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REPORT

Capital Region Southwest Water Services Commission

Water Master Plan Update



JUNE 2026

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EXECUTIVE SUMMARY

1 INTRODUCTION

The Capital Region Southwest Water Services Commission (the Commission) supplies water to the following members, along with several small commercial and residential users:

- Leduc County
  - Hamlet of New Sarepta
  - Edmonton Airports (as a customer of Leduc County)
- City of Beaumont
- City of Leduc
- Town of Calmar
- Village of Hay Lakes
- Camrose County (Hamlet of Armena)
- Town of Millet

The City of Camrose, the City of Wetaskiwin, and the County of Wetaskiwin have expressed interest in being serviced by the Commission. A separate study is underway to determine the feasibility.

The Master Plan provides a comprehensive review of the Commission's future water demand requirements, system operations, anticipated future upgrades, and an assessment of the condition of all facilities. This report also provides the creation of a policy to formalize the practice of what infrastructure the Commission is responsible to plan and construct, and an updated financial plan for capital and operational forecasting.

2 STRATEGIC INITIATIVES

The following strategic initiatives have been established by the Commission to add focus to the Master Plan and provide a framework for decision making, resource allocation, and ongoing organizational improvements:

Initiative	Priority
Emergency Preparedness	High
Rate Predictability	High
Commission Governance	High
Member Education	Medium
Environmental Stewardship	Medium
Commission Expansion	Low
Member Communications	Low

3 WATER DEMAND PROJECTIONS

Through discussions with the Commission and its Members, the following growth rates have been applied for water supply in this report. Table ES-1 presents the short-term (5-year) water demand projections, as provided by the Members, and Table ES-2 presents the growth rates for the 25-year water demand projections.

Table ES-1 Short-Term Projected Water Demands (m^3)

Customer	2026	2027	2028	2029	2030
City of Leduc	3,362,414	3,446,474	3,532,636	3,620,952	3,711,476
City of Beaumont	1,748,558	1,824,432	1,903,599	1,986,202	2,072,388
Leduc County	1,057,385	1,110,254	1,182,420	1,265,190	1,353,753
Town of Calmar	235,000	240,000	245,000	250,000	255,000
Edmonton Airports	471,184	485,319	499,879	514,875	530,322
Village of Hay Lakes	40,364	41,576	42,823	44,108	45,431
Hamlet of New Sarepta	55,026	56,126	57,249	58,394	59,562
Camrose County (Hamlet of Armena)	65,238	68,335	70,951	72,961	74,103
Town of Millet	194,638	199,017	203,495	208,074	212,755

Table ES-2 Long-Term Projected Increase in Water Demand

Customer	Projected Increase in Water Demand 2031 – 2051
City of Leduc	2.5%
City of Beaumont	3.5%
Leduc County	3.0%
Town of Calmar	1.0%
Edmonton Airports	3.5%
Village of Hay Lakes	2.0%
Hamlet of New Sarepta	2.0%
Camrose County (Hamlet of Armena)	2.6% (+Tillicum Beach at 1.0%)
Town of Millet	2.0%
Looma/Rolly View (Leduc County)	5.33 L/s ADD (10-year) then 4.0%
Saunders Lake (Leduc County)	17.5 L/s ADD (25-year)

4 PROPOSED SYSTEM UPGRADES

Upgrades proposed over the 25-year study period, along with the Opinion of Probable Costs, are summarized in Table ES-3.

Table ES-3 Proposed System Upgrades

Year	Proposed Upgrade	Opinion of Probable Costs
5-Year (2031)	• 350 mm Nisku East Lateral Replacement • 600 mm Beaumont Secondary Supply Main	$8,363,000
10-Year (2036)	• Highway 21 Booster Pumps Upgrade	$762,000
20-Year (2046)	• 900 mm Watermain Twinning from EIA R1 to EIA R2 • 500 mm Beaumont Supply Main Extension to Beaumont Reservoir • 300 mm Highway 21 Waterline Replacement (3 km)	$21,968,000
25-Year (2051)	• 900 mm Watermain Twinning from EIA R2 to the Millet Line • Install fourth Nisku Booster Station Pump	$9,589,000

Short-Term Capital Improvements Plan

The short-term (5-year) Capital Plan is divided into four categories for identifying expenditures and funding sources: operation, repair, replacement, and system improvements. Table ES-4 details the 5-Year Capital Plan cost breakdown.

Table ES-4 5-Year Capital Plan Cost Breakdown[1]

Facility	2026	2027	2028	2029	2030
General					
Cathodic Protection Report and Maintenance	$6,000	$6,000	$6,000	$6,000	$6,000
Annual Infrastructure Maintenance	$117,000	$117,000	$117,000	$117,000	$117,000
Air Release Manhole Rehab	$18,700				
Nisku Booster Station & Beaumont Piping Upgrades	$3,675,840				
SCADA Upgrades	$68,750	$600,000	$150,000		
Water Master Plan and Strategic Plan	$152,000				
Camrose & Wetaskiwin Regional Water Supply Feasibility Study	$229,500				
Camrose & Wetaskiwin Regional Water Supply Preliminary Design		$150,000	$150,000		
Emergency Planning	$120,000	$120,000			
Sub-Total	**$4,387,790**	**$993,000**	**$423,000**	**$123,000**	**$123,000**
Facility Assessment Capital Plan	$395,500	$615,300	$63,000	$35,900	$75,000
Yearly Total	**$4,782,290**	**$1,608,300**	**$486,000**	**$158,900**	**$198,000**

[1]*All costs are presented in 2026 dollars and exclude inflation; inflation will be incorporated as part of future rate structure reviews.*

5 RATE REVIEW

To support long-term financial planning and evaluate the sustainability of future water rates, three water sales rate scenarios were developed to assess a range of funding strategies—from reliance on debt financing to fully funding capital upgrades through 100% reserve allocations. The three scenarios reviewed are:

- **Scenario 1** – Fully funded capital through reserves
- **Scenario 2** – Mixed reserves and debt financing
- **Scenario 3** – Fixed allocation

A comparison of the water rates for the reviewed scenarios up to 2051 is shown in **Table ES-5**.

Table ES-5 Water Sales Rate Comparison

Year	Scenario 1 ($/m³)	Scenario 2 ($/m³)	Scenario 3 ($/m³)
2026	1.74	1.74	1.74
2027	1.74	1.74	1.79
2028	1.74	1.74	1.84
2029	1.74	1.74	1.89
2030	1.75	1.74	1.94
2031	1.80	1.74	1.99
2035	2.02	1.91	2.19
2040	2.29	2.18	2.44
2045	2.56	2.45	2.69
2050	2.81	2.70	2.94
2051	2.86	2.75	2.99

Following a detailed review of these three funding scenarios at the March 2026 Board Meeting, the Commission determined that **Scenario 3 – Fixed Allocation** best supports the Commission's long-term interests and aligns with the objectives of the Strategic Plan. Fixed Allocation allows the reserve contribution to remain stable, while the water sales rate increases in line with rising water purchase costs and operational expenditures.

6 LARGE DEMAND USER AND INFRASTRUCTURE UPGRADE POLICY

A Large Demand User and Infrastructure Upgrade Policy was created to establish a consistent framework for evaluating proposed system connections and growth, including large demand users, to ensure the regional water system can continue to operate reliably and within design capacity. It outlines how the Commission will assess potential system impacts, identify required infrastructure upgrades, and assign financial responsibility.

The Commission maintains responsibility for planning and funding capacity upgrades associated with anticipated, planned growth, while Members are responsible for funding upgrades driven by unplanned or large demand developments that exceed established projections or create system constraints. Where upgrades provide both local and system-wide benefits, costs can be shared proportionally.

7 RECOMMENDATIONS

Associated recommends the following:

- Complete the identified system upgrades in the appropriate timeframe.
- Review existing fire storage requirements with the communities that did not provide them.
- **Strategic Plan No. 2.5.2 – Environmental Stewardship**: Promote water conservation among Members, by providing educational materials or encouraging the development of public education programs.
- **Strategic Plan No. 2.4.1 – Emergency Preparedness**:
  - Review the long-term sustainability and vulnerability of existing infrastructure and operations, with consideration of climate-related hazards.
  - Establish and maintain emergency response protocols specific to climate-related events; the Commission has recently updated its emergency response plan and should continue to review and refine it on an ongoing basis.
  - Continue to review water restriction protocols to support consistent and coordinated demand management during shortages.
  - Undertake the SCADA System modernization.
- Undertake the maintenance and upgrade recommendations outlined in the Facilities Assessment.
- Implement the Short-Term (5-year) Capital Improvement Program, as outlined in Section 8.
- **Strategic Plan No. 2.4.2 – Rate Predictability**: Adopt **Scenario 3 – Fixed Allocation** for long-term capital funding.
- **Strategic Plan No. 2.4.3 – Commission Governance**:
  - Adopt the Large Demand User and Infrastructure Upgrade Policy
  - Conduct a Governance Review to ensure operation of the Commission is optimal
- Begin the update to this Master Plan 5 years after adoption to review and confirm system water demands, future service connections, and the timing of proposed upgrades. System upgrades should be undertaken based on updated water demands.

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1 INTRODUCTION

The Capital Region Southwest Water Services Commission (the Commission) owns potable water pipelines located south of the City of Edmonton. These water pipelines supply EPCOR treated water to several municipalities and rural customers.

In 2020, Associated Engineering (Associated) completed the Commission's current Master Plan. The Commission has requested an update to the current Master Plan, including an assessment of the Commission's 15 existing facilities, to review the Commission's system based on capacity and design life.

Associated Engineering is concurrently completing a Feasibility Study for the Commission which investigates servicing the City of Camrose, the City of Wetaskiwin and the County of Wetaskiwin. This work will be presented in a separate report, and these communities are not part of the current Master Plan update. The next Water Master Plan Update, in 5 years, would address any required changes to future capital forecasting if servicing Camrose and Wetaskiwin are deemed feasible through the study.

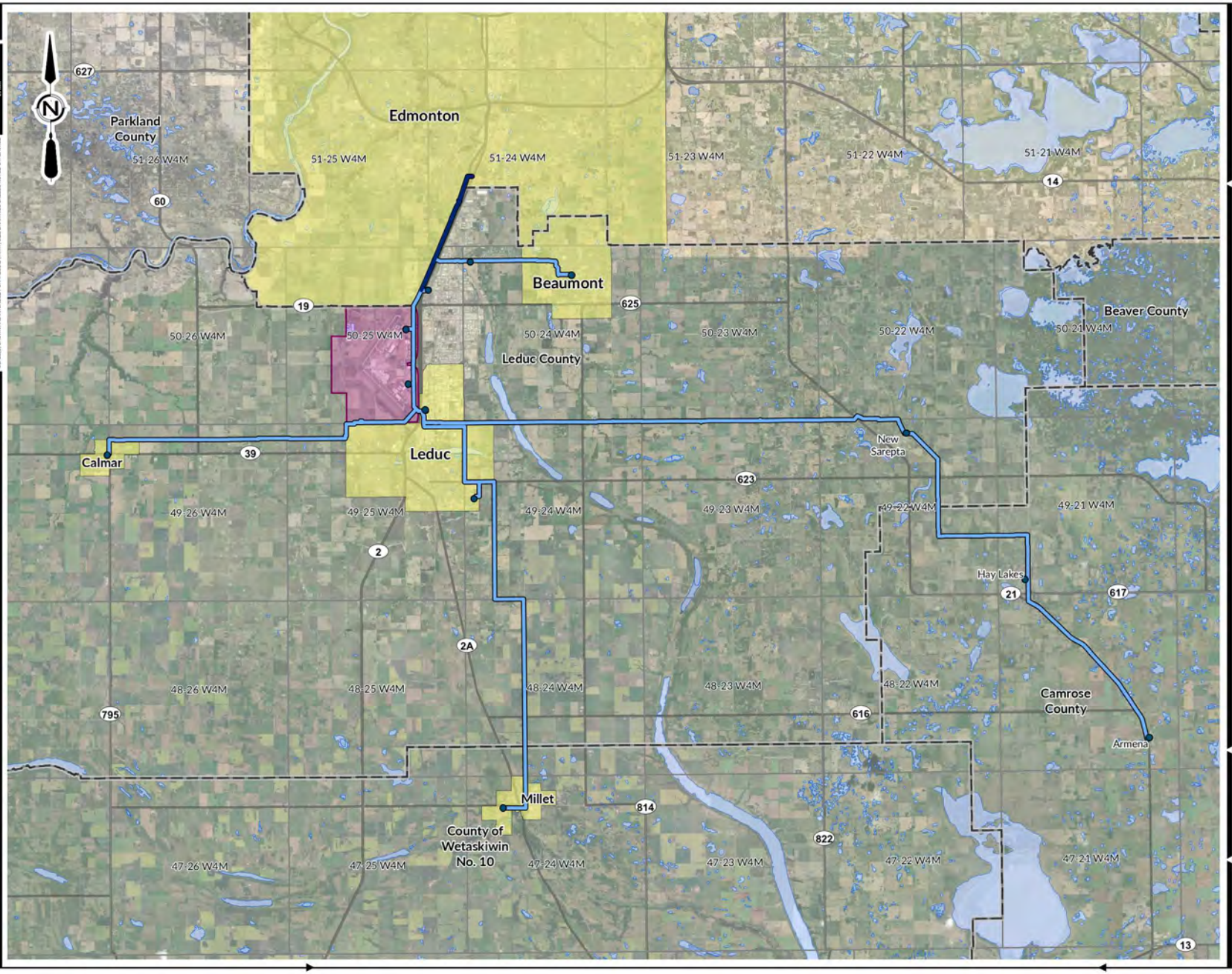
1.1 Members and Stakeholders

The Commission supplies water to the following members, as shown on **Figure 1-1**, along with several small commercial and residential users:

- Leduc County
  - Hamlet of New Sarepta
  - Edmonton Airports (as a customer of Leduc County)
- City of Beaumont
- City of Leduc
- Town of Calmar
- Village of Hay Lakes
- Camrose County (Hamlet of Armena)
- Town of Millet

In addition to these members and customers, the following organizations are impacted or have an interest in the Commission's Master Plan:

- EPCOR – the Commission's water source from the City of Edmonton.
- Regional Water Customer Group (RWCG) – the negotiating body for the Water Service Commissions being serviced by EPCOR, of which the Commission is a member.
- Alberta Environment and Parks – the regulator for water transmission systems.



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LEGEND:

- Service Location
- Existing Waterline EPCOR
- Existing Waterline CRSWSC

Base Data

- Highway
- Water Body
- Edmonton International Airport Land

FIGURE 1-1

CRSWSC
WATER MASTER PLAN

COMMISSION'S SYSTEM OVERVIEW

AE PROJECT No.	2025-3197-00
SCALE	1:200,000
DATE	2026APR21
PROJECTION	NAD 1983 3TM 114
DRAWN BY	DD
CHECKED BY	KR
DESCRIPTION	ISSUED FOR DRAFT

0 2,500 5,000 m

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DATA SOURCE: World Imagery: Earthstar Geographics;

1.2 Scope/Objectives

The Master Plan will assess the needs of the above members against the capacity of the existing water pipeline. The scope of work includes the following:

- Review of the existing system.
- Recommendation of solutions to satisfy the Commission's current and future water demand projections and development changes.
- Assessment of the waterlines based on design life expectancy of the Commission's current system.
- Assessment of the Commission's facilities, description of the condition and evaluation of repairs and upgrades required.
- Creation of a policy to formalize the practice of what infrastructure the Commission is responsible to plan and construct
- Updated Financial Plan, by reviewing funds available in reserve for capital improvement and required funding needed to meet current and future operation and maintenance needs to meet objectives of the Master Plan.
- Update of the Master Plan.

2 STRATEGIC INITIATIVES

In the Fall of 2025, Associated Engineering engaged Strategic Steps Inc. to assist with the creation of a set of strategic priorities to include to add focus to the Commission Master Plan.

Strategic Steps engaged Commission members through a survey that asked members to rank strategic themes from the Commission's previous Strategic Plan. This was followed up with a check-in with newly elected Commission members in early November 2025. During this check-in, several priorities were ranked and others identified.

The 2026 Strategic Priorities outline the governance direction for the Commission for this master planning period. They provide a framework for decision-making, resource allocation, and ongoing organizational improvement.

The following section was prepared by Strategic Steps Inc. and summarizes the strategic themes identified by Commission members as high, medium, and low priorities, based on alignment with similar themes from the Commission's 2022 Strategic Plan.

2.1 Vision, Mission, and Values

The Board is looking towards the future of the Capital Region. When doing so, it is important that Commissioners agree on what the destination looks like. With this in mind, the Board first decides on the Commission's ideal long-term future (Vision) and the general direction it will take to achieve that future (Mission).

These items were generated for the 2019 Strategic Plan and have remained consistent since then.

2.1.1 Vision Statement

Empowering Communities with Water

The Board's vision provides a long-term picture of where or what the region wishes to be or become. The vision also indicates what makes the Commission unique from other similar organizations.

2.1.2 Mission Statement

The CRSWSC delivers a reliable supply of clean, safe, drinking water to our members

The mission generated by the Board answers a question about what business the Commission is in. It lets readers know what the Commission does and who benefits from its work.

2.2 Values

The values expressed here are the guiding principles that help determine how the Commission will operate, both in public and privately.

- ***Innovation:*** *We explore new ways of meeting member needs and maintain technology and processes that are considered leading edge.*
- ***Integrity:*** *We do what we say we are going to do.*
- ***Leadership:*** *We provide high-value service delivery and environmental protection that inspires our regional neighbors. We are seen as leaders in our field of expertise.*

- ***Quality**: When our services are measured alongside similar services provided elsewhere, our services are among the most reputable, timely, and efficient.*
- ***Reliability**: We are committed to providing dependable service to member municipalities.*

2.3 Overview

The rest of this plan contains a series of priorities that are identified by the Commission as being noteworthy to achieve over the next 5 years. They are focused on the Board's governance role and so are phrased as outcomes – or a desired change over time. Once the Board has identified a goal as important, it is the responsibility of administration to determine how best to achieve that goal using limited resources and available expertise.

2.3.1 Relative Priorities

At the adoption of this plan in 2026, these priorities are identified and ranked relative to one another, giving administration the direction to focus on what the Board members identify as the highest priorities. Administration will report on the progress made on the Strategic Plan through regular Board meetings throughout the duration of the Master Plan.

Board members are aware that their governance role as Commissioners means that they are responsible for identifying priorities that benefit the Commission and its customers as a region rather than focusing solely on their own municipalities.

2.3.2 Goal Summary

The goals in Table 2-1 are described in detail through the rest of this plan. What is illustrated here are the goals and their relative priorities as of the creation of this plan and its adoption by the Commission in 2026.

These seven goals have a relative ranking from highest to lowest, with the most important and timely goals appearing at the top of the list.

Table 2-1 Goal Summary

Goal	Priority
Emergency Preparedness	High
Rate Predictability	High
Commission Governance	High
Member Education	Medium
Environmental Stewardship	Medium
Commission Expansion	Low
Member Communications	Low

These goals will be expanded upon and undertaken over the span of the current Master Plan duration. The relative priority will change over the course of implementation until the next Master Plan is adopted.

2.4 High Priority Goals

High priorities are defined as being both timely and important for the success of the Commission over the course of this plan. The priority on each item below will likely change over the life of this plan as effort is expended in completing these goals and as new strategic priorities emerge.

2.4.1 Emergency Preparedness

Goal

The Commission is prepared to respond to, and recover from, unanticipated events that may limit or eliminate customers' access to safe, reliable water.

What it Means

Emergency Preparedness refers to the organization's capacity to anticipate, plan for, respond to, and recover from disruptions such as natural disasters, system failures, security incidents, or operational crises. It includes emergency plans, resource allocation, response protocols, staff training, and coordination with municipal partners.

Why Ranked as a High Priority

Emergencies pose immediate safety, service continuity, reputational, and financial risks, preparedness is foundational. Without strong, realistic, and practiced emergency plans, all other strategic initiatives are vulnerable.

2.4.2 Rate Predictability

Goal

The Commission provides members with realistic forecasts for costs associated with Commission operations and water pricing through the course of this plan.

What it Means

Rate Predictability involves establishing stable, high-value, transparent, and long-term cost forecasts around which Commission members can budget realistically. This certainty reduces volatility in rates for services and helps municipalities plan their budgets with confidence.

Why Ranked as a High Priority

Stable and predictable costs for Commission members directly affect municipal members budgeting ability and political accountability. Predictability also affects growth plans and serves as a basis for realistic strategic planning.

2.4.3 Commission Governance

Goal

Role clarity and long-term planning ensure that the Commission operates in a predictable and effective manner, providing confidence for Commission members and customers.

What it Means

Governance refers to the membership, structures, bylaws, policies, plans, and processes that guide decision making, ensure accountability, clarify roles, and support transparent organizational oversight.

Why Ranked as a High Priority

The Board and Administration of the Commission have, over many years, established a strong foundation of bylaws, policies, and strategic plans to support the Commission's operations. As part of maintaining an effective and responsive organization, it is appropriate for the Board to periodically evaluate governance options to ensure the structure continues to meet the evolving needs of its members and supports the efficient delivery of its mandate. This review could include an evaluation of various governance models to confirm that a commission is still the most appropriate.

Options such as a Part 9 company, a municipally controlled corporation, or an independent utility structure could be examined to determine whether a different governance approach may provide enhanced flexibility, accountability, and long-term sustainability. Recent examples within Alberta, such as the Capital Region Wastewater Commission's transition to an independent utility (Arrow Utilities), or the Leduc and District Regional Waste Management Authority transition to a commission demonstrate the appropriateness of making sure to evaluate options periodically to ensure the most appropriate structure is in place. This could potentially support a more utility-focused, regionally responsive service model.

2.5 Medium Priority Goals

Medium priorities are typically defined as being either timely or important – but not both – at the start of this plan. As high priorities get completed or move into a status of being more operational than governance, these goals may elevate to become high priorities based on the will of the Board.

2.5.1 Member Education

Goal

Commission members, their elected officials, and their administrators understand the role of the Commission and how it provides services.

What it Means

Member education means that the Commission provides training opportunities, orientation, workshops, and resources for members' municipal officials. This can be general or it can be focused on specific aspects of the Commission's service delivery. Recent direction from the Board has been to extend training opportunities to member municipalities administration on a cost share basis to elevate knowledge across the membership.

Why Ranked as a Medium Priority

Regular education is primarily an operational function, however there are times, such as at the beginning of an electoral term, that it takes on increasing importance. This means that the education function can also have strategic, governance-focused, deliverables.

2.5.2 Environmental Stewardship

Goal

The Commission understands the fundamental importance of water to the ecosystem and seeks to minimize the Commission's impact on the physical environment through its distribution of safe drinking water to its customers.

What it Means

Environmental stewardship includes initiatives that minimize or reduce environmental impact, comply with regulations, and support sustainable resource management.

Why Ranked as a Medium Priority

Stewardship of the physical environment is strategically important to the Commission and its members. This goal relies on strong governance and operational stability for effective implementation to minimize water loss.

2.6 Low Priority Goals

Low priorities are defined as goals that are neither timely or important compared to the high and medium priorities at the start of this Commission's plan. These items remain significant and may elevate in status as the environment shifts or as other work is completed and resources become available.

2.6.1 Commission Expansion

Goal

The members of the Commission are always looking at how to maximize value through economies of scale to members and beyond.

What it Means

The potential of expansion for the Commission is based on adding additional members who are in need of a stable long-term supply of water. Planning for expansion has positive ramifications on existing membership through potential redundancies to the transmission system and increasing economies of scale for additional water supply to existing members.

Why Ranked as a Low Priority

Expansion is long-term and complex. Various plans and regional agreements would need to be updated should this be undertaken. The Commission is currently evaluating this through the City of Camrose Water Supply Feasibility Study, which is being done in conjunction with the Water Master Plan.

2.6.2 Member Communication

Goal

Commission members are always aware of the activities of the Commission, both as a routine practice and in times of emergency.

What it Means

This strategy ensures clear, transparent, timely communication with municipal members, including operational updates and strategic direction.

Why Ranked as a Low Priority

Communication strengthens relationships and builds trust. It depends on the delivery of high priority goals for communication to be effective and useful to recipients. Recently there has been a focus on ensuring consistent communication and response to water demand management which will continue to be worked on over the course of the next Water Master Plan cycle.

2.7 Summary

The Strategic Priorities Update provide a roadmap that was developed by the Commission's Board and Administrations. It is important that both the Board and administration work together to achieve the priorities that are outlined in this plan. Progress towards the goals of the plan will continue to be reported on through the Commission's annual reporting.

Also important is the recognition that the environment in which the Commission operates is always shifting. In response, the Commission's plans also must shift to remain relevant. As with any plan, this one must be used, reviewed and updated on a regular basis.

3 DESIGN CRITERIA

3.1 Historical Water Demands

The Commission provided water consumption records from 2018 to 2024. These have been reviewed and analysed in conjunction with the 2020 Master Plan Update.

Table 3-1 summarizes the historical water consumption records for all members and Edmonton Airports. The records indicate that from 2018 to the end of 2024 there has been an increase of 934,840 m^3 in water demand for the Commission. The average annual increase in water consumption for the Commission over this period was 2.5% per year.

Table 3-1 Water Consumption Records 2018-2024 (m^3)

Customer	2018	2019	2020	2021	2022	2023	2024
City of Leduc	2,911,949	2,771,635	2,779,246	3,027,254	2,997,233	3,092,786	3,200,394
City of Beaumont	1,326,824	1,301,174	1,381,538	1,528,692	1,492,574	1,539,347	1,602,423
Leduc County	685,952	720,559	606,876	784,335	887,067	958,424	959,079
Town of Calmar	237,193	223,393	233,662	250,478	211,457	212,210	224,348
Edmonton Airports	378,415	492,839	364,037	397,700	476,745	417,768	426,130
Village of Hay Lakes	37,097	40,069	35,517	37,468	35,351	36,239	36,901
Hamlet of New Sarepta	47,632	44,664	47,868	52,846	49,747	50,399	52,889
Camrose County (Hamlet of Armena)	6,558	8,873	14,710	20,476	35,585	52,558	63,602
Town of Millet	188,019	179,214	177,964	195,704	180,310	183,230	188,713
TOTAL	5,819,639	5,782,420	5,641,418	6,294,953	6,063,622	6,542,961	6,754,479

A breakdown of the historical water consumption data by reservoir is provided in **Appendix A**.

The amount of water supplied to the Commission's members in 2024 was 6,754,479 m^3, or an average day demand of 771 m^3/hr (214 L/s). Figure 3-1 shows the ratio of average water consumption among the Commission's members.

Figure 3-1 2024 Water Consumption by Customer

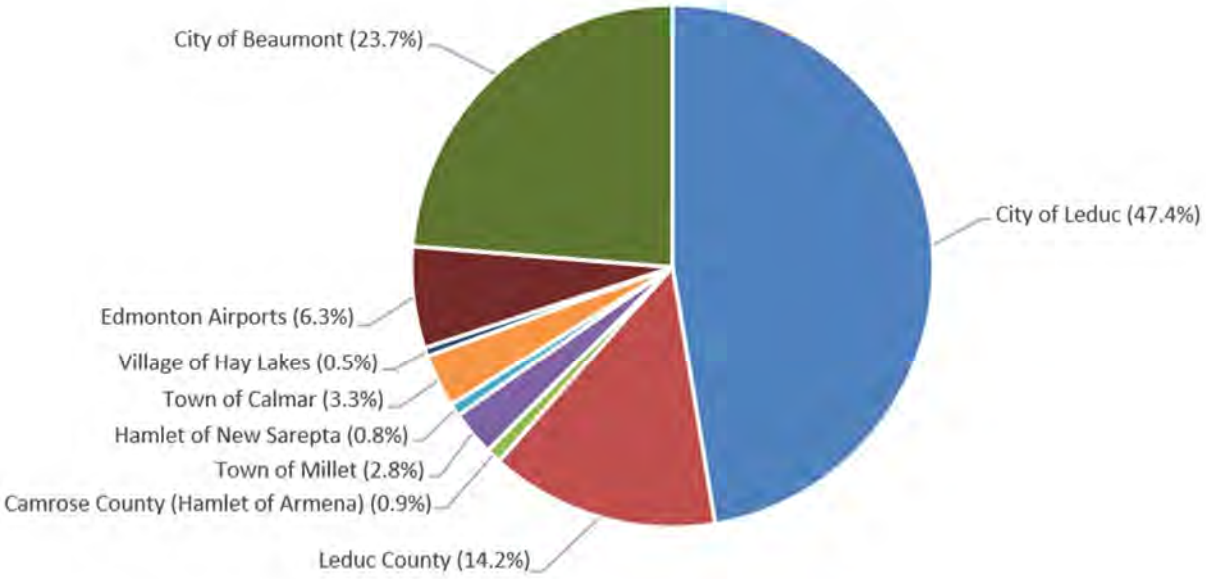


Table 3-2 shows the average annual historical growth rates (water demand) for each Commission member and Edmonton Airports from 2018 to 2024.

Table 3-2 Average Annual Historical Growth Rates

Customer	Growth in Water Demand 2018 – 2024
City of Leduc	1.6%
City of Beaumont	3.2%
Leduc County	5.7%
Town of Calmar	-0.9%
Edmonton Airports	2.0%
Village of Hay Lakes	-0.1%
Hamlet of New Sarepta	1.8%
Camrose County (Hamlet of Armena)	46%
Town of Millet	0.1%

As shown in the table, the average annual water usage increased for all but two members (Hay Lakes and Millet) with the highest increase occurring for Camrose County. It is understood that Camrose County has begun servicing additional communities downstream of the Armena Reservoir since the 2020 Master Plan, which can account for the unusually high growth. As this is from additional communities, this high rate of growth is considered inorganic and therefore is not expected to continue.

3.2 Projected Water Demands

The average day demand (ADD) is defined as the average daily water usage in a year. For this study, the ADD was determined using the 2024 consumption records. As this study began in 2025, the 2024 records were the most recent at the time. The Peak Day Demand (PDD) represents the maximum recorded consumption in the system on a single day. To project the PDD, a peak day to average day ratio (peak day factor) is used. For this study, a peak day Factor of 1.8 is used, consistent with the 2020 Master Plan. The PDD is then used in determining the delivery capacity required of the system.

It should be noted that, while municipal boundaries may change over time, the projected water demand reflects overall regional growth and is not dependent on specific municipal boundary limits.

The Commission requested that members and customers provide short-term projected water demands (5 years). Table 3-3 summarizes the projected water demands provided by each of the members and Edmonton Airports.

Table 3-3 Short-Term Projected Water Demands (m^3)

Customer	2026	2027	2028	2029	2030
City of Leduc	3,362,414	3,446,474	3,532,636	3,620,952	3,711,476
City of Beaumont	1,748,558	1,824,432	1,903,599	1,986,202	2,072,388
Leduc County	1,057,385	1,110,254	1,182,420	1,265,190	1,353,753
Town of Calmar	235,000	240,000	245,000	250,000	255,000
Edmonton Airports	471,184	485,319	499,879	514,875	530,322
Village of Hay Lakes	40,364	41,576	42,823	44,108	45,431
Hamlet of New Sarepta	55,026	56,126	57,249	58,394	59,562
Camrose County (Hamlet of Armena)	65,238	68,335	70,951	72,961	74,103
Town of Millet	194,638	199,017	203,495	208,074	212,755

Based on these short-term projections and discussions with the Commission and the members, long-term projected water demands (25-years) were also determined. Future connections to the Commission's system are also included in the long-term projections. The locations added are discussed below.

Leduc County Rural (Rolly View and Looma)

Leduc County Rural is comprised of the Hamlets of Rolly View and Looma. The future Rolly View tie-in is located approximately 12 km east of the City of Leduc boundary along Township Road 500, and the future Looma tie-in is located approximately 5 km further east. Updated demand projections have not been received, or a projected timeline for servicing. As such, the demand projections included in the 2020 Master Plan will be applied and have been adjusted for the current period.

The water demand projections are identified below:

- 2.1 L/s ADD for the 5-year period
- 5.33 L/s ADD for the 10-year period
- 4% growth after 10 years
- 95% of the water usage will be applied to Looma, and 5% applied to Rolly View

Leduc County Saunders Lake Industrial Area

The Saunders Lake Industrial Area is located south of the Nisku Business Park and north of Township Road 500. The 2020 Master Plan identified that construction was anticipated to begin in 2022; however, it does not appear to have begun at this time.

The 25-year horizon at 50% buildout, as identified during the 2020 Master Plan, will be applied for current planning purposes, and has been adjusted to coincide with the current planning period. As such, the 25-year (2051) ADD will be 8.75 L/s.

Camrose County (Tillicum Beach)

Camrose County has indicated that the Tillicum Beach Reservoir is anticipated to be connected to the regional system, projected to be completed between 2031-2035. The projected demand at that time is assumed to be a one-time addition of 0.46 L/s ADD. This demand will be applied in 2031, with a 1.0% growth rate, and will be added to the Armena demands.

The long-term projections for existing Commission Members and customers and future connections are shown in Table 3-4.

Table 3-4 Long-Term Projected Water Demand Increase

Customer	Projected Increase in Water Demand 2031 – 2051
City of Leduc	2.5%
City of Beaumont	3.5%
Leduc County	3.0%
Town of Calmar	1.0%
Edmonton Airports	3.5%
Village of Hay Lakes	2.0%
Hamlet of New Sarepta	2.0%
Camrose County (Hamlet of Armena)	2.6% (+Tillicum Beach at 1.0%)
Town of Millet	2.0%
Looma/Rolly View (Leduc County)	5.33 L/s ADD (10-year) then 4.0%
Saunders Lake (Leduc County)	17.5 L/s ADD (25-year)

Detailed water demand projections are provided in Appendix A.

3.3 Assumptions

Assumptions made regarding long-term demands are discussed below.

City of Edmonton – Discovery Park

The Discovery Park Reservoir was constructed west of Highway 2 and north of Highway 19 in 2018. The reservoir services the Discovery Business Park which is partially developed. Discovery Park is no longer supplied by the Commission; however, it remains included in the existing water model as upstream conditions will affect water supply to Nisku East and Beaumont.

EPCOR has provided updated demand projections based on the current usage at the Discovery Park Reservoir. A demand growth rate of 1.0% has been applied to the 25-year design horizon. No peaking factor will be applied, as EPCOR has advised that filling of the reservoir will not occur during peak usage events.

Camrose County (Hamlet of Armena)

The historical growth rate for the Hamlet of Armena since 2018 has been unusually high, as discussed above. As the 5-year growth projections provided by Camrose County are much lower, at 2.6%, this indicates that continued significant growth is not anticipated. A long-term growth rate of the same has been applied.

Reservoir Allocation

The allocation of water demand between reservoirs for Leduc County, City of Leduc, and Edmonton Airports has been assigned based on usage data over the last 3 years. Details of the historical usage is included in **Appendix A**. The demand allocation by reservoir is shown in **Table 3-5**.

Table 3-5 Reservoir Demand Allocation

Location	Reservoir Demand Allocation
City of Leduc	• North Reservoir: 60% • Robinson Reservoir: 40%
Leduc County	• Nisku East Reservoir: 80% • Nisku West Reservoir: 20%
Edmonton Airports	• EIA Reservoir 1: 30% • EIA Reservoir 2: 70%

Leduc County 510 Local Area Structure Plan and East Vistas Area Structure Plan

Significant growth is expected to occur within Leduc County in the 510 Local Area and East Vistas Area. As these developments are both currently underway, future water demand will be included in the adopted growth projection for the County. Both developments are anticipated to be serviced from the Nisku East Reservoir.

Single Commercial/Residential Customers

Single customer water use totalled 0.04 L/s ADD in 2023. This flowrate is negligible compared to the rest of the Commission (215 L/s ADD); therefore, single customers have been excluded from the current assessment.

Miquelon Lake Provincial Park

Alberta Parks has expressed interest in receiving water service from the Commission system. They have provided an average day design demand of 197 m^3/day, or 2.3 L/s. They have also provided a peak day design demand of 4.6 L/s.

The park's water treatment plant has received several upgrades in recent years, extending its serviceable life. However, the asset is nearing the end of its lifecycle and will require a permanent, long-term solution within approximately 5 years.

The addition of these demands would require extensive upgrades to the Commission's existing system; therefore, Miquelon Lake has been excluded from the current study. If appropriate, servicing will be investigated in the Feasibility Study for supplying Wetaskiwin and Camrose.

STRATEGIC PLAN No. 2.6.1 – COMMISSION EXPANSION

3.4 Pipeline Analysis Criteria

A maximum velocity of 1.5 m/s is recommended for supply waterlines, as maintaining velocities at or below this threshold minimizes head loss and pumping requirements, improving system efficiency. While this limit primarily serves as a design guideline for new infrastructure, it also supports lower long-term operations and maintenance costs by reducing energy consumption and minimizing wear on system components. Existing waterlines can typically accommodate higher velocities before replacement is required; however, acceptable operating velocities should be evaluated on a case-by-case basis considering pipe material, age, condition, and system criticality.

Operating above 3.0 m/s is generally considered a threshold where risks to system performance, reliability, and asset life increase significantly. While short-term or localized exceedances may be manageable, sustained operation at these velocities typically warrants mitigation (e.g., upsizing pipes, operational controls, or system upgrades) and should be carefully evaluated. High velocities and potential sudden changes in these velocities can result in pressure surges and possibly negative pressure, which can then cause serious pipe (equipment) damage.

The minimum system pressure recommended for supply waterlines is 140 kPa (20 psi) to maintain positive pressure within the waterline. The maximum recommended system pressure must account for potential surge pressures and must not exceed the maximum allowable pipe pressure based on AWWA standards.

Hazen-Williams pipe roughness coefficients (C-values) are presented below:

- Steel pipe = 125
- Concrete pressure pipe = 120
- HDPE and PVC pipe = 135

The C-values have been based on the 2020 Master Plan values and have been updated where appropriate based on recent model validation. The validation of the model is further discussed in **Section 5.2**.

4 EXISTING SYSTEM

4.1 Commission Components

The system comprises of five major sections of pipeline. The main transmission line to the City of Leduc, the Beaumont line, the Calmar line, the Millet Line, and the Highway 21 Line.

A brief description of each section of the system is provided below. **Figure 4-1** identifies the location of pipelines as well as the facilities described.

Main Transmission Line (to the City of Leduc) (Installed 1978)

- 750 mm steel transmission main from the point of transfer from EPCOR, just south of the Discovery Park Reservoir
- 600 mm steel transmission main to the Leduc North Reservoir
- Lateral mains to:
  - Nisku West Reservoir (500 mm)
  - EIA Reservoir 1 (200 mm)
  - EIA Reservoir 2 (300 mm)
- 900 mm PVC SDR 25 mains to and from the Nisku Booster Station
- Nisku Booster Station within Lot 4, Plan 1011 M.C.
- Nisku West, EIA R1, EIA R2, and Leduc North reservoirs and fill stations

Beaumont Line (Installed 1987)

- 400 mm concrete supply main to the City of Beaumont
- 200 mm lateral main to Nisku East Reservoir
- City of Beaumont and Nisku East reservoirs and fill stations

Calmar Line (Installed 1981)

- 300 mm steel supply main to the Town of Calmar, from just upstream of the Leduc North Reservoir
- Town of Calmar Reservoir and fill station

Millet Line (Installed 2018)

- 550 mm HDPE DR11 supply main, from just upstream of the Leduc North Reservoir to the Leduc Robinson Reservoir lateral
- 300 mm HDPE DR11 supply main, from the Leduc Robinson Reservoir lateral to the Town of Millet
- 400 mm lateral main to the Leduc Robinson Reservoir
- Telford Lake Booster Station located within NW 25-49-25-W4M
- Leduc Robinson and Town of Millet reservoirs and fill stations

Highway 21 Line (Installed 2009)

- 250 mm HDPE DR11 supply main, from just upstream of the Leduc North Reservoir later to the Hamlet of New Sarepta
- 200 mm HDPE DR11 supply main, from the Hamlet of New Sarepta to the Village of Hay Lakes
- 150 mm HDPE DR11 supply main, from the Village of Hay Lakes to the Hamlet of Armena
- Highway 21 Booster Station within SW 01-50-24-W4M which is approximately 11.5 km east of the City of Leduc Boundary
- The Commission's radio hub, located at the Highway 21 Booster Station. The main Supervisory Control and Data Acquisition (SCADA) system is located at the Nisku Booster Staton.
- Hamlet of New Sarepta, Village of Hay Lakes, and Hamlet of Armena reservoirs and fill stations

4.2 System Updates Since Previous Master Plan

EPCOR Purchase of Boundary Booster Station and 750 mm Waterline

The Blackmud Booster Station (formerly the Boundary Booster Station) was purchased by EPCOR in 2021 along with the existing 750 mm steel waterline extending south to Discovery Park lateral. Due to this purchase, there are now two separate custody transfer points between EPCOR and the Commission. The locations of these are within the Nisku Booster Station and along the Beaumont supply line, just off the main supply line. The purchase of the Blackmud Booster Station will ultimately allow EPCOR to operate at a lower pressure, which has necessitated construction of the Commission's Nisku Booster Station. EPCOR has committed to operating the Blackmud Booster Station at a pressure which will meet the needs of the City of Beaumont and the Nisku East Reservoir, until such time as a second fill line to Beaumont is constructed.

The water use agreement between the Commission and EPCOR requires the Commission to provide notice to EPCOR 5 years prior to construction of the additional Meter Vault and Second Fill Line to service the City of Beaumont. Based on Associated's analysis the second fill line would be required shortly after 2031 (5 years) due to velocity criteria in the existing 400 mm waterline (specifically west of the Nisku East lateral). EPCOR has agreed to meeting the minimum supply pressure to the City of Beaumont until the second fill line is constructed, estimated to be completed by spring of 2028.

Nisku Booster Station

The Nisku Booster Station was constructed with the understanding that EPCOR's ultimate intention is to operate the Blackmud Booster Station at the Tertiary Pressure Zone of 752 m HGL, which will not be sufficient to meet the Commission's needs. As such, the Nisku Booster Station was constructed north of the Nisku West Reservoir, and services all downstream members and customers. The lateral servicing Nisku West is located within the Nisku Booster Station, downstream of the PRV but upstream of the booster pumps.

Beaumont Main Reservoir Supply

The City of Beaumont has started constructing (March, 2026) a new water transmission line from the Main Reservoir to the St. Vital Pumphouse and Reservoir in order to establish a second regional supply connection and ultimately transition St. Vital into the primary service reservoir. This proposed extension would require installing a new pipeline between the two reservoirs and integrating it with the existing Commission supply system.

However, supplying water to St. Vital is constrained primarily by system pressure limitations and elevation differences within Beaumont's network. The St. Vital Reservoir sits 14.5 m higher than the Main Reservoir; the existing Commission supply main cannot deliver peak day flows and would only provide average day flows without additional boosting. Furthermore, the presence of a high point between the reservoirs at an elevation of 738.8 m requires a minimum hydraulic grade line of approximately 752 m to maintain adequate pressure.

Current Commission Water Supply Policy indicates that the Commission will supply water to only one reservoir, meaning any new connection to St. Vital, as well as any required booster infrastructure—must be fully funded and constructed by the City of Beaumont. Given these constraints, the City has proposed converting the existing Main Reservoir into a pumping station. This approach would utilize the existing air gap and reservoir at the Main site, with water being repumped to the St. Vital Reservoir to meet peak day demands and support downstream distribution. Because this option does not require increased pressure from the Commission's system and relies solely on City-owned pumping infrastructure, it provides a practical means of supplying St. Vital under current system and policy conditions.

4.3 Facilities

Water is supplied from the Blackmud Booster Station, owned by EPCOR, via 750 mm pipe. EPCOR targets a discharge pressure from Blackmud of approximately 700 kPa (40.77 m head).

The three booster stations owned by the Commission are detailed below.

Nisku Booster Station

The Nisku Booster Station is located within Leduc County, immediately north of the Nisku West Reservoir (Lot 4, Plan 1011 M.C.), to supply and maintain pressure to the majority of the Commission, as described in **Section 4.2** above.

Water is supplied to the Nisku Booster Station via a 900 mm diameter PVC DR 25 lateral pipe off of the 750 mm steel main that is owned by EPCOR. Table 4-1 summarizes the pumping capacities for the three pumps at the Nisku Booster Station.

Table 4-1 Nisku Booster Station Pumps

Pump	Pump ID	Rated Capacity	Rated Discharge Head	Power Required
1	P-101	817.2 m^3/hr (227 L/s)	47 m (461 kPa)	149 kW (200 Hp)
2	P-102	817.2 m^3/hr (227 L/s)	47 m (461 kPa)	149 kW (200 Hp)
3	P-103	817.2 m^3/hr (227 L/s)	47 m (461 kPa)	149 kW (200 Hp)

Highway 21 Booster Station

The Highway 21 Booster Station is located at SW01-50-24-4 to increase system pressure to maintain 140 kPa (20 psi) along the Highway 21 Line. The Highway 21 Booster Station is located approximately 11.5 km east of the City of Leduc. Water is supplied to the Highway 21 Booster Station via a 250 mm diameter connection from the Commission's 250 mm Highway 21 Line.

A minimum supply pressure of 140 kPa (20 psi) is to be maintained at the upstream side of the Highway 21 Booster Station. The outlet pressure is controlled by VFDs. Based on information provided, this outlet pressure can fluctuate between 826 and 842 kPa. Both booster pumps have been upgraded since 2021. Table 4-2 summarizes the pumping capacities for the two current pumps at the Highway 21 Booster Station.

Table 4-2 Highway 21 Booster Station Pumps

Pump	Pump ID	Rated Capacity	Rated Discharge Head	Power Required
1	BP-0406	74.4 m^3/hr (20.7 L/s)	88.22 m (865 kPa)	30 kW (40 HP)
2	BP-0407	74.4 m^3/hr (20.7 L/s)	88.22 m (865 kPa)	30 kW (40 HP)

The Highway 21 Booster Station operates on a duty/standby pumping configuration, meaning one pump will run at a time.

Telford Lake Booster Station

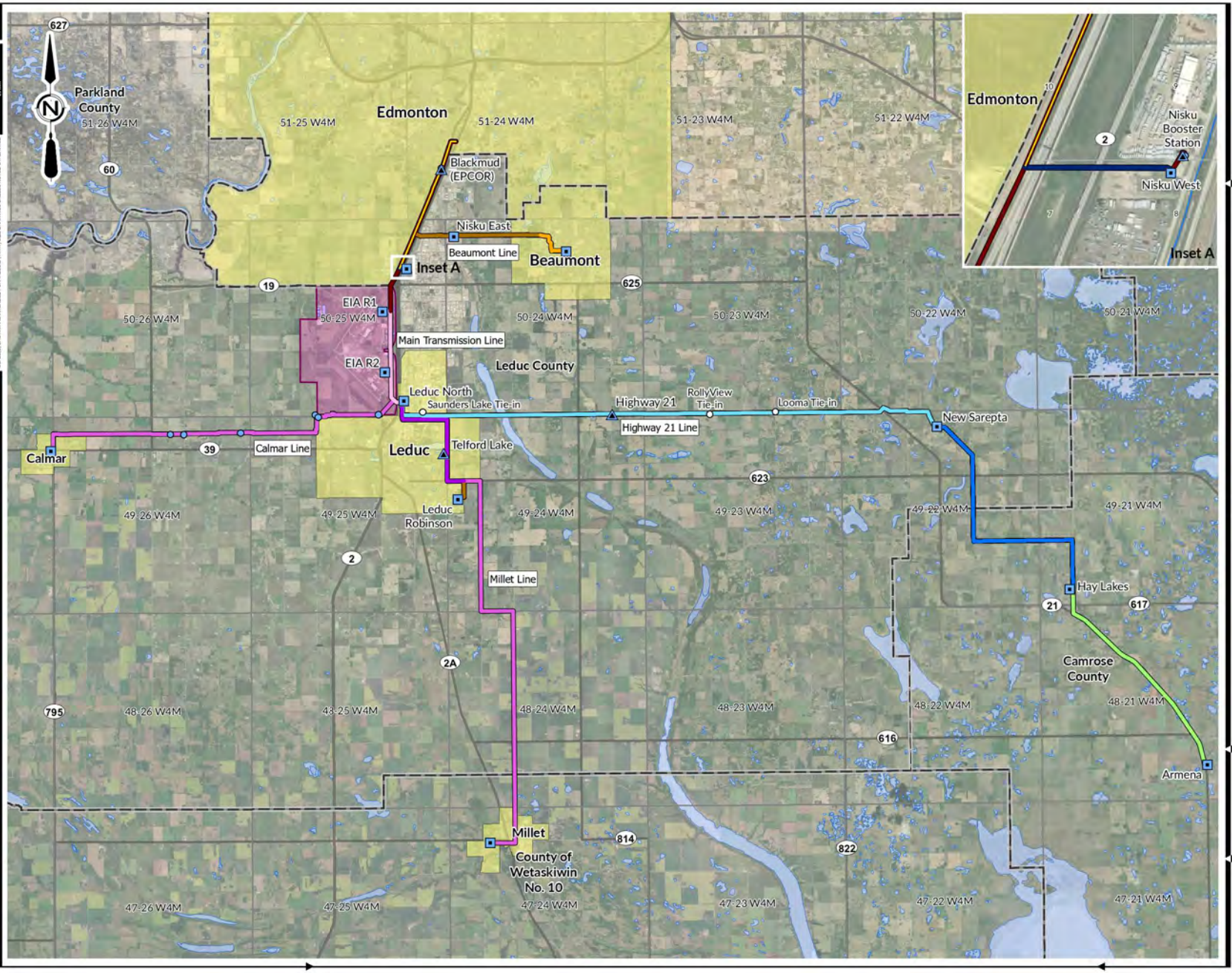
The Telford Lake Booster Station is located at NW 25-49-25-W4M to supply and maintains water pressure to the Town of Millet. This booster station is located just south of Telford Lake within the City of Leduc. Water is supplied to the Telford Lake Booster Station via a 300 mm diameter connection from the Commission's 550 mm Millet Line, upstream of the Leduc Robinson Reservoir.

A minimum supply pressure of 140 kPa (20 psi) is to be maintained at the upstream side of the Telford Lake Booster Station. The outlet pressure is controlled by VFDs to approximately 680 kPa leaving the station. Table 4-3 summarizes the pumping capacities for the two booster pumps at the Telford Lake Booster Station.

Table 4-3 Telford Lake Booster Station Pumps

Pump	Pump ID	Rated Capacity	Rated Discharge Head	Power Required
1	PMP1	566 m^3/hr (157.2 L/s)	67.06 m (657 kPa)	149 kW (200 Hp)
2	PMP2	566 m^3/hr (157.2 L/s)	67.06 m (657 kPa)	149 kW (200 Hp)

The Telford Booster Station operates on a duty/standby pumping configuration, meaning one pump will run at a time.



LEGEND:

CRSWSC Facility
- Booster Station
- Reservoir
- Single Connection
- Future Tie-In

Existing Waterline CRSWSC
Pipe Diameter (mm)
- 150
- 200
- 250
- 300
- 400
- 500
- 550
- 600
- 750
- 900
- Waterline Owned by EPCOR

Base Data
- Highway
- Water Body
- Edmonton International Airport Land

FIGURE 4-1

CRSWSC
WATER MASTER PLAN

EXISTING SYSTEM

AE PROJECT No.	2025-3197-00
SCALE	1:180,000
DATE	2026APR21
PROJECTION	NAD 1983 3TM 114
DRAWN BY	DD
CHECKED BY	KR
DESCRIPTION	ISSUED FOR DRAFT

0 2,500 5,000 m

4.4 System Capacity

EPCOR's 750 mm supply line to the Commission was designed to handle a theoretical ultimate demand of 650 L/s, based upon a maximum velocity of 1.5 m/s. This maximum velocity and other pipeline parameters are discussed in the design criteria provided in Section 3. The following are the theoretical capacities of each supply main in the system:

- Main Transmission Line – 600 mm (to Leduc North): 411 L/s
- Beaumont Line - 400 mm (to Nisku East and City of Beaumont): 194 L/s
- Calmar Line – 300 mm: 103 L/s
- Millet Line
  - Leduc North to Leduc Robinson – 550 mm: 240 L/s
  - Downstream of Leduc Robinson – 300 mm: 81 L/s
- Highway 21 Line
  - Leduc North to the Hamlet of New Sarepta – 250 mm: 57 L/s
  - New Sarepta to the Village of Hay Lakes – 200 mm: 37 L/s
  - Hay Lakes to the Hamlet of Armena – 150 mm: 22 L/s

4.5 Storage Capacity

As per the Commission's Bylaws, each customer is responsible to provide adequate storage to meet their requirements. Table 4-4 shows the existing storage capacity of each member and customer.

