Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda
Juan De Fuca Water Distribution Commission

Tuesday, May 5, 2026 | **1:30 PM** | **Goldstream Conference Room, 479 Island Hwy, Victoria BC V9B 1H7**

Members of the public can view the live meeting via MS Teams link: **Click here**

G. Baird (Chair), M. Wagner (Vice Chair), S. Donaldson, D. Grove, K. Guiry, K. Pearson, J. Rogers, A. Wickheim

The Capital Regional District strives to be a place where inclusion is paramount and all people are treated with dignity. We pledge to make our meetings a place where all feel welcome and respected.

1. Territorial Acknowledgement

2. Approval of Agenda

3. Adoption of Minutes

3.1. 26-0494 Minutes of the Juan de Fuca Water Distribution Commission Meeting of February 3, 2026

Recommendation: That the minutes of the Juan de Fuca Water Distribution Commission meeting of February 3, 2026 be adopted as circulated.

Attachments: Minutes - February 3, 2026

4. Chair's Remarks

5. Presentations/Delegations

6. Consent Agenda

6.1. 26-0478 Summary of Recommendations from Other Water Commissions

Recommendation: There is no recommendation. This report is for information only.

Attachments: Summary: RWSC - February 18, 2026
Summary: RWSC - March 18, 2026
Summary: RWSC - April 15, 2026
Summary: SPWC - February 5, 2026
Summary: SPWC - April 2, 2026

6.2. 26-0477 Water Watch Report

Recommendation: There is no recommendation. This report is for information only.

Attachments: Water Watch Report - April 27, 2026

7. Commission Business

7.1. 26-0474 General Manager's Verbal Update - May

Recommendation: There is no recommendation. This verbal update is for information only.

7.2. 26-0278 2027 Service and Financial Planning Guidelines

Recommendation: [At the April 8, 2026 Capital Regional District Board meeting, the staff report recommendation was carried.]
There is no recommendation. This report is for information only.

Attachments: Staff Report: 2027 Service & Fin Planning Guidelines
Appendix A: Corp Planning Framework
Appendix B: Fin Planning Timetable-Service & Fin Planning Guidelines
Appendix C: Fin Mgmt Strategies
Appendix D: 2027 Anticipated Req Impacts

7.3. 26-0471 Juan de Fuca Water Distribution Asset Management Plan Overview

Recommendation: There is no recommendation. This report is for information only.

Attachments: Staff Report: JDF Asset Management Plan Overview
Appendix A: JDFWDS Asset Management Plan - Final Report

7.4. 26-0470 2027 Service Delivery - Staffing Requirements

Recommendation: There is no recommendation. This report is for information only.

Attachments: Staff Report: 2027 Service Delivery - Staffing Requirements
Appendix A: JDFWDS Asset Management Plan - Executive Summary

7.5. 26-0469 Monthly Drinking Water Quality Dashboard

Recommendation: There is no recommendation. This report is for information only.

Attachments: Staff Report: Monthly Drinking Water Quality Dashboard
Appendix A: WQ Dashboard - Feb. & Mar. 2026

8. Notice(s) of Motion

9. New Business

10. Adjournment

The next meeting is September 15, 2026.

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Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Meeting Minutes

Juan De Fuca Water Distribution Commission

Tuesday, February 3, 2026 **1:30 PM** **Goldstream Conference Room**
479 Island Hwy
Victoria BC V9B 1H7

PRESENT:
G. Baird (Chair), M. Wagner (Vice Chair) (1:36 pm), S. Donaldson, D. Grove, K. Guiry, K. Pearson (EP), J. Rogers

STAFF: A. Fraser, General Manager, Infrastructure and Water Services; G. Harris, Senior Manager, Environmental Protection (EP); J. Kelly, Manger, IWS Capital Projects; D. Robson, Manager, Saanich Peninsula Gulf Island Operations; D. Dione, Manager, IWS Business Support Services; M. MacDonald, Legislative Services Coordinator (Recorder)

EP - Electronic Participation

Regrets: A. Wickheim

The meeting was called to order at 1:30 pm.

1. Territorial Acknowledgement

Chair Baird provided the Territorial Acknowledgement.

2. Approval of Agenda

MOVED by Commissioner Grove, SECONDED by Commissioner Rogers,
That the agenda for the Juan De Fuca Water Distribution Commission meeting of February 3, 2026 be approved.
CARRIED

3. Adoption of Minutes

3.1. 26-0029 Minutes of the Juan de Fuca Water Distribution Commission Meeting of October 7, 2025

That the minutes of the Juan de Fuca Water Distribution Commission meeting of October 7, 2025 be adopted as circulated.

4. Chair's Remarks

There were no Chair's remarks.

5. Presentations/Delegations

There were no presentations or delegations.

6. Commission Business

6.1. 26-0031 General Manager's Verbal Update - February

A. Fraser spoke to Item 6.1. and advised:
- the Sooke Lake Reservoir hit capacity mid January
- the water watch report shows well below seasonal average until mid-December
- heavy rain in December exemplifies seasonal variability
- importance of infrastructure investments and demand management
- the Regional Water supply Strategic Plan has been made public

Vice Chair Wagner joined the meeting in person at 1:36 pm.

6.2. 26-0035 Juan de Fuca Water Distribution Commission Appointment to Water Advisory Committee

D. Dione presented Item 6.2.

Discussion ensued regarding the requirement for the appointment of Juan de Fuca Water Distribution Commission member alternate.

MOVED by Commissioner Wagner, SECONDED by Commissioner Grove,
That Commissioner John Rogers of the Juan de Fuca Water Distribution Commission be appointed as the Juan de Fuca Water Distribution Commission's representative on the Water Advisory Committee for a one-year term ending December 31, 2026.
CARRIED

6.3. 26-0103 Juan de Fuca Water Distribution System Annual Operational Report

S. Irg presented Item 6.3. for information.

Discussion ensued regarding:
- frequency of water main flushing and related conditions required
- upcoming report on the post disaster program within the next year
- flushing water lines on private property is not under CRD jurisdiction
- the water quality department handles all related calls within the region

6.4. 26-0033 Water Meter Replacement Strategy

J. Marr presented Item 6.4. for information.

Discussion ensued regarding:
- the meter manufacturer has discontinued the models currently in use
- current budget for replacement will prioritize broken meters
- the upcoming asset management plan highlights the need for new meters
- an upcoming meter replacement strategy to provide information on future replacements

6.5. 26-0041 Summary of Recommendations from Other Water Commissions

A. Fraser spoke to Item 6.5. for information.

6.6. 26-0038 Water Watch Report

A. Fraser spoke to Item 6.6. for information.

7. Notice(s) of Motion

There were no notice(s) of motion.

8. New Business

There was no new business.

9. Adjournment

MOVED by Commissioner Guiry, SECONDED by Commissioner Donaldson,
That the Juan De Fuca Water Distribution Commission meeting of February 3, 2026 be adjourned at 2:03 pm.
CARRIED

_____
Chair

_____
Recorder

HOTSHEET AND ACTION LIST

Regional Water Supply Commission

Wednesday, February 18, 2026 **1:30 PM** **6th Floor Boardroom**
625 Fisgard St.
Victoria, BC V8W 1R7

The following is a quick snapshot of the FINAL decisions made at the meeting. The minutes will represent the official record of the meeting. A name has been identified beside each item for further action and follow-up.

6. CONSENT AGENDA

6.1. **26-0182** Summary of Recommendations from Other Water Commissions

Recommendation: There is no recommendation. This report is for information only.

A. Fraser

6.2. ***26-0181*** *Water Watch Report*

Recommendation: There is no recommendation. This report is for information only.

A. Fraser

6.3. ***26-0171*** *Monthly Drinking Water Quality Dashboard*

Recommendation: There is no recommendation. This report is for information only.

G. Harris

7. COMMISSION BUSINESS

7.1. ***26-0031*** *General Manager's Verbal Update – February*

Recommendation: There is no recommendation. This verbal update is for information only.

A. Fraser

7.2. **26-0121** Summary of Peak Demands and High Water Users - Operational Implications and Action Plan

Recommendation: There is no recommendation. This report is for information only.

G. Harris

HOTSHEET AND ACTION LIST

Regional Water Supply Commission

Wednesday, March 18, 2026 **1:30 PM** **6th Floor Boardroom**
625 Fisgard St.
Victoria, BC V8W 1R7

The following is a quick snapshot of the FINAL decisions made at the meeting. The minutes will represent the official record of the meeting. A name has been identified beside each item for further action and follow-up.

6. CONSENT AGENDA

6.1. **26-0336** Water Watch Report — A. Fraser

Recommendation: There is no recommendation. This report is for information only.

6.2. ***26-0317*** *Monthly Drinking Water Quality Dashboard* — A. Fraser

Recommendation: There is no recommendation. This report is for information only.

7. COMMISSION BUSINESS

7.1. ***26-0339*** *General Manager's Verbal Update – March* — A. Fraser

Recommendation: There is no recommendation. This verbal update is for information only.

7.2. **26-0331** Bylaw No. 4754, Water Advisory Committee Bylaw No. 1, 1997, Repeal Bylaw No. 1, 2026 and Revised of Terms of Reference

A. Fraser, K. Morley

Recommendation: The Regional Water Supply Commission recommends to the Capital Regional District Board:
1. That Bylaw No. 4754, "Water Advisory Committee Bylaw No. 1, 1997, Repeal Bylaw No. 1, 2026," be introduced and read a first, second and third time;
2. That Bylaw No. 4754 be adopted; and
3. That the revised Water Advisory Committee Terms of Reference be approved. (NWA)

HOTSHEET AND ACTION LIST

Regional Water Supply Commission

Wednesday, April 15, 2026 **1:30 PM** **6th Floor Boardroom**
625 Fisgard St.
Victoria, BC V8W 1R7

The following is a quick snapshot of the FINAL decisions made at the meeting. The minutes will represent the official record of the meeting. A name has been identified beside each item for further action and follow-up.

6. CONSENT AGENDA

6.1. **26-0432** Summary of Recommendations from Other Water Commissions (A. Fraser)

Recommendation: There is no recommendation. This report is for information only.

6.2. **26-0431** Water Watch Report – April (A. Fraser)

Recommendation: There is no recommendation. This report is for information only.

6.3. **26-0426** Monthly Drinking Water Quality Dashboard – March (G. Harris)

Recommendation: There is no recommendation. This report is for information only.

7. COMMISSION BUSINESS

7.1. **26-0383** General Manager's Verbal Update – April (A. Fraser)

Recommendation: There is no recommendation. This verbal update is for information only.

7.2. **26-0278** 2027 Service and Financial Planning Guidelines (V. Somosan)

Recommendation: [At the April 8, 2026 Capital Regional District Board meeting, the staff report recommendation was carried.]
There is no recommendation. This report is for information only.

7.3. **26-0407** Field Operations Centre Project Capital Plan Amendment and Contract Change Order (A. Fraser)

Recommendation: The Regional Water Supply Commission recommends to the Capital Regional District Board:
1. That the project budget for the New Field Operations Centre Building (16-06), as included in the 2026 Regional Water Supply Capital Plan, be increased by $995,000, funded through a grant from the City of Langford;
2. That the 2026 Regional Water Supply Capital Budget be amended to reallocate $2,000,000 from the Land and Site Works (23-31) to the New Field Operations Centre Building (16-06); and
3. That a change order be authorized under the existing Design-Build contract with Kinetic Design-Build Ltd. for the construction of a sanitary line extension in the amount of $1,242,612 (excluding GST).
WP - All

7.4. 26-0403 Capital Regional District Cross Connection Control Program Update

(G. Harris)

Recommendation: There is no recommendation. This report is for information only.

HOTSHEET AND ACTION LIST

Saanich Peninsula Water Commission

Thursday, February 5, 2026 **9:30 AM** **Mary Winspear Centre - Room 3**
2243 Beacon Ave, Sidney, BC

The following is a quick snapshot of the FINAL decisions made at the meeting. The minutes will represent the official record of the meeting. A name has been identified beside each item for further action and follow-up.

Election of Chair - Commissioner Novek by acclamation

Election of Vice Chair - Commissioner Halldorson by acclamation

8. Commission Business

8.1. **26-0031** General Manager's Verbal Update – February A. Fraser

Recommendation: There is no recommendation. This verbal update is for information only.

8.2. **26-0036** Saanich Peninsula Water Commission Appointment to Water Advisory Committee A. Fraser

Recommendation: That the Vice Chair-Chair of the Saanich Peninsula Water Commission be appointed as the Commission's representative on the Water Advisory Committee for a one-year term ending December 31, 2026.

8.3. ***26-0040*** *Summary of Recommendations from Other Water Commissions* A. Fraser

Recommendation: There is no recommendation. This report is for information only.

8.4. ***26-0039*** *Water Watch Report* A. Fraser

Recommendation: There is no recommendation. This report is for information only.

Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda
Saanich Peninsula Water Commission

Thursday, April 2, 2026 **9:30 AM Town of Sidney Municipal Hall - Arbutus Room**
2440 Sidney Avenue
Sidney, BC

The following is a quick snapshot of the FINAL decisions made at the meeting. The minutes will represent the official record of the meeting. A name has been identified beside each item for further action and follow-up.

6. Commission Business

6.1. **26-0383** General Manager's Verbal Update – April (A. Fraser)

Recommendation: There is no recommendation. This verbal update is for information only.

6.2. **26-0241** Monthly Drinking Water Quality Dashboard (G. Harris)

Recommendation: There is no recommendation. This report is for information only.

6.3. ***26-0379*** *Summary of Recommendations from Other Water Commissions* (A. Fraser)

Recommendation: There is no recommendation. This report is for information only.

6.4. ***26-0376*** *Water Watch Report* (A. Fraser)

Recommendation: There is no recommendation. This report is for information only.

File No. 902-03

CAPITAL REGIONAL DISTRICT - INFRASTRUCTURE & WATER SERVICES

Water Watch

Issued April 27, 2026

Water Supply System Summary:

1. Useable Volume in Storage:

Reservoir	April 30 5 Year Ave		April 30/25		April 26/26		% Existing Full Storage
	ML	MIG	ML	MIG	ML	MIG	
Sooke	91,843	20,206	91,279	20,081	91,646	20,162	98.8%
Goldstream	9,668	2,127	9,824	2,161	9,905	2,179	99.9%
Total	101,511	22,332	101,103	22,243	101,551	22,341	98.9%

2. Average Daily Demand:

For the month of April	116.2 MLD	25.6 MIGD
For week ending April 26, 2026	127.3 MLD	28.0 MIGD
Max. day April 2026, to date:	139.9 MLD	30.8 MIGD

3. Average 5 Year Daily Demand for April

Average (2021 - 2025)	116.9 MLD [1]	25.7 MIGD [2]

[1]MLD = Million Litres Per Day [2]MIGD = Million Imperial Gallons Per Day

4. Rainfall April:

Average (1914 - 2025):	89.1 mm
Actual Rainfall to Date	48.3 mm (54% of monthly average)

5. Rainfall: Sep 1- Apr 26

Average (1914 - 2025):	1,488.3 mm
2025/2026	1,583.4 mm (106% of average)

6. Water Conservation Required Action:

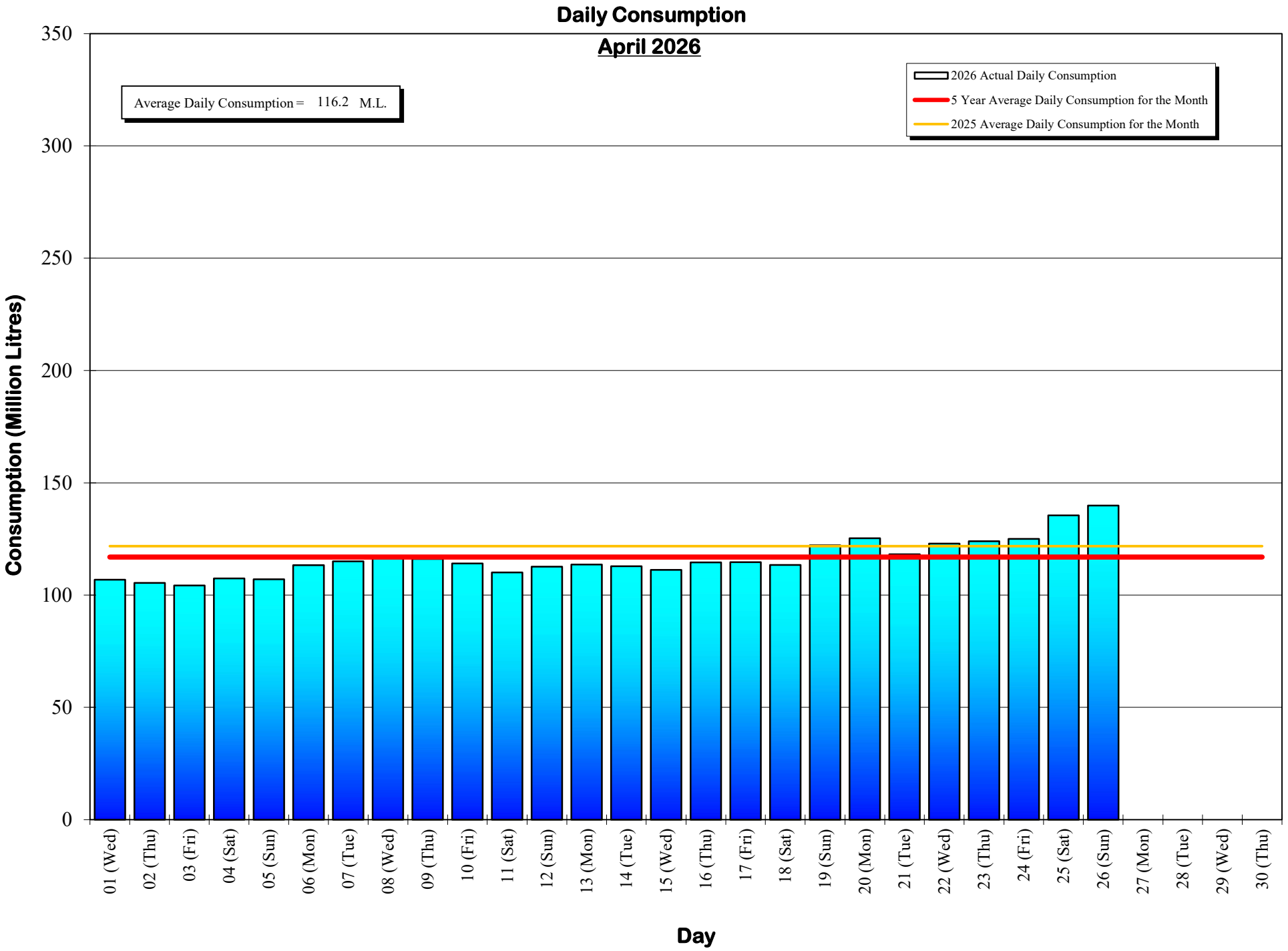
Spring is a great time to check for leaks in your home and yard.
A leaky toilet can waste 20 - 40 litres of water per hour.
Learn how to find and fix leaks on our website at:
https://www.crd.ca/environment/water-conservation/conserving-water-home/fix-leak

For general information regarding water conservation, visit the CRD webpage linked below:
CRD Water Conservation Homepage: https://www.crd.ca/environment/water-conservation

If you require further information, please contact:

Alicia Fraser, P. Eng.
General Manager, CRD - Infrastructure and Water Services
or
Glenn Harris, Ph D., RPBio
Senior Manager - Environmental Protection

CRD Infrastructure & Water Services
479 Island Highway
Victoria, BC V9B 1H7
(250) 474-9600


Daily Consumption
April 2026
Average Daily Consumption = 116.2 M.L.
2026 Actual Daily Consumption
5 Year Average Daily Consumption for the Month
2025 Average Daily Consumption for the Month
Consumption (Million Litres)
350
300
250
200
150
100
50
0
01 (Wed)
02 (Thu)
03 (Fri)
04 (Sat)
05 (Sun)
06 (Mon)
07 (Tue)
08 (Wed)
09 (Thu)
10 (Fri)
11 (Sat)
12 (Sun)
13 (Mon)
14 (Tue)
15 (Wed)
16 (Thu)
17 (Fri)
18 (Sat)
19 (Sun)
20 (Mon)
21 (Tue)
22 (Wed)
23 (Thu)
24 (Fri)
25 (Sat)
26 (Sun)
27 (Mon)
28 (Tue)
29 (Wed)
30 (Thu)
Day

Daily Consumptions: - April 2026

Date	Total Consumption		Air Temperature @ Japan Gulch		Weather Conditions	Precipitation @ Sooke Res.: 12:00am to 12:00am		
	(ML) [1.]	(MIG) [2.]	High (°C)	Low (°C)		Rainfall (mm)	Snowfall [2.] (mm)	Total Precip.
01 (Wed)	106.8	23.5	8	4	Cloudy / Showers	6.6	0.0	6.6
02 (Thu)	105.4	23.2	12	4	Cloudy / P. Sunny	0.0	0.0	0.0
03 (Fri)	104.3 <=Min	23.0	12	5	Cloudy / Showers	2.1	0.0	2.1
04 (Sat)	107.4	23.6	15	5	Cloudy / P. Sunny	0.0	0.0	0.0
05 (Sun)	107.0	23.5	18	5	Cloudy / P. Sunny	0.0	0.0	0.0
06 (Mon)	113.3	24.9	22	6	Cloudy / P. Sunny	0.0	0.0	0.0
07 (Tue)	115.0	25.3	13	4	Sunny	0.0	0.0	0.0
08 (Wed)	116.7	25.7	15	2	Sunny	0.0	0.0	0.0
09 (Thu)	116.1	25.6	17	3	Sunny	0.0	0.0	0.0
10 (Fri)	114.1	25.1	18	4	Cloudy / P. Sunny	0.0	0.0	0.0
11 (Sat)	110.1	24.2	12	8	Cloudy / Showers	3.8	0.0	3.8
12 (Sun)	112.6	24.8	13	8	Cloudy	0.0	0.0	0.0
13 (Mon)	113.6	25.0	13	7	Cloudy	0.0	0.0	0.0
14 (Tue)	112.8	24.8	7	2	Cloudy / Rain	34.3	0.0	34.3
15 (Wed)	111.2	24.5	9	0	Cloudy / P. Sunny / Showers	0.4	0.0	0.4
16 (Thu)	114.5	25.2	12	0	Sunny	0.0	0.0	0.0
17 (Fri)	114.6	25.2	13	3	Cloudy / P. Sunny	0.0	0.0	0.0
18 (Sat)	113.4	25.0	15	3	Cloudy	0.0	0.0	0.0
19 (Sun)	122.2	26.9	21	6	Cloudy / P. Sunny	0.0	0.0	0.0
20 (Mon)	125.3	27.6	24	7	Cloudy / P. Sunny	0.0	0.0	0.0
21 (Tue)	118.2	26.0	15	10	Cloudy / P. Sunny / Showers	1.1	0.0	1.1
22 (Wed)	122.9	27.0	17	9	Cloudy / P. Sunny	0.0	0.0	0.0
23 (Thu)	124.0	27.3	15	7	Cloudy / P. Sunny	0.0	0.0	0.0
24 (Fri)	125.0	27.5	18	5	Sunny	0.0	0.0	0.0
25 (Sat)	135.5	29.8	19	5	Sunny	0.0	0.0	0.0
26 (Sun)	139.9 <=Max	30.8	20	5	Sunny	0.0	0.0	0.0
27 (Mon)								
28 (Tue)								
29 (Wed)								
30 (Thu)								
TOTAL	3021.9 ML	664.85 MIG				48.3	0	48.3
MAX	139.9	30.77	24	10		34.3	0	34.3
AVG	**116.2**	25.57	15.0	4.9		1.9	0	1.9
MIN	104.3	22.95	7	0		0.0	0	0.0

1. ML = Million Litres

2. 10% of snow depth applied to rainfall figures for snow to water equivalent.

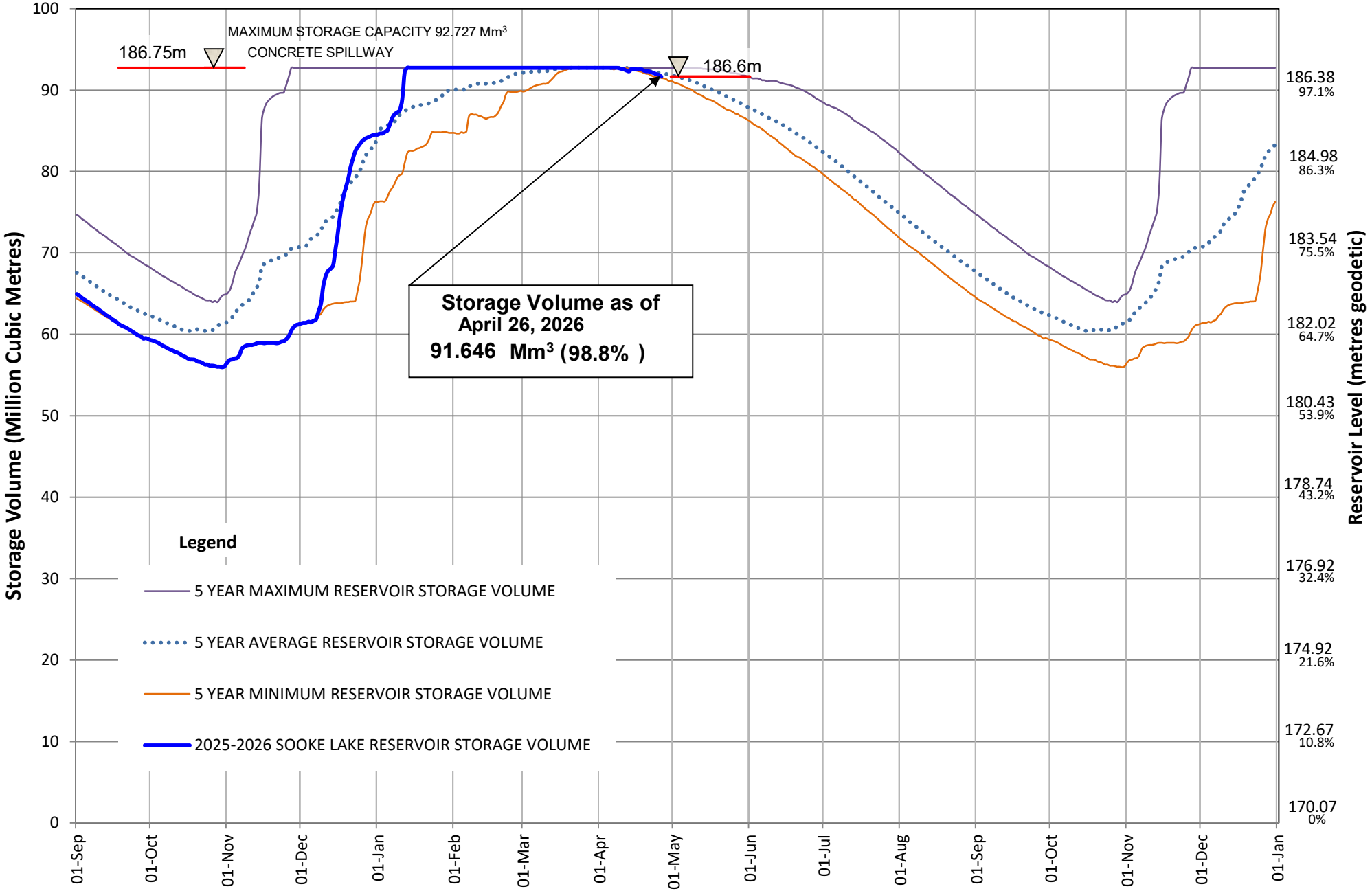
Average Rainfall for April (1914-2025)	89.1	mm
Actual Rainfall: April	48.3	mm
% of Average	54%	
Average Rainfall (1914-2025): Sept 01 - Apr 26	1,488.3	mm
Actual Rainfall (2025/26): Sept 01 - Apr 26	1,583.4	mm
% of Average	106%	

Number days with precip. 0.2 or more
6

Water spilled at Sooke Reservoir to date (since Sept. 1) =

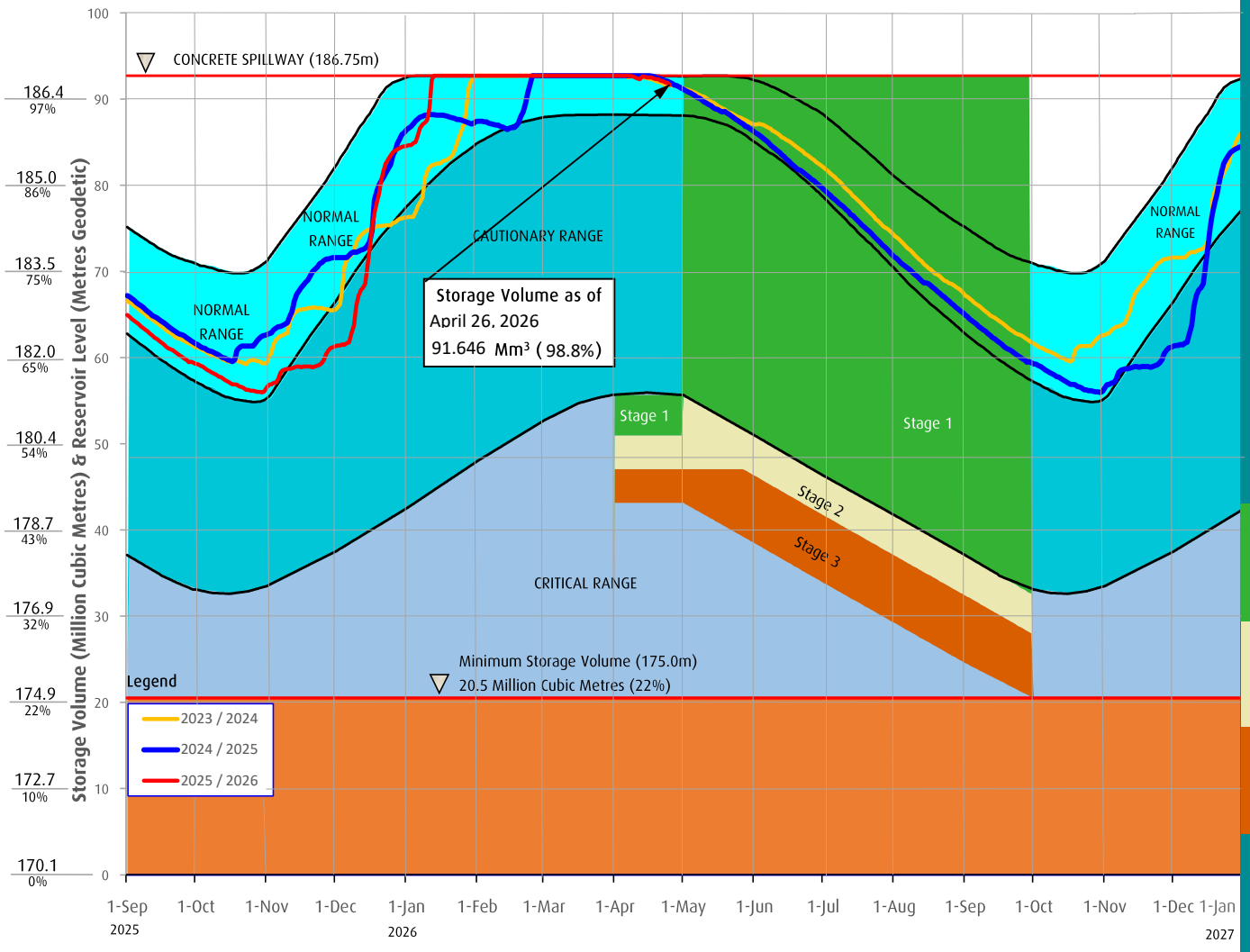
4.26	Billion Imperial Gallons
19.40	Billion Litres

SOOKE LAKE RESERVOIR STORAGE SUMMARY
2025 / 2026



Sooke Lake Reservoir Storage Level

Water Supply Management Plan



FAQs

How are water restriction stages determined?

Several factors are considered when determining water use restriction stages, including,

1. Time of year and typical seasonal water demand trends;
2. Precipitation and temperature conditions and forecasts;
3. Storage levels and storage volumes of water reservoirs (Sooke Lake Reservoir and the Goldstream Reservoirs) and draw down rates;
4. Stream flows and inflows into Sooke Lake Reservoir;
5. Water usage, recent consumption and trends; and customer compliance with restriction;
6. Water supply system performance.

The Regional Water Supply Commission will consider the above factors in making a determination to implement stage 2 or 3 restrictions, under the Water Conservation Bylaw.

At any time of the year and regardless of the water use restriction storage, customers are encouraged to limit discretionary water use in order to maximize the amount of water in the Regional Water Supply System Reservoirs available for nondiscretionary potable water use.

Stage 1 is normally initiated every year from May 1 to September 30 to manage outdoor use during the summer months. During this time, lawn watering is permitted twice a week at different times for even and odd numbered addresses.

Stage 2 Is initiated when it is determined that there is an acute water supply shortage. During this time, lawn water is permitted once a week at different times for even and odd numbered addresses.

Stage 3 Is initiated when it is determined that there is a severe water supply shortage. During this time, lawn watering is not permitted. Other outdoor water use activities are restricted as well.

For more information, visit www.crd.bc.ca/drinkingwater

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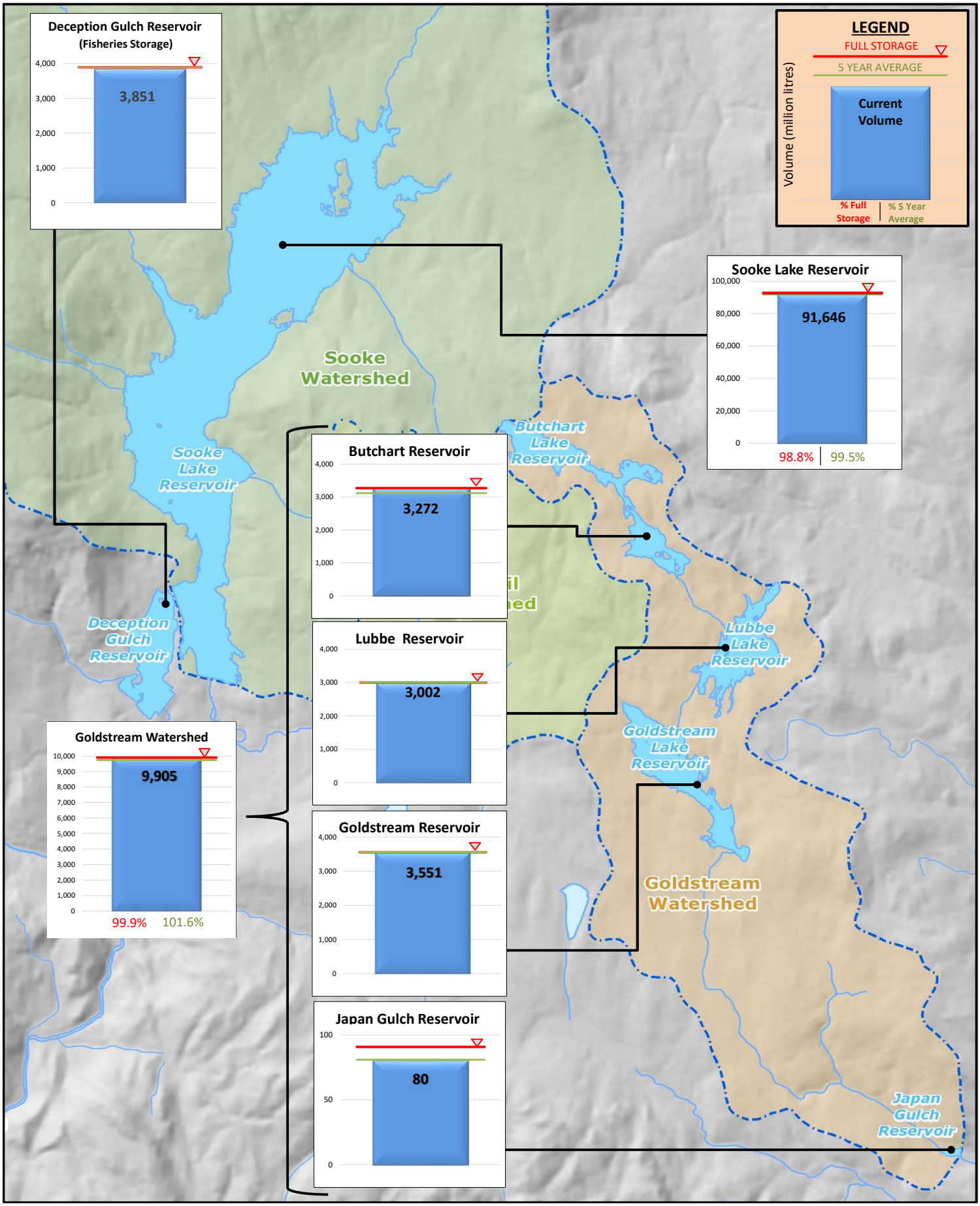
Making a difference...together

Useable Reservoir Volumes in Storage for April 26, 2026



Making a difference...together

REPORT TO THE CAPITAL REGIONAL DISTRICT BOARD
MEETING OF WEDNESDAY, APRIL 08, 2026

SUBJECT **2027 Service and Financial Planning Guidelines**

ISSUE SUMMARY

This report provides guidelines for annual service and financial planning while highlighting key budget considerations.

