	25	Analysis assumption
<i>Variable (%)</i>	75	Analysis assumption
<i>Driver</i>	Uptake	Analysis assumption
Non-Energy OpEx (\$/acre)	\$30.41	As estimated by Clifton in 2022
<i>Fixed (%)</i>	75	Analysis assumption
<i>Variable (%)</i>	25	Analysis assumption
<i>Key driver</i>	Uptake	Analysis assumption

On-Farm Assumptions

Input	Value	Note / Rationale
ON-FARM EQUIPMENT		
On-farm equipment one-time cost per acre (\$K)	4.0	As provided by the Ministry of Agriculture
Time of purchase	Uptake	Assumes producers would acquire irrigation equipment during the year in which irrigation becomes available
DRYLAND CROPS		
Revenue per acre (\$)	562	Based on crop reports from the Ministry of Agriculture and the following weighting defined by the Ministry of Agriculture: wheat (35%), canola (33%), peas (7%), red lentil (16%).
OpEx per acre (\$)	472	
IRRIGATED CROPS		
Revenue per acre (\$)	1,254	Based on crop reports from ICDC and the following weighting defined by the Ministry of Agriculture: wheat (45%), canola (28%), alfalfa (11%), potato (5%), peas (4%), flax (3%), black bean (3%), red lentil (1%).
OpEx per acre (\$)	717	

Value-Add Assumptions

Input	Value	Note / Rationale
SMALL FOOD MANUFACTURERS		
Current count in SK	128	Statistics Canada (retrieved from: https://ised-isde.canada.ca/app/ixb/cis/businesses-entreprises/311)
One-time CapEx (\$M)	50	Analysis assumption
Employee Count (#)	50	Statistics Canada classifies this with a range of 5-100, so 50 is assumed as a midpoint (retrieved from: https://ised-isde.canada.ca/app/ixb/cis/businesses-entreprises/311)
Annual OpEx (\$M)	10	Based on benchmarks showing an average of \$28.3M USD for 350 employees, converted USD to CAD in 2018, adjusted for inflation, adjusted for 50 assumed employees, rounded to nearest \$10M ⁶
Key driver	Irrigation uptake	Analysis assumption
Delay from uptake (years)	2	Analysis assumption
MEDIUM FOOD MANUFACTURERS		
Current count in SK	12	Statistics Canada (retrieved from: https://ised-isde.canada.ca/app/ixb/cis/businesses-entreprises/311)
One-time CapEx (\$M)	200	Analysis assumption
Employee Count (#)	300	Statistics Canada classifies this with a range of 101-500, so 300 is assumed as a midpoint (retrieved from: https://ised-isde.canada.ca/app/ixb/cis/businesses-entreprises/311)

⁶ The Boyd Company, Inc. *Comparative: Food & Beverage Processing Industry Operating Costs*. Retrieved from: https://www.pmedc.com/wp-content/uploads/2018/02/pne_boyd_food_processing_industry_cost_report_060617.pdf.

Input	Value	Note / Rationale
Annual OpEx (\$M)	40	Based on benchmarks showing an average of \$28.3M USD for 350 employees, converted USD to CAD in 2018, adjusted for inflation, adjusted for 50 assumed employees, rounded to nearest \$10M ⁶
Key driver	Irrigation uptake	Analysis assumption
Delay from uptake (years)	5	Analysis assumption
LARGE FOOD MANUFACTURERS		
Current count in SK	1	Statistics Canada (retrieved from: https://ised-isde.canada.ca/app/ixb/cis/businesses-entreprises/311)
One-time CapEx (\$M)	350	Analysis assumption (e.g., Cargill's \$350M canola crushing facility in Regina, Saskatchewan or Roquette \$400M pea-processing plant in Portage la Prairie, Manitoba)
Employee Count (#)	600	Statistics Canada classifies this with a range of 500+, so 600 is assumed for analysis purposes (retrieved from: https://ised-isde.canada.ca/app/ixb/cis/businesses-entreprises/311)
Annual OpEx (\$M)	80	Based on benchmarks showing an average of \$28.3M USD for 350 employees, converted USD to CAD in 2018, adjusted for inflation, adjusted for 50 assumed employees, rounded to nearest \$10M ⁷
Key driver	Irrigation uptake	Analysis assumption
Delay from uptake (years)	10	Analysis assumption
PROBABILISTIC WEIGHTING		
Increase in irrigation	20.9%	Increasing from 431,000 acres in Saskatchewan to 521,000 (+90,000 acres from the WIRP)
Impact on producer count	20.0%	Analysis assumption, as described in the body of the report
<i>Incremental increase (#)</i>		
Percentage (%)	4.2%	20.9% increase in irrigation x 20.0% factor weighting
Small	+5.35	$128 \times (1 + 4.2\%) = 133.35$ (probability weighted increase of 5.35)
Medium	+0.50	$12 \times (1 + 4.2\%) = 12.50$ (probability weighted increase of 0.50)
Large	+0.04	$1 \times (1 + 4.2\%) = 1.04$ (probability weighted increase of 0.04)

⁷ The Boyd Company, Inc. *Comparative: Food & Beverage Processing Industry Operating Costs*. Retrieved from: https://www.pmedc.com/wp-content/uploads/2018/02/pne_boyd_food_processing_industry_cost_report_060617.pdf.

Economic Impact Assumptions

Input	Value	Note / Rationale
APPLICABLE MULTIPLIER CODES⁸		
On-farm dryland OpEx	BS11A	Classified as <i>crop and animal production</i>
On-farm irrigated OpEx	BS11A	Classified as <i>crop and animal production</i>
Project initial CapEx	BS23B	Classified as <i>non-residential building construction</i>
Project sustaining CapEx	BS23D	Classified as <i>repair construction</i>
Project energy OpEx	BS220	Classified as <i>utilities</i>
Project non-energy OpEx	BS115	Classified as <i>support activities for agriculture and forestry</i>
On-farm equipment	BS115	Classified as <i>support activities for agriculture and forestry</i>
Value-add one-time CapEx	BS23B	Classified as <i>non-residential building construction</i>
Value-add ongoing OpEx	BS3A0	Classified as <i>manufacturing</i>

⁸ Statistics Canada. *Input-output multipliers, provincial and territorial, summary level*. Retrieved from: <https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3610011301>.