Table 4-4 Existing Water Storage Capacity

Member	Reservoir Capacity (m^3)	Total Reservoir Capacity (m^3)
City of Leduc	• North Reservoir = 14,000 • Corinthia Reservoir = 6,400 • Robinson Reservoir = 4,500	24,900
City of Beaumont	• Main Reservoir = 7,273 • St. Vital Reservoir = 10,000	17,273
Leduc County	• Nisku East Reservoir = 6,815 • Nisku West Reservoir = 4,545	11,360
Edmonton Airports	• EIA Reservoir 1 = 2,000* • EIA Reservoir 2 = 4,200	6,200
Town of Calmar	• Calmar Reservoir = 5,000	5,000
Hamlet of New Sarepta	• New Sarepta Reservoir = 1,286	1,286
Village of Hay Lakes	• Hay Lakes Reservoir = 474	474
Camrose County (Hamlet of Armena)	• Armena Reservoir = 120 • Ervick Reservoir = 618 • Ohaton Reservoir = 397	1,135
Town of Millet	• Millet Reservoir = 4,090	4,090

**Edmonton Airports has indicated that the total capacity of EIA R1 is 4,200 m^3; however, due to hydraulic limitations only 2,000 m^3 is available*

5 HYDRAULIC ASSESSMENT

5.1 Existing System Model

The existing Commissions' system has been modelled using the computer hydraulics program WaterCAD, by Bentley. The model was updated to reflect upgrades to the existing system including pipeline extensions, Nisku Booster Station, Highway 21 booster pump upgrades, current design flows, and any other additional information relevant to the assessment.

The most significant update to the model has been the inclusion of the Nisku Booster Station. The station has been modelled based on available record drawings using the installed pump curves. It is understood that the pumps operate to maintain a target pressure at the Leduc North Reservoir, of 310 kPa (45 psi). An existing PRV currently limits the supply pressure within the Nisku Booster Station to 379 kPa (55 psi).

The Commission's system comprises three booster stations. Existing members, customers, and facilities supplied directly by these booster stations as well as EPCOR's Blackmud Booster Station, are identified below.

Blackmud Booster Station (EPCOR)

- Nisku East and West Reservoirs
- City of Beaumont
- Nisku Booster Station
- Discovery Park (EPCOR)

Nisku Booster Station

- EIA Reservoirs 1 and 2
- Leduc North Reservoir
- Town of Calmar
- Telford Lake Booster Station
- Highway 21 Booster Station

Telford Lake Booster Station

- Leduc Robinson Reservoir
- Town of Millet

Highway 21 Booster Station

- Hamlet of New Sarepta
- Village of Hay Lakes
- Hamlet of Armena

5.2 Model Validation

The existing WaterCAD model was validated using information provided by the Commission. This included flow and pressure data at all Commission facilities on four different occasions. Each dataset was compared against the existing model, which was updated to reflect the recorded flows. Pressure results were then compared between the model and field data to assess the model's adequacy.

The data provided is listed below along with the reference used in the validation:

- Q5 Facility Pressure – Flow Snapshot Part 1 (Run 1)
- Q5 Facility Pressure – Flow Snapshot Part 2 (Run 2)
- Q5 Facility Pressure – Flow Snapshot Part 3 (Run 3)
- Point in Time Snapshot (Run 4)

The field results and modelled results were summarized and compared. Based on the observations, tie-in elevations at some locations were reviewed and revised where appropriate. Note that the pressure at the Blackmud Booster Station was not provided for the specific runs and is assumed at 700 kPa as indicated by the Commission. The Discovery Park demands are also unknown and assumed to be zero for validation purposes.

Following the adjustments, the model was rerun and the results summarized and compared against the field data provided. Table 5-1 presents the validation results comparison. Of note:

- Inlet elevations were reviewed and revised where necessary, generally from floor elevation to pipe centreline
- The diameter of the 400 mm C303 pipe was increased from the nominal diameter to the actual diameter of 406 mm
- The C value was reduced from 130 to 120 in the 400 mm C303 waterline to Beaumont

The pressure difference at Nisku East suggests that the Blackmud Booster Station pressure may have been operating slightly higher than 700 kPa.

Table 5-1 Validation Results Comparison

Location	Difference (SCADA to Model)			
	Run 1 10/6/2025	Run 2 10/3/2025	Run 3 10/3/2025	Run 4 10/1/2025
Fill Station Inlet Pressure (psi)				
Nisku East	3.1	3.9	3.5	1.9
Nisku West	0.0	-1.5	-0.8	0.0
Beaumont	0.2	5.2	4.6	2.8
EIA Reservoir 1	-0.8	-1.1	-0.6	-1.2
EIA Reservoir 2	-0.6	-0.9	-0.5	-0.4
Leduc North	0.3	0.0	1.5	0.0
Leduc Robinson	0.7	1.3	0.8	1.2
Calmar	0.8	1.9	2.0	1.1
Millet	0.7	1.1	-0.4	0.5
New Sarepta	-0.6	-2.5	0.8	0.0
Hay Lakes	-2.4	-8.4	0.8	-1.7
Armena	0.1	-10.8	4.8	0.6
Booster Station Pressure (psi)				
Nisku	1.7	0.3	1.8	0.4
Telford Lake	-1.1	-2.2	-0.5	-0.8
Highway 21	0.2	-4.1	3.1	0.4
Booster Station Flow (L/s)				
Nisku	1.3	7.8	-2.4	0.8
Telford Lake	0.3	-0.5	0.0	0.1
Highway 21	0.1	5.8	-2.5	-0.3

Runs 2 and 3 do not reconcile in terms of the flow through the booster stations and at the downstream fill stations, based on the information provided. This appears to be primarily focused downstream of the Highway 21 Booster Station. Although Runs 2 and 3 do not reconcile, Runs 1 and 4 showed very good results with the field data and modelled data falling well within 5 psi. The C-values adopted in the 2020 Master Plan are appropriate for use in the current assessment, other than the 400 mm C303 watermain to Beaumont which has been reduced to 120. No further changes are proposed to the model.

5.3 Existing System Model Results

Based on the existing system peak day model results, the following operating conditions are expected at the booster stations:

- Two pumps operating at the Nisku Booster Station at 765 m HGL, to achieve a target operating pressure at Leduc North of 310 kPa (45 psi)
- One pump operating at the Telford Lake Booster Station at an HGL of 799 m
- One pump operating at the Highway 21 Booster Station at an HGL of 809 m
- Operating HGL of 754 m at the Blackmud Booster Station to meet the minimum supply pressure at Beaumont

Peak day pressures range from 140 kPa (20 psi) at Beaumont and south of Hay Lakes and 827 kPa (120 psi) at the discharge of the Highway 21 Booster Station.

Velocity within the waterlines will remain below 1.5 m/s (other than within some facilities).

5.4 Minimum Operating Pressure

The hydraulic analysis identified that it will be necessary for the Commission to monitor and increase the minimum supply pressure to the Leduc North Reservoir over time. Currently, the minimum delivery pressure is controlled to 310 kPa (45 psi) at Leduc North Reservoir, and the pumps at the Nisku Booster Station are operated to maintain this minimum system pressure. The setpoint is anticipated to meet the minimum system pressure for the next 5 years.

As demands continue to increase south and east of the City of Leduc, it will be necessary to assess and increase overall system pressure to maintain a minimum pressure of 140 kPa (20 psi) at all locations on the system.

5.5 Reservoir Filling Rates

The Commission establishes fill rate set points at their reservoirs to reflect the daily demand draw rates. Maximum flow rates are set at 1.9 x ADD, or slightly above the PDD (1.8 x ADD). These set points should be updated as required as demands change over time.

5.6 Pumping Assessment

The existing pumping capacity was assessed for each facility as presented in Table 5-2 below, using the peak day design demands. At each booster station, one pump is kept in reserve as backup. Values in **bold** indicate additional pumping is required.

Table 5-2 Pumping Capacity Assessment

Location	Flowrate (L/s)					
	2026	2031	2036	2041	2046	2051
Nisku – 2 Pumps Operating						
Total Capacity	454	454	454	454	454	454
Peak Day Flow	252.9	294.6	341.9	390.5	445.5	**507.9**
Surplus/Deficit	201.1	159.4	112.1	63.5	8.5	-53.9
Telford Lake – 1 Pump Operating						
Total Capacity	157.2	157.2	157.2	157.2	157.2	157.2
Peak Day Flow	88	99.3	112	126.3	142.5	**160.7**
Surplus/Deficit	69.2	57.9	45.2	30.9	14.7	-3.5
Highway 21 – 1 Pump Operating						
Total Capacity	20.7	20.7	20.7	20.7	20.7	20.7
Peak Day Flow	9.2	16.4	**23.3**	**26.6**	**30.5**	**35.2**
Surplus/Deficit	11.5	4.3	-2.6	-5.9	-9.8	-14.5

Existing pumping capacity (one pump in reserve)
- *Nisku Booster Station (3 x 227 L/s pumps at 47 m)*
- *Highway 21 Booster Station (2 x 20.7 L/s pumps at 88.2 m)*
- *Telford Lake Booster Station (2 x 157.2 L/s pumps at 67.1 m)*

The table indicates that a third pump will be required to operate at the Nisku Booster Station prior to 2051. As one pump is required to be maintained as backup, a fourth pump will need to be installed prior to 2051. Pump upgrades will be required for the Highway 21 Booster Station prior to 2036. Although Table 5-2 indicates that a pump upgrade may be required at the Telford Lake Booster Station by 2051, it is not anticipated due to increasing discharge pressure from the Nisku Booster Station. Pump replacement due to age or condition has not been considered in this assessment.

Figure 5-1 presents the system curve from the Nisku Booster Station including the current and projected average day and peak day demands through 2051. The figure presents the pump capacity based on the operational range of the VFD (between 30 and 60 Hz), for one pump, two pumps and three pumps operating simultaneously. The demand "curves" presented on the figure are directly related to the downstream demand distribution and downstream upgrades. As such, they are specific to each modelled year and cannot be combined into a single curve.

Figures 5-2 to 5-4 present the Hydraulic Grade Lines (HGL) from the Nisku Booster Station to Calmar, Millet, and Armena, respectively. The 2026, 2036, and 2051 peak day flows are shown on each figure.

The HGL figures demonstrate that the existing system has sufficient capacity for both the 2026 and 2036 peak day flows. Upgrades to accommodate the 2051 peak day flows will be required, and the resulting change in pipe rating is shown on the figures as dashed lines. Upgrades between the Nisku Booster Station and the Millet Line are assumed to be PVC DR25 pipe, in keeping with the discharge main from the Nisku Booster Station. In each HGL figure, the pipe pressure rating is noticeably lower due to the proposed upgrades. This is due to the fact that PVC has a lower pipe pressure rating than steel, which is the existing pipe material. The proposed upgrade east of the Highway 21 Booster Station is assumed to be HDPE DR 11 pipe, as increased pipe pressure rating is required.

Figure 5-1 Nisku Booster Station System Curve

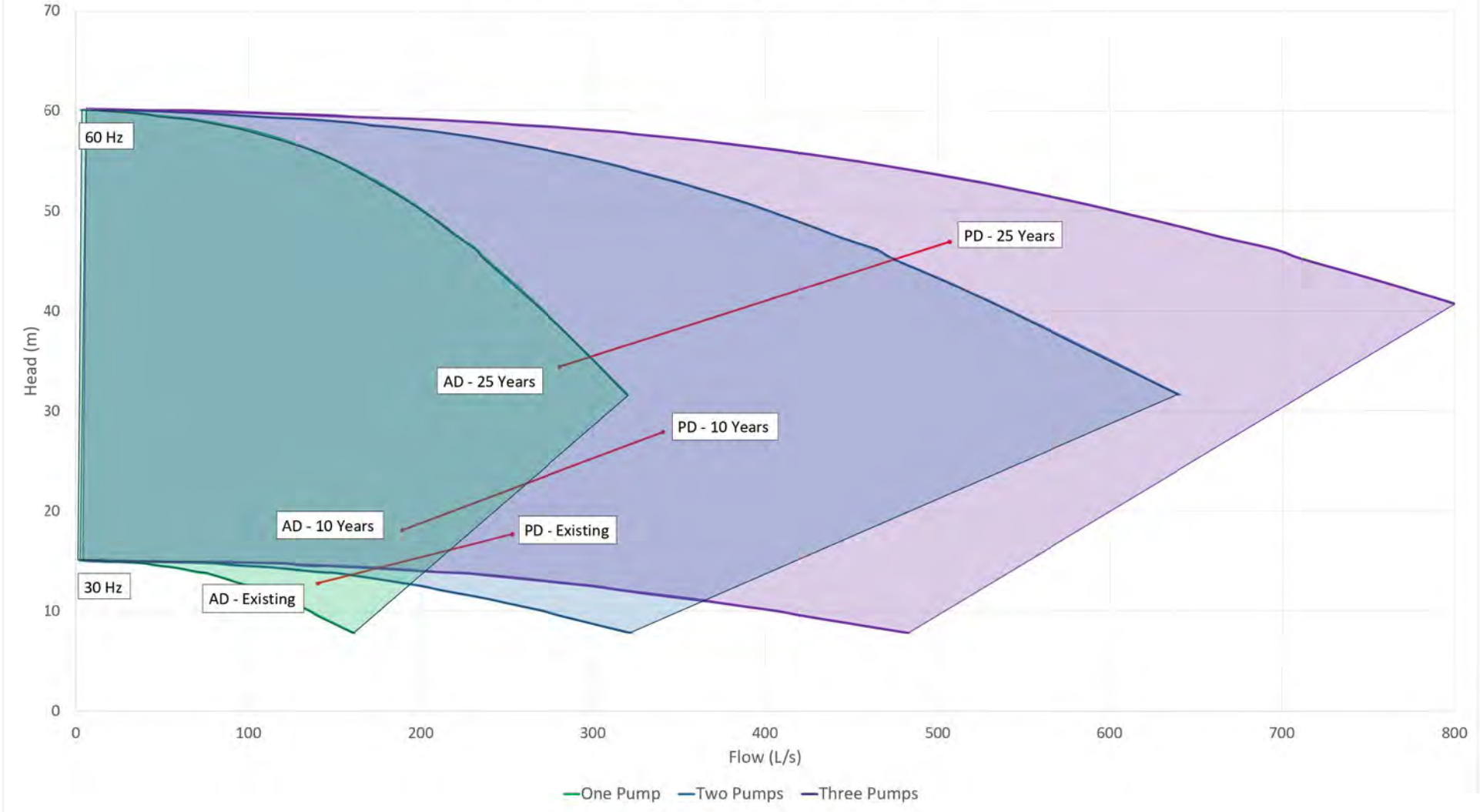
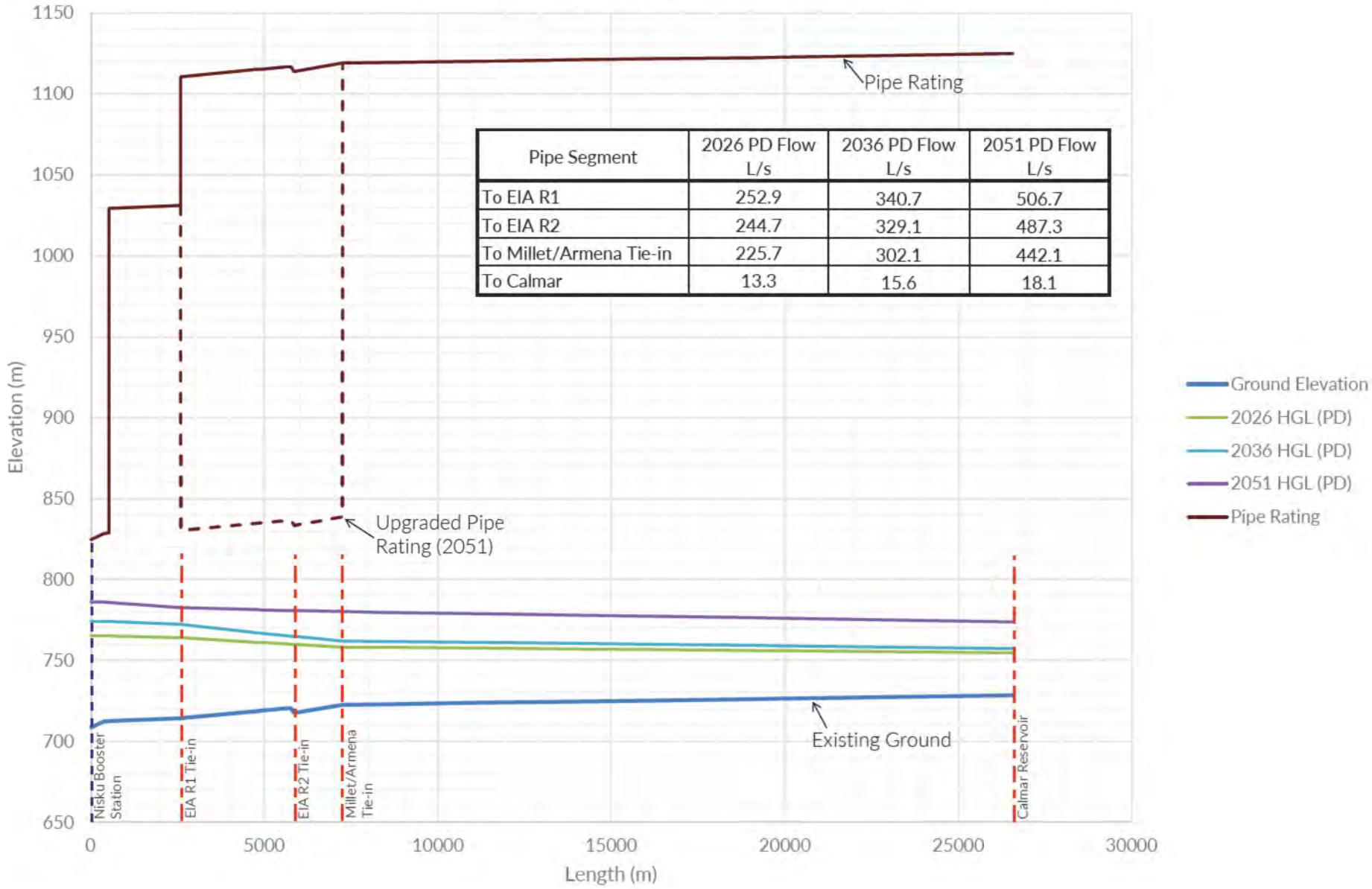


Figure 5-2 Hydraulic Grade Line
Nisku Booster Station to Calmar



Pipe Segment	2026 PD Flow L/s	2036 PD Flow L/s	2051 PD Flow L/s
To EIA R1	252.9	340.7	506.7
To EIA R2	244.7	329.1	487.3
To Millet/Armena Tie-in	225.7	302.1	442.1
To Calmar	13.3	15.6	18.1

Figure 5-3 Hydraulic Grade Line
Nisku Booster Station to Millet

Pipe Segment	2026 PD Flow L/s	2036 PD Flow L/s	2051 PD Flow L/s
To EIA R1	252.9	340.7	506.7
To EIA R2	244.7	329.1	487.3
To Calmar Tie-in	225.7	302.1	442.1
To Leduc North/Armena Tie-in	212.4	286.5	424
To Saunders Lake	88.0	117.0	176.5
To Leduc Robinson	88.0	112.0	160.7
To Millet	11.2	13.7	18.4

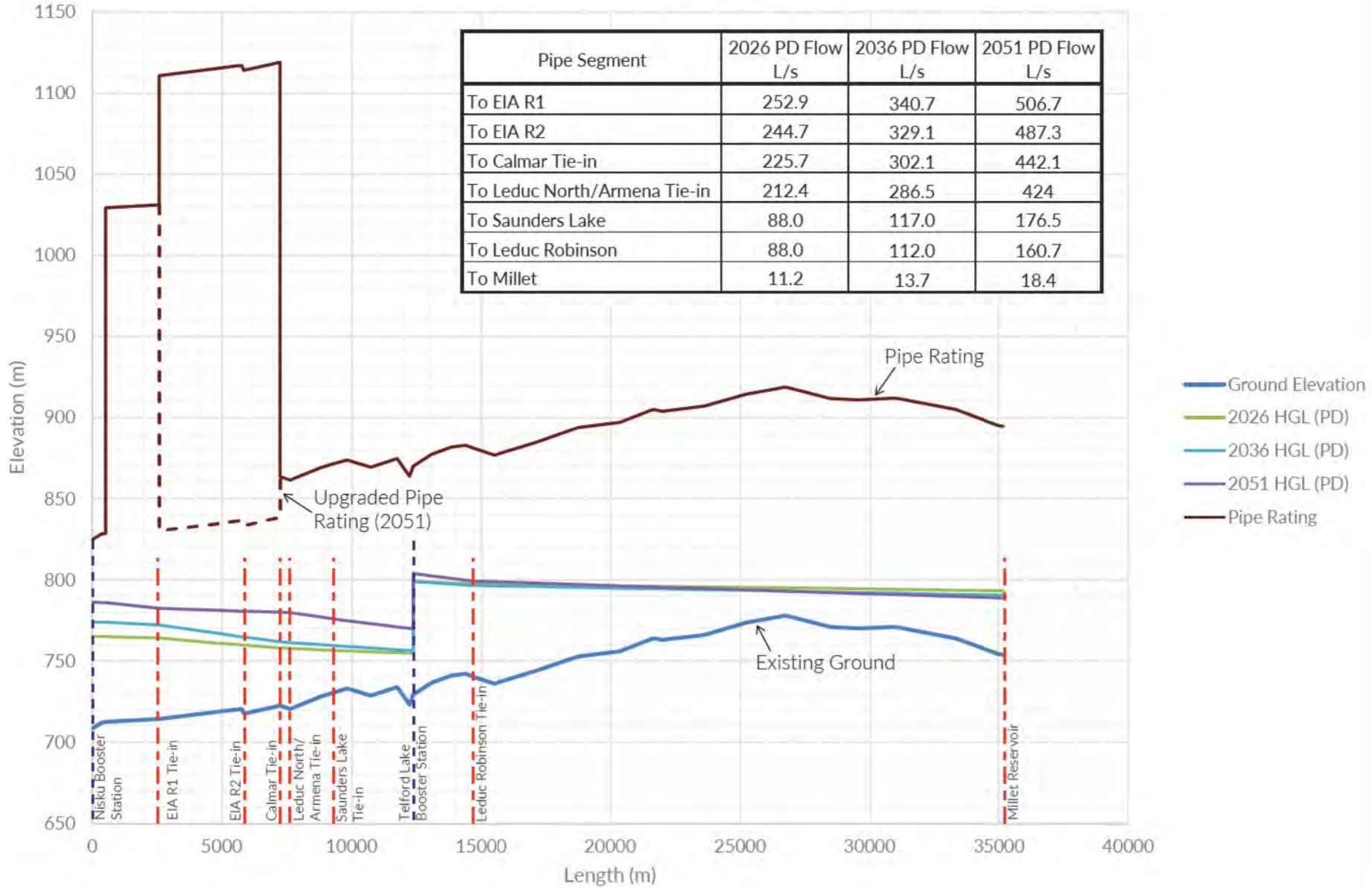
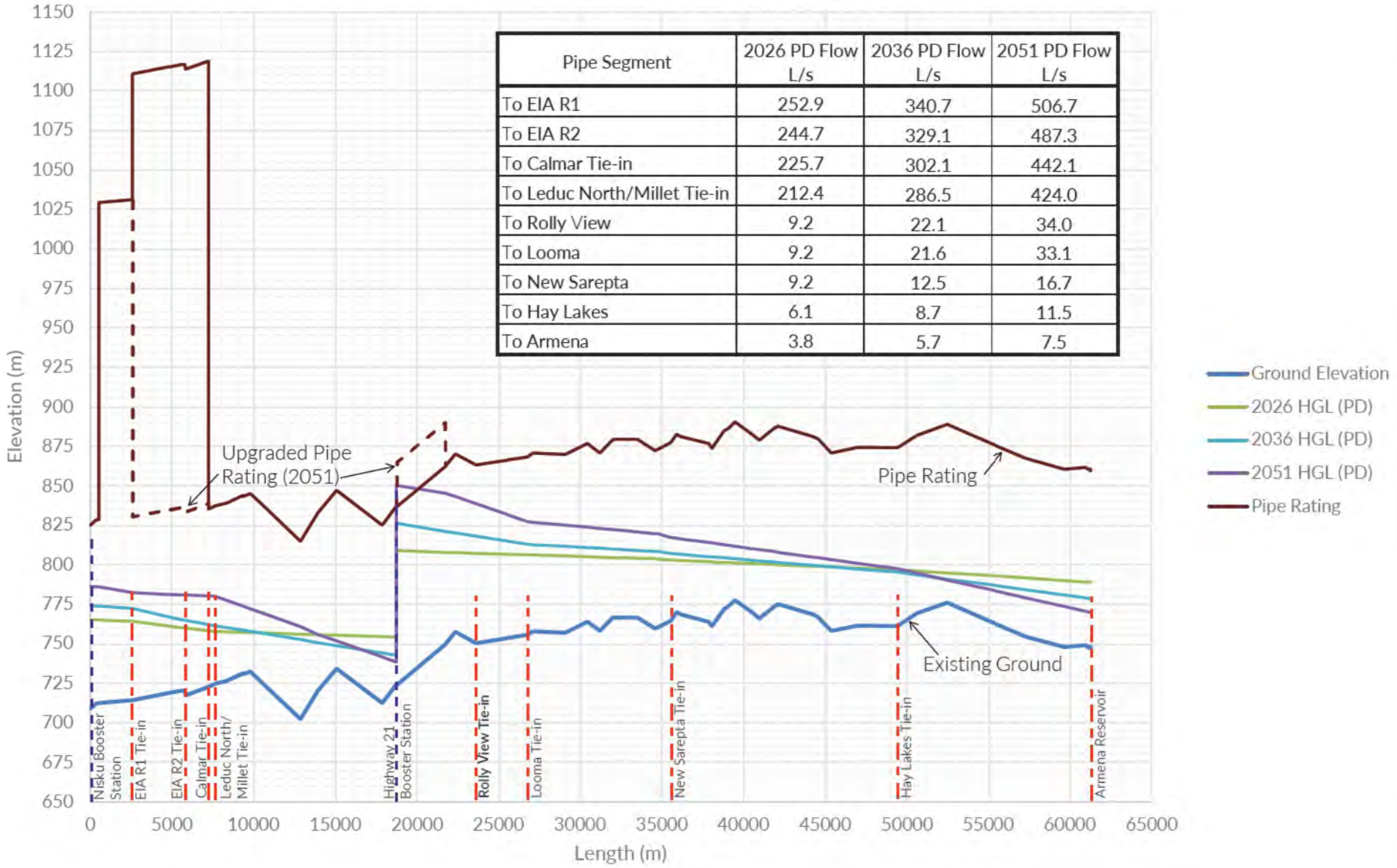


Figure 5-4 Hydraulic Grade Line
Nisku Booster Station to Armena

Pipe Segment	2026 PD Flow L/s	2036 PD Flow L/s	2051 PD Flow L/s
To EIA R1	252.9	340.7	506.7
To EIA R2	244.7	329.1	487.3
To Calmar Tie-in	225.7	302.1	442.1
To Leduc North/Millet Tie-in	212.4	286.5	424.0
To Rolly View	9.2	22.1	34.0
To Looma	9.2	21.6	33.1
To New Sarepta	9.2	12.5	16.7
To Hay Lakes	6.1	8.7	11.5
To Armena	3.8	5.7	7.5



5.7 Storage Assessment

The Commission's *Water Supply Policy* details the storage requirements for members and customers as two times the average day demand plus fire storage, where provided. Table 5-3 provides a comparison of each Community's reservoir capacity and the average two-day storage plus their reported fire storage requirements, based on the 2026 design demands. As shown, the average two-day demand is significantly lower than the capacity of the majority of the reservoirs. Values in **bold** show where the reservoir capacity does not meet the total storage requirements.

Table 5-3 Fire Storage Assessment

Customer	Reservoir Capacity	Fire Storage Requirement	2026 2-Day Storage	2026 + Fire	2051 2-Day Storage	2051 + Fire
City of Leduc	24,957	2,452	18,424	20,876	34,157	**36,609**
City of Beaumont	17,273	3,460	9,732	13,192	24,016	**27,476**
Leduc County	11,360	2,484	5,877	8,361	14,071	**16,555**
Town of Calmar	5,000	523*	1,281	1,804	1,735	2,258
Edmonton Airports	6,200	1,755	2,506	4,261	6,204	7,959
Village of Hay Lakes	474	523*	217	**740**	382	**905**
Hamlet of New Sarepta	1,286	648	302	950	495	1,143
Camrose County (Hamlet of Armena)	1,135	-	367	367	717	717
Town of Millet	4,090	523*	1,076	1,599	1,765	2,288

**The Town of Calmar, the Village of Hay Lakes, and the Town of Millet did not provide a fire storage requirement, therefore a value of 523 m^3 was assigned, based on a fire flow of 83 L/s for 1.75 hrs.*

Hay Lakes is the only member whose present-day total storage requirements exceed their reservoir capacity, based on the Commission's policy. However, the required fire storage has been assumed as the fire flow target has not been communicated. By 2051, Leduc, Beaumont, and Leduc County will all also require further reservoir capacity to meet the total projected storage requirements.

6 PROPOSED SYSTEM UPGRADES

Proposed upgrades are outlined below based on the hydraulic assessment, and do not consider condition or age of the infrastructure. Note that the majority of the upgrades proposed for each scenario must occur before the benchmark year. For example, an upgrade which is necessary to meet the 2046 system demands will need to occur at some point between 2041 and 2046.

No upgrades are proposed to the existing system.

6.1 5-Year Model

Based on the 5-year (2031) peak day model results, the following operating conditions are expected at the booster stations:

- Two pumps operating at the Nisku Booster Station at 767.5 m HGL, to achieve a target operating pressure at Leduc North of 310 kPa (45 psi)
- One pump operating at the Telford Lake Booster Station at an HGL of 799 m
- One pump operating at the Highway 21 Booster Stations at an HGL of 816 m
- Operating HGL of 765 m at the Blackmud Booster Station to meet the minimum supply pressure at Beaumont

Peak day pressures range from 142 kPa (21 psi) at the Beaumont Reservoir and 901 kPa (131 psi) at the discharge of the Highway 21 Booster Station.

System Upgrades

Replace the existing 200 mm diameter Nisku East lateral with a 350 mm diameter lateral watermain due to velocity criteria.

A new supply main to the Beaumont Reservoir will be required shortly after 2031, as modelling indicates velocities of approximately 1.7 m/s in the 400 mm main west of the Nisku East lateral, resulting in headlosses of approximately 30 m and consequently lower pressures towards Beaumont. This would likely require increased pumping head to counteract, if not a new supply main. While this velocity exceeds the preferred design guideline of 1.5 m/s, it remains below the typical 3.0 m/s upper limit for existing infrastructure; however, it does indicate increasing hydraulic constraints and reduced system efficiency, supporting the need for future system upgrades.

The Commission will be responsible for installing the section of waterline located south of 41 Street SE, with EPCOR responsible for installing the section north of this location. It is anticipated that the watermain will terminate at a connection to the existing 400 mm supply main west of Beaumont. The watermain will be extended to the Beaumont Reservoir at a later date. The preferred alignment was provided City of Beaumont on May 28, 2026, and is included in **Appendix B**.

The timing, diameter and alignment of the future watermain will be determined in collaboration with EPCOR. The analysis indicates a 600 mm waterline will be required to service Beaumont throughout the study period. Flow through the proposed second supply main to Beaumont may offset the timing for future upgrades to the existing 750 mm EPCOR steel supply main (downstream of the Blackmud Booster Station). Note that upgrades to this EPCOR supply main have not been assessed as part of the current analysis. A new supply main to Beaumont would allow the

operating HGL of the Blackmud Booster Station to be reduced from 765 m (in 2031) to 752 m, which is the EPCOR tertiary pressure zone operating HGL. In discussion with EPCOR, EPCOR undertakes capital planning in four-year cycles, and while the Beaumont second feed line is not included in the 2028–2031 cycle, it is currently anticipated to be delivered in the subsequent 2032–2035 cycle.

If possible, directing additional flow to the Nisku West Reservoir (reducing flow to the Nisku East Reservoir), may delay the required supply main construction.

6.2 10-Year Model

Based on the 10-year (2036) peak day model results, the following operating conditions are expected at the booster stations:

- Two pumps operating at the Nisku Booster Station at 774 m HGL, to achieve a target operating pressure at Leduc North of 343 kPa (50 psi)
- One pump operating at the Telford Lake Booster Station at an HGL of 799 m
- One pump operating at the Highway 21 Booster Stations at an HGL of 826 m
- Operating HGL of 752 m at the Blackmud Booster Station (see system upgrades for further details)

Peak day pressures range from 140 kPa (20 psi) at a high point upstream of the Highway 21 Booster Station and 999 kPa (145 psi) at the discharge of the Highway 21 Booster Station.

System Upgrades

The Highway 21 booster pumps will require upgrading by 2036 to meet the demand and pressure head requirements.

6.3 15-Year Model (2041)

Based on the 15-year (2041) peak day model results, the following operating conditions are expected at the booster stations:

- Two pumps operating at the Nisku Booster Station at 781 m HGL, to achieve a target operating pressure at Leduc North of 382 kPa (55 psi)
- One pump operating at the Telford Lake Booster Station at an HGL of 801 m
- One pump operating at the Highway 21 Booster Stations at an HGL of 834 m
- Operating HGL of 752 m at the Blackmud Booster Station (will depend on the future EPCOR zone pressure)

Peak day pressures range from 143 kPa (21 psi) at a high point upstream of the Highway 21 Booster Station and 1,078 kPa (156 psi) at the discharge of the Highway 21 Booster Station.

System Upgrades

No upgrades are anticipated in the 15-year (2041) system.

6.4 20-Year Model (2046)

Based on the 20-year (2046) peak day model results, the following operating conditions are expected at the booster stations:

- Two pumps operating at the Nisku Booster Station at 780 m HGL, to achieve a target operating pressure at Leduc North of 448 kPa (62 psi)
- One pump operating at the Telford Lake Booster Station at an HGL of 802 m
- One pump operating at the Highway 21 Booster Stations at an HGL of 839 m
- Operating HGL of 752 m at the Blackmud Booster Station (will depend on the future EPCOR zone pressure)

Peak day pressures range from 140 kPa (20 psi) at a high point upstream of the Highway 21 Booster Station and 1,127 kPa (163 psi) at the discharge of the Highway 21 Booster Station.

System Upgrades

Twin the existing 600 mm steel watermain from EIA Reservoir 1 to EIA Reservoir 2 with a 900 mm pipe by 2046, as the velocity will exceed the preferred design guideline.

The new Beaumont supply main from north of the City of Beaumont will be extended to connect to the Beaumont Reservoir, as the velocity will exceed the preferred design guideline. The waterline is assumed to be 500 mm based on the current analysis.

Approximately 3 km of the Highway 21 watermain will be replaced with a 300 mm DR 11 HDPE pipe. The current watermain will not support the proposed growth and increase in operating pressure required to meet projected downstream demands. The existing HDPE pipe's pressure rating is 160 kPa, while the new HDPE material formulation will have a pressure rating of 200 kPa. The existing 3 km of watermain will be abandoned. This is the result of higher-than-expected growth in the downstream system.

6.5 25-Year Model (2051)

Based on the 25-year (2051) peak day model results, the following operating conditions are expected at the booster stations:

- Three pumps operating at the Nisku Booster Station at 787 m HGL, to achieve a target operating pressure at Leduc North of 524 kPa (76 psi)
- One pump operating at the Telford Lake Booster Station at an HGL of 804 m
- One pump operating at the Highway 21 Booster Stations at an HGL of 850 m
- Operating HGL of 752 m at the Blackmud Booster Station (will depend on the future EPCOR zone pressure)

Peak day pressures ranging from 140 kPa (20 psi) at a high point downstream of Hay Lakes and 1,234 kPa (179 psi) at the discharge of the Highway 21 Booster Station.

System Upgrades

Twin the existing 600 mm steel watermain from EIA Reservoir 2 to the Millet Line tie-in with a 900 mm pipe by 2051, as the velocity will exceed the preferred design guideline.

Install the fourth pump at the Nisku Booster Station so that three pumps can operate with one as standby.

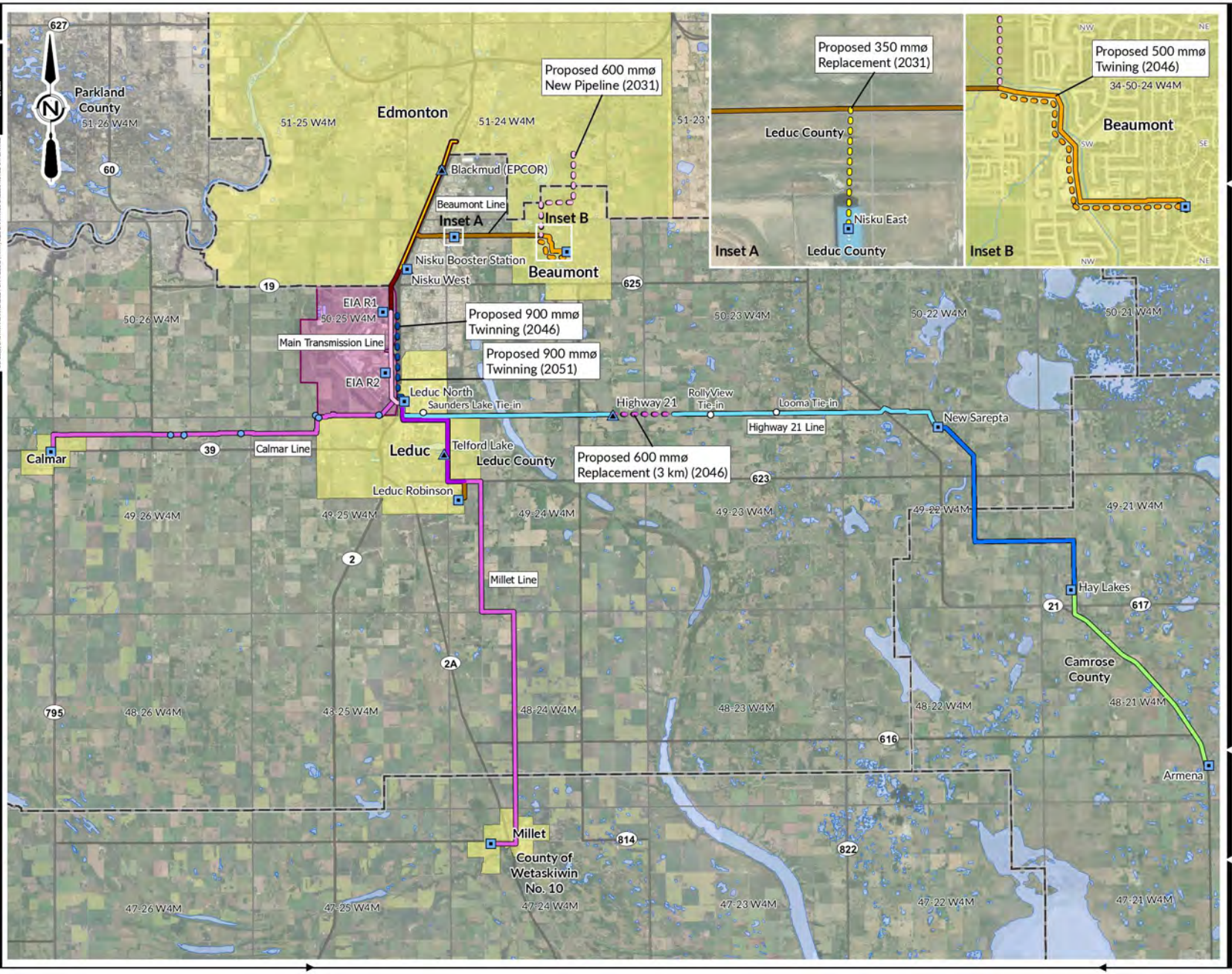
The Commission may also want to consider a short interconnection between the Highway 21 and Millet waterlines. Connecting these pipes at the easternmost point will reduce headloss in the Highway 21 waterline upstream of the Highway 21 Booster Station. Significant headloss through this line is a contributing factor of increased pumping head requirements at the Nisku Booster Station. This upgrade is not required and has therefore not been costed for the purpose of this Master Plan but has been identified for future consideration to reduce the potential pumping requirements and therefore electrical costs at the Nisku Booster Station. It is anticipated that the pumping head requirements at the Nisku Booster Station could be reduced by approximately 5 m in 2051, should the interconnection be constructed.

6.6 Summary of Proposed Upgrades

Upgrades proposed over the 25-year study period are summarized in Table 6-1 below and shown in Figure 6-1.

Table 6-1 Summary of Proposed Upgrades

Year	Proposed Upgrade
5-Year (2031)	• 350 mm Nisku East Lateral Replacement • 600 mm Beaumont Secondary Supply Main
10-Year (2036)	• Highway 21 Booster Pumps Upgrade
20-Year (2046)	• 900 mm Watermain Twinning from EIA R1 to EIA R2 • 500 mm Beaumont Supply Main Extension to Beaumont Reservoir • 300 mm Highway 21 Waterline Replacement (3 km)
25-Year (2051)	• 900 mm Watermain Twinning from EIA R2 to the Millet Line • Install fourth Nisku Booster Station Pump



Associated Engineering

CANADA'S BEST MANAGED COMPANIES
Platinum member

LEGEND:

CRSWSC Facility
- Booster Station
- Reservoir
- Single Connection
- Future Tie-In

Existing Waterline CRSWSC
Pipe Diameter (mm)
- 150
- 200
- 250
- 300
- 400
- 500
- 550
- 600
- 750
- 900
- Waterline Owned by EPCOR

Proposed Upgrades
Pipe Diameter (mm)
- 300
- 350
- 500
- 600
- 900

Base Data
- Highway
- Water Body
- Edmonton International Airport Land

FIGURE 6-1

CRSWSC
WATER MASTER PLAN

PROPOSED UPGRADES

AE PROJECT No.	2025-3197-00
SCALE	1:180,000
DATE	2026APR21
PROJECTION	NAD 1983 3TM 114
DRAWN BY	DD
CHECKED BY	KR
DESCRIPTION	ISSUED FOR DRAFT

0 2,500 5,000 m

SAVE DATE: 2026-04-20 2:05 PM SAVED BY:
DRAWING PATH: C:\Projects\2025-3197-00\2026-3197-00.aprx
DATA SOURCE: World Imagery: Vantor
World Imagery: Earthstar Geographics;

6.7 Water Conservation

In 2025, the Commission reported a water-billing capture rate of 96.98%, indicating that unaccounted-for water represented just over 3.02% of total system flow. Given that the Commission's metering equipment is understood to operate within an accuracy range of approximately ±2%, actual system water loss may be even lower than reported. Continued efforts to reduce water loss from the system and encourage water conservation remain important components of responsible system management.

To minimize losses and ensure accurate accounting of all water use, the Commission may consider several operational improvements. These include:

- Tracking all non-metered uses—such as sampling, hydrant flushing, and operational discharges—so that these flows can be incorporated into overall water-use reporting.
- Maintaining a regular meter-calibration program, which would help ensure that metered data remains reliable and reflective of true system conditions.

The Commission will also continue to encourage member municipalities and their customers to adopt water-conscious practices and improve accounting for water loss within their own distribution systems.

Member municipalities play a critical role in overall system efficiency and should consider undertaking community-level water audits to identify physical losses (such as leaks, service failures, or breakages) as well as commercial losses resulting from meter inaccuracies or billing anomalies. Water audits can provide valuable insight into system performance and guide targeted corrective actions. In addition, municipalities are encouraged to develop public education programs aimed at reducing residential and commercial water consumption. These programs could include guidance on household or business water audits, evaluation of water-efficient fixtures and operational practices, and consideration of low-water-use landscaping and irrigation methods.

To support these efforts, the Commission may provide member municipalities with educational materials outlining best practices for water conservation and system efficiency. Doing so would help promote consistent messaging across the region and strengthen collective progress toward reducing water loss and improving long-term water sustainability.

STRATEGIC PLAN No. 2.5.2 – ENVIRONMENTAL STEWARDSHIP

6.8 Climate Change

Climate change refers to long-term shifts in climatic conditions, including variations in temperature, precipitation, wind patterns, snow cover, and the frequency and severity of extreme weather events. These changes can affect both average conditions and the intensity of climate-related hazards. For a regional water system, climate change presents several key risks, including:

- Potential water shortages
- Reduced source-water quality
- Increased vulnerability of critical infrastructure

The Commission's source water is the North Saskatchewan River, which is treated and supplied to the Commission by EPCOR. Climate-related hazards—both short-term and long-term—may influence the ability of the region to withdraw, treat, and distribute water reliably.

Risk of Water Shortage and Inadequate Water Quality

The risk of water shortage and reduced water quality is influenced by both drought conditions and river flow variability. During drought or low-flow periods, reduced water availability and diminished dilution capacity can degrade water quality through elevated temperatures, sediment buildup, and upstream nutrient loading, which may limit treatment effectiveness and constrain supply. Conversely, high-flow events can introduce increased turbidity and debris, also challenging treatment processes and potentially reducing available supply. In response to supply constraints, the Regional Water Customers Group may implement restrictions by adjusting daily water allocations to member commissions. The Commission would then reduce deliveries to its members, requiring local conservation measures. While such restrictions have historically been short in duration, more severe or prolonged conditions could necessitate stricter and longer-term measures to ensure essential water needs are met.

It is noted; however, that these risks are considered low likelihood, as current allocations from the North Saskatchewan River are estimated to be approximately 30% of total capacity. As such, while the potential consequences of water shortage or reduced quality are high, the likelihood of occurrence remains low under current allocation and supply conditions.

Infrastructure Vulnerability

Climate change may also increase risks to the Commission's extensive network of buried pipelines, river and creek crossings, booster stations, fill stations, and communication towers. Potential hazards include river flooding, high overland flows, heavy precipitation, and localized drainage failures. Flooding, riverbank erosion, and channel scouring may damage pipeline crossings or affect access to facilities. Higher temperatures, extreme weather, and stronger storm events may lead to greater wear on facilities, increased heating and cooling requirements, and greater exposure to power disruptions such as brownouts or blackouts—each of which can impair the Commission's ability to deliver water. In periods of severe weather, operator access to sites across the nine member communities may also be limited due to poor driving conditions or damaged roadways.

To mitigate climate-related infrastructure risks, the Commission can enhance system resilience through targeted upgrades to transmission mains; implement redundancy in key supply corridors; and harden critical facilities such as booster and fill stations against flooding and power disruptions. Expanding SCADA, backup power, and communications systems will support reliable operations, while coordinated emergency planning with EPCOR and member municipalities will strengthen response capabilities. These measures, supported by risk-informed asset management and capital planning, will help ensure continued service reliability under increasingly variable climate conditions.

Potential Regional Climate Futures

Two broad climate scenarios could significantly influence water demand in the Edmonton region. A wetter, cooler climate may reduce outdoor water use, potentially delaying the need for planned system upgrades. Conversely, a hotter, drier climate would likely increase water consumption and place additional pressure on the Commission to supply higher volumes, potentially requiring stricter conservation measures and policy enforcement.

Recommended Actions

Considering these risks, the Commission should proactively assess the resilience of its infrastructure and operations under future climate conditions. Recommended actions include:

- Reviewing the long-term sustainability and vulnerability of existing infrastructure and operations, with consideration of climate-related hazards.
- Establishing and maintaining emergency response protocols specific to climate-related events; the Commission has recently updated its emergency response plan and should continue to review and refine it on an ongoing basis.
- Continuing to review water restriction protocols to support consistent and coordinated demand management during shortages.

STRATEGIC PLAN No. 2.4.1 – EMERGENCY PREPAREDNESS

7 FACILITY ASSESSMENT

Associated undertook a facility assessment in 2025 to evaluate the condition, operational integrity, and maintenance requirements of key electrical, process, and building mechanical systems of the Commission's potable water infrastructure sites. The 2025 facility assessment was a follow-up to an initial assessment completed in 2020.

The facilities assessed in 2025 were the Nisku Booster Station, the Telford Lake Booster Station, the Highway 21 Booster Station, and the fill stations at all 12 reservoirs.

The assessment identified several deficiencies and maintenance considerations requiring attention to ensure continued operational reliability and compliance with asset management best practices. The majority of the identified issues pertain to routine maintenance activities and the planned replacement of components approaching or exceeding their expected service life.

The 5-Year Capital Plan as presented in the facility assessment is included below as **Table 7-1**. **Appendix C** provides the full Facility Assessment Report, including a summary of the recommended actions and suggested timelines for implementation.

Table 7-1 Facility Assessment 5-Year Capital Plan

Facility	2026	2027	2028	2029	2030
Airport #1 Fill Station	$ 51,000	$15,100	-	$1,200	$15,000
Airport #2 Fill Station	$23,000	$30,400	$21,000	$1,200	-
Calmar Fill Station	$203,500	$39,500	$9,500	$1,200	-
CRSWSC Nisku Booster Station	-	-	-	$3,100	-
Nisku West Fill Station	$17,500	$52,000	$25,000	$1,200	$10,000
Nisku East Fill Station	$4,000	$6,200	$500	$1,200	-
Beaumont Fill Station	$6,500	$10,300	-	$9,300	-
HWY 21 Booster Station	$10,000	$14,000	$1,000	$11,200	$50,000
Leduc North Fill Station	$15,000	$19,200	$1,000	$100	-
Leduc Robinson Fill Station	$6,000	$3,000	-	$1,200	-
Armena Fill Station	$14,000	$19,000	$2,500	$1,000	-
Town of Hay Lakes Fill Station	-	$304,000	-	$1,000	-
Hamlet of New Sarepta Fill Station	$26,000	$68,500	-	$1,000	-
Telford Lake Booster Station	$16,000	$21,600	$2,500	$1,000	-
Town of Millet Fill Station	$3,000	$12,500	-	$1,000	-
TOTAL	**$395,500**	**$615,300**	**$63,000**	**$35,900**	**$75,000**

8 SHORT-TERM (5 YEARS) CAPITAL IMPROVEMENT PROGRAM

The capital program is divided into the following categories for identifying expenditures and funding sources:

- Operation
- Repair
- Replacement
- System improvements

8.1 Operation Budget

The operation budget covers the day-to-day operations and preventative maintenance of the entire system including generating reports, meter readings, and generally the duties described for the System Operator in the Operations and Maintenance Manual. Funding for this service is from the annual operating budget and included in the water rates set annually.

Cathodic Protection

Arc Cathodic Protection Inc. continue to perform the annual CP survey of the Commission – Water Transmission Pipeline system.

8.2 Repair Budget

The repair costs are directly related to Operator's costs, and specialist contractors retained by the Operator to make repairs and service specialty equipment and valves. This service is funded from an annual budget for repair and is included in the water rates set annually.

The Commission should have capacity to address emergency repairs or replacements should they occur.

8.3 Replacement Budget

Planned replacements (pumps, valves, etc.) are normally engineered, scheduled, and budgeted. The funding for replacements should be from the Commission's accumulated reserve to spread expenditures over several years and provide water rate stability.

Valves Replacement Program

Isolation valves need to be assessed, exercised, and checked for their working conditions. The age of many of the Commission's large isolation valves are approximately 35 to 40 years. Existing isolation valves should be planned for phased replacement.

8.4 System Improvement Budget

Improvements to the system are engineered projects to provide specific improvement to capacity or longevity to the Commission's system. Improvements to the system may be eligible for grant funding and other grants. The available grant programs should be reviewed prior to each major capital project.

Typically, government funding sources will not provide grant funds for the portion of a project that is to service commercial users. This could significantly impact the amount of grant funds the Commission is able to obtain for major projects.

8.5 Capital Projects Carried Forward From 2025

The following projects were not completed in 2025, so the remaining budgets were carried forward into 2026.

- Air Release Manhole Rehab
- Nisku Booster Station & Beaumont Piping Upgrades
- SCADA System Modernization
- Water Master Plan and Strategic Plan
- Camrose & Wetaskiwin Regional Water Supply Feasibility Study

SCADA System Modernization

The Commission's SCADA system provides real-time monitoring and control across the network. The current backhaul uses GE MDS SD4 UHF radio modems, which are approaching end of life and should be replaced on a planned schedule.

The proposed system is structured around two communication tiers:

- **Tier 1 – Refreshed UHF Radio Network (critical control):** The existing licensed UHF network is refreshed and retained as the primary control path. It is low-bandwidth, low-latency, and suitable for critical event reporting, alarms, and control instructions. A Commission-owned radio link removes dependence on third party carriers for core SCADA functions.
- **Tier 2 – High-Speed Network (video and expanded telemetry):** A higher-bandwidth tier supports site video monitoring, expanded telemetry, and remote engineering access. Transport is selected per site from ISP fibre, licensed-frequency microwave backhaul, cellular modem, or Starlink, allowing the most appropriate option for each location.

The replacement platform is a highly available VTScada deployment. Cybersecurity is aligned with IEC 62443, consistent with the OT requirements anticipated under federal Bill C-8. OT network security inspection is provided by Fortinet, with segmentation between the control network and the broader Commission and member IT environments.

Operating costs depend on the transport mix selected at each site and will be confirmed during detailed design. ISP fibre, cellular, and Starlink services have recurring monthly subscription costs. Licensed microwave backhaul has higher upfront capital and lower ongoing licensing fees, comparable to the existing UHF network. A mixed approach is anticipated.