BACKGROUND

The Capital Regional District (CRD) has commenced its 2027 service and financial planning processes. Board priorities and core service delivery requirements typically form the foundation of the Five-Year Financial Plan. Appendix A outlines the overall corporate planning process, while Appendix B provides details about the timeline specific to the planning cycle.

In late 2026 the CRD will enter a period of transition as strategic priorities are established for the 2027 to 2030 Board term. Service level activity in the first year of the term ensures organizational continuity through the development of the 2027 to 2030 Corporate Plan and continued implementation of strategic initiatives that span Board terms. Given the transition year, staff aim to limit Initiative Business Cases (IBCs) to support approved initiatives and critical programs.

The organization is addressing several challenges impacting its operating environment as it plans for 2027 and beyond. Similar to the approach deployed in 2025 and 2026, the Executive Leadership Team (ELT) will prioritize all planned work for 2027 and will only bring forward staff resourcing requests to advance critical deliverables and newly established services. A critical need, in this context, is defined as initiatives required to meet legal, safety or risk management obligations and initiatives where postponements or cancellation would result in significant service disruption or other negative impacts.

IBCs will be reprioritized or rescoped, with ELT determining which of these are included in the 2027 to 2031 financial plan. This ELT review will be completed in early spring and will develop a recommended package of work for Board approval in the early fall. As in prior years, this report recommends planning guidelines in the context of observed trends, assumptions and drivers impacting the organization.

The 2027 planning cycle will be accelerated to present the service plans and provisional budget at the Committee of the Whole meeting scheduled for September 23, 2026, ahead of the general election on October 17, 2026. This results in service and financial planning processes beginning earlier and the overall planning timeline contracted.

ALTERNATIVES

Alternative 1
That the service and financial planning guidelines be approved, and that staff be directed to prepare the draft financial plan review based on the timeline presented.

Alternative 2
That this report be referred back to staff for additional information.

IMPLICATIONS

Alignment with Board & Corporate Priorities

The organizational financial policies, practices and assumptions guide the Board and staff in allocating resources to implement the Corporate Plan. These are periodically reviewed and adjusted based on current economic trends and financial health targets for the organization. Aligning the financial plan with strategic priorities and financial management strategies ensures service delivery is efficient and effective. The 2027 financial planning process will incorporate feedback from various commissions, committees and the Board.

In 2027, staff will prioritize programs and initiatives that:

- Align with and, in some cases, continue to advance the 2023-2026 Board priorities or Corporate Plan initiatives;
- Implement capital commitments and investments;
- Ensure the maintenance of core service levels following regulatory changes or address safety risks to customers, communities or staff; and
- Have been explicitly directed to proceed by the Board or a commission or standing committee.

Financial Implications

Financial Planning Guidelines

The financial planning guidelines are centered around the CRD's consolidated requisition forecast, which is influenced by past Board approvals but also include recommended inflation rate adjustments and consideration of other economic factors. The organization's financial management policies and practices related to surpluses, reserves, debt and cost containment measures also guide the service and financial plan development and are intended to support service sustainability, optimize revenue needs and minimize requisition increases. They are informed by analysis of economic conditions, core service levels, infrastructure investment and financial management strategies.

Economic Conditions

External economic conditions continue to shape the CRD's financial planning and service delivery. Factors such as inflation, interest rates, population growth and labour market dynamics directly influence borrowing costs, capital project delivery and long-term sustainability.

Highlights of key interrelated economic indicators in this report include interest, inflation and unemployment rates and population growth.

Inflation and Interest Rates

Inflation and interest rates continue to be key drivers of budget pressure. The Bank of Canada reduced its overnight rate from 3.25% at the start of 2025 to 2.25% by year-end and maintained that level in January 2026[1]. The CRD continues to work with the Municipal Finance Authority of British Columbia (BC) to monitor indicative borrowing rates and adjust long-term planning assumptions accordingly.

Inflation has remained close to target. For 2025 overall, BC's annual Consumer Price Index (CPI) averaged 2.1%, the lowest annual increase since 2020[2]. Looking ahead, the province forecasts Canadian CPI growth of 2.2% in 2026 and 2.1% in 2027[3], while BC CPI is forecast at 2.1% in 2026, and 2.0% in 2027. The Bank of Canada similarly expects inflation to remain near 2% through 2027, with upward and downward pressures expected to broadly offset each other[4].

Population Growth and Service Demand

Greater Victoria's population has grown materially over the past decade, although annual growth slowed in 2025[5]. This is consistent with provincial budget commentary that lower federal immigration targets are reducing net inflows of temporary residents and moderating population growth[6].

Population growth continues to place pressure on infrastructure and core services, including transportation, water, wastewater, solid waste management and housing, increasing fiscal pressure on both capital programs and operating budgets. Balancing service expansion with affordability, sustainability and infrastructure capacity remains a central focus of the CRD's planning framework.

Labour Market Conditions

Labour market conditions have softened modestly but remain relatively tight in the Victoria area by historical standards. As of February 2026, the unemployment rate was 4.5% in Victoria, compared with 6.7% nationally, 6.2% in both BC and Vancouver[7].

Employers may continue to face wage pressures and recruitment challenges in professional fields such as finance and accounting, information technology and engineering as well as skilled trades.

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[1]Bank of Canada, policy rate announcement / press release, Jan. 28, 2026: https://www.bankofcanada.ca/2026/01/fad-press-release-2026-01-28/
[2] Province of British Columbia, Budget and Fiscal Plan 2026/27 to 2028/29, p. 95
[3] Province of British Columbia, Budget and Fiscal Plan 2026/27 to 2028/29, Table 3.6.4, p. 116
[4] Bank of Canada, Monetary Policy Report (January 28, 2026): https://www.bankofcanada.ca/publications/mpr/mpr-2026-01-28/canadian-outlook/
[5]BC Population Estimates: https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/population/population-estimates
[6] BC Stats, Municipal Population Estimates, 2025: https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/population/population-estimates; and BC Budget 2026 / BC Stats population outlook (including 2025-2026 slowdown assumptions), page 9: https://www.bcbudget.gov.bc.ca/2026/pdf/2026_Budget_and_Fiscal_Plan.pdf
[7] Statistics Canada, Table: 14-10-0459-01: https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1410045901

These constraints can affect recruitment and retention, lengthen project timelines and reduce delivery efficiency.

Housing and Development Trends

Housing affordability remains constrained across the region. In February 2026, the benchmark price for a single-family home in the core of the CRD was $1.3 million[8]. Persistently high land and construction costs continue to pressure households and increase demand for CRD services and infrastructure.

The Canadian Mortgage and Housing Corporation reports that housing starts in Greater Victoria remained high, totaling 4,859 in 2025 versus 4,185 in 2024[9], indicating firm near-term construction activity.

Within CRD, building permit activity in 2025 was relatively stable. Total permit values were $2.01 billion, up 2% from $1.97 billion in 2024, while permit volumes declined 7% to 2,589 from 2,775[10]. Residential projects accounted for the largest share and non-residential trends were mixed, with commercial values largely unchanged, industrial higher and institutional lower than in 2024.

Overall, the total CRD development in 2025 remained substantial. However, if lower permit volumes persist, future housing supply growth, parts of the development pipeline and related development-related revenues could moderate over time.

Impacts on the 2027 Budget

Based on economic indicators reported by the Bank of Canada and the Province at the beginning of 2026, the 2027 CRD budget will include a 2.1% base inflation rate adjustment, aligned with the province's 2027 inflation forecast[11]. Recent collective bargaining and compensation review outcomes will also impact the CRD budget in 2027. It is important to note that inflation assumptions may change based on evolving economic conditions. Updated information and any resulting adjustments will be included with the Provisional Budget to be presented in September.

The consolidated requisition forecast includes multi-year projects, programs and initiatives already underway. A number of in-flight activities, including annualization of initiatives introduced in prior years, the implementation of new services and increasing debt obligations for existing capital commitments, are expected to contribute to a 2027 budget increase above the base inflation rate. Appendix D summarizes some key decisions during the 2023 to 2026 Board term and associated 2027 to 2030 implications.

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[8] Victoria Real Estate Board, January 2026 report. In the report, **"Core"** is a specific sub-region made up of 7 VREB districts: Victoria, Victoria West, Oak Bay, Esquimalt, View Royal, Saanich East, and Saanich West: https://www.vreb.org/pdf/VREBNewsReleaseFull.pdf

[9] Monthly Housing Starts and Other Construction Data Tables (December 2025-Table 2): https://www.cmhc-schl.gc.ca/professionals/housing-markets-data-and-research/housing-data/data-tables/housing-market-data/monthly-housing-starts-construction-data-tables

[10] At: https://www.crd.bc.ca/about/data/regional-information/monthly-permit-reporting-tool

[11] Province of British Columbia, Budget and Fiscal Plan 2026/27 to 2028/29, p. 96

Financial Capacity

The CRD's organizational capacity is linked to both current and projected financial capacity. Following established CRD financial management strategies, capacity is regularly evaluated to inform target-setting and manage upper financial limits. As growth continues to affect service delivery, financial forecasting provides critical visibility into associated impacts—enabling proactive mitigation and reduction of financial risk.

Given the complexity and variability of factors influencing revenue projections, sensitivity analysis is used to estimate approximately the financial capacity in future years. The 2027 consolidated requisition increase for CRD and Capital Regional Hospital District (excluding municipal debt) is forecast at 8.9%, with a potential range from 7.3% to 15.7% The range is influenced by past commitments and Board approvals, including a loan authorization in the Land Banking and Housing Service, the establishment of new regional services such as the Regional Transportation Service and the Performing Arts Facilities Service, capital cost-sharing commitments for health infrastructure through the Hospital District and previously approved loan authorization bylaws. Any direction to decrease the requisition will potentially result in deferral or cancelation of previously approved initiatives or decreases in services levels.

Debt management is an essential part of the financial strategy, ensuring that borrowing decisions align with both operational demands and long-term asset needs. Regular assessments of overall debt levels, alongside available borrowing capacity under current loan authorization bylaws, position the organization to respond effectively to evolving financial and service delivery pressures.

Core Service Levels

The CRD Board's 2023 to 2026 strategic priorities form the basis of the existing Corporate Plan and service plans until the new Board determines its strategic priorities and establishes the 2027 to 2030 Corporate Plan. The five-year financial plan assumes maintaining service level continuity, with adjustments for timing, scope and cost estimates.

Service delivery costs include capital and operating expenses like salaries, benefits, debt servicing, materials and equipment. These expenses are influenced by economic conditions such as unemployment rates, tariffs, supply and demand as well as contractual agreements.

Financial Management Strategies

Financial management strategies incorporate essential financial objectives into organizational decision-making and operations. Appendix C summarizes the existing financial management strategies outlined for corporate planning.

Infrastructure Funding

There are plans in place or under development across the CRD, reflecting a long-term view for asset investments and levels of service. The 2019 Board-approved Corporate Asset Management Strategy and Policy set activities required in planning and managing infrastructure assets of the organization.

Initiatives include development and completion of:

- Sustainable Service Delivery (asset management) plans to maintain and replace existing assets in the short, medium and long-term
- Operationalizing asset management practices into day-to-day asset lifecycle activities
- Financial guidelines aimed at optimizing reserves and borrowing capacity, while lowering current costs and diversifying revenue

Public Engagement

As in prior years, public engagement on the financial plan is considered an integral part of the process. The CRD continually seeks to improve this process by developing a plan reflective of community desired methods of engagement. Ongoing opportunities for public input through committee, commission and Board meetings will be available throughout the year.

CONCLUSION

Board priorities and core service delivery requirements will form the foundation of the 2027 to 2031 Five-Year Financial Plan. To proactively influence the planning process, this report recommends planning guidelines in the context of observed trends, assumptions and drivers impacting the organization. The organization's financial management policies and practices related to surpluses, reserves, debt and cost containment measures also guide the service and financial plan development and are intended to support service sustainability, optimize revenue needs and minimize requisition increases.

RECOMMENDATION

That the service and financial planning guidelines be approved, and that staff be directed to prepare the draft financial plan review based on the timeline presented.

Submitted by:	Varinia Somosan, CPA, CGA, Senior Manager, Financial Services & Deputy Chief Financial Officer
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENTS

Appendix A: Corporate Planning Framework
Appendix B: Financial Planning Timetable Service and Financial Planning Guidelines
Appendix C: Financial Management Strategies
Appendix D: 2027 Anticipated Requisition Impacts

Corporate Planning Framework

Every four years, the Board sets the strategic priorities, policy and direction that guide the activities of the organization. Board members, other elected officials and, in some cases, First Nations and ratepayers sit on various committees and commissions that receive public input.

Public input happens throughout the planning cycle, through customer satisfaction surveys, financial plan consulting, user statistics, advisory body reports and other public engagement activities. This input drives the Board's strategic priorities.

Service and Financial Planning Guidelines

CRD Timetable for 2027 2031 Financial Plan	
Month	Description
April	Executive Leadership Team - Review and Prioritize initiative Business Cases
May	Financial Plan Guidelines distributed to staff
June - July	Staff - Service Planning and Budget Preparation
July - August	Executive Leadership Team, Delegated Commissions - Review of Budgets, including Initiative Business Cases
September	Electoral Area Committee - Budgets and Intiative Business Cases (Sept 23) Committee of the Whole - Financial Plan and Intiative Business Cases (Sept 23) Board - Approval Provisional Financial Plan (Sept 23)
January	Surplus/Deficits - Budget Recast
March	Board - Final Bylaw Approval
April	Requisition

Financial Management Strategies

Financial management strategies ensure critical financial objectives are integrated into organizational decision making and operations. The following outlines the financial management strategies that will generally guide financial planning:

- Set reserve target ranges based on guidelines, determining multi-year funding strategies for one-time projects or to stabilize revenue requirements
- Balance debt repayment across time, correlating debt term commitments to asset life based on guideline
- Optimize fees for service revenues and stabilize tax rates to fund operations, maintenance, growth and asset utilization
- One-time variances resulting in surplus transferred to reserve to fund future capital liabilities or reduce future revenue requirements and only applied to reduce tax rates in rare circumstances where the offset is sustainable and stable

Board approved financial policies and guidelines such as the Asset Management Policy, Capital Reserve Guidelines, Operating Reserve Guidelines and Debt Term Guideline inform financial planning in a standard way at a service level whereas the strategies given above provide general corporate direction.

Appendix D: 2027 Anticipated Requisition Impacts

1. Service / Program-Specific		Approved 2026 Financial Plan		Prior years decisions impacts excluded from 2026 Financial Plan		Total		Note
Service No.	Service / Program	Requisition ($)	Requisition (%)	Requisition ($)	Requisition (%)	Requisition ($)	Requisition (%)	
	Non-Service-Level-Specific							
	Inflation & Other Service Pressure Impacts	$1,712,000	1.3%	$1,000,000	0.8%	$2,712,000	2.1%	**1**
	2026 One-Time funding, not available in 2027	$1,248,000	1.0%			$1,248,000	1.0%	
	Labour Adjustments	$1,800,000	1.4%	$300,000	0.2%	$2,100,000	1.6%	
	Existing / service-specific items							
3.717	Core Area Wastewater Operations							
	Reinstatement of ERF and Operating Reserve contributions	$180,000	0.1%			$180,000	0.1%	**2**
	Annualisation of Operating Costs resulting from RTF Settlement	$112,500	0.1%			$112,500	0.1%	
3.798C	Debt - Core Area Wastewater Treatment Program							
	Additional Debt Servicing Costs for Core Area Wastewater capital renewal	$519,000	0.4%			$519,000	0.4%	**3**
1.329	Regional Transportation							
	Impact of Trail Widening & Lighting project for Regional Parks	$1,200,000	0.9%			$1,200,000	0.9%	**4**
1.280	Regional Parks							
	Additional Debt Servicing Costs for Routine Planned Land Acquisitions	$190,000	0.1%			$190,000	0.1%	
1.312	Regional Goose Management							
	Reinstatement of Goose Management Service			$350,000	0.3%	$350,000	0.3%	
1.44X	Panorama Recreation Center							
	Impact to Debt Servicing Costs for upgrades to Centennial Sport Box and Heat Recovery System	$646,000	0.5%			$646,000	0.5%	**5**
1.40X	SEAPARC - Arena and Pool Facilities and Recreation							
	Additional Debt Servicing Costs	$100,000	0.1%			$100,000	0.1%	**6**
1.326	Foodlands Access							
	Increase in requisition funding due to drop in transfer from reserves	$100,000	0.1%			$100,000	0.1%	
CRHD	Capital Regional Hospital District							
	Impact of CRHD contribution to Royal Bay Long Term Care Facility	$575,000	0.4%			$575,000	0.4%	**7**
1.45X	SSI Parks and Recreation							
	Impact of Rainbow Recreation Centre Building Envelope / Pool Structural Upgrades	$73,500	0.1%			$73,500	0.1%	
Section 1 subtotal		**$8,456,000**	**6.6%**	**$1,650,000**	**1.3%**	**$10,106,000**	**7.8%**	

2. New Services		Approved 2026 Financial Plan		Prior years decisions impacts excluded from 2026 Financial Plan		Total		Note
Service No.	Service / Program	Requisition ($)	Requisition (%)	Requisition ($)	Requisition (%)	Requisition ($)	Requisition (%)	
	Performing Arts Facilities Service			$1,160,000	0.9%	$1,160,000	0.9%	
	West Shore RCMP Detachment Expansion Service			$215,411	0.2%	$215,411	0.2%	
	Borrowing for Peninsula Recreation Facility in Central Saanich (TBD)							**8**
Section 2 subtotal		**$0**	**0.0%**	**$1,375,411**	**1.1%**	**$1,375,411**	**1.1%**	
Grand total		**$8,456,000**	**6.6%**	**$3,025,411**	**2.3%**	**$11,481,411**	**8.9%**	

Notes:

Overview of outyears impacts of prior year decisions:

1) Revised inflation estimates will be incorporated during preparation of the provisional 2027 to 2031 Financial Plan
2) The majority of funding for Service 3.717 is through Invoice by Agreement
3) Debt servicing costs: 2027 - $11.0mil, 2028 - $12.2mil, 2029 - $12.3mil, 2030 - $11.5mil
4) Debt servicing costs: 2027 - $2.3mil, 2028 - $5.2mil, 2029 - $4.9mil, 2030 - $5.8mil
5) Debt servicing costs: 2027 - $1.0mil, 2028 - $1.5mil, 2029 - $2.7mil, 2030 - $2.7mil
6) Debt servicing costs: 2027 - $221k, 2028 - $354k, 2029 - $354k, 2030 - $354k
7) Debt servicing costs: 2027 - $14.1mil, 2028 - $16.0mil, 2029 - $17.9mil, 2030 - $19.5mil
8) $14.2mil borrowing with 15 year amortization period. $1.67mil debt servicing costs starting 2028

Making a difference...together

REPORT TO JUAN DE FUCA WATER DISTRIBUTION COMMISSION
MEETING OF MAY 5, 2026

SUBJECT **Juan de Fuca Water Distribution Asset Management Plan Overview**

ISSUE SUMMARY

To provide an update on the findings of the Juan de Fuca (JDF) Water Distribution System Asset Management Plan.

BACKGROUND

In November 2024, the Capital Regional District (CRD) retained AECOM to support the development of an Asset Management Plan (AMP) for the Juan de Fuca Water Distribution System (JDFWDS). The JDFWDS provides water to residents of the City of Langford, City of Colwood, Town of View Royal, District of Metchosin, District of Sooke, Sc'ianew (Beecher Bay) First Nation, T'Sou-ke Nation, Songhees Nation, portions of Highlands and the JDF Electoral Area. The JDFWDS relies on an extensive network of watermains, pressure control stations, pump stations and storage tanks to deliver water from regional transmission pipelines to end users, with an estimated total replacement value of $2 billion.

The asset management plan includes the following components:

- condition assessment of the existing assets
- asset risk assessment and management of assets
- hydraulic modelling and capacity assessment of the system based on projected growth
- maintenance, repair and replacement strategies
- financial planning
- recommendations

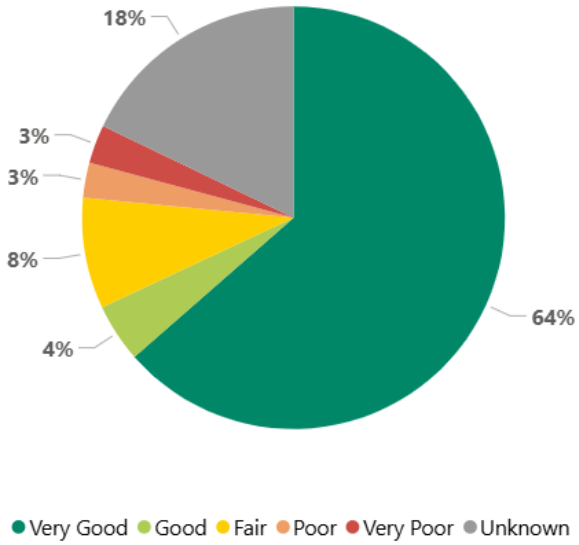
The purpose of the AMP is to ensure that the JDFWDS is operated and maintained in a sustainable and cost-effective manner while continuing to deliver the expected level of service for present and future customers. The AMP achieves this by establishing a financial and technical road map to guide the management and reinvestment of JDF assets.

The AMP outcome will inform multiple future JDFWDS capital projects and programs, including, but not limited to, pressure control station upgrades, pump station upgrades, water main replacements, meter replacements, storage tank upgrades and site decommissioning initiatives.

Asset Condition

The JDFWDS has an estimated total replacement value of approximately $2 billion. While most assets are currently in good or better condition, the system is aging. Overall, 64% of the total replacement value is associated with assets in Very Good condition, and only 6% are rated Poor or Very Poor, with a significant portion of these belonging to the water meter category (Figure 1). In addition, approximately 18% of the total replacement value is attributed to assets with Unknown condition ratings, which for the JDFWDS is limited to service laterals, highlighting an area where further inspection and condition assessment may be required.

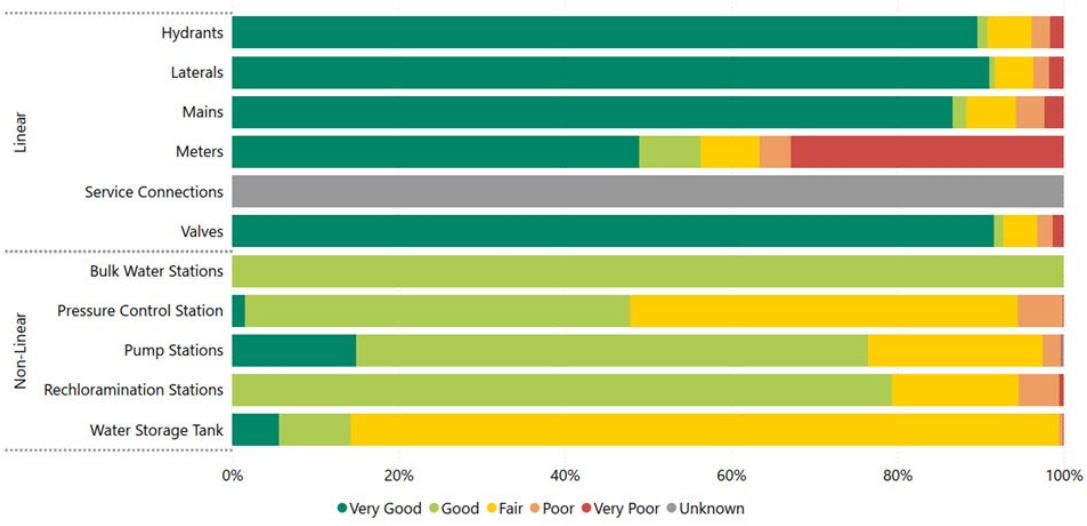
Figure 1: JDFWDS Overall Condition Summary



Condition data indicates that proactive reinvestment, particularly in water meters, aging AC mains, storage tanks and pressure control station assets, is required to avoid accelerated deterioration later in the planning horizon.

Linear assets are largely in Very Good or Good condition; however, water meters show significant deterioration, with over 30% in Poor or Very Poor condition. Linear assets' condition assessments were based on their age and expected service life. Condition information for service connections is not available and may be considered for future data collection and condition assessment initiatives. A visual inspection of all non-linear assets was completed by AECOM and the CRD in early 2025. The assessment covered 107 facilities, including bulk water stations, pressure control stations, pump stations, rechloramination stations and water storage tanks. A summary of the asset condition by asset category and subsystem is shown below in Figure 2.

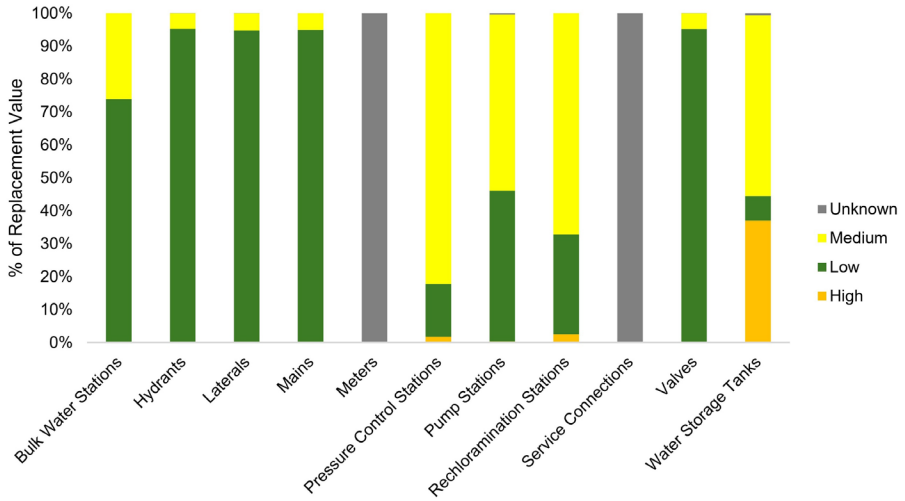
Figure 2: JDFWDS Condition Distribution by Asset Category and Subsystem



Risk Assessment and Management of Assets

Risk-based planning and decision-making form a core foundation of modern asset management practices. The risk score reflects the probability (or likelihood) and consequences of failure (or criticality) and is ultimately used to identify assets which require immediate attention and provide opportunities to reduce risk exposure. The majority of assets (by replacement value) are in the low-risk category (68%), followed by 8% being characterized as medium-risk, with the remaining 1% in the high-risk category. Approximately 22% of assets have unknown risk at this stage.

Figure 3: Risk by Asset Category



Hydraulic Modelling and Capacity Assessment of the System Based on Projected Growth

The capacity assessment involved reviewing and understanding the existing system model and available data, defining current system demands, and identifying service gaps. Through this process, several growth-related projects were identified and assigned priority rankings (these recommendations can be found in Appendix A in Section 5 of the AMP Final Report). These priorities will be used to inform decisions on the timing and inclusion of projects in the capital projects program and the existing Development Cost Charge Program.

Maintenance, Repair and Replacement Strategies

While the system continues to function at a high standard with minimal watermain breaks and service outages, corrective maintenance, including emergency repairs, service call and development connections, has resulted in increased backlog in our preventative maintenance programs. Effective maintenance, repair, and replacement strategies are essential to sustaining the long-term performance, reliability, and safety of the JDFWDS. In the absence of service specific maintenance standards, industry best practices were used.

A review of labour capacity identified that existing staffing levels are increasingly focused on corrective activities as the system has grown and complexity has increased. As a result, the report recommends additional resources are required to deliver maintenance activities in alignment with industry best practices. The following key recommendations were identified to strengthen lifecycle management and service delivery. The resourcing estimates presented below reflect a total

program delivery requirement and are not intended to represent a direct or immediate staffing increase:

- Address labour capacity considerations through the incremental addition of approximately 19 operations full-time equivalents (FTEs) and 1 Electrical, Instrumentation and Controls FTE.
- Continue to Leverage Strategic Alliance Partners (SAPs) to support contracted field services and maintenance activities that do not require a water ticket certification. Leveraging third parties has been and will continue to be an effective strategy to support the maintenance program, thereby reducing the additional internal staffing requirement from approximately 20 FTEs to about 10 FTEs.
- Transition toward a 30-70 corrective-to-preventive maintenance split.

Maintenance activities that are currently being completed at lower frequencies than industry best practices include hydrant tear-downs, valve exercising, air valve inspections and water meter replacements.

The long-term objective is to define level of service and operational risks, then align preventative maintenance targets to balance service level and affordability concerns. By defining our level of service standards for high volume maintenance activities and then aligning our resources to suit, we can shift toward a predominantly preventive maintenance-based program to reduce risk and lifecycle costs.

Efforts are already in place to address the risks and backlog related to water meter replacements. One additional FTE was added in 2026, with a second proposed for 2027.

Financial Planning

A lifecycle reinvestment model was applied to develop a 20-year financial plan under multiple funding scenarios to evaluate how varying levels of reinvestment affect asset condition over time. Figures 4 and 5 illustrate the projected condition of linear and non-linear assets under three funding scenarios. These scenarios reflect reinvestment expenditures only and do not include capital projects related to growth.

While the unconstrained scenario identifies the estimated long-term reinvestment need, this funding level is not considered realistic. As a result, the analysis focuses on understanding how each funding scenario influences JDFWDS's ability to sustain desired levels of service. For this analysis, level of service is defined as the percentage of assets in fair or better condition.

Figure 4: % of Linear Assets in Fair or Better Condition

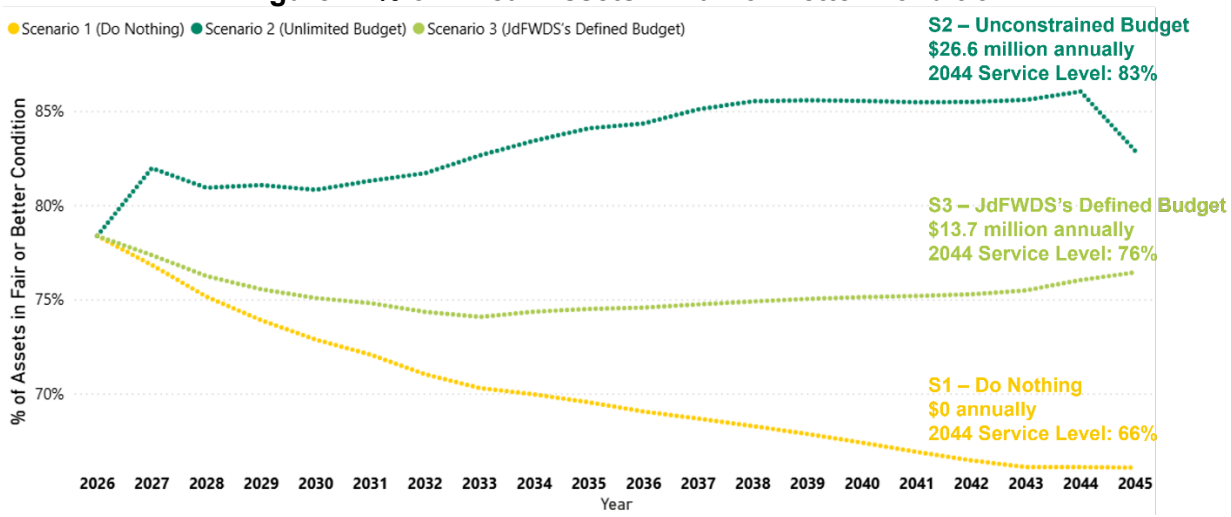
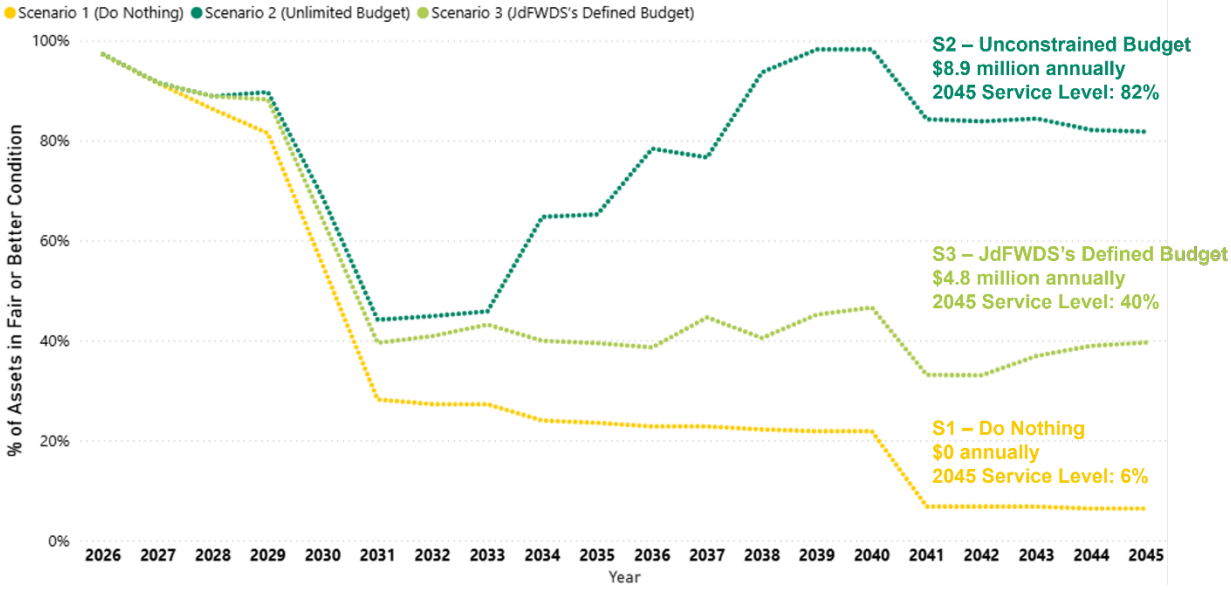


Figure 5 % of Non- Linear Assets in Fair or Better Condition Over the Next 20 Years for All Budget Scenarios



Currently, about 78% of linear assets and 97% of non-linear assets are in Fair or better condition. At today's funding levels, linear assets are expected to generally maintain service performance over the next 20 years, while the condition of non-linear assets is projected to decline over time. Without increased investment, the percentage of non-linear assets in Fair or better condition could drop to about 40% over the long term. With additional funding, asset condition could be maintained closer to 80%

To support reliable service delivery and manage assets cost-effectively, the AMP recommends aiming to keep approximately 80% of system assets in Fair or better condition, with particular focus on non-linear assets, such as facilities and equipment. This target is consistent with practices at similar utilities, and balances service expectations with affordability.

This 80% condition target will be used as a guide during the annual capital planning process to help prioritize renewal projects and inform funding decisions. Where possible, larger renewal projects such as larger storage tank replacements will be phased over multiple years to spread costs and reduce year-to-year budget impacts.

R*ecommended Improvement Initiatives and Roadmap*

The AMP sets out a practical roadmap focused on improving asset information, clearly defining service targets, applying consistent risk assessment methods, strengthening preventive maintenance, and ensuring sustainable long-term capital funding. Priority actions include addressing data gaps, continuing to meet regulatory requirements, resolving capacity constraints and maintaining stable asset condition over time. Together, these initiatives are intended to support reliable water service and informed decision making as the system continues to grow and age.

IMPLICATIONS

Alignment with Existing Plans & Strategies

The JDFWDS Asset Management Plan advances the CRD's corporate objectives as outlined in the Corporate Asset Management Strategy. The Corporate Asset and Maintenance Management division works across the organization to develop and implement standards, processes, and tools for asset management reporting and decision-making. Asset management plans are an opportunity to support the actions and objectives in the CRD's Corporate Asset Management Strategy.

Financial Implications

The AMP provides a structured basis for forecasting capital investments, operations and maintenance costs, and long-term funding needs. By understanding asset condition, risk, and remaining service life, the CRD can prioritize renewal and replacement spending, reduce unplanned emergency repairs, and smooth capital expenditures over time. This proactive approach supports more predictable budgeting, helps justify rate adjustments or funding requests, and minimizes lifecycle costs while maintaining reliable service levels and regulatory compliance.