STRATEGIC PLAN No. 2.4.1 – EMERGENCY PREPAREDNESS

STRATEGIC PLAN No. 2.4.3 – COMMISSION GOVERNANCE

Camrose/Wetaskiwin Regional Water Supply

The Commission is currently undertaking a feasibility study to assess the potential extension of regional water services to the City of Camrose, the City of Wetaskiwin and the County of Wetaskiwin. This work is being completed in parallel with the Master Plan and represents the first step toward determining the viability of constructing a regional water supply line to these communities. Should the project proceed beyond the feasibility stage, the next phases would include preliminary design, detailed design, and ultimately construction. While it is anticipated that future stages will be funded similarly to the current feasibility study, preliminary design costs have been included in the capital projections as a conservative measure and to ensure the Commission is able to reserve adequate funds should it be required

8.6 2026 to 2030 Program

Within the next 5 years the following activities are anticipated to occur within the Commission:

2026

- Review the Commission SCADA upgrade requirements.
- The Commission is to coordinate with the City of Beaumont and EPCOR to secure a future pipeline alignment for the future service pipeline from 50 Street to the Beaumont Reservoir.
- The Commission should share the Master Plan with its members to ensure alignment with municipal planning objectives and priorities.
- Repair the Commission's supply line at the Calmar Fill Station.
- Complete the 2025 projects that carried over into 2026.
- The Commission is to prepare an application and submit for the next phase of the Camrose/Wetaskiwin Regional Water Supply.

2027

- Full reconstruction of the process piping within the Hay Lakes Fill Station
- SCADA Modernization – High-Speed Network
- Camrose/Wetaskiwin Regional Water Supply Preliminary Design
- Miscellaneous maintenance items within the Commission Facilities
- Annual maintenance requirements

2028

- SCADA Modernization – UHF Radio Refresh
- Camrose/Wetaskiwin Regional Water Supply Preliminary Design
- Miscellaneous maintenance items within the Commission Facilities
- Annual maintenance requirements

2029

- Miscellaneous maintenance items within the Commission Facilities
- Annual maintenance requirements

2030

- Annual maintenance requirements

In addition to the above, it is recommended through a yearly maintenance program that the following be undertaken:

- Servicing all mechanical components, including motors and pumps
- Servicing all electronic, electrical components
- SCADA – ensure programing is up to date
- Variable Speed Drive – Ensure parts are available and up to date
- All isolation (gate) valves, air valves, interior valves need to be exercised at least once a year
- GIS – asset inventory updated as required
- Cathodic protection – check annual (prevent corrosion)
- Inspect and clean all air heating units within the Commission facilities

Table 8-1 details the 5-Year Capital Plan cost breakdown.

Table 8-1 Table 8-2 5-Year Capital Plan[1]

Facility	2026	2027	2028	2029	2030
General					
Cathodic Protection Report and Maintenance	$6,000	$6,000	$6,000	$6,000	$6,000
Annual Infrastructure Maintenance	$117,000	$117,000	$117,000	$117,000	$117,000
Air Release Manhole Rehab	$18,700				
Nisku Booster Station & Beaumont Piping Upgrades	$3,675,840				
SCADA Upgrades	$68,750	$600,000	$150,000		
Water Master Plan and Strategic Plan	$152,000				
Camrose & Wetaskiwin Regional Water Supply Feasibility Study	$229,500				
Camrose & Wetaskiwin Regional Water Supply Preliminary Design		$150,000	$150,000		
Emergency Planning	$120,000	$120,000			
Sub-Total	**$4,387,790**	**$993,000**	**$423,000**	**$123,000**	**$123,000**
Facility Assessment Capital Plan[2]	$395,500	$615,300	$63,000	$35,900	$75,000
Yearly Total	**$4,782,290**	**$1,608,300**	**$486,000**	**$158,900**	**$198,000**

[1]*All costs are presented in 2026 dollars and exclude inflation; inflation will be incorporated as part of future rate structure reviews.*
[2]*The Facility Assessment Capital Plan costs are taken from **Table 7-1**.*

9 LONG-TERM (25 YEARS) CAPITAL IMPROVEMENT PROGRAM

9.1 2026 Water Sales Rate

The current water sales rate is $1.74/m^3, which is composed of three major components:

- **Water Purchase Rate**: The cost of water purchased from EPCOR, forming the base input cost.
- **Commission Operating Costs**: This includes utilities, administration, management, contracted operations, professional services, repairs and maintenance, and other operating expenses.
- **Water Reserve Contributions**: Allocations directed toward long-term capital reserves to support future infrastructure needs and system sustainability.

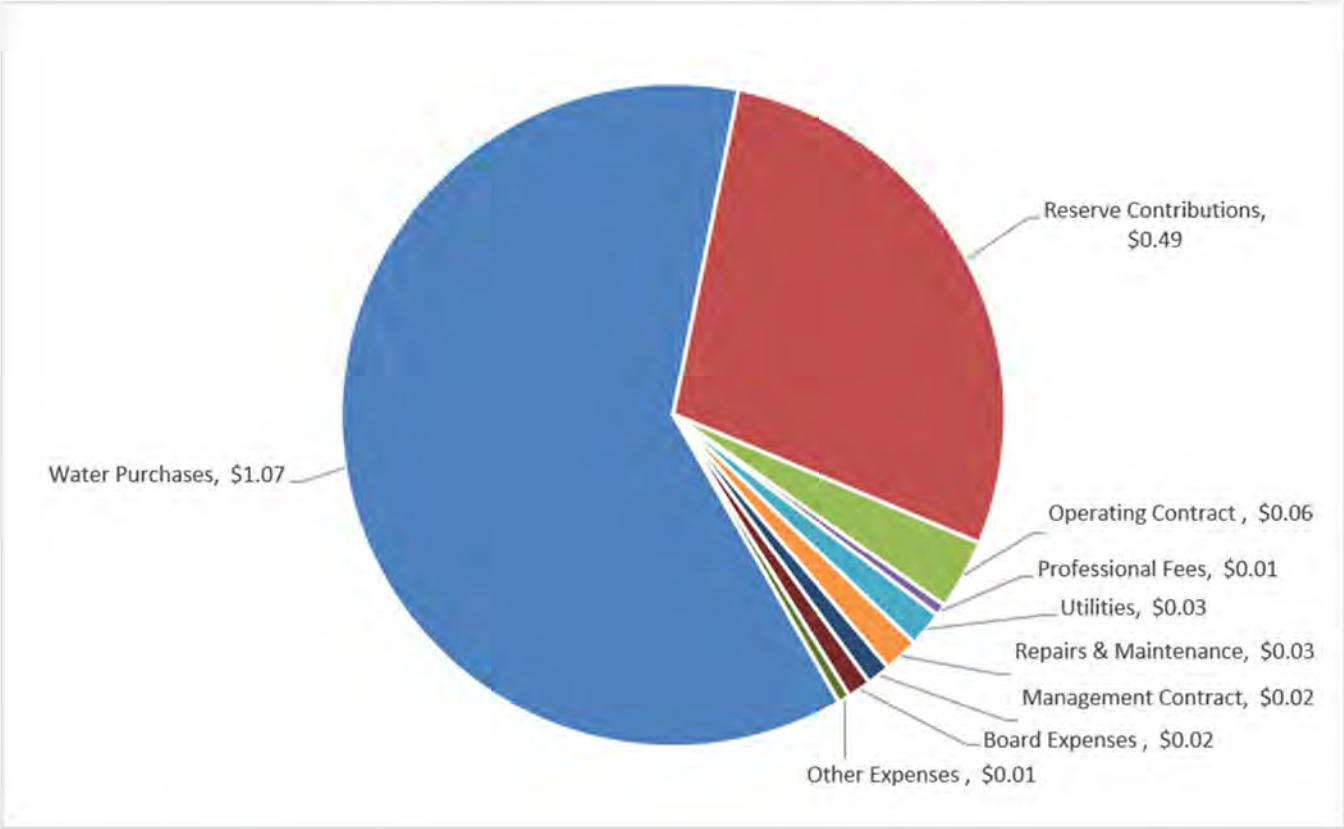
Based on the Commission's approved 2026 Budget, the rate consists of the following:

- Water Purchases: $1.07
- Reserve Contributions: $0.49
- Operating Contract: $0.06
- Professional Fees: $0.01
- Utilities: $0.03
- Repairs & Maintenance: $0.03
- Administration Contract: $0.02
- Board Expenses: $0.02
- Other Expenses: $0.01

It is important to note that the EPCOR water purchase rate of **$1.00/m^3** used in the 2026 budget is temporary and should not be considered reflective of long-term costs. This reduced rate is being applied to draw down the Balancing Fund. Once the fund is exhausted, the Commission's water purchase rate is anticipated to return to approximately $1.07/m^3, plus applicable inflation adjustments. As such, the water purchase rate of **$1.07/m^3** will be used for the Master Plan.

Figure 9-1 shows the rate breakdown as described above.

Figure 9-1 2026 Commission Water Sales Rate



9.2 Long-Tern Capital Projects

The following long-term capital upgrades have been identified

- Year 2031 - $8,363,000
  - Nisku East Lateral Upgrades
  - Beaumont Secondary Feed
- Year 2036 – $762,000
  - Highway 21 Booster Pump Upgrades
- Year 2046 - $21,968,000
  - 900 mm Transmission Main Twinning (EIA 1 to EIA 2)
  - Beaumont Lateral Twinning
  - Highway 21 Main Replacement
- Year 2051 - $9,589,000
  - 900 mm Transmission Main Twinning (EIA 2 to Millet Line)
  - Nisku Booster Pump Upgrades

9.3 Long-Term Capital Funding Review

To support long-term financial planning and evaluate the sustainability of future water rates, three water sales rate scenarios were developed to assess a range of funding strategies—from reliance on debt financing to fully funding capital upgrades through 100% reserve allocations.

All scenarios are built on core assumptions to ensure comparability across the analysis. These include an annual EPCOR rate increase of $\$0.03/m^3$, which reflects historical trends and provides a reasonable basis for projecting future wholesale water costs. Commission operating costs are assumed to increase by $\$0.02/m^3$ annually to account for anticipated growth in administration requirements and increases on operating expenses such as insurance, power, gas, and maintenance. Each scenario also begins with the Commission's current capital reserve balance of $6,763,343, ensuring the modelling reflects the Commission's actual financial position at the start of the analysis period.

In addition to these core assumptions, the rate models include several key financial assumptions that influence long-term cost projections and borrowing requirements. Construction costs are assumed to increase at 5% annually, reflecting recent construction market conditions, including material and labour cost escalation, supply-chain issues, and increasing regulatory complexity. A general inflation rate of 3% is applied to align with long-term inflation targets and historical averages, ensuring future costs are represented in realistic dollars.

For scenarios requiring borrowing, an interest rate of 3.5% is assumed, representing a moderate long-term average consistent with municipal-style financing and intended to balance recent borrowing conditions with the potential for future interest rate variability. Where capital projects are funded through debentures, a higher rate of 4.5% is applied to account for issuance costs, longer-term market risk, and less favourable financing terms compared to shorter-term or internal borrowing.

Together, these scenarios provide a clear picture of how different funding models influence long-term water rates, reserve levels, and the Commission's future borrowing needs.

Scenario 1 — Fully Funded Capital Through Reserves

Scenario 1 focuses on long-term financial independence by ensuring all future capital work is paid for using reserve funds only, with no reliance on debt. This scenario keeps the water rate at $\$1.74/m^3$ until 2030, using the current $\$0.49/m^3$ reserve allocation to cover cost increases during this period, with the allocation gradually reduced to $\$0.24/m^3$. After 2030, reserve contributions increase by $\$0.02/m^3$ every 5 years to support long-term capital planning.

The Commission maintains a healthy capital reserve balance between $14 million and $28 million to support unexpected or emergency projects. This approach avoids future borrowing but requires careful planning.

The Cash Flow and Water Rate is summarized in **Figure 9-2** and **Figure 9-3**, and the detailed analysis is provided in **Appendix D**.

Scenario 2 — Mixed Reserves and Debt Financing

Scenario 2 keeps the water rate at $\$1.74/m^3$ until 2032, using the current $\$0.49/m^3$ reserve allocation to cover cost increases during this period, with the allocation gradually reduced to $\$0.19/m^3$ by 2032. After 2032, reserve contributions increase by $\$0.02/m^3$ every 5 years to support long-term capital planning.

To complete major future upgrades, the Commission would only need to borrow $9.8 million in 2051, representing about 14% of the Commission's projected debt capacity. This debt is expected to be fully repaid by 2054, providing a balanced approach that maintains rate stability in the short-term while using borrowing responsibly when needed.

The Cash Flow and Water Rate is summarized in **Figure 9-4** and **Figure 9-5**, and the detailed analysis is provided in **Appendix D**.

Scenario 3 – Fixed Allocation

In **Scenario 3**, the reserve allocation remains at $0.49/m^3, and the water sales rate increases in line with rising water purchase costs and operational expenditures.

This scenario allows the Commission to build and maintain a strong capital reserve, ranging between $20 million in 2031 and $88 million in 2051, to support unplanned or emergency capital projects and waterline replacements. By doing so, the Commission avoids the need for future borrowing. However, this approach results in higher water sales rates to sustain the reserve levels.

The Cash Flow and Water Rate is summarized in **Figure 9-6** and **Figure 9-7**, and the detailed analysis is provided in **Appendix D**.

Figure 9-2 Cash Flow – Scenario 1

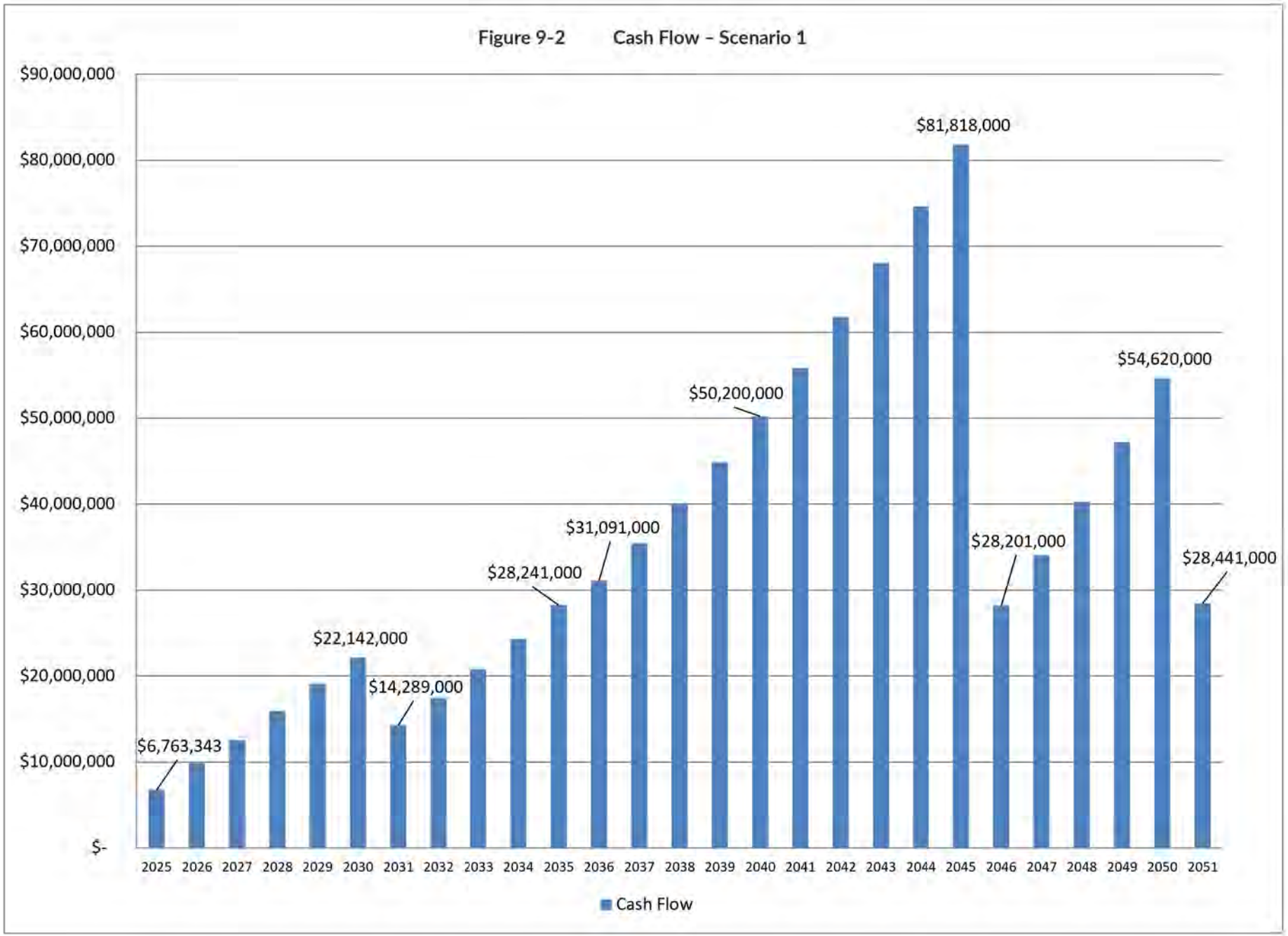


Figure 9-3 Water Rate – Scenario 1

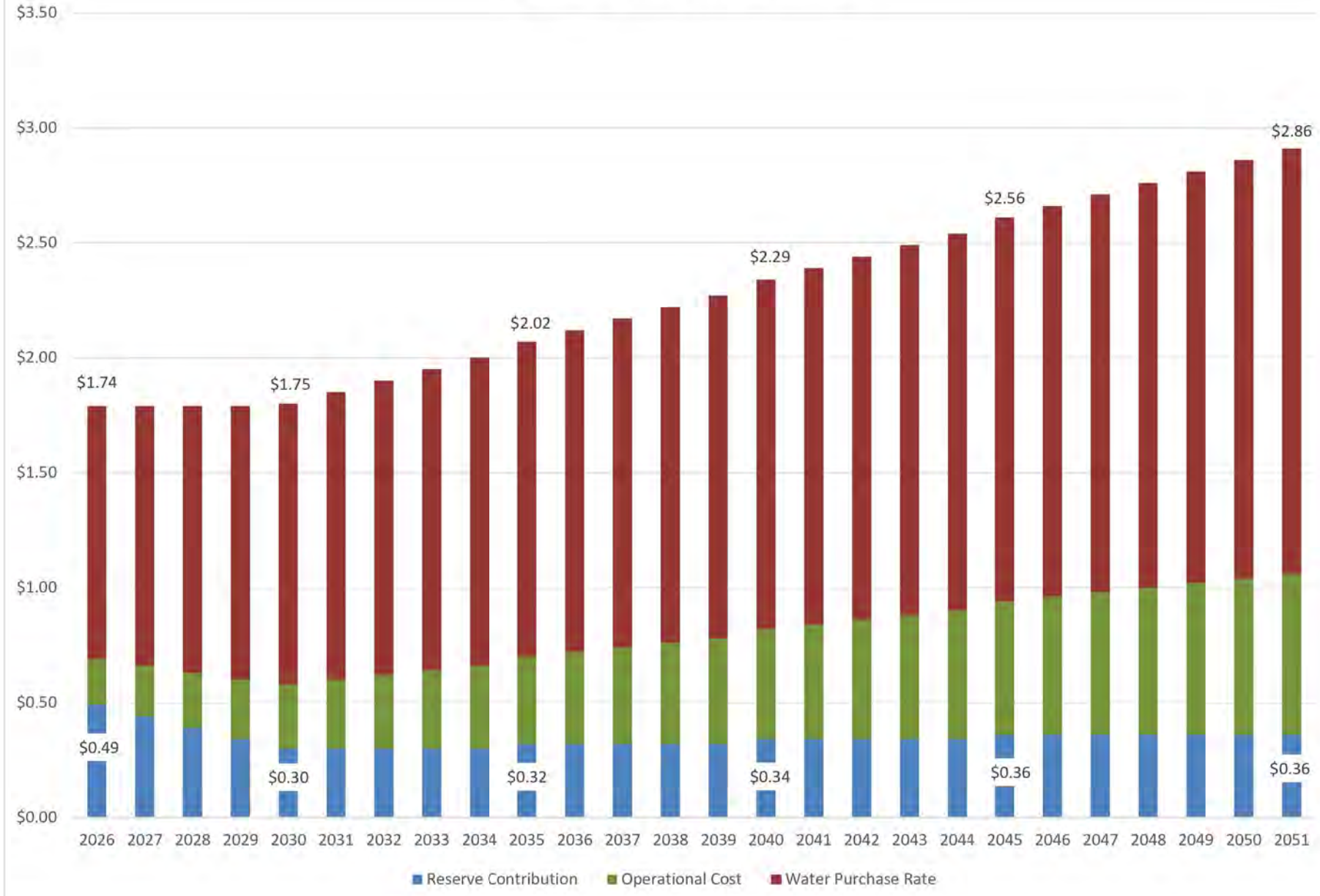


Figure 9-4 Cash Flow – Scenario 2

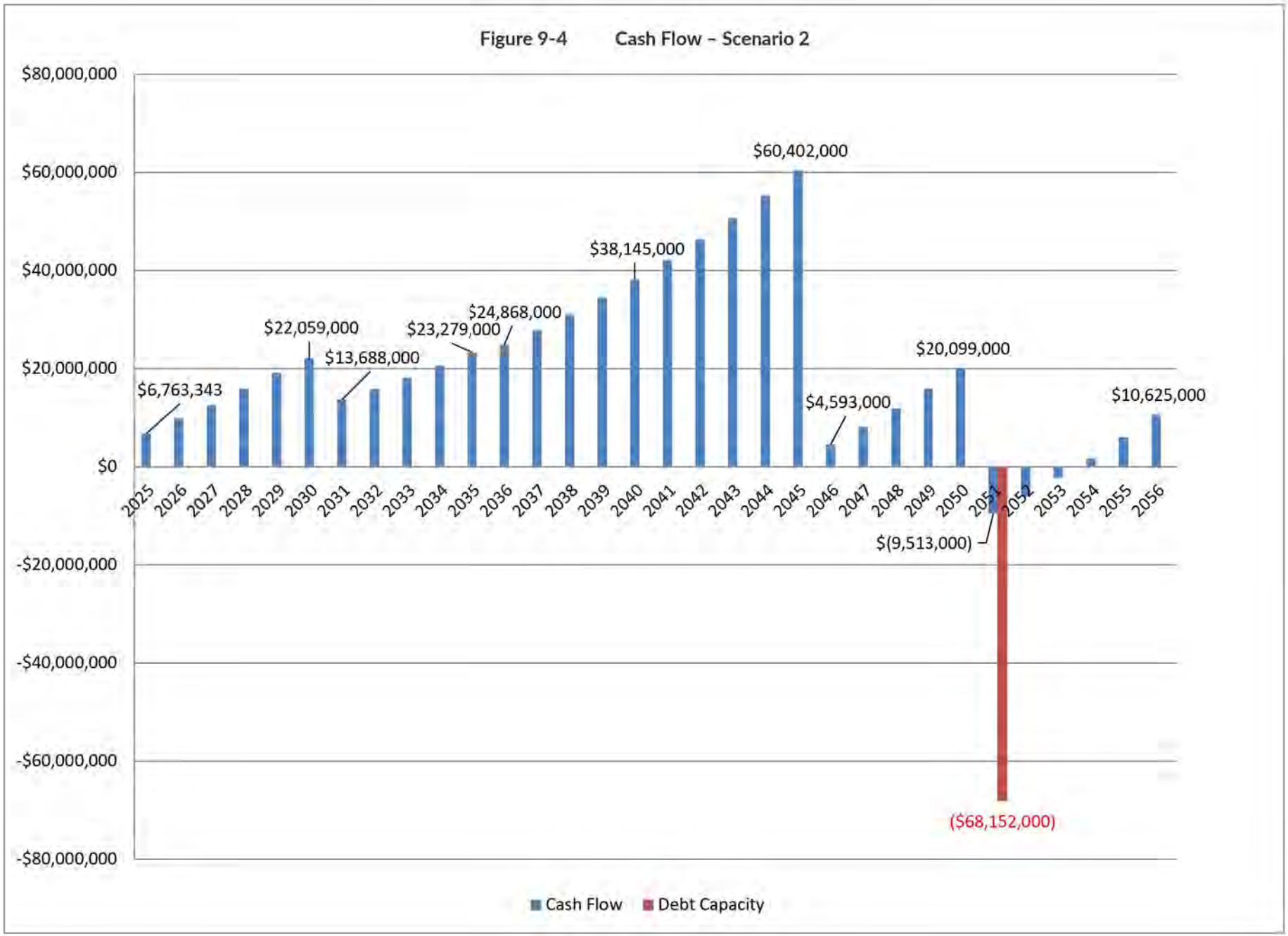


Figure 9-5 Water Rate – Scenario 2

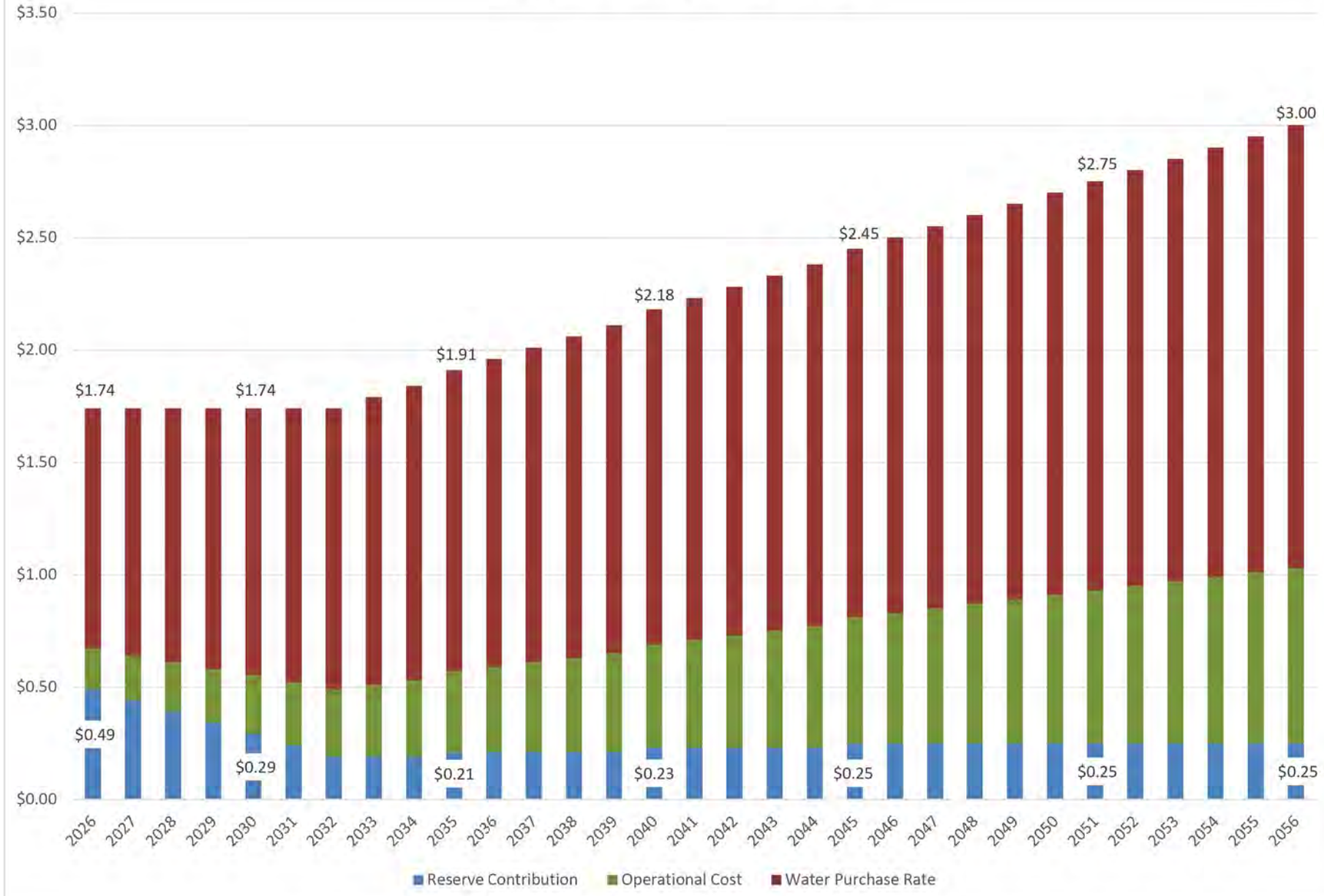


Figure 9-6 Cash Flow – Scenario 3

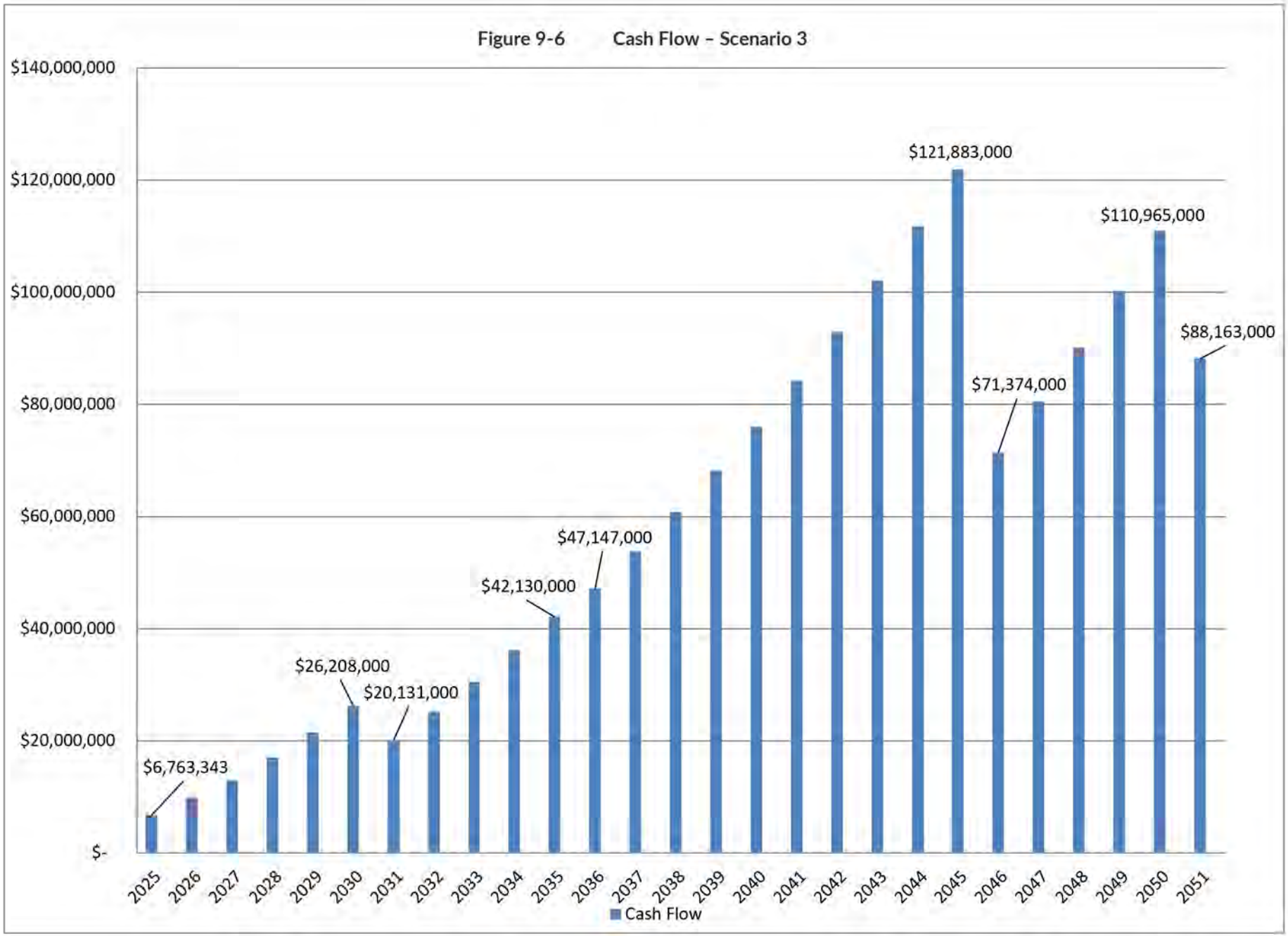
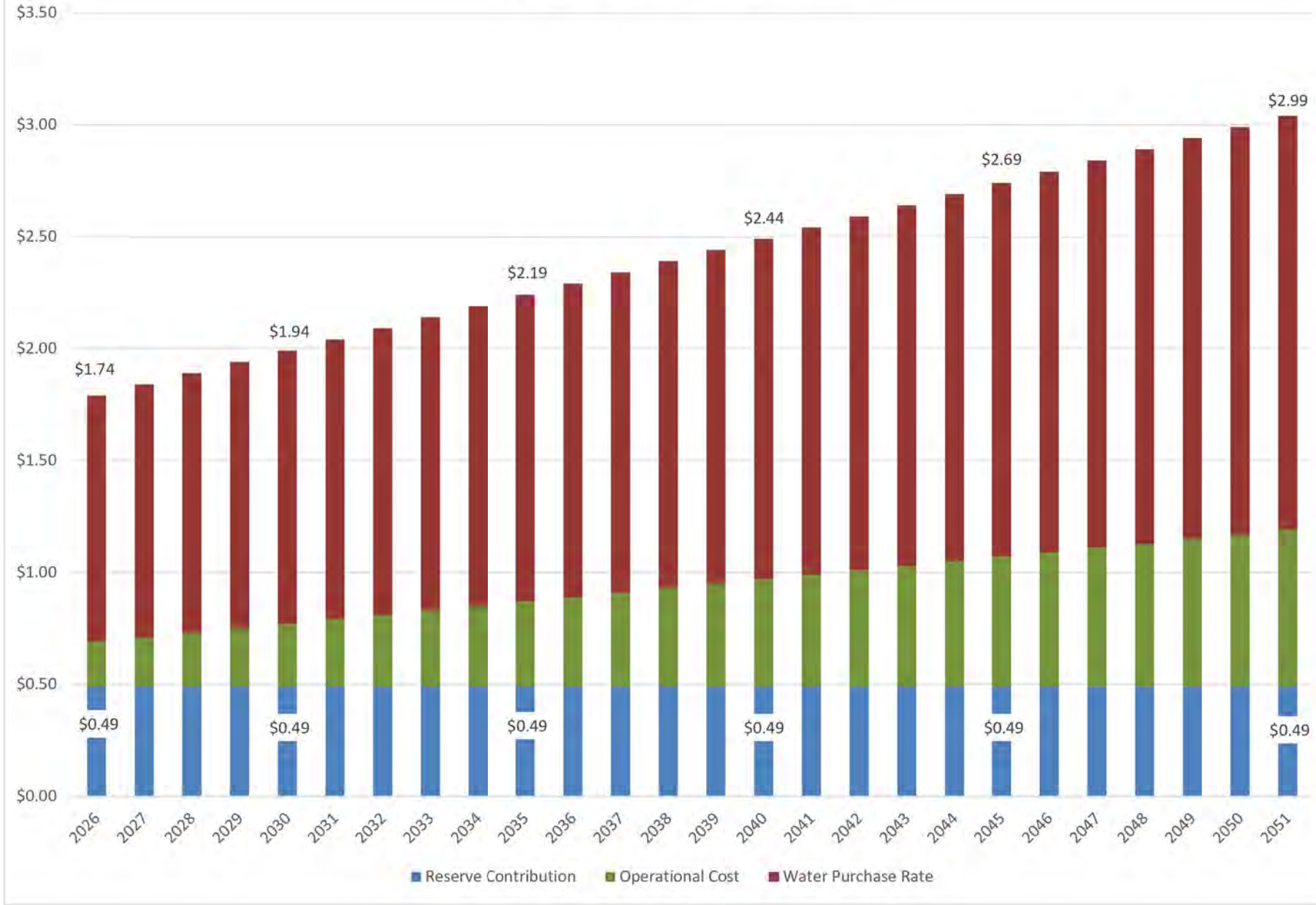


Figure 9-7 Water Rate – Scenario 3



9.4 Rate Model Summary

Table 9-1 provides a comparison of the water rates for the reviewed scenarios until 2051.

Table 9-1 Water Sales Rate Comparison

Year	Scenario 1 ($/m³)	Scenario 2 ($/m³)	Scenario 3 ($/m³)
2026	1.74	1.74	1.74
2027	1.74	1.74	1.79
2028	1.74	1.74	1.84
2029	1.74	1.74	1.89
2030	1.75	1.74	1.94
2031	1.80	1.74	1.99
2035	2.02	1.91	2.19
2040	2.29	2.18	2.44
2045	2.56	2.45	2.69
2050	2.81	2.70	2.94
2051	2.86	2.75	2.99

Table 9-2 provides a consolidated overview of each scenario to support clear comparison of the benefits within the Master Plan.

Table 9-2 Rate Model Summary

Category	Scenario 1 Reserves Only (No Debt)	Scenario 2 Mixed Reserves & Debt Financing	Scenario 3 Fixed Allocation
Water Rate Strategy	Hold $1.74/m³ until 2030	Hold $1.74/m³ until 2032	Adjusted based on water rate and operation cost increase
Reserve Allocation	Adjusted; reduced to $0.30/m³ by 2030	Reduced to $0.19/m³ by 2032	Held at $0.49/m³
Reserve Growth Rule	+$0.02/m³ every 5 years	+$0.02/m³ every 5 years	No increase over time
Capital Funding Approach	All capital from reserves	Combination of reserves + debt	All capital from reserves
Capital Reserve Balance	Maintain $14M–$28M	Accumulate reserves until needed	$71M (2046), $88M (2051)
Debenture Requirement	None	Yes: $9.8M (2051)	None

Category	Scenario 1 Reserves Only (No Debt)	Scenario 2 Mixed Reserves & Debt Financing	Scenario 3 Fixed Allocation
Debt Capacity Impact	0% used	14% of 2051 capacity	0% used
Debt Payoff Year	N/A	2054	N/A
Who Pays for Future Costs?	Commission (via reserves)	Commission (mixed funding)	Commission (via reserves)
Key Advantage	No borrowing; healthy reserves	Stable water rate through 2032 + balanced approach	No borrowing + Reserves for replacements and emergencies
Key Disadvantage	Requires higher reserve rates later	Requires moderate debt	Highest water sales rate

Overall, the three scenarios offer different ways the Commission can fund its long-term capital needs, showing how various combinations of reserve contributions, water rate strategies, and borrowing affect overall financial stability. Each scenario highlights different trade-offs such as maintaining lower water rates, building stronger reserves, or relying on debt and demonstrates how these choices influence future planning and the responsibilities placed on member municipalities.

Together, these scenarios demonstrate how rising EPCOR rates, increasing operating costs, and current reserve levels shape the Commission's financial outlook over the coming decades. Following a detailed review of the funding scenarios at the March 2026 Board Meeting, the Commission determined that **Scenario 3** best supports the Commission's long-term interests and aligns with the objectives of the Strategic Plan.

In selecting this scenario, the Commission should remain mindful of the need to balance financial resilience with rate stability and affordability. Maintaining appropriate reserve levels is essential for addressing long-term infrastructure needs and responding to unforeseen capital requirements; however, it is also important that reserve balances remain aligned with planned and anticipated expenditures. Doing so helps ensure that water rates are perceived as fair, reasonable, and reflective of the Commission's actual funding needs.

STRATEGIC PLAN No. 2.4.2 – RATE PREDICTABILITY

10 POTENTIAL FUNDING SOURCES

Prior to the design and construction of any major project, the Commission should review the currently available grant programs, for there acceptance criteria and eligibility of the project. Below is a list of currently available grant programs.

It should be noted that previous direction from the Board has been to establish water rates such that the Commission remains financially self-sufficient and does not require additional funding from member municipalities, except in cases of infrastructure that falls outside the Commission's typical funding scope, as outlined in **Section 11 – Large Demand User and Infrastructure Upgrade Policy**.

10.1 Alberta Transportation and Economic Corridors – Water for Life

The Water for Life strategy, initiated in 2003 and renewed in 2008, is Alberta's comprehensive approach to managing water resources, focusing on safe drinking water, healthy aquatic ecosystems, and reliable water supplies for a sustainable economy. It relies on partnerships, knowledge, and conservation to address population growth and economic development. The Water for Life Program provides cost-shared funding for regional water and wastewater systems for municipalities, Metis Settlements, and regional commissions.

In previous discussion with Alberta Transportation and Economic Corridors (ATEC) regarding similar projects as is proposed by the Commission; ATEC identified that funding would only be attributed to the portion of the line that supports residential water use. This would leave the portion of the system that services industrial customers not funded. ATEC would consider Edmonton Airports and Nisku as industrial customers and may also consider industrial water uses within the City of Leduc as part of the overall industrial system demand.

Under the current Water for Life Funding, only the residential water demand would be considered for funding. The need for funding would be based on the residential water demand as compared to the overall system capacity.

10.2 Alberta Municipal Water/Wastewater Partnership

The Alberta Municipal Water/Wastewater Partnership, which launched in 1991, provides cost-shared funding to eligible municipalities to help build municipal facilities for water supply and treatment, and wastewater treatment and disposal.

Eligible projects can receive up to 75% of project costs. Funding is calculated as a percentage of eligible project costs based on the municipality's official population when the grant is approved. Populations and grant percentages are determined at the time of approval and do not change during the project.

Regional commissions are eligible to receive funding for multi-municipal, commission-owned water supply, water treatment, and wastewater treatment facilities. Municipalities that are part of a regional commission but require their own standalone facilities may submit individual funding applications.

10.3 Green Infrastructure Fund

The Green Infrastructure Fund supports environmental infrastructure projects that promote reduced greenhouse gas emissions, cleaner air, cleaner water and cleaner land. There are five eligible categories of investment: wastewater infrastructure, green energy generation infrastructure, green energy transmission infrastructure, solid waste infrastructure, and carbon transmission and storage infrastructure. By providing up to 50% federal funding on a cost-shared basis, the fund leverages additional investments from other partners.

The Green Infrastructure Fund was extended to March 31, 2036.

10.4 New Building Canada Fund

The New Building Canada Fund – National Infrastructure Component supports projects of a national significance that have broad public benefits and that contribute to Canada's long-term economic growth and prosperity and reduce potential economic disruptions or foregone economic activity.

10.5 Other Funding Sources or Alternatives

In addition to the above funding sources, Members of the Commission can allocate a portion of their received funding from such sources as the Municipal Sustainability Initiative (MSI) towards the project.

The debenture limit of the Commission can be increased, by having individual members of the Commission take a portion of the overall project debenture. This would require that each member utilize a portion of their debt capacity on behalf of the Commission. The Commission would be responsible to service the debt, through the Commission's water rate.

11 LARGE DEMAND USER AND INFRASTRUCTURE UPGRADE POLICY

A copy of this proposed policy is included in **Appendix E**.

11.1 Purpose

The purpose of this Policy is to establish a clear, consistent framework for how the Commission will assess, evaluate, and determine the impacts of proposed water service connections and growth—including connections from large demand users—on the regional treated water transmission system. This includes identifying potential System Capacity Constraints, determining any required infrastructure upgrades, and allocating financial responsibility for such upgrades. The Policy ensures that system integrity, service reliability, system hydraulics, and long-term planning objectives are protected while enabling responsible and sustainable growth across all members and customers.

11.2 Definitions

All existing definitions in the Water Supply Policy remain. The following additional or updated definitions are proposed to be added:

- **Large Demand User** – The specific water demand attributable to a single proposed customer, development, or service area that exceeds either:
  - when combined with a Member's Forecasted Growth, the Commission's long-term planning projections.
  - the demand projections included within the Commission's Long-Term Demand, and which may trigger the identification of System Capacity Constraints and the requirement for Capacity Upgrades.
- **Forecasted Growth** – Incremental user growth within a Member's service area that is consistent with and supported by the Commission's Long-Term Planning Projections and forms part of the Commission's Long-Term Demand
- **Long-Term Planning** – The 25-year planning forecast as outlined in the Commission's current Master Plan.
- **Long-Term Planning Projections** – The projected water demand, system requirements, and associated infrastructure needs established and adopted by the Commission through its master plans for the purpose of system planning, capacity management, and investment decisions.
- **Long-Term Growth** – The incremental increase in water demand within a Member's service area that is consistent with and supported by the Commission's Long-Term Planning Projections, representing anticipated and planned development over the applicable planning horizon.
- **Long-Term Demand** – The total projected water demand over the Commission's established planning horizon, as defined through its Long-Term Planning Projections and long-range demand forecasts, including Forecasted Growth within Member service areas, and used to guide system capacity planning and infrastructure development.
- **Unplanned Capacity Growth** – Demand generated by a Large Demand Customer that exceeds a Member's Forecasted Growth and is not accounted for within the Commission's Long-Term Planning Projections or Long-Term Demand.

- **System Capacity Constraints** – Any condition in which a proposed connection would:
  - Reduce system pressures below Commission design standards
  - Exceed hydraulic, pumping, or transmission capacity
  - Impair water quality, redundancy, or operational reliability
  - Compromise the Commission's ability to reliably serve existing members and customers

Interpretation:

- Forecasted Growth forms part of Long-Term Demand and is planned for by the Commission.
- Large Demand Customer Demand represents demand outside of or exceeding planned growth.
- Unplanned Capacity Growth is the portion of Large Demand Customer Demand that is not included in Long-Term Demand and may require Member-funded upgrades.

11.3 Policy Statement

The Commission shall maintain sufficient system capacity to meet Member needs as forecast in its long-term growth plans.

The Commission must ensure that any new connection or increase in demand does not create **System Capacity Constraints** or compromise its ability to maintain established service levels. The Commission also seeks to protect capacity for existing Members by requiring that any new connection or demand increase that reduces available capacity contributes financially in proportion to the incremental cost required to add that capacity in the future.

When System Capacity Constraints are identified, the Commission may, at its sole discretion:

- Deny the proposed connection
- Approve the connection subject to required capacity upgrades
- Impose demand-management, phasing, or operational conditions necessary to maintain system reliability
- Permit the Member to provide a financial contribution in lieu of constructing the required infrastructure

11.4 Funding Responsibility for Capacity Upgrades

Commission Responsibility – Forecasted Growth

The Commission shall fund and construct any capacity upgrades required to accommodate Forecasted Growth where:

- The additional demand aligns with long-term growth projections adopted by the Commission
- The required upgrade is included in the Commission's approved capital and financial plans

Interpretation: If growth was predictable and already identified through the Commission's master planning, the Commission funds the required upgrades.

Member Responsibility – Unplanned Large Capacity Growth

A Member shall be responsible for funding all capacity upgrades required to support a Large-Demand User when:

- The projected demand of the Large-Demand User exceeds the Member's Forecasted Growth in long-term planning.
- The demand necessitates upgrades not included in the Commission's capital plans.

- The upgrade accelerates, expands, or advances a Commission-planned project solely due to the new user's demand.
- The proposed connection would cause System Capacity Constraints as determined through Commission engineering assessments.

Interpretation: If the demand was not forecasted as part of expected growth or would overload the system, the Member funds the required upgrades. The Commission's Board may, at their discretion, vote to waive all or a portion of the applicable surcharge for a Member.

11.5 Cost Allocation for Mixed Benefits

Where a required upgrade benefits both the Large-Demand User and the broader system:

- The Member shall pay the incremental cost attributable to the Large-Demand User and the mitigation of any System Capacity Constraints.
- The Commission shall pay the portion associated with Forecasted Growth or previously planned system development.

The Member shall initially fund the total cost of the required upgrades. The Commission shall reimburse the Member for its share at the time the upgrades would have otherwise been implemented through the Commission's approved capital planning and budgeting process.

In determining the reimbursement amount, the Commission shall recognize the financial impact to the Member of advancing the works, including interest and debt servicing costs incurred during the interim period. The cost of borrowing shall be considered an eligible component of reimbursement and will be based on the market interest rate, subject to any limitations, criteria, or rates established by the Commission. The Commission reserves the right to reimburse approved amounts in a single lump-sum payment.

11.6 System Capacity Constraints Evaluation

The Commission shall conduct hydraulic modelling, engineering evaluations, and operational assessments to determine whether a proposed connection may cause System Capacity Constraints.

If constraints are identified, the Commission shall issue a written notice to the Member outlining:

- The nature of the constraints
- Required mitigation measures or capacity upgrades
- Cost responsibilities under this policy
- Any conditions under which the connection may proceed

The Commission may defer, limit, or condition the approval of the connection until mitigation has been completed.

11.7 Application Process

A Member proposing to connect a Large-Demand User shall submit a formal request for capacity assessment to the Commission.
The Commission shall complete the following:

- A hydraulic capacity assessment
- An evaluation of System Capacity Constraints
- A determination of whether the demand aligns with Forecasted Growth

The Commission shall issue a formal Determination of Capacity, identifying available system capacity, any applicable System Capacity Constraints, and the associated cost responsibilities. This determination will include the cost of completing the required capacity assessment. which may be charged back to the prospective or existing Member. as applicable.

11.8 Payment and Construction Requirements

Member-funded capacity upgrades must be paid in full prior to construction or financed through agreements approved by the Commission.

All Commission upgrades must be designed, tendered, managed, and constructed under the Commission's authority to ensure consistency with system standards.

Upon completion, ownership of the infrastructure shall transfer to the Commission unless otherwise agreed in writing.

11.9 Policy Amendments

This Policy may be amended by resolution of the Commission Board.

STRATEGIC PLAN No. 2.4.3 – COMMISSION GOVERNANCE

12 CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

The following conclusions from the Master Plan are outlined below:

- The average annual growth in water demand for the Commission from 2018 to 2024 was 2.5%. The projected average annual growth in water demand is also 2.5% over the 25-year study period.
- The Commission is anticipating the following new services to tie into the system:
  - Leduc County Rural (Rolly View and Looma)
  - Saunders Lake Industrial Park
- Changes to the system since the previous Master Plan include the Blackmud Booster Station, previously the Boundary Booster Station, being owned by EPCOR, the newly constructed Nisku Booster Station, and upgrades to the Highway 21 booster pumps
- Demand projections have also changed since the previous Master Plan
- The current supply pressure setpoint to the City of Leduc North Reservoir – 310 kPa (45 psi) is adequate to meet requirements for the next 5 years
- System capacity issues were identified in the future scenarios modelled. Upgrades to the system will be required.
- Three scenarios were reviewed for long-term capital funding:
  - **Scenario 1** – Fully funded capital through reserves
  - **Scenario 2** – Mixed reserves and debt financing
  - **Scenario 3** – Fixed allocation
- **Strategic Plan No. 2.6.1 – Commission Expansion:** The City of Camrose, the City of Wetaskiwin, and the County of Wetaskiwin have expressed interest in being serviced by the Commission. A separate study is underway to determine the feasibility.

12.2 Recommendations

Associated recommends the following:

- Complete the identified system upgrades in the appropriate timeframe.
- Review existing fire storage requirements with the communities that did not provide them.
- **Strategic Plan No. 2.5.2 – Environmental Stewardship:** Promote water conservation among Members, by providing educational materials or encouraging the development of public education programs.
- **Strategic Plan No. 2.4.1 – Emergency Preparedness:**
  - Review the long-term sustainability and vulnerability of existing infrastructure and operations, with consideration of climate-related hazards.
  - Establish and maintain emergency response protocols specific to climate-related events; the Commission has recently updated its emergency response plan and should continue to review and refine it on an ongoing basis.
  - Continue to review water restriction protocols to support consistent and coordinated demand management during shortages.
  - Undertake the SCADA System Modernization.
- Undertake the maintenance and upgrade recommendations outlined in the Facilities Assessment.

- Implement the Short-Term (5-year) Capital Improvement Program, as outlined in **Section 8**.
- **Strategic Plan No. 2.4.2 – Rate Predictability:** Adopt **Scenario 3** for long-term capital funding.
- **Strategic Plan No. 2.4.3 – Commission Governance:**
  - Adopt the Large Demand User and Infrastructure Upgrade Policy
  - Conduct a Governance Review to ensure operation of the Commission is optimal
- Begin the update to this Master Plan 5 years after adoption to review and confirm system water demands, future service connections, and the timing of proposed upgrades. System upgrades should be undertaken

CLOSURE

This report was prepared for the Capital Region Southwest Water Services Commission to provide a compressive review of the Commission's future water demand requirements, system operations, anticipated future upgrades, water performance review, and capital and operational forecasting.

The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practising under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

Associated Engineering Alberta Ltd.