Service Delivery Implications

The AMP will enable reliable, consistent, and safe water supply to customers. By identifying critical assets, assessing condition and risk, and planning timely maintenance or replacement, the CRD can reduce the frequency and duration of service disruptions such as main breaks, pressure loss, or water quality issues. This proactive approach supports predictable levels of service, faster response to failures, improved customer confidence, and alignment with regulatory and public health requirements.

CONCLUSION

An Asset Management Plan (AMP) has been completed for the Juan de Fuca Water Distribution System (JDFWDS). While the system assets are generally in good condition, the network is mature and will require continued maintenance and targeted upgrades to support both current and future service demands. The AMP will be considered as part of the Capital Regional District's annual capital planning process, with the majority of funding for capital upgrades expected to be sourced from the Capital and Development Cost Charge (Growth) Reserve Fund.

At present, the JDFWDS assets are being managed in a sustainable and cost-effective manner. The CRD will continue to pursue opportunities to enhance asset performance, optimize lifecycle costs, and improve service reliability. In alignment with best practices, the CRD intends to update the asset management plan on a five-year cycle.

RECOMMENDATION

There is no recommendation. This report is for information only.

Submitted by:	Joseph Marr, P.Eng., Senior Manager, Infrastructure Engineering
Concurrence:	Alicia Fraser, P. Eng., General Manager, Infrastructure and Water Services
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT(S)

Appendix A: JDFWDS Asset Management Plan – Final Report

APPENDIX A

AECOM

CRD

CAPITAL REGIONAL DISTRICT

JUAN DE FUCA WATER DISTRIBUTION SYSTEM ASSET MANAGEMENT PLAN

FINAL | 60744233 | April 2026

The attached Report (the “Report”) has been prepared by AECOM Canada ULC. (“AECOM”) for the benefit of the Client (“Client”) in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the “Agreement”).

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Quality information

Prepared by

Evelyn Gao, M.Sc., IAM Cert., Asset Management Consultant

Prepared by

Mohammad Amini., M.ASc., IAM Cert., Asset Management Consultant

Prepared by

Bill Hart, M.Eng., P.Eng., IAM Cert., Asset Management Consultant

Prepared by

Quincy Liu, M.Eng., EIT, IAM Cert., Asset Management Consultant

Prepared by

Hilary Irving, M.Sc., Asset Management Consultant

Prepared by

Peggie Wang, PhD, P.Eng., PMP, IAM Cert., Asset Management Consultant

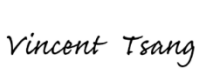
Prepared by

Luke Zhao, PhD, P.Eng., PMP, IAM Cert., Asset Management Consultant

Prepared by

Benny Wan, P.Eng.
Hydraulic Modelling Lead

Prepared by

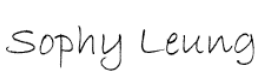


Vincent Tsang, P.Eng.
Hydraulic Modelling Engineer

Prepared by

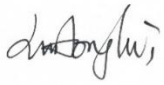
Kevin Sze, P.Eng. Hydraulic Modelling Engineer

Prepared by



Sophie Leung, EIT, Hydraulic Modelling Analyst

Checked by



Donghui Lu, PhD., IAM Cert., Civil Manager

Verified by

David Main, Lead Verifier

Approved by

Christiaan Lombard, MBA P.Eng., Asset Management Leader, Americas Water

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0	1	Katarina Konicek, P.Eng., PMP, Project Engineer, Infrastructure Engineering, Infrastructure & Water Services, Capital Regional District

Prepared for:

Capital Regional District
Integrated Water Services
479 Island Highway
Victoria BC V9B 1H7

Prepared by:

AECOM Canada ULC.
3292 Production Way
Suite 330
Burnaby, BC V5A 4R4
Canada

T: 604.444.6400
F: 604.608.9154
aecom.com

Executive Summary

Background

The Juan de Fuca Water Distribution System (JdFWDS) provides potable water to ten communities in the western region of Greater Victoria, British Columbia, including the City of Langford, City of Colwood, Town of View Royal, District of Metchosin, District of Sooke, Scia'new Nation, T'Souke Nation, Songhees Nation, portions of Highlands, and the Juan de Fuca (JdF) Electoral Area. As a critical component of the Capital Regional District (CRD)'s infrastructure, the system's long-term functionality and sustainability are essential for maintaining service reliability and supporting future growth. CRD has engaged AECOM Canada ULC (AECOM) to develop an Asset Management Plan (AMP) for the JdFWDS. The objective of this AMP is to establish a structured framework and provide a financial and technical roadmap for the effective management of JdFWDS assets.

Current State of the Infrastructure

The CRD's JdFWDS has an estimated total replacement value of approximately **$2 billion**. Table ES-1 shows the replacement costs (in 2025 dollars) of the JdFWDS water infrastructure.

Table ES-1: JdFWDS Current Replacement Value (2025)

Asset Class	Asset Category	Asset Subsystem	Quantity	Unit	Unit Replacement Value Range ($ / Unit)	Total Replacement Value
Linear	Watermains	Hydrants	5,259 (2,622 hydrants and 2,637 hydrant valves)	Ea.	Hydrant = $17,400 Hydrant Valve = $867 - $2,603	$50,199,000
	Watermains	Laterals	13,093	m	$2,900	$37,969,000
	Watermains	Mains	547,454	m	$1,740 - $7,540	$1,267,265,000
	Water Meters	Meters	26,775	Ea.	$2,900 – $8,700	$84,399,000
	Water Meters	Service Connections	242,000	m	$1,450	$350,900,000
	Watermains	Valves	8,672	Ea.	$867 - $9,763	$19,924,000
	Total of Linear					**$1,810,655,000**
Non-Linear	Bulk Water Stations	-	4	Ea.	$66,700	$267,000
	Pressure Control Stations	-	55	Ea.	$180,515 - $2,104,245	$45,622,000
	Pump Stations	-	32	Ea.	$613,970 - $3,513,066	$51,604,000
	Rechloramination Stations	-	2	Ea.	$673,896 - $1,046,119	$1,720,000
	Water Storage Tanks	-	14	Ea.	$295,053 - $19,515,729	$55,590,000
	Total of Non-Linear					**$154,803,000**
Grand Total						**$1,965,458,000**

Figure ES-1 summarizes condition rating of all the JdFWDS assets with associated replacement values. Almost two thirds of the total replacement value is attributed to assets in Very Good condition (64%). Only 6% are rated Poor or Very Poor with a significant portion of these belonging to the meter category, and 18% of total replacement value is related to the assets with unknown condition rating, such as service laterals.

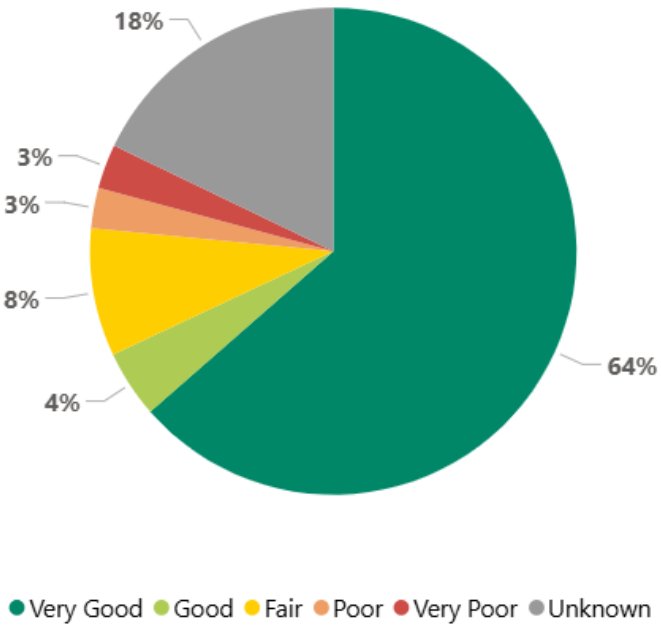

Figure ES-1: JdFWDS Overall Condition Summary

Additionally, **Figure ES-2** shows the condition of the assets based on different asset categories (non-linear) and subsystems (linear). Linear assets are largely in Very Good or Good condition with the exception of Meters which show significant deterioration, with over 30% in Poor or Very Poor condition (the linear meters include all linear conveyance segments and chambers as well). Condition information for service connections is not yet available and may be considered for future data collection. The condition distribution reflects the results of the non-linear asset condition assessments, which were completed through visual inspections by AECOM assessors from January 13–17 and February 24–28, 2025. The assessment covered 107 facilities, including bulk water stations, pressure control stations, pump stations, rechloramination stations, and water storage tanks (detailed breakdown is provided in **Table ES-1**). Additional information on the state of the infrastructure analysis can be found in **Section 2**.

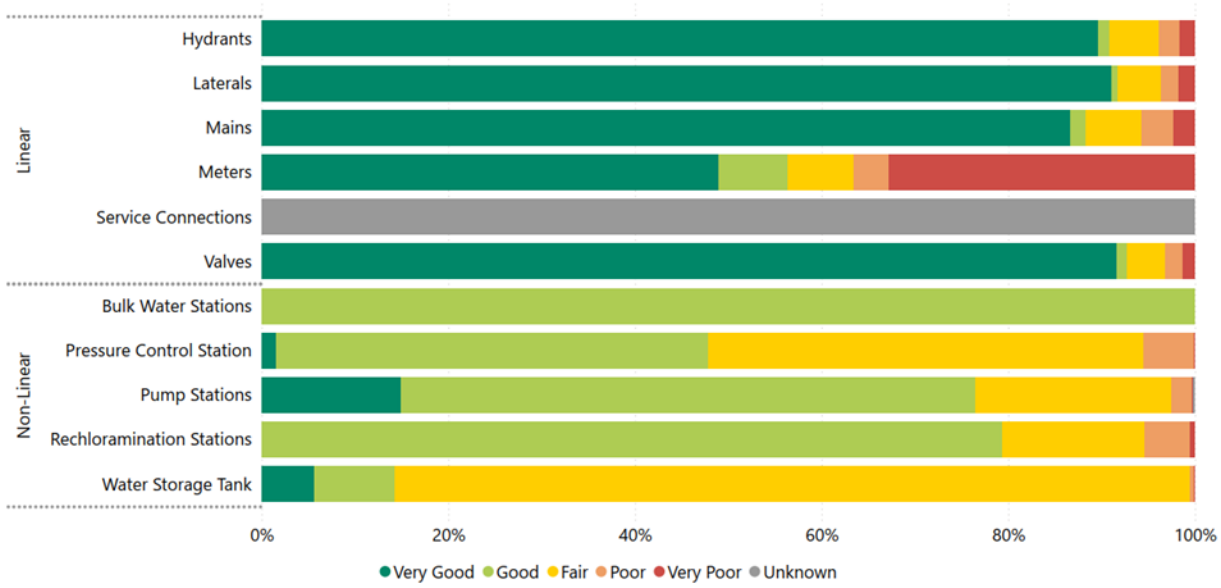

Figure ES-2: JdFWDS Condition Distribution by Asset Category and Subsystem

Levels of Service (LoS)

Levels of Service (LoS) measure the extent and quality of a given service. With a well-defined LoS framework, the CRD JdFWDS can leverage LoS to inform operations and maintenance planning, service delivery, resource planning, capital planning, and track progress on corporate or department-wide strategic initiatives.

Defined LoS may be any combination of parameters deemed important by the CRD and represent service-cost trade-offs, established in a flexible, rational, and transparent manner, as follows:

- LoS assist and support decision-making and investment planning related to the planning, development, operation, maintenance, renewal, and replacement of municipal infrastructure.
- LoS promote good practice, sustainable development, and environmental stewardship.
- LoS facilitate community involvement and a public sense of ownership and incorporate community values.
- LoS supports the implementation of a corporate continuous improvement program to further optimize AM across all service areas.

The process for identifying and developing the CRD JdFWDS LoS Framework included several steps. It began with a scan of existing CRD documents, including the 2019 Corporate Asset Management Strategy and the Water Supply Strategic Plan, to identify relevant goals and objectives. The team also reviewed the Canadian Infrastructure Benchmarking Initiative (CIBI) key performance indicators (KPIs) that CRD collects for the JdFWDS. In addition, the framework development included compiling additional measures to ensure all pertinent objectives were reflected in the LoS. AECOM supported the development of a list of 19 measures, presented in **Table 3-4**, by facilitating a LoS workshop with CRD staff and holding a meeting to review CIBI KPIs. Detailed information on LoS framework and performance measures can be found in **Section 3** and **Appendix B**.

Several future demand drivers that might have an impact on the JdFWDS LoS were identified.

- Aging infrastructure.
- Regulatory changes.
- Staff availability (i.e., technical skill availability, skill gaps from changing technology, etc.).
- Succession management & skills transfer (i.e., succession plan to have experienced operators to operate the system, etc.).
- Funding (i.e., ensuring appropriate asset management planning and sustainable financial strategies to support service delivery).
- Contractor availability (i.e., contractors' availability for executing large projects, etc.).
- Climate change (i.e., droughts, sea level rise, etc.).
- Supply chain issues (i.e., material and equipment availability for capital projects, technology, etc.).
- Fluctuations on contract pricing (i.e., impact of inflation, supply chain considerations, etc.).
- Changing demographics (i.e., aging population is resistant to change).
- Population growth

Despite the wide range of future demand drivers identified above, the CRD has foundational programs in place that support proactive management of system pressures, including its established water conservation education and outreach program. While demand management in this context primarily relates to influencing customer water use, the CRD continues to monitor external drivers and adjust plans, budgets, and strategies to maintain service delivery as conditions evolve.

Asset Criticality and Risk Management

Risk-based planning and decision-making serves as the foundation for modern, tactical asset management. Through gaining an understanding of its risk exposure, an organization can identify vulnerable assets and target its O&M and capital investments to reduce that exposure most effectively and ultimately improve the resiliency of its assets. Risk exposure is assessed based on the probability and consequences of an asset failure and is used to drive the selection and prioritization of appropriate actions, based on risk tolerance thresholds and funding availability.

The risk score reflects the probability (or likelihood) and consequence of failure (or criticality) and is ultimately used to identify assets which require immediate attention and provides opportunities to reduce risk exposure. AECOM

developed the risk model for JdFWDS watermains and non-linear assets. **Table ES-2** shows that the majority of assets (by replacement value) are in the low-risk category (68%), followed by 8% being characterized as medium risk, with the remaining 1% in the high and very high-risk categories. About 22% of assets have unknown risk at this stage, mostly for meters and service connections. Future integration of additional data sources will help refine these ratings.

Table ES-2: Risk Thresholds and Asset Risk by Replacement Cost – All Assets

Risk Level (Score Thresholds)	Replacement Cost	% of Replacement Cost
Low (0 ≤ Score < 5)	$1,340,924,000	68.2%
Medium (5 ≤ Score < 11)	$165,720,000	8.4%
High (11 ≤ Score < 16)	$22,965,000	1.2%
Very High (16 ≤ Score ≤ 25)	$0	0%
Unknown	$435,849,000	22.2%
Total	**$1,965,458,000**	**100%**

Figure ES-3 shows that the non-linear assets have a much higher proportion of assets in the medium and high categories, whereas the majority of watermains have been characterized as low risk. **Appendix A** and **Appendix C** provide more details on the risk score for JdFWDS assets. Meters and service connections were not included in the risk analysis. Meters were excluded because, although GIS data was provided, the Excel/SAP dataset contains more detailed meter information. Service connections were omitted due to the absence of a complete service connection inventory within the available asset data. Refer to **Section 4** for more information.

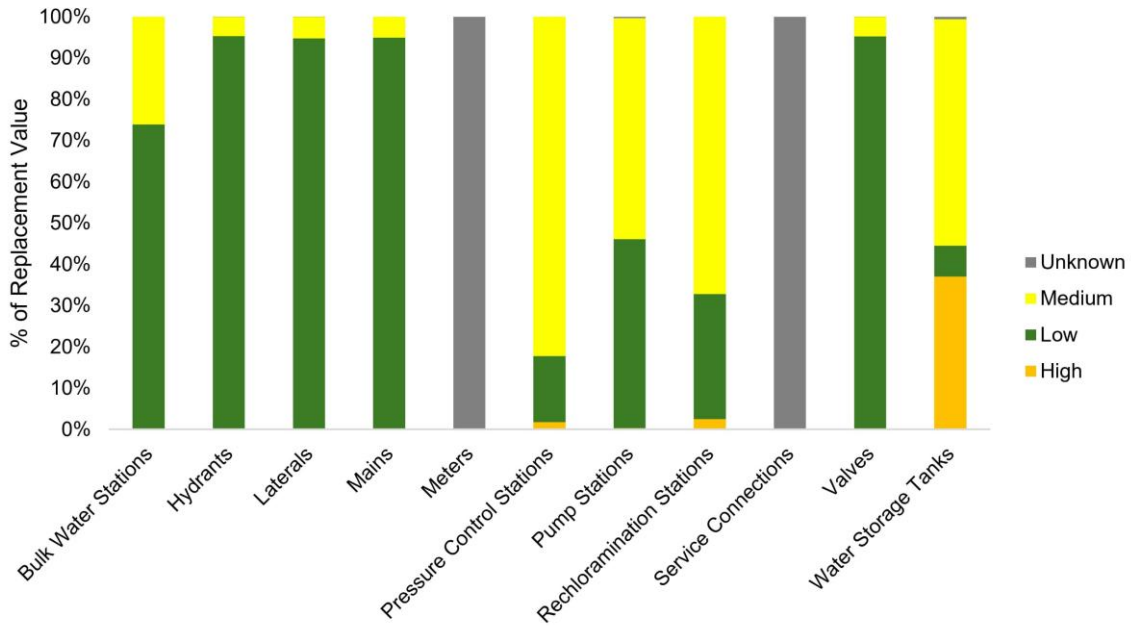

Figure ES-3: Risk by Asset Category

Water Distribution System Capacity Assessment

To model the current and future capacity requirements of the JdFWDS, AECOM has followed the process outlined below:

- **Review and understand the current model and the available data.** This activity was to determine what work needs to be done upfront to build a reliable model. This preliminary review assessed the available information with the aim of ensuring that the model is updated to reflect current conditions and infrastructure.
- **Define the current system demand**. This activity was to understand the current system demand to ensure an accurate baseline scenario with which to compare future scenarios against.
- **Determine the service gaps**. Identify and quantify the forecast gaps between the current demand and each future demand scenario. To support this, a set of scenarios was created (this approach was summarized in the technical memo presented in **Appendix F** and agreed with the CRD) and the changes to population and demand were identified through to the end of the AMP's horizon.

The hydraulic model is supplied in **Appendix D** with key assessment results presented in **Appendix E** and a full methodology in **Appendix F**. The high-level findings of the capacity assessment are shown in **Table ES-3**.

Table ES-3: Capacity Assessment Findings

Capability	Gap	Recommendation	Priority
Growth projects	Network capacity is exceeded in several areas once growth forecasts have been loaded into the demand model.	Refer to **Table 5-10** for a summary of recommendations for linear and non-linear projects.	Determined per project by population, growth and strategy.
Capacity Modelling	The Sooke River Road Disinfecting Facility (SRRDF) supply cannot meet future demand using forecast population and the CRD design criteria.	The East-West Connector* is a vital piece of infrastructure that Sooke will rely on in the future and has been used in models to allow further analysis. Its installation has been assumed as certain for the future scenarios of Sooke.	High
	Fire flow scenarios are assessed on a pressure zone requirement basis only. Individual fire flow scenarios (per linear asset) have not been assessed as individual zoning and growth construction was not available	Ongoing update of the model should include input from the local municipalities to allow detailed fire flow assessment to take place.	Medium (Continuous Improvement)
	The design consumption rate is noted to be significantly higher than the actual consumption reported in the JdFWDS and results in future flexibility but also future growth projects being determined as required prior to the reality.	An accurate figure should be used to realistically determine the requirements for growth projects and a consistent conservatism factor determined that accommodates the routine fluctuations in demand and localized growth that a pressure zone may experience.	Medium (Continuous Improvement)

* Note – The East-West Connector is a Regional Water Supply Master Plan Project

Maintenance, Repair and Replacement Strategies

Effective maintenance, repair, and replacement strategies are essential to sustaining the long-term performance, reliability, and safety of the JdFWDS. AECOM began with the analysis of current-state business process maps that illustrate how maintenance activities are identified, scheduled, executed, and recorded (**Section 6 Figure 6-1** to **Figure 6-4**).

This was followed by a detailed examination of existing maintenance, repair, and replacement strategies across linear and non-linear assets, supported by findings from recent condition assessments, staff input, and operational data.

Benchmarking insights from the Canadian Infrastructure Benchmarking Initiative (CIBI) were also integrated to assess performance relative to peer utilities and to rationalize the recommended resourcing and budget enhancements. In summary, the following high-level recommendations draw together the resourcing plan (**Table 6-6**) and the benchmarking insights to provide a focused roadmap for the future.

Recommendations are as follows.

- **Close the labour gaps as recommended in Table 6-6**. The additional 19.4 process FTE and 1 EIC FTE, estimated through a rigorous review with CRD staff (meetings with operations staff, analysis of work order hours, and benchmarking), will help achieve industry-guided targets for flushing, valve exercising, hydrant teardown, and meter-testing cycles. However, of this gross requirement of approximately 20 additional FTEs, approximately 10 FTE-equivalents are assumed to be addressed through Strategic Alliance Partners support, with the remaining ~10 internal FTEs to be phased at ~2 FTE per year over 5 years.
- **Continue to Leverage Strategic Alliance Partners.** Further to the previous recommendation, Strategic Alliance Partners currently supports a variety of contracted field support and maintenance tasks that do not require a water ticket. These include landscaping and similar non-ticketed duties, as well as labour-intensive support work associated with valve and hydrant maintenance, such as removing valve box lids, vacuuming debris from sleeves, painting lids, and cutting grass around hydrants. A meaningful share of the current field-based support workload is already being delivered through the Strategic Alliance Partners, allowing CRD's certified operators to remain focused on utility-based work requiring the appropriate qualifications.
- **Target a 30/70 corrective–preventive split.** With the added staff, the CRD should shift work plans so that corrective maintenance hours drop from approximately 45% toward the <30% benchmark shown by top-quartile peers (**Figure 6-8**).
- **Reduce overtime costs.** Filling daytime positions should pull overtime spend down from $15,000 to the peer median $6,000–8,000 per field FTE within three years, freeing a further $200,000+ annually for proactive work.
- **Expand proactive leak detection**. Allocate staff time to district metering and acoustic leak audits to begin quantifying non-revenue water and prioritising leak fixes and main renewals. As Non-Revenue Water and Infrastructure Leakage Index are not analyzed in detail, proactive leak detection is not financially justified by this AMP. However, early discovery of leaks provides benefits such as assisting in an improved maintenance split and reduced overtime costs which could be easily measured with a pilot project.
- **Institute a four-year valve and air-valve cycle**. Establish the dedicated valve crew and use Strategic Alliance Partners support to ensure every valve group is located, exercised, and documented at least once per cycle.

Capital Projects Identification and Financial Plan

In order to support the development of a 20-year financial plan, a lifecycle reinvestment model was developed. Financial projections are presented under three funding scenarios to illustrate the implications of different investment strategies on asset condition and service level outcomes:

- Funding Scenario 1 (S1): Do nothing, with no capital investment.
- Funding Scenario 2 (S2): an unconstrained budget, allowing the JdFWDS to reinvest in assets as required.
- Funding Scenario 3 (S3): the defined budget scenario, allowing $10 millions for linear assets and $3.5 millions for non-linear assets in 2026, escalated for inflation in subsequent years.

Under the unconstrained funding scenario (S2), the total funding requirement for the JdFWDS linear and non-linear assets is approximately $1.1 billion dollars over 20 years (including inflation). This averages $56.3 million dollars per year, with $39 million dollars for linear assets (**Figure ES-4**) and $16.8 million dollars for non-linear assets (**Figure ES-5**). Of the total funding requirement, approximately $708.8 million dollars is allocated to capital projects (63 % of the total, see **Section 7.6** for details). The summary of capital projects identified under S2 are provided in **Section 7.5**, with complete project lists available in **Appendix H**.

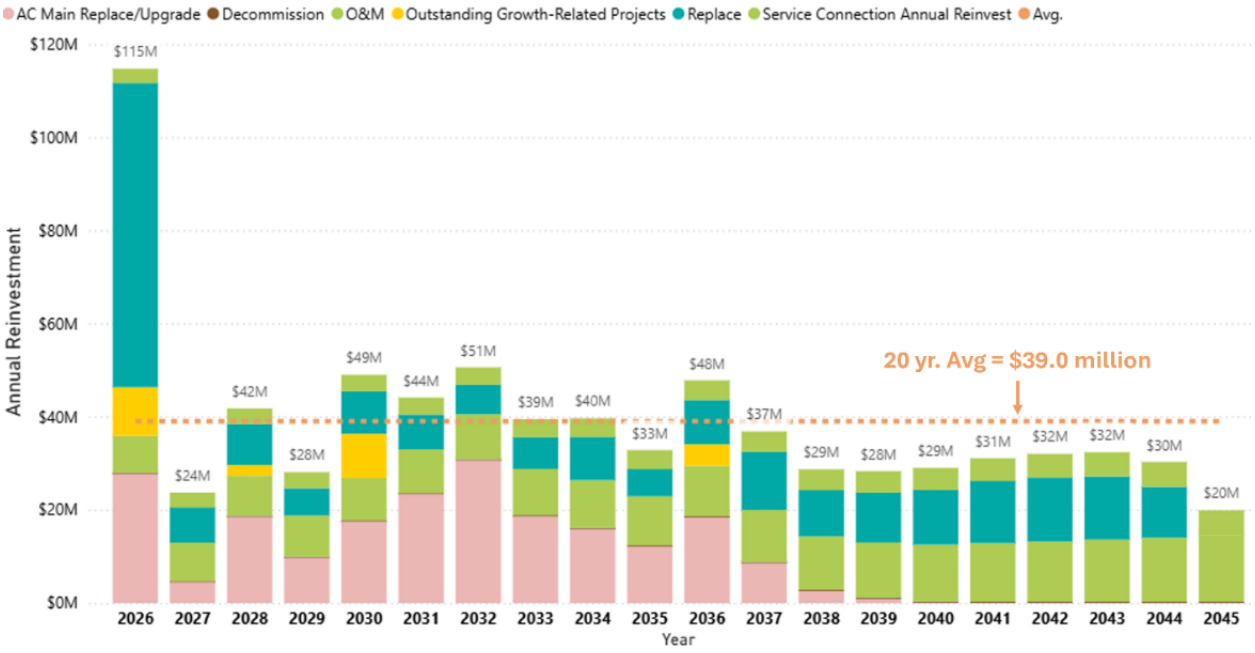

Figure ES-4: Linear Asset Full Funding Need Profile

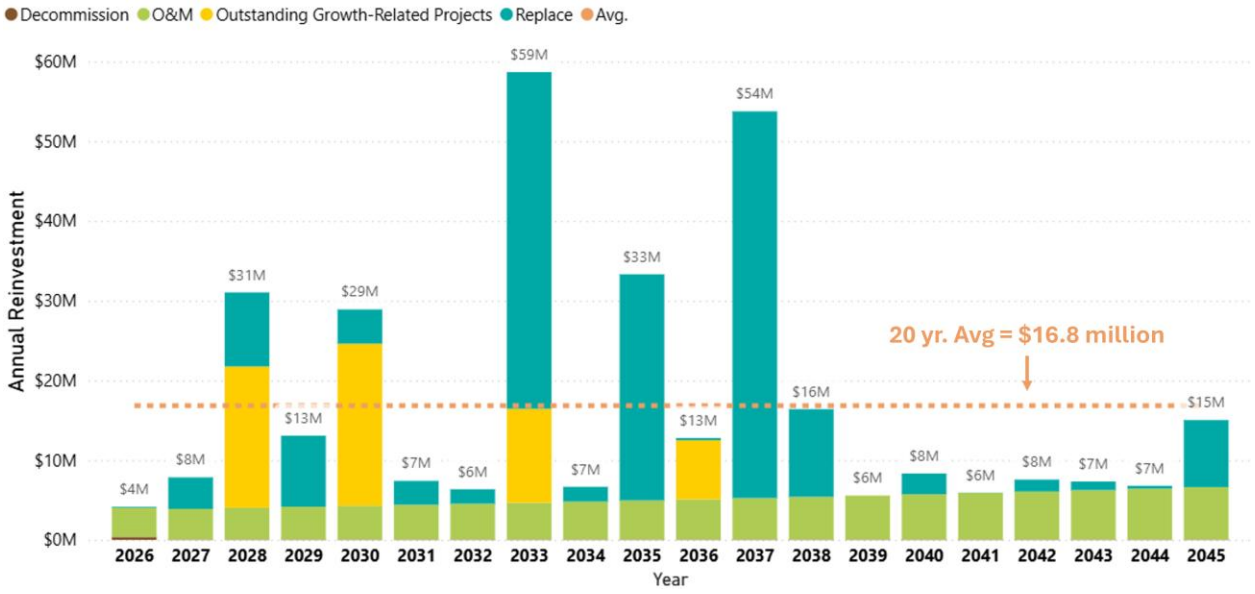

Figure ES-5: Non-Linear Asset Full Funding Need Profile

While S2 identifies the ideal long-term funding need, this level of reinvestment is not expected to be achievable. The following analysis therefore focuses on how each funding scenario affects the ability of JdFWDS to sustain the desired levels of service. In this context, level of service is defined as the percent of assets in fair or better condition.

For linear assets (**Figure ES-6**), the current funding level is approximately sufficient to maintain service levels at approximately 76% over the next 20 years. As the broader main inventory ages and deterioration accelerates, higher investment will be required to avoid sharper declines in condition and service performance.

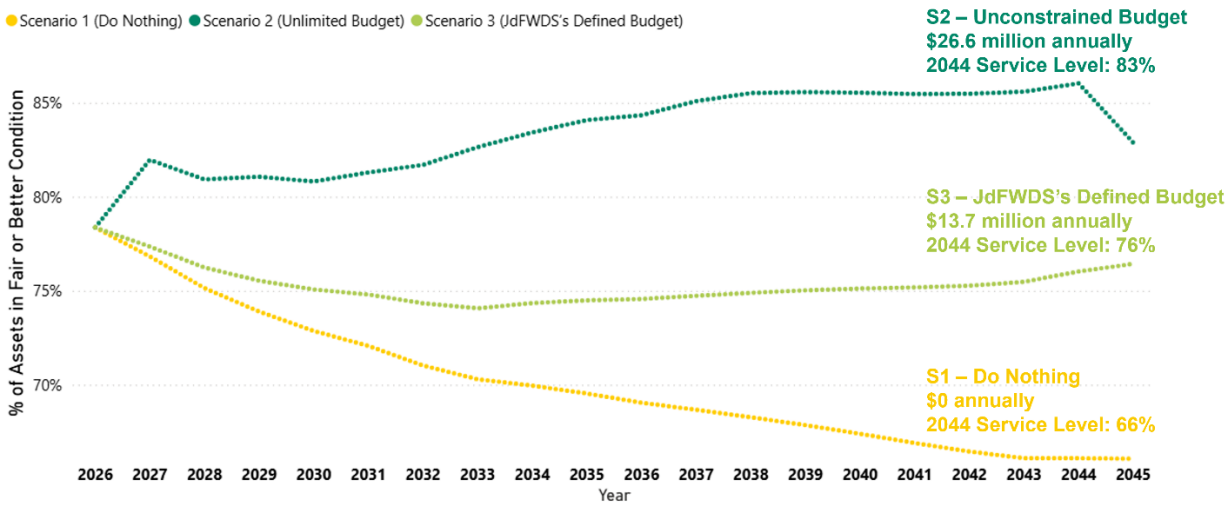

Figure ES-6: % of Linear Assets in Fair or Better Condition Over the Next 20 Years for All Budget Scenarios

For non-linear assets (**Figure ES-7**), the gap between S2 and S3 is more pronounced. Under S2, condition stabilizes at approximately 82% by 2044, while under S3 it declines to approximately 40%. This difference can be partly attributed to the shorter Expected Service Lives (ESLs) of non-linear assets, which makes their condition more sensitive to funding levels and more responsive to reinvestment. Because non-linear assets are easier to access and inspect, renewal decisions should continue to rely on field condition assessments and risk scoring. The most recent assessment, completed in 2025, provides the current basis for prioritizing limited funding toward the highest-priority assets.

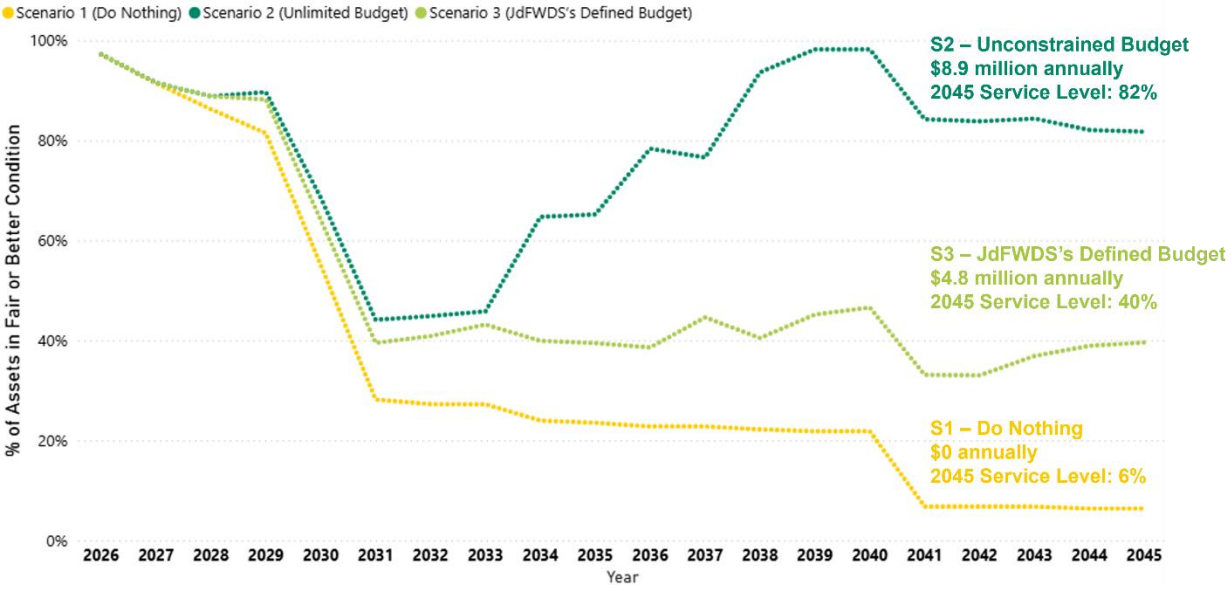

Figure ES-7: % of Non- Linear Assets in Fair or Better Condition Over the Next 20 Years for All Budget Scenarios

In summary, to support long-term service reliability and cost-effective asset management, it is recommended that the JdFWDS adjust funding levels to maintain approximately 80% of assets in fair or better condition, particularly for non-linear assets. This target aligns with peer utility practices and research, and strikes a balance between acceptable service performance and financial efficiency. In addition, major renewal projects should be planned and delivered in phases to spread large investments over multiple years and smooth budget requirements.

Performance Tracking

Performance tracking is a critical component of a sustainable and effective asset management. It ensures that the AMP remains a living document, responsive to changes in system condition, funding, risk, and service expectations. AECOM outlined a framework for monitoring and evaluating the effectiveness of the AMP over time, with the goal of enabling data-driven decision-making, supporting continuous improvement, and maintaining alignment with CRD's strategic objectives. A set of proposed performance indicators specific to AMP execution is summarized in **Table ES-4**.

Table ES-4: AM Plan Performance Monitoring Indicators

AMP Component	Performance Monitoring Indicators
State of Infrastructure	% of assets from JdFWDS in fair or better condition
Levels of Service	% of LoS performance measures of which current performance is recorded % of LoS performance measures for which current performance meets / exceeds target performance
Risk Management	% of high and very high-risk assets
Lifecycle Strategies & Financial Plan	Asset reinvestment rate (%) for JdFWDS Asset expansion rate (%) for JdFWDS Forecasted annual expenditure ($) for JdFWDS Funding Gap (% or $) for JdFWDS
Continuous Improvement	% of high priority improvement initiatives implemented

Asset Management Maturity

The CRD requested that a maturity assessment of the JdFWDS be carried out using the Institute of Asset Management (IAM) maturity scale. This eight-point scale was used by AECOM to assess the capabilities and maturity of the CRD's JdFWDS. AECOM mapped 40 targeted assessment questions to the scale to evaluate current practices.

Figure ES-8 shows the summary of results which indicates the current AM maturity position of the JdFWDS. The JdFWDS has greater maturity in Purpose and Context, however, to successfully reach the AM Readiness Target Level, improvements in Asset Management Decision Making and Lifecycle Delivery is essential.

Figure ES-8: AM Maturity Assessment Results

Table ES-5 shows a summary of the action items to improve AM maturity, gathered from discussions, workshops, and surveys.

Table ES-5: Summary of Short and Long-Term Actions for AM Maturity Improvement

Capability	Short Term Action	Long Term Action
Purpose & Context	• Develop an external stakeholder communications plan that formalizes existing informal relationships with regulators, municipalities, and others. • Create an internal stakeholder prioritization plan which identifies key internal stakeholders (IT, fleet, finance, and more).	• Conduct a study on resource use to quantify how much staffing and support is required for system growth and maintain aging infrastructure. • Establish a CMMS work order standard that shows status progression, closure criteria, and other information for accurate tracking.
Leadership & Governance	• Conduct a CMMS Function Review to include breakdown work order failure codes to allow reliable reporting, required regulatory work order tracking, and work order prioritization standards. • Review and update the existing AM policy from 2019, making sure it reflects current operational needs and is still appropriate for staff.	• Develop clear operational guidelines to support current and future staff that will serve as a reference for operations, standards, and procedures (“Water Bible”).
Organization & People	• Implement succession planning for key roles and shadowing of critical personnel to help retain knowledge.	• Establish planning and scheduling standards with defined windows that evolve from the current two week look-ahead to the more structured intervals such as monthly, quarterly, and eventually six, 12, and 18 months to support proactive maintenance planning and resource allocation
Strategy & Planning	• Improve communication and prioritization within the AM strategy. • Define clear roles and responsibilities for AM practices and procedures to reduce duplication of effort.	• Support planning and scheduling by establishing accurate resourcing requirements to enable the organisation to identify and address shortfalls
Asset Management Decision-Making	• Use asset risk to inform and improve decision making and prioritization to ensure that resources are spent wisely.	• Leverage the AMP LoS, valuation data, and asset registry to establish a single, reliable source for asset history.
Life Cycle Delivery	• Define disposal standards for large and small equipment like standards for long-term isolations, mothballing, and management of redundant assets to set requirements for management and divestment. • Develop emergency response and mitigation plans based on asset risk and CoF.	• Not Applicable.
Information Management	• Establish a work order date standard that defines the purpose of each data field within the CMMS and who is responsible. • Develop standardized procedures for document management.	• Define standards for inputting and updating asset registries across all business systems for consistency to help with maintain accurate asset data.
Risk	• Fully implement an asset risk framework for tactical risk analysis to assist with prioritization and decision making. • Escalate strategic risks from this AMP to enterprise risk for consideration and formalise the risk escalation methodology and responsibilities.	• Implement a defined Management of Change procedure that should be followed for asset changes.

Recommended Improvement Initiatives and Roadmap

Measuring and reporting AM performance reflects CRD's commitment to delivering JdFWDS services effectively and in alignment with defined service objectives. The successful implementation of this AMP relies on ongoing performance evaluation and continuous improvement. This includes executing recommended improvement initiatives that support long-term, sustainable service delivery. In summary, the improvement initiatives are described in **Table ES-6**.

Table ES-6: Recommended Improvement Initiatives

AMP Area	Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
State of Infrastructure	**Linear – General**	• No Global ID Included in the source GIS database	• Global IDs have been produced and assigned as part of the consolidated asset inventory to ensure consistent identification across datasets. In addition, Global IDs have been incorporated into the source GIS data provided by JdFWDS. The provided Global IDs can be used as a starting point for ongoing data management, or alternatively, JdFWDS may choose to regenerate Global IDs based on their preferred convention, provided that consistency is maintained across all systems	Medium
	Linear – Water Meters	• Inconsistency between attribute names	• Update the meter information stored in SAP ISU to include Global IDs by cross-referencing with the GIS layer and establish consistent naming conventions and attribute structures across SAP and GIS to support data integration and accuracy.	High
	Linear – Service Connections	• No data currently available for service connections • No installation date data and no condition data.	• Collect and input core service connection data, starting with inventory, to enable assignment of Global IDs in the future.	High
			• Obtain installation dates from as-built records or historical documentation, where available; otherwise, estimate based on adjacent main installation dates.	High
			• Establish a process for collecting and tracking service connection condition data (e.g., through inspections or age-based proxies).	High
	Linear – Watermains	• Duplicate IDs	• Review and resolve duplicate entries in the CRD Model ID field to ensure each asset is uniquely identified. It is recommended to implement a data validation process to prevent future duplication during data entry or system integration.	High
	Non-Linear – Bulk Water Station	• No original asset records • No ID assigned	• The bulk water station assets were not included in the region's existing asset inventory. AECOM developed corresponding asset records to capture key components such as electrical, plumbing, and superstructure elements. • It is recommended to maintain the bulk water station assets in the inventory, refine the listings with detailed asset information, and assign unique asset IDs to each station.	High
	Non-Linear – Pressure Control Stations	• Only 28% of assets have an Equipment ID assigned	• Approximately 28% of the assets within the Pressure Control Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Pressure Control Station assets and affix identification labels to the corresponding physical equipment.	High
	Non-Linear – Pump Stations	• Only 35% of assets have an Equipment ID assigned	• Approximately 35% of the assets within the Pump Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Pump Station assets and affix identification labels to the corresponding physical equipment.	High
	Non-Linear – Rechloramination Stations	• Only 30% of assets have an Equipment ID assigned	• Approximately 30% of the assets within the Rechloramination Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Rechloramination Stations assets and affix identification labels to the corresponding physical equipment.	High
	Non-Linear – Water Storage Tanks	• Only 21% of assets have an ID assigned.	• Approximately 21% of the assets within the Water Storage Tanks, including valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Water Storage Tank assets and affix identification labels to the corresponding physical equipment.	High
Level of Service	**Target Setting / Review**	• Some LoS targets exist (e.g., from CIBI), but not all measures have defined targets.	• Review existing targets against CRD's service goals and historical performance; establish targets for measures without one. Where a target is not feasible, set desired trends.	High
	Refine and Review Measures	• A preliminary list of LoS has been established, however it should be regularly reviewed going forward.	• Implement regular reviews (e.g., annually or every 4 years) to assess performance, verify data quality, and confirm alignment with strategic goals.	High
	Incorporate Customer Feedback	• Current LoS framework does not capture direct customer input.	• Introduce customer feedback mechanisms (e.g., surveys) to identify service expectations, gaps, and areas where CRD may be exceeding expectations.	Medium
	Evaluate Risks with LoS	• Risks associated with not meeting LoS have not been considered.	• Assess risks of not achieving LoS to better inform both capital planning and O&M prioritization.	Medium
Asset Criticality & Risk Management	**Improved methodology**	• CoF scores for pump stations and pressure control station assets are mostly directed by the operation team.	• Develop repeatable rules for determining station criticality for PCS and PS, building on efforts already carried out by CRD. • It is recommended to improve the framework by incorporating additional quantitative and system-based factors, such as: – Population or customers served: Weight stations by the number of people or service connections dependent on them.	Medium

AMP Area	Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
			– Elevation and hydraulic criticality: Include factors such as elevation head, system pressure influence, and storage tank dependency.	
	Improved methodology	• CoF scores for water storage tank assets are mostly directed by the CRD's subject matter experts (SMEs)	• Consideration should be given to developing a more standardized and transparent framework for assessing water storage tanks criticality, ensuring consistent evaluation across the system. The framework could incorporate the following key factors: – Location: Water storage tanks situated in more remote or upstream areas (e.g., Sooke) typically have a higher Consequence of Failure (CoF) due to their importance in maintaining supply continuity and limited alternative sources. – Valve System Configuration: The degree of system isolation and control—such as the availability and reliability of inlet/outlet valves, bypass arrangements, and pressure zones—can significantly influence the operational flexibility and response time during an outage. – Population Served: water storage tanks supplying larger populations or critical service areas (e.g., hospitals, emergency services, or dense residential zones) should be assigned higher criticality scores, reflecting their greater social and service impacts. – Redundancy: The presence (or absence) of backup water storage tanks, interconnections, or alternative supply routes affects the system's resilience. Water storage tanks without redundancy should be deemed more critical due to the higher risk of service interruption.	Medium
	Improved methodology	• CoF and PoF scores for watermains are equally weighted	• Establish weightings for CoF and PoF criteria to reflect CRDs expectations regarding what should drive PoF and CoF scores	Medium
	Risk framework application	• Asset-level risk management strategies	• Incorporate asset-level risk and CoF management strategies into future corporate risk management initiatives or update existing documents such as the ARMF and risk management policy.	Medium
	Risk Analysis	• Meter assets were excluded from this specific risk analysis as they are managed through the SAP dataset, which provides a more detailed basis for future integration.	• Meter assets were analyzed separately using the SAP-based inventory, which provided more detailed attribute information than the GIS dataset. For the next update, the existing unique identifier can be leveraged to enhance integration between the SAP and GIS datasets, allowing the risk analysis to draw on both spatial and attribute information. This approach will strengthen data alignment and enable a more comprehensive inclusion of meters within the overall risk framework.	Medium
Capacity Modelling	**Growth projects**	• Network capacity is exceeded in several areas once growth forecasts have been loaded into the demand model.	• Refer to **Table 5-10** for a summary of recommendations for linear and pumping projects.	Determined per project
	Capacity Modelling	• SRRDF supply cannot meet future demand using forecast population and the CRD design criteria.	• The East-West Connector* is a vital piece of infrastructure that Sooke will rely on in the future and has been used in models to allow further analysis. Its installation has been assumed as certain for the future scenarios of Sooke.	High
		• Fire flow scenarios are assessed on a pressure zone requirement basis only. Individual fire flow scenarios (per linear asset) have not been assessed as individual zoning and growth construction was not available	• Ongoing update of the model should include input from the local municipalities to allow detailed fire flow assessment to take place.	Medium
		• The design consumption rate is noted to be significantly higher than the actual consumption reported in the JdFWDS and results in future flexibility but also future growth projects being determined as required prior to the reality.	• An accurate figure should be used to realistically determine the requirements for growth projects and a consistent conservatism factor determined that accommodates the routine fluctuations in demand and localized growth that a pressure zone may experience.	Medium
Maintenance, Repair and Replacement Strategies	**Staffing & Workforce Capacity**	• Crew numbers have remained static despite system growth. Operators spend more time reacting to emergencies and less on scheduled tasks, creating backlog, fatigue, and overtime costs. • Supporting services (vehicles, IT licences, HR, safety) are also under pressure.	• Add 19 process FTEs and 1 EIC FTE (**Table 6-6**). Of this gross requirement, approximately 10 FTE-equivalents are assumed to be addressed through Strategic Alliance Partners support, with the remaining approximately 10 internal FTEs to be phased at ~2 FTE per year over 5 years. • Include trucks, IT, and training costs in future staffing plans. • Reduce overtime (current $15 k per field FTE vs $6–8k/FTE as per CIBI peer median).	Medium to High
	Preventive vs. Corrective Balance	• PM requirements for new assets are identified informally through staff discussions, with inconsistent documentation and data entry in SAP PM. • Maintenance task scheduling is performed manually despite SAP PM being used to generate PM tasks. • Corrective work still ~44% of hours, diverting crews from preventive programs.	• Introduce a standardized PM intake form at asset commissioning, capturing manufacturer recommendations, regulatory requirements, and operational needs. • Develop a formal SOP to guide the integration of PM tasks into SAP PM. • Leverage SAP PM capabilities for geographic grouping and automated scheduling; establish documented protocols to reduce reliance on staff knowledge. • Target 30/70 corrective–preventive split by expanding flushing, valve exercising, hydrant inspections, and leak detection.	Medium
	Information Management & Data Quality	• Work details are not consistently entered into GIS or cost codes. • Work order closure and data entry rely on manual QA processes, with inconsistent validation and limited backlog analysis. • Missing data hampers planning, budget defense, and compliance audits.	• Implement a standardized QA checklist for work orders. • Integrate maintenance records into GIS/CMMS in near-real time. • Conduct periodic backlog and feedback reviews to identify systemic issues and improve process consistency.	High
	Decision-Making & Workflow Integration	• Field decisions on CM tasks (e.g., whether to complete on-site or escalate) are based on informal judgment, with no clear thresholds.	• Define thresholds and triggers for minor vs. major CM tasks, including safety and timing criteria. • Create SOPs to guide field staff and supervisors on CM handling, including escalation and documentation requirements. • Develop end-to-end SOPs for workflows involving Operations, Engineering, and Finance.	Medium to High

AMP Area	Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
		• Maintenance activities involve multiple departments, but roles, handoffs, and communication protocols are not clearly defined.	• Ensure SOPs are version-controlled and embedded in training/onboarding.	
	Supply Chain & Spare Parts	• Specialty electronics, pumps, and valves that once arrived in weeks now take months. • CRD stocks more spares in older facilities, tying up money and creating security/insurance concerns.	• Establish a centralized critical-spares strategy and long-term supplier agreements. • Modernize storage facilities and strengthen inventory controls. • Use Strategic Alliance Partner contractors for excavation, traffic control, and specialised O&M where parts delays are common.	Medium
	Regulatory Compliance	• Provincial and federal regulations continue to tighten, with more prescriptive sampling, analytical, and reporting requirements. • Non-compliance risks penalties, reputational damage, and loss of public trust.	• Prepare to increase monitoring and sampling capacity to align with future regulatory requirements when confirmed. • Prepare to enhance reporting and monitoring processes to ensure timely compliance with evolving regulatory requirements if requirements are updated.	High
	Advancing Preventive Programs & System Modernization	• Legacy programs (AMI migration, valve cycles, proactive leak detection) face long backlogs and limited resources.	• Allocate one new FTE for district metering and acoustic leak audits and consider a pilot project to support financial justification for enhanced leak detection. • Institute a four-year valve/air-valve cycle supported by Strategic Alliance Partner asphalt services. • Accelerate AMR-to-AMI migration by doubling the meter team and supplementing with Strategic Alliance Partner plumbing resources.	Medium to High
Capital Projects and Financial Plan	**Maintain Target Asset Condition Levels**	• Under the current planned budget: • The percentage of linear assets in fair or better condition is forecast to remain steady at approximately 74% to 76% over the planning period. • The percentage of non-linear assets in fair or better condition is expected to gradually decline from 97% to 40% by the end of the planning period.	• Many water utilities aim to maintain approximately 80% of their assets in fair or better condition[1], as research and peer practices suggest this range supports cost-effective lifecycle management while avoiding steep renewal spikes. Maintaining asset health within this band provides a defensible foundation for long-term service reliability and cost stability.	High
	Establish Minimum Annual Reinvestment Rate	• Under the current budget, the capital reinvestment rate is 0.94%, which represents the percentage of total replacement value reinvested annually in system assets.	• Maintain a minimum annual reinvestment rate of 1% of replacement value would allow the JdFWDS to renew the system over a 100-year lifecycle and support sustainable long-term asset condition.	High
	Risk-Based Capital Prioritization	• Current budgeting practices do not explicitly apply risk-based prioritization to capital reinvestment decisions.	• Prioritize projects using risk-based criteria to ensure funding is directed to assets with the greatest impact on service and risk reduction. • For linear assets, if funding is constrained, prioritize legacy AC main upgrades and aging meter replacement to reduce operating risk, improve reliability, and enhance billing accuracy.	High
	Phased Planning for Large-Ticket Items	• Upcoming large-ticket renewal needs (e.g., Water Storage Tanks) may exceed short-term delivery capacity and budget flexibility. Executing all major renewals immediately is not feasible given resource and market constraints.	• Develop a phased capital planning and delivery strategy for major renewal projects, spreading large-ticket investments over a multi-year horizon. This will align project scheduling with internal capacity, contractor availability, and annual funding growth.	Medium

* Note – The East-West Connector is a Regional Water Supply Master Plan Project

[1] Municipality of Bluewater. Asset Management Plan (2024). 20240812-fin-amp-2024-bluewater-asset-management-plan-psd-final.pdf. Retrieved on Oct 29, 2025.
Region of Waterloo. Asset Management Plan (2025). 2025 ASSET MANAGEMENT PLAN. Retrieved on Oct 29, 2025.
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List of Abbreviations

Abbreviation	Description
AM	Asset Management
AMP	Asset Management Plan
ARMF	Asset Risk Management Framework
B	Billion
CIBI	Canadian Infrastructure Benchmarking Initiative
CMMS	Computerized Maintenance Management System
CRD	Capital Regional District
CoF	Consequence of Failure
DCC	Development Cost Charge
Ea.	Each
EIC	Engineer-in-Charge
ERM	Enterprise Risk Management
ESL	Expected Service Life
FCA	Facility Condition Assessment
FTE	Full-Time Employee
GIS	Geographic Information System
GWTP	Goldstream Water Treatment Plant
HVAC	Heating, Ventilation, and Air Conditioning
IAM	Institute of Asset Management
ID	Identifier
ISO	International Organization for Standardization
KPI	Key Performance Indicator
JdF	Juan de Fuca
JdFWDS	Juan de Fuca Water Distribution System
LoS	Level of Service
M	Million
MS	Microsoft
N/A	Not Available
O&M	Operations and Maintenance
O. Reg.	Ontario Regulation
PCS	Pump Control Station
PS	Pump Station
RSL	Remaining Service Life
SCADA	Supervisory Control and Data Acquisition
SMART	Specific, Measurable, Achievable, Realistic, Time-Bound
sq. ft.	Square Feet
SOI	State of Infrastructure
SRRDF	Sooke River Road Disinfecting Facility
Yr(s)	Year(s)

1. Introduction

The Juan de Fuca Water Distribution System (JdFWDS) provides potable water to ten communities in the western region of Greater Victoria, British Columbia, including the City of Langford, City of Colwood, Town of View Royal, District of Metchosin, District of Sooke, Scia'new Nation, T'Souke Nation, Songhees Nation, portions of Highlands, and the JdF Electoral Area. As a critical component of the Capital Regional District (CRD)'s infrastructure, the system's long-term functionality and sustainability are essential for maintaining service reliability and supporting future growth.

CRD has engaged AECOM Canada ULC (AECOM) to develop an Asset Management Plan (AMP) for JdFWDS. This initiative is aligned with the CRD's seven core asset management principles as shown in **Figure 1-1** below.

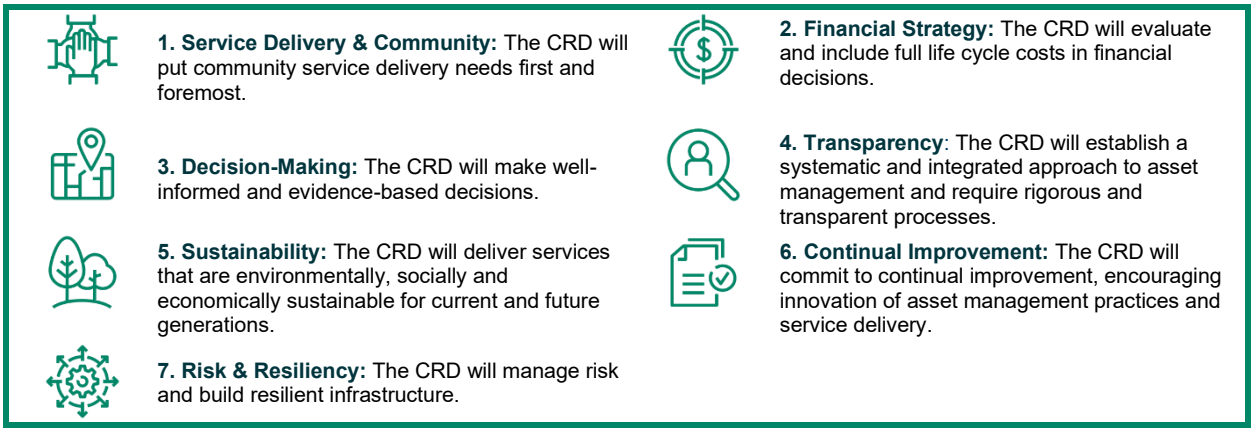


Figure 1-1: CRD's Seven AM Principles and Organizational Values

The objective of this AMP is to establish a structured framework and provide a financial and technical roadmap for the effective management of JdFWDS assets. Key elements in this AMP include:

- Conduct visual condition assessment of the pump stations, pressure control stations, water meter stations and water storage tanks
- Updating asset inventory with condition ratings, estimated remaining life, and asset valuations.
- Delivering defined levels of service (LoS) and monitoring performance over time.
- Identifying, assessing, and effectively managing risks.
- Analyzing system capacity to support future growth.
- Applying a lifecycle approach to develop long-term, cost-effective management strategies that align with service objectives.
- Integrating asset management (AM) with a long-term financial plan that outlines necessary and affordable expenditures and their allocation.
- Evaluating the current maturity of the CRD's asset management practices, laying the groundwork for continuous improvement and implementation of future asset management (AM) initiatives.

This AMP, containing a visual assessment of asset condition, cost, criticality, and risk, will serve as a critical tool to support CRD staff for guiding future capital projects and operational initiatives for the JdFWDS.

The geographical context of JdFWDS is shown in **Figure 1-2** below.

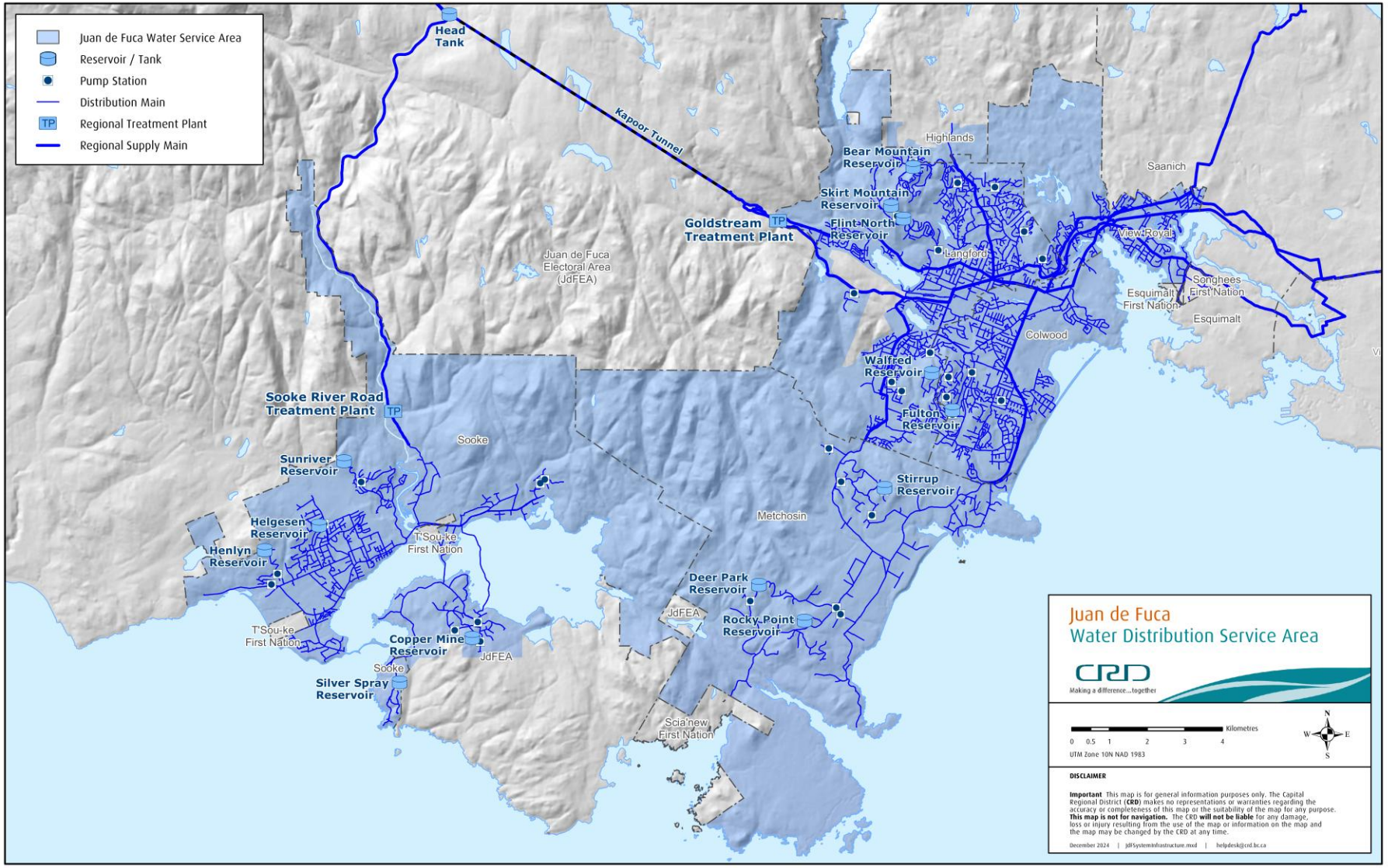


Figure 1-2: Overview Map of the Juan de Fuca Water Distribution System

2. State of the Infrastructure

This section presents a summary of the asset hierarchy, inventory, valuation, age, and condition, based on current information obtained from on-site condition assessments, ArcGIS shapefiles, and various organizational sources and systems.

2.1 Condition Assessment

2.1.1 Condition Data Collection Methodology

All assets are expected to deteriorate over their lifetime, and the condition reflects the physical state of the asset.

Condition assessments for non-linear assets were completed through visual inspections by AECOM assessors from January 13th to 17th, and February 24th to 28th, 2025. Condition assessments were based on visual inspections where the assets were accessible, as per the five-point Condition Rating Scale discussed in **Section 2.1.2**. As outlined in the RFP, the scope included reviewing the existing JdFWDS system asset inventory, aggregating and optimizing data, and completing condition assessments based on asset type through physical and desktop review using available information.

The visual assessments were non-destructive in nature and aimed to quantify the current condition of JdFWDS non-linear assets. The inspectors incorporated knowledge of the building system histories, dimensions, and construction dates for assets from conversations with the JdFWDS staff and from other documentation provided by the CRD. In instances where recent asset information was not available, elements were assumed to be original to the year the facility was commissioned.

In addition, Fulcrum is a mobile software application (see https://www.fulcrumapp.com/) that was used by AECOM in this project. This application has been used for a variety of facility condition assessment (FCA) and asset inventory projects. FCA projects require field assessors to capture a multitude of data quickly, accurately, and consistently, often under strict schedule constraints. Fulcrum's streamlined customizable user interface, camera functionality and automated quality controls optimize the mass-data collection process, allowing field teams to cover larger areas more efficiently and capture data with increased accuracy. The resulting database contains fewer errors and greater consistency, reducing the time required to perform post-assessment data clean-up.

The approach for linear assets is explained in **Section 2.1.2** below.

2.1.2 Condition Rating Methodology

For non-linear assets, the assessment of physical condition was based on on-site condition assessments and consultations with operators with experience in managing the assets. Condition assessments were based on the five-point Condition Rating Scale presented in **Table 2-1**.

Table 2-1: Condition Rating for Non-Linear Assets

Condition Rating	Condition Score	Description	Maintenance Required
Very Good	1	New or Excellent Condition: Sound modern structure / equipment, operable and well-maintained.	**Preventive Maintenance** – Regular inspections, lubrication, cleaning, calibration, and condition monitoring to ensure continued optimal performance. No corrective work expected.
Good	2	Minor Defects Only: Same as 1 but showing some minor signs of deterioration. Minor refurbishment and maintenance required.	**Preventive Maintenance** – Continue regular inspections and servicing. **Minor Corrective Maintenance** – Small-scale repairs such as replacing gaskets, seals, fuses, worn parts, repainting, tightening connections, patching coatings, or updating firmware/software. These are low-cost, short-duration interventions that restore full function without affecting asset availability.
Fair	3	Moderate Deterioration: Asset is functionally sound, but appearance is significantly affected by deterioration. Mechanical, electrical and instrumentation components function adequately but with some inefficiency and minor defects. Structural elements may have deficiencies but no impact on structural integrity or performance.	**Preventive Maintenance** – Continue regular inspections and servicing. **Major Corrective Maintenance** – Larger repairs requiring downtime, specialized labor, or higher cost, e.g., motor rewinding, pump overhauls, control panel replacement, structural patching of concrete, partial pipe relining, or refurbishment of significant sub-components. These extend useful life but do not fully renew the asset.
Poor	4	Significant Deterioration: Mechanical, electrical and instrumentation components function but require significant maintenance to remain operational. Equipment functional but obsolete. Deterioration has a significant impact on performance of asset due to leakage or other structural problems.	**Renewal/ Repair** – Capital intervention aimed at extending service life. This can include structural rehabilitation, major component replacement (e.g., motor + pump bowl replacement), relining or slip lining of pipes, recoating tanks, or full refurbishment of control systems. Renewal usually restores capacity/performance to near-original levels but retains some original components.
Very Poor	5	Virtually Unserviceable: Serious condition problems having a detrimental effect on the performance of the asset. Will require major overhaul / replacement within the immediate future.	**Replacement (immediate)** – Full decommissioning and replacement of the asset. Includes demolition/removal, site preparation, and installation of new equipment or structure. Replacement may also involve upgrading to modern standards, adding resilience, or redesigning the asset to meet future capacity and regulatory requirements.

For linear assets, a three-parameter Weibull distribution function was used to estimate the current condition rating of linear assets based on their age and expected service life. The Weibull distribution has been used extensively in reliability studies and lifetime prediction models in industries ranging from automotive to the oil & gas and provides a suitable distribution for this type of analysis.

To perform a high-order network-level analysis, it was assumed that assets would fail (and require replacement) within a deterioration envelope / curve approximated by a Weibull probability distribution. The Weibull probability distribution provides a left-skewed distribution that rises slowly and diminishes quickly as the population is consumed. The underlying premise of the Weibull-shaped deterioration is that while some assets fail prematurely due to severe conditions or improper installation, other assets are very long-lived and function well beyond their theoretical expected service life. The Weibull probability distribution has three parameters: age, scale, and shape, as set out in **Equation [1]:**

$$f(x;\alpha,\beta) = e^{-\left(\frac{x}{\beta}\right)^{\alpha}} \quad [1]$$

Where: x = Age
α = Shape parameter (or slope)
β = Scale parameter

A set of Weibull cumulative distribution functions were leveraged to simulate a set of deterioration curves for assets with different ESLs as shown in **Figure 2-1**.

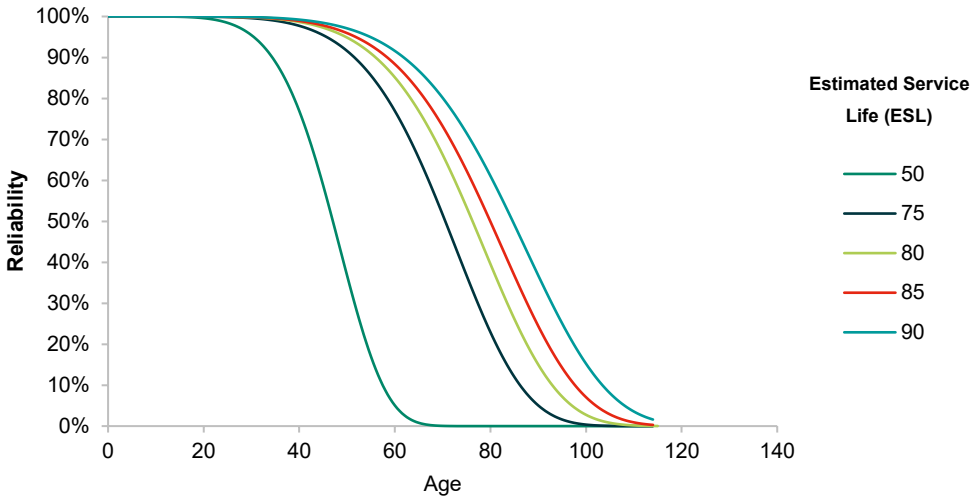


Figure 2-1: Asset Deterioration Curve Samples (ESL and age in years)

Table 2-2 presents an age-based condition rating approach. The condition scores and rating scales are aligned with the CRD's overall condition rating strategy, where a five-point condition rating scale was adopted.

Table 2-2: Condition Rating for Linear Assets

Condition Rating	Weibull Distribution Score	Description	Range % of ESL Consumed	Range of % Operational Life Consumed *
Very Good	1 – 1.5	New or Excellent Condition: Sound modern asset, operable and well-maintained.	0% – 71%	0% – 47%
Good	1.5 – 2.2	Minor Defects Only: Same as 1 but showing some minor signs of deterioration. Minor refurbishment and maintenance required.	72% - 84%	48% - 56%
Fair	2.2 – 2.8	Moderate Deterioration: Asset is functionally sound, but appearance is significantly affected by deterioration.	85% – 92%	57% – 60%
Poor	2.8 – 3.5	Deterioration has a significant impact on performance of asset and asset requires significant maintenance to remain operational.	93% - 99%	61% - 66%
Very Poor	3.5 - 5	Virtually Unserviceable: Serious condition problems having a detrimental effect on the performance of the asset. Will require major overhaul / replacement within the immediate future.	>=100%	67% -100%

** Water Environment Research Foundation (WERF) uses the term "operational life" to define the time-period over which an asset remains operational irrespective of performance, risk, or cost considerations.*

2.2 Asset Hierarchy

For the purpose of this project, the CRD's Asset Management Data Standards (AMDS)[2] document was used to support consistency with the CRD's approach to asset data structure and management. The AMDS establishes a standardized asset hierarchy—ranging from organization and service levels down to system and individual asset levels—to support reliable data collection and reporting across all asset types. It defines core and system-specific data fields, outlines documentation requirements, and sets expectations for integrating data from various sources such as SAP, GIS, and as-built records. This functional and structured approach ensures that asset information is captured and maintained in a consistent manner, facilitating effective planning, decision-making, and continuous improvement in managing data gaps for CRD assets.

Figure 2-2 below shows the asset hierarchy diagram for the JdFWDS. All its assets are categorized into two main groups: Non-Linear and Linear. Non-linear assets include facilities such as Water Storage Tanks, pump stations, Pressure Control Stations, rechloramination stations, bulk water stations, and water meter stations, along with associated architectural, structural, mechanical, and electrical components. Linear assets are categorized into water meters and watermains. Water meters, referred to as distribution services, include meter chambers, linear conveyance segments, and service connections. Watermains, referred to as distribution mains, include watermains systems, each comprising mains, hydrants, valves, and laterals. These laterals differ from service connections, as they are associated with hydrants and valves rather than individual customer services.