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APPENDIX A - DEMAND TABLES

Table 1 - Historical Water Usage by Reservoir

Location	2018		2019		2020		2021		2022		2023		2024	
	% Demand	AD (L/s)	% Demand	AD (L/s)	% Demand	AD (L/s)	% Demand	AD (L/s)	% Demand	AD (L/s)	% Demand	AD (L/s)	% Demand	AD (L/s)
Leduc North	100%	92.1	91%	79.8	72%	63.0	67%	64.3	63%	60.1	60%	59.3	59%	59.9
Leduc Robinson	0%	0.3	9%	8.1	28%	25.1	33%	31.6	37%	35.0	40%	38.7	41%	41.6
Beaumont	-	42.1	-	41.3	-	43.8	-	48.5	-	47.3	-	48.8	-	51.7
Nisku West	25%	5.3	25%	5.8	26%	5.0	31%	7.6	32%	9.1	21%	6.3	10%	3.2
Nisku East	75%	16.4	75%	17.0	74%	14.2	69%	17.2	68%	19.0	79%	23.9	90%	27.2
EIA R1	100%	12.0	98%	15.2	61%	7.1	23%	2.9	30%	4.5	33%	4.4	31%	4.1
EIA R2	0%	0.0	2%	0.4	39%	4.5	77%	9.7	70%	10.7	67%	8.9	69%	9.4
Calmar	-	7.5	-	7.1	-	7.4	-	7.9	-	6.7	-	6.7	-	7.1
Camrose County	-	0.2	-	0.3	-	0.5	-	0.6	-	1.1	-	1.7	-	2.0
Hay Lakes	-	1.2	-	1.3	-	1.1	-	1.2	-	1.1	-	1.1	-	1.2
New Sarepta	-	1.5	-	1.4	-	1.5	-	1.7	-	1.6	-	1.6	-	1.7
Millet	-	6.0	-	5.7	-	5.6	-	6.2	-	5.7	-	5.8	-	6.0

Table 2 - Detailed Demand Projections by Reservoir

Location	2026		2031		2036		2041		2046		2051	
	AD (L/s)	PD (L/s)	AD (L/s)	PD (L/s)	AD (L/s)	PD (L/s)	AD (L/s)	PD (L/s)	AD (L/s)	PD (L/s)	AD (L/s)	PD (L/s)
Leduc North	64.0	115.2	72.4	130.3	81.9	147.4	92.7	166.8	104.8	188.7	118.6	213.5
Leduc Robinson	42.6	76.8	48.3	86.9	54.6	98.3	61.8	111.2	69.9	125.8	79.1	142.3
Beaumont	56.3	101.4	69.8	125.7	83.0	149.3	98.5	177.3	117.0	210.6	139.0	250.2
Nisku West	8.5	15.3	11.3	20.3	13.1	23.5	15.1	27.3	17.6	31.6	20.4	36.6
Nisku East	25.5	45.9	33.8	60.9	39.2	70.6	45.4	81.8	52.7	94.8	61.1	109.9
EIA R1	4.5	8.2	5.4	9.7	6.4	11.6	7.6	13.7	9.1	16.3	10.8	19.4
EIA R2	10.6	19.0	12.6	22.7	15.0	27.0	17.8	32.1	21.2	38.1	25.1	45.2
Calmar	7.4	13.3	8.2	14.8	8.6	15.6	9.1	16.4	9.6	17.2	10.0	18.1
Camrose County	2.1	3.8	2.9	5.2	3.1	5.7	3.5	6.2	3.8	6.8	4.1	7.5
Hay Lakes	1.3	2.3	1.5	2.7	1.6	3.0	1.8	3.3	2.0	3.6	2.2	4.0
New Sarepta	1.7	3.1	1.9	3.5	2.1	3.8	2.3	4.2	2.6	4.7	2.9	5.2
Millet	6.2	11.2	6.9	12.4	7.6	13.7	8.4	15.1	9.3	16.7	10.2	18.4
Looma	-	-	2.0	3.6	5.1	9.1	6.2	11.1	7.5	13.5	9.1	16.4
Rolly View	-	-	0.1	0.2	0.3	0.5	0.3	0.6	0.4	0.7	0.5	0.9
Tillicum Beach	-	-	0.5	0.8	0.5	0.9	0.5	0.9	0.5	1.0	0.6	1.0
Saunders Lake	-	-	0.8	1.4	2.8	5.0	4.8	8.6	6.8	12.2	8.8	15.8
Discovery Park	2.7	2.7	2.8	2.8	3.0	3.0	3.1	3.1	3.3	3.3	3.4	3.4

APPENDIX B - BEAUMONT SECOND WATER SUPPLY MAIN PREFERRED ALIGNMENT

BEAUMONT

May 28, 2026

Shawn Olson, P.Eng., CLGM
Manager, Capital Region Southwest Water Services Commission
#1 Alexandra Park, Leduc, AB T9E 4C4
solson@leduc.ca www.leduc.ca

Dear Mr. Olson:

RE: CRSWSC Second Water Supply Main – Beaumont Preferred Conceptual Alignment

Thank you for the opportunity to provide Beaumont's input on the conceptual alignment for the planned second water supply main within City limits for inclusion in the Capital Region Southwest Water Services Commission's updated Water Master Plan.

Beaumont reviewed potential routing approaches based on land use compatibility, constructability, long-term operations and maintenance considerations, proximity to the future Northwest Pumphouse and Reservoir, and flexibility for future regional servicing. Based on this review, Beaumont's preferred alignment follows the City's north boundary and the existing Range Road 242/66 Street right-of-way. Please refer to the enclosed figure.

This alignment is preferred because it generally follows the north boundary of the future ASP area and planned arterial corridor, minimizes impacts on future development, supports a future connection to the Northwest Pumphouse and Reservoir, and provides flexibility for the ultimate connection location between EPCOR and CRSWSC along the north side of Beaumont.

As next steps, Beaumont requests that the preferred alignment be reflected in the updated 2026 Water Master Plan. The City will also continue to consider this corridor through future land use planning and development review to help protect the alignment and facilitate implementation at the appropriate time.

If you have any questions or would like to discuss the alignment further, please feel free to contact me.

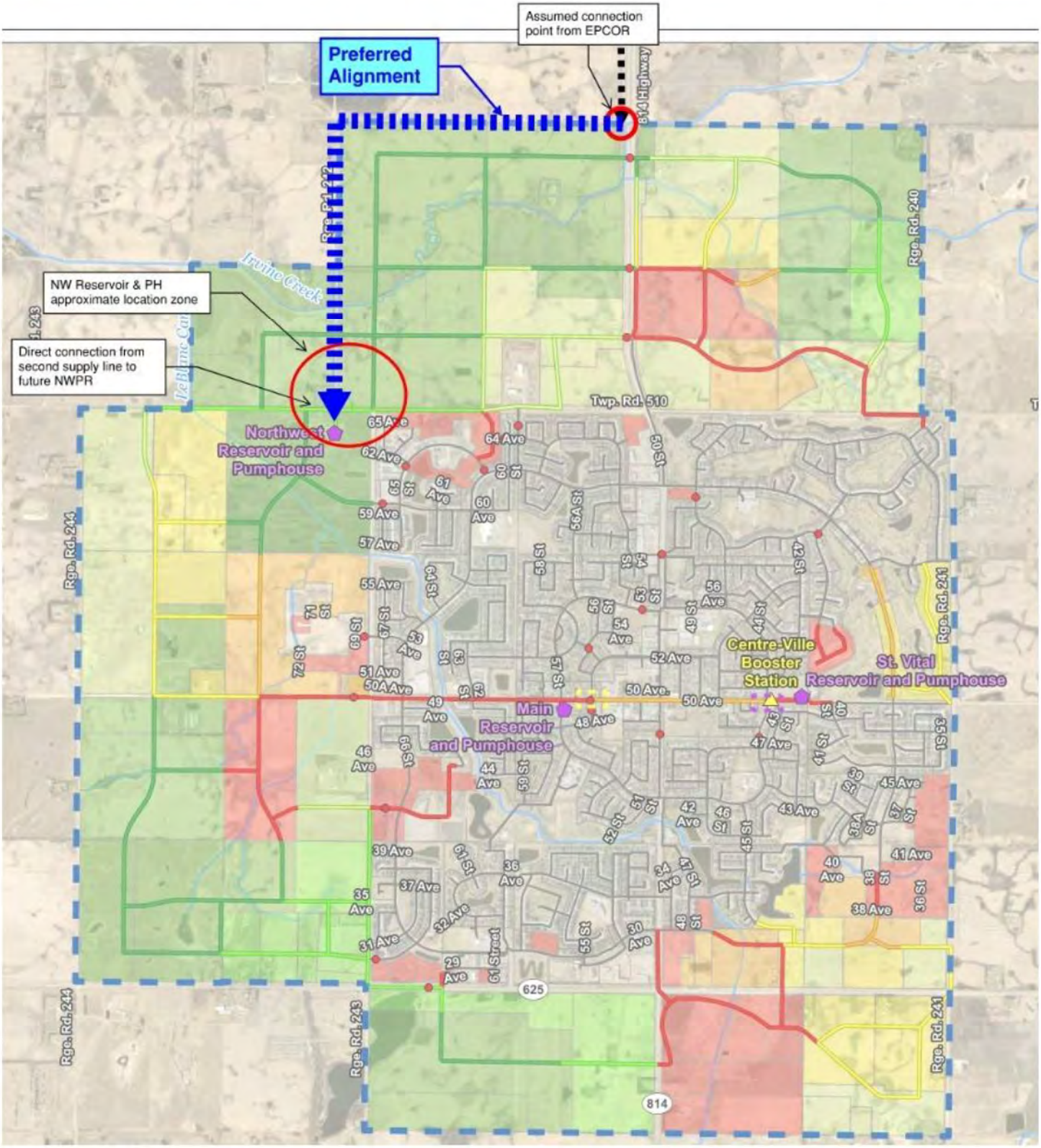
Sincerely,

Aaron Lewicki, P. Eng.
Director - Infrastructure

Aaron Lewicki, P.Eng.
Director, Infrastructure & Engineering

cc: Mayor Lisa Vanderkwaak, CRSWSC Board Member
Councillor Anthony Kohlsmith, CRSWSC Board Member
Councillor Steven VanNieuwkerk, CRSWSC Alternate Board Member
Mike Schwirtz, CAO
Maureen O'Neil, Deputy CAO, External Services
Kendra Raymond, Director, Planning and Development
Joanne Dargis, Director, Legal and Legislative Services
Joannes Wong, Manager, City and Regional Planning
Ryan Orlovsky, Manager, Utility and Facility Operations
Trevor Moningka, Long Range Engineer

Encl: Preferred Alignment Figure



Beaumont Preferred Alignment

APPENDIX C - FACILITY ASSESSMENT REPORT

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

REPORT

Capital Region Southwest Water Services Commission

Facility Assessment



JUNE 2026

carbon neutral since 2009

PROUDLY CANADIAN
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CANADA BEST MANAGED COMPANIES Platinum member

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1 INTRODUCTION

Associated Engineering (Associated) was previously engaged by the Capital Region Southwest Regional Water Services Commission (CRSWSC) in 2020 to complete a system-wide assessment of multiple Commission-owned potable water infrastructure sites. In 2025, CRSWSC retained Associated to conduct a follow-up facility condition assessment to re-evaluate the condition, operational integrity, and maintenance requirements of key electrical, process, and building mechanical systems. This work supports CRSWSC's ongoing asset management and capital renewal planning.

The facilities included in this 2025 assessment program comprise the Edmonton International Airport No. 1 Fill Station, Edmonton International Airport No. 2 Fill Station, Calmar Fill Station, CRSWSC Nisku Booster Station, Leduc Nisku West Fill Station, Leduc Nisku East Fill Station, City of Beaumont Fill Station, Highway 21 Fill Station, Leduc North Fill Station, Armena Fill Station, Hay Lakes Fill Station, New Sarepta Fill Station, Telford Lake Booster Station, Millet Fill Station, and Leduc Robinson Fill Station.

The cost estimates presented in this report are intended for planning and budgeting purposes only. They represent a **Class C Estimate** as defined by the Association for the Advancement of Cost Engineering (AACE) and industry best practices, with an expected accuracy range of ±30%. These estimates are based on preliminary information, typical unit rates, and assumed quantities, and should be refined as project design details are further developed.

2 ASSESSMENT DATA

The following is Associated's review and assessment of each of the following locations. Associated's observations are broken into four main categories:

- Electrical
- Instrumentation
- Process
- Building Mechanical

Non-Destructive Testing (NDT) – Rationale and Importance

While external visual inspection provides insight into coating condition, external corrosion, and general material performance, it does not assess the internal condition or remaining structural integrity of the process piping. At present, there are no historical records, baseline thickness readings, or previous NDT results available for any of the stations at the time of this assessment. As a result, the internal condition of both legacy carbon steel piping—some of which exhibit active corrosion externally—and newer piping systems remains unknown.

For systems containing older or visibly deteriorated carbon steel pipe, the likelihood of internal pitting, wall thinning, or tuberculation is elevated. Even in stations with recently installed piping, establishing a defensible baseline is essential to understand each asset's current position within its lifecycle, to support risk-based planning, and to guide future rehabilitation or replacement strategies.

Accordingly, it is recommended that the Commission undertake a targeted non-destructive condition assessment, including ultrasonic thickness (UT) testing and selective radiographic (X-ray) examination at critical or representative locations. This approach will allow the Commission to:

- Quantify current internal wall thickness relative to ASME B31.3 minimum allowable values
- Identify active corrosion or deterioration mechanisms
- Establish a defensible inspection baseline for future comparative assessments
- Align with recognized asset management best practices

Industry best practice for potable water transmission and distribution assets is to conduct NDT condition verification on a 5–8 year interval, depending on age, operating environment, and system pressure.

Costing Note

The cost for this recommended NDT work has not been included in the overall project planning budget. Instead, it has been itemized under the NDT recommendation section for information purposes only, to allow the Commission to understand the expected scale of future asset management investment.

2.1 Airport Fill Station (No.1)

The Airport #1 Fill Station was originally constructed in 1982. A comprehensive facility assessment was last conducted by Associated Engineering in 2020. This follow-up inspection, completed five years later, evaluates the current condition of major electrical, controls, process mechanical and building mechanical with focus on integrity and conformance with modern standards.

2.1.1 Electrical

The Airport Fill Station (No. 1) has a single-phase 240V 70A service feeding into a newer 100A 240V 24cct service entrance rated circuit distribution panel. The utility meter is mounted on the exterior of the building next to the entrance door. An old Federal Pioneer (UPS-6C) is still in service. Most loads have been migrated off this panel but it appears one circuit is still in use. This panel should be decommissioned and removed due to age and corrosion.

2.1.1.1 Electrical Observations and Findings

Item No.	Description
1	**Lighting**
	The lighting appears to be original fluorescent fixtures.
	Item 1 - Recommendations
	• Since the lights are off 99% of the time, there is little benefit to upgrading these to LED.
2	**Emergency Lighting Wallpack**
	• An emergency lighting wallpack is present; however, the ability of an old unit like this to provide the 30 minutes of emergency lighting is unlikely. Also, there is no illuminated exit sign over the doorway.
	Item 2 - Recommendations
	• Recommend a new emergency exit sign with lights be installed next to the door (include auto exerciser option) to resolve both issues.
3	**Alarm System**
	• An alarm system with keypad was observed.
	Item 3 - Recommendations
	• The system is functional, but the equipment is old and due for upgrade.
4	**Carbon Monoxide Detector**
	• A Carbon Monoxide detector was observed; this appears to have been replaced since last assessment. These should be replaced every 5-10 years.
	Item 4 - Recommendations
	• Recommend replacement in 2030.
5	**PLC Cabinet UPS**
	• PLC cabinet UPS has two battery pack power extenders. These need replacement every 5 years on average. Last replacement is noted as Dec 2024
	Item 5 - Recommendations
	• UPS batteries should be good until 2029. Continue to monitor.
6	**Active Cathodic Protection**
	• Active Cathodic protection is installed. **This appears to be functional but is outside of Associated's expertise to determine the condition.**

2.1.2 Controls

The control system PLC is a Schneider M340 PLC, and the radios are GE MDS SD4 licensed radios. M340 is a supported PLC platform, and no upgrade currently is recommended. A mast-mounted Yagi antenna is mounted to the building and points to the Hwy 21 repeater station, and PLC communications is via serial MB protocol for system stability.

2.1.2.1 Controls Observations and Findings

Item No.	Description
1	**MDS 4710 Series Radio**
	• The old MDS 4710 series radio is still in the PLC cabinet post previous SCADA upgrade.
	Item 1 - Recommendations
	• This can be removed and recycled. The MDS 4710 series is obsolete, and the radios are 12 years old with the antennas and cables original to the facility. See SCADA summary.
2	**PLC Spare Rack Slots**
	• PLC spare rack slots have terminal covers to protect the connections
	Item 2 - Recommendations
	• This is acceptable.
3	**Terminals and Wiring**
	• Terminals and wiring appear in good condition.
	Item 3 - Recommendations
	• None
4	**PIT-0500 (fill line)**
	• PIT-0500 (fill line) is an E&H unit and is in good condition.
	Item 4 - Recommendations
	• None
5	**Flow Control Valve, Actuator, Flow Meter**
	• The flow control valve, actuator, and flow meter were last upgraded in 2013 and should have another 10-15 years of life.
	Item 5 - Recommendations
	• None
6	**Chlorine Residual Unit**
	• The chlorine residual analyser is a ProMinent unit and appears to be in good condition.
	Item 6 - Recommendations
	• Continue to monitor condition.

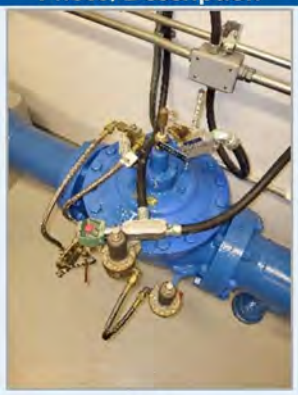
Item No.	Description
7	**Level Transmitter (LIT-0580)**
	• The level transmitter (LIT-0580) is a Siemens Milltronics MultiRanger 100 unit and appears to be in good condition and functional, but the level element is not visible as it hangs in the reservoir in the next chamber. This series is now discontinued and based on the age and installation a hydrostatic transmitter would be a better instrument for this application.
	Item 7 - Recommendations
	• Associated recommends replacing with a hydrostatic transmitter and a small local display panel in the PLC cabinet.
8	**Pressure Gauge**
	• The pressure gauge between the pressure reducing valve (PRV) and flow valve needs a neck extension. This observation was made in 2020 as well. The isolation valve handle obscures the face. The gauge is also smaller than the normally recommended 4" dial face.
	Item 8 - Recommendations
	• The pressure gauge between the pressure reducing valve (PRV) and flow valve needs a neck extension. • Isolation Valve Handle. • Increase gauge size.

2.1.2.2 Electrical and Controls Photos

Table 2-1 Photos – Airport Fill Station (No. 1) – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
	New Incoming Panel	**Antenna and Power Meter**

Photo/Description	Photo/Description	Photo/Description
		
Rusting Distribution Panel	PLC Panel	UPS Stack
		
Radios	PLC Rack	Panel Wiring
		
Inlet PIT and Analyser Feed	Flow Meter	Cl2 Analyser and CO Detector

Photo/Description	Photo/Description	Photo/Description
		
Level Transmitter	Control Valve Actuator	PRV
		
Level Sensor Through Wall	Blocked Gauge	

2.1.3 Process Mechanical

The Edmonton International Airport #1 Fill Station consists predominantly of painted and epoxy-coated carbon steel process piping ranging in size from 150 mm to 300 mm, configured for controlled reservoir filling. Flow control and isolation are provided through five (5) manually actuated butterfly valves of original vintage and one (1) modern electrically actuated ball valve for automated operation. The system incorporates a pressure control reducing control valve (PCV) that maintains a downstream pressure of approximately 145 kPag (21 psig) against an upstream supply pressure of 515 kPag (75 psig). The fill discharge enters the reservoir via an air-gap configuration at the top sidewall of the station.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, an electronic pressure transducer for upstream pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality and returns its sample discharge to the reservoir.

2.1.3.1 Process Mechanical - Observations and Findings:

Item No.	Description
1	**Pressure Control Reducing Valve (PCV) (Installed 1982 – 43 Years in Service) - Image - Table 2-2 a**
	• The PRV body and bonnet show no apparent external corrosion; the typical service life 35–40 years. • The Pilot tubing was replaced with stainless braided hose per previous 2020 assessment; need to ensure routing avoids high points to prevent air entrapment and pilot instability. • The Pilot assemblies appear original, and consistent with 2020 assessment photographs.
	Item 1 - Recommendations
	• Conduct a full internal inspection of PRV body and diaphragm. • Replace the diaphragm, seals, and soft parts per the manufacturer's service manual. • If the internal condition is acceptable, replace pilots and return to service; otherwise, replace complete PRV assembly.
2	**Flow Transmitter FIT-0520 – Dissimilar Metal Connection - Image - Table 2-2 b**
	• The stainless steel spool piece is connected directly to carbon steel piping upstream and downstream. • Dissimilar metals will promote galvanic corrosion in humid or condensate conditions.
	Item 2 - Recommendations
	• Install galvanic isolation hardware (Mylar sleeves and washers) on all flange bolts, nuts, and washers.
3	**Backflow Prevention – Hose Bib and Fill Connection (CSA B64 Compliance) - Image - Table 2-2 c**
	• Direct hose bib connection does not comply with CSA B64 cross-connection requirements for high-hazard facilities. • Existing valve assembly lacks verification of NSF/ANSI 61 certification.
	Item 3 - Recommendations
	• Install NSF-61-certified Watts LF7 or equivalent hose bib vacuum breaker/backflow preventer. • Confirm galvanic compatibility with adjoining carbon steel piping; and ensure prevention of dissimilar metals.
4	**Threaded Stainless Piping and Carbon Steel Thread-Olet (PIT-0500) - Image - Table 2-2 e**
	• Stainless steel threaded piping connects directly to carbon steel thread-olet, creating a galvanic couple.
	Item 4 - Recommendations
	• Install NSF-61 dielectric union or replace material with galvanic suitable pipe at carbon steel thread-olet.
5	**Chlorine Analyser Feed Line and Pressure Regulator - Image - Table 2-2 f**
	• Branch from 75 psi fill line supplies pressure regulator set ≈ 12–15 psi with poly tubing to analyser. • Regulator body shows visible surface corrosion.
	Item 5 - Recommendations
	• Replace with dual-stage regulator configuration: first stage 15 psi, second adjusted per analyser manufacturer requirements. • Use NSF-61-approved materials for all wetted components; and ensure galvanic compatibility.
6	**Flow Control Valve FCV-0530 – Dissimilar Metal Connection - Image - Table 2-2 g**
	• Stainless steel valve body flanged to carbon steel piping upstream and downstream.

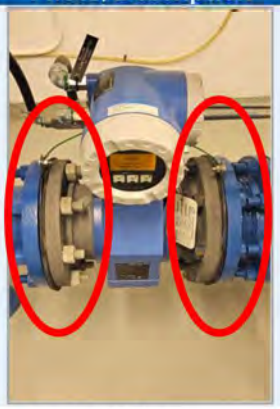
Item No.	Description
Item 6 - Recommendations	
	• Install galvanic isolation using Mylar sleeves and washers at bolted joints.
7	**Pressure Gauge Assembly (Between PCV and FCV-0530) - Image Table 2-2 d**
	• Stainless steel isolation valve installed on carbon steel thread-olet.
Item 7 - Recommendations	
	• Install NSF-61 dielectric union between valve and thread-olet to mitigate galvanic corrosion.
8	**Reservoir Level Indication – Pulley System - Image Table 2-2 h**
	• Mechanical pulley level system shows cable fraying and deterioration; technology is obsolete.
Item 8 - Recommendations	
	• Replace with modern electronic level transmitter (submersible pressure or radar type).
9	**Butterfly Valves - Image Table 2-2 i**
	• Original 1982 valves (~43 years old) show no visible external corrosion. Though paint touch-ups have been observed. • Exercise and isolation test records unavailable.
Item 9 - Recommendations	
	• Replace with new NSF-61-certified butterfly valves to restore isolation reliability/confidence. Valves are beyond life expectancy.
10	**Piping Coating Condition**
	• Piping repainted within the last five years; no external corrosion observed.
Item 10 - Recommendations	
	• Maintain routine inspection and touch-up coating as required per manufacturer specifications.
11	**Non-Destructive Testing (NDT) - Image Table 2-2 j and Table 2-2 k**
	Note: Not included in budgetary planning costs – General Estimate $15,000 • Legacy carbon steel piping may exhibit internal corrosion or wall thinning not visible externally.
Item 11 - Recommendations	
	• Conduct targeted ultrasonic thickness (UT) and localized radiographic (X-ray) inspection at representative locations to establish baseline wall thickness for future trend monitoring and asset management.
12	**General Safety Observation - Image Table 2-2 l**
	• Abandoned pipe stanchion bases behind piping and pulley indicator create trip hazards for personnel.
Item 12 - Recommendations	
	• Remove bases to eliminate tripping risk and improve maintenance access.

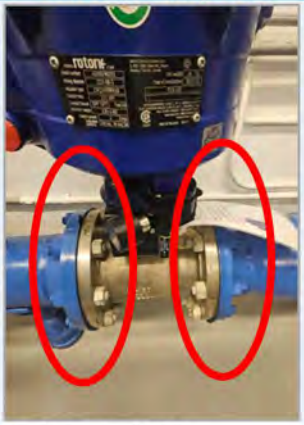
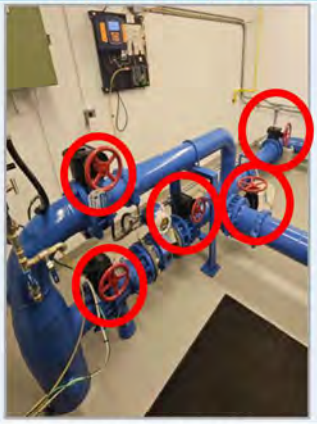
2.1.3.2 Process Mechanical Overall Summary

The Airport #1 Fill Station remains in acceptable external condition relative to its age. The primary concerns are aging mechanical components (PCV, butterfly valves), galvanic coupling between dissimilar metals, obsolete level instrumentation, and non-compliance with current CSA B64 requirements. Implementation of the above recommendations—including PCV refurbishment or replacement, dielectric isolation, NDT verification, and modernization of key valves and instruments—will improve reliability, safety, and regulatory compliance.

2.1.3.3 Process Mechanical Photos

Table 2-2 Photos – Airport Fill Station (No. 1) – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. PCV	b. Flow Control Valve	c. Hose Bib Connection
		
d. SS Ball Valve on CS	e. SS Ball Valve on CS	f. Analyser Pressure Regulator

Photo/Description	Photo/Description	Photo/Description
		
g. SS Ball Control Valve	h. Fraying Support Cable for Reservoir Level	i. Original Butterfly Valves
		
j. Piping Arrangement Fill	k. Piping Arrangement to Reservoir	l. Old Stanchion Bases

2.1.4 Building Mechanical

The building mechanical system consists of a force air furnace and accessories.

2.1.4.1 Building Mechanical - Observations and Findings:

Item No.	Description
1	Natural Gas Fired Forced Air Furnace

- The natural gas fired forced air furnace, controlled by a simple wall mounted thermostat, is located within the Commission Room. It appears in a fair condition.

Item 1 - Recommendations

- Recommend normal maintenance.
- The furnace should be cleaned and maintained on yearly basis.
- The filter in the return air intake shall be changed based on maintenance schedule.

Item No.	Description
2	**Air Intake**

- There is an air intake with cold air trap, which provides combustion from the exterior. It appears in a fair condition.

Item 2 - Recommendations

- Recommend normal maintenance.

3	**Furnace Flue**

- The flue of the furnace connects to a chimney through roof. It appears in a fair condition.

Item 3 - Recommendations

- Recommend normal maintenance.

4	**Exposed Uncapped Duct**

- Along the ceiling is an exposed uncapped duct.

Item 4 - Recommendations

- The intent of this duct should be identified, and either capped or properly terminated. Based on its location it is assumed to be vent.

5	**Outside Air Duct**

- There is no outside air duct for the furnace.

Item 5 - Recommendations

- The venting within the room should be reviewed to determine its adequacy.

6	**Fire Extinguisher**

- There is one fire extinguisher beside the door.

Item 6 - Recommendations

- The fire extinguisher shall check and inspected as per Maintenance and inspection schedule.

2.1.4.2 Building Mechanical - Photos

Table 2-3 Photos - Airport Fill Station (No. 1) – Building Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Furnace	b. Combustion Air and Return Air Filter	c. Chimney
		
d. Flue Duct	e. Flue Duct	f. Fire Extinguisher

2.2 Airport Fill Station (No.2)

The Airport Fill Station (No.2) is located within the grounds of the Edmonton International Airport. A comprehensive facility assessment was not conducted by Associated Engineering in 2020 as the system has been brought online within the last 3 years. This initial assessment (2025) evaluates the current condition of major electrical, controls, process mechanical and building mechanical with focus on integrity and conformance with modern standards. The Commission has a dedicated meter room at this facility. The following outlines Associated's observations from the facility.

2.2.1 Electrical

The Airport Fill Station (No. 2) is fed from the pumphouse side with 120V power to the control system.

2.2.1.1 Electrical - Observations and Findings:

Item No.	Description
1.	**Emergency Exit Wall Pack**
	• An emergency exit wall pack is present over the door; it appears to be relatively new.
	Item 1 - Recommendations
	• The wall pack likely has another 10 – 15 years of life.
2	**Alarm System with Keylock**
	• An alarm system with keylock was observed. A swing lever style door switch is wired to the alarm is present. Loose wires hang down into the door frame from the door jamb wiring.
	Item 2 - Recommendations
	• The loose wiring should be secured.
3	**PCL Cabinet with UPS on Control Panel Roof**
	• PLC cabinet has a UPS on the control panel roof. These batteries need replacement every 5 years on average. Could not observe the last replacement date but it is assumed to match all other sites of Dec 2024.
	Item 3 - Recommendations
	• UPS batteries should be good until 2029.
4	**Fire Alarm Detector Beam System**
	• This is wired back to the overall pumphouse fire alarm and not CRSWSC controls. Condition appears new.
	Item 4 - Recommendations
	• None.

2.2.2 Controls

The control system PLC is a Schneider M340 PLC, and the radio is a GE MDS SD4 licensed radios. M340 is a supported PLC platform, and no upgrade currently is recommended. A mast-mounted Yagi antenna is mounted to the building and points to the Hwy 21 repeater station, and PLC communications is via serial MB protocol for system stability.

2.2.2.1 Controls - Observations and Findings:

Item No.	Description
1.	MDS 4710 Series Radio

- The antenna and cables were installed with the construction in 2018 and appear in good condition.
- PLC is connected via serial and ethernet but only serial is used for SCADA. See SCADA summary.

Item 1 - Recommendations

- Radio and antenna is due for upgrade.

2	Antenna Ground

- Antenna ground runs to a dedicated ground bus on the wall. Condition appears acceptable.

Item 2 - Recommendations

3	Radio Power Supply

- Radio power supply is sitting loose on PLC cabinet floor.

Item 3 - Recommendations

- Correct mounting for best air flow should be addressed at next radio upgrade.

4	PLC Cabinet Terminals And Wiring

- PLC cabinet terminals and wiring appear in good condition.
- A small 5 port ethernet switch is present in the cabinet and is in good condition.

Item 4 - Recommendations

- None

5	PITs Upstream and Downstream of the PRV

- PITs upstream and downstream of the PRV are E&H PMC71 units and are in good condition although they lack Block and Bleed valves to ensure no air is trapped

Item 5 - Recommendations

- Consider installing Block and Bleed valves to improve reading accuracy,

6	Flow Control Valve Actuator

- The flow control valve actuator is a Bettis unit with odd power controls for manual override
- This is non-standard to the CRSWSC equipment and is likely to get broken if operated in manual due to complexity.

Item 6 - Recommendations

- Recommend replacement with Rotork IQ series.

Item No.	Description
7	**Level Transmitter**

- The level transmitter is a hydrostatic unit with display on the wall and appears functional and in good condition.

Item 7 - Recommendations

- None

8	**Chlorine Residual Analyser**

- The chlorine residual analyser is a ProMinent unit that appears to be functional and in good condition.

Item 8 - Recommendations

- None

9	**Pressure Gauges**

- The pressure gauges are functional, but the faces are non-CRSWSC standard with smaller 2" faces.

Item 9 - Recommendations

- A 4" dial face is recommended for ease of reading, recommend replacing gauges.

10	**PLC Panel**

- The PLC panel had an HMI installed which has been removed.

Item 10 - Recommendations

- None

2.2.3 Electrical and Controls Photos

Table 2-4 Photos – Airport Fill Station (No. 2) – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
	Exterior Antenna Mast	Fire Beam Detector

Photo/Description	Photo/Description	Photo/Description
		
PIT Upstream of PRV	PIT Downstream of PRV	Cl2 Analyser
		
UPS	PLC Rack	Panel Wiring
		
Control Valve	Flow Meter	PLC Cabinet

Photo/Description	Photo/Description	Photo/Description
		
Level Transmitter	LIT Standpipe	Radio
		
Dedicated Ground Bus	Ethernet Switch	

2.2.4 Process

The Edmonton International Airport #2 Fill Station main process piping is stainless steel and ranges in size of 250 – 300 mm configured for filling of their reservoir. Flow control and isolation are provided through six (6) manually actuated butterfly and one (1) electrically actuated ball valve for automated operation. Additionally, the facility contains an air release valve upstream of the flow meter on the high end. The system incorporates a pressure control reducing control valve (PCV) that maintains a downstream pressure of approximately 77 kPag (11 psig) against an upstream supply pressure of 429 kPag (62 psig). The fill discharge enters the reservoirs, Cell #1 and Cell #2.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, an electronic pressure transducer upstream and downstream of the PCV for pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality and returns to a local floor drain.

2.2.4.1 Process Observations and Findings

Item No.	Description
1.	**Victaulic Couplings – Images: Table 2-4 a, and Table 2-4 b**
	• Several Victaulic couplings exhibit visible surface corrosion within the fill station. • Corrosion appears superficial at present but indicates ongoing condensation or humidity issues.
	Item 1 - Recommendations
	• Investigate and correct HVAC design or operation to maintain stable humidity within the building. • Per Victaulic guidance, couplings showing corrosion are to be removed, internally inspected, and replaced where necessary. Recoat or replace affected couplings as appropriate per manufacturer specifications and requirements.
2	**Air Release Valve Threaded Connection (Bypass Line) – Image: Table 2-4 c**
	• Minor weeping and rust staining were observed at the threaded joint of the local air release valve on the bypass line. • The valve material could not be confirmed in the field; though inferred as carbon steel.
	Item 2 - Recommendations
	• Remove and inspect the valve to confirm material compatibility. Where dissimilar metals are present, install an NSF-61-certified dielectric union. Clean and reseal the threaded connection using NSF-61-approved PTFE tape or sealant.
3	**Pipe Support Knee Braces (CMU Wall Mounts)** **Image: Table 2-4 d, Table 2-4 e, Table 2-4 f, and Table 2-4 g**
	• Support knee braces attached to CMU walls show mixed use of isolating materials. • Some braces include a rubber isolator between pipe and support; others do not.
	Item 3 - Recommendations
	• Confirm brace and fastener materials to ensure galvanic compatibility. • Install isolating rubber sleeves or pads between the brace saddle and pipe at all locations to prevent direct metal-to-metal contact.
4	**Stainless Steel Piping and Flanges (Condensation Corrosion) – Images: Table 2-4 h and Table 2-4 i**
	• Localized surface rusting is evident on horizontal flange faces where condensate accumulates. • No pitting was observed, suggesting superficial oxidation.
	Item 4 - Recommendations
	• Clean affected areas using Citrisurf 77 or equivalent per manufacturer's recommendations. • Pickling and passivation in accordance with ASTM A380 and ASTM A967 for affected areas.
5	**Copper–Stainless Interface (Drain Line Connection) – Images: Table 2-4 j and Table 2-4 k**
	• A copper drain line is directly connected to a stainless steel ball valve. • Galvanic corrosion is evident at the interface.

Item No.	Description
Item 5 - Recommendations	
	• Replace copper section with NSF-61 PVC or galvanically compatible material or install an NSF-61 dielectric union between stainless and copper components. • Replace any corroded copper sections if proceeding with copper piping.
6	**Analyser Supply Line Assembly (Branch Tee, PRV, and Air Release) – Image: Table 2-4 l**
	• The 60 psi fill line branch includes stainless, brass, and copper components with visible corrosion. • A single brass pressure regulator (12–15 psi) serves the analyser system.
Item 6 - Recommendations	
	• Replace corroded brass and copper components with NSF-61-certified stainless materials. • Install dielectric isolation between dissimilar metals. • Add a dual-regulator configuration (primary and secondary in series) for redundancy and pressure safety per best practice as incoming is close to regulator range.
7	**Brass Hose Bib/Globe Valve on Stainless Line – Image: Table 2-4 m**
	• Brass hose bib connected directly to stainless steel presents galvanic corrosion risk.
Item 7 - Recommendations	
	• Replace with stainless valve or install NSF-61-certified dielectric union.
8	**Brass Hose Bib/Globe Valve on Stainless Line – Image: Table 2-4 m**
	• The hose bib connection to the fill manifold constitutes a potential high-hazard cross-connection. • Existing assembly lacks confirmation of NSF/ANSI 61 certification.
Item 8 - Recommendations	
	• Install NSF-61-certified Watts LF7 or equivalent hose bib vacuum breaker/backflow preventer. • Confirm and ensure galvanic compatibility with adjoining piping.
9	**Pressure Control Valve (PCV) – Image: Table 2-4 n**
	• PCV body and bonnet are in good condition.
Item 9 - Recommendations	
	• Conduct internal service of seals and pilots; inspect diaphragm integrity if not recently done.
10	**Valve Material Compatibility (Butterfly, Ball, and PRV Assemblies) – Image: Table 2-4 o**
	• Bray butterfly valves, Bettis ball valve body, and Singer PRV components appear to be carbon steel construction with coating. Due to dissimilar metals with coating damage, galvanic corrosion risk is elevated.

Item No.	Description
	Item10 - Recommendations
	• Install as applicable Mylar insulating sleeves and washers at flanged interfaces to minimize galvanic coupling between stainless and non-stainless components. Continue to monitor.
11	**Pipe Wall Penetrations through CMU – Images: Table 2-4 p and Table 2-4 q**
	• Process piping penetrates CMU walls sealed with cementitious grout. • No puddle flanges or flexible fire-stop materials observed. • Rigid grout limits thermal and hydraulic movement and may impart thrust loads to CMU. Additionally, will cause cracking of grout and/or CMU.
	Item 11 - Recommendations
	• Remove cementitious grout and reseal wall penetrations using flexible fire-stop material compliant with building code. • Assess structural loading on CMU due to internal pressure and flow thrust; retrofit supports if required.
12	**Non-Destructive Testing (NDT)**
	Note: Not included in budgetary planning costs – General Estimate $15,000 • Piping may exhibit internal corrosion or wall loss not visible externally; based on externally observed corrosion.
	Item 12 - Recommendations
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

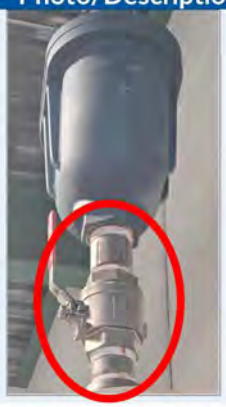
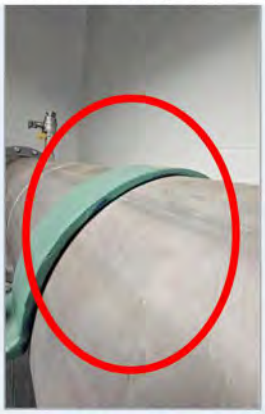
2.2.4.2 Process Mechanical General Summary

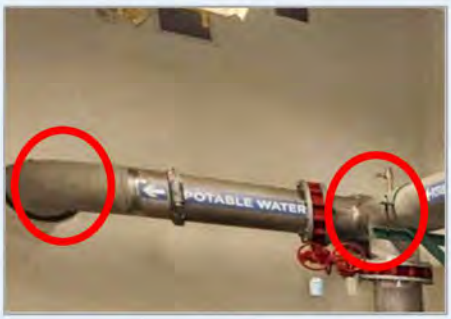
The Airport #2 Fill Station shows early-stage corrosion and galvanic activity due to mixed materials and indoor moisture conditions.

No immediate mechanical failures were observed; however, preventive maintenance or equipment and piping, moisture control, and dielectric isolation are essential to preserve asset longevity and ensure conformance with *NSF/ANSI 61*, *CSA B64*, and *ASME B31* standards.

2.2.5 Process Mechanical Photos

Table 2-5 Photos - Airport Fill Station (No. 2) – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Vic Coupling	b. Vic Coupling	c. Air Release Piping Corrosion
		
d. Rubber Insert on Knee-Brace Belly of Pipe	e. Missing Rubber Insert on Knee-Brace Belly of Pipe	f. Missing Rubber Insert Under Bonnet of Clamp
		
g. Missing Rubber Insert Under Bonnet of Clamp	h. Surface Corrosion of Flange and Pipe	i. Surface Corrosion of Pipe

Photo/Description	Photo/Description	Photo/Description
		
j. SS to Copper Connection	k. Copper Drain Line Corrosion	l. Dissimilar Metals for Analyser Regulator and Air Release
		
m. Brass to SS Connection for Hosebib	n. PCV	o. Valving of Dissimilar Materials
		
p. Piping Penetration Through CMU	q. Close-up of Piping Through Grouted CMU	

2.2.6 Building Mechanical

The mechanical system in the space consists of one supply duct with grill and return louver, and unit heater.

2.2.6.1 Building Mechanical Observations and Findings

Item No.	Description
1.	**Fill Station**

- The Fill Station uses one portion of the reservoir building.
- The Fill Station receive supply air through a branch and air returns to the air handling unit is in another portion of the building through wall mounted louver.
- That air handling unit is in another portion of the building was not accessible.

Item 1 - Recommendations

None

2	**Natural Gas Fired Unit Heater**

- The natural gas fired unit heater provides heating to the space.
- The unit heater is a separation combination type. The unit heater draws combustion air from outside and exhaust flue to outside.
- The unit heater is in a fair condition.

Item 2 - Recommendations

- Recommend normal maintenance.

3	**Combustion Air Intake Duct to the Unit Heater**

- There are some water marks and rusty spots on the combustion air intake duct to the unit heater.

Item 3 - Recommendations

- This duct shall be inspected and replaced as necessary in next few years.

4	**Supply Duct and Grill, Return Air Louver, Unit Heater**

- The supply duct and grill, return air louver, unit heater are in a fair condition.

Item 4 - Recommendations

- Recommend normal maintenance.

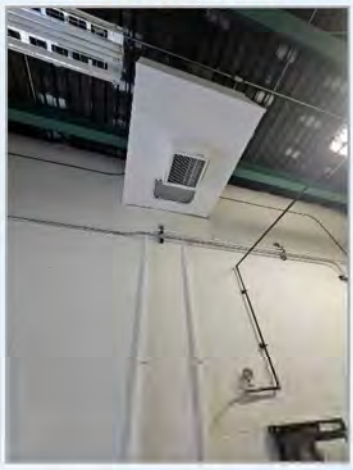
5	**HVAC System**

- Assess HVAC system for dehumidification effectiveness.
- That air handling unit is in another portion of the building was not accessible.

Item 5 - Recommendations

- None

Table 2-6 Photos - Airport Fill Station (No.2)- Building Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Supply Air Duct and Grill	b. Return Air Louver	c. Unit Heater

2.3 Town of Calmar Fill Station

The Calmar Fill Station is located at approximately 50 Avenue and 51 Street within the Town of Calmar. The Calmar Fill Line was constructed in 1981. A comprehensive facility assessment was previously completed by Associated Engineering in 2020. This follow-up assessment, conducted five years later, evaluates the current condition of major electrical, controls, process mechanical and building mechanical with focus on integrity and conformance with modern standards. The following outlines Associated's observations from the facility.

2.3.1 Electrical

The Calmar Fill Station has a single-phase 240V 60A service MCC feeding into a 225A 240V 42 circuit distribution panel.

The utility meter was not observed, and it is believed that the power is fed from the pumphouse next door. A 2022 inspection sticker was observed on the 60A breaker cabinet.

2.3.1.1 Electrical Observations and Findings

Item No.	Description
1.	Main Breaker
	• The main breaker looks to be relatively new as does the distribution panel.
Item 1 - Recommendations	
	• The main breaker should be good for another 15-20 years.
2	Smoke Detector on the Ceiling
	• There is a smoke detector on the ceiling, and it appears relatively new.

Item No.	Description
Item 2 - Recommendations	
	• This should be replaced in the next 5 years with a suitable unit to provide an alarm contact. • The install date or a replace by date should be written on the outside of the unit.
3	**Lighting**
	• Lighting appears to be original fluorescent fixtures.
Item 3 - Recommendations	
	• Since the lights are off 99% of the time there is little benefit to upgrading these to LED currently. • When the existing fixtures fail, Associated recommends upgrading to LED units.
4	**Alarm System with Keypad**
	• The DSC system appears to be offline, and instead the alarm is via the PLC, a keyed switch is used. The system is functional.
Item 4 - Recommendations	
	• Remove DSC alarm panel if not used.
5	**Active Cathodic Protection**
	• Active cathodic protection is installed. • This appears to be functional but is outside of Associated's expertise to determine the condition.
Item 5 - Recommendations	
	• Continue with periodic inspections by Cathodic provider.
6	**PLC Cabinet UPS**
	• The PLC cabinet UPS is a single unit replaced in December of 2024.
Item 6 - Recommendations	
	• UPS batteries should be replaced every five years on average.
7	**Telephone Entrance Panel**
	• An original design telephone entrance panel is present.
Item 7 - Recommendations	
	• This panel is not in use; it can be demolished if space is required.

2.3.2 Controls

The control system PLC is a Schneider M340 PLC, and the radio is a GE MDS SD4 licensed radios. M340 is a current PLC platform, and no upgrade currently is recommended.

A tower mounted Yagi antenna is mounted several meters away from the building (cable routed via 4" conduit) and points to the HWY 21 repeater station located at the HWY 21 Booster Station. PLC communication is via serial MB protocol for system stability.

2.3.2.1 Controls Observations and Findings

Item No.	Description
1.	**Old Power Supply**

- The old power supply is still in use for the radio; this appears to be at least 15 years old.

Item 1 - Recommendations

- Recommend upgrading the power supply to a new unit before the old one fails.

2	**Sixnet 5 Port Managed Ethernet Switch**

- Cabinet has a Sixnet 5 port managed ethernet switch for future communications and PLC access.
- Switch appears functional and in good condition.

Item 2 - Recommendations

- Replace at next PLC upgrade.

3	**Terminals and Wiring**

- Terminals and wiring appear in good condition.

Item 3 - Recommendations

- None

4	**Instrumentation**

- Instrumentation is newer E&H units, and in good condition.

Item 4 - Recommendations

- None

5	**Incoming PIT**

- The incoming PIT is angled downwards; this can result is an air trap that cannot be expelled by the block and bleed.

Item 5 - Recommendations

- Recommend re-orient the PIT vertically and perform a line purge of air via the Block and bleed.
- Otherwise, the instrument is functional and in good condition, life span for another 10-15 years.

Item No.	Description
6	**Chlorine Residual Analyser**

- The chlorine residual analyser is a ProMinent unit with a CTE sensor (Total Chlorine).
- The analyser is in good condition and operational; life expectancy is another 5 -10 years.
- The incoming water feed is routed correctly, always rising to the analyser.
- The drain line runs directly into a drainpipe that empties into the reservoir.

Item 6 - Recommendations

- An air gap is recommended to prevent drain contaminants from crawling up the hose into the analyser chamber.
- Recommend to either add a funnel at the top of the drainpipe stack and position the hose to drop the drain water into the funnel with an air gap or ensure that where the drain hose returns to reservoir it is air gapped.

7	**Level Transmitter**

- The level transmitter is a Milltronics MiniRanger Plus unit and appears to be in good condition.
- The element penetrates the floor just in front of the transmitter.
- The floor penetration is well covered.

Item 7 - Recommendations

- MiniRangers are obsolete and this sensor should be replaced in the next five years to reduce the chance of failure.

8	**Pressure Gauge**

- The pressure gauge between the PRV and flow valve has a block and bleed valve and is operational and in reasonable condition, but it is a small 2" face.

Item 8 - Recommendations

- A 4-inch face is recommended for easier reading such as an Ashcroft 1279 series.

2.3.2.2 Electrical and Controls Photos

Table 2-7 Photos – Calmar Fill Station - Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
	MCB	Antenna and Tower
		
Oversized Distribution Panel	PLC Panel Wiring	UPS
		
Radios and Power Supply	PLC Rack	

Photo/Description	Photo/Description	Photo/Description
		
Inlet PIT	Flow Meter	Repaired Polyphasor



Control Valve and Analyser Return

2.3.3 Process Mechanical

The Calmar Fill Stations consist of a mixture of painted and epoxy-coated carbon steel process piping (original) and recently installed stainless steel ranging in size from 150 mm to 200 mm, configured for controlled filling.

Flow control and isolation are provided through six (6) recently installed manually actuated butterfly valves and one (1) modern electrically actuated ball valve for automated operation. The system incorporates a pressure control reducing control valve (PCV) that maintains a downstream pressure of approximately 110 kPag (16 psig) against an upstream supply pressure of 357 kPag (52 psig). The fill discharge enters the reservoir through the fill station floor. Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, an electronic pressure transducer for upstream pressure measurement, in-floor reservoir level sensor, and a reagent-less chlorine analyser that continuously monitors water quality and returns its sample discharge to the reservoir.

2.3.3.1 Process Mechanical Observations and Findings:

Item No.	Description
1.	**Pipe Support System – Images: Table 2-8 a. and Table 2-8 b**

- Additional pipe supports have been installed since 2020, consisting of likely aluminum Unistrut-type supports in direct contact with carbon steel piping. Aluminum and carbon steel are galvanically incompatible, and no isolation gaskets were observed between the members/clamps and the pipe.

Item 1 - Recommendations

- Recommend installing rubber shims between the pipe and support surfaces (belly and clamp interfaces).
- Existing clamps are not suitable for proper pipe restraint—replace with cushion-type clamps such as EATON Vibra-Clamp BVT or equivalent.
- A missing upper clamp component was observed on one support (Image Table 2-8a)—replace with complete, compatible assembly.

2	**Galvanic Incompatibility Between Piping Metals – Images: Table 2-8 c and Table 2-8 d**

- A mix of stainless steel and carbon steel piping remains throughout the facility. A section of stainless steel appears to have been painted post-2020. Dissimilar metals promote galvanic corrosion of piping.

Item 2 - Recommendations

- Install mylar sleeves and insulating washers at all interfaces where stainless steel contacts carbon steel (piping, valves, etc.) or replace with galvanic compatible material.

3	**Pressure Reducing Valve – Image: Table 2-8 e**

- The Singer PRV appears to be of an older vintage than the surrounding recently replaced butterfly valves. The valve body exhibits moderate weeping and corrosion at bonnet threads—indicative of diaphragm and seal wear, and exposure to humid environment. Pilot tubing has been replaced with braided stainless hose, suggesting a partial rebuild.

Item 3 - Recommendations

- Given age, condition, and corrosion state, replace the complete PRV assembly with a new anti-cavitation model conforming to NSF/ANSI 61.

4	**Galvanic Protection of Valve**

- Bray butterfly valves appear to have epoxy-coated steel bodies. While coatings reduce galvanic potential, chips or coating damage will expose the substrate to corrosion.

Item 4 - Recommendations

- Inspect coating condition and touch up damaged areas per manufacturer specifications.
- Where stainless flanges or bolting contact coated steel, install mylar sleeves and insulating washers (as applicable) to mitigate galvanic attack.

Item No.	Description
5	**Fill Line Penetration and Pipe Integrity – Images: Table 2-8 f and Table 2-8 g**

- A full penetration hole was identified on the incoming carbon steel fill line, likely due to internal coating failure and galvanic degradation. The line is part of a welded assembly embedded through the floor slab into the isolation chamber.

Item 5 - Recommendations

- Given the 44-year age and evidence of through-wall failure, integrity of pipe is questionable for existing original. Recommend replacing the entire fill piping assembly from the stainless steel connection inside the building to the external isolation manhole with stainless steel piping.
- New piping is to be cathodically protected and designed to ASME B31.3 with full isolation from dissimilar materials.

6	**Backflow Protection (CSA B64 Compliance) – Images: Table 2-8 h and Table 2-8 i**

- Multiple branch connections with hose bibs and wash-down lines lack backflow prevention and anti-siphon protection.

Item 6 - Recommendations

- Install NSF/ANSI 61-certified backflow preventers such as Watts LF7 or equivalent at each hose bib.
- Remove or retrofit permanent camlock or threaded hose assemblies lacking protection to meet CSA B64 potable water backflow requirements.

7	**Victaulic Couplings – Image: Table 2-8 j**

- Observed use of epoxy-coated carbon steel Victaulic couplings on stainless steel piping in high humidity environment. Moderate corrosion is evident and active.

Item 7 - Recommendations

- Replace incompatible couplings with stainless steel (e.g., Victaulic Style 77SS or similar) to ensure galvanic compatibility.

8	**Analyser Pressure Regulator – Image: Table 2-8 k**

- A branch line from the main fill line supplies flow to a chlorine analyser through a brass pressure

Item 8 - Recommendations

- Install an NSF/ANSI 61 dielectric union between the stainless line and the brass regulator to mitigate galvanic corrosion.

9	**Surface Rust on Stainless Steel Welds – Images: Table 2-8 l and Table 2-8 m**

- Rust is visible at several stainless steel weld joints. Evidence suggests previous mechanical cleaning (grinding/buffing); however, is not effective as it removes protective oxide layers and accelerates active corrosion.

Item 9 - Recommendations

- Perform localized pickling and passivation of all affected welds in accordance with ASTM A380 and ASTM A967 standards to restore the passive chromium oxide layer.