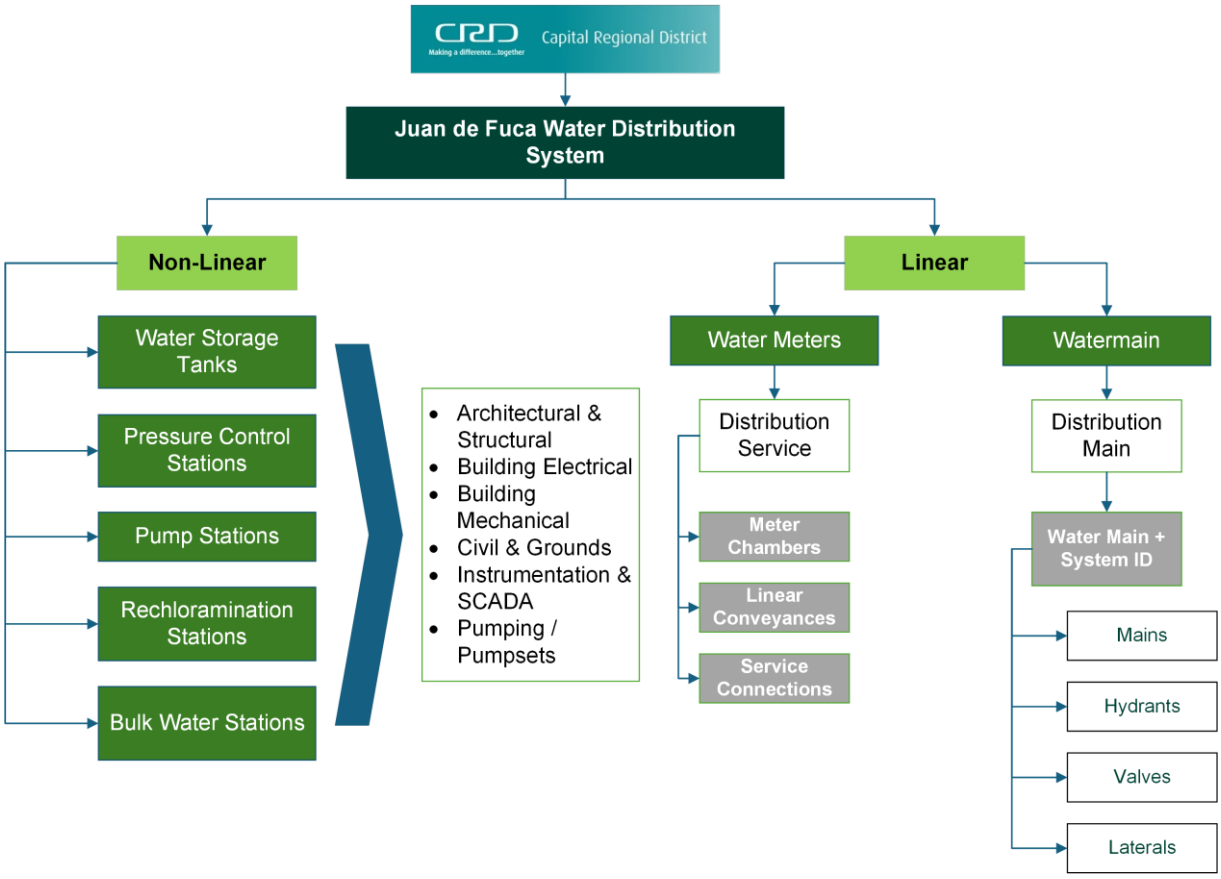


Figure 2-2: The JdFWDS Asset Hierarchy

2.3 Asset Inventory

An asset inventory was developed to provide a comprehensive record of the assets within the CRD's JdFWDS. As shown in **Figure 2-2,** the inventory was structured to strike a balance between granularity and manageability. It is detailed enough to identify individual assets requiring renewal (refurbishment or replacement), yet not so detailed that data collection and management become inefficient. Where information gaps existed, AECOM supplemented the

[2] CRD Asset Management Data Standards (AMDS), 2024

inventory using available engineering studies and as-built drawings. Additional details regarding data gaps and associated methodologies are provided in **Section 2.7**. This structured asset hierarchy enables the CRD to organize data by asset type and adapt the inventory over time as asset conditions, estimated service lives, and replacement costs evolve. The summary of the JdFWDS inventory is provided in **Table 2-3** below.

Table 2-3: JdFWDS Asset Inventory Summary

Asset Class	Asset Category	Asset System	Quantity	Unit
Linear	Watermains	Hydrants	5,259 (2,622 hydrants and 2,637 hydrant valves)	Ea.
	Watermains	Laterals	13,093	m
	Watermains	Main	547,454	m
	Water Meters	Meters	26,775	Ea.
	Water Meters	Service Connections*	242,000	m
	Watermains	Valves	8,672**	Ea.
Non-Linear	Bulk Water Stations	-	4	Ea.
	Pressure Control Stations	-	55	Ea.
	Pump Stations	-	32	Ea.
	Rechloramination Stations	-	2	Ea.
	Water Storage Tanks	-	14	Ea.

* *A service connection is the pipe that connects the watermain to an individual customer property, allowing water to be delivered to homes or businesses. It is different from a lateral, which connects hydrants and valves to the main. The inventory for service connections was not provided by CRD.*

*** JdFWDS has a total of 11,309 valves, of which 2,637 are hydrant valves and are counted under hydrants (2,622 hydrants and 2,637 valves). The remaining 8,672 valves belong to other valve types.*

The asset inventory was completed with the addition of various descriptive and calculated attributes, including asset age, expected and estimated service life, apparent condition, consequence of failure (CoF), probability of failure (PoF), risk, and replacement values, to support a comprehensive asset replacement planning through the financial and lifecycle analysis (Refer to **Section 7**). A detailed inventory is provided in MS Excel format in **Appendix A**.

2.4 Asset Valuation and Installation Profile

The replacement value was assigned to each asset based on historical cost data, budget quotations from equipment suppliers, and other data sources such as the RSMeans Construction Cost Database (2025 edition) by Gordian. The replacement valuation for all JdFWDS assets was based on the following assumptions:

- Unit Cost – represents the cost in 2025 dollars to replace the assets to a new condition with a current / similar model of equipment / asset, as applicable. This includes supply, delivery and installation.
- Replacement Value – estimated to be the nominal cost plus a 45% allowance for construction contingency, engineering and project management.

The CRD's JdFWDS has an estimated total replacement value of approximately $2 billion. For non-linear assets, the replacement values associated with Pelican Pump Station and Copper Mine Pump Stations #1 and #2 were excluded from the analysis, as these facilities are either decommissioned or undergoing reconstruction. Among the remaining non-linear assets, water storage tank represent the highest replacement value at approximately $56 million, followed by pump stations at around $52 million and pressure control stations at roughly $46 million.

Table 2-4 outlines the replacement value by asset category. Mains represent the largest share, with an estimated value of $1.3 billion. Among other linear assets, service connections and meters contribute approximately $351 million and $85 million, respectively. Refer to **Appendix A** for more information on linear unit costs.

Table 2-4: JdFWDS Current Replacement Value

Asset Class	Asset Category	Asset Subsystem	Quantity	Unit	Unit Replacement Value Range ($ / Unit)	Total Replacement Value
Linear	Watermains	Hydrants	5,259 (2,622 hydrants and 2,637 hydrant valves)	Ea.	Hydrant = $17,400 Hydrant Valve = $867 - $2,603	$50,199,000
	Watermains	Laterals	13,093	m	$2,900	$37,969,000
	Watermains	Mains	547,454	m	$1,740 - $7,540	$1,267,265,000
	Water Meters	Meters	26,775	Ea.	$2,900 – $8,700	$84,399,000
	Water Meters	Service Connections	242,000	m	$1,450	$350,900,000
	Watermains	Valves	8,672	Ea.	$867 - $9,763	$19,924,000
	Total of Linear					**$1,810,655,000**
Non-Linear	Bulk Water Stations	-	4	Ea.	$66,700	$267,000
	Pressure Control Stations	-	55	Ea.	$180,515 - $2,104,245	$45,622,000
	Pump Stations	-	32	Ea.	$613,970 - $3,513,066	$51,604,000
	Rechloramination Stations	-	2	Ea.	$673,896 - $1,046,119	$1,720,000
	Water Storage Tanks	-	14	Ea.	$295,053 - $19,515,729	$55,590,000
	Total of Non-Linear					**$154,803,000**
Grand Total						**$1,965,458,000**

Figure 2-3 illustrates the total replacement value of JdFWDS linear assets by installation decade. Mains represent the largest cost component across all periods. Assets with unknown install years (e.g., service connections) account for $351 million. The largest investment value occurred in the 2000-2009 period, totaling $409 million. “Installation year data are available for all assets. For laterals, valves, and hydrants, the installation year is assumed to match that of the connected watermain to maintain consistency across associated components. However, installation year information for service connections is unavailable, as these data were not included in the provided inventory.

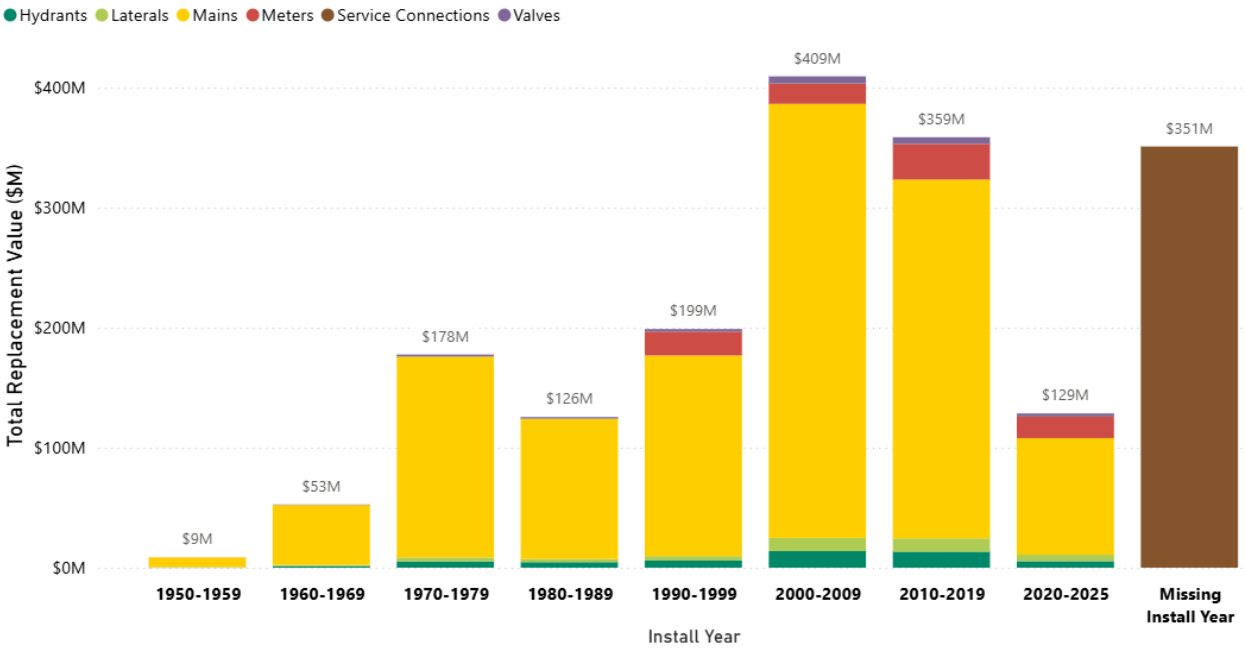


Figure 2-3: JdFWDS Linear Asset Installation Profile by Replacement Value

Similarly, **Figure 2-4** shows the total replacement value of JdFWDS non-linear assets by installation decade. Similar to linear assets, the 2000-2009 period shows the highest investment value at $48 million, followed by 1990-1999 at $47 million.

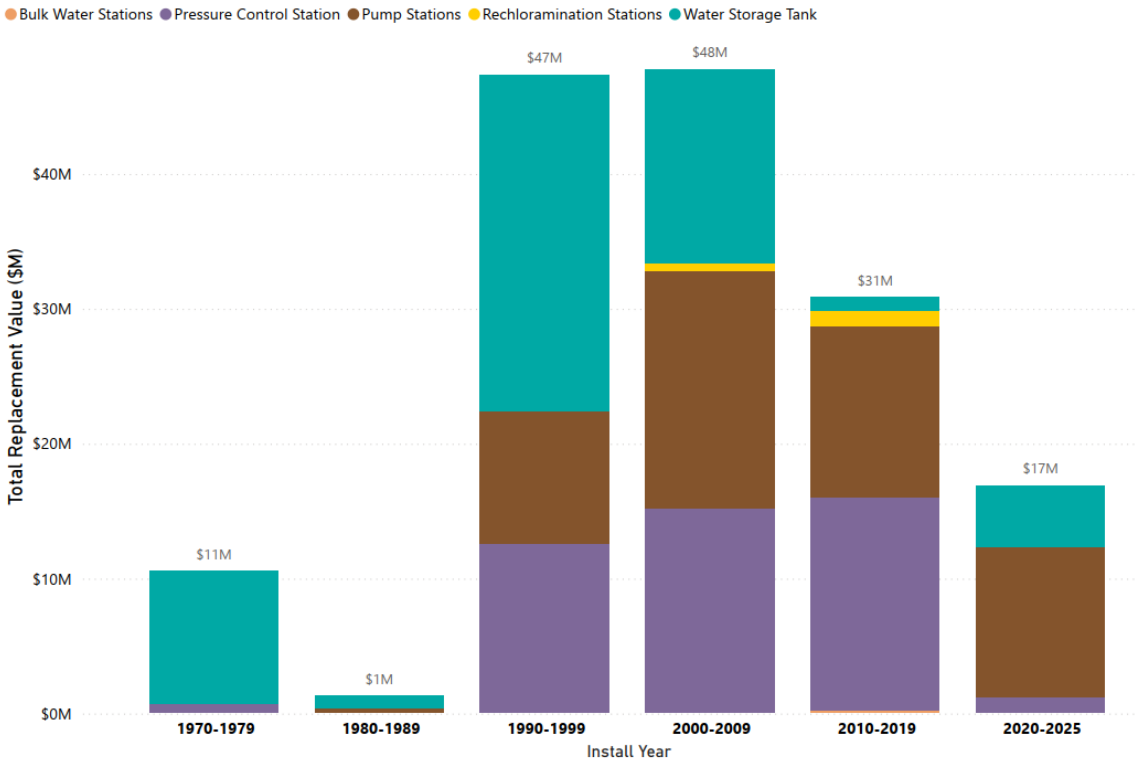


Figure 2-4: JdFWDS Non-Linear Asset Installation Profile in Replacement Value

2.5 Age and Remaining Service Life

In practice, various assets will deteriorate at different rates and not necessarily linearly over time. However, it is pivotal to keep in mind the level of effort required to predict failure compared with the asset value. More sophisticated deterioration modelling may be warranted for assets with high replacement values, whilst the cost of deterioration modelling for low-value assets may very well exceed the replacement cost of the asset. The actual service life can vary significantly from the estimated service life (ESL). The latter is defined as the period over which an asset is available for use and able to provide the required LoS at an acceptable risk and serviceability (asset can continue to provide the required level of service without incurring excessive or unforeseen risks, disruptions, or maintenance/repair costs). In other words, the ESL is the period an asset can reasonably be expected to perform its intended function reliably and cost-effectively.

In some instances, a variation in expected vs. actual service life is evident due to the following factors:

- **Operating conditions and demands:** Some assets are operated intermittently or even infrequently or are being operated at a lower demand than their designed capacity. Thus, the actual operating “age” of the asset is reduced.
- **Environment:** Some assets are exposed to very aggressive environmental conditions (e.g., corrosive chemicals), while other assets are in relatively benign conditions; thus, the deterioration of assets is affected differently.
- **Maintenance:** Assets are maintained through refurbishment or replacement of components, which prolongs the service life of the asset.
- **Technological Obsolescence:** Some assets can theoretically be maintained indefinitely, although considerations such as cost to maintain the asset, its energy efficiency, and the cost to upgrade to an updated technology that would result in cost savings are likely to render this approach uneconomical.

The replacement-value-weighted average age and ESL represent the overall performance of an asset portfolio, calculated by weighting each asset’s data according to its replacement value. This approach emphasizes the financial significance of higher-value assets (usually are the structures of facilities and water storage tanks), ensuring the measure reflects where most capital is invested. The benefit is that it provides a more realistic and meaningful indicator of system estimated service life and aging, supporting sound reinvestment planning, performance tracking, and communication of asset health to decision-makers.

Figure 2-5 presents the weighted average age and estimated remaining service life (calculated as weighted average ESL minus the weighted average age) for various linear and non-linear assets within the JdFWDS. Noted that the weighted average is the average values weighted by their replacement values. Among linear assets, mains have the longest remaining service life at 51 years, followed by valves and laterals at 28 years.

For the non-linear assets, the water storage tanks, and pressure control stations exhibit the highest weighted average age (45 years), largely due to several older concrete structures built in the 1970s, which still retain about 10 years of remaining service life. In contrast, the pump stations are comparatively younger (30 years old) and have a substantial remaining service life of approximately 14 years. Overall, the portfolio indicates that most high-value assets have surpassed the midpoint of their expected service life and retain moderate remaining service lives, suggesting that the system as a whole is generally mature but not yet approaching a critical stage of renewal.

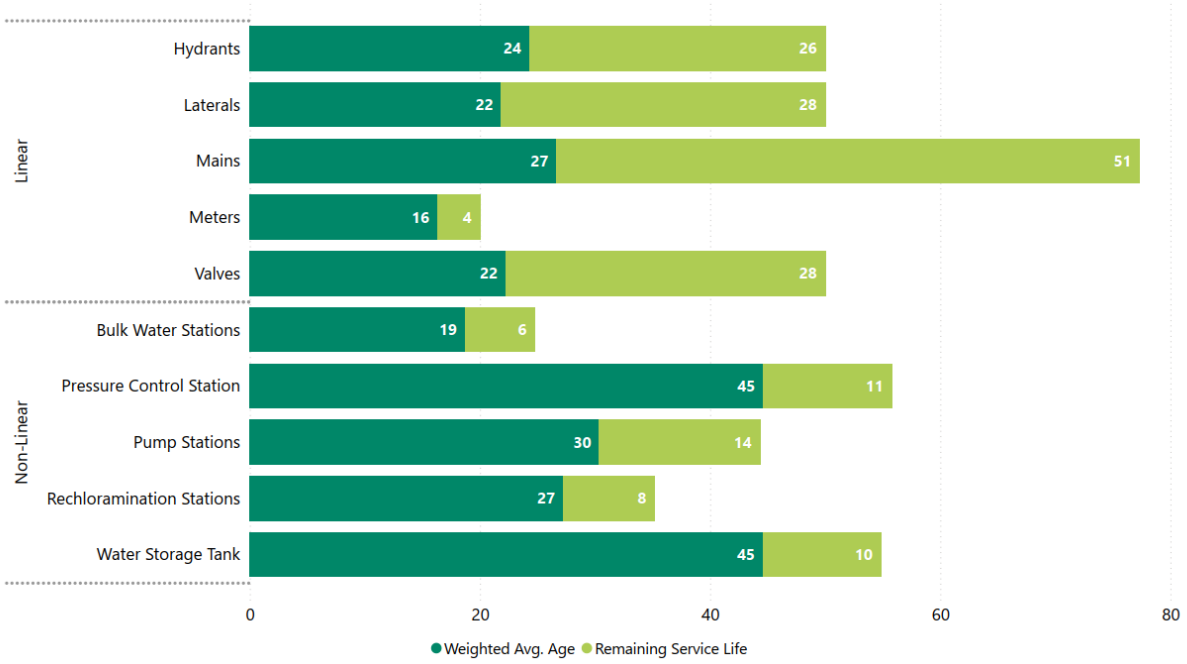


Figure 2-5: JdFWDS System Weighted Average Age and Remaining Service Life

2.6 Asset Condition

Table 2-5 and **Figure 2-6** summarize the condition rating of all the JdFWDS System assets weighted by the assets' replacement values. Note that this metric can be biased because high-value linear assets in better condition may overshadow the low-value assets in worse condition, understating overall system aging. In summary, almost two thirds (64%) of the total replacement value is attributed to assets in Very Good condition. Only 6% of assets are rated as Poor or Very Poor, with a significant portion of these belonging to the meter category. In addition, 18% of total replacement value is related to the assets with unknown condition rating. It should be noted that the unknown installation years primarily belong to service connections, as this information was not included in the provided inventory.

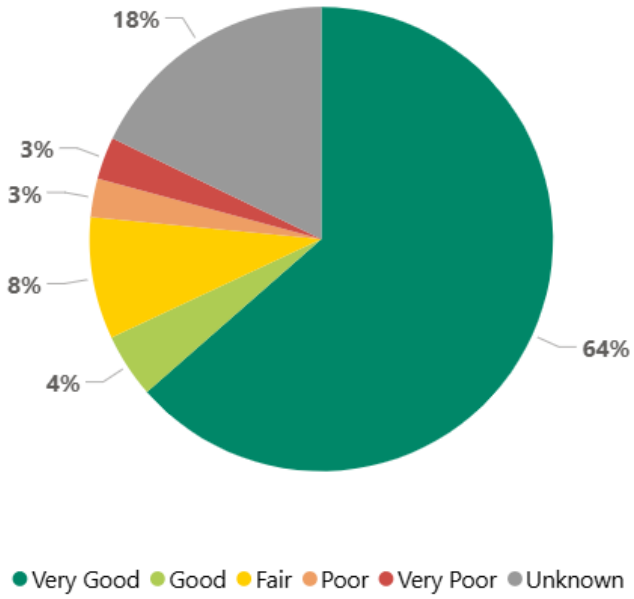


Figure 2-6: JdFWDS Overall Condition Summary

Table 2-5: JdFWDS Condition Summary

Condition Rating	Replacement Value	% of Replacement Value
Very Good	$1,248,995,000	64%
Good	$88,028,000	4%
Fair	$166,792,000	8%
Poor	$52,736,000	3%
Very Poor	$57,908,000	3%
Unknown	$350,999,000	18%
Total	**$1,965,452,000**	**100%**

Additionally, **Figure 2-7** and **Table 2-6** granulate the condition of the assets based on different asset sub-categories. Linear assets such as hydrants, laterals, mains, and valves are largely in Very Good or Good condition, while meters have a high proportion in Poor and Very Poor condition. Service connections have unknown condition data. The condition distribution of non-linear assets indicates that the majority are in Good to Fair condition, with bulk water stations showing entirely in Good condition. Pressure Control Stations and water storage tanks are primarily in Fair condition, while rechloramination stations and pump stations exhibit a larger share of Good to Fair ratings. Only a small percentage of assets fall under the Poor or Very Poor categories, suggesting that while most facilities remain functional, several key structures—particularly storage and pressure control facilities—are approaching the lower end of their performance condition.

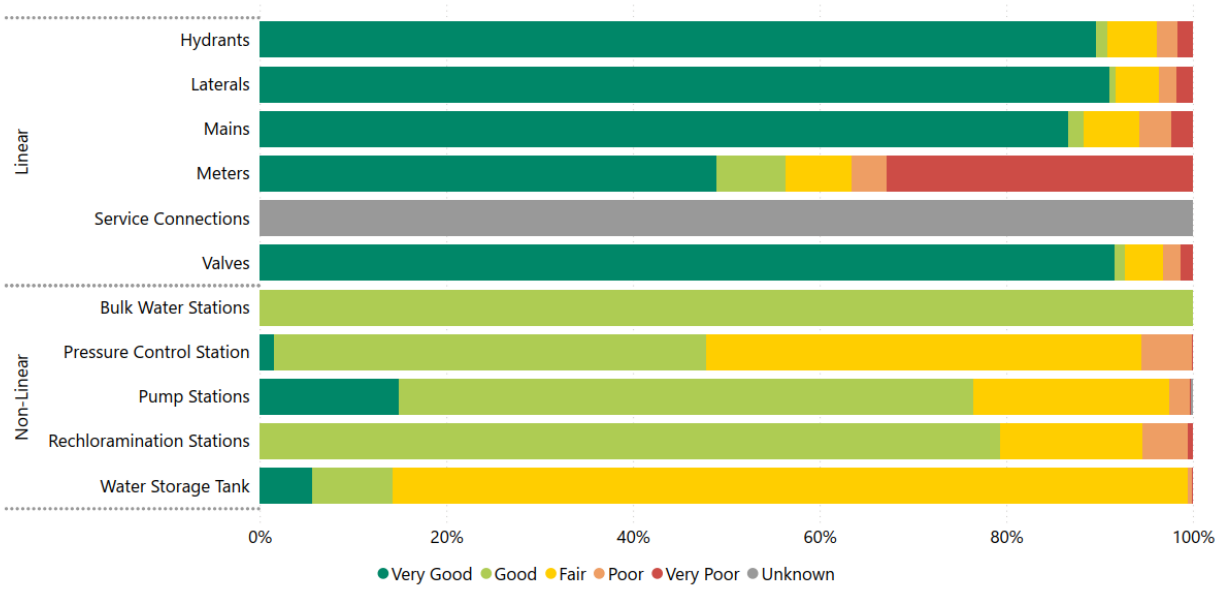


Figure 2-7: JdFWDS Condition Distribution by Asset Category and Subcategory

Table 2-6: JdFWDS Asset Condition Distribution

Asset Class	Asset Category/System	Very Good	Good	Fair	Poor	Very Poor	Unknown	All
Linear	Hydrants	90%	1%	5%	2%	2%	0%	100%
	Laterals	91%	1%	5%	2%	2%	0%	100%
	Mains	87%	2%	6%	3%	2%	0%	100%
	Meters	49%	7%	7%	4%	33%	0%	100%
	Service Connections	0%	0%	0%	0%	0%	100%	100%
	Valves	92%	1%	4%	2%	1%	0%	100%
	All Linear Total	**68%**	**2%**	**5%**	**3%**	**3%**	**19%**	**100%**
Non-Linear	Bulk Water Stations	0%	100%	0%	0%	0%	0%	100%
	Pressure Control Stations	2%	46%	47%	5%	0%	0%	100%
	Pump Stations	15%	62%	21%	2%	0%	0%	100%
	Rechloramination Stations	0%	79%	15%	5%	1%	0%	100%
	Water Storage Tank	6%	9%	85%	1%	0%	0%	100%
	All Non-Linear Total	**7%**	**38%**	**51%**	**3%**	**0%**	**0%**	**100%**
Grand Total		**64%**	**4%**	**8%**	**3%**	**3%**	**18%**	**100%**

2.7 Asset Data Gap Analysis

This section summarizes the current state of the JdFWDS asset data by assessing the quality of the asset inventory. Specifically, this section identifies existing data gaps, determines the overall confidence in the current asset data, and introduces good practices of data management.

As mentioned in **Section 2.2**, the Asset Management Data Standards (AMDS) document was used to support a consistent and structured approach to asset data management, supporting standardized data collection, integration, and reporting across all CRD assets.

Table 2-7 and **Table 2-8** provide a summary of observed data gaps in the compiled JdFWDS asset inventory across key data attributes that help to make informed decisions over the asset lifecycle for this AMP.

2.7.1 General Observations

Accurate and comprehensive asset information is essential for making informed decisions, such as determining the most appropriate maintenance or renewal intervals for infrastructure assets. This section aims to identify current gaps in the JdFWDS asset inventory and highlight priority areas where data improvements are needed to support more effective lifecycle planning and management.

By addressing the data gaps outlined in this report, the CRD will be better equipped to collect and maintain asset data that directly supports the decision-making processes required for managing JdFWDS assets. Implementing these recommendations will ensure that the asset information is both relevant and actionable for operational, maintenance, and capital planning purposes.

To enable efficient asset identification across different asset systems, multiple types of IDs were assigned to assets:

- FicID: Used for tracking assets within the Power BI model, formatted as Linear00000 or NonLinear00000.
- System ID: Assigned to connected or adjacent linear asset segments, formatted as WaterMain-ID000000.
- CRD Water Model ID: Used to identify distribution main piping within the system, formatted as PPE00000.

- Global ID: Automatically generated by GIS or Fulcrum for both linear and non-linear assets, formatted as 7DDFA3BE-A200-4C25-80EB-D09421B0A24C (example).
- Equipment ID (Meters): Original identifier from the regional SAP ISU system, formatted as 9000040432 (example).
- Equipment ID (Non-linear assets): Original identifier from the regional SAP PM system for facility assets, formatted as 6007050 (example).
- Functional Location ID (stations and water storage tanks): indicating the facilities' functional location within the entire CRD water system, formatted as S200-WS-SP00000.

Table 2-7 and **Table 2-8** present a summary of the data gaps observed across all JdFWDS assets, organized by key data attributes.

Table 2-7: Observations on Asset Data Completeness - Linear

Asset Category	Asset Unit	System	Global ID	Install Date	Condition	ESL	Replacement Cost	Equipment ID
Watermains	Distribution Main	Hydrants	100%	100%	100%	100%	100%	-
		Laterals	100%	100%	100%	100%	100%	-
		Mains	100%	100%	100%	100%	100%	-
		Valves	100%	100%	100%	100%	100%	-
Water Meters	Distribution Service	Meters*	N.A.	100%	100%	100%	100%	100%
		Service Connections*	N.A.	0%**	0%***	100%	100%	-

** Data for meters was sourced from an MS Excel spreadsheet provided by CRD, which does not include Global IDs. As a result, the analysis presented here does not reference Global IDs for meter assets. However, Global IDs were added to the GIS layer and can be used in the future to update the meter data and, subsequently, the CMMS data. For service connections, no data is currently available, and therefore, no Global IDs exist for this asset subsystem.*

*** No installation Data available for service connections.*

**** No condition data for service connections, as the data is not available for service connections.*

***** Equipment ID only Provided for meters in the CMMS data not in the GIS.*

Table 2-8: Observations on Asset Data Completeness - Non-Linear

Asset Category	Asset Unit	Subsystem	Location	Install Date	Condition	ESL	Replacement Cost	Equipment ID
Bulk Water Meter Station	100%	100%	100%	100%	100%	100%	100%	0%*
Bulk Water Station	100%	100%	100%	100%	100%	100%	100%	0%
Pressure Control Stations	100%	100%	100%	100%	99.9%	100%	100%	28%
Pump Stations	100%	100%	99.99%	100%	100%	100%	100%	35%
Rechloramination Station	100%	100%	100%	100%	100%	100%	100%	30%

Asset Category	Asset Unit	Subsystem	Location	Install Date	Condition	ESL	Replacement Cost	Equipment ID
Water Storage Tank	100%	100%	100%	100%	100%	100%	100%	21%

** ID is not available*

For recommendations on improving data quality, please refer to **Section 10**, which provides detailed guidance and specific actions aimed at enhancing the accuracy, completeness, and reliability of asset data.

2.8 Gaps & Recommendations

Overall, the CRD JdFWDS asset inventory is currently stored across multiple data platforms, including GIS, SAP PM, and SAP ISU, with asset status further tracked through separate work order management systems. However, these platforms lack consistent ID formats or linkage mechanisms, resulting in duplicate or mismatched records. For example, pumps and valves recorded in GIS often have different IDs than their corresponding entries in SAP PM, and the operations team maintains additional, unlinked records in their work order system, with no physical tags on equipment. It is recommended to establish complete data entries for all linear and non-linear assets within the GIS platform using system-generated Global IDs to track geographic locations, and to adopt a consistent equipment ID structure that combines the JdFWDS functional location code, asset category abbreviation, and ID number—for example, S200-WS-SP03002-PMP5581, representing a diaphragm dosing pump in the Rocky Point Rechloramination Station.

Table 2-9 summarizes the key gaps and corresponding recommendations identified through the state of the infrastructure analysis.

Table 2-9: SOI Gaps and Recommendations

Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
Linear -General	• No Global ID Included in the source GIS database	• Global IDs have been produced and assigned as part of the consolidated asset inventory to ensure consistent identification across datasets. In addition, Global IDs have been incorporated into the source GIS data provided by JdFWDS. The provided Global IDs can be used as a starting point for ongoing data management, or alternatively, JdFWDS may choose to regenerate Global IDs based on their preferred convention, provided that consistency is maintained across all systems	Medium/High
Linear – Water Meters	• Inconsistency between attribute names	• Update the meter information stored in SAP ISU to include Global IDs by cross-referencing with the GIS layer and establish consistent naming conventions and attribute structures across SAP and GIS to support data integration and accuracy.	High
Linear – Service Connections	• No data currently available for service connections • No installation date data and no condition data.	• Collect and input core service connection data, starting with inventory, to enable assignment of Global IDs in the future. • Obtain installation dates from as-built records or historical documentation, where available; otherwise, estimate based on adjacent main installation dates. • Establish a process for collecting and tracking service connection condition data (e.g., through inspections or age-based proxies).	High
Linear - Watermains	• Duplicate IDs	• Review and resolve duplicate entries in the CRD Model ID field to ensure each asset is uniquely identified. It is recommended to implement a data validation process to prevent future duplication during data entry or system integration.	High
Non-Linear – Bulk Water Station	• No original asset records • No ID assigned	• The bulk water station assets were not included in the region's existing asset inventory. AECOM developed corresponding asset records to capture key components such as electrical, plumbing, and superstructure elements. • It is recommended to maintain the bulk water station assets in the inventory, refine the listings with detailed asset information, and assign unique asset IDs to each station.	High

Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
Non-Linear – Pressure Control Stations	• Only 28% of assets have an Equipment ID assigned	• Approximately 28% of the assets within the Pressure Control Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Pressure Control Station assets and affix identification labels to the corresponding physical equipment.	High
Non-Linear – Pump Stations	• Only 35% of assets have an Equipment ID assigned	• Approximately 35% of the assets within the Pump Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Pump Station assets and affix identification labels to the corresponding physical equipment.	High
Non-Linear – Rechloramination Stations	• Only 30% of assets have an Equipment ID assigned.	• Approximately 30% of the assets within the Rechloramination Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Rechloramination Stations assets and affix identification labels to the corresponding physical equipment.	High
Non-Linear – Water Storage Tanks	• Only 21% of assets have an ID assigned.	• Approximately 21% of the assets within the Water Storage Tanks, including valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Water Storage Tank assets and affix identification labels to the corresponding physical equipment.	High

3. Level of Service

The following sections present a Levels of Service (LoS) framework, outline how it fits within the CRD's corporate AM structure and summarize outputs from a LoS workshop held with key CRD staff. Facilitated by AECOM, the workshop aimed to capture institutional knowledge and insights to inform the proposed LoS framework presented below.

3.1 Levels of Service Introduction

LoS measure the extent and quality of a given service. With a well-defined LoS framework, the CRD JdFWDS can leverage LoS to enable operations and maintenance planning, service delivery, resource planning, capital planning, and track progress on corporate or department-wide strategic initiatives. In other words, LoS are a common theme in many aspects of AM planning and help establish a line of sight between the legislated and corporate direction, and capital and O&M budgets (**Figure 3-1**). Taking the time to establish and review LoS on a consistent basis will form the foundation of sound AM planning practices.

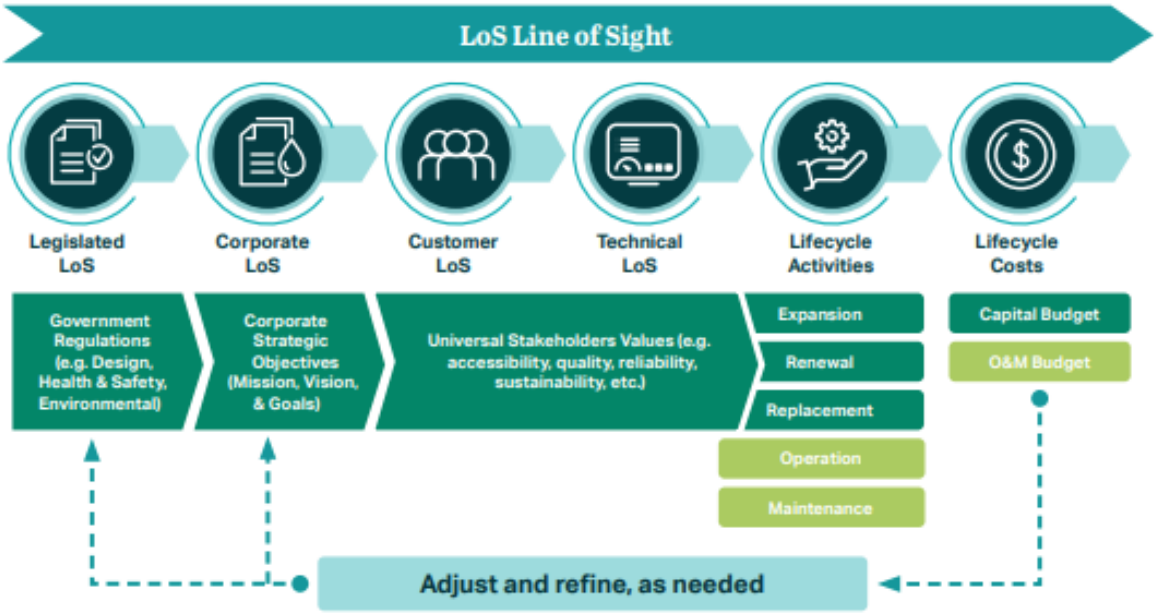


Figure 3-1: LoS Line of Sight

LoS also play an important role in shifting towards service-centric AM, focusing on the outcomes or services that infrastructure assets deliver, rather than just the inputs (e.g., labour, equipment and materials) required to manage the assets. This shift emphasizes the importance of defining LoS that align with community needs, expectations, and sustainability goals, while also considering the long-term lifecycle of assets.

Defined LoS may be any combination of parameters deemed important by the CRD and represent service-cost trade-offs, established in a flexible, rational, and transparent manner, as follows:

- LoS assist and support decision-making and investment planning related to the planning, development, operation, maintenance, renewal, and replacement of municipal infrastructure.
- LoS promote good practice, sustainable development, and environmental stewardship.
- LoS facilitate community involvement and a public sense of ownership and incorporate community values.
- LoS supports the implementation of a corporate continuous improvement program to further optimize AM across all service areas.

The process for identifying and developing the CRD JdFWDS LoS Framework included a scan of existing CRD documents including the 2019 Corporate Asset Management Strategy and Water Supply Strategic Plan to identify

relevant goals and objectives, reviewing the Canadian Infrastructure Benchmarking Initiative (CIBI) key performance indicators (KPIs) that CRD collects for the JdFWDS, and compiling additional measures to confirm that pertinent objectives were reflected in the JdFWDS LoS Framework. AECOM supported the development of a list of ~ 20 measures, presented in **Table 3-4**, by facilitating a workshop with CRD staff and holding a meeting to review CIBI KPIs.

3.2 Relationship to Other Corporate Documents

Since AM affects a large portion of the CRD's activities, it is important that there is line-of-sight between all policies and documents of the CRD. **Figure 3-2** demonstrates the line-of-sight between AM strategic objectives and tactical and operational AM elements, including the relationship of this AMP and the LoS identified in **Section 3.4** to other corporate plans in the CRD's hierarchy of documents.

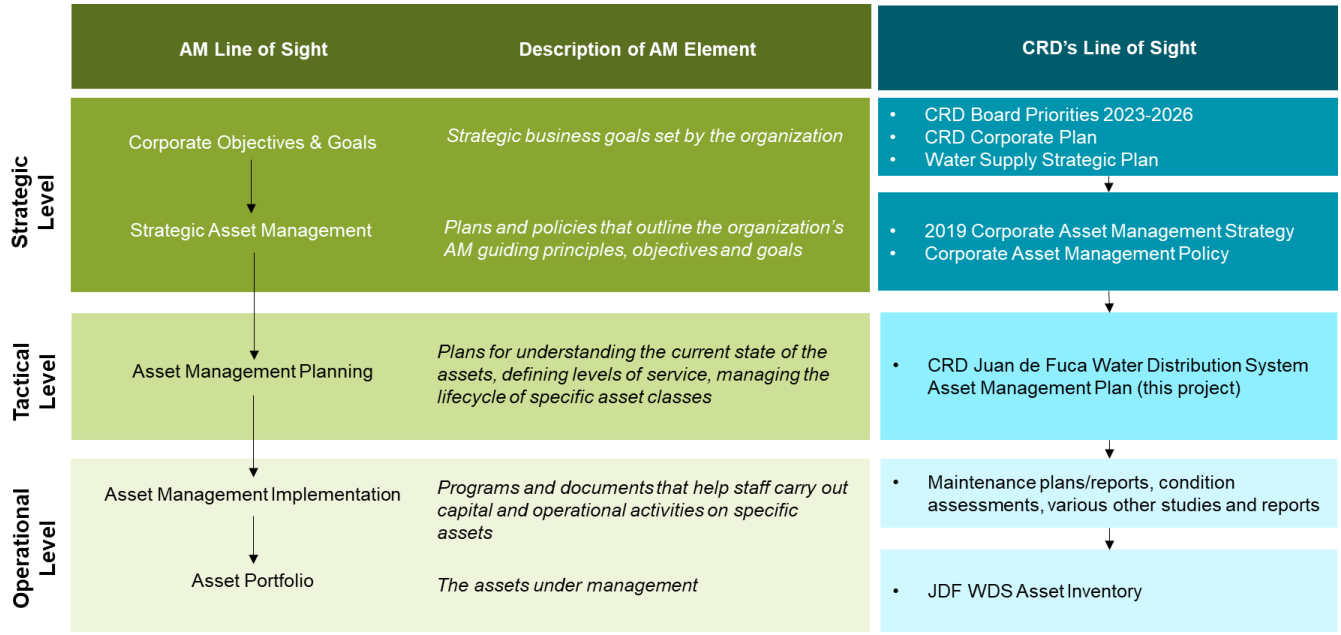


Figure 3-2: CRD's Line of Sight

Starting at the corporate / strategic level, this AMP and the LoS identified in **Section 3.4** supports the CRD's mission and vision statement, which are as follows:

Mission

We are diverse communities working together to serve the public good and build a vibrant, livable and sustainable region, through an effective, efficient and open organization.

Vision

Our communities strive to achieve exemplary environmental stewardship, a dynamic vibrant economy and an inclusive, caring society. Regional cooperation, mutually beneficial decision making and advancing shared interests shape the essence of the CRD.

The AMP and LoS also serve to advance the CRD's corporate objectives as outlined in the Corporate Asset Management Strategy and presented previously in **Section 1**.

3.3 Stakeholder Identification

A stakeholder is any person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or an activity. Stakeholder analysis is the process of understanding stakeholder needs, expectations and perceptions relative to the stakeholder's level-of-interest and level-of-influence over the organization. Organizations typically engage with their stakeholders to:

- Establish which activities or services matter most to them.
- Understand their risk appetite and risk threshold.
- Understand their willingness to pay for services.

Stakeholders can take many forms and may be internal (i.e., staff, Board of Directors) or external (i.e., the public, regulatory agencies, suppliers, neighbouring municipalities, etc.) to the organization. Several stakeholders and their perceived interests in and expectations of the JdFWDS were identified during the LoS workshop with CRD staff, as shown in **Table 3-1**.

Table 3-1: JdFWDS Stakeholders and Interests / Expectations

Stakeholder Group	Description / Examples	Expectations and Interests
Residential Customers	Property owners and renters that purchase potable drinking water supplied the by the JdFWDS.	• Water supply that is reliable, high quality, has adequate pressure. • Accurate meter readings and billing • Service delivered in a cost-efficient manner.
Bulk Water Customers	Private Utilities, Bulk Water Stations (off-grid customers, contractors), Strata's & Condominiums that purchase water either from a bulk water station or have a bulk meter attached to several customers.	• Water supply that is adequate, reliable, and high quality.
Industrial, Commercial & Institutional (ICI) Customers	Priority customers in the event of an emergency including Victoria General Hospital (VGH) and the Vancouver Island Regional Correctional Centre.	• Water supply that is adequate, reliable, high quality and maintained without disruption in the event of an emergency.
CRD Board & Local Government Representatives	Elected officials	• That the JdFWDS considers board directives and objectives in the delivery of potable water in Electoral Areas covered by the JdFWDS.
CRD JdF Water Distribution Commission	The Commission is made up of elected representatives from the member municipalities to develop a plan for rationalization of the water distribution system in the Western Community municipal participating areas and the Sooke Electoral Area. Reports back to the CRD Board of Directors.	• That the JdFWDS is meeting standards and operating effectively and efficiently.
Municipalities & Electoral Areas Served by JdFWDS	City of Colwood, City of Langford, District of Metchosin, Town of View Royal, District of Sooke, Juan de Fuca Electoral Area, District of Highlands.	• Adequate supply from JdFWDS system that is reliable and high quality.
Emergency Services (Fire, Health, Police)	Fire departments (all above served municipalities), paramedics, hospitals, police services.	• Adequate supply from JdFWDS system to maintain adequate fire flow.
First Nations	Sc'ianew (Beecher Bay), Songhees, T'Sou-ke (Sooke), xʷsepsəm (Esquimalt)	• Adequate supply from JdFWDS system that is reliable and high quality.
Environmental Groups	Conservation organizations, advocacy groups, and non-governmental organizations	• Water conservation efforts are in place. • Sustainable Practice, Water disposal in appropriate location.
Internal Departments	Infrastructure & Water Services, Infrastructure Planning & Engineering, Corporate Asset & Maintenance Management, Finance, Protective Services, Building Inspections, Parks Departments, Regional Planning, etc.	• Communication regarding WDS that may impact their services are timely. • Work collaboratively wherever and whenever necessary and applicable.

Stakeholder Group	Description / Examples	Expectations and Interests
CRD Staff	Employees working in operations, maintenance, engineering, planning, finance, and customer service, etc.	• Provide a safe working environment. • Provide necessary training to meet standards.
Developers	Real estate and land developers	• Work collaboratively to ensure adequate supply of water can reach new developments.
Tourism and Recreation Industry	Hotels, resorts, parks, outdoor recreation businesses	• Adequate supply from JdFWDS system Potable and good quality water.
Suppliers	Equipment manufacturers, material suppliers, etc.	• Use materials and equipment that are up to code and meet the current best practices.

3.4 Legislative Requirements

An important consideration for service levels are the legislations, regulations and any guidelines that dictate design, operations and maintenance of different infrastructure assets. These typically form the basis of what is an acceptable LoS, or the minimum requirements. **Table 3-2** outlines legislation and guidelines that are applicable to the JdFWDS.

Of note are the non-legislated guidelines and standards that the CRD has voluntarily adopted to guide the maintenance of its water systems, including the JdFWDS. In the absence of comprehensive provincial legislation governing system operations and maintenance, CRD has chosen to align with well-established international standards, such as those developed by the U.S. Environmental Protection Agency (US EPA) and the American Water Works Association (AWWA).

Table 3-2: Relevant Legislation and Non-Legislated Guidelines

Legislation Type	Legislation Relevant to CRD	Description / Relevance to CRD
Federal & Provincial	Guidelines for Canadian Drinking Water Quality	While not legally required to comply with all water quality parameters in the Guidelines for Canadian Drinking Water Quality, the CRD voluntarily complies with and regularly tests for the water quality parameters set out in the Guidelines.
	BC Drinking Water Protection Act (DWPA)	The DWPA establishes key requirements that the JdFWDS must adhere to including construction permits (for any construction, extension, alteration, installation within the system) and system operating permits.
	BC Drinking Water Protection Regulation	The DWPA provides overarching legal framework, board requirements and responsibilities whereas the DWPA regulation provides specific details and standard to enforce the DWPA including technical and operational standards and procedures.
	BC Health Authority (Island Health Authority)	Drinking Water Officers who work for the Island Health Authority are responsible for issuing all construction permits and operating permits for the JdFWDS.
Local Government Act	Capital Region Water Supply and Sooke Hills Protection Act	Provincial Act that establishes the framework to manage and protect the water supply and natural resources within the CRD including the Sooke Hills (where CRD's water sources are).
CRD By-Laws	CRD Water Management Strategic Plan Bylaw	Bylaw that outlines the requirement to provide a strategic plan for the management of the Regional Water Supply.
	Water Distribution Local Service Conditions, Fees and Charges	Bylaw to establish conditions for service and to impose fees and other charges within the water distribution local service in the Western Communities of the CRD.
	Water Distribution Local Service Area Establishment Bylaw	Establishes local service, boundaries, defines participant areas, cost recovery and maximum requisition.
	Development Cost Charges Bylaw (Juan de Fuca Water Distribution)	Bylaw to impose DCCs in the Juan de Fuca Water Distribution Local Service Area.
	JdF Water Distribution Commission Bylaw	Bylaw to establish the Juan de Fuca Water Distribution Commission.

Legislation Type	Legislation Relevant to CRD	Description / Relevance to CRD
	CRD Cross Connection Control Bylaw	Bylaw to protect public health by controlling cross connections in the Greater Victoria drinking water supply system.
	Water Conservation Bylaw for Greater Victoria (Capital Regional District Water Conservation Bylaw No 4099)	Bylaw that dictates water use restriction applicable to the Juan de Fuca Water Distribution Local Area.
Non-Legislated Guidelines & Standards	United States Environmental Protection Agency	Where appropriate, CRD-operated water systems also comply with many of the United States Environmental Protection Agency (USEPA) rules and regulations on a voluntary basis. Some of the limits in the USEPA rules provide the basis for water quality treatment goals.
	American Water Works Association	CRD follows several AWWA manuals and standards related to water quality (AWWA C651-14 and C652-19), and maintenance programs (AWWA 1086, 31594, 7326, 34815, 1886, 1880, 2232, 2335, 1970).
	National Fire Protection Association (NFPA)	NFPA 291 utilized for Hydrant Testing.
	Fire Underwriters Survey (FUS)	CRD Bylaw 3889 (Water Distribution Local Services Conditions, Fee and Charges) refers to the FUS fire flow for watermain sizing and hydrant spacing. CRD Engineering Specifications refer to the FUS for fire flow requirements and storage tank requirements.
	CRD Engineering Specifications and Standard Drawings	Establishes engineering requirements for the design and installation of CRD Integrated Water Services physical plant or waterworks.

3.5 LoS Performance Measures

Table 3-4 provides a summary of the LoS performance measures chosen by CRD, in collaboration with AECOM, during the development of this AMP. The full list of LoS measures is provided in **Appendix B**, which represents the first iteration of the JdFWDS LoS framework, designed to align with and reflect the key objectives outlined in both the Asset Management Strategic Plan and the Regional Water Supply Strategic Plan.

Many of these measures were selected from the Canadian Infrastructure Benchmarking Initiative (CIBI), an AECOM-led project that CRD has contributed to for several years. CIBI tracks hundreds of key performance indicators (KPIs) from various Canadian municipalities on the performance of their water, wastewater, transportation and stormwater infrastructure. Since this is data that CRD already collects, these KPIs served as a starting point to develop the list of LoS presented in **Table 3-4**. The LoS measures from CIBI also have a target value associated with them (median value for all CIBI participants for 2023). Additional sources for LoS measures include:

- **Ontario Regulation 588/17 – Asset Management Planning for Municipal Infrastructure:** O. Reg. 588/17 requires municipalities to produce AMPs for all core and non-core infrastructure assets. It also defines LoS metrics for core infrastructure assets (water, wastewater, transportation and stormwater).
- **Canadian Drinking Water Quality Guidelines:** Maximum acceptable concentrations or treatment goals based on a comprehensive review of the known health effects associated with various contaminants, considering health, aesthetics and operational objectives.
- **BC Drinking Water Protection Regulation:** Sets out certain requirements for drinking water operators and suppliers to ensure the provision of safe drinking water to their customers.

With ongoing tracking and reporting, these LoS measures can be used to assess overall system performance. Over time, they can be used to help inform decision-making, guide strategic improvements, and ensure continued alignment with CRD's broader service delivery objectives and performance targets. The LoS measures included in **Appendix B** can form the foundation for this work, however it should be stressed that work to refine the list, gather performance data and set targets is a crucial first step that CRD staff commit to now and moving forward for this to be a useful and informative exercise. To start the process of further refining the list if desired, and where to focus resources on tracking and reporting, Table indicates if each LoS should be considered High, Medium, or Low priority, with rational for priority described below.

- **High Priority:** These LoS can provide a good snapshot of the overall health of the system in terms of asset condition, risk, operations and maintenance efficiency, financial sustainability and regulatory requirements.
- **Medium Priority:** These LoS are good indicators of strategic priorities such as Climate Action, however their tracking does not directly indicate the overall performance of the system in terms of what is typically most important to customers (reliable, financially sustainable service delivery).
- **Low Priority:** These LoS would complement other High or Medium Priority LoS, adding to the narrative that goes along with capital and O&M planning.

Table 3-3 compiles LoS performance data back to 2019 for a handful of measures from CIBI. One trend worth highlighting is Debt / Annual revenue. Since 2019 this has been reduced by approximately 50% and has always been well below the CIBI median. This is indicative of an organization that is committed to improving financial sustainability over time by minimizing its reliance on debt financing.

CIBI results are based on self-reported data and may contain inconsistencies. Based on the review from this AMP assignment, it is recommended that CRD review and update its replacement value information to ensure a more accurate representation in future benchmarking results.

Table 3-3: LoS Performance Trends – CIBI LoS Measures

LoS Measures	Unit	2019	2020	2021	2022	2023	2023 CIBI Median	Trend
Average Residential Daily Consumption	L/capita/day	187	223	227	223	201	176	Stable
Pipe O&M Cost per km	($'000) / km Length	6.36	5.94	5.84	6.18	6.35	6.35	Stable
Debt / Annual Revenue	%	16%	7%	8%	-	7%	37%	Decreasing
Hours of Water Storage Tank at Average Day Demand	#	20.8	26.6	25.0	26.5	26.9	27.25	Stable

Table 3-4: LoS Performance Measures

LoS #	System	Asset Class	CRD Strategic AM Objectives	CRD Water Supply Strategic Plan Commitment	LoS Measures	Unit	Recent Performance	Performance Target (CIBI 2023 Group Median, where applicable)	LoS Source	Priority
1	JdFWDS	Whole System	Sustainability	Provide an adequate, long-term supply of drinking water	Cost of Water Conservation Program	$ / Population Served	-	-	CIBI	Low
2	JdFWDS	Whole System	Financial Strategy	Provide a reliable and efficient drinking water transmission system	Water Charge for a Typical Size Residential Connection Using Canadian Average Consumption Rate (175m^3/year)	175m^3/year	$500	510 (2024 Group Median)	CIBI	Low
3	JdFWDS	Whole System	Sustainability	Provide an adequate, long-term supply of drinking water	Average Residential Daily Consumption	m^3	-	-	CIBI	Medium
4	JdFWDS	Mains	Financial Strategy	Provide a reliable and efficient drinking water transmission system	Pipe O&M Cost per km	('000 $) / km Length	$6.35	6.35	CIBI	High
5	JdFWDS	Whole System	Financial Strategy	Provide a reliable and efficient drinking water transmission system	Capital Reinvestment Rate	%	2.04	0.75	CIBI	High
6	JdFWDS	Whole System	Financial Strategy	Provide a reliable and efficient drinking water transmission system	Debt / Annual Revenue	%	6.98	37	CIBI	Low
7	JdFWDS	Whole System	Continual Improvement	Provide a reliable and efficient drinking water transmission system	Distribution of Workforce by Age	N/A	-	-	CIBI	Low
8	JdFWDS	Whole System	Sustainability	Provide a reliable and efficient drinking water transmission system	GHG Emissions / ML water delivered	tCO_2e / ML	-	-	2025 AMP (Proposed)	Medium
9	JdFWDS	Whole System	Sustainability	Provide a reliable and efficient drinking water transmission system	Energy use / ML water delivered	kWh / ML	-	-	2025 AMP (Proposed)	Medium
10	JdFWDS	Whole System	Sustainability	Provide a reliable and efficient drinking water transmission system	Non-revenue water	ML	86	1831	CIBI	Low
11	JdFWDS	Whole System	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Preventive Maintenance Planned / Preventive Maintenance Completed	%	44%	52%	CIBI	High
12	JdFWDS	Whole System	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	% of properties where fire flow is available	%	-	-	O. Reg. 588 / 17	High
13	JdFWDS	Whole System	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	% of watermains in fair or better condition	%	95%	-	2025 AMP (Proposed)	High
14	JdFWDS	Mains	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	% of non-linear assets in fair or better condition (water storage tanks, pump stations, PCSs)	%	30%	-	2025 AMP (Proposed)	High
15	JdFWDS	Whole System	Risk & Resiliency	Provide an adequate, long-term supply of drinking water	Hours of Water Storage Tank at Average Day Demand	#	26.92	27.25	CIBI	Low
16	JdFWDS	Mains	Risk & Resiliency	Provide a reliable and efficient drinking water transmission system	% of high and very high risk watermains	%	<1%	-	2025 AMP (Proposed)	High
17	JdFWDS	Non-linear Assets	Risk & Resiliency	Provide a reliable and efficient drinking water transmission system	% of high and very high-risk non-linear assets (water storage tanks, pump stations, PCSs)	%	33%	-	2025 AMP (Proposed)	High
18	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	% of water samples within health parameters	%	-	-	BC & Canada Drinking Water Guidelines / Regulation	High
19	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	% of water samples within aesthetic parameters	%	-	-	BC & Canada Drinking Water Guidelines / Regulation	High

3.6 Future Demand

Demand management is a critical component of managing LoS in a sustainable manner, now and into the future. Understanding demand drivers enables the CRD to proactively develop effective, long-term strategies that are suitable for its unique political, environmental, social and technological landscape.

Factors identified during the LoS workshop that would impact service levels related to the JdFWDS now and into the future include, but are not limited to, the following:

- Aging infrastructure.
- Regulatory changes.
- Staff availability (i.e., technical skill availability, skill gaps from changing technology, etc.).
- Succession management & skills transfer (i.e., succession plan to have experienced operators to operate the system, etc.).
- Funding (i.e., ensuring appropriate asset management planning and sustainable financial strategies to support service delivery).
- Contractor availability (i.e., contractors' availability for big projects, etc.).
- Climate change (i.e., higher I&I from precipitation, sea level rise, etc.).
- Supply Chain (i.e., material and equipment availability for capital projects, etc.).
- Fluctuations on contract pricings.
- Changing demographics (i.e., aging population is resistant to change).
- Population growth.

Despite the wide range of future demand drivers, the CRD is well poised to handle these and how they impact service delivery given the well-established demand management program that collects data to guide internal decision-making surrounding water conservation education and outreach programs.

3.7 Gaps & Recommendations

An important part of effective AM is the commitment to continuous improvement. Continuous improvement aims to enhance the effectiveness, efficiency and value derived from AM planning. **Table 3-5** outlines recommendations, aligned with the Corporate Asset Management Strategy, for the CRD to consider improving and enhancing the LoS framework and support its effective integration into AM planning at the CRD.

Table 3-5: LoS Gaps & Recommendations

Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
Target Setting / Review	Some LoS targets exist (e.g., from CIBI), but not all measures have defined targets.	Review existing targets against CRD's service goals and historical performance; establish targets for measures without one. Where a target is not feasible, set desired trends.	High
Refine and Review Measures	A preliminary list of LoS has been established, however it should be regularly reviewed going forward.	Implement regular reviews (e.g., annually or every 4 years) to assess performance, verify data quality, and confirm alignment with strategic goals.	High
Incorporate Customer Feedback	Current LoS framework does not capture direct customer input.	Introduce customer feedback mechanisms (e.g., surveys) to identify service expectations, gaps, and areas where CRD may be exceeding expectations.	Medium
Evaluate Risks with LoS	Risks associated with not meeting LoS have not been considered.	Assess risks of not achieving LoS to better inform both capital planning and O&M prioritization.	Medium

4. Asset Criticality and Risk Management

Risk-based planning and decision-making serves as the foundation for modern, tactical asset management. Through gaining an understanding of its risk exposure, an organization can identify vulnerable assets and target its O&M and capital investments to reduce that exposure most effectively and ultimately improve the resiliency of its assets. Risk exposure is assessed based on the probability and consequences of an asset failure and is used to drive the selection and prioritization of appropriate actions, based on risk tolerance thresholds and funding availability.

Typically, the assessment of asset risk involves several contributing factors including assessed equipment condition rating, age-based condition rating and criticality rating. The risk score reflects the probability (or likelihood) and consequence of failure (or criticality) and is calculated using the following equation:

Risk Score = Consequence of Failure (CoF) x Probability of Failure (PoF)

The risk score is ultimately used to identify assets which require immediate attention and provides opportunities to reduce risk exposure. While the probability of failure and asset criticality are often abstract and challenging to predict, it is typical to develop data-driven quantitative risk frameworks to ensure that risk assessments are structured, consistent, and repeatable. By applying specific indices, the risk assessment framework generates a risk (or priority) score for each asset. The risk score is a rating of the asset based on the detailed assessment of the probability and consequence of failure derived from several key parameters. All parameters are then calculated using the equation above. Based on this principal, the risk associated with a given asset's failure can be managed by limiting the probability of it occurring, or the impact realized, should it occur.

A simple 1-to-5 scoring scale is often used to rate the PoF. This approach provides a consistent way to evaluate different factors, with each score corresponding to a defined probability level.

- Rare (1): Failure is highly unlikely, with no recorded incidents and minimal theoretical possibility.
- Unlikely (2): Failure is possible but not anticipated; infrequent occurrences have been documented.
- Possible (3): Failure might occur occasionally; there is a distinct possibility under certain conditions.
- Likely (4): Failure is expected to occur in many circumstances; it has occurred several times in the past.
- Almost Certain (5): Failure is imminent or expected to occur in most circumstances; it has a history of frequent occurrences.

Also, a simple 1-to-5 scoring scale is often used to rate CoF. This provides a consistent way to compare impacts, with each score linked to a defined severity level.

- Insignificant (1): Negligible impact; no significant consequences or impact on the level of service.
- Minor (2): Minor impact; some loss of system capacity, but minimal costs or impacts.
- Moderate (3): Moderate impact; loss of some system capacity, yet important level of service still achieved.
- Major (4): Major impact; loss of system capacity, major consequences or costs, level of service compromised.
- Catastrophic (5): Severe impact; massive system failure, severe economic, environmental, health, and/or social consequences, persistent and extensive damage, unable to meet level of service goals.

The following sections present the risk assessment methodology and results for JdFWDS watermains and non-linear (pump stations, pressure control stations, water storage tanks, and disinfection facilities) assets. Outputs from a Risk & Criticality Workshop facilitated by AECOM with relevant CRD staff were key to developing the methodologies used. The approach taken for watermains and non-linear assets varied, thus they have been presented separately in **Section 4.2** and **Section 4.3**, respectively, followed by a summary of results.

4.1 Existing CRD Risk Assessment and Management Initiatives

CRD has undertaken various internal exercises related to risk management both at the corporate level and JdFWDS level. These documents are both formal in nature (e.g. policy and strategy), and informal (departmental efforts to incorporate risk into maintenance planning). These have been outlined below and, where applicable, incorporated into the methodology for risk assessment described in **Section 4.2** and **Section 4.3**.

- **Corporate Risk Management Reporting Policy (2024):** Policy that outlines procedure to document and report risks that work against the CRD's strategic and operational objectives, including the requirement that all known risks shall be identified, analyzed, reported and mitigated in accordance with the CRD's Corporate Risk Management Framework.
- **Corporate Risk Management Framework (2024):** The Risk Management Framework describes the CRD's commitment to Enterprise Risk Management (ERM), in alignment with the CSA/ISO 31000 2018 Risk Management standard. The framework describes the requirement and benefits of using risk registers along with the CRD's 5-Tier Risk Management Reporting approach.
- **Risk Management Program for Asset Management (2018):** The asset risk management framework (ARMF) aims to provide a consistent methodology for risk assessment across the organization including the guidance, tools and instructions for incorporating risk management into business processes related to lifecycle management, strategic planning and capital project delivery.
- **Distribution System Vulnerability Report (2010):** The vulnerability assessment was done to align with the Canadian Water and Wastewater Associations (CWWA) recommendation to conduct vulnerability assessments for various components of drinking water systems. This report includes an assessment of mainly strategic risks associated with JDFs Pump Stations and Water Storage Tanks. At the time, all assets included in the report were deemed either low or moderate risk, with none being high, very high or extreme risk.
- **JdF Distribution PCS & Pump Station Criticality Assessments**: Excel-based criticality assessment of JdF Pressure Control Stations (PCS) and Pump Stations (PS) that consider various factors such as redundancy, history of issues, confined spaces, or if the station is in a zone with a critical facility.
- **JdF Distribution Pressure Control Station and Pump Station PM Program Proposal:** Outlines an updated preventive maintenance program for PCS and PS that consider results from the criticality assessment.

4.2 Risk Assessment Methodology: Linear Assets

Risk assessments can vary widely in complexity, depending on the data inputs available and data processing methods used. The current risk assessment for the JdFWDS watermains was conducted using a simple MS Excel based approach, using data extracted from GIS and the updated JdFWDS Hydraulic Model. The available data was used to inform various criteria related to both PoF and CoF for each watermain in the JdFWDS. These inputs and their associated criteria are described in **Table 4-1** and results are summarized in **Sections 4.2.1** and **Section 4.3.4.**

These results also informed the capital projects and financial plan (**Section 7**) where risk has been used as a method for prioritization. The analysis and results presented there are based on Water Systems which grouped pipe segments, hydrants, laterals and valves under one system, rather than assessing each individual asset – consistent with CRD's replacement strategy. For systems with multiple pipe segments, the highest risk score among them was applied to all associated assets (valves, hydrants, laterals and other lower risk pipe segments), and a bundled replacement cost was calculated which summed the replacement cost of each asset in the System. Results have none the less primarily been presented according to watermains in this section, since they are the assets that drove risk scores. Additionally, by focusing on results for watermains, it made it possible to also present CoF and PoF independently, which is useful to fully understand the whole picture when it comes to risk. For a presentation of risk results for the whole JdFWDS (including non-linear assets), see **Section 4.4**.

Table 4-1: Risk Assessment Criteria and Data Inputs

CoF / PoF	Criteria	Description	Data Source	Geoprocessing
CoF	Main Diameter	Larger mains are typically serving a higher population and are more expensive to replace.	GIS – wtr_Main	NA
	Proximity to Waterbody	Proximity to waterbody indicates the likelihood a main failure could introduce pollution to waterbody.	GIS – Hyd_Poly & Hyd_Line	Spatial join to identify pipes that were less than 15 m from a waterbody.
	Redundancy	Failure of a pipe without redundancy could result in a greater disruption in both population impacted and duration.	Hydraulic Model	Each pipe was assessed for redundancy based on if its removal would remove supply to any adjacent segments on a connectivity basis only.
CoF & PoF	Pressure – Demand	Higher pressure indicates higher demand and more stress on a main (PoF); as well as more destruction to surrounding areas and more complex to repair in the event of a failure (CoF).	Hydraulic Model	NA
	Flow – Demand	Higher flow indicates higher demand and more stress on a pipe (PoF); as well as more destruction to surrounding areas and more complex to repair in the event of a failure (CoF).	Hydraulic Model	NA
PoF	Meets Needs – Capacity	Pipes that do not meet the systems capacity should be flagged for replacement.	Hydraulic Model	NA
	Leak History – Condition	Pipes that are still active in the system and have had leak in the past are assumed to be more likely to fail.	GIS - wtr_Main	Spatial join to match leak locations to proximal pipes.
	Age / ESL – Condition (Weibull-Based)	Older mains are assumed to be in poorer condition compared to younger pipes.	GIS - wtr_Main, ESL Presented in **Section 2.4**.	NA
	Pipe Material – Condition	It has been noted that AC pipes lifespans are shorter than previously expected and CRD is actively replacing them.	GIS - wtr_Main	NA

Figure 4-1 depicts the risk assessment methodology in graphical format, including the scoring from 1-5 associated with each criterion. It was agreed that all inputs would be assigned equal weighting for this exercise, however in the future consideration could be given to assigning weighting for each criterion. This would result in a risk score that is reflective of what would drive PoF and CoF most, according to CRD staff input and expertise. **Figure 4-1** also includes CoF correction factors, detailed in **Table 4-2.** These factors were identified by CRD operations staff during the Risk & Criticality Workshop and have been applied to CoF scores to either elevate or reduce them. It should also be noted that at this time, the risk assessment results have not considered capacity (shown greyed out in **Figure 4-1**), however very few mains were flagged as being undersized, and thus would have little to no impact on the risk assessment results presented in **Section 4.2.1**.

Table 4-2: Watermain Risk Assessment CoF Correction Factors

Correction Factor Name	Correction Factor Value	Description
Located in Sooke	CoF +1	Mains located in Sooke were given a higher CoF due to the time it takes for staff to travel to Sooke.
Located in Downtown Langford	CoF +1	Mains located along Station Ave. in Downtown Langford were given a higher CoF due to nearby assets that could easily flood in the event of a failure.
Exposed/Underwater Watermain	CoF = 5	Any exposed mains were automatically given a CoF of 5.
Redundancy	CoF * 0.8	Any pipe that was identified as being looped (e.g., has redundancy), had its CoF score lowered using a multiplier of 0.8. This was not applied to pipes with a CoF of 5.

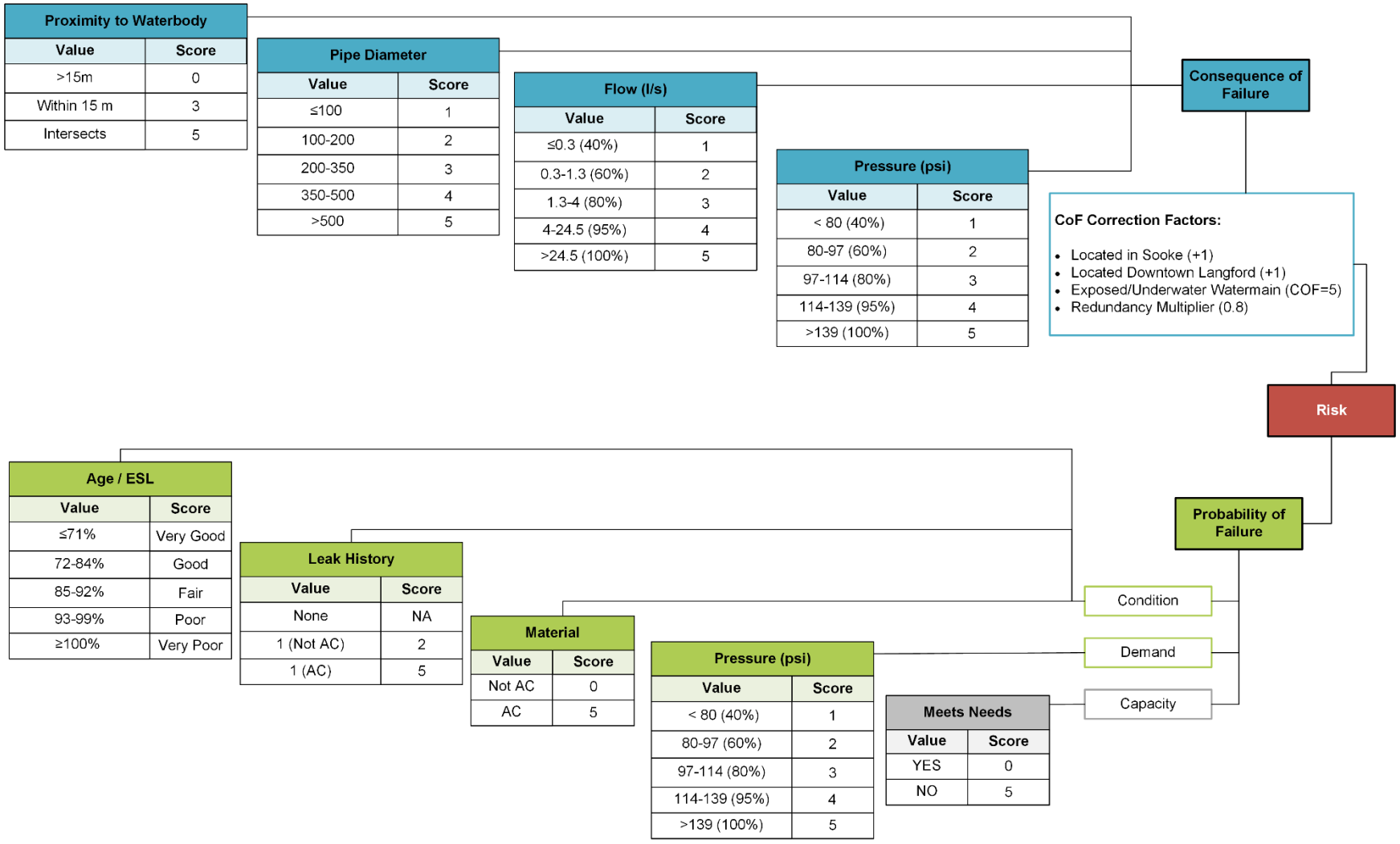


Figure 4-1: Linear Asset Risk Assessment – Fishbone Diagram

4.2.1 Risk Assessment Results: Watermains

The risk assessment for JdFWDS watermains are presented below by Risk, PoF and CoF. It is useful to consider PoF and CoF independently in addition to risk, as it reveals what is driving risk across the system overall.

Table 4-3 defines four risk levels (Low, Medium, High, and Very High) based on the combined product of CoF and PoF scores. These thresholds align with the CRD's Asset Risk Management Framework (ARMF). **Table 4-4** and **Table 4-5** present the CoF and PoF results, respectively, using a 1–5 scoring scale. This format clearly illustrates how CoF and PoF scores interact to determine the overall risk rating.

Overall, the JdFWDS watermains are mostly in the low-risk category (95%), with 5% medium-risk and the remaining less than 1% in the high and very high-risk categories. When looking at CoF and PoF independently, it becomes clear that the high number of assets in the low-risk category are being driven by a network that is mostly in good or very good condition (PoF = 1 or 2).

Table 4-3: Risk Thresholds and Watermain Risk by Replacement Cost

Risk Level (Score Thresholds)	Replacement Cost	% of Replacement Cost
Low (0-4)	$1,202,461,000	94.9%
Medium (5-11)	$63,567,000	5%
High (12-16)	$1,236,000	0.1%
Very High (16-25)	$0	0.0%
Total	**$1,267,264,000**	**100%**

Table 4-4: Watermain Consequence of Failure by Replacement Cost

Consequence of Failure	Corresponding CoF from ARMF	Replacement Cost	% of Replacement Cost
1 (0-1)	Insignificant	$177,663,625	14.0%
2 (1-2)	Minor	$636,591,289	50.2%
3 (2-3)	Moderate	$354,001,205	27.9%
4 (3-4)	Major	$76,061,931	6.0%
5 (4-5)	Catastrophic	$22,946,809	1.8%
	Total	**$1,267,265,000**	**100%**

Table 4-5: Watermain Probability of Failure by Replacement Cost

Probability of Failure	Corresponding Condition	Replacement Cost	% of Replacement Cost
1 (0-1)	Very Good	$677,884,000	53.5%
2 (1-2)	Good	$422,271,000	33.3%
3 (2-3)	Fair	$161,888,000	12.8%
4 (3-4)	Poor	$4,448,000	0.4%
5 (4-5)	Very Poor	$774,000	0.1%
	Total	**$1,267,265,000**	**100%**

Figure 4-2 and **Figure 4-3** illustrates the geographic distribution of risk scores for watermains within the JdFWDS (see **Appendix A** and **Appendix C** for more information). As previously noted, the vast majority of these assets are classified as low risk. Among the higher-risk assets, nearly all are located in Sooke. This reflects feedback from CRD staff indicating that the extended travel time to Sooke increases the operational risk associated with these watermains.