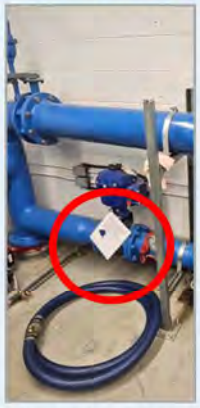
Item No.	Description
10	**Stress on Oriented Electric Actuator – Image: Table 2-8 n**
	• A horizontally mounted actuator on a vertically oriented butterfly valve is imparting torsional stress on the valve shaft. This was identified in the previous 2020 assessment report.
	Item 10 - Recommendations
	• Engineer and install a dedicated actuator support bracket to relieve mechanical stress on value shaft.
11	**Missing Air Release Upstream, and Incompatible Valve on Downstream Air Release Images: Table 2-6 o, and Table 2-6 p**
	• No upstream air release valve is provided ahead of the flow meter. Entrained air upstream can lead to inaccurate flow readings. • Air release isolation valve that is downstream of the flow meter has in compatible valve (brass). Galvanic corrosion activation.
	Item 11 - Recommendations
	• Install a stainless steel air release valve with isolation valve on the high point upstream of the flow meter in the new fill piping arrangement. • Existing downstream air release valve includes a brass isolation valve; replace with compatible or isolate via dielectric union to prevent galvanic reaction.
12	**Non-Destructive Testing (NDT)**
	Note: Not included in budgetary planning costs – General Estimate $15,000 • Based on active external corrosion and pitting, legacy piping may exhibit internal corrosion or wall loss not visible externally.
	Item 12 - Recommendations
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

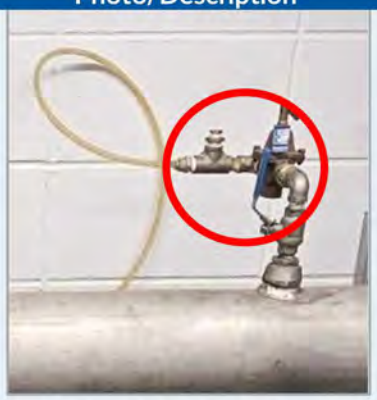
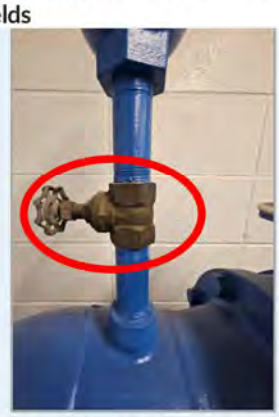
2.3.3.2 Process Mechanical General Summary

Overall, the Calmar Fill Station remains functional but exhibits multiple galvanic corrosion and critical aging component concerns. Systematic implementation of electrical isolation, material compatibility upgrades, and full stainless replacement of the fill piping is recommended to restore compliance/integrity and extend service life.

2.3.4 Process Photos

Table 2-8 Photos - Calmar Fill Station – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Incorrect Pipe Clamps, Missing Pipe Clamps, and Missing Rubber Isolation	b. Proper Pipe Clamps with Rubber Isolation	c. Dissimilar Piping Materials
		
d. Dissimilar Piping Materials	e. PCV with Active Corrosion on Bonnet	f. Through-wall Failure
		
g. Incoming Fill Piping Through-Wall Failure	h. Branching Connection Lacking Backflow and Anti-Siphon Protection	i. Branching Connection Lacking Backflow and Anti-Siphon Protection

Photo/Description	Photo/Description	Photo/Description
		
j. Corrosion of Victaulic Coupling (Dissimilar Metals)	k. Dissimilar Metals for Analyser Regulator	l. Active Corrosion on Stainless Steel Welds
		
m. Active Corrosion on Stainless Steel Welds	n. Active Corrosion on Stainless Steel Welds	o. Missing Air Release Valve
		
p. Brass Isolation Valve on Air Release		

2.3.5 Building Mechanical

The building mechanical system consists of a natural gas fires unit heater, an exhaust fan and accessories.

2.3.5.1 Building Mechanical Observations and Findings

Item No.	Description
1.	**Ceiling Mounted Unit Heater**

- The ceiling mounted unit heater is in a fair condition.
- There is an air intake with cold air trap, which provides combustion from the exterior.

Item 1 - Recommendations

- The ceiling mounted unit heater should be cleaned and inspected yearly.

2	**Ceiling Mounted Exhaust**

- A ceiling mounted exhaust is used to improve air movement within the room.

Item 2 - Recommendations

- Recommend that the ventilation within the building be reviewed, to ensure that the ventilation requirements are met.
- The exhaust fan air intake grill should be cleaned and inspected yearly.

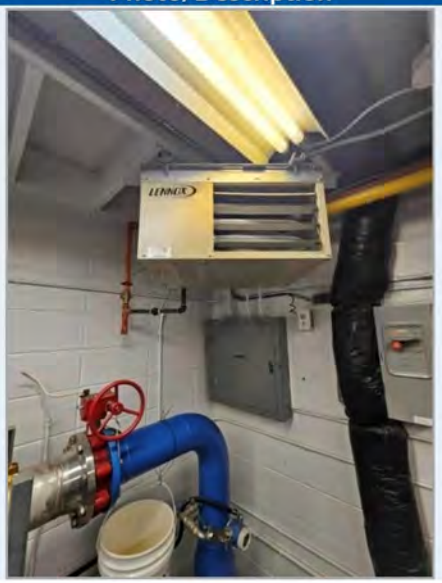
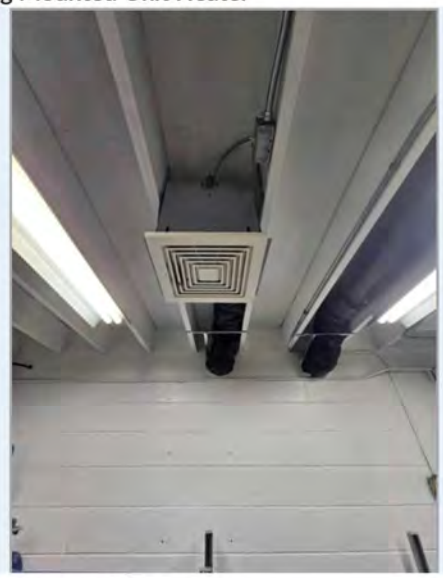
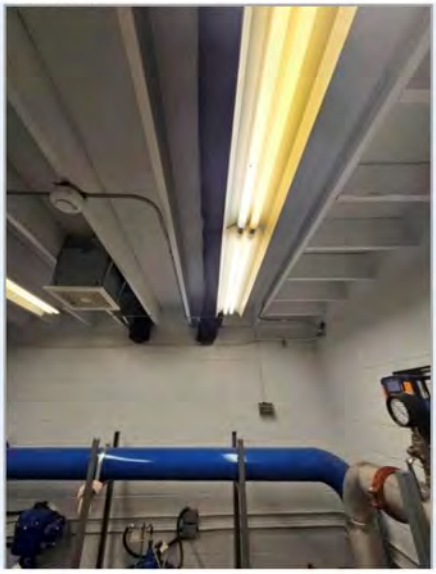
3	**Gas Branch to the Unit Heater**

- Gas branch to the unit heater is not painted.

Item 3 - Recommendations

- Recommend painting to meet code.

Table 2-9 Photos - Calmar Fill Station - Building Mechanical

Photo/Description	Photo/Description
	
a. Ceiling Mounted Unit Heater	b. Combustion Air
	
c. Ceiling Mounted Fan	d. Flexible Duct

2.4 CRSWSC Nisku Booster Station

The Nisku Booster Station was constructed in 2025 and has been in operation for less than one year. The facility consists of new building mechanical, process mechanical, electrical, and control systems designed to meet current CRSWSC operational and regulatory standards. Associated is conducting its initial assessment of the facility.

2.4.1 Electrical

Since this station has just been constructed a condition assessment is not required. However, some construction deficiencies have been noted and are listed as follows.

Item No.	Description
1.	**UPS**

- No UPS has been installed on the camera system.
- The Operator complains that when an outage or a generator test occurs the camera system crashes.

Item 1 - Recommendations

- Suggested fix is to extend the outlet used by the camera system to the PLC cabinet and connect into the UPS in the cabinet.
- The PLC cabinet UPS is multi-battery (3) and will have enough capacity to handle this load as well as the PLC.
- UPS batteries will require replacement in 5 years.

2	**PLC Cabinet**

- PLC cabinet light is new but is unsecured and hanging by wires.

Item 2 - Recommendations

- Secure light.

3	**HMI Computers**

- HMI computers are not connected to a UPS.
- A UPS was required per the construction contract, deficiency.

Item 3 - Recommendations

- Contract to supply missing UPS.

2.4.2 Controls

Item No.	Description
1.	**Master PLC, Radio, and HMI**

- The Master PLC is a Schneider M340 PLC.
- The Master PLC communicates via licensed serial radio using MB Serial to the SCADA.

Item 1 - Recommendations

- None

2	**Radio**

- The radio is a GE MDS SD4 licensed radio.
- The radio points to the HWY 21 Booster Station via a Yagi antenna that is on a monopole outside the station.

Item 2 - Recommendations

- Upgrade radio.

3	**HMI**

- The Master HMI is VTSCADA.

Item 3 - Recommendations

- None

2.4.2.1 Electrical and Controls Photos

Table 2-10 Photos - CRSWSC Nisku Booster Station – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
Camera/DVR Rack – No UPS	Booster PLC	MDS SD4 Radio

Photo/Description	Photo/Description	Photo/Description
		
Alarm Dialer	Hanging Light	Radio

2.4.3 Process Mechanical

The facility is equipped with a process pumping system designed to operate with up to three centrifugal pumps, providing flexible flow capacity, redundancy, and operational reliability. The system includes multiple manually operated butterfly valves to enable selective isolation or actuated flow control without interrupting service. Flow passes through an inline strainer that provides progressive mechanical filtration to protect downstream components from debris and particulate matter. Pressure regulation is achieved through two pressure reducing control valves of differing sizes, allowing the system to manage varying flow and pressure conditions while maintaining stable downstream performance. The facility also incorporates a reagent-less chlorine analyser, which enables continuous monitoring of disinfectant residuals without the need for chemical reagents. Additionally, submersible pumps located within the facility sump provide automated drainage and protection against localized flooding or equipment submersion, supporting the reliable and safe operation of the overall system.

2.4.3.1 Process Observations and Findings

Item No.	Description
1.	**Pressure Control Valve (CLA-VAL PCV) – Images: Table 2-11 a, and Table 2-11 b**

- The primary CLA-VAL pressure control valve and associated pilot assembly are mounted above typical operator reach. While the installation meets mechanical and hydraulic layout requirements, serviceability is challenging due to elevation (per operator discussion).

Item 1 - Recommendations

- Evaluate the installation for operator access safety. Consider the following solutions:
  - Install a permanent, engineered access platform designed to meet CSA S157 and OHS Part 8 – Entrances, Walkways, Stairways and Ladders requirements; or
  - Provide a mobile, commercial-grade engineered platform or ladder system that ensures stable, safe access for maintenance of the PCV and pilot components.

2	**Non-Destructive Testing (NDT) – Image: Table 2-11 c**

Note: Not included in budgetary planning costs – General Estimate $15,000

- Facility piping does not appear to have external corrosion or defects; however, internal is not known.

Item No.	Description
Item 2 - Recommendations	
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning

2.4.3.2 Process Mechanical General Summary

Overall, the booster station remains in new condition for all components. General accessibility and baseline integrity data would enhance the stations operation.

2.4.3.3 Process Mechanical Photos

Table 2-11 Photos - CRSWSC Nisku Booster Station – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. PCV at Elevated Height	b. Close-up of PCV	c. Process Piping and Pumps

2.4.4 Building Mechanical

The building mechanical systems consists of a heating and ventilation system in the pump room, heating, ventilation and cooling system in the electrical room, heating, ventilation and cooling system in the office area, plumbing and fire protection system. All components are in a good condition.

2.4.4.1 Building Mechanical Observations and Findings

Item No.	Description
1.	**Pump Room**

- There is a supply fan with dampers and ductwork to provided cooling through outside air to the pump room.
- Two natural gas fire unit heaters provided heating to the Pump Room.
- Three ceiling fans are used to circulate air throughout the space and maintain thermal-destratification.

Item 1 - Recommendations

- Recommend normal maintenance.

2	**Office Area**

- A natural gas fire furnace, with a fresh air energy recovery unit and roof mounted mechanical refrigeration condensing unit, provides heating, ventilation, and cooling to the office area.

Item 2 - Recommendations

- Recommend normal maintenance.

3	**Plumbing System**

- The plumbing system includes domestic cold, hot piping, a gas fired water heater in the office area, hose bibs in the process area, sanitary drainage, sump pump and discharge piping.

Item 3 - Recommendations

- Recommend normal maintenance.

4	**Fire Protection**

- The fire protection system includes fire extinguishers in the building.

Item 4 - Recommendations

- Fire extinguishers shall check and inspected as per Maintenance and inspection schedule.

5	**Filters**

- The filters in the pump room supply fan, electrical room air handling unit, office area furnace.

Item 5 - Recommendations

- The filters in the pump room supply fan, electrical room air handling unit, office area furnace shall be replaced according to equipment maintenance schedules.
- Ceiling mounted unit heater and exhaust fan air intake grill should be cleaned and inspected yearly.

2.4.4.2 Building Mechanical Photos

Table 2-12 Photos – CRSWSC Nisku Booster Station – Building Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Supply Fan in Pump Room	b. Unit Heater in Pump Room	c. Ceiling Fan in Pump Room
		
d. AHU for Electrical Room	e. Diffusers in Electrical Room	f. Sump Pump Control Panel
		
g. Furnace for Office Area	h. Condensing Unit for Office Area	i. Energy Recovery Unit for Office Are

Photo/Description	Photo/Description	Photo/Description
		
j. Domestic Water Heater	k. Hose Reel	l. Fire Extinguisher

2.5 Nisku West Fill Station

The Nisku West Fill Station is located along Sparrow Drive Service Road, within the Nisku Industrial Park. The Nisku West Fill Station is an older facility that has been in service for an extended period and functions as a key reservoir fill point within the CRSWSC transmission network. The facility includes a primary pressure reducing valve (PRV) and pressure control valve (PCV) configuration, bypass flow control valve, magnetic flow meter, and associated isolation valves and piping. A visual condition assessment was completed to evaluate mechanical integrity, corrosion, and conformance with current standards, pervious inspection was conducted in 2020. The following outlines Associated's observations from the facility.

2.5.1 Electrical

The Nisku West Fill Station has a single-phase 240V service into a newer incoming service and distribution panel main circuit breaker (MCB) with 22 circuit spaces. The service panel should have 15-20 years of service life. The utility meter was observed outside the door on the wall. The rest of the observations are as follows:

2.5.1.1 Electrical Observations and Findings

Item No.	Description
1.	**Room Venting**
	• The venting of this room needs to be examined as the rust observed is indicative that excess moisture is present.
	Item 1 - Recommendations
	• Refer to Building Mechanical.
2	**Smoke Detector**
	• There is a smoke detector on the ceiling, and it appears relatively new.
	Item 2 - Recommendations
	• This should be replaced in 5 years with the install or a replace by date on the unit.

Item No.	Description
3	**Lighting**

- Lighting appears to be original fluorescent fixtures, and since the lights are off 99% of the time there is little benefit to upgrading these to LED.
- Water damage to several of the lights can be observed and the source of the water needs to be determined, and the damaged fixtures replaced with new LED units.
- An emergency exit sign and light wallpack is present and appears to be new.

Item 3 - Recommendations

- Recommend replacement of the fixtures.
- Emergency wallpack battery condition (ability to illuminate for at least 30 min) should be checked annually.

4	**Alarm System**

- An alarm system with keyed switch was observed on the PLC panel above the chlorine analyser. The system is functional.

Item 4 - Recommendations

- None

5	**Active Cathodic Protection**

- Active cathodic protection is installed.
- This appears to be functional but is outside of Associated's expertise to determine the condition.

Item 5 - Recommendations

- Continue to have cathodic vendor periodically check system.

6	**PLC Cabinet**

- PLC cabinet UPS is a single unit

Item 6 - Recommendations

- UPS batteries should be replaced every 5 years on average. Last replaced is December 2024.

7	**Original Design Telephone**

- An original design telephone entrance panel is present.

Item 7 - Recommendations

- This panel is not in use. (possible to remove?)

2.5.2 Controls

2.5.2.1 Controls Observations and Findings

The control system PLC is a Schneider M340 PLC, and the radio is a GE MDS SD4 licensed radio. M340 is a current PLC platform and no upgrade at this time is recommended. A Yagi antenna is mounted on a mast to the building and points to the HWY 21 repeater station located at the HWY 21 Booster Station. PLC communications is via serial MB protocol for system stability.

Item No.	Description
1.	**MDS 4710 Series Radio**

- The old MDS 4710 series radio has been left in the PLC cabinet post SCADA upgrade.
- The radio power supply appears to be original to the SCADA.

Item 1 - Recommendations

- The MDS 4710 Series Radio can be removed and recycled.
- The radio power supply should be updated to new before it fails.

2	**Sixnet 5 Port Managed Ethernet Switch**

- The cabinet has a Sixnet 5 port managed ethernet switch for future communications and PLC access, switch is functional and appears in good condition.

Item 2 - Recommendations

- Upgrade to newer when PLC is upgraded.

3	**Terminals and Wiring**

- Terminals and wiring appear in good condition.

Item 3 - Recommendations

- None

4	**Online Instrumentation**

- Online instrumentation is newer E&H units and in good condition.

Item 4 - Recommendations

- None

5	**Chlorine Residual Analyser**

- The chlorine residual analyser is a ProMinent unit with a CTE sensor (Total Chlorine), it is functional and in good visual condition.

Item 5 - Recommendations

- The incoming water feed does have an air trap, and this should be corrected so the line rises or stays level at all times towards the analyser.

Item No.	Description
	• Correction is achieved by adjusting the hose route such that the line always rises from source to analyser, not rise then drop down.
5	**Analyser Drain Line**
	• The analyser drain line runs directly into a drain pipe that empties into the reservoir.
	Item 5 - Recommendations
	• An air gap is recommended to prevent drain contaminants from crawling up the hose into the analyser chamber. • Recommend either adding a funnel at the top of the drain pipe stack and position the hose to drop the drain water into the funnel with an air gap or ensure that where the drain hose returns to reservoir it is air gapped.
6	**Level Transmitter**
	• The level transmitter is a Milltronics MiniRanger Plus unit and appears to be operational; however, it is obsolete.
	Item 6 - Recommendations
	• Recommend replacement with modification of the floor penetration and flange.

2.5.2.2 Electrical and Controls Photos

Table 2-13 Photos – Nisku West Fill Station – Electrical and Controls Photos

Photo/Description	Photo/Description	Photo/Description
		
Building Exterior	**Service Panel + Exit Light**	**UPS**

Photo/Description	Photo/Description	Photo/Description
		
Radios	Old Radio - Remove	Valve and PRV Assembly
		
Control Valve	Flow Meter	Level Sensor - Obsolete
		
Chlorine Analyser	Level Element – Replace Lid	Stained Lighting

2.5.3 Process Mechanical

The Nisku West Fill Station consists of painted and epoxy-coated carbon steel process piping ranging in size from 100 mm to 300 mm, configured for controlled reservoir filling. Flow control and isolation are provided through four (4) manually actuated butterfly valves of original vintage and one (1) modern electrically actuated ball valve for automated operation. The system incorporates a pressure control reducing valve (PCV) that maintains a downstream pressure of approximately 150 kPag (21 psig) against an upstream supply pressure of 400 kPag (58 psig). The fill discharge enters the reservoir via an air-gap configuration by discharged through the facilities floor.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, an electronic pressure transducer for upstream pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality and returns its sample discharge to the reservoir.

2.5.3.1 Process Observations and Findings

Item No.	Description
1.	**Pressure Reducing/Pressure Control Valves (PRV/PCV) – Image: Table 2-14 a**
	• The PRV pilot piping has been upgraded to stainless steel braided hoses. • The PRV/PCV body and bonnet show no visible external corrosion; however, pilot assemblies exhibit rusting and general age. • There is no record indicating an internal body inspection or diaphragm replacement.
	Item 1 - Recommendations
	• Conduct internal inspection of the PRV/PCV body. If found satisfactory, replace diaphragm and rebuild pilots. • Plan for full valve replacement within the next 5 years with a new anti-cavitation PRV/PCV assembly if inspection.
2	**Pipe Supports – Image: Table 2-14 b**
	• Rusting and surface degradation observed at relocated stanchion supports, particularly at base plates and anchors.
	Item 2 - Recommendations
	• Replace or refurbish corroded base plates and anchor points. Mechanically clean and recoat with an approved protective epoxy system. Ensure and maintain galvanic compatibility with materials.
3	**Flow Control Valve and Flow Meter Assembly – Images: Table 2-14 c, and Table 2-14 d**
	• The flow control valve and flow meter utilize stainless steel bodies bolted to coated carbon steel piping. This configuration presents a risk of galvanic corrosion between dissimilar metals.
	Item 3 - Recommendations
	• Install non-conductive isolation kits (Mylar sleeves and washers) at flanged joints to mitigate galvanic coupling.
4	**Butterfly Valves – Image: Table 2-14 e**
	• Valves exhibit no visible external rusting; however, there is no documentation confirming regular exercise testing or seal verification. The valves appear original to the facility and are nearing the end of their expected service life. There is evidence of paint touch-ups on the valve external bodies.
	Item 4 - Recommendations
	• Replace existing butterfly valves with modern NSF/ANSI 61-certified units and implement a valve exercising and testing program if not done so already.

Item No.	Description
5	Air Release and Meter Accuracy – Image: Table 2-14 f

- This has been identified in 2020 assessment as well.
- No air release valve is installed upstream of the flow meter. Entrained air may adversely affect meter accuracy and hydraulic performance.

Item 5 - Recommendations

- Install an automatic air release valve on the high side of the bypass line upstream of the flow meter to improve accuracy and reduce measurement error.

6	Flanged Connection Integrity – Image: Table 2-14 g

- An incomplete gasket seal and localized rusting observed at the incoming fill flanged connection.

Item 6 - Recommendations

- Replace gasket and bolting, clean flanged surfaces, and reassemble with corrosion-resistant hardware. Apply a suitable and manufacturer specified protective coating to exposed metal surfaces.

7	External Floor Puddle Flange – Image: Table 2-14 h

- Surface corrosion and rusting observed on external bolted floor flange and adjacent piping.

Item 7 - Recommendations

- Mechanically remove corrosion, recoat using a compatible protective system, and address superficial rusting on surrounding pipe surfaces.

8	Hose Bib and Cross-Connection Protection – Image: Table 2-14 i

- A hose bib connection is present on the incoming fill line without visible backflow protection.

Item 8 - Recommendations

- Install CSA B64-compliant anti-siphon backflow prevention devices on all hose bibs to protect against potential contamination of the potable water system.
- Ensure galvanic compatibility as well.

9	Non-Destructive Testing (NDT)

Note: Not included in budgetary planning costs – General Estimate $15,000

- With active corrosion and galvanic dissimilarities in the system, legacy piping may exhibit internal corrosion or wall loss not visible externally.

Item 9 - Recommendations

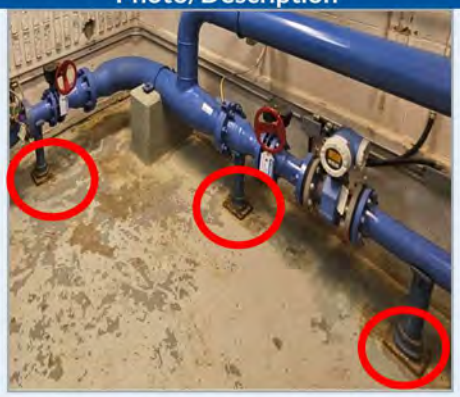
- It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

2.5.3.2 Process Mechanical Overall Summary

The Nisku West Fill Station remains operational as a reservoir fill facility but exhibits clear signs of age-related wear and environmental exposure. Primary process components—including the PRV/PCV assembly and flow control system—are functional but require internal inspection, diaphragm replacement, and corrosion mitigation (or replacement fully). Several ancillary elements, including stanchion supports, gasketed joints, and the external floor flange, show progressive deterioration. With targeted rehabilitation—specifically valve modernization, corrosion protection, and installation of proper cross-connection safeguards—the facility can continue to provide reliable service while meeting current mechanical and regulatory standards.

2.5.3.3 Process Mechanical Photos

Table 2-14 Photos - Nisku West Fill Station – Process Mechanical Photos

Photo/Description	Photo/Description	Photo/Description
		
a. PCV	b. Corrosion on Stanchion Bases	c. Flow Meter
		
d. Electrically Actuated Ball Valve	e. Original Manual Actuated Butterfly Valves	f. Missing Air Release

Photo/Description	Photo/Description	Photo/Description
		
g. Active Flange and Hardware Corrosion	h. Active Pipe and Puddle Floor Flange Corrosion	i. Unprotected Hose Bib Connection

2.5.4 Building Mechanical

2.5.4.1 Building Mechanical - Observations and Findings:

The building Mechanical system consists of one unit heater.

Item No.	Description
1.	Natural Gas Fired Unit Heater

- A ceiling mounted natural gas fires unit heater provides heating to the room. Based on observation the unit appears in a fair condition.
- There is an air intake with cold air trap, which provides combustion from the exterior.

Item 1 - Recommendations

- Recommend normal maintenance.

2	Gas Meter

- The gas meter is located within the meter room.

Item 2 - Recommendations

- When the meter is upgraded by the utility company, the gas meter should be relocated to the outside of the building.

3	Wall Penetration

- Wall penetration near the PRV should be filled.

Item 3 - Recommendations

- Recommend fill the gap.

Item No.	Description
4	Partial Dividing Wall

- There is a partial dividing wall between the Commission's meter room and the County's pump room.

Item 4 - Recommendations

- Due to the shared space the heating and ventilation requirements for the space should be reviewed with the County.

2.5.4.2 Building Mechanical Photos

Table 2-15 Photos – Nisku West Fill Station – Building Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Ceiling Mounted Unit Heater	b. Gas Meter	c. Combustion Air Intake

2.6 Nisku East Fill Station

The Nisku East Fill Station is located east of 9 Street, and approximately 800 m south of 30 Avenue within the Nisku Industrial Park. The Leduc Nisku East Fill Station is less than 10 years old. A comprehensive facility assessment was previously conducted by Associated Engineering in 2020. This follow-up inspection, completed five years later, evaluates the current condition of major building mechanical, process mechanical, electrical, and controls components with focus on corrosion, functional integrity and operation. The following outlines Associated's observations from the facility.

2.6.1 Electrical

The Nisku East Fill Station does not have a power panel for the room. All loads are fed from the reservoir side of the building. This can be an issue for simple isolation or reset of circuits as it requires the County to respond and allow reservoir access. Very little wall space exists to allow for the installation of a small power panel, recommend leave as-is. The rest of the observations are as follows:

2.6.1.1 Electrical Observations and Findings

Item No.	Description
1.	Lighting

- Lighting appears to be chain suspended fluorescent fixtures, operational and in good condition.

Item 1 - Recommendations

- Since the lights are off 99% of the time, there is little benefit to upgrading these to LED.
- Recommend that these units be upgraded to LED when the existing units fail.

2	Alarm System

- An alarm system with keyed switch was observed on the PLC panel below the HMI display.
- The system is functional.

Item 2 - Recommendations

- None

3	PLC Cabinet

- PLC cabinet UPS is a single unit.

Item 3 - Recommendations

- UPS batteries should be replaced every 5 years on average. Last replacement is unknown (no label).

2.6.2 Controls

2.6.2.1 Controls Observations and Findings

Item No.	Description
1.	Control System PLC

- The Control System PLC is a Schneider M340 PLC.
- The PLC communications is via serial MB protocol for system stability.

Item 1 - Recommendations

- M340 has another 10-15 years of life before an upgrade is required.

2	Radio

- The radio is a GE MDS SD4 licensed radio.
- A Yagi antenna is mounted on a mast to the building and points to the HWY 21 repeater station located at the HWY 21 Booster Station.

Item 2 – Recommendations

- Consider upgrade of radio with an overall SCADA refresh of old and new.

Item No.	Description
3	**Sixnet 5 Port Managed Ethernet Switch**

- The cabinet has a Sixnet 5 port managed ethernet switch for future communications and PLC access, switch is operational and visually in good condition.

Item 3 - Recommendations

- Replace with eventual PLC upgrade.

4	**Terminals and Wiring**

- Terminals and wiring appear in good condition.

Item 4 - Recommendations

- None

5	**Online Instrumentation**

- Online instrumentation is newer E&H units and in good condition.

Item 5 - Recommendations

- None

6	**Flow Meter**

- Flow meter is operational and in good condition but does not have grounding rings; use of grounding rings is a best practice regardless of pipe material.

Item 6 - Recommendations

- Recommend ground rings be added.

7	**Chlorine Residual Analyser**

- The chlorine residual analyser is a ProMinent unit with a CTE sensor (Total Chlorine) and in good condition.
- The incoming water feed does have a possible air trap as it drops down towards the analyser and then rises back up just before connecting.
- A realignment of the water line along the wall can correct this condition.
- Double PRVs are installed due to high incoming pressure.

Item 7 - Recommendations

- Correct water line alignment.

8	**Level Transmitter**

- No level transmitter was observed in the room.
- Level is a signal split with the reservoir side.

Item 8 - Recommendations

- None

Item No.	Description
9	**Pressure Gauge PI-0200**

- Pressure gauge PI-0200 at the analyser tap is in good condition but is small.

Item 9 - Recommendations

- The analyser tap is small and should be replaced with at least a 4" face gauge.

10	**PIT-0200**

- PIT-0200 is in good condition but has no Block and Bleed to ensure an accurate reading, as well a manual line tap directly under the PIT when in use will create a pressure gradient and severely skew the transmitter readings.

Item 10 - Recommendations

- Recommend the manual line be located elsewhere and a Block and Bleed valve installed for the transmitter.

11	**Automated Direct Graphical HMI**

- This facility has an Automation Direct Graphical HMI that has been turned off as no fill stations use a local HMI.

Item 11- Recommendations

- None

2.6.2.2 Electrical and Controls Photos

Table 2-16 Photos - Nisku East Fill Station – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
Building Exterior	Flow Control Valve	Re-seated PRV (straight)

Photo/Description	Photo/Description	Photo/Description
		
Flow Meter	Cl2 Feed Line	Tap Before Pressure Transmitter
		
CL2 Analyser	HMI	UPS
		
PLC Rack and Radio		Exterior Antenna

2.6.3 Process Mechanical

The Nisku East Fill Station consists of painted stainless steel process piping ranging in size from 100 mm to 200 mm, configured for controlled reservoir filling. Flow control and isolation are provided through four (4) manually actuated butterfly valves and one (1) electrically actuated ball valve for automated operation. The system incorporates a pressure control reducing valve (PCV) that maintains a downstream pressure of approximately 150 kPag (21 psig) against an upstream supply pressure of 600 kPag (87 psig). An air release valve exists on the incoming fill line upstream of the flow meter on the high side. The fill discharge enters to the County's booster and reservoir station.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, an electronic pressure transducer for upstream pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality.

2.6.3.1 Process Mechanical Observations and Findings

Item No.	Description
1.	**Pipe Supports and Corrosion Protection - Images - Table 2-17 a, and Table 2-17 b**

- Existing pipe supports appear to be aluminum or galvanized steel clamp-style assemblies. These clamps do not provide uniform stress distribution along the pipe circumference and may contribute to localized stress points or potential fretting at contact surfaces.
- Record drawings do not identify or detail these specific supports within the fill station, suggesting that they may have been field-installed or modified post-construction.

Item 1 - Recommendations

- Replace existing clamps with cushioned or lined pipe support assemblies to ensure uniform stress distribution and isolate dissimilar metals. This will reduce the risk of galvanic corrosion between the carbon steel process piping and aluminum supports.
- Ensure future supports conform to ASME B31.3 Appendix D stress criteria and employ non-absorbent elastomeric isolators rated for potable water service.

2	**Hose Bib Connection and Backflow Protection - Image - Table 2-17 c**

- A hose bib connection is installed on a T-branch downstream of a pressure regulator within the fill station. The assembly utilizes a brass hose connection with a clear flexible hose.
- There is no evidence of integral backflow and anti-siphon protection, which is required to safeguard the potable water system per CSA B64.

Item 2 - Recommendations

- Install a CSA B64.7-compliant anti-siphon backflow prevention device on all hose bib connections.
- Verify material compatibility between dissimilar fittings, hose assemblies, and carbon steel piping to prevent galvanic coupling.

3	**Analyser Supply Line Assembly (Branch Tee) – Image - Table 2-17 d**

- The 87 psi fill line branch includes stainless and brass dissimilar metal components with minor surface corrosion.
- A dual brass pressure regulators (12–15 psi) serves the analyser system.

Item 3 - Recommendations

- Install dielectric isolation between dissimilar metals.

4	**Non-Destructive Testing (NDT)**

Note: Not included in budgetary planning costs – General Estimate $15,000

- Facility piping does not appear to have external corrosion or defects; however, internal is not known.

Item 4 - Recommendations

- It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning

2.6.3.2 Process Mechanical Overall Summary

The Nisku East Fill Station remains in good mechanical and operational condition consistent with its relatively recent construction. Minor modifications are recommended to align the facility with current CSA B64 potable protection requirements and to improve pipe support design for long-term corrosion prevention and structural performance.

2.6.3.3 Process Photos

Table 2-17 Photos – Nisku East Fill Station – Process Mechanical Photos

Photo/Description	Photo/Description	Photo/Description
		
a. Galvanized Pipe Supports with Clamps	b. Non-uniformed Galvanized Pipe Clamp	c. Unprotected Potable Water Branch Connection
		
d. Electrically Dissimilar Materials on Branch T to Analyser		

2.6.4 Building Mechanical

The mechanical system in the space consists of one supply duct with outlet mount low and one electric baseboard convector mounted below the valve assembly.

2.6.4.1 Building Mechanical Observations and Findings

Item No.	Description
1.	**Electric Baseboard Heater and Duct**

- The electric baseboard heater provides heating to the space.
- The baseboard heater and duct are in a fair condition.

Item 1 - Recommendations

- Recommend normal maintenance.

2	**Air Handling Unit**

- The Fill Station uses one portion of the reservoir building.
- The air handling unit is in another portion of the building that was not accessible.

Item 2 - Recommendations

- None

3	**Fire Extinguisher**

- There is one fire extinguisher beside the supply air duct.

Item 3 - Recommendations

- The fire extinguisher shall check and inspected as per Maintenance and inspection schedule.

2.6.4.2 Building Mechanical Photos

Table 2-18 Photos – Nisku East Fill Station – Building Mechanical

Photo/Description	Photo/Description
	
a. Electrical Baseboard Heater	b. Supply Air Duct and Grill

2.7 City of Beaumont Fill Station

The City of Beaumont Fill Station is located at 57 Street and 50 Avenue within the City. The Commission has a dedicated fill room at this facility. This facility was constructed in approximately 1982/83. Associated previously conducted a comprehensive facility assessment in 2020. After that assessment, the station underwent upgrade works (2022/2023). This follow-up inspection, completed five years later, evaluates the current condition of major building mechanical, process mechanical, electrical, and controls components with focus on corrosion, functional integrity and operation. The following outlines Associated's observations from the facility Fill Station.

2.7.1 Electrical

The City of Beaumont Fill Station has a 3 phase 600V incoming electrical service that powers a 15kVA 600/208/120V transformer connected to a single-phase 240V 225A 24 circuit distribution panel.

2.7.1.1 Electrical Observations and Findings

Item No.	Description
1.	MCB

- The MCB has been replaced and the power feed re-directed to come from the Beaumont pumphouse next door.
- Power appears to be generator backed.

Item 1 - Recommendations

- None.

2	Distribution Panel

- The distribution panel is several years old but appears to be in good condition with no obvious signs of corrosion.
- An internal inspection sticker dated Jan 2022 was observed.

Item 2 - Recommendations

- Replace in 5-10 years.

3	Smoke Detector

- There is a smoke detector on the ceiling, and it appeared clean and is new since last inspection.

Item 3 - Recommendations

- Smoke detectors should be replaced every 10 years; therefore, this unit has another 5 years till replacement.
- A replace by or installed date should be labelled on the detector to assist with replacement timing.

4	Lighting

- Lighting appears to be original fluorescent fixtures but in decent condition.

Item No.	Description
Item 4 - Recommendations	
	• Since the lights are off 99% of the time there is little benefit to upgrading these to LED. • When the existing units fail, they should be upgraded to LED units.
5	**Emergency Wallpack**
	• A newer emergency wallpack is present, good condition and operational but the unit is not mounted over the door.
Item 5 - Recommendations	
	• Sign does point to the exit but visibility is blocked by the ARV. This should have been placed over the door and is the recommended location.
6	**External Light Over the Doorway**
	• The external light over the doorway is an old and yellowed implying HPS wall pack.
Item 6 - Recommendations	
	• Recommend a new LED vandal resistant unit be installed with integral photocell. • Recommend a colour in the 3500k range to reduce insect attraction (more yellow). The improved light cut-off features of the LED will reduce bleed to the residential properties around the facility.
7	**Alarm System**
	• An alarm system with keypad was observed, but power appears to be disconnected to the panel. • An alarm via the PLC and keyed switch is used instead. • The system is functional.
Item 7 - Recommendations	
	• Remove old alarm system.
8	**Carbon Monoxide Detector**
	• A carbon monoxide detector was observed.
Item 8 - Recommendations	
	• These should be replaced every 5 to 10 years and as such, Associated recommends replacement as well as write the installed or replace by date on the device.
9	**Active Cathodic Protection**
	• Active Cathodic protection is installed and mounted externally. • This appears to be functional but is outside of Associated's expertise to determine the condition.
Item 9 - Recommendations	
	• One area of concern is the proximity of the unit heater vent to the Cathodic box; it is partially over top of the box and corrosive vent condensate could drip onto the Cathodic box.

Item No.	Description
	• Ensuring condensate cannot drip onto the junction box is a prudent preventive measure.
10	**PLC Cabinet UPS**
	• PLC cabinet UPS is a single unit with an extension battery pack.
	Item 10 - Recommendations
	• UPS batteries should be replaced every 5 years on average and appears to have been serviced Dec 2024 with all other stations.
11	**Telephone Entrant Panel**
	• A telephone entrance panel is present. This panel is not in use.
	Item 11- Recommendations
	• None. Can be removed if wall space is needed.
12	**Entry Door**
	• Entry door has a door switch left abandoned.
	Item 12- Recommendations
	• Recommend remove old door switch.
13	**600-208V Transformer**
	• 600-208V transformer is original to facility (15kVA) and operational but is at least 40 years old. • It has an inspection sticker similar to the other electrical panels from 2022.
	Item 13 - Recommendations
	• Recommend replacing the transformer and cables in the next 5 years before it fails due to age. Consider replacing distribution panel at the same time.

2.7.2 Controls

The control system PLC is a Schneider M340 PLC and the radio is a GE MDS SD4 licensed radio. M340 is a current PLC platform, and no upgrade currently is recommended. A Yagi antenna is mounted on a mast to the building and points to the HWY 21 repeater station located at the HWY 21 Booster Station. PLC communications is via serial MB protocol for system stability.

2.7.2.1 Controls Observations and Findings

Item No.	Description
1.	**Control System PLC**

- The Control System PLC is a Schneider M340 PLC.
- The PLC communications is via serial MB protocol for system stability.

Item 1 - Recommendations

- None, PLC has another 10-15 years of life.

2	**Radio**

- The radio is a GE MDS SD4 licensed radio.
- A Yagi antenna is mounted on a mast to the building and points to the HWY 21 repeater station located at the HWY 21 Booster Station.

Item 2 - Recommendations

- Radio should be refreshed with an overall SCADA communications refresh.
- Radio power supply is original to radio (at least 20 years old) and is in need of replacement.
- External radio antenna support is bent from possible impact. Support needs to be replaced.
- Radio antenna polyphasor is mounted in PLC cabinet. Should be relocated outside of cabinet to avoid a lighting strike on the antenna energizing the entire cabinet.

3	**Sixnet 5 Port Managed Ethernet Switch**

- The cabinet has a Sixnet 5 port managed ethernet switch for future communications and PLC access.
- The switch is in good condition and operational.

Item 3 - Recommendations

- Replace switch with PLC upgrade.

4	**Terminals and Wiring**

- Terminals and wiring appear in good condition.

Item 4 - Recommendations

- None

5	**Online Instrumentation**

- Online instrumentation is newer E&H units and in good condition.

Item 5 - Recommendations

- None

6	**Flow Meter**

- Flow meter is in good condition (new), has grounding rings and is installed per manufacturer's recommendations.

Item No.	Description
	• The flow control valve is new with a new Rotork IQT actuator.
	Item 6 - Recommendations
	• None
7	**Chlorine Residual Analyser**
	• The chlorine residual analyser is a ProMinent unit with a CTE sensor (Total Chlorine). • The incoming water feed line to the transmitter rises consistently from the PRV to the analyser. This is installed correctly.
	Item 7 - Recommendations
	• None
8	**Drain Line**
	• The drain line runs directly into a drain pipe that empties into the reservoir,
	Item 8 - Recommendations
	• An air gap is recommended to prevent drain contaminants from crawling up the hose into the analyser chamber. • Recommend either adding a funnel at the top of the drain pipe stack and position the hose to drop the drain water into the funnel with an air gap or insure that where the drain hose returns to reservoir it is air gapped.
9	**Level Transmitter**
	• The level transmitter is a Milltronics MiniRanger Plus and appears to be in good condition but is obsolete.
	Item 9 - Recommendations
	• Recommend an upgrade to a newer supported model.

2.7.2.2 Electrical and Controls Photos

Table 2-19 Photos – Beaumont Fill Station – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
 Building Exterior	 Original Outside Light	 Bent Radio Mast Support
 Door Switch to be Removed	 Incoming Service and Panel	 Level Transmitter
 Level Element & Drain Line	 New Flow Ctrl Valve + Actuator	 PRV

Photo/Description	Photo/Description	Photo/Description
		
Flow Meter	CL2 Analyser	Heat Trace
		
Smoke Detector	PLC Rack	Radios
		
Hole in Soffit/Facia Over Doorway	Conduit Penetration Outside Doorway	Pipe Grounding Connections
		
Exit Sign Blocked by ARV		

2.7.3 Process Mechanical

The Beaumont Fill Station consists of painted stainless steel process piping ranging in size from 250 mm to 300 mm, configured for controlled reservoir filling. Flow control and isolation are provided through three (3) manually actuated butterfly valves, one (1) manual actuated knife gate, and one (1) electrically actuated ball valve for automated operation. The system incorporates a pressure control reducing valve (PCV) that maintains a downstream pressure of approximately 100 kPag (15 psig) against an upstream supply pressure of 371 kPag (54 psig). An air release valve exists on the incoming fill line upstream of the flow meter on the high side. The fill discharge enters to the County's reservoir.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, electronic pressure transducers for upstream and downstream pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality and discharges to the reservoir.

2.7.3.1 Process Mechanical Observations and Findings

Item No.	Description
1.	**Pipe Supports and Corrosion Protection** – Image: Table 2-20 a
	• The pressure control valve (PCV) is an epoxy-coated ductile iron body connected directly to stainless steel piping. Despite the epoxy barrier, a galvanic potential remains between the underlying ductile iron substrate and stainless steel when moisture or coating discontinuities are present.
	Item 1 - Recommendations
	• Install isolation gasket kits (e.g., Mylar or phenolic sleeves and washers) at flanged interfaces to mitigate galvanic current transfer and extend service life.
2	**Branch Connection – Brass Regulators and Stainless Steel Piping** – Image: Table 2-20 b
	• A single branching assembly was observed on the coated steel fill main, consisting of stainless steel branch piping with two brass pressure regulators. Brass and stainless steel in direct contact represent a galvanically incompatible pairing, particularly under humid or wet conditions.
	Item 2 - Recommendations
	• Fully confirm material, if incompatible, install dielectric unions between the brass regulators and stainless connections to electrically isolate the dissimilar metals and prevent localized corrosion.
3	**Air Relief Valve Assembly** – Image: Table 2-20 c
	• The air relief valve is an epoxy-coated ductile iron body with stainless steel float, threaded directly to a stainless steel pipe nipple, with a stainless steel isolation valve leading to a stainless steel weld-o-let on the fill main. The threaded ductile iron-to-stainless interface presents a galvanic risk, compounded by potential coating breakdown over time.
	Item 3 - Recommendations
	• Install a dielectric union between the air relief valve and the stainless nipple to provide electrical isolation and prevent galvanic pitting.

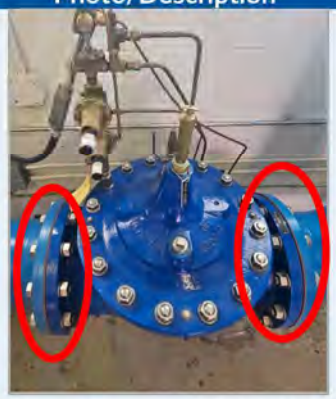
Item No.	Description
4	Non-Destructive Testing (NDT)
	Note: Not included in budgetary planning costs – General Estimate $15,000 • As the facility is relatively new and in good condition, there is existing legacy piping present on the incoming and outgoing elbows. Internal corrosion or wall loss is not visible externally.
	Item 4 - Recommendations • It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

2.7.3.2 Process Mechanical Overall Summary

While the Station remains in overall good condition, several metallic interface points remain susceptible to galvanic corrosion due to dissimilar materials. Implementation of isolation kits and dielectric fittings is recommended as part of the asset management strategy to preserve long-term integrity and alignment with modern corrosion prevention practices.

2.7.3.3 Process Mechanical Photos

Table 2-20 Photos – Beaumont Fill Station – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Galvanic Dissimilar Metals Between PCV and Pipe	b. Galvanic Dissimilar Metals on Piping	c. Galvanic Dissimilar Metals on CAV

Photo/Description	Photo/Description	Photo/Description
		
d. Facility Facing East	e. Facility Facing Southeast	f. Facility Facing South

2.7.4 Building Mechanical

The mechanical equipment in the space consists of one natural gas fired unit heater and a set of manually operated dampers.

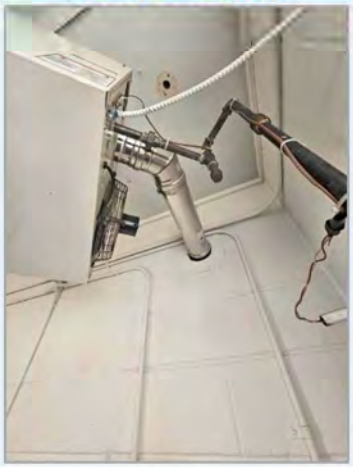
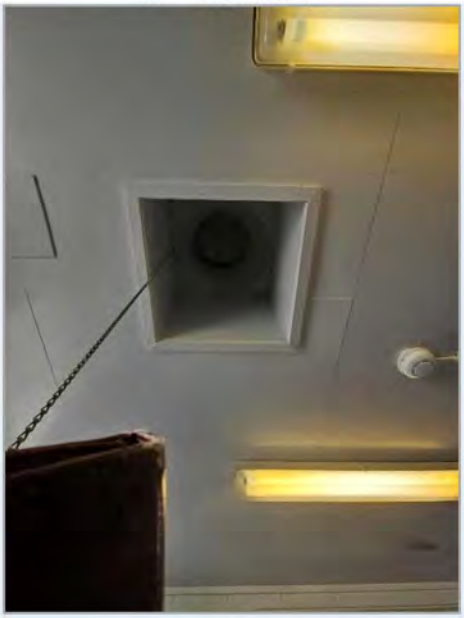
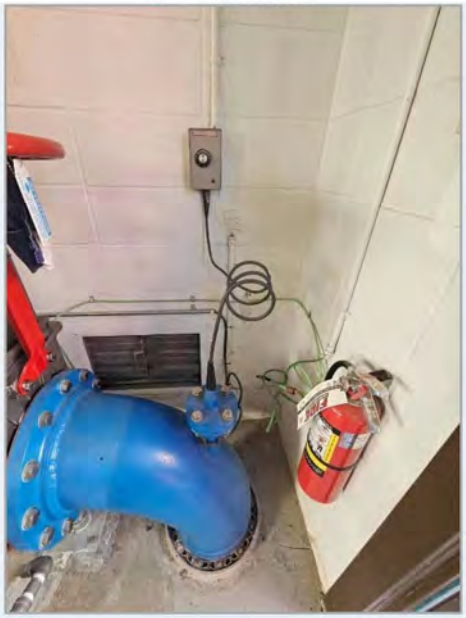
2.7.4.1 Building Mechanical Observations and Findings

Item No.	Description
1.	**Unit Heater**
	• The unit heater takes combustion air is from the room space and vents to the exterior through side wall. • Controls are using a line voltage thermostat. • The unit heater is in a fair condition.
	Item 1 - Recommendations
	• Recommend normal maintenance.
2	**Indoor Natural Gas Piping**
	• The indoor natural gas piping is not painted.
	Item 2 - Recommendations
	• Recommend painting to meet code.
3	**Manually Operated Damper**
	• The set of manually operated damper includes a damper at the roof and another damper above floor.
	Item 3 - Recommendations
	• Recommend normal maintenance.
4	**Fire Extinguisher**
	• There is one fire extinguisher beside the door.

Item No.	Description
Item 3 - Recommendations	
	• The fire extinguisher shall check and inspected as per Maintenance and inspection schedule.

2.7.4.2 Building Mechanical Photos

Table 2-21 Photos – Beaumont Fill Station – Building Mechanical

Photo/Description	Photo/Description
	
a. Unit Heater	b. Unit Heater
	
c. Manual Damper at Roof	d. Manual Damper Above the Floor

2.8 HWY 21 Booster Station

The HWY 21 Booster Station is located at the intersection of Township 500 and Range Road 241 within Leduc County. This facility provides system pressure to the Commission Transmission Line No 2, which services the Hamlet of New Sarepta, Village of Hay Lakes, and Hamlet of Armena. The facility was originally constructed in 2009/2010. Associated conducted an initial facility assessment in 2020, and this 2025 inspection represents a follow-up review conducted five years later. The objective of this assessment is to evaluate the current condition of building mechanical, process mechanical, electrical, and instrumentation components with a focus on corrosion, functionality, and asset longevity. Associated's observations from the facility are summarized below.

2.8.1 Electrical

The HWY 21 Booster Station has a 3 phase 600V 75kVA utility transformer with pad mounted metering. This feeds into an Allen-Bradley Bulletin 2100M MCC with a 600A bus 60A MCB, with a 100A rated transfer switch. The booster station contains two 20HP variable frequency drive (VFD) driven pumps operating in Duty/Standby configuration. A 42kW 3 phase 600V natural gas generator provides emergency backup power. The facility was built around 2009/2010 and is in overall good condition from an electrical perspective.

2.8.1.1 Electrical Observations and Findings

Item No.	Description
1.	MCC

- The MCC appears to be in good condition with no obvious signs of corrosion and given its age it has at least another 10 years of life.
- There is approximately a section and a half of spare space provided.
- Expansion physically is not an issue for this MCC.

Item 1 - Recommendations

- Consider hiring a maintenance company like Pace Technologies to open and clean the MCC. This is a rural location and rodents get into everything.

2	ASCO Transfer Switch

- The ASCO transfer switch appeared to be operational and operations indicated that routine generator failure testing is conducted.

Item 2 – Recommendations

- None

3	120/208V Distribution Panel

- The 120/208V distribution panel is in good condition with no obvious signs of corrosion and is fed by a 7.5kVA step down three-phase transformer.

Item 3 – Recommendations

- None

Item No.	Description
4	**BP-707**

- The BP-707 is a 20HP pump with a VFD from Cutler Hammer (SVX9000 series) with passive harmonic filter.
- This drive and filter is original to the facility construction and is nearing end of life.

Item 4 - Recommendations

- This drive and filter should be replaced in the next 5 years.

5	**Smoke Detector**

- There is a smoke detector on the ceiling above the MCC.

Item 5 - Recommendations

- This device may have been replaced recently and should be scheduled for replacement in another 5 years with an installed or replace by date written on the device face.

6	**Lighting**

- Lighting is the original to the building fluorescent fixtures but are in good condition.

Item 6 - Recommendations

- Since the lights are off 99% of the time there is little benefit to upgrading these to LED.
- When these units fail, recommend upgrading to LED lights.

7	**Emergency Lighting**

- Emergency lighting wall packs are present upstairs and downstairs including the stairwell.

Item 7 - Recommendations

- These units need to have their batteries refreshed every 10 years to maintain their required 30min runtime. Unable to determine last battery change date.

8	**Main Entry Door**

- The main entry door has an illuminated exit sign with lights; replaced within the last 5 years.

Item 8 - Recommendations

- None.

9	**External Lighting**

- The external lighting over the doorway and around the building is LED with built in photocell control and appear in good condition

Item 9 - Recommendations

- None

Item No.	Description
10	**Security Alarm**

- An alarm via the PLC and keyed switch is used for security. The system is functional.

Item 10 - Recommendations

- None

11	**Carbon Monoxide Detector**

- A carbon monoxide detector was observed.

Item 11- Recommendations

- These should be replaced every 5 years, unable to determine installation date.
- The install or replace by date should be written on the unit.

12	**PLC cabinet UPS**

- PLC cabinet UPS is a single unit.

Item 12- Recommendations

- UPS batteries should be replaced every 5 years on average. Last service noted as Dec 2024.

13	**Sola Hevi-Duty Power Conditioner**

- A Sola Hevi-Duty Power Conditioner is installed to filter the power going to the UPS.
- These units have shown a tendency to wear out and fail if exposed to significant line noise after several years while doing their job of noise filtering.