Notably, the watermains crossing beneath Sooke Basin are classified as medium risk, which may not align with CRD's expected outcomes from the risk assessment. This highlights the importance of evaluating risk, CoF and PoF independently when informing decisions related to capital investment, operations, and maintenance planning (see **Section 4.5** for further detail).

The relationship between overall risk and CoF is more clearly shown in **Table 4-6** and **Table 4-7**, which present the top 40 watermains ranked by risk score and CoF score, respectively. Each table includes a column showing the opposite ranking of CoF or risk to emphasize the variation between the two assessments.

The top 40 risk scores are primarily influenced by factors such as pipe age and material (PoF), their location in Sooke, as well as pressure, flow, and system redundancy (CoF). In contrast, the top 40 watermains ranked by CoF are almost all characterized by the highest possible score (5) for proximity to a waterbody. This suggests that certain CoF criteria, like proximity to waterbodies, may not significantly impact overall risk when PoF is low.

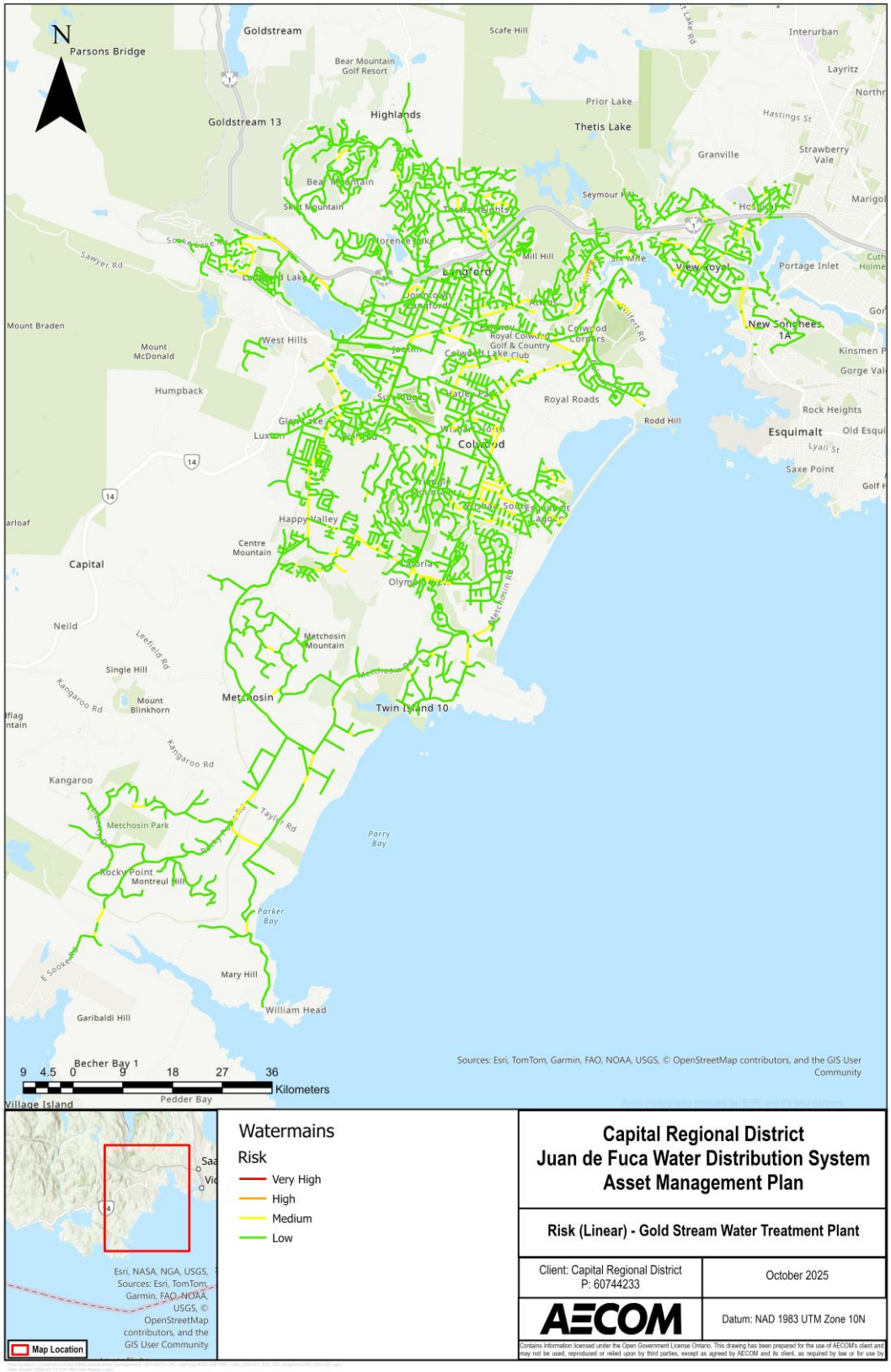


Figure 4-2: Risk – Watermains – Goldstream Water Treatment Plant System

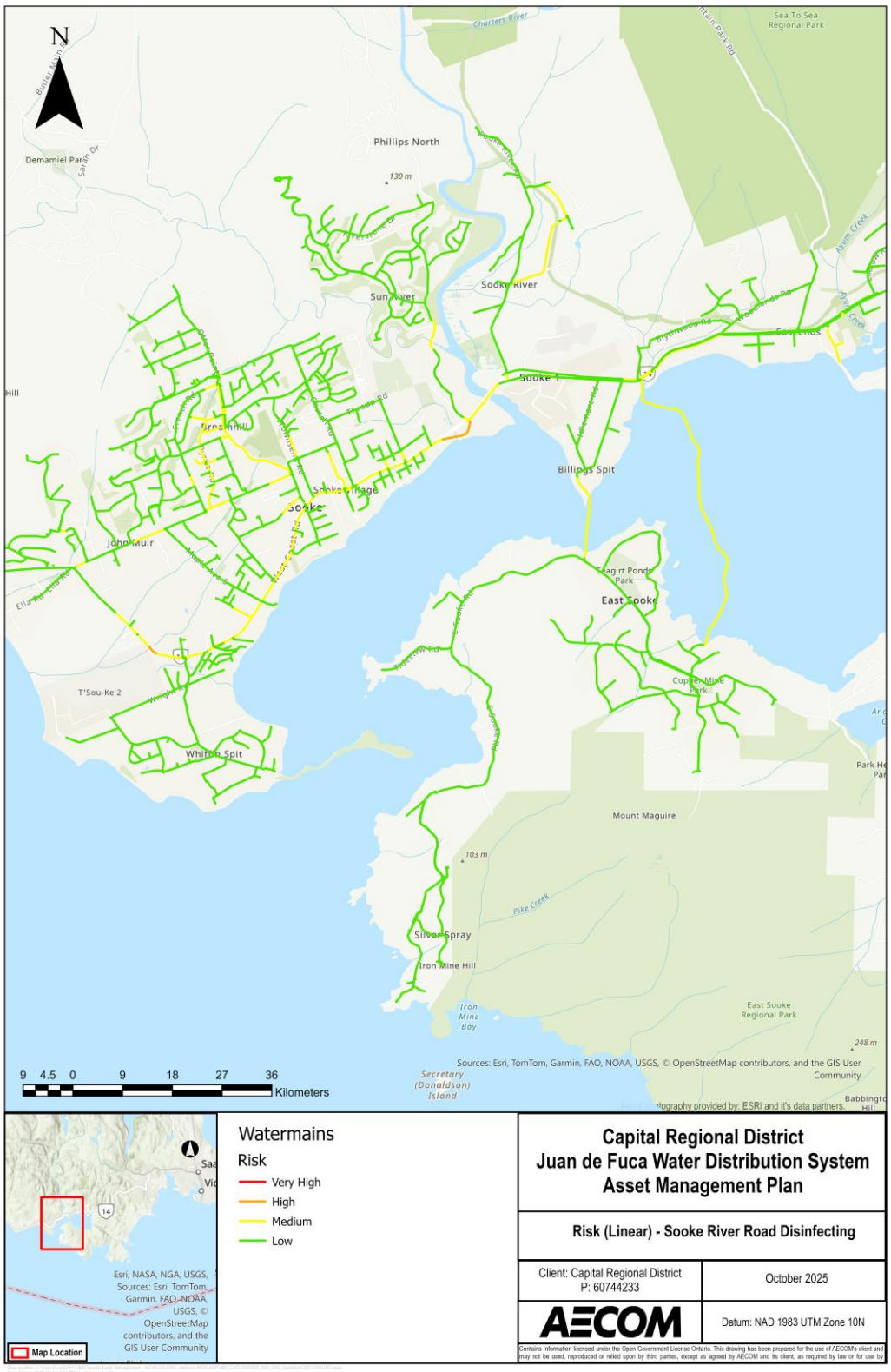


Figure 4-3: Risk – Watermains – Sooke River Road Disinfecting Facility

Table 4-6: Top 40 Watermains by Risk Scores

Risk Rank	Pipe Info					PoF			PoF/CoF	CoF			CoF Correction Factors				CoF x PoF = Risk			
	CoF Rank	ID	Road Name	Replacement Cost	Install Year	Age vs ESL - Weibull-Based	Leaks	Material	Pressure	Flow	Diameter	Proximity to Waterbody	Sooke	Exposed Main	Downtown Langford	Redundancy	CoF	PoF	Risk Score	Risk
1	9	PPE00843	Belvista Pl	$123,263	1970	2.93	0	Asbestos Concrete	4	5	3	5	Yes	No	No	Single Feed	5.00	2.98	14.9	High
2	15	PPE06606	Belvista Pl	$559,269	1970	2.93	0	Asbestos Concrete	3	5	3	5	Yes	No	No	Single Feed	5.00	2.73	13.7	High
3	39	PPE02375	West Coast Rd	$170,106	1976	2.14	0	Asbestos Concrete	3	4	2	5	Yes	No	No	Single Feed	4.50	2.53	11.4	High
4	96	PPE01139	Sooke Rd	$131,275	1967	3.38	0	Asbestos Concrete	3	5	3	0	Yes	No	No	Single Feed	3.75	2.85	10.7	Medium
5	85	PPE01826	Sooke Rd	$230,769	1976	2.14	0	Asbestos Concrete	4	4	3	0	Yes	No	No	Single Feed	3.75	2.78	10.4	Medium
6	91	PPE04496	Sooke Rd	$5,695	1976	2.14	0	Asbestos Concrete	4	4	3	0	Yes	No	No	Single Feed	3.75	2.78	10.4	Medium
7	67	PPE03067	Pyrite Dr	$166,377	1974	2.38	0	Asbestos Concrete	3	2	2	5	Yes	No	No	Single Feed	4.00	2.60	10.4	Medium
8	92	PPE10783	Sooke Rd	$10,866	1970	2.93	0	Asbestos Concrete	3	5	3	0	Yes	No	No	Single Feed	3.75	2.73	10.3	Medium
9	94	PPE04549	Sooke Rd	$250,451	1970	2.93	0	Asbestos Concrete	3	5	3	0	Yes	No	No	Single Feed	3.75	2.73	10.3	Medium
10	99	PPE03311	Belvista Pl	$10,814	1970	2.93	0	Asbestos Concrete	3	5	3	0	Yes	No	No	Single Feed	3.75	2.73	10.3	Medium
11	247	PPE01362	Sooke Rd	$12,806	1957	4.60	0	Asbestos Concrete	3	4	2	0	Yes	No	No	Single Feed	3.25	3.15	10.2	Medium
12	250	PPE01360	Sooke Rd	$35,851	1957	4.60	0	Asbestos Concrete	3	4	2	0	Yes	No	No	Single Feed	3.25	3.15	10.2	Medium
13	193	PPE01075	Kirby Rd	$404,103	1967	3.38	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.85	10.0	Medium
14	196	PPE07033	Sooke Rd	$3,378	1967	3.38	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.85	10.0	Medium
15	2279	PPE01367	Goodridge Rd	$169,332	1963	3.95	5	Asbestos Concrete	4	1	2	0	Yes	No	No	Looped	2.20	4.49	9.9	Medium
16	2105	PPE01463	Atkins Rd	$269,662	1970	2.93	5	Asbestos Concrete	4	3	2	0	Yes	No	No	Single Feed	2.25	4.23	9.5	Medium
17	130	PPE01920	West Coast Rd	$279,156	1971	2.79	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.70	9.4	Medium
18	132	PPE07288	West Coast Rd	$156,566	1971	2.79	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.70	9.4	Medium
19	134	PPE03502	West Coast Rd	$903	1971	2.79	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.70	9.4	Medium
20	155	PPE00958	West Coast Rd	$26,408	1971	2.79	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.70	9.4	Medium
21	156	PPE07287	West Coast Rd	$309,039	1971	2.79	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.70	9.4	Medium
22	172	PPE01921	West Coast Rd	$23,789	1971	2.79	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.70	9.4	Medium
23	186	PPE01011	West Coast Rd	$280,087	1971	2.79	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.70	9.4	Medium
24	195	PPE10958	West Coast Rd	$107,404	1971	2.79	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.70	9.4	Medium
25	192	PPE07286	West Coast Rd	$147,985	1973	2.51	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.63	9.2	Medium
26	44	PPE00602	Otter Point Rd	$838,582	1972	2.65	0	Asbestos Concrete	1	4	3	5	Yes	No	No	Single Feed	4.25	2.16	9.2	Medium
27	55	PPE01417	Otter Point Rd	$245,899	1972	2.65	0	Asbestos Concrete	1	4	3	5	Yes	No	No	Single Feed	4.25	2.16	9.2	Medium
28	57	PPE00500A	Helgesen Rd	$93,210	1972	2.65	0	Asbestos Concrete	1	4	3	5	Yes	No	No	Single Feed	4.25	2.16	9.2	Medium
29	143	PPE07289	West Coast Rd	$49,055	1974	2.38	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.60	9.1	Medium
30	162	PPE07290	West Coast Rd	$6,764	1974	2.38	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.60	9.1	Medium
31	194	PPE11976	West Coast Rd	$4,771	1974	2.38	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.60	9.1	Medium
32	3029	PPE01439	Medberry	$94,949	1962	4.08	5	Asbestos Concrete	4	1	1	0	Yes	No	No	Looped	2.00	4.52	9.0	Medium
33	921	PPE01437	Goodridge Rd	$34,190	1963	3.95	0	Asbestos Concrete	4	1	2	0	Yes	No	No	Single Feed	2.75	3.24	8.9	Medium
34	170	PPE07079	Dixon Rd	$196,569	1977	2.03	0	Asbestos Concrete	3	4	3	0	Yes	No	No	Single Feed	3.50	2.51	8.8	Medium
35	142	PPE01369	Sooke Rd	$247,971	1970	2.93	0	Asbestos Concrete	2	5	3	0	Yes	No	No	Single Feed	3.50	2.48	8.7	Medium
36	163	PPE04550	Sooke Rd	$192,312	1970	2.93	0	Asbestos Concrete	2	5	3	0	Yes	No	No	Single Feed	3.50	2.48	8.7	Medium
37	165	PPE04551	Sooke Rd	$214,303	1970	2.93	0	Asbestos Concrete	2	5	3	0	Yes	No	No	Single Feed	3.50	2.48	8.7	Medium
38	180	PPE00516	Sooke Rd	$38,966	1970	2.93	0	Asbestos Concrete	2	5	3	0	Yes	No	No	Single Feed	3.50	2.48	8.7	Medium
39	83	PPE00493	Quartz Dr	$183,223	1975	2.26	0	Asbestos Concrete	2	2	2	5	Yes	No	No	Single Feed	3.75	2.31	8.7	Medium
40	1616	PPE05763	Latoria Rd	$8,955	1960	4.32	0	Asbestos Concrete	5	1	1	5	Yes	No	No	Looped	2.40	3.58	8.6	Medium

Table 4-7: Top 40 Watermains by CoF Score

Pipe Info					PoF/CoF		CoF		CoF Correction Factors				CoF x PoF = Risk			
CoF Rank	Risk Rank	ID	Road Name	Replacement Cost	Pressure	Flow	Diameter	Proximity to Waterbody	Sooke	Exposed Main	Downtown Langford	Redundancy	CoF	PoF	Risk Score	Risk
1	130	PPE05128	Cockle Ln	$1,804	4	2	2	5	No	No	No	Single Feed	5.00	1.30	6.5	Medium
2	314	PPE04438	Phillips Rd	$559,058	3	4	3	5	Yes	Yes	No	Looped	5.00	1.00	5.0	Medium
3	167	PPE04029	Sooke Rd	$106,391	4	4	3	5	Yes	No	No	Single Feed	5.00	1.25	6.3	Medium
4	742	PPE02102	Sooke River	$764,132	2	5	4	5	Yes	No	No	Single Feed	5.00	0.75	3.8	Low
5	312	PPE04956	Sooke Rd	$433,855	3	3	2	0	Yes	No	No	Single Feed	5.00	1.00	5.0	Medium
6	159	PPE05841	Sooke Rd	$15,539	4	4	3	5	Yes	No	No	Single Feed	5.00	1.25	6.3	Medium
7	160	PPE01376	Sooke Rd	$131,122	4	5	3	5	Yes	No	No	Single Feed	5.00	1.25	6.3	Medium
8	161	PPE00946	Cornelius Rd	$22,725	4	4	2	5	No	No	No	Single Feed	5.00	1.25	6.3	Medium
9	1	PPE00843	Belvista Pl	$123,263	4	5	3	5	Yes	No	No	Single Feed	5.00	2.98	14.9	High
10	313	PPE06934	Sooke Rd	$340,915	3	3	2	0	Yes	No	No	Single Feed	5.00	1.00	5.0	Medium
11	315	PPE50849	Millstream Rd	$22,738	3	1	2	5	No	Yes	No	Looped	5.00	1.00	5.0	Medium
12	90	PPE06455	Sooke Rd	$336,162	4	5	3	5	Yes	Yes	No	Single Feed	5.00	1.40	7.0	Medium
13	256	PPE05318	ROW (Selwyn	$45,935	3	3	2	5	No	Yes	No	Single Feed	5.00	1.07	5.4	Medium
14	316	PPE14805	Metchosin Rd	$123,089	3	3	3	5	No	Yes	No	Single Feed	5.00	1.00	5.0	Medium
15	2	PPE06606	Belvista Pl	$559,269	3	5	3	5	Yes	No	No	Single Feed	5.00	2.73	13.7	High
16	131	PPE04777	Cockle Ln	$32,907	4	2	2	5	No	No	No	Single Feed	5.00	1.30	6.5	Medium
17	133	PPE00156	Sooke Basin	$2,853,434	4	2	2	5	Yes	No	No	Single Feed	5.00	1.29	6.5	Medium
18	162	PPE04955	Sooke Rd	$275,261	4	3	2	0	Yes	No	No	Single Feed	5.00	1.25	6.3	Medium
19	61	PPE02944	Helmcken Rd	$53,588	5	4	3	5	No	Yes	No	Single Feed	5.00	1.50	7.5	Medium
20	163	PPE01082	Sooke Rd	$355,476	4	5	3	5	Yes	No	No	Single Feed	5.00	1.25	6.3	Medium
21	164	PPE00745	East Sooke	$35,330	4	4	2	5	No	No	No	Single Feed	5.00	1.25	6.3	Medium
22	743	PPE07588	Sooke River	$624,647	2	5	4	5	Yes	No	No	Single Feed	5.00	0.75	3.8	Low
23	728	PPE06485	Treanor Ave	$18,303	2	3	2	5	No	Yes	No	Single Feed	5.00	0.75	3.8	Low
24	60	PPE07003	Talcott Rd	$138,596	5	1	2	0	No	Yes	No	Looped	5.00	1.50	7.5	Medium
25	165	PPE05331	Sooke Basin	$797,583	4	4	2	5	Yes	No	No	Single Feed	5.00	1.25	6.3	Medium
26	1904	PPE02416	Glen Forest	$31,304	1	3	2	5	No	Yes	No	Single Feed	5.00	0.51	2.6	Low
27	134	PPE00954	Flesh Rd	$73,701	4	1	2	5	No	Yes	No	Single Feed	5.00	1.29	6.4	Medium
28	166	PPE02012	Billings Rd	$253,293	4	4	2	5	Yes	No	No	Single Feed	5.00	1.25	6.3	Medium
29	132	PPE00157	Sooke Basin	$618,992	4	2	2	5	Yes	No	No	Single Feed	5.00	1.30	6.5	Medium
30	168	PPE67451	West Coast	$222,305	4	4	3	5	Yes	No	No	Looped	5.00	1.25	6.3	Medium
31	169	PPE67452	West Coast	$235,136	4	4	3	5	Yes	No	No	Looped	5.00	1.25	6.3	Medium
32	170	PPE68264	Caribou Dr	$73,791	4	3	3	5	No	Yes	No	Single Feed	5.00	1.25	6.3	Medium
33	351	PPE04495	Derbend Rd	$449,048	3	4	3	5	Yes	No	No	Single Feed	4.75	1.00	4.8	Low
34	204	PPE45647	Sooke Rd	$104,344	4	3	3	5	Yes	No	No	Single Feed	4.75	1.25	5.9	Medium
35	177	PPE00806	Sooke Rd	$235,110	4	3	3	5	Yes	No	No	Single Feed	4.75	1.29	6.1	Medium
36	95	PPE10926	Latoria Rd	$258,036	5	4	4	5	No	No	No	Single Feed	4.50	1.50	6.8	Medium
37	96	PPE33236	Latoria Rd	$241,736	5	4	4	5	No	No	No	Single Feed	4.50	1.50	6.8	Medium
38	229	PPE01851	Sooke Rd	$181,120	4	3	2	5	Yes	No	No	Single Feed	4.50	1.25	5.6	Medium
39	3	PPE02375	West Coast	$170,106	3	4	2	5	Yes	No	No	Single Feed	4.50	2.53	11.4	High
40	967	PPE06595	Sooke River	$697,555	2	5	4	3	Yes	No	No	Single Feed	4.50	0.75	3.4	Low

4.3 Risk Assessment Methodology: Non-Linear Assets

An asset-level risk assessment was carried out for the CRD JdFWDS non-linear assets (assets installed in the facilities and water storage tanks), covering all major categories, including architectural and structural components, building mechanical and electrical systems, process mechanical equipment, instrumentation and control, and site civil works. The high-level risk analysis incorporated consequence of failure scores derived from existing CRD studies, namely, the JdF Distribution PCS & Pump Station Criticality Assessments and the JdF Distribution Pressure Control Station and Pump Station PM Program Proposal, along with insights gathered during the risk and criticality workshop. The probability of failure scores was based on condition assessments completed in January and February 2025.

4.3.1 Pump Station & Pressure Control Station Consequence of Failure

The risk assessment for JdFWDS non-linear assets has leveraged previous work done by WDS operations staff regarding pump station (PS) and pressure control station (PCS) criticality[3]. A recent re-evaluation of the PCS and PS preventive maintenance (PM) program sought to consider asset criticality, along with the existing location-based program, acknowledging the need to use a more nuanced approach to PM planning in light of emerging budgetary and workforce restrictions. These efforts resulted in a criticality ranking of Red, Amber or Green for each of the systems 60 PCS and 34 PS[4]. **Table 4-8** maps CRD's ranking to AECOM's non-linear assets' CoF scores.

Table 4-8: Criticality Rank to CoF Score

CRD PS and PCS Criticality Ranking	AECOM Non-linear Assets CoF Score
Red	N/A (no stations received a red ranking from CRD)
Amber	4
Green	3

These station-level CoF scores were uniformly applied to all individual non-linear assets within a station, such as pumps, electrical components, instrumentation, and structural elements. This approach reflects the understanding that the overall consequence of failure is primarily governed by the station's role and operational importance within the water distribution system. Applying a consistent CoF score to all assets within a station ensures alignment with the station's criticality profile and supports a coherent, system-level evaluation of asset risk.

The criteria and associated scoring used to determine criticality for PCS and PS are detailed in **Table 4-9** and **Table 4-10**, respectively. It evaluates each station based on its operational role, redundancy, monitoring capability, service coverage, and associated risks. Stations are classified as lead, lag, or fire-flow-only, and further assessed on whether they have redundancy and are connected to SCADA. Additional criteria include the number of services and hydrants in the zone, any history of operational issues, confined space entry requirements, and whether the zone contains critical facilities. Together, these factors help determine the operational importance and risk profile of each station. It should be noted that while common criteria were considered and scoring was consistent (where available), there was no clear indication of how the overall station criticality score was determined based on all criteria combined. In the future, consideration should be given to documented rules that can be replicated in determining the overall score.

Table 4-9: Criticality Criteria for JdFWDS Pressure Control Stations

Criteria	Scoring
Is it a lead, lag or fire flow only station?	Lead
	Lag
	Fire Flow Only
Is there redundancy (can the station be shut down?)	No
	Yes

[3] JdF Distribution Pressure Control Station and Pump Station PM Program Proposal
[4] JdF Distribution PCS & Pump Station Criticality Assessments

Criteria	Scoring
Is the station on SCADA?	No
	Yes
How many services and hydrants are in the zone?	Water Storage Tanks / Private / > 350 Services / > 30 Hydrants
	> 100 Services / > 10 Hydrants
	≤ 100 Services / ≤ 10 Hydrants
Is there history of issues?	No
	Yes
Is the station a confined space?	No
	Yes
Does the zone contain a critical facility?	No
	Yes

Table 4-10: Criticality Criteria for JdFWDS Pump Stations

Criteria	Scoring
Is it a lead, lag or fire flow only station? *No clear scoring given for each option.	Domestic
	Domestic and fill to water storage tanks
	Domestic and fire
	Fill to water storage tanks
	Fire pump
	Recirculation
Is there redundancy (can the station be shut down?)	No
	Yes
Is the station on SCADA?	No
	Yes
Is the station a confined space?	No
	Yes
Does the zone contain a critical facility?	No information

4.3.2 Water Storage Tank Consequence of Failure

CoF scores for water storage tanks was collected during the Risk & Criticality workshop facilitated by AECOM with key CRD operations, engineering and asset management staff. While these scores were subjective and based on individuals' knowledge of the system, some common parameters were considered during the discussion, including, location, valve system, population served by the water storage tank and redundancy.

Table 4-11 presents the CoF score identified by CRD staff during the workshop, along with a brief explanation for why the score was given.

Table 4-11: Water Storage Tank CoF Scores

Water Storage Tank Name	CoF Score	Workshop Comments
Fulton Water Storage Tank	4	Fulton Water Storage Tank is the sole supply source for its service area, with no alternative means of water delivery, making it highly critical. In addition, failure of isolation valves or level sensors would cut the service. And it takes long for the tanks to drains to empty, which rises environmental risk during maintenance.
Bear Mountain Water Storage Tank	3	Bear Mountain Water Storage Tank has partial redundancy through Skirt Mountain zone and another pump station, reducing the overall consequence of failure. However, the valve/sensor failure still impacts customers. And it takes a long time to drains to empty, which rise environmental risk during maintenance.
Flint North Water Storage Tank	3	Flint North Water Storage Tank can rely on mirrored infrastructure on the other side of the system, providing some backup capacity, allowing service to be maintained through alternative pathways during a disruption.
Peacock Water Storage Tank (Out of Service)	N/A	The CoF score for the Peacock Water Storage Tank was not discuss during the workshop. The region plans to decommission the water storage tank in the future.
Skirt Mountain Water Storage Tank	5	Skirt Mountain Water Storage Tank serves as the primary supply for the entire mountain zone, with no backup supply available. Seismic impacts or valve failure would halt the service to the entire zone. UPS and SCADA are essential for real-time response.
Walfred Water Storage Tank	4	Walfred zone has access to Fulton Water Storage Tank and Walfred Pump Station, but full redundancy details are unclear and require further evaluation. Valve isolation has improved, but drains are still inadequate. The probability of failure is moderate, and structural integrity is acceptable.
Deer Park Water Storage Tank	3	Deer Park Water Storage Tank has some redundancy via Rocky Point Water Storage Tank, which provides operational flexibility and allows the supply to be maintained through alternative pathways during a disruption
Rocky Point Water Storage Tank	4	Rocky Point Water Storage Tank is a primary supply for its zone, warranting a high CoF score due to limited redundancy. The valve or sensor failure immediately impacts customers. The SCADA lag hinders timely response.
Stirrup Water Storage Tank	3	Stirrup Water Storage Tank serves a smaller customer base, resulting in a moderate CoF score due to lower service impact. There is a high probability of structural failure from corrosion. The inadequate drains and limited cathodic protection raise the environmental and service risks.
Helgesen Water Storage Tank	5	Helgesen Water Storage Tank supports the highest population in Sooke, with no secondary feed, making it extremely critical. The failure of level sensors or seismic valves would disrupt service to a large population. And it takes long for the tanks to drains to empty, which rise environmental risk during maintenance.
Henlyn Water Storage Tank	3	Henlyn Water Storage Tank is relatively small in scale and supported by a backup pump station, minimizing failure consequences.
Silver Spray Water Storage Tank	3	Silver Spray Water Storage Tank includes two cells, providing some operational flexibility, though only one is currently in use. The corrosion in the inactive cell and in efficient drains create moderate risk.
Sunriver Water Storage Tank	4	Sunriver Water Storage Tank is the only supply to its neighbourhood and also backs up Helgesen, making it highly important for fire flow and redundancy. Valve or sensor failure would disrupt service to the neighbourhood and the Helgesen backup zone.
Copper Mine Water Storage Tank	3	Copper Mine Water Storage Tank currently has limited redundancy, but planned pump station upgrades will enhance reliability and reduce its future CoF.

4.3.3 Non-linear Asset Probability of Failure

The PoF rating for each non-linear asset is derived from its condition assessment score (1–5). To obtain a facility-level PoF, the weighted average condition scores of all asset systems are combined as a weighted average, using the weighting factors shown in **Table 4-12**.

Table 4-12: Weighting Factors for Each Asset Systems

Asset Systems	Weighting	Rationale for Weighting
Architectural & structural	0.15	Sound structures preserve overall integrity but typically deteriorate slowly and can often be maintained without immediate service loss.
Building mechanical	0.15	HVAC and other mechanical components affect operability and safety but usually have redundancy or manual workarounds.
Building electrical	0.20	Power distribution failures can halt operations and compromise safety, giving this system a higher influence on overall risk.
Instrumentation & SCADA	0.20	Real-time monitoring and remote control are critical for detecting problems and maintaining service continuity; loss of SCADA has system-wide ramifications.
Pumps / pump sets	0.25	Core process equipment—pump failures directly interrupt water delivery and require rapid response.
Civil & grounds	0.05	Site civil elements (e.g., drainage, fencing) affect reliability and safety but have relatively limited direct impact on day-to-day service.

The PoF for each asset system within a particular facility, using building mechanical in facility A as an example, is calculated by:

$$PoF\ (Building\ Mechanical\ in\ Facility\ A) = \frac{\sum PoF\ (Building\ Mechanical\ Asset\ in\ Facility\ A\ ) \times Asset\ Replacement\ Value}{Total\ Replacement\ Values\ for\ All\ Building\ Mechanical\ Assets}$$

Then the overall facility-level PoF scores were calculated by:

$$PoF\ (Facility\ A) = \sum Weighting\ Factor\ \times PoF\ (Asset\ Systems)$$

4.3.4 Risk Assessment Results: Non-Linear Assets

The risk assessment for the JdFWDS non-linear assets is presented below by Risk, PoF and CoF. It is useful to consider PoF and CoF independently in addition to risk, as it reveals what is driving risk across the system overall. **Table 4-13** defines four risk levels (Low, Medium, High, and Very High) based on the combined product of CoF and PoF scores. These thresholds align with the CRD's Asset Risk Management Framework (ARMF). The assets categorized to the medium risk range represent approximately $97 million, or 63% of total replacement cost, confirming that most equipment is neither immediately critical nor comfortably low-risk—and is likely to trend upward without timely reinvestment. In addition, about $22 million (33%) is classified within the High to Very-High ranges (scores 12–25), highlighting components whose failure would have considerable service, safety, and financial repercussions if left unaddressed.

Table 4-13: Risk Thresholds and Non-linear Asset Risk by Replacement Cost

Risk Level (Score Thresholds)	Replacement Cost	% of Replacement Cost
Low (0-4)	$35,797,000	23%
Medium (5-11)	$96,880,000	63%
High (12-16)	$21,604,000	14%
Very High (16-25)	$0	0%
Unknown	$522,380	0.3%
Total	**$154,803,000***	**100%**

** A small number of non-linear assets were not given a CoF score (and therefore no risk score was calculated), thus total replacement value presented for risk and PoF is slightly lower than for CoF.*

Table 4-14 and Table 4-15 present the CoF and PoF results, respectively, using a 1–5 scoring scale. The CoF profile is heavily weighted toward the middle risk grouping yet still contains a high-consequence segment. Only $0.6 million (0.4 %) of replacement value carries a minor rating and none is deemed insignificant; by contrast, $92 million (60 %) is assessed as moderate CoF. A further $40 million (26.1 %) and $21 million (13.7 %) are determined as major and catastrophic CoF, respectively. In practical terms, nearly one-third of the non-linear assets (about $61 million) could trigger severe or system-wide disruption if it failed, underscoring the need for strong contingency planning and priority capital funding.

PoF assessment results reveal a similar pattern. Assets in good or very good condition (PoF 1–2) represent roughly $71 million (46 %). However, the majority of assets are already past their midpoint in their ESL, $80 million (51.4 %) are rated fair, and another $4 million (2.6 %) are assessed as poor. An additional small portion $0.1 million is classed as very poor, signalling assets beyond their forecast ESL. Approximately two-thirds of the portfolio is trending that PoF scores are increasing unless mid-life refurbishments and targeted renewals are accelerated.

Table 4-14: Non-linear Asset Consequence of Failure by Replacement Cost

Consequence of Failure	Corresponding CoF from ARMF	Replacement Cost	% of Replacement Cost
1 (0-1)	Insignificant	$0	0%
2 (1-2)	Minor	$674,000	0.4%
3 (2-3)	Moderate	$92,235,000	59.6%
4 (3-4)	Major	$40,325,000	26.1%
5 (4-5)	Catastrophic	$21,146,000	13.7%
Unknown	Unknown	$423,000	0.3%
	Total	**$154,803,000**	**100%**

Table 4-15: Non-linear Asset Probability of Failure by Replacement Cost

Probability of Failure	Corresponding Condition	Replacement Cost	% of Replacement Cost
1 (0-1)	Very Good	$11,589,000	7.5%
2 (1-2)	Good	$59,355,000	38.3%
3 (2-3)	Fair	$79,613,000	51.4%
4 (3-4)	Poor	$4,038,000	2.6%
5 (4-5)	Very Poor	$107,000	0.1%
Unknown	Unknown	$99,000	0.1%
	Total	**$154,803,000**	**100%**

These results establish two priorities for the renewal capital planning:

- Immediate action is required to address the $22 million of assets already classed as High or Very High risk,

- Closely monitor and address the potential failure risks associated with the $61 million in assets identified as having Major or Catastrophic CoF to ensure overall system risk remains within an acceptable operating range.
- Proactive life-extension is critical for Fair-condition assets, supplemented by preventive maintenance for those still in Good condition, to prevent further escalation into higher-risk tiers and to smooth long-term funding requirements. A focus on life extension can assist in smoothing capital requirements.

Figure 4-4 and **Figure 4-5** illustrates the geographic distribution of risk scores for facilities within the JdFWDS.

In conclusion, the risk mapping shows a clear divide: the well-looped (system redundancy present) Langford and Colwood areas include the majority of low-risk sites, whereas remote or upland areas (where redundancy is minimal), and access is difficult carry much higher risk scores. The following observations on risk are noted.

- **Hot spots**: Sooke, East Sooke, Bear Mountain, and Skirt Mountain contain most high and very-high risk facilities, reflecting single-feed supply and challenging geography.
- **Urban cores:** Assets within the Langford–Colwood area are generally low to medium risk, supported by newer infrastructure, looped mains, and full SCADA coverage.
- **Elevation effect:** Water Storage Tanks that supply broad pressure zones are consistently calculated as higher-risk, while lower-elevation facilities nearer to transmission mains fall into lower risk brackets.