Item 13 - Recommendations

- After 10 years this filter needs to be closely inspected for wear and damage and replaced if any is found.
- Associated recommends this filter be replaced with a new EATON AEGIS Power filter.

14	**Sump Pump**

- The sump pump in the basement appears to operate often if the flow rate of water to the sump is any indication.
- Dual sumps have been installed with different bulb trigger levels.

Item 14 - Recommendations

- Operators test the sump, but replacement is recommended after 10 years of repeated use before it fails.
- Debris appears to have been swept into the sump pit; a cleanup is recommended to prevent debris and other matter from clogging the pump.
- A second electrical outlet needs to be installed to allow for both sumps to be plugged in at the same time providing redundant operation.

Item No.	Description
15	**New Lighting Ground**

- New lightning ground connections have been installed on the radio tower but have not been disguised.

Item 15 - Recommendations

- Recommend sleeving the ground wires in conduit to mask their presence.

2.8.2 Controls

The control system PLC has been upgraded to a Schneider M340 series PLC, and the radio is a GE MDS SD4 licensed radio. A Yagi antenna is mounted on a new 60 m free-standing radio tower with a new lighting rod added to the tower in 2024. This location acts as the new SCADA repeater node for the entire Commission SCADA radio network. The old radio tower is still present and should be decommissioned. PLC communications are via serial MB protocol for system stability.

2.8.2.1 Controls Observations and Findings

Item No.	Description
1.	**Control System PLC**

- The control system PLC has been upgraded to a Schneider M340 series PLC.
- The PLC communications is via serial MB protocol for system stability.

Item 1 - Recommendations

- None, PLC is current for another 10-15 years.

2	**Radio**

- The radio is a GE MDS SD4 licensed radio.
- A Yagi antenna is mounted on a new 60 m free-standing radio tower with a new lighting rod added to the tower in 2024.
- This location acts as the new SCADA repeater node for the entire Commission SCADA radio network.

Item 2 - Recommendations

- The old radio tower is still present and should be decommissioned.
- Replace radio with refresh of SCADA system.

3	**Sixnet 5 Port Managed Ethernet Switch**

- The cabinet has a Sixnet 5 port managed ethernet switch for future communications.
- The switch is in good condition and operational.

Item 3 - Recommendations

- Replace when PLC is upgraded.

Item No.	Description
4	Magelis HIMI

- A local Magelis HMI has been added to the facility and is operational and in good condition.

Item 4 - Recommendations

- None

5	Terminals and Wiring

- Terminals and wiring appear in good condition.

Item 5 - Recommendations

- None

6	Instrumentation

- Instrumentation is E&H units and in general operational.
- Some sort of white powder has contaminated several PIT displays in the basement piping gallery. The powder obscures the display and may shorten the device life.
- Pressure gauges added to the PITs in the basement are small.

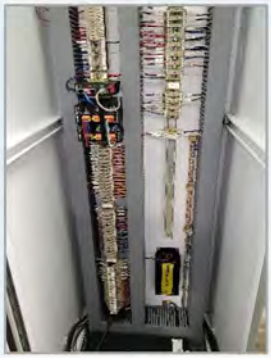
Item 6 - Recommendations

- Devices contaminated with the white powder need to be cleaned and/or replaced.
- The small pressure gauges added to the PITs in the basement should be 4" dual scaled for easier reading.
- Better cable supports should be fabricated to support the instrument cabling to the discharge PITs to relieve stress on the instruments.

2.8.2.2 Electrical and Controls Photos

Table 2-22 Photos - HWY 21 Booster Station - Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
Utility Transformer	PLC Rack	Hide Ground Wiring

Photo/Description	Photo/Description	Photo/Description
		
MCC	New Exit Sign with Lights	Old Radio Tower
		
PLC Cabinet	UPS	PIT with Tiny Pressure Gauge
		
Flow Meter	Sump	Contaminated PIT Display

2.8.3 Process Mechanical

The Highway 21 Booster Station consists of painted and epoxy-coated steel process piping ranging in size from 80 mm to 250 mm, configured for pressure boosting control to surrounding region(s). Flow isolation is provided through eight (8) manually actuated butterfly valves. The system incorporates two (2) boosting pumps, one (1) a horizontal centrifugal pump and one (1) vertical inline multistage pump. Incoming pressure on the suction side of the pump(s) is 409 kPag (59 psig) with boosted pressure on the discharge of the pumps as 839 kPa (121 psig). An air release valve exists on the discharge piping upstream of the flow meter on the high side. There are two submersible pumps as high and high-high duty stand by located in the facilities sump pit.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring and electronic pressure transducers for upstream and downstream of each pump for pressure measurement.

2.8.3.1 Process Observations and Findings

Item No.	Description
1.	**Centrifugal Pumps – Images: Table 2-23 a, and Table 2-23 b**
	• The horizontal split-case pump shows minor superficial rusting at the bolting of the casing bonnet and light weeping at the suction flange joint. The vertical inline pump exhibits no observable rusting, leakage, or operational concerns. Continue with standard maintenance inspection intervals.
	Item 1 - Recommendations
	• Verify and re-torque casing bonnet and flange bolts in accordance with the manufacturer's specifications, including checking for condition of seals and packing. If leakage persists, replace flange gaskets and casing seals.
2	**Victaulic Fittings – Images: Table 2-23 c. and Table 2-23 d**
	• Victaulic Joint: Superficial rusting is visible on the exterior pipe surface adjacent to a Victaulic coupling, though the coupling itself shows no corrosion. Humidity is present in the building.
	Item 2 - Recommendations
	• Clean and mechanically remove surface rust from pipe, reapply compatible manufacturer approved coating, and monitor for progression; else replace entirely. If leaking and rusting continues to reappear, replace the Victaulic coupling assembly.
3	**Check Valves - Image: Table 2-23 e**
	• Check Valve Bolting: Minor rusting is observed at the wafer-style check valve bolting downstream of the vertical inline pump.
	Item 3 - Recommendations
	• Replace bolting and hardware with pickled and passivated stainless steel, and galvanically isolated.
4	**Sump and Drainage System - Image: Table 2-23 f**
	• The sump is approximately 50% full, partially submerging the weeping tile invert opening. Currently, only one of the two sump pumps is powered, as the second receptacle is used for the portable dehumidifier. Both sump pumps are functional.
	Item - Recommendations
	• Install an additional electrical receptacle so that both sump pumps can operate independently of the dehumidifier circuit. Adjust float switch activation levels to initiate pump operation earlier, preventing submergence of the weeping tile invert and potential groundwater backup.
5	**Instrumentation and Auxiliary Piping – Image: Table 2-23 g**
	• Galvanized fittings have been used for the pressure transmitter, pressure gauge, and sample line connections. This was noted in the 2020 assessment. The presence of dissimilar metals in a humid environment presents a high risk of galvanic corrosion.

Item No.	Description
	Item 5 - Recommendations
	• Replace galvanized fittings with stainless steel and install dielectric unions or isolation fittings to electrically separate components.
6	**Non-Destructive Testing (NDT)**
	Note: Not included in budgetary planning costs – General Estimate $15,000
	• Active moisture deposition is present in the facility with visible corrosion on piping and equipment. Internal corrosion or wall loss is not visible from external.
	Item 6 - Recommendations
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

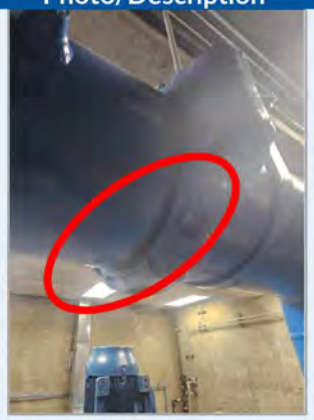
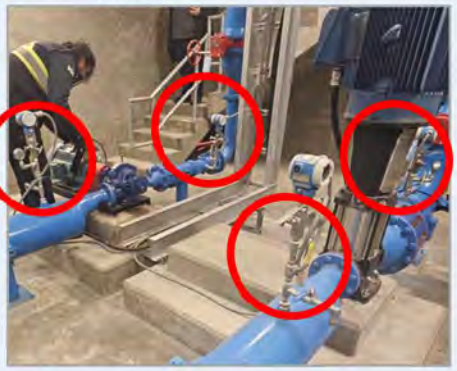
2.8.3.2 Process Mechanical Overall Summary

The HWY 21 Booster Station remains in good operational condition with all major mechanical components functioning as intended. Minor corrosion and electrical management deficiencies are localized and manageable through targeted maintenance. Preventive measures related to humidity control, electrical receptacle layout, and fitting materials are recommended to extend asset service life and align with best practices under ASME B31.3 and NSF/ANSI 61 for potable water applications.

2.8.3.3 Process Mechanical Photos

Table 2-23 Photos - HWY 21 Booster Station - Process

Photo/Description	Photo/Description	Photo/Description
		
a. Leaking through Bonnet Bolting	b. Weeping and Corrosion of Suction Flange	c. Active Corrosion around Victaulic Coupling

Photo/Description	Photo/Description	Photo/Description
		
d. Active Corrosion around Victaulic Coupling	e. Both Checkvalves Bolting Exhibit Corrosion	f. Sump Pit with Pumps
		
g. Galvanized Fittings	h. Facility Process	

2.8.4 Building Mechanical

The Building Mechanical system consists of a ventilation system for the pump room, a ventilation system for the generator, and a unit heater.

2.8.4.1 Building Mechanical Observations and Findings

Item No.	Description
1.	**Ventilation System for the Pump**
	• The ventilation system for the pump includes a supply fan with a outside air damper and a return damper, supply air duct and a relief damper for general ventilation.
	Item 1 - Recommendations
	• Recommend normal maintenance.
2	**Unit Heater**
	• The area has a ceiling mounted unit heater.

Item No.	Description
Item 2 - Recommendations	
	• Recommend normal maintenance.
3	**Generator Ventilation System**
	• The generator ventilation system includes an air intake damper, radiator exhaust damper and recirculating damper. has an intake louver and exhaust louver for cooling and ventilation purposes.
Item 3 - Recommendations	
	• Recommend normal maintenance.
4	**Natural Gas Fired Heater**
	• A ceiling mounted natural gas fired unit heater provided heating to the space, with a fan for air circulation within space.
Item 4 - Recommendations	
	• Recommend normal maintenance.
5	**Plug-In Type Portable Humidifier**
	• During site visit, there is a plug-in type of potable humidifier.
Item 5 - Recommendations	
	• Recommend checking for potential humidity issues. • Evaluate HVAC humidity control, as moisture accumulation is contributing to corrosion within the station. A portable dehumidifier is currently in use. Consider permanent moisture management improvements or maintenance of existing HVAC systems.
6	**Fire Extinguisher**
	• There is one fire extinguisher beside the door on the main floor and one in the basement.
Item 6 - Recommendations	
	• The fire extinguishers shall be checked and inspected as per the maintenance and inspection schedule.

2.8.4.2 Building Mechanical Photos

Table 2-24 Photos – HWY 21 Booster Station - Building Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Supply Fan	b. Outside Air Damper and Return Air Damper for the Supply Fan	c. Supply Air Duct
		
d. Relief Air Damper	e. Generator Exhaust Damper and Recirculating Damper	f. Air Intake Damper
		
g. Unit Heater	h. Louver	i. Louvers

2.9 City of Leduc North Reservoir

The City of Leduc North Reservoir is located at 6611 Sparrow Drive, within the City of Leduc. The Commission has a dedicated meter room within this facility. The Leduc County North Reservoir Fill Station was originally constructed between 1983 and 1985. A major upgrade was completed in 2018, after which Associated Engineering (Associated) conducted a comprehensive facility assessment in 2020. This 2025 inspection represents a follow-up review conducted five years later, focusing on integrity, corrosion, and compliance with applicable standards. Associated's observations are as follows.

2.9.1 Electrical

The City of Leduc North Reservoir Fill Station has a single-phase 240V 70 A service fed from a pole mounted transformer on the property edge. The power runs underground to an exterior wall mounted utility meter then into the MCB. The MCB then feeds a 12 circuit 100A 240V Federal Pioneer single-phase distribution panel.

2.9.1.1 Electrical Observations and Findings

Item No.	Description
1.	**MCB**
	• The MCB is still severely corroded and needs replacement.
	Item 1 - Recommendations
	• Consider sealing the conduit between the meter and the MCB, this is a likely source of cold air which is condensing on the MCB, causing corrosion issues. An inspection sticker indicates this was examined in 2023. • Replace MCB.
2	**Main Distribution Panel**
	• The main distribution panel has surface corrosion, and an internal inspection was conducted in 2023 (sticker). • Replacement was recommended 5 years ago and is still recommended due to age and that Federal Pioneer panels have a history of failure.
	Item 2 - Recommendations
	• Associated recommends replacing the incoming MCB and panel together with one new service rated panel and integrated MCB.
3	**Second Distribution Panel**
	• A second distribution panel (UPS-6E) exists. This is a Federal Pioneer panel and should be replaced.
	Item 3 - Recommendations
	• Recommend remove panel and re-direct existing active circuits to the new distribution panel.
4	**External Power and Telephone Conduit**
	• The external power and telephone conduit are rusted.

Item No.	Description
Item 4 - Recommendations	
	• A coat of protective paint is required to slow down the eventual rust through on these metal conduits.
5	**Smoke Detector**
	• There is a smoke detector on the ceiling, and it appears relatively new. • This should be replaced in 5 to 10 years with a suitable unit to provide an alarm contact.
Item 5 - Recommendations	
	• Recommend placing a replace by or installed date sticker on the device to make replacement timing easier.
6	**Lighting**
	• Lighting appears to be original fluorescent fixtures but functional.
Item 6 - Recommendations	
	• Since the lights are off 99% of the time there is little benefit to upgrading these to LED. • Recommend replacing these units with LED lights when the existing units fail.
7	**Alarm System**
	• An alarm system with keyed switch was observed in the PLC panel door. • The system is functional. • An old DSC alarm system and keypad are still on the wall but disconnected.
Item 7 - Recommendations	
	• Remove old alarm system.
8	**Carbon Monoxide Detector**
	• A carbon monoxide detector was observed and appears to be relatively new. These should be replaced every 5 to 10 years.
Item 8 - Recommendations	
	• No install date or replace by date was observed but is recommended to be written directly on device. Given this was observed new 5 years ago it likely has less than 5 years life left.
9	**PLC Cabinet**
	• The PLC cabinet UPS is a single unit with dual battery extensions, last updated in 2024. • The UPS has an extension cord leading outside the PLC cabinet to a common outlet. This is not recommended. A dedicated outlet should be provided to prevent accidental sharing with other appliances.
Item 9 - Recommendations	
	• UPS batteries should be replaced every 5 years on average.

Item No.	Description
	• A dedicated outlet should be provided for the UPS to prevent accidental sharing with other appliances.
10	**Telephone Entrance Panel**
	• A telephone entrance panel is present. This panel is not in use.
Item 10 - Recommendations	
	• None

2.9.2 Controls

The control system PLC is a Schneider M340 PLC and the radio is a GE MDS SD4 licensed radio. M340 is a current PLC platform and no upgrade currently is recommended. A mast-mounted Yagi antenna is mounted to the building and points to the Hwy 21 Booster Station and PLC communications is via serial MB protocol for system stability.

2.9.2.1 Controls Observations and Findings

Item No.	Description
1.	**Control System PLC**
	• The control system PLC is a Schneider M340 PLC. • M340 is a current PLC platform and no upgrade currently is recommended.
Item 1 - Recommendations	
	• None.
2	**Radio**
	• The radio is a GE MDS SD4 licensed radio. • A mast-mounted Yagi antenna is mounted to the building and points to the Hwy 21 Booster Station and PLC communications is via serial MB protocol for system stability.
Item 2 - Recommendations	
	• Upgrade radio and antenna with SCADA refresh.
3	**Sixnet 5 Port Managed Ethernet Switch**
	• The cabinet has a Sixnet 5 port managed ethernet switch for future communications and PLC access. • The switch is in good condition and operational.
Item 3 - Recommendations	
	• Replace when PLC is upgraded.
4	**Terminals and Wiring**
	• Terminals and wiring appear in good condition.

Item No.	Description

Item 4 - Recommendations

- None

5	**Instrumentation**

- Instrumentation are E&H units and are in good condition.

Item 5 - Recommendations

- None

6	**Flow Meter**

- Flow meter is in good condition and has a sticker indicating it was last calibrated in August of 2023.

Item 6 - Recommendations

- None

7	**Chlorine Residual Analyser**

- The chlorine residual analyser is a ProMinent unit in good condition.
- The incoming water feed has an air trap issue. The pipe tap should always rise or fall so air cannot get trapped in the line; this one falls and then rises to the instrument.
- Incoming pressure to chlorine residual analyser is +400kPa (+58psi). The regulator has a limit of 75psi, and the manufacturer recommends a second regulator in line with the first to ensure redundancy should a high pressure failure occur; this has happened with other clients where the incoming pressure exceeded 75psi.
- The analyser discharge drops to a conduit chase then to the level transmitter opening in the floor. The line routing is acceptable, but an air gap needs to be verified between the analyser return and the maximum water level to prevent back contamination of the analyser. This was not possible to determine during the inspection. Also, the penetration point is not sealed well, this point should be caulked to prevent water or dust contaminants from entering the wet well.

Item 7 - Recommendations

- Re-route the water line and add a support to the frame to facilitate the elimination of the air traps.
- Add a second regulator to ensure system safety due to high line pressure or change tap point to be post large PRV.
- Caulk discharge penetration point.

8	**Level Transmitter**

- The level transmitter (LIT-0580) is a Siemens Milltronics MiniRanger unit and appears to be in good condition. The element is suspended over the reservoir via a floor opening and cap.

Item 8 - Recommendations

- This sensor is obsolete and replacement to a supported version should be accomplished in the next 5 years.

2.9.2.2 Electrical and Controls Photos

Table 2-25 Photos – Leduc North Fill Station – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
Level Element and CL2 drain	CL2 Analyser	CL2 Feed
		
Flowmeter	Flow Control Valve; Rust Stains	PLC Rack
		
Radio	UPS	Rusted Conduits
		
Replace Federal Pioneer Panels		

2.9.3 Process Mechanical

The Leduc North Fill Station consists of painted and epoxy-coated steel process piping ranging in size from 350 mm to 450 mm, configured for controlled filling. Flow control and isolation are provided through five (5) manually actuated butterfly valves, and one (1) electrically actuated ball valve for automated operation. The system incorporates a pressure control reducing valve (PCV) that maintains a downstream pressure of approximately 100 kPag (15 psig) against an upstream supply pressure of 409 kPag (59 psig). The fill discharge enters to the County's reservoir.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, an electronic pressure transducer for upstream pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality and discharges to the reservoir. There is a level indicating sensor located directly in the fill stations floor.

2.9.3.1 Process Mechanical Observations and Findings

Item No.	Description
1.	**Galvanized Reducer and Brass Hose Bib** - Image: Table 2-26 a
	• A galvanized steel reducer was observed installed with a brass hose bib. Galvanized materials are not permitted in potable water systems due to corrosion and potential for zinc leaching.
	Item 1 - Recommendations
	• Replace the galvanized reducer with a stainless steel reducer and stainless steel valve. Install a dielectric union to mitigate galvanic corrosion between dissimilar metals. In accordance with CSA B64, provide a backflow prevention and anti-siphon adapter on the hose bib.
2	**Brass Hose Bib on Steel Fill Line** - Image: Table 2-26 b
	• The existing brass hose bib connected directly to a carbon steel fill line does not comply with CSA B64 requirements for potable water protection.
	Item 2 - Recommendations
	• In accordance with CSA B64, provide a backflow prevention and anti-siphon adapter on the hose bib.
3	**Flange Paint Damage and Corrosion** – Image: Table 2-26 c
	• Localized coating damage and oxidation were observed at a flange near the PCV connection. Appears that paint was applied over top of existing corrosion. Do not paint/coat over existing corrosion, as this still permits active undersurface corrosion.
	Item 3 - Recommendations
	• Clean and remove surface rust per (Society for Protective Coatings) SSPC standards (blast to white metal) for affected areas and recoat with an approved coating system suitable per manufacturers specifications.
4	**Valve Stem Weeping** - Image Table 2-26 d
	• Minor weeping was observed at the valve stem, likely due to packing or seal degradation.

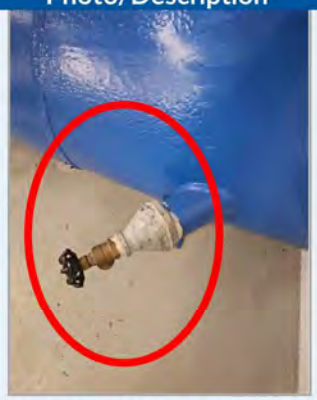
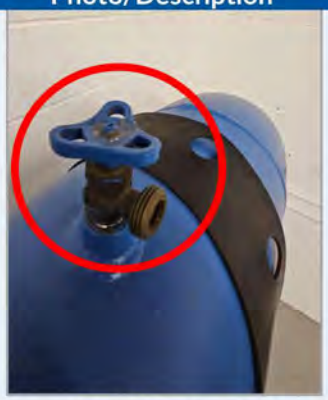
Item No.	Description
Item - Recommendations	
	• Conduct inspection and replace packing and seals as required to restore leak-tight operation.
5	**Scuffed Paint on Elbow Near Pressure Gauges - Image Table 2-26 e**
	• Paint scuffing was observed on the elbow along the incoming fill line near the installed gauges.
Item 5 - Recommendations	
	• Repaint affected areas so long as there is no observable corrosion to prevent further corrosion. If active corrosion is observed, clean and prepare surface as per (Society for Protective Coatings) SSPC standards (blast to white metal) and recoat with approved coating system.
6	**Reservoir Vent Discharge within Fill Station Room - Image: Table 2-26 f**
	Note: The cost associated for this item in budgetary planning would be a City of Leduc Cost. Commission is to coordinate with the City of Leduc to rectify the issue. • The reservoir vent terminates within the fill station enclosure, contributes to elevated humidity and promoting corrosion within building facility. Screen also exhibits corrosion.
Item 6 - Recommendations	
	• Extend the vent piping to the exterior of the building (roof or wall penetration) with appropriate insect, rodent, and tamper-proof screening to comply with standard waterworks practice.
7	**Non-Destructive Testing (NDT) Recommendation – Images: Table 2-26 g, and Table 2-26 h**
	Note: Not included in budgetary planning costs – General Estimate $15,000 • Piping has been recently repainted; however, there is evidence that portions of the pipe with corrosion were painted over without surface preparation. Internal corrosion or wall loss is not visible externally.
Item 6 - Recommendations	
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

2.9.3.2 Process Mechanical Overall Summary

Overall, the Leduc North Fill Station remains in satisfactory condition with no major process mechanical deficiencies observed. Minor localized corrosion and coating damage are present but can be mitigated through routine maintenance and recoating in accordance with SSPC standards. Several compliance-related upgrades are recommended to align with CSA B64 potable water protection requirements, including replacement of galvanized components and installation of backflow and anti-siphon devices. The vent termination within the building should be corrected to limit humidity and corrosion risk. To support proactive asset management, it is further recommended that a baseline non-destructive piping condition assessment (UT + X-ray) be undertaken to quantify internal wall conditions and provide measurable data for future trend analysis and lifecycle.

2.9.3.3 Process Photos

Table 2-26 Photos – Leduc North Fill Station - Process

Photo/Description	Photo/Description	Photo/Description
		
a. No Potable Water Protection, and Galvanized Materials on Carbon Steel Piping	b. No Potable Water Protection	c. Active Corrosion around Flange
		
d. Valve Stem Weeping	e. Scuffed Paint on Piping	f. Indoor Vent for Reservoir
		
g. Facility Process	h. Facility Process	

2.9.4 Building Mechanical

The Building Mechanical system consists of one furnace.

2.9.4.1 Building Mechanical Observations and Findings

The Building Mechanical system consists of one furnace.

Item No.	Description
1.	Furnace

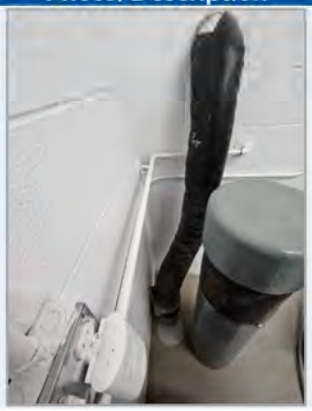
- The natural gas fired a forced air furnace provides heating and ventilation the Commission room.
- The furnace is in a fair condition.
- There is an air intake with cold air trap, which provides combustion from the exterior.
- The furnace does not have an outside air intake. There is insufficient ventilation within the room, due to the observed rusting on equipment within the room.

Item 1 - Recommendations

- The ventilation within the room should be checked for adequacy.
- The furnace should be cleaned on an annual basis. The filter in the return air intake shall be changed based on maintenance schedule.

2.9.4.2 Building Mechanical Photos

Table 2-27 Photos –Leduc North Fill Station – Building Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Furnace	b. Furnace Chimney	c. Combustion Air Intake

2.10 City of Leduc Robinson Reservoir

The City of Leduc Robinson Reservoir is located at 180 Robinson Drive, Leduc. The Robinson Fill Station was issued for tender and construction in 2015/2016. Associated Engineering did not conduct a prior condition assessment in 2020; therefore, this report represents the first facility assessment conducted by Associated Engineering in 2025. The focus of this assessment is on the condition of components. Associated's observations are as follows.

2.10.1 Electrical

The City of Leduc Robinson Reservoir Fill Station has a 3 phase 208V distribution panel in the dedicated fill room. The panel is fed from the main pumphouse which has a 600V generator backed power supply. This panel provides power to the fill room lights, controls and heater.

2.10.1.1 Electrical Observations and Findings

Item No.	Description
1.	**Lighting and Electrical Panel**
	• Lighting and electrical panel are all relatively new and are in good condition.
	Item 1 - Recommendations
	• None
2	**Alarm System**
	• An alarm system with keyed switch was observed in the PLC panel door. • The system is functional.
	Item 2 - Recommendations
	• None
3	**PLC Cabinet UPS**
	• The PLC cabinet UPS is a single unit; serviced December 2024.
	Item 3 - Recommendations
	• Replace batteries every 5 years.
4	**Sola Power Filter (2000VA)**
	• A sola power filter (2000VA) is installed on the wall and appears to be operational and in good condition. It provides power filtration to the PLC panel UPS. However, this filter is 10 years old and have a history of failures.
	Item 4 - Recommendations
	• Recommend replacement with a new EATON AEGIS PH120 power filter.

Item No.	Description
5	**Curb Area - Hole**

- A hole next to the curb in the parking lot was observed.

Item 5 - Recommendations

- The City of Leduc should investigate this collapse and rectify the issue before it becomes a larger problem.

2.10.2 Controls

The control system PLC is a Schneider M340 PLC and the radio is a GE MDS SD4 licensed radios. M340 is a current PLC platform and no upgrade currently is recommended. A mast-mounted Yagi antenna is mounted to a 20 m tall tower with extra anti-climbs due to proximity to the fence.

2.10.2.1 Controls Observations and Findings

Item No.	Description
1.	**Control System PLC**

- The control system PLC is a Schneider M340 PLC.
- M340 is a current PLC platform and no upgrade currently is recommended.

Item 1 - Recommendations

- None, PLC has another 10-15 years of life.

2	**Radio**

- The radio is a GE MDS SD4 licensed radio.
- A mast-mounted Yagi antenna is mounted to a 20 m tall tower with extra anti-climbs due to proximity to the fence.

Item 2 - Recommendations

- Upgrade with SCADA refresh.

3	**8 Port Red Lion Ethernet Switch**

- The cabinet has an 8 port Red Lion ethernet switch for future communications and PLC access.
- The switch is operational and in good condition.

Item 3 - Recommendations

- A router is leftover in the cabinet from use as the Master node while the new Booster Station was constructed; this can be removed.
- Replace switch when PLC is upgraded.

Item No.	Description
4	**Terminals and Wiring**

- Terminals and wiring appear in good condition.

Item 4 - Recommendations

- None

5	**Instrumentation**

- Instrumentation are E&H units and are in good condition.

Item 5 - Recommendations

- None

6	**Flow Meter**

- Flow meter is in good condition and has a sticker indicating it was last calibrated in August of 2023.

Item 6 - Recommendations

- None

7	**Chlorine Residual Analyser**

- The chlorine residual analyser is a ProMinent unit in good condition.

Item 7 - Recommendations

- None

8	**Level Transmitter**

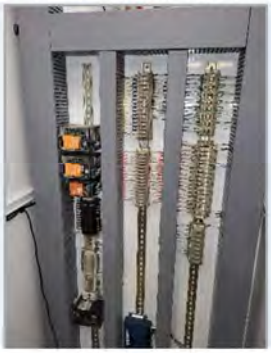
- The Level is a signal split from the main pumphouse.

Item 8 - Recommendations

- None

2.10.2.2 Electrical and Controls Photos

Table 2-28 Photos - Leduc Robinson Fill Station - Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
Building Exterior	General Fill Piping	CL2 Feed and Inlet PIT
		
Flowmeter	Flow Control Valve	PLC Cabinet with Sola and Panel
		
PLC Rack	Cabinet General	Radio

Photo/Description	Photo/Description	Photo/Description
		
UPS and Leftover Router	Radio Tower	Hole in Parking Lot (curb)

2.10.3 Process Mechanical

The Leduc Robinson Fill Station consists of painted and epoxy-coated steel process piping ranging in size from 200 mm to 250 mm, configured for controlled filling. Flow control and isolation are provided through five (5) manually actuated butterfly valves, one (1) electrically actuated butterfly valve, and one (1) electrically actuated ball valve for automated control. The system incorporates a pressure control reducing valve (PCV) that maintains a downstream pressure of approximately 215 kPag (31 psig) against an upstream supply pressure of 430 kPag (62 psig). An air release valve is located upstream and downstream of the facility's flow meter on the high end. The fill discharge enters to the County's reservoir.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, electronic pressure transducers for upstream and downstream for pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality and discharges the facility's floor drain.

2.10.3.1 Process Mechanical Observations and Findings

Item No.	Description
1.	**Backflow and Cross-Connection Control** - Image: Table 2-29 a

- A steel branch connection near the elbow for the outgoing flow from the fill station has an open camlock connection with single valve. This connection is not protected from backflow/anti-siphon per CSA B64.

Item 1 - Recommendations

- In accordance with CSA B64, provide a backflow prevention and anti-siphon adapter/equipment on connection.

2	**Dissimilar Metals for Flow Meter** - Image: Table 2-29 b

- The existing brass hose bib connected directly to a carbon steel fill line does not comply with CSA B64 requirements for potable water protection.

Item No.	Description
	Item 2 - Recommendations
	• For the stainless steel control valve flanged to carbon steel, install a complete flange isolation kit, including an isolation gasket, mylar sleeves, and washers.
3	**Non-Destructive Testing (NDT) Recommendation – Image: Table 2-29 c**
	Note: Not included in budgetary planning costs – General Estimate $15,000
	• Internal corrosion or wall loss is not visible externally.
	Item 3 - Recommendations
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

2.10.3.2 Process Mechanical Photos

Table 2-29 Photos – Leduc Robinson Fill Station – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. No Potable Water Protection	b. Dissimilar Metals Contact for Control Valve	c. Facility Process

2.10.4 Building Mechanical

The Building Mechanical system consists of one natural gas fired unit heater.

2.10.4.1 Building Mechanical Observations and Findings

Item No.	Description
1.	Unit Heater

- The unit heater is a separation combination type. The unit heater draws combustion air from outside and exhaust flue to outside. The unit heater is in a good condition.
- There is insufficient ventilation within the room, due to the observed rusting on equipment within the room.

Item 1 - Recommendations

- The ventilation within the room should be checked for adequacy.

2.10.4.2 Building Mechanical Photos

Table 2-30 Photos –Leduc Robinson Reservoir – Building Mechanical

Photo/Description


a. Supply Fan in Pump Room

2.11 Armena Fill Station

The Armena Fill Station is located along Main Street along the entrance to the Hamlet of Armena from Highway 21. The Commission shares this facility with the County of Camrose. This facility was constructed in 2014. The facility was previously assessed by Associated Engineering in 2020. This 2025 follow-up inspection evaluates the current condition. Associated's observations from the inspection are as follows. This is a very crowded facility.

2.11.1 Electrical

The Armena Fill Station is a combination truck fill and fill station. As such, the electrical system is not included in this evaluation other than components directly affecting the Commission filling system.

2.11.1.1 Electrical Observations and Findings

Item No.	Description
1.	**PLC Cabinet**

- A power filter to the PLC cabinet was not observed.
- A UPS has been added on top of the cabinet; 1500VA dated Dec 30 2024.
- No generator was found for this system.

Item 1 - Recommendations

- Recommend an AEGIS PH120 power filter be added pre-UPS to ensure clean power is going to the cabinet.
- Replace UPS batteries every 5 years.

2.11.2 Controls

The Commission fill controls are handled by a Schneider M340 PLC communicating over licensed serial radio to the HWY 21 Booster repeater node. M340 is a current PLC platform and no upgrade at this time is recommended. A tower mounted Yagi antenna is used and points to the Hwy 21 repeater station and PLC communications is via serial MB protocol for system stability.

2.11.2.1 Controls Observations and Findings

Item No.	Description
1.	**Control System PLC**

- The PLC cabinet has a single power supply.
- The fill controls are handled by a Schneider M340 PLC communicating over licensed serial radio to the HWY 21 Booster repeater node.
- M340 is a current PLC platform and no upgrade currently is recommended.

Item 1 - Recommendations

- Dual redundant supplies are recommended.

2	**Communication Tower**

- A tower mounted Yagi antenna is used and points to the Hwy 21 repeater station and PLC communications is via serial MB protocol for system stability.
- The communication tower ground is a single wire. Normally with a tower ground you can see the piles connected to each other and then a solid link to the ground grid. It appears that a #6 green ground is bolted to the tower heading into the earth. The ground is assumed to be adequate from the original design of the facility since all connections are buried.

Item No.	Description

Item 2 - Recommendations

- The tower does have anti-climbing deterrents installed, but they could extend about 1 m higher to be more effective.

3	**Incoming Pressure Transmitter**

- Incoming pressure transmitter is in good condition but needs a block and bleed to ensure all air is bled away from the sensor for an accurate reading.
- The old water sample tap tee fitting is still in place with a plug in the tee below the PIT, this is not the same as a Block and bleed.

Item 3 - Recommendations

- Add a block and bleed valve to PIT.

4	**PRV**

- The PRV does not have a power fail solenoid, and flow control valve does not appear to have a super capacitor backup.
- In a power fail condition this station could overflow with unmetered water very quickly.

Item 4 - Recommendations

- Recommend a power fail backup system be designed to allow for system shutdown in the event of a power fail.

5	**Flow Meter**

- The flow meter does not have grounding rings but since the piping and valve body is stainless steel one is technically not required as water and piping are all in contact and conductive.

Item 5 - Recommendations

- Grounding rings are recommended to ensure no bias across the meter to skew readings.

6	**Flow Control Valve**

- The flow control valve is using a Bray actuator not a Rotork per Commission standards. Bray positional actuators have proven to fail prematurely.

Item 6 - Recommendations

- A close eye needs to be kept on this actuator.

7	**Chlorine Analyser**

- Chlorine analyser is a ProMinent with CTE sensor for total chlorine and is in good condition.
- The sample line to the analyser is installed correctly with the line running uphill the entire way.
- The discharge is piped off to a location that was not noted.

Item 7 - Recommendations

- None

Item No.	Description
8	Red Lion HMI

- A Red Lion HMI is included on this system but is now offline. Remote fill systems do not require an HMI typically.

Item 8 - Recommendations

- None

2.11.2.2 Electrical and Controls Photos

Table 2-31 Photos - Armena Fill Station – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
Radio Tower	Radio Tower Ground	Inlet Piping
		
Flowmeter	Analyser PRV	Flow Valve
		
CL2 Analyser	PLC Cabinet with HMI	PLC Rack

Photo/Description	Photo/Description	Photo/Description
		
Radio	UPS	

2.11.3 Process Mechanical

The Armena Fill Station consists of stainless steel process piping with Victaulic couplings and flanges, piping ranging in size from 50 mm to 100 mm, configured for controlled filling. Flow control and isolation are provided through two (2) manually actuated butterfly valve, three (3) manually actuated ball valves, and one (1) electrically actuated ball valve for automated control. The system incorporates a pressure control reducing valve (PCV) that maintains a downstream pressure of approximately 124 kPag (18 psig) against an upstream supply pressure of 300 kPag (43.5 psig). An air release valve is located upstream and downstream of the facility's flow meter on the high end. The fill discharge enters to the County's reservoir.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, an electronic pressure transducer for upstream for pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality and discharges the facility's reservoir.

2.11.3.1 Process Mechanical Observations and Findings

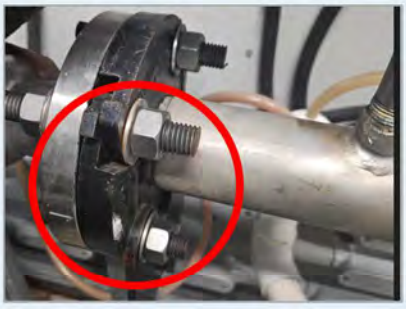
Item No.	Description
1.	**Stainless Steel Process Piping** - Images: Table 2-32 a, Table 2-32 b, and Table 2-32 c,
	• The facility utilizes primarily stainless steel process piping throughout. Overall, the piping shows no critical signs of corrosion, indicating satisfactory general condition. However, localized superficial rusting is evident on some pipe sections, which may suggest either residual contamination from fabrication (insufficient pickling/passivation) or the presence of moisture within the mechanical room.
	Item 1 - Recommendations
	• Inspect all pipe, spot treat affected areas by cleaning and applying localized pickling and passivation per ASTM A380 and ASTM A967. Evaluate HVAC ventilation or humidity control within the room to minimize condensation potential.
2	**Incoming Fill Line Piping** - Image: Table 2-32 c
	• The incoming fill line near air release valve show surface corrosion, particularly at the floor-set puddle flange, where advanced rusting and deterioration of washers and anchor bolting were observed.

Item No.	Description
	Item 2 - Recommendations
	• Replace all affected bolting and washers with pickled and passivated stainless steel hardware (ASTM A380/A967 compliant). Clean the puddle flange plate to sound metal, pickle and passivate the surface.
3	**Victaulic Flange Adapters – Images: Table 2-20 d., Table 2-32 e., Table 2-32 f., Table 2-32 g., and Table 2-32 h**
	• Multiple Victaulic flange adapters exhibit minor corrosion on the housings and external hardware. • The adapters appear to be black-coated ductile iron (Style 741) housings, where coating damage has occurred on external surfaces, exposing bare iron. This introduces a potential galvanic corrosion risk at the interface with stainless steel piping.
	Item 3 - Recommendations
	• Clean all corroded areas to sound material and reapply a manufacturer approved protective coating. • Replace rust-affected washers, nuts, and bolts with pickled and passivated stainless steel hardware. • Install isolation kits (e.g., mylar washers and sleeves) where practical to electrically isolate stainless steel from ductile iron components and mitigate galvanic coupling.
4	**Pressure Control Valve - Image: Table 2-32 i**
	• The PCV body and bonnet appear to be in good external condition. • There are no visible leaks or structural concerns. However, given the elapsed service interval since construction in 2015, preventive maintenance is recommended.
	Item 4 - Recommendations
	• Conduct a full internal inspection of the PCV body and replace the diaphragm. • Install a pilot rebuild kit and recalibrate to manufacturer specifications following reassembly.
5	**Non-Destructive Testing (NDT) Recommendation – Image: Table 2-29 c**
	Note: Not included in budgetary planning costs – General Estimate $15,000 • While the external condition of the stainless steel piping appears satisfactory, there is observed surface corrosion, and active corrosion in Victaulic flanges. • The internal wall condition and corrosion rate cannot be visually confirmed.
	Item 5 - Recommendations
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

2.11.3.2 Process Mechanical Overall Summary

The Armena facility is in generally satisfactory mechanical condition with localized areas of external corrosion on piping and flanges primarily attributed to moisture exposure and dissimilar metal contact. Addressing the identified corrosion, improving isolation practices, and conducting baseline UT/Radiographic condition assessments will ensure continued reliability and extend the service life of the stainless steel process piping system.

Table 2-32 Photos – Armena Fill Station – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Surface Corrosion	b. Surface Corrosion	c. Surface Corrosion
		
d. Surface Corrosion	e. Victaulic Flange Corrosion	f. Victaulic Flange Corrosion
		
g. Victaulic Flange Corrosion	h. Victaulic Flange Corrosion	i. Victaulic Flange Corrosion



j. PVC



k. Facility Process



l. Facility Process

2.11.4 Building Mechanical

The Armena Fill Station is a combination truck fill and fill station, and the room is shared with the County of Camrose. As such, the building mechanical system was not reviewed.

2.12 Village of Hay Lakes Fill Station

The Village of Hay Lakes Fill Station is located at the north end of 5 Avenue within the Village. This facility was used as the Village's old water treatment plant and pump house. The Commission fill piping was installed in approximately 2009, and the old water treatment equipment has since been removed. Associated Engineering (Associated) conducted a comprehensive facility assessment in 2020. This 2025 assessment provides an updated evaluation of the fill station's condition. The Commission shares this facility with the Village of Hay Lakes. Associated's observations from this facility are outlined below.

2.12.1 Electrical

Electrical power to the fill system is provided by the local pumphouse.

2.12.1.1 Electrical Observations and Findings

Item No.	Description
1.	**Sola Hevi-Duty Power Conditioner**

- A Sola Hevi-Duty power conditioner is installed to filter the power going to the UPS. After 15 years this filter needs to be closely inspected for wear and damage and replaced if any found.
- These units have shown a tendency to wear out and fail if exposed to significant line noise after several years while doing their job of noise filtering.

Item 1 - Recommendations

- Associated recommends replacing the Sola power filter with an AEGIS PH120 Power filter.

Item No.	Description
2.	**EATON Powerware UPS**

- Single EATON Powerware UPS in cabinet.

Item 2 - Recommendations

- UPS batteries should be replaced every 5 years; last servicing shown as December 2024.

2.12.2 Controls

The Commission fill controls are handled by a Modicon Momentum PLC communicating over licensed serial radio to the HWY 21 repeater station. Momentum is an obsolete PLC series.

2.12.2.1 Controls Observations and Findings

Item No.	Description
1.	**Fill Station PLC**

- The Fill Station PLC is a Modicon Momentum PLC that is now obsolete.
- This station is overdue for an upgrade to Modicon M580 series.
- While M340 is current like many of the stations the newer version of M580 is recommended for longevity.

Item 1 - Recommendations

- Replace PLC with new in the next 1-2 years.

2	**Radio Tower**

- The Commission's radio tower is located just outside the reservoir footprint.
- A Yagi antenna is used and points to the Hwy 21 repeater station and PLC communications is via serial MB protocol for system stability.
- Overhead guy wires support the antenna cable into the building.

Item 2 - Recommendations

- Replace antenna and cable with SCADA radio refresh.

3	**Fill Piping**

- The fill piping is PVC and is overhead due to space restrictions at the time of the original installation.
- It is showing signs of leaking.

Item 3 - Recommendations

- Replace piping.

4	**Instrumentation**

- Instrumentation is E&H pressure and flow meters and are in good condition.

Item No.	Description
	• E&H flow meter is in good condition and has grounding rings but they are not grounded correctly. • The manufacture recommends connecting the ground rings to the unit and then to a solid grounding point, this final connection to a solid ground appears to be missing.
	Item 4 - Recommendations
	• Correct grounding on flowmeter.
5	**Level Transmitter**
	• The Commission has a dedicated level transmitter, a Siemens Multiranger 100 unit that is in good condition.
	Item 5 - Recommendations
	• None
6	**Flow Control Valve and Actuator**
	• The flow control valve and Rotork actuator appear to be in good condition as well and are suspended using ready rod from the ceiling. • No obvious signs of rust on any equipment suggesting the ventilation in this facility is adequate.
	Item 6 - Recommendations
	• None
7	**PLC Cabinet**
	• PLC cabinet wiring is in good condition. • The original MDS 4710 radio and two additional SD4 radios are in the PLC cabinet.
	Item 7 - Recommendations
	• The MDS 4710 should be recycled and the spare SD4 radio stored at the Master station as a spare, not left in the cabinet. • Radios to be replaced with a SCADA refresh.
8	**Local Chlorine Analyser**
	• The local chlorine analyser is a ProMinent unit using a CTE sensor (total chlorine) and is in good condition. • The unit is functional, but the water feed has an air trap where the line rises before dropping to the unit. • The chlorine analyser discharge drops to a line for wet well return.
	Item 8 - Recommendations
	• The water feed should be corrected to ensure the line runs continuously up or down to prevent air from being trapped in the line. • The chloring analyser discharge needs to be air gapped to ensure the analyser is never at risk from reverse line contamination.

2.12.2.2 Electrical and Controls Photos

Table 2-33 Photos – Hay Lakes Fill Station – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
Building Exterior	Radio Tower	Radio Tower Grounding
		
Sola Above PLC Cabinet	Radio Stack	PIT Angled Down
		
Level Transmitter	Incorrect Tubing to PIT	PLC

Photo/Description	Photo/Description	Photo/Description
		
UPS	PLC	Flowmeter

2.12.3 Process Mechanical

The Hay Lakes Fill Station consists of predominantly PVC piping ranging in size from 50 mm to 100 mm, with a small section of stainless steel piping that are configured for controlled filling. Flow control and isolation are provided through five (5) manually actuated butterfly valves, one (1) manually actuated ball valves, and one (1) electrically actuated ball valve for automated control. The system incorporates a pressure control reducing valve (PCV) that maintains a downstream pressure of approximately 113 kPag (16 psig) against an upstream supply pressure of 241 kPag (39.5 psig). An air release valve is located upstream the facility's flow meter on the high end. The fill discharge enters to the Town's reservoir.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, electronic pressure transducers for upstream and downstream for pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality.

2.12.3.1 Process Mechanical Observations and Findings

Item No.	Description
1.	**Process Piping Condition – Images:** Table 2-34 a., Table 2-34 b., Table 2-34 c., Table 2-34 d., Table 2-34 e., Table 2-34 f., Table 2-34 g., Table 2-34 h., Table 2-34 i., and Table 2-34 j

- The Victaulic coupling on the stainless steel piping to the reservoir is leaking.
- Numerous piping supports throughout the facility show active and aggressive corrosion.
- Several heavier components—including the pressure control valve (PCV) and actuated flow control valve—are improperly supported or entirely unsupported, resulting in localized stress on adjacent PVC piping and glued joints.
- Use of U-bolts, conduit clamps, and clevis hangers in non-engineered applications has led to point loading and torsional stress, resulting in micro-cracking and leakage visible at multiple locations; failed piping.
- The piping elevation and routing layout further inhibit preventive maintenance access to valves and instrumentation, increasing operational risk and safety challenges, and decreasing serviceability.

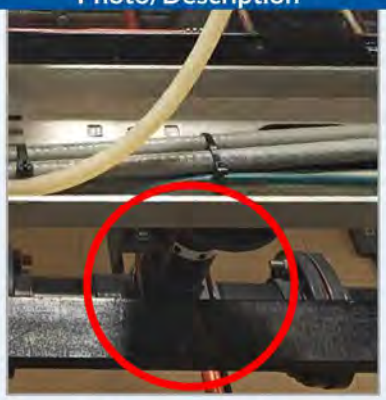
Item No.	Description
Item 1 - Recommendations	• Fully reconstruct the fill system—from the incoming chamber connection to the fill discharge assembly—using pickled and passivated stainless steel (ASTM A380 and A967). • Review and re-use valves, transmitters, and equipment that are in good condition and can be salvaged. • Implement engineered pipe supports designed for distributed load bearing, vibration isolation, and material compatibility with stainless steel. • Re-elevate and realign process piping and equipment to improve accessibility for future maintenance, in accordance with ergonomic and OHS best practices. • Replace all corroded or undersized supports with stainless or non-metallic corrosion-resistant engineered alternatives (e.g., FRP or epoxy-coated systems).

2.12.3.2 Process Mechanical Overall Summary

The combination of improper support, poor material compatibility, failing piping, and environmental exposure has significantly compromised the integrity of the fill piping system. The current condition represents an elevated failure risk and a potential compliance concern with potable water system reliability standards.

2.12.3.3 Process Mechanical Photos

Table 2-34 Photos – Hays Lake Fill Station – Process Mechanical Photos

Photo/Description	Photo/Description	Photo/Description
		
a. Leaking Victaulic Coupling and Pipe Corrosion	b. Failed Pipe Due to Stress	c. Failed Pipe Due to Stress

Photo/Description	Photo/Description	Photo/Description
		
d. Active Corrosion with Poor Pipe Supports	e. Failed Pipe Due to Stress	f. Failed Pipe Due to Stress
		
g. Failed Pipe Due to Stress	h. Active Corrosion with Poor Supports	i. Poor Pipe Supports
		
j. Accessibility Challenges for Operation		

2.12.4 Building Mechanical

The Hay Lakes Fill Station is a shared with the Village of Hay Lakes. As such, the building mechanical system was not reviewed.

2.13 Hamlet of New Sarepta Fill Station

The Hamlet of New Sarepta is located along Centre Avenue west of Centre Street. The Commission's fill piping was installed within the Hamlet of New Sarepta's existing water treatment plant/pump house in 2009. In 2024/2025 the reservoir was expanded with an extra fill pipe and manual valving to the new reservoir post fill system controls. Associated Engineering (Associated) completed a facility assessment of the fill components in 2020, and this 2025 assessment provides a five-year follow-up to evaluate the condition. The Commission shares the facility with Leduc County. Associated's observations from the inspection are provided below.

2.13.1 Electrical

Electrical power to the fill system is provided by the local pumphouse.

2.13.1.1 Electrical Observations and Findings

Item No.	Description
1.	**Sola Hevi-Duty Power Conditioner**
	• A Sola Hevi-Duty power conditioner is installed to filter the power going to the UPS.
	Item 1 - Recommendations
	• After 15 years the Sola Hevi-Duty Power Conditioner should be replaced with a new EATON AEGIS PH120 unit.
2.	**EATON Powerware UPS**
	• Single EATON Powerware UPS in cabinet.
	Item 2 - Recommendations
	• UPS batteries should be replaced every 5 years; last servicing shown as December 2024.

2.13.2 Controls

The Commission fill controls are handled by a Modicon Momentum PLC communicating over licensed serial radio to the HWY 21 Booster repeater node. The Modicon Momentum PLC is obsolete. A Yagi antenna on a free-standing radio tower points to the Hwy 21 repeater station, PLC communications is via serial MB protocol for system stability. Overhead guy wires support the antenna cable into the building.

2.13.2.1 Controls Observations and Findings

Item No.	Description
1.	**Commission Fill Controls**

- The Fill Station PLC is a Modicon Momentum PLC that is obsolete and due for an upgrade to an M580 PLC.

Item 1 - Recommendations

- Associated recommends upgrading this PLC to an M580 in the next 1-2 years.

2	**Radio Tower**

- A Yagi antenna on a free-standing radio tower points to the Hwy 21 repeater station, PLC communications is via serial MB protocol for system stability.
- Overhead guy wires support the antenna cable into the building.
- The original MDS 4710 radio as well as the newer SD4 radio are in the cabinet.

Item 2 - Recommendations

- Replace antenna and cable with SCADA refresh.
- Recycle old MDS 4710 radio.

3	**Piping**

- The piping is a mixture of threaded and flanged components.
- Corrosion is found on several flanges and needs to be addressed.
- The pipe is sagging due to poor supports.

Item 3 - Recommendations

- Repair piping, clean flanges and paint.

4	**Instrumentation**

- The E&H flow meter is in good condition, has grounding rings and is grounded correctly.

Item 4 - Recommendations

- None

5	**Level Transmitter**

- The Commission has a dedicated level transmitter, a Siemens MultiRanger 100 unit, that is also in good condition.

Item 5 - Recommendations

- None

Item No.	Description
6	**Chlorine Analyser**

- The local chlorine analyser is a ProMinent unit using a CTE sensor (total chlorine) and is in good condition.
- The unit is functional, and the incoming water line appears to be installed correctly.

Item 6 - Recommendations

- The chlorine analyser discharge rises and then falls to a drain line connection tube. This needs to be replumbed as it imposes some back pressure on the analyser discharge and the direct connection could allow back contamination into the analyser for the drain line.

2.13.2.2 Electrical and Controls Photos

Table 2-35 Photos – New Sarepta Fill Station – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
Radio Tower	CL2 for Commission	Flowmeter
		
Pressure Transmitter	Flow Valve; Rusting	Level Transmitter

Photo/Description	Photo/Description	Photo/Description
		
PLC Cabinet Sola	PLC Rack	New Radio (top) & Old Radio
		
Incoming PIT		

2.13.3 Process Mechanical

The New Sarepta Fill Station consists of stainless steel piping ranging in size from 50 mm to 100 mm, configured for controlled filling. Flow control and isolation are provided through four (4) manually actuated butterfly valves, three (3) manually actuated ball valves, and one (1) electrically actuated ball valve for automated control. The system incorporates a pressure control reducing valve (PCV) that maintains a downstream pressure of approximately 272 kPag (39.5 psig) against an upstream supply pressure of 314 kPag (45.5 psig). An air release valve is located upstream the facility's flow meter on the high end.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, electronic pressure transducers for upstream and downstream for pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality.

2.13.3.1 Process Mechanical Observations and Findings

Item No.	Description
1.	Victaulic Couplings – Images: Table 2-36 a, Table 2-36 b, and Table 2-36 c

- Active and advancing corrosion at various Victaulic coupling connections.

Item 1 - Recommendations

- Replace all affected corrosion observed Victaulic couplings and re-seat on cleaned piping ends to ensure uniform gasket compression and seal integrity.

2	Active Corrosion on Flanges and Pipe – Images: Table 2-36 d, Table 2-36 e, and Table 2-36 f

- Active and advancing corrosion with corrosion blooming for flanges and threaded pipe sections.

Item 2 - Recommendations

- Replace severely rusted or bloom-corroded flanges and threaded pipe sections with ASTM A312 TP316L stainless steel that has been pickled and passivated per ASTM A380 and A967.

3	Galvanic Dissimilar Connections - Images: Table 2-36 g, and Table 2-36 h

- Brass valves connected directly to stainless steel piping - active and aggressive corrosion.
- Carbon steel epoxy-coated PCV installed on stainless steel piping - galvanic corrosion risk.

Item 3 - Recommendations

- Replace valve with stainless steel and install dielectric union.
- Install isolation kits (Mylar sleeves and washers) at all dissimilar metal interfaces—to mitigate galvanic corrosion.

4	Piping Supports – Images: Table 2-36 i, Table 2-36 j, Table 2-36 k, and Table 2-36 l

- Stainless steel process piping is supported on likely aluminum or galvanized Unistrut framing using standard metal clamps, creating a galvanic potential between dissimilar materials in a humid environment.

Item 4 - Recommendations

- Clamp BVT or equivalent, which incorporate a rubber barrier to prevent direct metal-to-metal contact.
- Where feasible, apply non-conductive shims (EPDM or neoprene pads) between the pipe and Unistrut channel to provide electrical isolation and reduce corrosion potential.

5	PCV Integrity – Image: Table 2-36 m

- The existing PCV appears to be in good external condition. Installed in 2009, it is approaching mid-life for typical service expectancy. There is no record confirming internal inspection or pilot rebuilds since installation.

Item 5 - Recommendations

- Conduct a complete internal inspection of the PCV body and seat.
- Replace the diaphragm and pilot assembly rebuild kit, consistent with manufacturer service recommendations (typically every 5–7 years).

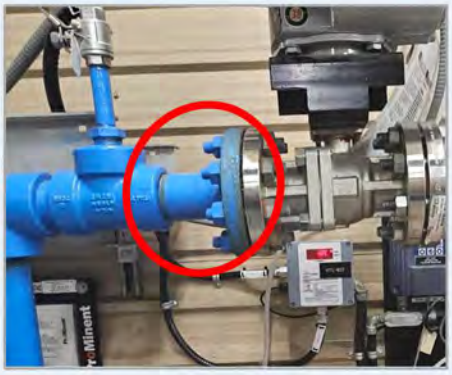
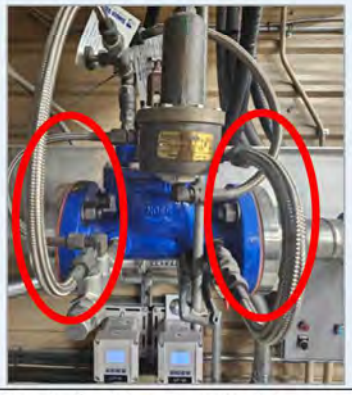
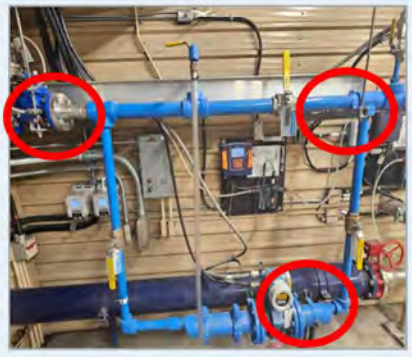
Item No.	Description
	• Verify that pilot tubing and strainers are free from scale or debris and confirm correct orientation and pressure sensing line routing.
6	**Backflow Protection (CSA B64 Compliance) Image: Table 2-36 n**
	• Hose bib connections observed on the fill piping do not provide adequate backflow or anti-siphon protection, contrary to CSA B64 requirements for potable systems.
	Item 6 - Recommendations
	• Install approved backflow prevention and anti-siphon devices on all hose bib connections.
7	**Non-Destructive Testing (NDT) Recommandation**
	Note: Not included in budgetary planning costs – General Estimate $15,000
	• There is evidence of active pipe corrosion on the surface within the facility. Internal corrosion or wall loss is not visible externally.
	Item 7 - Recommendations
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

2.13.3.2 Process Mechanical Overall Summary

Overall, the New Sarepta fill system exhibits active moderate corrosion due to a combination of moisture exposure, galvanic coupling, and localized coating failures. Proactive replacement of corroded fittings, isolation of dissimilar metals, and scheduled internal valve maintenance will extend the service life of the system and improve compliance with modern potable water standards. Additionally, supporting piping appropriately will extend the service life of the system.

2.13.3.3 Process Mechanical Photos

Table 2-36 Photos – New Sarepta Fill Station – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Leaking Victaulic Coupling and Pipe Corrosion	b. Leaking Victaulic Coupling and Pipe Corrosion	c. Victaulic Coupling Weeping and Corrosion
		
d. Flange and Pipe Corrosion Bloom	e. Corrosion of Bolts and Washers	f. Pipe Corrosion
		
g. Galvanic Dissimilar Materials with Corrosion	h. Dissimilar Metals of Stainless and Carbon Steel	i. Improper Pipe Supports

Photo/Description	Photo/Description	Photo/Description
		
j. Improper and Corroded Pipe Supports	k. Improper Pipe Supports	l. Improper Pipe Supports
		
m. PCV	n. Unprotected Potable Water Connection	

2.13.4 Building Mechanical

The New Sarepta Fill Station is a shared with the Leduc County. The building mechanical system was not reviewed.

2.14 Telford Booster Station

The Telford Booster Station is located on the south side of Telford Lake, along Lions Park Road. This facility provides system pressure to the Millet Line, which services the City of Leduc Robinson Reservoir and the Town of Millet. The Telford Lake Booster Station was constructed in 2016/2017, with Associated Engineering (Associated) conducting the initial facility assessment in 2020. Associated has now returned five years later (2025) to complete a follow-up assessment to evaluate the current condition. Associated's observations from the facility are summarized below.

2.14.1 Electrical

The Telford Lake Booster Station has a 3 phase 600V 225kVA utility transformer with pad mounted metering. This feeds underground to a 450A MCB that then connects to 600V manual transfer switch (ampacity unknown). The transfer switch connects to an external portable generator connection box and a 600V 600A EATON Switchboard (PDP-100). The PDP powers a distribution transformer (30kVA) and two external cabinet mounted VFDs (400A breakers). The Telford Booster Station contains two 200HP VFD driven pumps operating in Duty/Standby

configuration. The incoming service is too small for both pumps to run at the same time even for a brief transfer of Lead status. As built, the station must shut down before restarting the other pump.

2.14.1.1 Electrical Observations and Findings

Item No.	Description
1.	**Electrical Equipment**

- The electrical equipment appears to be in good condition with no obvious signs of corrosion but given how new the station is none was expected. Typical electrical equipment if maintained can last 20 to 25 years. Because this station is surrounded by forest and trials rodent infestation into the equipment is possible.

Item 1 - Recommendations

- Every 5 to 10 years the equipment needs to be de-energized and cleaned/inspected for rodent damage.

2.	**VFD Inlet Screens**

- The VFD inlet screens and are very dirty and covered in dust.
- Inlet filters need to be changed and the insides of the VFD cleaned for dust. Dust will increase heat retention in the drives and shorten their life expectancy.

Item 2 - Recommendations

- Recommend the PDP be serviced as well by qualified personnel. Based on observation the PDP is expected to be dusty as well. This same condition was noted last inspection as well.

3.	**Smoke Detector**

- A smoke detector was not noted as present. One is not required but is good to have as a warning alarm.

Item 3 - Recommendations

- Install a smoke detector with alarm contact to PLC in next 5-10 years.

4.	**Emergency Lighting Wall Packs**

- Emergency lighting wall packs are present on the walls and are in good condition.
- The Exit sign over the door is now lit.
- An emergency light was observed to the right of the door, not directly over the door, to provide direct illumination of the exit.

Item 4 - Recommendations

- Recommend replace the exit sign with a combination exit and lighting sign for correct exit illumination per code.

Item No.	Description
5.	**Exit Signs**

- Exit signs are possibly incorrectly powered.
- Code requires the emergency lights be on the same circuit powering the overhead lights (unswitched). The intent is if power is lost to the overhead lights and not via a light switch then the emergency packs automatically activate.

Item5 - Recommendations

- Recommend replace the exit sign with a combination exit and lighting sign for correct exit illumination per code.

6.	**Security Alarm**

- An alarm via keyed switch is used for security.
- The system is functional.
- A NetworX alarm panel was located on the wall but its function is not clear if it is integrated to the PLC or is a standalone unit that is armed/disarmed by the keyed switch.

Item 6 - Recommendations

- None

7.	**Carbon Monoxide Detector**

- A Carbon Monoxide detector was not observed in this facility.
- They are not required by code but should be added to match other Commission facilities. If installed, they should be replaced every 10 years.

Item 7 – Recommendations

- Replace every 10 years; note install date on unit.

8.	**PLC Cabinet UPS**

- PLC cabinet UPS is a single unit.

Item 8 - Recommendations

- UPS batteries should be replaced every 5 years on average; this one had a Dec 2024 service sticker on the unit.

9.	**Power Conditioner**

- No power conditioner is installed to filter the power going to the UPS.

Item 9 - Recommendations

- Recommend adding a power filter like an EATON AEGIS unit.

2.14.2 Controls

The control system PLC is a Schneider M340 PLC and the radio is a GE MDS SD4 licensed radio. The M340 is a current platform and consistent with the rest of the stations in the SCADA.

A Yagi antenna is mounted on a mast pointing to the HWY 21 repeater station. PLC communications are via serial MB protocol for system stability. This station has an ethernet switch for HMI PLC communications as well as connection to a "SCADADroid" cellular alarm dialer.

2.14.2.1 Controls Observations and Findings

Item No.	Description
1.	**Control System PLC**

- The control system PLC is a Schneider M340 PLC.
- The radio is a GE MDS SD4 licensed radio.
- The M340 is a current platform and consistent with the rest of the stations in the SCADA.

Item 1 - Recommendations

- Replace radio with SCADA refresh.

2	**Radio Tower**

- A Yagi antenna is mounted on a mast pointing to the HWY 21 repeater station.
- PLC communications are via serial MB protocol for system stability.
- This station has an ethernet switch for HMI PLC communications as well as connection to a "SCADADroid" cellular alarm dialer.

Item 2 - Recommendations

- Replace antenna and cable when radio is replaced.

3	**Local HMI**

- A GE QuickPanel provides a local HMI for this facility and is in good condition.

Item 3 - Recommendations

- None

4	**Terminals and Wiring**

- Terminals and wiring appear in good condition as the system is new.

Item 4 - Recommendations

- None

5	**Power Supplies**

- Dual 24VDC power supplies are present in the cabinet; nothing faulted.
- Power supplies appear in good condition.

Item No.	Description
Item 5 - Recommendations	
	• None
6	**Dialer**
	• With the SCADA connected to the Master node a local alarm dialer is redundant with additional monthly cellular fees for alarm calling that can be handled by the Master node.
Item 6 - Recommendations	
	• Recommend deactivating this dialer.
7	**Online Instrumentation**
	• Online instrumentation is in good condition. • One major issue is the pressure gauge and transmitter arrangements. Refer to photos, the piping is very non-standard and will allow for air to trap in the line going to the transmitter.
Item 7 - Recommendations	
	• Recommend all these trees be reconfigured such that the piping goes **line tap -> isolation valve -> tee -> gauge, and from the other tee half -> Block and Bleed valve -> pressure transmitter**. • This configuration will ensure air is never trapped at the transmitter.
8	**Flow Meter**
	• The flow meter is in good condition but does not have grounding rings. • Because the piping is coated steel it is considered non-conductive and stainless steel grounding rings are recommended by the manufacturer.
Item 8 - Recommendations	
	• Associated recommends stainless steel grounding rings and a ground connection be installed.
9	**Thermostat**
	• A low building temperature thermostat is located on the wall, but it is in degrees F not Celsius.
Item 9 - Recommendations	
	• Suggest at least a fine marker to note typical Celsius values.

2.14.2.2 Electrical and Controls Photos

Table 2-37 Photos – Telford Booster Station – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
Radio Mast & Power Service	Utility Transformer	Electrical Equipment
		
Distribution Panel	Exit Sign	VFD Face
		
VFD Intake Filter; Plugged	PDP-100	PLC cabinet HMI

Photo/Description	Photo/Description	Photo/Description
		
PLC Cabinet Interior	Cellular Modem and Router	Radio
		
Odd Gauge Arrangement	Flowmeter - No Grounding Rings	Incorrect Power To Emergency Light

2.14.3 Process Mechanical

The Telford Lake Booster Station is equipped with stainless steel process piping ranging from 100 mm to 300 mm in diameter. The piping configuration comprises parallel suction headers that converge into a single discharge header supplying the downstream distribution system. Flow modulation and isolation are achieved through eleven (11) manually operated butterfly valves strategically positioned throughout the system. Two horizontally mounted split-case centrifugal pumps provide discharge flow to the distribution piping network. Each pump is fitted with an independent pressure control valve (PCV) to maintain consistent discharge pressure and prevent hydraulic transients.

The station operates with an inlet pressure of approximately 329 kPag (47.7 psig) and delivers an outlet pressure of 681 kPag (98.8 psig) under normal operating conditions. Air release valves are installed on each pump discharge line and at the upstream high point near the facility's electromagnetic flow meter to mitigate air entrapment and ensure accurate flow measurement.

Instrumentation within the facility includes an electromagnetic flow meter for continuous flow monitoring and electronic pressure transducers located both upstream and downstream of each pump to provide real-time pressure data for operational control and performance verification.

2.14.3.1 Process Mechanical Observations and Findings

Item No.	Description
1.	**Air Release Valve Isolation Assemblies – Image: Table 2-38 a**

- Both isolation valves on the air release lines for the booster pump and fill piping exhibit superficial rusting on the valve bodies and hardware.
- The corrosion pattern indicates that moisture and minor discharge from the air release ports are flowing down the valve body during operation, resulting in surface rust formation.

Item 1 - Recommendations

- Mechanically clean affected areas using an approved rust-removal agent compatible with stainless steel surfaces.
- Pipe the air release outlet with rigid PVC or CPVC tubing to the floor drain to prevent discharge from contacting valve or metal surfaces.

2	**Victaulic Couplings – Suction and Fill Piping – Images: Table 2-38 b, Table 2-38 c, Table 2-38 d, and Table 2-38 e**

- Superficial rusting is observed on several Victaulic couplings located on suction and fill lines entering and leaving the station through the floor slab.

Item 2 - Recommendations

- Clean couplings using Victaulic-approved cleaning and maintenance methods, such as mechanical brushing and application of Victaulic-recommended coating or touch-up paint (per manufacturer guidance).
- Monitor for recurring rust formation; if pitting or corrosion reappears, replace couplings and inspect adjoining pipe ends for under film corrosion.

3	**Pressure Control Valves (PCVs) - Image Table 2-38 f**

- The existing PCVs are approaching 10 years in service, which aligns with the recommended interval for major servicing.
- No visible external corrosion or leakage was noted; however, routine internal inspection and component replacement are due.

Item 3 - Recommendations

- Conduct internal inspection of valve bodies and replace diaphragms and pilot assembly components using OEM rebuild kits in accordance with the manufacturer's service interval (typically every 7–10 years).
- Verify pilot control performance and recalibrate setpoints following reassembly.

4	**Welding Quality of Flanges – Images: Table 2-38 g, Table 2-38 h, Table 2-38 i, Table 2-38 j, Table 2-38 j., Table 2-28 l, Table 2-28 m, Table 2-28 n, and Table 2-28 o**

- Numerous flange welds within the facility exhibit indications of substandard welding quality, including evidence of contamination and embedded impurities.
- Active surface corrosion is present on multiple welds and previously cleaned or mechanically brushed areas are exhibiting recurring rust formation, suggesting incomplete surface treatment and inadequate post-weld passivation.

Item No.	Description
	Item 4 - Recommendations
	• Perform a comprehensive inspection of all exposed and uncoated welds to identify areas of active or potential corrosion. • Mechanically prepare affected weld surfaces and conduct full pickling and passivation treatment in accordance with ASTM A380 and ASTM A967 to restore corrosion resistance. • Following treatment, implement a monitoring program to verify weld surface stability and evaluate the effectiveness of passivation. • Assess and improve humidity control or ventilation within the facility to reduce moisture accumulation that may accelerate corrosion on stainless steel surfaces reassembly.
5	**Non-Destructive Testing (NDT) – Images: Table 2-38 p, Table 2-38 q, and Table 2-38 r**
	Note: Not included in budgetary planning costs – General Estimate $15,000 • Active corrosion is present on external sections of process piping, largely superficial and minor but will lead to integrity challenges in the near future.
	Item 5 - Recommendations
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

2.14.3.2 Process Mechanical Overall Summary

The Telford Lake Booster Station is generally in good operational and structural condition, with process piping, valves, and equipment showing only minor to moderate cosmetic corrosion. The stainless steel process piping and major mechanical components remain serviceable and structurally sound. However, localized areas of concern were noted, primarily related to superficial corrosion on air release isolation valves and Victaulic couplings, as well as recurring surface rust and quality deficiencies at several flange welds. These conditions are attributed to incomplete post-weld surface treatment, exposure to residual moisture, and limited humidity control within the facility.

The pressure control valves (PCVs) are approaching their 10-year service interval, warranting preventive maintenance and internal inspection to ensure continued reliability and control accuracy. Implementation of a comprehensive weld inspection and passivation program, combined with improved moisture management, will extend the life of the stainless steel system. A strategic non-destructive testing (NDT) program using ultrasonic and radiographic methods is recommended to establish baseline wall thickness and internal condition data for ongoing asset management and long-term performance monitoring.

2.14.3.3 Process Mechanical Photos

Table 2-38 Photos – Telford Lake Booster Station – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Corrosion on Air Release Assembly	b. Active Victaulic Coupling Corrosion Pump Suction	c. Active Victaulic Coupling Corrosion Distribution Piping
		
d. Active Victaulic Coupling Corrosion Pump Suction	e. Active Victaulic Coupling Corrosion Distribution Piping	f. PCV's
		
g. Example of Welding Quality Concerns with Corrosion	h. Example of Welding Quality Concerns with Corrosion	i. Example of Welding Quality Concerns with Corrosion

Photo/Description	Photo/Description	Photo/Description
		
j. Example of Welding Quality Concerns with Corrosion	k. Example of Welding Quality Concerns with Corrosion	l. Example of Welding Quality Concerns with Corrosion
		
m. Example of Welding Quality Concerns with Corrosion	n. Example of Welding Quality Concerns with Corrosion	o. Example of Welding Quality Concerns with Corrosion
		
p. Facility Process	q. Facility Process	r. Facility Process

2.14.4 Building Mechanical

This building was constructed in 2014. The building mechanical system consists of one exhaust fan and associated dampers and hoods, and two unit heaters.

2.14.4.1 Building Mechanical Observations and Findings

Item No.	Description
1.	**Exhaust Fan**

- A wall mounted Greenheck propeller belt driven exhaust fan (Model SB-3H-24), with exhaust damper and hood extracts air from the space.
- A motorized air intake with hood is interlocked with the exhaust fan.
- Controls are A wall mounted thermostat control the exhaust to provide ventilation when the indoor temperature is above wet point.

Item 1 - Recommendations

- None

2.	**Heating**

- Two natural gas fired unit heater, REZNOR brand, provide heating to the space.

Item 2 - Recommendations

- None

3.	**Natural Gas Piping**

- The natural gas piping in the building is not painted or marked.

Item 3 - Recommendations

- None

4.	**Fire Extinguisher**

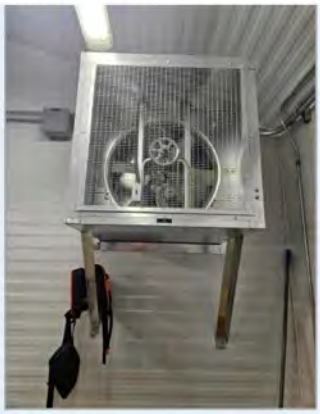
- There is one fire extinguisher beside the door.

Item 4 - Recommendations

- The fire extinguisher shall check and inspected as per Maintenance and inspection schedule.

2.14.4.2 Building Mechanical Photos

Table 2-39 Photos – Telford Booster Station – Building Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Air Intake Hood	b. Air Intake Damper	c. Exhaust Fan
		
d. Exhaust Fan	e. Exhaust Hood	f. Unit Heater
		
g. Unit Heater Flue	h. Unit Heater Flue	

2.15 Town of Millet Fill Station

The Town of Millet Fill Station is located along 45 Avenue and 49 Street. The Town of Millet fill line was constructed in 2016. Associated Engineering (Associated) conducted an initial facility assessment in 2020 to evaluate material performance and system integrity following commissioning. Five years later, Associated has returned in 2025 to perform a follow-up condition assessment. Associated's observations from site inspection are as follows.

2.15.1 Electrical

Electrical power to the fill system is provided by the local pumphouse.

2.15.1.1 Electrical Observations and Findings

Item No.	Description
1.	**UPS**

- A Single EATON Powerware UPS is in the PLC cabinet.

Item 1 - Recommendations

- UPS batteries should be replaced every 5 years; replaced in Dec 2024.

2.	**Power Filter**

- The PLC cabinet does not have a power filter.

Item 2 - Recommendations

- Associated recommends that a power filter like an EATON AEGIS PH120 unit be used to pre-filter noise from the power line before it reaches the UPS.

3.	**Electric Heat Trace**

- Electric heat trace has been installed on the incoming line to the reservoir pumphouse with insulation and metal cladding for the outside pipe segment.
- It appears to be functional and in good condition.

Item 3 - Recommendations

- None

2.15.2 Controls

The control system PLC is a Schneider M340 PLC and the radio is a GE MDS SD4 licensed radio. The M340 is a current platform and consistent with the rest of the stations in the SCADA.

A Yagi antenna is mounted on a mast pointing to the HWY 21 repeater station. PLC communications are via serial MB protocol for system stability. This station has an ethernet switch for PLC communications as well as connection to a "SCADADROID" cellular alarm dialer.

2.15.2.1 Controls Observations and Findings

Item No.	Description
1.	**Control System PLC**

- The control system PLC is a Schneider M340 PLC.
- The radio is a GE MDS SD4 licensed radio.
- The M340 is a current platform and consistent with the rest of the stations in the SCADA.

Item 1 - Recommendations

- Upgrade radio with SCADA refresh.

2	**Radio Tower**

- A Yagi antenna is mounted on a mast pointing to the HWY 21 repeater station.
- PLC communications are via serial MB protocol for system stability.
- This station has an ethernet switch for HMI PLC communications as well as connection to a "SCADADroid" cellular alarm dialer.

Item 2 - Recommendations

- Replace antenna and cable when radio is replaced.

3	**Flow Meter**

- E&H flow meter is in good condition but does not have grounding rings. On non-conductive system this is manufacturer recommended, since this is stainless steel piping technically, they are not required.

Item 3 - Recommendations

- For good measure, Associated recommends grounding rings still be used, especially with poorly grounded piping.

4	**Level Transmitter**

- The Commission has a dedicated level transmitter, a Siemens MultiRanger 100 unit that is also in good condition.
- The level element is located in a shaft directly under the PRV valve and is a very tight installation.

Item 4 - Recommendations

- None

5	**Flow Control Valve**

- Flow control valve and Rotork actuator appear to be in good condition.

Item 5 - Recommendations

- None

6	**PLC Cabinet**

- PLC cabinet wiring is in good condition.

Item No.	Description
	• PLC cabinet has dual 24VDC power supplies and are in good condition.
	Item 6 - Recommendations
	• None
7	**Pressure Transmitters and Gauges**
	• The same issue with Pressure Transmitters and Gauges as identified in the Telford Lake Booster Station is seen here. The piping is non-standard and will allow for air to trap in the line going to the transmitter.
	Item 7 - Recommendations
	• Recommend the two pressure trees be reconfigured such that the piping goes line tap -> isolation valve -> tee -> gauge and from the other tee half -> Block and Bleed valve -> pressure transmitter. • This configuration will ensure air is never trapped at the transmitter.
8	**Chlorine Analyser**
	• Chlorine analyser is a ProMinent with CTE (total chlorine) sensor and in good condition. • The water feed line is piped correctly as it drops down continuously to the instrument avoiding air traps. • The discharge line follows an odd route behind piping to an unknown destination. If this goes to drain or the wet well an air gap is required to be maintained to prevent back contamination of the line into the transmitter. • Incoming pressure was observed to be around 60psi before the PRV, the chlorine analyser PRV tap is exposed to the 60psi but is only rated to 75 psi.
	Item 8 - Recommendations
	• Recommend a second PRV be added to the sample line to ensure failure protection on the line.

2.15.2.2 Electrical and Controls Photos

Table 2-40 Photos – Millet Fill Station – Electrical and Controls

Photo/Description	Photo/Description	Photo/Description
		
	Radio Tower	Incoming Line, ARV and Heat Trace

Photo/Description	Photo/Description	Photo/Description
		
CL_2 Analyser and Piping	PRV and Level Stack	Odd Pressure Gauge Arrangement
		
PLC Cabinet	PLC Rack	Radio
		
Antenna Penetration Needs Sealant		

2.15.3 Process Mechanical

The Town of Millet Fill Station consists of stainless steel process piping ranging in size from 80 mm to 150 mm, configured for controlled filling. Flow control and isolation are provided through three (3) manually actuated ball valves and one (1) modern electrically actuated ball valve for automated operation. The system incorporates a pressure control reducing valve (PCV) that maintains a downstream pressure of approximately 183 kPag (26.5 psig) against an upstream supply pressure of 400 kPag (58 psig). The fill discharge enters the reservoir via an air-gap configuration discharged through the facilities floor.

Instrumentation within the facility includes an electromagnetic flow meter for real-time flow monitoring, an electronic pressure transducer for upstream and downstream pressure measurement, and a reagent-less chlorine analyser that continuously monitors water quality.

2.15.3.1 Process Mechanical Observations and Findings

Item No.	Description
1.	**Victaulic Coupling Corrosion – Image: Table 2-41 a**
	• A single Victaulic coupling is present on the fill line. • The coupling is a carbon steel epoxy-coated model installed on stainless steel process piping. Humidity is present in the facility. • The component is exhibiting active and aggressive corrosion, with evident surface deterioration and coating failure. • The current material combination is incompatible—carbon steel components are susceptible to galvanic corrosion when coupled to stainless steel.
	Item 1 - Recommendations • Replace the existing carbon steel coupling with a full stainless steel Victaulic coupling of equivalent size and pressure rating. • All replacement work shall comply with manufacturer specifications and be completed using stainless-only installation tools to avoid contamination.
2	**Stainless Steel Weld and Piping Condition – Images: Table 2-41 b, Table 2-41 c, Table 2-41 d.,Table 2-41 e, and Table 2-41 f**
	• Visual inspection of stainless steel piping joints indicates post-weld impurities, lack of fusion, and weld overlap, reflecting substandard weld quality. • Evidence of mechanical grinding is observed at all welds, likely performed to remove previous surface rust. • Active rusting is present at virtually all weld locations, caused by post-weld contamination, galvanic effects, and prolonged moisture exposure. • Localized micro-pitting is also observed along pipe runs, indicating progressive surface degradation.
	Item 2 - Recommendations • All affected stainless steel piping and welds are to be cleaned and restored per ASTM A380 (mechanical cleaning and pickling) followed by ASTM A967 (chemical passivation). • Welds exhibiting lack of fusion, overlap, or other visible defects should be cut out and re-welded under an approved procedure to ensure full penetration and fusion quality. • Following repair, ensure galvanic isolation between dissimilar metals, exclusive use of stainless-only tools, and improved environmental control to minimize moisture accumulation.
3	**Galvanic Corrosion Between Carbon Steel Equipment and Stainless Steel Piping – Images: Table 2-41 g, and Table 2-41 h**
	• Carbon steel components, including the combination air/vacuum valve and pressure control valve (PCV), are installed directly on stainless steel piping.

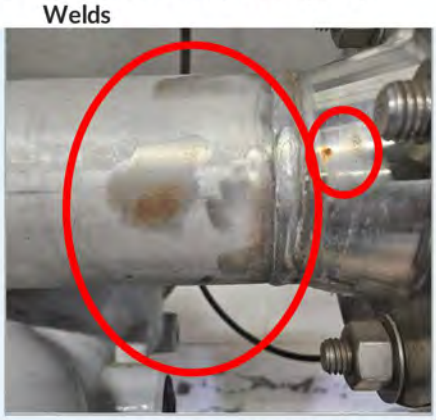
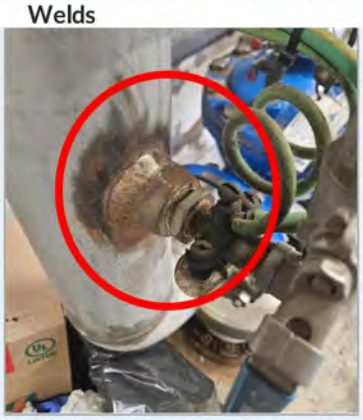
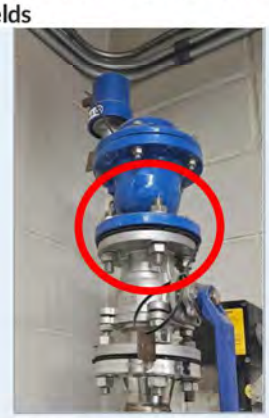
Item No.	Description
	• This material pairing promotes galvanic corrosion under moisture or condensate conditions.
	Item 3 - Recommendations
	• Install appropriate dielectric isolation kits (including gaskets, mylar sleeves, and washers rated to NSF/ANSI 61) at all carbon steel to stainless steel interfaces to mitigate galvanic potential.
4	**Pressure Control Valve (PCV) Maintenance** – Image: Table 2-41 i
	• The PCV body and external surfaces appear in good condition. • The valve is approaching ten years of service life. Routine maintenance is recommended to ensure continued performance and reliability.
	Item 4 - Recommendations
	• Conduct an internal body inspection, replace the diaphragm, and install a pilot rebuild kit per manufacturer specifications.
5	**Non-Destructive Testing (NDT)** – Images: Table 2-41 j, Table 2-41 k, and Table 2-41 l
	Note: Not included in budgetary planning costs – General Estimate $15,000 • Given the presence of corrosion and advancing deterioration at welds, an internal condition assessment is warranted to establish baseline wall thickness data and identify potential hidden deterioration.
	Item 5 - Recommendations
	• It is recommended that a strategic non-destructive piping condition assessment be conducted using ultrasonic thickness (UT) testing and localized radiography (X-ray) at representative sections of the facility's process piping. The intent is to establish a baseline wall thickness and internal condition profile to support future comparative assessments, trend analysis, and long-term asset management planning.

2.15.3.2 Process Mechanical Overall Summary

While the fill station remains functional, corrosion and weld quality issues represent moderate to high priority concerns. Timely corrective actions—including coupling replacement, weld restoration, galvanic isolation, and non-destructive testing—are necessary to preserve the facility's structural integrity and ensure reliable long-term operation within the CRSWSC system.

2.15.3.3 Process Mechanical Photos

Table 2-41 Photos - Millet Fill Station – Process Mechanical

Photo/Description	Photo/Description	Photo/Description
		
a. Corrosion on Victaulic Coupling	b. Active Corrosion, Poor Quality Welds	c. Active Corrosion, Poor Quality Welds
		
d. Active Corrosion, Poor Quality Welds	e. Active Corrosion, Poor Quality Welds	f. Active Corrosion, Poor Quality Welds
		
g. Air Release Dissimilar Metals	h. PCV Dissimilar Metals	i. PCV

Photo/Description	Photo/Description	Photo/Description
		
j. Facility Process	k. Facility Process	l. Facility Process

2.15.3.4 Building Mechanical

This building is shared with the Town of Millet and as such the building mechanical systems were not reviewed.

3 FACILITY UPGRADES

The cost estimates presented in this report are intended for planning and budgeting purposes only. They represent a Class C Estimate as defined by the Association for the Advancement of Cost Engineering (AACE) and industry best practices, with an expected accuracy range of ±30 percent. These estimates are based on preliminary information, typical unit rates, and assumed quantities, and should be refined as project design details are further developed.

Based on the above site observations the following budget is recommended for the facility upgrades as outlined in Table 3-1. The detailed summary for each facility is provided in **Appendix A.**

Table 3-1 2026 to 2030 Budget

Facility	2026	2027	2028	2029	2030
Airport #1 Fill	$51,000	$15,100	$0	$1,200	$15,000
Airport #2 Fill	$23,000	$30,400	$21,000	$1,200	$0
Calmar Fill Station	$203,500	$39,500	$9,500	$1,200	$0
CRSWSC Nisku Booster Station	$0	$0	$0	$3,100	$0
Nisku West Fill Station	$17,500	$52,000	$25,000	$1,200	$10,000
Nisku East Fill Station	$4,000	$6,200	$500	$1,200	$0
Beaumont Fill Station	$6,500	$10,400	$0	$9,200	$0
HWY 21 Booster Station	$10,000	$14,500	$1,000	$11,200	$50,000
Leduc North Reservoir Fill	$15,000	$19,200	$1,000	$100	$0
Leduc Robinson Fill	$6,000	$3,000	$0	$1,200	$0
Armena Fill Station	$22,000	$11,000	$2,500	$1,000	$0
Town of Hay Lakes	$250,000	$54,000	$0	$1,000	$0
Hamlet of New Sarepta	$36,000	$58,500	$0	$1,000	$0
Telford Lake Booster	$16,000	$24,100	$2,500	$1,000	$0
Town of Millet	$33,000	$12,500	$0	$1,000	$0
Yearly Summary	**$693,500**	**$350,400**	**$63,000**	**$35,800**	**$75,000**

4 RECOMMENDATIONS

Through the course of the facility assessment, Associated Engineering (Associated) identified several deficiencies and maintenance considerations requiring attention to ensure continued operational reliability and compliance with asset management best practices. The majority of the identified issues pertain to routine maintenance activities and the planned replacement of components approaching or exceeding their expected service life. A summary of the recommended actions, including suggested timelines for implementation, is provided within this report, and in **Appendix A**.

CLOSURE

This report was prepared for the Capital Region Southwest Water Services Commission to provide the results from Associated Engineering's review and assessment of a selection of Commission facilities.

The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practising under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

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M72575 2026-06-29

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The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

APPENDIX A – CAPITAL UPGRADES

Table 1 - Five Year Capital Plan

	2026	2027	2028	2029	2030
General					
Sub-Total	$0	$0	$0	$0	$0
Facility Upgrades	**2026**	**2027**	**2028**	**2029**	**2030**
Airport #1 Fill	$ 51,000	$ 15,100	$ -	$ 1,200	$ 15,000
Airport #2 Fill	$ 23,000	$ 30,400	$ 21,000	$ 1,200	$ -
Calmar Fill Station	$ 203,500	$ 39,500	$ 9,500	$ 1,200	$ -
CRSWSC Nisku Booster Station	$ -	$ -	$ -	$ 3,100	$ -
Nisku West Fill Station	$ 17,500	$ 52,000	$ 25,000	$ 1,200	$ 10,000
Nisku East Fill Station	$ 4,000	$ 6,200	$ 500	$ 1,200	$ -
Beaumont Fill Station	$ 6,500	$ 10,300	$ -	$ 9,300	$ -
HWY 21 Booster Station	$ 10,000	$ 14,000	$ 1,000	$ 11,200	$ 50,000
Leduc North Reservoir Fill	$ 15,000	$ 19,200	$ 1,000	$ 100	$ -
Leduc Robinson Fill	$ 6,000	$ 3,000	$ -	$ 1,200	$ -
$0	$ 14,000	$ 19,000	$ 2,500	$ 1,000	$ -
Town of Hay Lakes	$ -	$ 304,000	$ -	$ 1,000	$ -
Hamlet of New Sarepta	$ 26,000	$ 68,500	$ -	$ 1,000	$ -
Telford Lake Booster	$ 16,000	$ 21,600	$ 2,500	$ 1,000	$ -
Town of Millet	$ 3,000	$ 12,500	$ -	$ 1,000	$ -
Sub-Total	**$ 395,500**	**$ 615,300**	**$ 63,000**	**$ 35,900**	**$ 75,000**
Yearly Summary	**$ 395,500**	**$ 615,300**	**$ 63,000**	**$ 35,900**	**$ 75,000**

Table 2 - Facility Upgrades - Edmonton International Airport

Facility Name **Airport #1 Fill**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Airport #1 Fill		Electrical	Replace or remove UPS-6C panel from service	$ 1,500	1-2 years
Airport #1 Fill		Electrical	Replace Emergency lighting	$ 1,000	1-2 years
Airport #1 Fill		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
Airport #1 Fill		Electrical	Replace CO detector	$ 100	5-10 years
Airport #1 Fill		Electrical	Replace smoke detector	$ 100	5-10 years
Airport #1 Fill		Controls	The old MDS 4710 series radio has been left in the PLC cabinet post SCADA upgrade. This can be removed and recycled.	$ 100	1-2 years
Airport #1 Fill		Controls	The Level Transmitter (LIT-0580) is discontinued; replace with modern unit.	$ 3,500	1-2 years
Airport #1 Fill		Controls	The pressure gauge between the PRV and flow valve needs a neck extension. The isolation valve handle obscures the face. The gauge is also smaller than the normally recommended 4" dial face.	$ 1,000	1-2 years
Airport #1 Fill	1	Process	Isolate and depressurize valve; open bonnet and inspect seat, plug, and diaphragm. Replace diaphragm, O-rings, and pilot components per manufacturer's kit. If corrosion or scoring is evident, replace entire PRV with an NSF/ANSI 61-certified anti-cavitation model. Re-commission and calibrate to set pressure.	$ 35,000.00	Year 1
Airport #1 Fill	2	Process	Install galvanic isolation hardware on all flange bolts, nuts, and washers for FIT-0520.	$ 3,000.00	Year 1
Airport #1 Fill	3	Process	Replace existing hose bib with an NSF/ANSI 61-certified Watts LF7 backflow and anti-siphon preventor or equivalent. Commission and record annual cross-connection test per CSA B64.10.	$ 3,000.00	Year 1
Airport #1 Fill	4	Process	Remove and reinstall using an NSF-61 dielectric union to isolate stainless and carbon steel threads. Apply NSF-approved thread sealant.	$ 3,000.00	Year 1
Airport #1 Fill	5	Process	Replace with dual-stage stainless regulator (15 psi primary; analyzer-specific secondary). Use NSF-61-approved wetted materials and PTFE tubing. Pressure-test and document.	$ 3,000.00	Year 2
Airport #1 Fill	6	Process	Install galvanic isolation hardware on all flange bolts, nuts, and washers for FCV-0530.	$ 3,000.00	Year 1
Airport #1 Fill	7	Process	Install an NSF-61 dielectric union between the valve and thread-olet to mitigate galvanic corrosion between PCV and FCV-0530.	$ 3,000.00	Year 1
Airport #1 Fill	8	Process	Decommission mechanical level cable; install modern electronic level transmitter (submersible or radar) and integrate to SCADA.	See Electrical	Year 3 – 4
Airport #1 Fill	9	Process	Replace all existing butterfly valves with NSF/ANSI 61-certified units. Verify closure and tag for service direction.	$ 15,000.00	5
Airport #1 Fill	10	Process	Continue annual inspection; perform spot touch-ups using potable-approved epoxy where coating damage is observed.	$ -	Ongoing
Airport #1 Fill	11	Process	Conduct ultrasonic-thickness (UT) testing and localized radiography on representative pipe sections to establish baseline wall thickness data for future corrosion trending.	$ -	Not Included in Planning Budget. See Document Section
Airport #1 Fill	12	Process	Remove or cap unused stanchion bases and mark floor area to eliminate trip hazard.	$ 5,000.00	Year 2
Airport #1 Fill		Building Mechanical	Forced air furnace and accessories		
Airport #1 Fill		Building Mechanical	Along the ceiling is an exposed uncapped duct. Intent of this duct should be identified and either capped or properly terminated. Based on its location it is assumed to be vent.	$1,000	1

Table 3 - Facility Upgrades - Edmonton International Airport

Facility Name **Airport #2 Fill**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Airport #2 Fill		Electrical	Loose wires hang from a door jamb location for a door sensor. These wires need to be secured and the hole plugged	$ 200	1-2 years
Airport #2 Fill		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
Airport #2 Fill		Electrical	Replace CO detector	$ 100	5-10 years
Airport #2 Fill		Electrical	Replace smoke detector	$ 100	5-10 years
Airport #2 Fill		Controls	The old MDS 4710 series radio has been left in the PLC cabinet post SCADA upgrade. This can be removed and recycled.	$ 100	1-2 years
Airport #2 Fill		Controls	Mount radio power supply correctly to a wall not loose.	$ 100	1-2 years
Airport #2 Fill		Controls	PIT's require Block and Bleed valves.	$ 3,000	2-5 years
Airport #2 Fill		Controls	Replace Flow control valve actuator with standard Rotork.	$ 7,500	2-5 years
Airport #2 Fill		Controls	Replace small pressure gauges with 4" faces.	$ 2,500	2-5 years
Airport #2 Fill	1	Process	Remove affected corroded Victaulic couplings for inspection. Replace any pitted or rusted housings. Clean and recoat with Victaulic-approved epoxy touch-up system. Verify HVAC humidity control to prevent reoccurrence.	$ 8,000	Year 2
Airport #2 Fill	2	Process	Disassemble air release connection, confirm valve and pipe materials. Replace with NSF-61 dielectric union between dissimilar metals. Re-seal threads using NSF-approved PTFE tape or sealant and reassemble.	$ 4,000	Year 1
Airport #2 Fill	3	Process	Inspect all support brace materials. Add rubber or EPDM isolating pads between pipe and clamp to eliminate direct metal contact. Standardize all supports to include non-conductive interfaces.	$ 2,000	Year 2
Airport #2 Fill	4	Process	Clean affected flange faces with Citrisurf 77 or equivalent. Rinse and dry. Perform localized pickling and passivation per ASTM A380/A967 to restore oxide layer. Improve HVAC dehumidification if condensation persists.	$ 10,000	Year 2
Airport #2 Fill	5	Process	Remove copper section and replace with PVC (NSF-61) or install dielectric union between stainless and copper. Ensure electrical isolation and confirm leak-tight joint.	$ 5,000	Year 1
Airport #2 Fill	6	Process	Replace all brass and copper components with 316L stainless or appropriate materials. Add dual regulator assembly for redundancy. Include dielectric unions between all dissimilar metals.	$ 3,000	Year 1
Airport #2 Fill	7	Process	Replace brass hose bib with stainless steel equivalent or add dielectric union. Install backflow with anti-siphon.	$ 3,000	Year 1
Airport #2 Fill	8	Process	Install NSF/ANSI 61-certified backflow with anti-siphon preventer (e.g., Watts LF7). Commission and test by certified cross-connection tester. Update CSA B64 test log.	$ 3,000	Year 1
Airport #2 Fill	9	Process	Conduct internal inspection of PCV body. Replace diaphragm, seat seals, and pilot assembly components. Reassemble, recalibrate, and document pressure setpoint.	$ 6,000	Year 3
Airport #2 Fill	10	Process	Install flange isolation kits (Mylar sleeves, insulating washers) between carbon steel valves and stainless piping. Verify electrical isolation.	$ 10,000	Year 2
Airport #2 Fill	11	Process	Remove rigid grout. Reseal wall penetrations with flexible fire-stop system to accommodate movement. Verify compliance with building and fire code.	$ 5,000	Year 1
Airport #2 Fill	13	Process	Conduct UT and localized radiography on representative piping sections to establish wall thickness baseline. Record data for future trending and asset management.	$ -	Not Included in Planning Budget. See Document Section
Airport #2 Fill		Building Mechanical	one supply duct with grill and return louver, and unit heater		
Airport #2 Fill		Building Mechanical	water marks and rusty spots on the combustion air intake duct to the unit heater	$ 2,000	1-2 years

Table 4 - Facility Upgrades - Calmar Fill Station

Facility Name **Calmar Fill Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Calmar Fill Station		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
Calmar Fill Station		Electrical	Replace CO detector	$ 100	5-10 years
Calmar Fill Station		Electrical	Replace smoke detector	$ 100	5-10 years
Calmar Fill Station		Controls	Radio communication issues are with this location, recommend replacing radio antenna cable and antenna at next SCADA upgrade	$ 5,000	2-5 years
Calmar Fill Station		Controls	Radio power supply appears to be original to radio installation. Replace with new.	$ 500	2-5 years
Calmar Fill Station		Controls	Re-orient incoming PIT to allow for air expulsion	$ -	1-2 years
Calmar Fill Station		Controls	Add funnel and air gap between drain line and drain from Chlorine AIT to prevent sensor contamination. Ensure drain line to reservoir is air gapped to reservoir and holes are sealed.	$ 500	1-2 years
Calmar Fill Station		Controls	Upgrade old MiniRanger to newer version.	$ 3,000	2-5 years
Calmar Fill Station		Controls	Replace tiny pressure gauge between PRV and flow control valve with 4" unit for easier reading.	$ 1,000	2-5 years
Calmar Fill Station	1	Process	Replace all field clamps with cushioned, lined pipe supports (e.g., EPDM-lined saddle/clamps). Install isolation pads between pipe and support steel. Replace missing upper clamp and verify load rating/spacing per ASME B31.3 (Appendix D guidance).	$ 6,000	Year 1
Calmar Fill Station	2	Process	Install electrical isolation at every SS–CS interface (full-face isolating gasket + non-conductive sleeves + insulating washers; dielectric unions on threaded/o-let joints). Verify isolation with continuity test. Identify painted SS sections (spark test/PMI if needed) and label materials on P&IDs.	$ 6,000	Year 1
Calmar Fill Station	3	Process	Remove and replace complete PRV with NSF/ANSI 61 anti-cavitation model; include new pilots, strainers, isolation valves, and sense lines; factory start-up and set-point calibration.	$ 30,000	Year 1
Calmar Fill Station	4	Process	Bray butterfly valves appear to have epoxy-coated steel bodies. While coatings reduce galvanic potential, chips or coating damage will expose the substrate to corrosion. Inspect coating condition and touch up damaged areas per manufacturer specifications. Where stainless flanges or bolting contact coated steel, install mylar sleeves and insulating washers to mitigate galvanic attack.	$ 6,000	Year 1
Calmar Fill Station	5	Process	Demolish failed CS run and replace entire fill piping from indoor SS tie-in to external isolation manhole with 316L SS (pickled/passivated). Provide thrust control, dielectric breaks, hydrotest, and as-built updates.	$ 150,000	Year 1
Calmar Fill Station	6	Process	Install NSF/ANSI 61-certified backflow with anti-siphon preventer (e.g., Watts LF7). Commission and test by certified cross-connection tester. Update CSA B64 test log.	$ 3,000	Year 1
Calmar Fill Station	7	Process	Replace with stainless couplings (e.g., Victaulic Style 77SS or equivalent) and SS hardware; verify groove dimensions and torque to manufacturer specification.	$ 6,000	Year 2
Calmar Fill Station	8	Process	Install NSF-61 dielectric union between brass and stainless; remake threads with NSF-approved sealant; leak test.	$ 2,000	Year 1
Calmar Fill Station	9	Process	Localized clean, pickle, and passivate per ASTM A380/A967 for all affected welds; perform post-treatment inspection (ferroxyl or copper sulfate test) to confirm passivation.	$ 15,000	Year 2
Calmar Fill Station	10	Process	Design and install dedicated actuator support bracket/frame to remove bending/torque from valve shaft; verify alignment and travel after install.	$ 8,000	Year 2
Calmar Fill Station	11	Process	Install SS automatic ARV at high point upstream of magmeter; pipe discharge to drain. Replace downstream brass isolation with SS or add dielectric union to isolate from SS.	$ 10,000	Year 2
Calmar Fill Station	12	Process	Execute NDT program: UT thickness at representative straights/elbows/tees and targeted radiography at critical joints/penetrations; establish CMLs and baseline corrosion map for future trending.	$ -	Not Included in Planning Budget. See Document Section
Calmar Fill Station		Building Mechanical	natural gas fires unit heater, an exhaust fan and accessories		
Calmar Fill Station		Building Mechanical	Recommend that the ventilation within the building be reviewed, to ensure that the ventilation requirements are met.		
Calmar Fill Station		Building Mechanical	•Gas branch to the unit heater is not painted.	$ 500	1

Table 5 - Facility Upgrades - Nisku West Fill Station

Facility Name **CRSWSC Nisku Booster Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
CRSWSC Nisku Booster Station		Electrical	Missing UPS power for camera system; deficiency from construction	$ -	1 year
CRSWSC Nisku Booster Station		Electrical	PLC cabinet has unsecured cabinet light hanging; warranty item from construction.	$ -	1 year
CRSWSC Nisku Booster Station		Electrical	Replace smoke detectors	$ 100	5-10 years
CRSWSC Nisku Booster Station		Electrical	Replace UPS batteries	$ 3,000	5-10 years
CRSWSC Nisku Booster Station		Electrical	HMI computers do not have a UPS; construction deficiency.	$ -	1 year
CRSWSC Nisku Booster Station		Process	Provide safe access: either install a fixed engineered platform with guardrails and ladder compliant with OHS Part 8 / CSA S157, or procure a rated mobile work platform. Add an SOP and signage for PCV maintenance access.	Investigate	Year 2
CRSWSC Nisku Booster Station		Process	Conduct UT thickness survey at representative CMLs (straights, elbows, reducers) and targeted radiography where warranted; store wall-thickness baseline for future trending.	$ -	Not Included in Planning Budget. See Document Section
CRSWSC Nisku Booster Station		Building Mechanical	Heating and ventilation system in the pump room, new in 2025	$ -	
CRSWSC Nisku Booster Station		Building Mechanical	Heating, ventilation and cooling system in the electrical room new, in 2025	$ -	
CRSWSC Nisku Booster Station		Building Mechanical	Heating, ventilation and cooling system in the office area, new in 2025	$ -	
CRSWSC Nisku Booster Station		Building Mechanical	Plumbing and fire protection system, new in 2025	$ -	

Table 6 - Facility Upgrades - Nisku West Fill Station

Facility Name **Nisku West Fill Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Nisku West Fill Station		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
Nisku West Fill Station		Electrical	Replace CO detector	$ 100	5-10 years
Nisku West Fill Station		Electrical	Replace smoke detector	$ 100	5-10 years
Nisku West Fill Station		Controls	Remove obsolete MDS 4710 radio.	$ -	1-2 years
Nisku West Fill Station		Controls	Replace radio power supply with new.	$ 500	1-2 years
Nisku West Fill Station		Controls	Add funnel and air gap between drain line and drain from Chlorine AIT to prevent sensor contamination. Ensure drain line to reservoir is air gapped to reservoir and holes are sealed.	$ 500	1-2 years
Nisku West Fill Station		Controls	Upgrade old MiniRanger to newer version.	$ 3,000	1-2 years
Nisku West Fill Station	1	Process	Isolate and open PRV/PCV bodies; inspect seat/plug; replace diaphragms and full pilot rebuild kits; flush sense lines/strainers; document setpoints. Plan full replacement with anti-cavitation trims if wear or cavitation is noted.	$ 25,000	Year 3
Nisku West Fill Station	2	Process	Abrasive clean pipe stanchions to SSPC SP-3, repair/replace wasted baseplates/anchors, and apply 2-coat potable-approved epoxy; verify support spacing and load rating; add isolation pads where pipe contacts carbon steel.	$ 8,000	Year 2
Nisku West Fill Station	3	Process	Install flange isolation kits (full-face isolating gasket, non-conductive sleeves, insulating washers) at all SS–CS interfaces; verify electrical isolation with continuity test.	$ 4,000	Year 1
Nisku West Fill Station	4	Process	Replace with NSF/ANSI 61-certified butterfly valves; install new gaskets/bolting; implement quarterly exercise and annual leak-by verification log.	$ 10,000	Year 5
Nisku West Fill Station	5	Process	Install SS automatic ARV at the upstream high point; hard-pipe discharge to drain; verify magmeter accuracy post-installation and update calibration record.	$ 40,000	Year 2
Nisku West Fill Station	6	Process	De-energize, disassemble joint; clean flange faces; replace gasket and bolting; reassemble to torque spec; spot-coat exposed metal.	$ 2,000	Year 1
Nisku West Fill Station	7	Process	Mechanically clean to sound metal, apply approved coating; replace any corroded hardware with 316 SS; mark inspection date.	$ 8,000	Year 1
Nisku West Fill Station	8	Process	Install NSF/ANSI 61-certified backflow with anti-siphon preventer (e.g., Watts LF7). Commission and test by certified cross-connection tester. Update CSA B64 test log.	$ 3,000	Year 1
Nisku West Fill Station	9	Process	Perform UT thickness survey at representative straights/elbows/tees and targeted radiography at critical joints; establish corrosion monitoring locations (CMLs) for future trending.	$ -	Not Included in Planning Budget. See Document Section
Nisku West Fill Station		Building Mechanical	A ceiling mounted natural gas fires unit heater provides heating to the room. Based on observation the unit appears in a fair condition.		
Nisku West Fill Station		Building Mechanical	The gas meter is located within the meter room. When the meter is upgraded by the utility company, the gas meter should be relocated to the outside of the building.		
Nisku West Fill Station		Building Mechanical	Wall penetration near the PRV should be filled.	$ 500	1
Nisku West Fill Station		Building Mechanical	No exhaust air vent observed within room. Exhaust vent should be installed to allow for proper air changes within the space and to keep moisture levels down		

Table 7 - Facility Upgrades - Nisku East Fill Station

Facility Name **Nisku East Fill Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Nisku East Fill Station		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
Nisku East Fill Station		Electrical	Replace CO detector	$ 100	5-10 years
Nisku East Fill Station		Electrical	Replace smoke detector	$ 100	5-10 years
Nisku East Fill Station		Controls	Add grounding rings to flow meter and connect to system ground.	$ 2,500	1-2 years
Nisku East Fill Station		Controls	Re-align chlorine analyser feed to eliminate possible air traps in line.	$ 100	1-2 years
Nisku East Fill Station		Controls	PI-0200 is small (2" face); replace with standard 4" face.	$ 500	2-5 years
Nisku East Fill Station		Controls	Add missing Block and Bleed valve to PIT-0200	$ 1,500	1-2 years
Nisku East Fill Station		Controls	Relocate manual sample line to not influence PIT due to pressure gradient	$ 100	1-2 years
Nisku East Fill Station	1	Process	Replace all field clamps with cushioned, lined supports (EPDM/Teflon liners); install isolation pads under saddles; standardize hardware; verify spacing and loads per ASME B31.3	$ 2,000	Year 2
Nisku East Fill Station	2	Process	Install NSF/ANSI 61-certified backflow with anti-siphon preventer (e.g., Watts LF7). Commission and test by certified cross-connection tester. Update CSA B64 test log. Confirm wetted materials; if brass remains, add dielectric union to isolate from stainless/CS; replace clear hose with rated potable hose/tube; remake joints with NSF-61 sealant.	$ 2,000	Year 1
Nisku East Fill Station	3	Process	The 87 psi fill-line branch includes stainless and brass dissimilar metal components with minor surface corrosion. Install dielectric isolation between dissimilar metals	$ 2,000	Year 1
Nisku East Fill Station	4	Process	Perform UT thickness survey at representative straights/elbows/tees and targeted radiography at critical joints; establish corrosion monitoring locations (CMLs) for future trending.	$ -	Not Included in Planning Budget. See Document Section
Nisku East Fill Station		Building Mechanical	The electric baseboard heater provides heating to the space		
Nisku East Fill Station		Building Mechanical	The Fill Station uses one portion of the reservoir building. Air handling unit is in another portion of the building that was not accessible		

Table 8 - Facility Upgrades - City of Beaumont

Facility Name **Beaumont Fill Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Beaumont Fill Station		Electrical	Replace distribution panel with new.	$ 5,000	5-10 years
Beaumont Fill Station		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
Beaumont Fill Station		Electrical	Replace CO detector	$ 100	5-10 years
Beaumont Fill Station		Electrical	Replace smoke detector	$ 100	5-10 years
Beaumont Fill Station		Electrical	Place exit sign over doorway where it is required to be mounted.	$ 300	1-2 years
Beaumont Fill Station		Electrical	Replace external doorway light with newer LED and photocell.	$ 1,000	1-2 years
Beaumont Fill Station		Electrical	Remove old entry door switch.	$ 100	5-10 years
Beaumont Fill Station		Electrical	Replace 600-208 V 15kVA transformer due to age.	$ 3,000	5-10 years
Beaumont Fill Station		Controls	Replace radio power supply.	$ 500	1-2 years
Beaumont Fill Station		Controls	External radio mast support brackets are bent and not a correct use of unistrut. Replace supports.	$ 5,000	1-2 years
Beaumont Fill Station		Controls	Add a funnel and air gap between analyser drain and drain line. Then ensure drain line where it enters reservoir is sealed and air gapped to reservoir to prevent contamination.	$ 500	1-2 years
Beaumont Fill Station		Controls	Replace Miniranger transmitter with newer unit due to age.	$ 3,000	1-2 years
Beaumont Fill Station	1	Process	Install flange isolation kits at every DI–SS interface (full-face isolating gasket, non-conductive sleeves, insulating washers). Verify electrical isolation with continuity test and record in asset log.	$ 2,000	Year 1
Beaumont Fill Station	2	Process	Install NSF/ANSI 61 dielectric unions between brass regulators and SS connections; remake threads with NSF-approved sealant; leak-test and tag.	$ 2,000	Year 1
Beaumont Fill Station	3	Process	Remove threaded joint; install NSF-61 dielectric union between DI ARV and SS nipple; reassemble with NSF-approved sealant; function test ARV.	$ 2,000	Year 1
Beaumont Fill Station	4	Process	Execute NDT baseline: UT thickness at representative straights/elbows + targeted radiography at one flange pair; establish CMLs and enter wall-thickness baseline in asset database for trending.	$ -	Not Included in Planning Budget. See Document Section
Beaumont Fill Station		Building Mechanical	natural gas fired unit heater and a set of manually operated dampers.	$ -	
Beaumont Fill Station		Building Mechanical	The indoor natural gas piping is not painted.	$ 500	1

Table 9 - Facility Upgrades - HWY 21 Booster Fill Station

Facility Name **HWY 21 Booster Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
HWY 21 Booster Station		Electrical	The MCC appears to be in good condition with no obvious signs of corrosion and given it's age it has at least another 10 years of life. There is a good section and a half of spare space provided. Expansion physically is not an issue for this MCC.	$ 50,000	10-15 years
HWY 21 Booster Station		Electrical	Replace BP-707 VFD and harmonic filter due to age.	$ 10,000	5-10 years
HWY 21 Booster Station		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
HWY 21 Booster Station		Electrical	Replace CO detector	$ 100	5-10 years
HWY 21 Booster Station		Electrical	Replace smoke detector	$ 100	5-10 years
HWY 21 Booster Station		Electrical	Replace Sola power filter with new AEGIS power filter.	$ 1,000	2-5 years
HWY 21 Booster Station		Electrical	Install second receptacle outlet for sumps so both sumps can be turned plugged in with different trigger points on for true redundancy.	$ 500	10-15 years
HWY 21 Booster Station		Electrical	Provide sleeves over ground wires at tower to disguise copper from thieves.	$ 500	1-2 years
HWY 21 Booster Station		Controls	Change small 2" pressure gauges on basement piping to larger 4" face dials for easier reading.	$ 2,000	1-2 years
HWY 21 Booster Station		Controls	Clean PIT transmitters faces of white power the tappers to be inside glass.	$ 500	1-2 years
HWY 21 Booster Station	1	Process	Isolate existing/original centrifugal pump; verify and re-torque bonnet and suction flange fasteners to OEM spec using calibrated wrench and cross-pattern; if weep persists, replace casing gasket and suction flange gasket; check alignment and re-commission	$ 2,000	Year 1
HWY 21 Booster Station	2	Process	Victaulic fittings show superficial rusting. Surface prep per manufacturers requirements, and apply approved coating touch-up per manufacturers requirements; inspect coupling for pitting when depressurized—replace only if metal loss detected; record torque on re-assembly.	$ 4,000	Year 2
HWY 21 Booster Station	3	Process	Replace corroded bolts/washers on check valves with SS hardware as compatible; apply anti-seize suitable for potable environments; and isolate from galvanic corrosion; verify torque. Service/verify HVAC dehumidification capacity to maintain RH <60%; add wall RH/temperature logger and trend; ensure condensate drains are clear; keep dehumidifier as backup.	$ 6,000	Year 2
HWY 21 Booster Station	4	Process	Install additional dedicated receptacle/circuit so both sump pumps can operate; reset/raise ON level of floats to prevent submergence of weeping-tile invert; function-test both pumps and alternate lead/lag.	$ 1,000	Year 2
HWY 21 Booster Station	5	Process	Replace all galvanized instrument/sampling fittings with 316L SS; add dielectric unions at any SS–CS threaded interfaces; remake seals with NSF-61 sealant; leak-test	$ 8,000	Year 1
HWY 21 Booster Station	6	Process	Perform UT thickness survey at representative straights/elbows/tees and targeted radiography at critical joints; establish corrosion monitoring locations (CMLs) for future trending.	$ -	Not Included in Planning Budget. See Document Section
HWY 21 Booster Station		Building Mechanical	ventilation system for the pump room		
HWY 21 Booster Station		Building Mechanical	ventilation system for the generator		
HWY 21 Booster Station		Building Mechanical	unit heater		

Table 10 - Facility Upgrades - City of Leduc North Reservoir

Facility Name **Leduc North Reservoir Fill**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Leduc North Reservoir Fill		Electrical	Replace MCB and Main distribution panel with new combined panel.	$ 5,000	1-2 years
Leduc North Reservoir Fill		Electrical	Replace UPS-6E panel.	$ 2,500	1-2 years
Leduc North Reservoir Fill		Electrical	Paint incoming service conduits on exterior by door.	$ 500	1-2 years
Leduc North Reservoir Fill		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
Leduc North Reservoir Fill		Electrical	Replace CO detector	$ 100	5-10 years
Leduc North Reservoir Fill		Electrical	Replace smoke detector	$ 100	5-10 years
Leduc North Reservoir Fill		Controls	Chlorine analyser water feed requires a re-route. As installed it has an air trap.	$ 100	1-2 years
Leduc North Reservoir Fill		Controls	Seal analyser water return line into level hatch to prevent contamination	$ 100	1-2 years
Leduc North Reservoir Fill		Controls	Replace level sensor with newer supported model.	$ 3,000	1-2 years
Leduc North Reservoir Fill	1	Process	Remove galvanized reducer and brass bib assembly. Replace with 316L stainless-steel reducer and valve. Install NSF/ANSI 61 dielectric union between dissimilar metals. Add CSA B64-compliant backflow prevention and antisiphon device.	$ 2,000	Year 1
Leduc North Reservoir Fill	2	Process	Install NSF/ANSI 61-certified backflow with anti-siphon preventer (e.g., Watts LF7). Commission and test by certified cross-connection tester. Update CSA B64 test log.	$ 3,000	Year 1
Leduc North Reservoir Fill	3	Process	Clean surface rust to SSPC standard. Recoat with potable-approved epoxy or polyurethane system. Maintain color coding and record maintenance date.	$ 4,000	Year 2
Leduc North Reservoir Fill	4	Process	Depressurize valve and isolation; repack stem gland with compatible packing per manufacturer procedure and requirements; test to confirm no further leakage.	$ 4,000	Year 2
Leduc North Reservoir Fill	5	Process	Light sand and touch up with appropriate coating; include in maintenance log.	$ 1,000	Year 3
Leduc North Reservoir Fill	6	Process	Extend vent piping to building exterior with screened termination (rodent- and insect-proof). Seal wall/roof penetration with appropriate boot or flashing. The cost associated for this item in budgetary planning would be a City of Leduc Cost. Commission is to coordinate with the City of Leduc to rectify the issue.	$ 10,000	Year 1
Leduc North Reservoir Fill	7	Process	Perform UT thickness survey at representative straights/elbows/tees and targeted radiography at critical joints; establish corrosion monitoring locations (CMLs) for future trending.	$ -	Not included in Planning Budget. See Document Section
Leduc North Reservoir Fill		Building Mechanical	natural gas fired a forced air furnace		
Leduc North Reservoir Fill		Building Mechanical	The furnace does not have an outside air intake. There is insufficient ventilation within the room, due to the observed resting on equipment within the room. The ventilation within the room should be checked for adequacy		

Table 11 - Facility Upgrades - Leduc Robinson Fill Station

Facility Name **Robinson Fill Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Robinson Fill Station		Electrical	A Sola Hevi-duty power conditioner is installed to filter the power going to the UPS. After 10 years this filter needs to be closely inspected for wear and damage and replaced if any found. These units have shown a tendency to wear out and fail if exposed to significant line noise after several years while doing their job of noise filtering. AE recommends replacing this filter proactively with an AEGIS PH120.	$ 3,000	1-2 years
Robinson Fill Station		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
Robinson Fill Station		Electrical	Replace CO detector	$ 100	5-10 years
Robinson Fill Station		Electrical	Replace smoke detector	$ 100	5-10 years
Robinson Fill Station	1	Process	Install a complete flange isolation kit for stainless control valve (full-face insulating gasket, sleeves, washers) at flow control valve. Verify electrical isolation with continuity test post-installation.	$ 3,000	Year 1
Robinson Fill Station	2	Process	Install NSF/ANSI 61-certified backflow with anti-siphon preventer (e.g., Watts LF7). Commission and test by certified cross-connection tester. Update CSA B64 test log.	$ 3,000	Year 1
Robinson Fill Station	3	Process	Perform UT thickness testing and targeted radiography on representative ASTM A139 carbon-steel piping segments. Establish baseline wall thickness for long-term asset management.	$ -	1-2 years
Robinson Fill Station		Building Mechanical	The unit heater is a separation combination type. The unit heater draws combustion air from outside and exhaust flue to outside. The unit heater is in a good condition. There is insufficient ventilation within the room, due to the observed resting on equipment within the room. The ventilation within the room should be checked for adequacy.		

Table 12 - Facility Upgrades - Hamlet of Armena

Facility Name **Armena Fill Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
$0		Electrical	Add an AEGIS PH120 power filter to power circuit feeding UPS.	$ 3,000	1-2 years
$0		Controls	The PLC cabinet has a single power supply. Dual redundant supplies are recommended.	$ 1,000	1-2 years
$0		Controls	Incoming pressure transmitter needs a Block and Bleed to ensure all air is bled away from the sensor for an accurate reading. This tap assembly has a very strange configuration that is not recommended as it can lead to leaks, air traps and skewed sensor readings if water is flowing from the sample valve port. The sample valve is also upstream of the PRV so full system pressure is experienced at this point (92 psi).	$ 2,500	1-2 years
$0		Electrical	Replace UPS batteries.	$ 1,000	5-10 years
$0		Controls	Convert PRV to use a solenoid on the pilot and have the PLC energize the pilot for filling. This way in a power outage the PRV closes when the fill valve cannot.	$ 2,500	1-2 years
$0		Controls	Flow meter does not have grounding rings but since the piping is all SS technically they are not required as water and piping are all in contact and conductive.	$ 2,500	2-5 years
$0	1	Process	Clean, then pickle & passivate affected areas such as piping, flanges, connections per ASTM A380/A967; verify passive layer (ferroxyl or copper sulfate test)	$ 8,000	1-2 years
$0	2	Process	Remove corroded anchors/washers; install 316 SS hardware that is pickled/passivated; clean puddle flange to sound metal, pickle & passivate.	$ 6,000	Year 1
$0	3	Process	Disassemble Victaulic flange adapters as needed; mechanically clean to sound metal; recoat housings with manufacturer-approved system; replace carbon-steel nuts/bolts with 316 SS; add isolation kits (non-conductive gasket, sleeves, insulating washers) at SS–DI flanges; verify electrical isolation with continuity test.	$ 8,000	Year 1
$0	4	Process	Isolate and open PCV; inspect seat/plug/bonnet; replace diaphragm and full pilot rebuild kit; flush/clean strainers and sense lines; recalibrate setpoint and record.	$ 5,000	Year 2
$0	5	Process	Perform UT thickness survey at representative straights/elbows/tees and targeted radiography at critical joints/penetrations; establish CMLs and a corrosion map for future trending.	$ -	Not included in Planning Budget. See Document Section
$0		Building Mechanical	The Armena Fill Station is a combination truck fill and fill station, and the room is shared with the County of Camrose. As such, the building mechanical system was not reviewed.	$ -	

Table 13 - Facility Upgrades - Town of Hay Lakes

Facility Name **Hay Lakes Fill Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Hay Lakes Fill Station		Electrical	AE recommends replacing the Sola power filter with a new AEGIS PH120 unit.	$ 3,000	1-2 years
Hay Lakes Fill Station		Electrical	Single EATON Powerware UPS in cabinet. UPS batteries should be replaced every 5 years.	$ 1,000	5-10 years
Hay Lakes Fill Station		Controls	Replace entire Momentum PLC with M580 series and convert program.	$ 50,000	1-2 years
Hay Lakes Fill Station		Controls	Remove spare SD4 radio in cabinet and store at Nisku Booster.	$ -	Year 1
Hay Lakes Fill Station		Controls	Air gap the chlorine discharge line to a funnel before it runs to the drain.	$ 500	1-2 years
Hay Lakes Fill Station		Controls	Re-route water line feed to chlorine analyser to eliminate air gaps.	$ 500	1-2 years
Hay Lakes Fill Station	1	Process	Replace entire fill system with 316L SS piping (pickled & passivated per ASTM A380/A967). Replace supports with engineered, cushioned/lined clamps and saddle supports rated for load/temperature; add isolation pads; verify spacing and loads per ASME B31.3 (Appendix D guidance). Install dedicated equipment support frames/brackets; remove loads from pipe; re-align spools; verify actuator alignment and valve stem loads; add removable service platforms where required. Re-route and re-elevate piping to provide clearances per OHS/ergonomic best practices	$ 250,000	1-2 years
Hay Lakes Fill Station		Building Mechanical	The Hay Lakes Fill Station is a shared with the Village of Hay Lakes. As such, the building mechanical system was not reviewed.	$ -	

Table 14 - Facility Upgrades - Hamlet of New Sarepta

Facility Name **New Sarepta Fill Station**

LOCATION	Item #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
New Sarepta Fill Station		Electrical	AE recommends replacing the Sola power filter with a new AEGIS PH120 unit.	$ 3,000	1-2 years
New Sarepta Fill Station		Electrical	Single EATON Powerware UPS in cabinet. UPS batteries should be replaced every 5 years.	$ 1,000	5-10 years
Hamlet of New Sarepta		Controls	Replace entire Momentum PLC with M580 series and convert program.	$ 50,000	1-2 years
Hamlet of New Sarepta		Controls	The original MDS 4710 radio as well as the newer SD4 radio are in the cabinet. The 4710 should be recycled.	$ -	Year 1
Hamlet of New Sarepta		Controls	Air gap the chlorine discharge line to a funnel before it runs to the drain.	$ 500	1-2 years
Hamlet of New Sarepta	1	Process	Replace all affected corrosion observed Victaulic couplings and re-seat on cleaned piping ends to ensure uniform gasket compression and seal integrity	$ 6,000	Year 1
Hamlet of New Sarepta	2	Process	Replace severely rusted or bloom-corroded flanges and threaded pipe with ASTM A312 TP316L stainless steel pickled & passivated per ASTM A380/A967.	$ 10,000	1-2 years
Hamlet of New Sarepta	3	Process	Install isolation kits (Mylar sleeves + insulating washers, isolating gaskets as applicable) at all dissimilar metal interfaces to mitigate galvanic corrosion.	$ 6,000	Year 1
Hamlet of New Sarepta	4	Process	Replace/retrofit pipe supports with cushioned clamps (e.g., Eaton Vibra-Clamp BVT or equivalent) to prevent metal-to-metal contact. And include where applicable isolating shims for unistrut as well.	$ 10,000	Year 1
Hamlet of New Sarepta	5	Process	Perform complete internal inspection of PCV body/seat; replace diaphragm and pilot rebuild kit per OEM (5–7 yr interval); verify pilot tubing/strainers are clear and correctly routed.	$ 5,000	Year 2
Hamlet of New Sarepta	6	Process	Install approved backflow prevention and antisiphon devices on all hose bibbs and outlet connections; add to CSA B64 cross-connection testing program.	$ 4,000	Year 1
Hamlet of New Sarepta	7	Process	Implement NDT program: UT thickness and targeted X-ray at representative segments (esp. couplings/flanges) to: establish baseline WT, support predictive maintenance, and enable trend-based renewal planning.	$ -	Not Included in Planning Budget. See Document Section
Hamlet of New Sarepta		Building Mechanical	The New Sarepta Fill Station is a shared with the Leduc County and as such, the building mechanical system was not evaluated.		

Table 15 - Facility Upgrades - Telford Lake Booster

Facility Name **Telford Booster Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Telford Booster Station		Electrical	Clean VFD inlet, outlet and internals. Dirty screens and internals will lead to heat buildup and reduced life. Use a qualified company like PACE to service the equipment.	$ 2,000	Year 1
Telford Booster Station		Electrical	Replace exit sign over door with exit and emergency lights to ensure proper illumination of exit path.	$ 1,500	1-2 Years
Telford Booster Station		Electrical	Install CO detector to match other facilities.	$ 100	1-2 Years
Telford Booster Station		Electrical	Install AEGIS power filter on power line to PLC UPS.	$ 3,000	1-2 Years
Telford Booster Station		Electrical	PLC cabinet UPS is a single unit. UPS batteries should be replaced every 5 years on average.	$ 1,000	5-10 years
Telford Booster Station		Controls	Online instrumentation is new and in good condition. One major issue is the pressure gauge and transmitter arrangements. Refer to photos, the piping is very non-standard and will allow for air to trap in the line going to the transmitter. Recommend all these trees be reconfigured such that the piping goes line tap -> isolation valve -> tee -> gauge, and from the other tee half -> Block and Bleed valve -> pressure transmitter. This configuration will ensure air is never trapped at the transmitter.	$ 5,000	1-2 Years
Telford Booster Station		Controls	Flow meter does not have grounding rings. Because the piping is coated steel it is considered non-conductive and SS grounding rings are recommended by the manufacturer. AE recommends SS grounding rings and a ground connection be installed.	$ 2,500	Year 1
Telford Booster Station	1	Process	Mechanically clean rusted areas using an approved rust remover. Pipe each air-release outlet to floor drain with rigid PVC or CPVC tubing to prevent discharge on valve surfaces. Recoat cleaned areas with a potable-grade corrosion-resistant coating.	$ 8,000	Year 1
Telford Booster Station	2	Process	Clean couplings using Victaulic-approved methods (wire brushing, solvent wipe). Apply manufacturer touch-up coating or paint. Inspect for pitting; replace housings and gaskets if rust reoccurs. Verify torque to manufacturer specs after reassembly.	$ 4,000	Year 2
Telford Booster Station	3	Process	Perform internal inspection of PCV bodies; replace diaphragms, seals, and pilot components using OEM rebuild kits; flush pilot lines and recalibrate pressure setpoints.	$ 8,000	Year 2
Telford Booster Station	4	Process	Perform a comprehensive visual inspection of all exposed and uncoated welds to identify areas of active or potential corrosion. Mechanically prepare affected weld surfaces and conduct full pickling and passivation treatment in accordance with ASTM A380 and ASTM A967 to restore corrosion resistance. Following treatment, implement a monitoring program to verify weld surface stability and evaluate the effectiveness of passivation	$ 5,000	Year 1
Telford Booster Station	5	Process	Conduct UT wall-thickness survey at representative straights/elbows and localized radiography at critical joints. Establish baseline wall-thickness data for future comparative assessments and trend analysis.	$ -	Not Included in Planning Budget. See Document Section
Telford Booster Station		Building Mechanical	one exhaust fan and associated dampers and hoods	$ -	
Telford Booster Station		Building Mechanical	two unit heaters	$ -	
Telford Booster Station		Building Mechanical	The natural gas piping in the building is not painted or marked.	$ 1,000	1

Table 16 - Facility Upgrades - Town of Millet

Facility Name **Millet Fill Station**

LOCATION	ITEM #	DISCIPLINE	ITEM	COST	TIMELINE/ YEAR
Millet Fill Station		Electrical	A Single EATON Powerware UPS is in the PLC cabinet. UPS batteries should be replaced every 5 years.	$ 1,000	5-10 years
Millet Fill Station		Electrical	The PLC cabinet does not have a power filter. AE recommends that a power filter like an Eaton AEGIS unit be used to pre-filter noise from the power line before it reaches the UPS.	$ 3,000	1-2 years
Millet Fill Station		Controls	Install grounding rings on flowmeter for added reliability of readings.	$ 2,500	2-5 years
Millet Fill Station		Controls	Online instrumentation is new and in good condition. One major issue is the pressure gauge and transmitter arrangements. Refer to photos, the piping is very non-standard and will allow for air to trap in the line going to the transmitter. Recommend all these trees be reconfigured such that the piping goes line tap -> isolation valve -> tee -> gauge, and from the other tee half -> Block and Bleed valve -> pressure transmitter. This configuration will ensure air is never trapped at the transmitter.	$ 3,000	1-2 years
Millet Fill Station		Controls	Install second PRV on chlorine sample line as incoming pressure is close to limit of one PRV.	$ 1,500	1-2 years
Millet Fill Station	1	Process	Replace existing carbon-steel coupling with a full 316 SS Victaulic coupling of the same size and rating. Use stainless-only tools during installation to prevent contamination. Verify groove dimensions and torque to manufacturer specifications.	$ 1,000	Year 1
Millet Fill Station	2	Process	Cut out and re-weld defective joints under approved WPS ensuring full fusion. Then mechanically clean and pickle (ASTM A380) followed by passivation (ASTM A967) for all SS welds and spools. Confirm surface quality using ferroxyl or copper-sulfate test. Following repair, ensure galvanic isolation between dissimilar metals, exclusive use of stainless-only tools, and improved environmental control to minimize moisture accumulation	$ 30,000	5-10 years
Millet Fill Station	3	Process	Install dielectric isolation kits (full-face gasket, mylar sleeves, and insulating washers) at each CS–SS interface including PCV, ARV, and appurtenances. Verify electrical isolation with a continuity test.	$ 2,000	Year 1
Millet Fill Station	4	Process	Perform internal inspection of PCV body and seat; replace diaphragm and pilot rebuild kit per OEM. Calibrate pressure setpoint and document maintenance in asset log.	$ 5,000	Year 2–3
Millet Fill Station	5	Process	Conduct UT wall-thickness testing and targeted X-ray at representative straights, elbows, and welds to create a baseline corrosion profile. Use data for future rate-of-loss tracking and renewal planning.	$ -	Not Included in Planning Budget. See Document Section
Millet Fill Station		Building Mechanical	This building is shared with the Town of Millet and as such the building mechanical systems were not reviewed.	$ -	

APPENDIX D - DETAILED RATE ANALYSIS

CRSWSC - Unit Cost Analysis - Scenario 1

Year	Projected Water Demand	Construction Cost (2026 Dollars) ($M)	Operating Cost (2026 Dollars)	Capital Yearly Costs (Fvalue) ($M)	Accured capital (per year)	Earned Interest	Value in Account	Water Reserve Rate ($/m3)	Water Rate
		$ 42,447,000.00		**$ 110,567,749**			$6,763,343		
2025	6,976,620	$ -	$ -				$ 6,763,343	$ 0.49	$ 1.74
2026	7,229,244	$ 644,000.00	$ -	$ 676,200.00	$3,542,330	$ 236,717	$ 9,866,190	$ 0.49	$ 1.74
2027	7,482,028	$ 870,000.00	$ -	$ 959,175.00	$3,292,092	$ 345,317	$ 12,544,424	$ 0.44	$ 1.74
2028	7,744,783	$ 91,000.00	$ -	$ 105,343.88	$3,020,465	$ 439,055	$ 15,898,600	$ 0.39	$ 1.74
2029	8,017,944	$ 52,000.00	$ -	$ 63,206.33	$2,726,101	$ 556,451	$ 19,117,945	$ 0.34	$ 1.74
2030	8,301,969	$ 109,000.00	$ -	$ 139,114.69	$2,490,591	$ 669,128	$ 22,138,550	$ 0.30	$ 1.75
2031	8,596,621	$ 8,363,000.00	$ -	$ 11,207,219.84	$2,578,986	$ 774,849	**$ 14,285,165**	$ 0.30	$ 1.80
2032	8,840,276	$ -	$ -	$ -	$2,652,083	$ 499,981	$ 17,437,229	$ 0.30	$ 1.85
2033	9,091,113	$ -	$ -	$ -	$2,727,334	$ 610,303	$ 20,774,866	$ 0.30	$ 1.90
2034	9,349,351	$ -	$ -	$ -	$2,804,805	$ 727,120	$ 24,306,791	$ 0.30	$ 1.95
2035	9,615,216	$ -	$ -	$ -	$3,076,869	$ 850,738	$ 28,234,398	$ 0.32	$ 2.02
2036	9,888,938	$ -	$ -	$ -	$3,164,460	$ 988,204	$ 32,387,062	$ 0.32	$ 2.07
2037	10,170,758	$ -	$ -	$ -	$3,254,643	$ 1,133,547	$ 36,775,252	$ 0.32	$ 2.12
2038	10,460,922	$ -	$ -	$ -	$3,347,495	$ 1,287,134	$ 41,409,881	$ 0.32	$ 2.17
2039	10,759,683	$ -	$ -	$ -	$3,443,099	$ 1,449,346	$ 46,302,325	$ 0.32	$ 2.22
2040	11,067,305	$ -	$ -	$ -	$3,762,884	$ 1,620,581	$ 51,685,790	$ 0.34	$ 2.29
2041	11,384,058	$ -	$ -	$ -	$3,870,580	$ 1,809,003	$ 57,365,373	$ 0.34	$ 2.34
2042	11,710,222	$ -	$ -	$ -	$3,981,475	$ 2,007,788	$ 63,354,636	$ 0.34	$ 2.39
2043	12,046,082	$ -	$ -	$ -	$4,095,668	$ 2,217,412	$ 69,667,716	$ 0.34	$ 2.44
2044	12,391,937	$ -	$ -	$ -	$4,213,259	$ 2,438,370	$ 76,319,345	$ 0.34	$ 2.49
2045	12,748,092	$ -	$ -	$ -	$4,589,313	$ 2,671,177	$ 83,579,835	$ 0.36	$ 2.56
2046	13,114,863	$ 22,729,000	$ -	$ 63,322,143.72	$4,721,351	$ 2,925,294	**$ 27,904,336**	$ 0.36	$ 2.61
2047	13,492,575	$ -	$ -	$ -	$4,857,327	$ 976,652	$ 33,738,315	$ 0.36	$ 2.66
2048	13,881,564	$ -	$ -	$ -	$4,997,363	$ 1,180,841	$ 39,916,519	$ 0.36	$ 2.71
2049	14,282,176	$ -	$ -	$ -	$5,550,843	$ 1,397,078	$ 46,864,440	$ 0.36	$ 2.76
2050	14,694,769	$ -	$ -	$ -	$5,772,876	$ 1,640,255	$ 54,277,572	$ 0.36	$ 2.81
2051	15,119,710	$ 9,589,000.00	$ -	$ 34,095,345.40	$6,003,791	$ 1,899,715	**$ 28,085,733**	$ 0.36	$ 2.86

CRSWSC - Unit Cost Analysis - Scenario 2

Year	Projected Water Demand	Construction Cost (2026 Dollars) ($M)	Operating Cost (2026 Dollars)	Capital Yearly Costs (Fvalue) ($M)	Net Present Valve	Depenture limit	Debt Servcie Level		Accured capital (per year)	Earned Interest	Value in Account	Water Reserve Rate ($/m3)	Water Rate
		$ 42,447,000.00		$ 110,567,749	$ 67,157,946						$6,763,343		
2025	6,976,620	$ -	$ -						$0	$ -	$6,763,343	$ 0.49	$ 1.74
2026	7,229,244	$ 644,000.00	$ -	$ 676,200.00		$25,409,346.81	$25,409,346.81		$3,542,330	$ 236,717	$ 9,866,190	$ 0.49	$ 1.74
2027	7,482,028	$ 870,000.00	$ -	$ 959,175.00		$26,560,810.33	$26,560,810.33		$3,292,092	$ 345,317	$ 12,544,424	$ 0.44	$ 1.74
2028	7,744,783	$ 91,000.00	$ -	$ 105,343.88		$27,768,512.69	$27,768,512.69		$3,020,465	$ 439,055	$ 15,898,600	$ 0.39	$ 1.74
2029	8,017,944	$ 52,000.00	$ -	$ 63,206.33		$29,035,396.28	$29,035,396.28		$2,726,101	$ 556,451	$ 19,117,945	$ 0.34	$ 1.74
2030	8,301,969	$ 109,000.00	$ -	$ 139,114.69		$30,364,575.93	$30,364,575.93		$2,407,571	$ 669,128	$ 22,055,530	$ 0.29	$ 1.74
2031	8,596,621	$ 8,363,000.00	$ -	$ 11,207,219.84		$31,756,692.74	$31,756,692.74		$2,063,189	$ 771,944	**$ 13,683,443**	$ 0.24	$ 1.74
2032	8,840,276	$ -	$ -	$ -		$32,983,344.03	$32,983,344.03		$1,679,652	$ 478,920	$ 15,842,016	$ 0.19	$ 1.74
2033	9,091,113	$ -	$ -	$ -		$34,258,416.90	$34,258,416.90		$1,727,311	$ 554,471	$ 18,123,798	$ 0.19	$ 1.79
2034	9,349,351	$ -	$ -	$ -		$35,583,861.29	$35,583,861.29		$1,776,377	$ 634,333	$ 20,534,507	$ 0.19	$ 1.84
2035	9,615,216	$ -	$ -	$ -		$36,961,707.56	$36,961,707.56		$2,019,195	$ 718,708	$ 23,272,410	$ 0.21	$ 1.91
2036	9,888,938	$ -	$ -	$ -		$38,394,057.38	$38,394,057.38		$2,076,677	$ 814,534	$ 26,163,622	$ 0.21	$ 1.96
2037	10,170,758	$ -	$ -	$ -		$39,883,113.12	$39,883,113.12		$2,135,859	$ 915,727	$ 29,215,208	$ 0.21	$ 2.01
2038	10,460,922	$ -	$ -	$ -		$41,431,157.52	$41,431,157.52		$2,196,794	$ 1,022,532	$ 32,434,533	$ 0.21	$ 2.06
2039	10,759,683	$ -	$ -	$ -		$43,040,563.97	$43,040,563.97		$2,259,533	$ 1,135,209	$ 35,829,276	$ 0.21	$ 2.11
2040	11,067,305	$ -	$ -	$ -		$44,713,815.39	$44,713,815.39		$2,545,480	$ 1,254,025	$ 39,628,780	$ 0.23	$ 2.18
2041	11,384,058	$ -	$ -	$ -		$46,453,487.50	$46,453,487.50		$2,618,333	$ 1,387,007	$ 43,634,121	$ 0.23	$ 2.23
2042	11,710,222	$ -	$ -	$ -		$48,262,267.97	$48,262,267.97		$2,693,351	$ 1,527,194	$ 47,854,666	$ 0.23	$ 2.28
2043	12,046,082	$ -	$ -	$ -		$50,142,939.21	$50,142,939.21		$2,770,599	$ 1,674,913	$ 52,300,178	$ 0.23	$ 2.33
2044	12,391,937	$ -	$ -	$ -		$52,098,418.81	$52,098,418.81		$2,850,146	$ 1,830,506	$ 56,980,830	$ 0.23	$ 2.38
2045	12,748,092	$ -	$ -	$ -		$54,131,730.21	$54,131,730.21		$3,187,023	$ 1,994,329	$ 62,162,182	$ 0.25	$ 2.45
2046	13,114,863	$ 22,729,000	$ -	$ 63,322,143.72		$56,246,027.08	$56,246,027.08		$3,278,716	$ 2,175,676	**$ 4,294,431**	$ 0.25	$ 2.50
2047	13,492,575	$ -	$ -	$ -		$58,444,588.88	$58,444,588.88		$3,373,144	$ 150,305	$ 7,817,880	$ 0.25	$ 2.55
2048	13,881,564	$ -	$ -	$ -		$60,730,833.36	$60,730,833.36		$3,470,391	$ 273,626	$ 11,561,896	$ 0.25	$ 2.60
2049	14,282,176	$ -	$ -	$ -		$63,108,316.56	$63,108,316.56		$3,570,544	$ 404,666	$ 15,537,107	$ 0.25	$ 2.65
2050	14,694,769	$ -	$ -	$ -		$65,580,745.90	$65,580,745.90		$3,673,692	$ 543,799	$ 19,754,598	$ 0.25	$ 2.70
2051	15,119,710	$ 9,589,000.00	$ -	$ 34,095,345.40		$68,151,971.51	$58,282,562.17	($68,151,971.51)	$3,779,928	$ 691,411	**$ (9,869,409)**	$ 0.25	$ 2.75
2052	15,573,301			$ -		$70,898,495.96	$64,478,288.53		$3,893,325	$ (444,123)	$ (6,420,207)	$ 0.25	$ 2.80
2053	16,040,500			$ -		$73,755,705.34	$71,056,713.67		$4,010,125	$ (288,909)	$ (2,698,992)	$ 0.25	$ 2.85
2054	16,521,715			$ -		$76,728,060.27	$76,728,060.27		$4,130,429	$ (121,455)	$ 1,309,983	$ 0.25	$ 2.90
2055	17,017,367			$ -		$79,820,201.10	$79,820,201.10		$4,254,342	$ 45,849	$ 5,610,174	$ 0.25	$ 2.95
2056	17,527,888			$ -		$83,036,955.20	$83,036,955.20		$4,381,972	$ 196,356	$ 10,188,502	$ 0.25	$ 3.00
2057	18,053,724			$ -		$86,383,344.50	$86,383,344.50		$4,513,431	$ 356,598	$ 15,058,530	$ 0.25	$ 3.05
2058	18,595,336			$ -		$89,864,593.28	$89,864,593.28		$4,648,834	$ 527,049	$ 20,234,413	$ 0.25	$ 3.10
2059	19,153,196			$ -		$93,486,136.39	$93,486,136.39		$4,788,299	$ 708,204	$ 25,730,916	$ 0.25	$ 3.15

CRSWSC - Unit Cost Analysis - Scenario 3

Year	Projected Water Demand	Construction Cost (2026 Dollars) ($M)	Operating Cost (2026 Dollars)	Capital Yearly Costs (Fvalue) ($M)	Net Present Valve	Depenture limit	Debt Servcie Level		Accured capital (per year)	Earned Interest	Value in Account	Water Reserve Rate ($/m3)	Water Rate
		$ 42,447,000.00		$ 110,567,749	$ 67,157,946						$6,763,343		
2025	6,976,620	$ -	$ -						$0	$ -	$ 6,763,343	$ 0.49	$ 1.74
2026	7,229,244	$ 644,000.00	$ -	$ 676,200.00		$25,409,346.81	$25,409,346.81		$3,542,330	$ 236,717	$ 9,866,190	$ 0.49	$ 1.74
2027	7,482,028	$ 870,000.00	$ -	$ 959,175.00		$26,560,810.33	$26,560,810.33		$3,666,194	$ 345,317	$ 12,918,525	$ 0.49	$ 1.79
2028	7,744,783	$ 91,000.00	$ -	$ 105,343.88		$27,768,512.69	$27,768,512.69		$3,794,944	$ 452,148	$ 17,060,273	$ 0.49	$ 1.84
2029	8,017,944	$ 52,000.00	$ -	$ 63,206.33		$29,035,396.28	$29,035,396.28		$3,928,793	$ 597,110	$ 21,522,969	$ 0.49	$ 1.89
2030	8,301,969	$ 109,000.00	$ -	$ 139,114.69		$30,364,575.93	$30,364,575.93		$4,067,965	$ 753,304	$ 26,205,123	$ 0.49	$ 1.94
2031	8,596,621	$ 8,363,000.00	$ -	$ 11,207,219.84		$31,756,692.74	$31,756,692.74		$4,212,344	$ 917,179	**$ 20,127,427**	$ 0.49	$ 1.99
2032	8,840,276	$ -	$ -	$ -		$32,983,344.03	$32,983,344.03		$4,331,735	$ 704,460	$ 25,163,622	$ 0.49	$ 2.04
2033	9,091,113	$ -	$ -	$ -		$34,258,416.90	$34,258,416.90		$4,454,645	$ 880,727	$ 30,498,994	$ 0.49	$ 2.09
2034	9,349,351	$ -	$ -	$ -		$35,583,861.29	$35,583,861.29		$4,581,182	$ 1,067,465	$ 36,147,641	$ 0.49	$ 2.14
2035	9,615,216	$ -	$ -	$ -		$36,961,707.56	$36,961,707.56		$4,711,456	$ 1,265,167	$ 42,124,264	$ 0.49	$ 2.19
2036	9,888,938	$ -	$ -	$ -		$38,394,057.38	$38,394,057.38		$4,845,580	$ 1,474,349	$ 48,444,193	$ 0.49	$ 2.24
2037	10,170,758	$ -	$ -	$ -		$39,883,113.12	$39,883,113.12		$4,983,671	$ 1,695,547	$ 55,123,411	$ 0.49	$ 2.29
2038	10,460,922	$ -	$ -	$ -		$41,431,157.52	$41,431,157.52		$5,125,852	$ 1,929,319	$ 62,178,582	$ 0.49	$ 2.34
2039	10,759,683	$ -	$ -	$ -		$43,040,563.97	$43,040,563.97		$5,272,245	$ 2,176,250	$ 69,627,077	$ 0.49	$ 2.39
2040	11,067,305	$ -	$ -	$ -		$44,713,815.39	$44,713,815.39		$5,422,979	$ 2,436,948	$ 77,487,004	$ 0.49	$ 2.44
2041	11,384,058	$ -	$ -	$ -		$46,453,487.50	$46,453,487.50		$5,578,188	$ 2,712,045	$ 85,777,238	$ 0.49	$ 2.49
2042	11,710,222	$ -	$ -	$ -		$48,262,267.97	$48,262,267.97		$5,738,009	$ 3,002,203	$ 94,517,450	$ 0.49	$ 2.54
2043	12,046,082	$ -	$ -	$ -		$50,142,939.21	$50,142,939.21		$5,902,580	$ 3,308,111	$ 103,728,141	$ 0.49	$ 2.59
2044	12,391,937	$ -	$ -	$ -		$52,098,418.81	$52,098,418.81		$6,072,049	$ 3,630,485	$ 113,430,675	$ 0.49	$ 2.64
2045	12,748,092	$ -	$ -	$ -		$54,131,730.21	$54,131,730.21		$6,246,565	$ 3,970,074	$ 123,647,314	$ 0.49	$ 2.69
2046	13,114,863	$ 22,729,000	$ -	$ 63,322,143.72		$56,246,027.08	$56,246,027.08		$6,426,283	$ 4,327,656	**$ 71,079,109**	$ 0.49	$ 2.74
2047	13,492,575	$ -	$ -	$ -		$58,444,588.88	$58,444,588.88		$6,611,362	$ 2,487,769	$ 80,178,240	$ 0.49	$ 2.79
2048	13,881,564	$ -	$ -	$ -		$60,730,833.36	$60,730,833.36		$6,801,966	$ 2,806,238	$ 89,786,444	$ 0.49	$ 2.84
2049	14,282,176	$ -	$ -	$ -		$63,108,316.56	$63,108,316.56		$6,998,266	$ 3,142,526	$ 99,927,236	$ 0.49	$ 2.89
2050	14,694,769	$ -	$ -	$ -		$65,580,745.90	$65,580,745.90		$7,200,437	$ 3,497,453	$ 110,625,126	$ 0.49	$ 2.94
2051	15,119,710	$ 9,589,000.00	$ -	$ 34,095,345.40		$68,151,971.51	$68,151,971.51		$7,408,658	$ 3,871,879	**$ 87,810,318**	$ 0.49	$ 2.99
2052	15,573,301			$ -		$70,898,495.96	$70,898,495.96		$7,630,918	$ 3,073,361	$ 98,514,597	$ 0.49	$ 3.04
2053	16,040,500			$ -		$73,755,705.34	$73,755,705.34		$7,859,845	$ 3,448,011	$ 109,822,453	$ 0.49	$ 3.09
2054	16,521,715			$ -		$76,728,060.27	$76,728,060.27		$8,095,641	$ 3,843,786	$ 121,761,879	$ 0.49	$ 3.14
2055	17,017,367			$ -		$79,820,201.10	$79,820,201.10		$8,338,510	$ 4,261,666	$ 134,362,055	$ 0.49	$ 3.19
2056	17,527,888			$ -		$83,036,955.20	$83,036,955.20		$8,588,665	$ 4,702,672	$ 147,653,392	$ 0.49	$ 3.24
2057	18,053,724			$ -		$86,383,344.50	$86,383,344.50		$8,846,325	$ 5,167,869	$ 161,667,585	$ 0.49	$ 3.29
2058	18,595,336			$ -		$89,864,593.28	$89,864,593.28		$9,111,715	$ 5,658,365	$ 176,437,666	$ 0.49	$ 3.34
2059	19,153,196			$ -		$93,486,136.39	$93,486,136.39		$9,385,066	$ 6,175,318	$ 191,998,050	$ 0.49	$ 3.39
2060	19,727,792			$ -		$97,253,627.69	$97,253,627.69		$9,666,618	$ 6,719,932	$ 208,384,600	$ 0.49	$ 3.44
2061	20,319,626			$ -		$101,172,948.88	$101,172,948.88		$9,956,617	$ 7,293,461	$ 225,634,678	$ 0.49	$ 3.49
2062	20,929,215			$ -		$105,250,218.72	$105,250,218.72		$10,255,315	$ 7,897,214	$ 243,787,207	$ 0.49	$ 3.54
2063	21,557,091			$ -		$109,491,802.54	$109,491,802.54		$10,562,975	$ 8,532,552	$ 262,882,733	$ 0.49	$ 3.59
2064	22,203,804			$ -		$113,904,322.18	$113,904,322.18		$10,879,864	$ 9,200,896	$ 282,963,493	$ 0.49	$ 3.64
2065	22,869,918			$ -		$118,494,666.36	$118,494,666.36		$11,206,260	$ 9,903,722	$ 304,073,475	$ 0.49	$ 3.69
2066	23,556,016			$ -		$123,270,001.42	$123,270,001.42		$11,542,448	$ 10,642,572	$ 326,258,494	$ 0.49	$ 3.74

APPENDIX E - LARGE DEMAND USER AND INFRASTRUCTURE UPGRADE POLICY

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CAPITAL REGION SOUTHWEST WATER SERVICES COMMISSION

Policy Name: 9 – Large Demand User and Infrastructure Upgrade Policy

Related Bylaws and Policies: Bylaw 01/2021 and Policy 6 – Water Supply Policy

Date Approved: May 28, 2026

Chairman:

Commission Manager:

To be Reviewed Before: May 28, 2031

Policy Objective:

To establish a clear, consistent framework for how the Commission will assess, evaluate, and determine the impacts of proposed water service connections and growth—including connections from Large-Demand Users—on the regional treated water transmission system. This includes identifying potential System Capacity Constraints, determining any required infrastructure upgrades, and allocating financial responsibility for such upgrades. The Policy ensures that system integrity, service reliability, system hydraulics, and long-term planning objectives are protected while enabling responsible and sustainable growth across all Members and Customers.

Definitions:

All existing definitions in the Water Supply Policy remain. The following additional or updated definitions are proposed to be added:

Large-Demand User – the specific water demand attributable to a single proposed customer, development, or service area that exceeds either:

a) When combined with a Member's Forecasted Growth, the Commission's long-term planning projections.

b) The demand projections included within the Commission's Long-Term Demand, and which may trigger the identification of System Capacity Constraints and the requirement for Capacity Upgrades.

Forecasted Growth – Incremental user growth within a Member's service area that is consistent with and supported by the Commission's Long-Term Planning Projections and forms part of the Commission's Long-Term Demand.

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Long Term Planning – The 25 year planning forecast as outlined in the Commission's current Master Plan.

Long-Term Planning Projections – The projected water demand, system requirements, and associated infrastructure needs established and adopted by the Commission through its master plans for the purpose of system planning, capacity management, and investment decisions.

Long-Term Growth – The incremental increase in water demand within a Member's service area that is consistent with and supported by the Commission's Long-Term Planning Projections, representing anticipated and planned development over the applicable planning horizon.

Long-Term Demand – The total projected water demand over the Commission's established planning horizon, as defined through its Long-Term Planning Projections and long-range demand forecasts, including Forecasted Growth within Member service areas, and used to guide system capacity planning and infrastructure development.

Unplanned Capacity Growth – Demand generated by a Large-Demand Customer that exceeds a Member's Forecasted Growth and is not accounted for within the Commission's Long-Term Planning Projections or Long-Term Demand.

System Capacity Constraints – Any condition in which a proposed connection would:

a) Reduce system pressures below Commission design standards

b) Exceed hydraulic, pumping, or transmission capacity

c) Impair water quality, redundancy, or operational reliability

d) Compromise the Commission's ability to reliably serve existing Members and Customers

Interpretation:

a) Forecasted Growth forms part of Long-Term Demand and is planned for by the Commission.

b) Large-Demand Customer Demand represents demand outside of or exceeding planned growth.

c) Unplanned Capacity Growth is the portion of Large-Demand Customer Demand that is not included in Long-Term Demand and may require Member-funded upgrades.

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Policy:

The Commission shall maintain sufficient system capacity to meet Member needs as forecast in its long-term growth plans.

The Commission must ensure that any new connection or increase in demand does not create system capacity constraints or compromise its ability to maintain established service levels. The Commission also seeks to protect capacity for existing Members by requiring that any new connection or demand increase that reduces available capacity contributes financially in proportion to the incremental cost required to add that capacity in the future.

When System Capacity Constraints are identified, the Commission may, at its sole discretion:

a) Deny the proposed connection

b) Approve the connection subject to required Capacity Upgrades

c) Impose demand management, phasing, or operational conditions necessary to maintain system reliability

d) Permit the Member to provide a financial contribution in lieu of constructing the required infrastructure

Responsibilities and Authorities:

The Capital Region Southwest Water Servies Commission Board of Directors is responsible for the review and approval of this policy on or before the review date specified and every 5 years thereafter.

The Commission Manager is responsible for the development, implementation, monitoring, and adherence to this policy.

1) Funding Responsibility for Capacity Upgrades

a) Commission Responsibility – Forecasted Growth:

The Commission shall fund and construct any capacity upgrades required to accommodate Forecasted Growth where:

i. The additional demand aligns with long-term growth projections adopted by the Commission.

ii. The required upgrade is included in the Commission's approved capital and financial plans.

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Interpretation: If growth was predictable and already identified through the Commission's master planning, the Commission funds the required upgrades.

b) Member Responsibility – Unplanned Large Capacity Growth:

A Member shall be responsible for funding all Capacity Upgrades required to support a Large Demand User when:

i. The projected demand of the Large Demand User exceeds the Member's forecasted growth in long-term planning.

ii. The demand necessitates upgrades not included in the Commission's capital plans.

iii. The upgrade accelerates, expands, or advances a Commission planned project solely due to the new user's demand.

iv. The proposed connection would cause System Capacity Constraints as determined through Commission engineering assessments.

Interpretation: If the demand was not forecasted as part of expected growth or would overload the system, the Member funds the required upgrades. The Commission's Board may, at their discretion, vote to waive all or a portion of the applicable surcharge for a Member.

2) Cost Allocation for Mixed Benefits

a) Where a required upgrade benefits both the Large Demand User and the broader system:

i. The Member shall pay the incremental cost attributable to the Large Demand User and the mitigation of any System Capacity Constraints.

ii. The Commission shall pay the portion associated with Forecasted Growth or previously planned system development.

b) The Member shall initially fund the total cost of the required upgrades. The Commission shall reimburse the Member for its share at the time the upgrades would have otherwise been implemented through the Commission's approved capital planning and budgeting process.

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c) In determining the reimbursement amount, the Commission shall recognize the financial impact to the Member of advancing the works, including interest and debt servicing costs incurred during the interim period. The cost of borrowing shall be considered an eligible component of reimbursement and will be based on the market interest rate, subject to any limitations, criteria, or rates established by the Commission. The Commission reserves the right to reimburse approved amounts in a single lump-sum payment.

3) System Capacity Constraints Evaluation

a) The Commission shall conduct hydraulic modelling, engineering evaluations, and operational assessments to determine whether a proposed connection may cause System Capacity Constraints.

b) If constraints are identified, the Commission shall issue a written notice to the Member outlining:

i. The nature of the constraints

ii. Required mitigation measures or capacity upgrades

iii. Cost responsibilities under this policy

iv. Any conditions under which the connection may proceed.

c) The Commission may defer, limit, or condition the approval of the connection until mitigation has been completed.

4) Application and Review Process

a) A Member proposing to connect a Large Demand User shall submit a formal request for capacity assessment to the Commission.

b) The Commission shall complete the following:

i. A hydraulic capacity assessment

ii. An evaluation of System Capacity Constraints

iii. A determination of whether the demand aligns with Forecasted Growth

c) The Commission shall issue a formal Determination of Capacity, identifying available system capacity, any applicable System Capacity Constraints, and the associated cost responsibilities. This determination will include the cost of completing the required capacity assessment, which may be charged back to the prospective or existing Member, as applicable.

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5) Payment and Construction Requirements

a) Member funded Capacity Upgrades must be paid in full prior to construction or financed through agreements approved by the Commission.

b) All Commission upgrades must be designed, tendered, managed, and constructed under the Commission's authority to ensure consistency with system standards.

c) Upon completion, ownership of the infrastructure shall transfer to the Commission unless otherwise agreed in writing.

6) Policy Amendments

a) This Policy may be amended by resolution of the Commission Board.