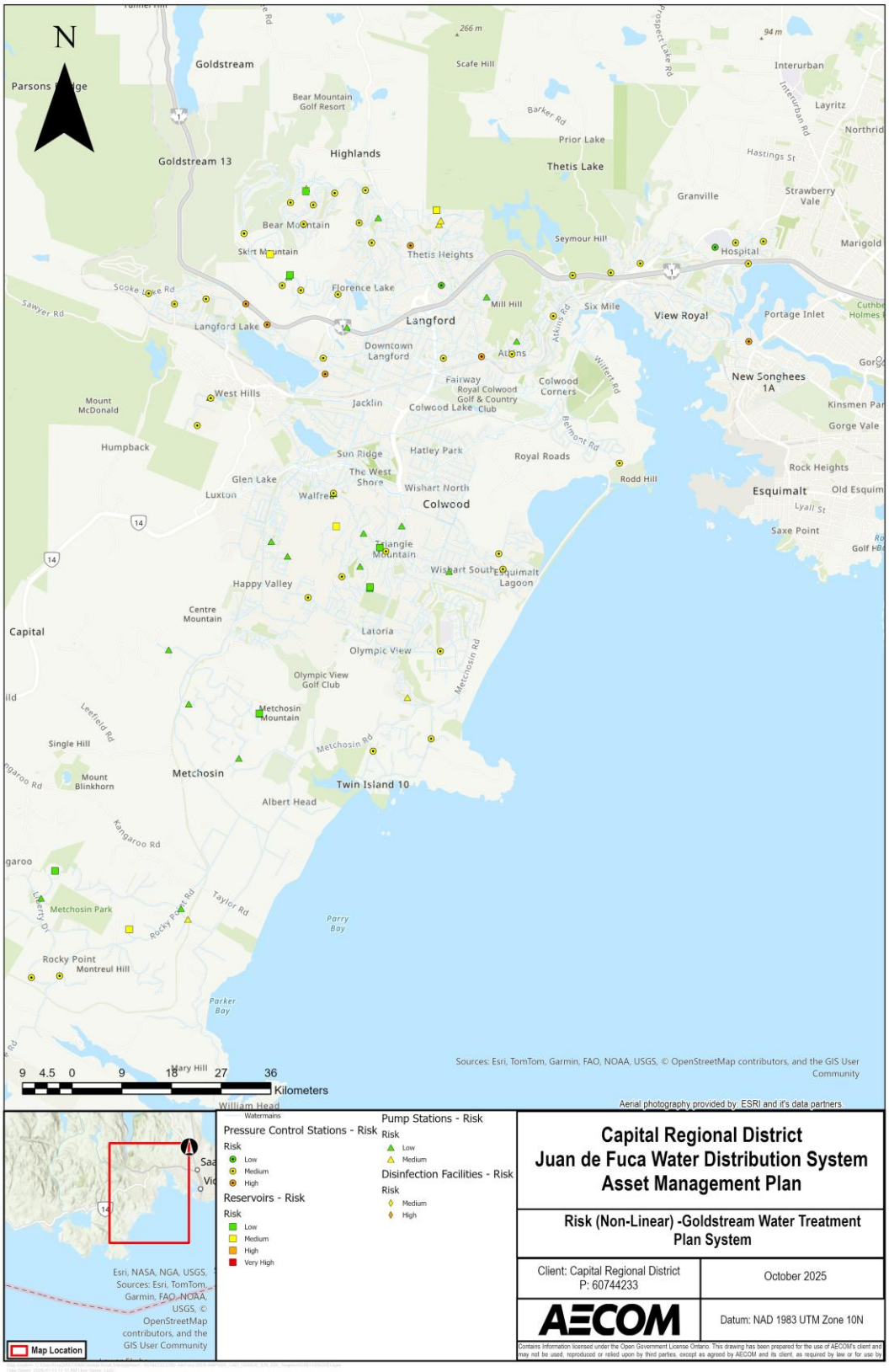


Figure 4-4: Risk – Non-Linear Assets – Goldstream Water Treatment Plant System

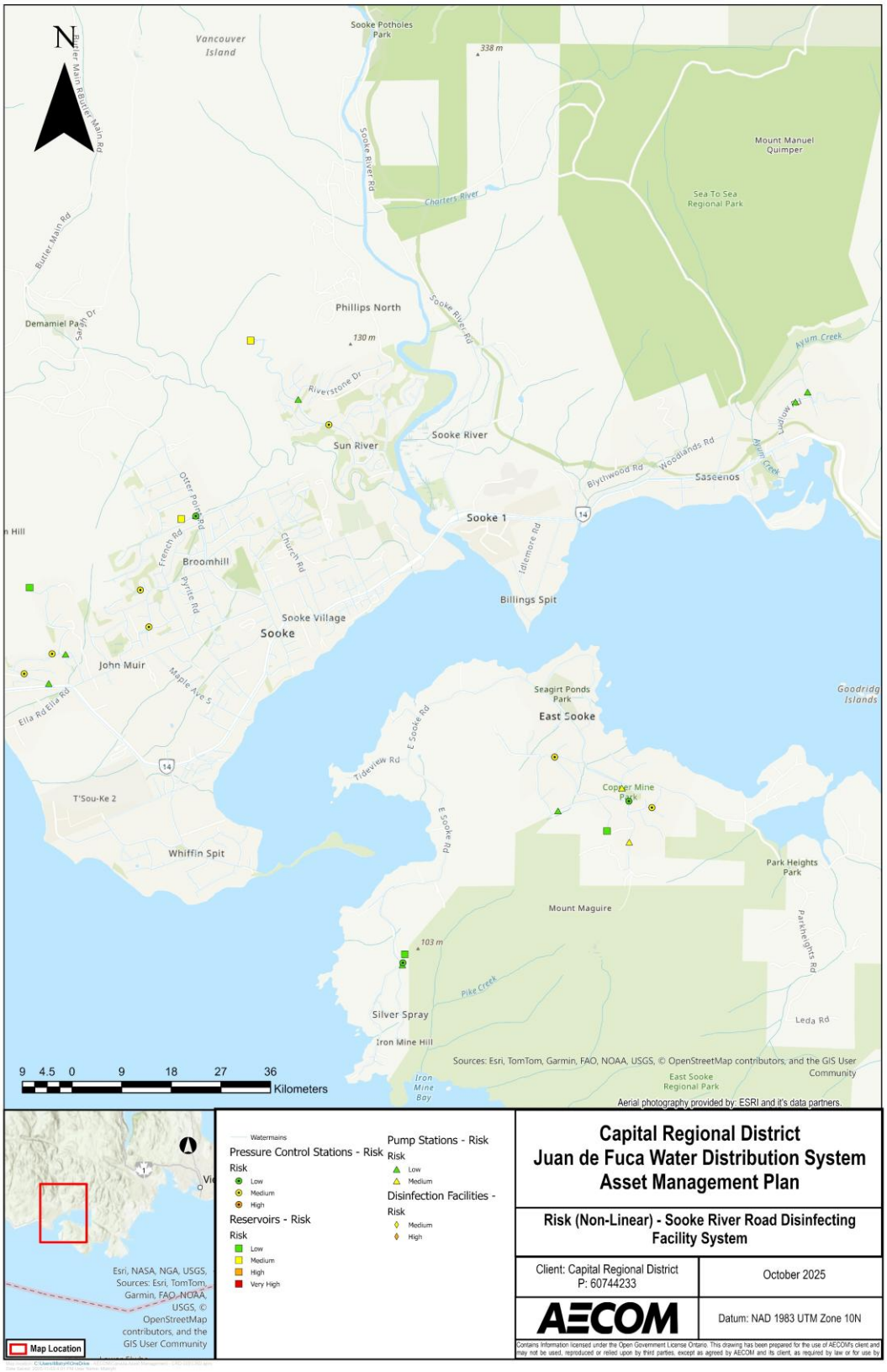


Figure 4-5: Risk – Non-Linear Assets – Sooke River Road Disinfecting Facility System

4.4 Risk Assessment Results: All Assets

Table 4-16, Figure 4-6 and Figure 4-7 summarize risk assessment results for all the JdFWDS assets discussed in the previous sections. Note that Table 4-16 and Figure 4-6 present risk according Water Systems which represent a grouping of pipe segments and associated hydrants, valves and laterals (as discussed in Section 4.2). Table 4-16 shows that the majority of assets by replacement value are in the low-risk category (73%), followed by 20% being characterized as medium risk, with the remaining 6% in the high and very high-risk categories.

Table 4-16: Risk Thresholds and Asset Risk by Replacement Cost - All Assets

Risk Level (Score Thresholds)	Definition	Replacement Cost	% of Replacement Cost
Low (0 ≤ Score < 5)	Indicates limited consequence or moderate likelihood of failure. The impact on service delivery or cost would be minor and localized. Preventive maintenance and regular inspection are generally sufficient to mitigate risk.	$1,340,924,000	68.2%
Medium (5 ≤ Score < 11)	Represents assets where either the probability or consequence of failure is moderate. Failure could cause noticeable service disruption, operational inefficiencies, or moderate repair costs. These assets warrant targeted condition assessment and prioritized renewal planning.	$165,720,000	8.4%
High (11 ≤ Score < 16)	Reflects a significant likelihood or consequence of failure that could cause major service interruption, high repair costs, or regulatory and reputational impacts. These assets should be closely monitored, with proactive mitigation or renewal actions planned in the short term.	$22,965,000	1.2%
Very High (16 ≤ Score ≤ 25)	Represents critical assets whose failure would have severe consequences on system performance, safety, environmental compliance, or financial stability. Immediate attention is required, including contingency planning, redundancy improvements, or urgent replacement to mitigate potential catastrophic impacts.	$0	0%
Unknown		$435,849,000	22.2%
Total		**$1,965,458,000**	**100%**

Figure 4-6 shows there is a clear difference in results when comparing risk for assets included under Water Systems and non-linear assets. The non-linear assets have a much higher proportion of assets in the medium and high categories, whereas the majority of Water Systems have been characterized as low risk. This is likely a reflection of the way PoF (e.g., condition) was determined for the respective risk assessments. For non-linear assets, PoF was informed by physical condition data and likely a more realistic representation of PoF compared to the desktop analysis used for watermains (which drove risk for Water Systems). Acknowledging the difficulty in completing physical condition assessments for linear assets, a more nuanced approach to evaluating PoF that considers additional inputs, or weighting factors could increase confidence in these scores.

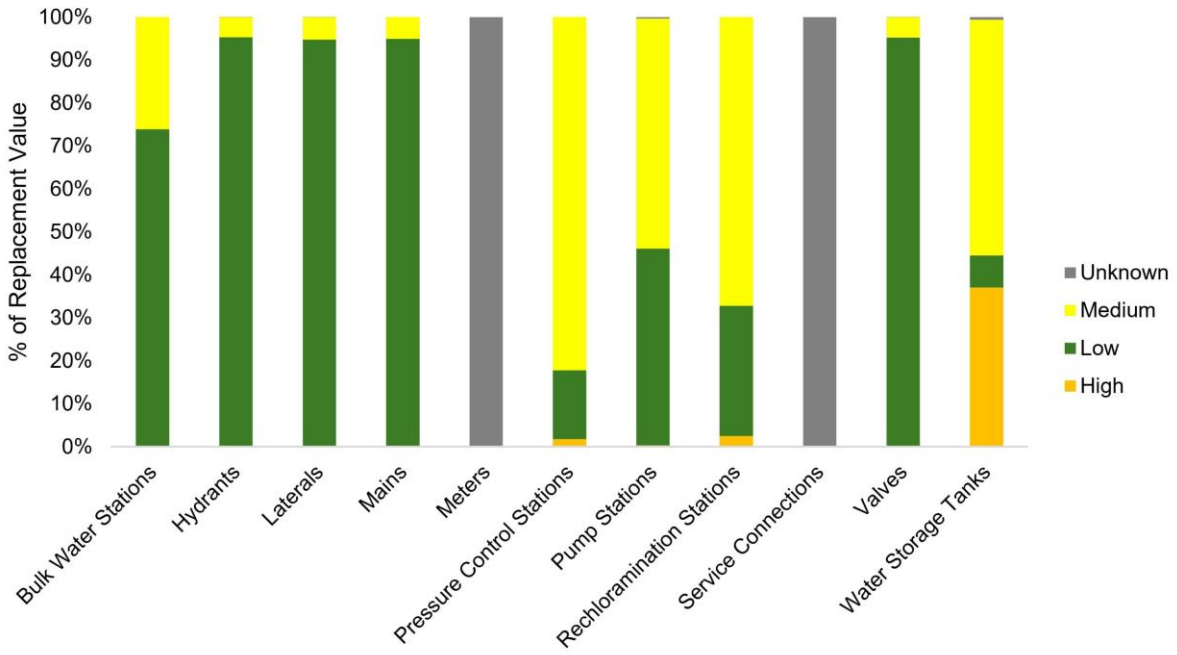


Figure 4-6: Risk by Asset Category

Figure 4-7 presents risk by replacement value in the format of a risk matrix. It helps to break down what is driving risk scores within each risk category. For instance, most medium-risk assets have a lower PoF, but CoF is typically what is driving the score higher, rather than a higher PoF and lower CoF score. Note that this figure includes watermains (as opposed to Water Systems) and non-linear assets, since CoF and PoF were used as opposed to Risk scores.

PoF \ CoF	1	2	3	4	5
1	$312.1 M 20.4%	$533.1 M 34.9%	$262.4 M 17.2%	$41.8 M 2.7%	$17.4 M 1.1%
2	$56 M 3.7%	$68.2 M 4.5%	$113.5 M 7.4%	$47.8 M 3.1%	$21.9 M 1.4%
3	$11.9 M 0.8%	$18.2 M 1.2%	$12.2 M 0.8%	$7.4 M 0.5%	$2.6 M 0.2%
4	$1.1 M 0.1%	$1.5 M 0.1%	$0.2 M 0.0%	$0 M 0.0%	$0 M 0.0%
5	$0 M 0.0%	$0.1 M 0.0%	$0 M 0.0%	$0 M 0.0%	$0 M 0.0%

Figure 4-7: Risk Matrix by Replacement Value – All Assets

4.5 Recommendations on Risk Management Strategy

The AMRF includes some existing strategies for risk management and treatment based on risk levels. However, its focus is primarily on strategic risks to the CRD, rather than the asset-level risks evaluated in this AMP. **Table 4-17** summarizes current actions related to strategic risk management and introduces additional considerations specific to asset-level risks. Asset-level risk assessment should guide timing for asset renewal and replacement and frequency of operations and maintenance activities.

Table 4-17: Risk Management Strategies

Risk Level	ARMF Action and Timing	Asset-Level Risk Considerations
Low (0 ≤ Score < 5)	Continue to manage through existing controls and procedures.	**Monitor** These assets are generally in good condition and pose minimal threat to service delivery. Continue routine monitoring and maintenance.
Medium (5 ≤ Score < 11)	Identify possible controls and continue to review for change.	**Monitor and Preventive Maintenance** These assets may be starting to show moderate wear and potentially introduce service issues. Increase monitoring and preventive maintenance where appropriate. Minor upgrades may be required, and capital expenditures should be planned for in the medium term.
High (11 ≤ Score < 16)	Immediate action required. Develop plan to address risk.	**Fix Soon** These assets may be in deteriorating condition or have a high consequence of failure. Short term repairs and close monitoring should be planned for along with renewal/replacement in the short term.
Very High (16 ≤ Score ≤ 25)	Immediate action required. Consider alternatives to activity.	**Fix Now** These assets may be in both poor condition and have a high consequence of failure, potentially posing a short-term threat to public safety, service continuity or regulatory compliance. Service continuity should be prioritized, and short-term renewal/replacement should be planned for.

As previously mentioned, evaluating CoF independently of risk is another important consideration when applying risk assessment results. Even though an asset may have a lower PoF that drives its overall risk score down, assets that are most critical, or carry the highest consequence of failure, require continuous monitoring and potentially more robust inspection and preventive maintenance programming. The exact approach would depend on what is driving CoF for a particular asset. For instance, some watermains have a high CoF due to the potential to pollute water ways in the event of a failure, even if other CoF criteria have received a lower score. Environmental response and spill plans should be in place for these assets. On the other hand, lack of redundancy drives CoF for some non-linear assets – in these cases service continuity plans should be developed. **Table 4-18** outlines some additional considerations for managing assets based on CoF.

Table 4-18: Management Strategies for Critical Assets

Management Strategy	Description
Develop Contingency Plans & Emergency Response Plans	Clear, actionable plans to respond quickly to asset failures and minimize service disruption. Plans should define roles, emergency procedures, and communication strategies, and be regularly tested and updated.
Redundancy and Backup Systems	Design infrastructure with duplicate or backup components to maintain service during failures, reducing service disruption and increasing system resiliency.
Preventive Maintenance Programming	Implement scheduled maintenance activities to keep assets in good working condition and prevent unexpected failures. Extend approach taken for PCS and PS criticality assessments discussed in **Section 4.3.1** to other non-linear assets and watermains.
Spare Strategy	Maintain an inventory of critical spare parts and components to enable quick repairs and minimize downtime during asset failures. An effective spare strategy reduces response time and limits the impact of unplanned outages.

Management Strategy	Description
Predictive Monitoring Program	Techniques such as vibration analysis, pressure monitoring, or thermal imaging help identify potential failures before they occur. This proactive approach allows targeted interventions that reduce the risk and severity of failure impacts.

4.6 Gaps & Recommendations

Table 4-19 summarizes the key gaps and corresponding recommendations identified through the risk analysis.

Table 4-19: Risk Management Gaps & Recommendations

Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
Improved methodology	CoF scores for pump stations and pressure control station assets are mostly directed by the CRD operation team.	Develop repeatable rules for determining station criticality for PCS and PS, building on efforts already carried out by CRD. It is recommended to improve the framework by incorporating additional quantitative and system-based factors, such as: • Population or customers served: Weight stations by the number of people or service connections dependent on them. • Elevation and hydraulic criticality: Include factors such as elevation head, system pressure influence, and water storage tank dependency.	Medium
Improved methodology	CoF scores for pump stations and pressure control station assets are mostly directed by the CRD subject matter experts (SMEs)	Consideration should be given to developing a more standardized and transparent framework for assessing water storage tanks criticality, ensuring consistent evaluation across the system. The framework could incorporate the following key factors: • Location: Water storage tanks situated in more remote or upstream areas (e.g., Sooke) typically have a higher Consequence of Failure (CoF) due to their importance in maintaining supply continuity and limited alternative sources. • Valve System Configuration: The degree of system isolation and control—such as the availability and reliability of inlet/outlet valves, bypass arrangements, and pressure zones—can significantly influence the operational flexibility and response time during an outage. • Population Served: water storage tanks supplying larger populations or critical service areas (e.g., hospitals, emergency services, or dense residential zones) should be assigned higher criticality scores, reflecting their greater social and service impacts. • Redundancy: The presence (or absence) of backup water storage tanks, interconnections, or alternative supply routes affects the system's resilience. Water storage tanks without redundancy should be deemed more critical due to the higher risk of service interruption.	Medium
Improved methodology	CoF and PoF scores for watermains are equally weighted	Establish weightings for CoF and PoF criteria to reflect CRDs expectations regarding what should drive PoF and CoF scores	Medium
Risk framework application	Asset-level risk management strategies	Incorporate asset-level risk and CoF management strategies into future corporate risk management initiatives or update existing documents such as the ARMF and risk management policy.	Medium
Risk Analysis	Meter assets were excluded from this specific risk analysis as they are managed through the SAP dataset, which provides a more detailed basis for future integration.	Meter assets were analyzed separately using the SAP-based inventory, which provided more detailed attribute information than the GIS dataset. For the next update, the existing unique identifier can be leveraged to enhance integration between the SAP and GIS datasets, allowing the risk analysis to draw on both spatial and attribute information. This approach will strengthen data alignment and enable a more comprehensive inclusion of meters within the overall risk framework.	Medium

5. Water Distribution System Capacity Assessment

To model the current and future capacity requirements of the JdFWDS AECOM has followed the process outlined below:

1. **Review and understand the current model and the available data.** This activity was to determine what work needs to be done upfront to build a reliable model. This preliminary review assessed the available information with the aim of ensuring that the model is updated to reflect current conditions and infrastructure.
2. **Define the current system demand**. This activity was to understand the current system demand to ensure an accurate baseline scenario with which to compare future scenarios against.
3. **Determine the service gaps**. Identify and quantify the forecast gaps between the current demand and each future demand scenario. To do this a list of scenarios was agreed and the changes to population and demand until the end of the AMP's horizon identified.

The final model is supplied in **Appendix D** alongside full storage results in **Appendix E** and the methodology memo in **Appendix F**.

5.1 Summary of Data and Model Review

During the data collection phase, AECOM received the following information from CRD for the hydraulic modelling task:

- GIS geodatabase of the existing water assets in the JdFWDS (Exported 2024-12-19).
- SCADA data of Water Storage Tank, Pumping Station, Bulk Water Meter (JdF), Retail Water Meter and Disinfection Facilities.
- As-built Drawings.
- Previous Studies and Reports:
  - Draft 2024 JdFWDS Development Cost Charge (DCC) Background Report[5].
  - Final 2024 JdFWDS DCC Background Report[6].
  - Technical Memo for Proposed Spatial Allocation of Future Growth Demands on the Juan de Fuca Water Network[7].
  - 2024 JdFWDS, RWS & SPW Model Update[8].
- Hydraulic Models supplied by CRD:
  - 2023 Model.
  - 2024 Model.
- GIS of Retail Meters with Land Use Classification.
- CRD Land Parcel Layer.
- Municipalities Boundary.
- To further supplement the information received from CRD, the following information was obtained online from the CRD and other relevant sources (e.g., the British Columbia website and local municipality websites):
  - CRD 2019 – 2038 Population, Dwelling Units and Employment Projection Report[9].

[5] Urban Systems (2024) Development Cost Charge Update (DRAFT)
[6] Urban Systems (2025) JdF WDS Development Cost Charge Bylaw Update (Final)
[7] GeoAdvice (2023) Proposed Spatial Allocation of Future Growth Demands on the JdF Water Network
[8] GeoAdvice (2025) 2024 JdFWD, RWS & SPW Model Update
[9] CRD (2019) 2019-2038 Population, Dwelling Units and Employment Projection Report

- CRD 2024 Population Estimates, July 1st Capital Region[10].
- B.C. Population Estimates: Regional District level and Outlook for 2046[11].
- Official Community Plans retrieved from the websites of the following local municipalities in March 2025:
  - City of Colwood[12]
  - City of Langford[13]
  - Town of View Royal[14]
  - District of Metchosin[15]
  - District of Sooke[16]
  - District of Highland[17]

5.1.1 SCADA Data Review

SCADA data gaps were identified and discussed with CRD for mitigation. For short-period missing data, interpolation was used to estimate the missing values while long-period missing data was discarded, and the period was excluded from the flow balance calculation.

5.1.2 Population Information Review

For estimating the future water demand and its allocation, future population information from the DCC Study and the B.C. Population Estimates: Regional District level and Outlook for 2046 were reviewed. The allocation method followed the Technical Memo for Proposed Spatial Allocation of Future Growth Demands on the Juan de Fuca Water Network developed under the DCC Study. For further information refer to Technical Memo for Methodology for Population and Demand Evaluation and Model Update found in **Appendix E**.

5.2 Existing and Future Water Demand Evaluation

To identify future gaps in water demand, the current and future demand was calculated.

5.2.1 Existing Water Demand Evaluation

The 2022-2024 SCADA (treatment plant outflow, Water Storage Tank storage level) was reviewed and the existing system demands were evaluated for the Sooke River Road Disinfecting Facility (SRRDF) and Goldstream Water Treatment Plant (GWTP) systems, which are summarized in **Table 5-1** and **Table 5-2**. The tables identify the average day demand (ADD), the maximum day demand (MDD) and the peak hourly demand (PHD). Further information could be referred to Technical Memo for Methodology for Population and Demand Evaluation and Model Update.

Table 5-1: Summary of Historical SRRDF System Water Demand

SRRDF System	2022	2023	2024
ADD (L/s)	61.41	58.99	59.13
MDD (L/s)	102.25	110.08	102.84
PHD (L/s)	135.77	156.22	145.79

[10] CRD (accessed January 2025) https://www.crd.ca/media/file/2024populationestimatepdf
[11] BC Statistics (2025) Population Estimates of B.C. Regional District level and Outlook for 2046
[12] City of Colwood (2022) Official Community Plan 1700-07
[13] City of Langford (2024) Official Community Plan Version 4.1
[14] Town of View Royal (2011) Official Community Plan
[15] District of Metchosin (2020) Official Community Plan Consolidated 2020
[16] District of Sooke (2023) Official Community Plan Consolidated Version January 23, 2023
[17] District of Highland (2013) Official Community Plan (277-OCP 2007)

Table 5-2: Summary of Historical GWTP System Water Demand

GWTP System	2022	2023*	2024
ADD (L/s)	337.27	227.30	350.87
MDD (L/s)	604.36	588.30	626.29
PHD (L/s)	947.00	810.60	949.38

*Metering issues are noted to be the cause of lower system demands in 2023. These values have been removed for analysis purposes.

5.2.2 Future Water Demand Evaluation

The latest population projections (up to 2043) in the JdFWDS Development Cost Charge (DCC) Study[6] and the B.C. Population Estimates[11] for 2046 was utilised to arrive at the future demand.

5.2.3 2028 to 2043 - DCC Population Growth

The DCC Study identified a total of 78,098 population growth in the distribution area. The breakdown of the population growth from the DCC study is shown in the **Table 5-3**.

Table 5-3: DCC Population Growth (up to 2043)

New Developments	View Royal	Highlands	Colwood	Langford	Metchosin	Sooke	Electoral Area A	Units / Area	Density (ppl/unit or ppl/m3)	Population Growth
Low Density Units	225	225	1,500	2,800	60	1,000	300	6,110	3.2	19,552
Medium Density Units	530	30	3,000	4,000	5	1,500	0	9,065	2.8	25,382
High Density Units	800	0	3,500	5,530	0	2,500	100	12,430	1.8	22,374
Commercial (m3)	35,000	15,440	3,460	150,000	5,000	35,000	100	244,000	0.012	2,928
Industrial (m3)	5,000	22,500	120,000	900,000	1,400	25,000	500	1,074,400	0.006	6,446
Institutional (m3)	5,000	750	52,500	50,000	4,700	5,000	0	117,950	0.012	1,415
Total	**4,154**	**1,133**	**20,892**	**37,914**	**331**	**12,530**	**1,144**	**-**		**78,098**

5.2.4 Post-2043 - Population Growth from BC Regional Population Growth

The B.C. Population Estimates: Regional District level and Outlook for 2046 estimated a 0.6% year-on-year growth rate in the CRD region after 2043. Based on that and the previous growth allocation identified from the DCC Study, the breakdown of the population growth from the BC Regional Population Growth is shown in **Table 5-4**.

Table 5-4: Post-2043 Population Growth

Area	Residential Growth (2043 - 2048)	ICI Land Development (2043 – 2048)
Colwood	1,582	14,167
Metchosin	17	1,250
Langford	2,443	79,500
View Royal	296	5,250
Sooke	965	6,417
Highland	65	3,333
East Sooke	92	0

5.2.5 Design Unit Water Consumption Rates for Population Growth

The CRD's Engineering Specifications were adopted for the determining design unit water consumption rates of the population growth in the JdFWDS. For existing population, the water consumptions were scaled to meet the 2024 water demand, as summarized in **Table 5-5**. This rate is noted to be significantly higher than the actual consumption reported in the JdFWDS and results in future flexibility but also future growth projects being determined as required prior to the reality. An accurate figure should be used to realistically determine the requirements for growth projects and a consistent conservatism factor determined that accommodates the routine fluctuations in demand and localized growth that a pressure zone may experience.

Table 5-5: Adopted Design Water Consumption Rates

Water Demand Type	Existing	Future
Residential	Scale to match the 2024 Water Demand	Residential Population Growth x 545 (L/cap/d)
ICI		ICI Development Area x 1.87 (L/m^2/d)

5.3 Model Update Methodology and Scenario Establishment

After the future population and demand per capita determined the future scenarios could be calculated.

5.3.1 Water Demand Update

The existing water demand was updated to the existing scenario in the collected model by scaling to meet the 2024 system water demand. For the future water demand, the water demand increase (i.e., water demand associated with population growth) was allocated to the corresponding water junctions recommended in the Technical Memo for Proposed Spatial Allocation of Future Growth Demands on the Juan de Fuca Water Network (see **Appendix F**).

5.3.2 Scenario Establishment

Apart from the existing scenario already established in the collected model and updated with the 2024 water demand, 5 interim scenarios (2028, 2033, 2038, 2043 and post-2043) were established.

Since the DCC Study Report only outlines the population growth until 2043, the phasing of the population growth was assumed gradually and uniformly across the 20-year planning horizons. **Table 5-6** summarizes the MDD for SRRDF and GWTP water systems under existing and future scenarios for all planning horizons.

Table 5-6: MDD for SRRDF and GWTP Water Systems

Water System	Existing (2024) (L/s)	2028 (L/s)	2033 (L/s)	2043 (L/s)	Post-2043 (L/s)
Sooke River Road	102.84	146.88	201.93	312.03	330.00
Goldstream Water Treatment Plant	626.29	822.08	1,066.81	1,556.26	1,631.29
Total	729.14	968.96	1,268.74	1,868.29	1,961.29

Note: Future MDD based on MDD peaking factor = 2.5xADD per CRD's Engineering Specifications

Figure 5-1 shows potential growth locations served by the GWTP within the JdFWDS, based on the GeoAdvice Report - Proposed Spatial Allocation of Future Growth Demands on the JdFWDS[7]. Growth areas are highlighted in red. Notable areas of concentrated growth are the Bear Mountain area (notably the Southeast region although significant new infrastructure is already in place and therefore fewer areas are highlighted for growth), Sooke Road (between Galloping Goose Trail and Veterans Parkway, Island Highway, the Southeastern edge of View Royal, and the Southern end of Langford around Klahanie Drive.

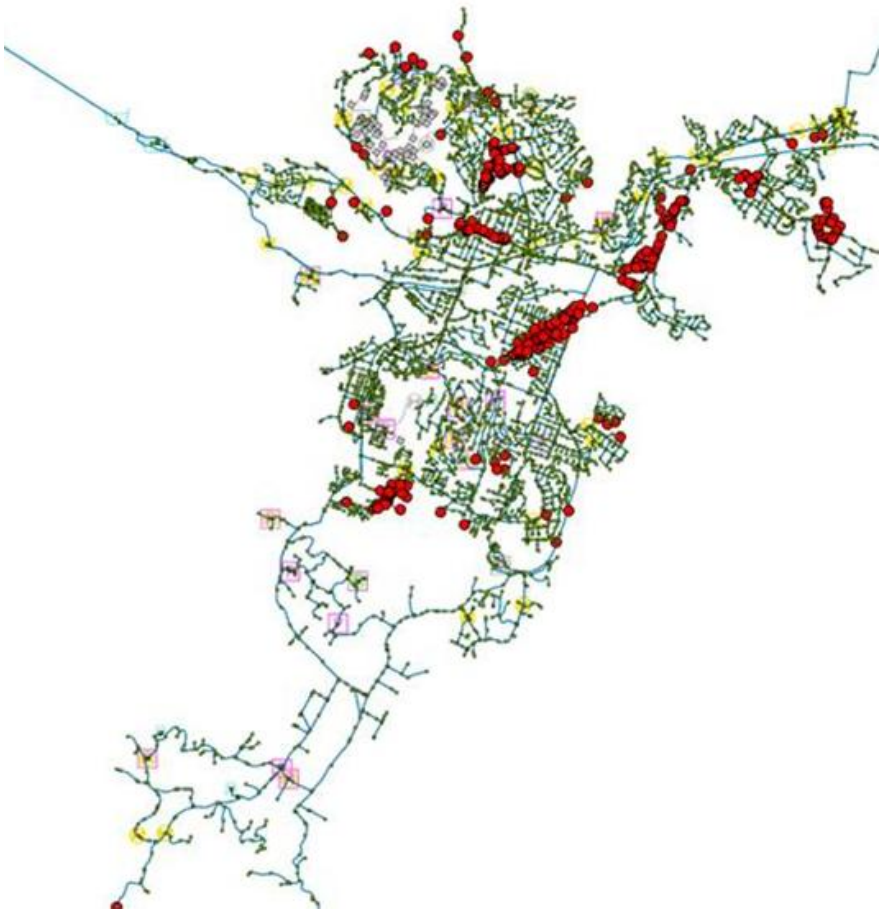


Figure 5-1: JdFWDS Future Growth Locations Served by GWTP

Key growth areas supplied by SRRDF are shown in **Figure 5-2**. Due to the number in comparison to **Figure 5-1** the total growth volume can be listed and are notably smaller than those found around Langford, but still present a significant percentage increase on the current demand as shown in **Table 5-6.** Minor growth is found across the area although special note should be taken of the growth in central Sooke along Highway 14 surrounding the main commercial district as this one area accounts for doubling the current supply over the modeled period.

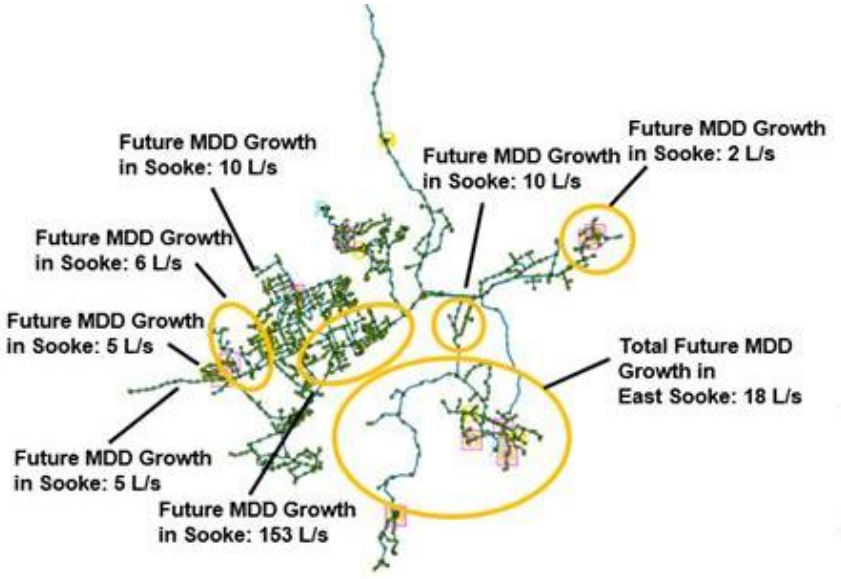


Figure 5-2: JdFWDS Future Growth Locations Served by SRRDF

For the entire JdFWDS the growth locations are heavily focused in the Sooke downtown area, and in the Veterans Memorial Pump Station area where densification is planned. Smaller areas of growth across the network are indicative of infill development which could cause demand increase.

5.4 System Evaluation for Storage and Conveyance Capacity

Based on the aforementioned model update methodology, the future demands were estimated for storage requirements alongside the conveyance (linear and pumping) requirements.

5.4.1 Fire & Storage Evaluation

The storage requirement for JdFWDS was determined based on the CRD's Engineering Specifications and by pressure zone (**Figure 5-3**). Total storage capacity requirement is the sum of Equalization Storage Capacity plus the greater of Fire Storage and Emergency Storge where Equalization Storage – 25% of MDD; Fire Storage – based on FUS fire flow calculation and duration (minimum fire storage of 1.2 ML per the CRD Engineering Specification 2009[18]); and Emergency Storage – 50% of ADD. This calculation is summarized as follows:

Total Storage Capacity Requirement	=	Equalization Storage Capacity (25% of MDD)	+	*Maximum of (* Fire Storage [FUS calcs and duration, min 1.2ML], or Emergency Storage [50% of ADD])

The fire flow storage requirement was also evaluated as discussed in the Technical Memo for Methodology for Population and Demand Evaluation and Model Update (see **Appendix F**). **Table 5-7** summarizes the storage requirement calculation results.

The system evaluation results, and corresponding improvement works are summarized in **Table 5-8**. The storage tank upgrades are determined based on pressure zone illustrated in **Figure 5-4** and summarized in **Figure 5-5**.

The following time frames are used based upon the pre-agreed methodology to follow the DCC timings:

- Short-term: 0-5 Years (2024 to 2029)
- Medium-term: 5-10 Years (2030 to 2035)
- Long-term: >10 Years (2036 and beyond)

[18] Note that this requirement has been removed in the August 2025 Update and is now in accordance with the FUS

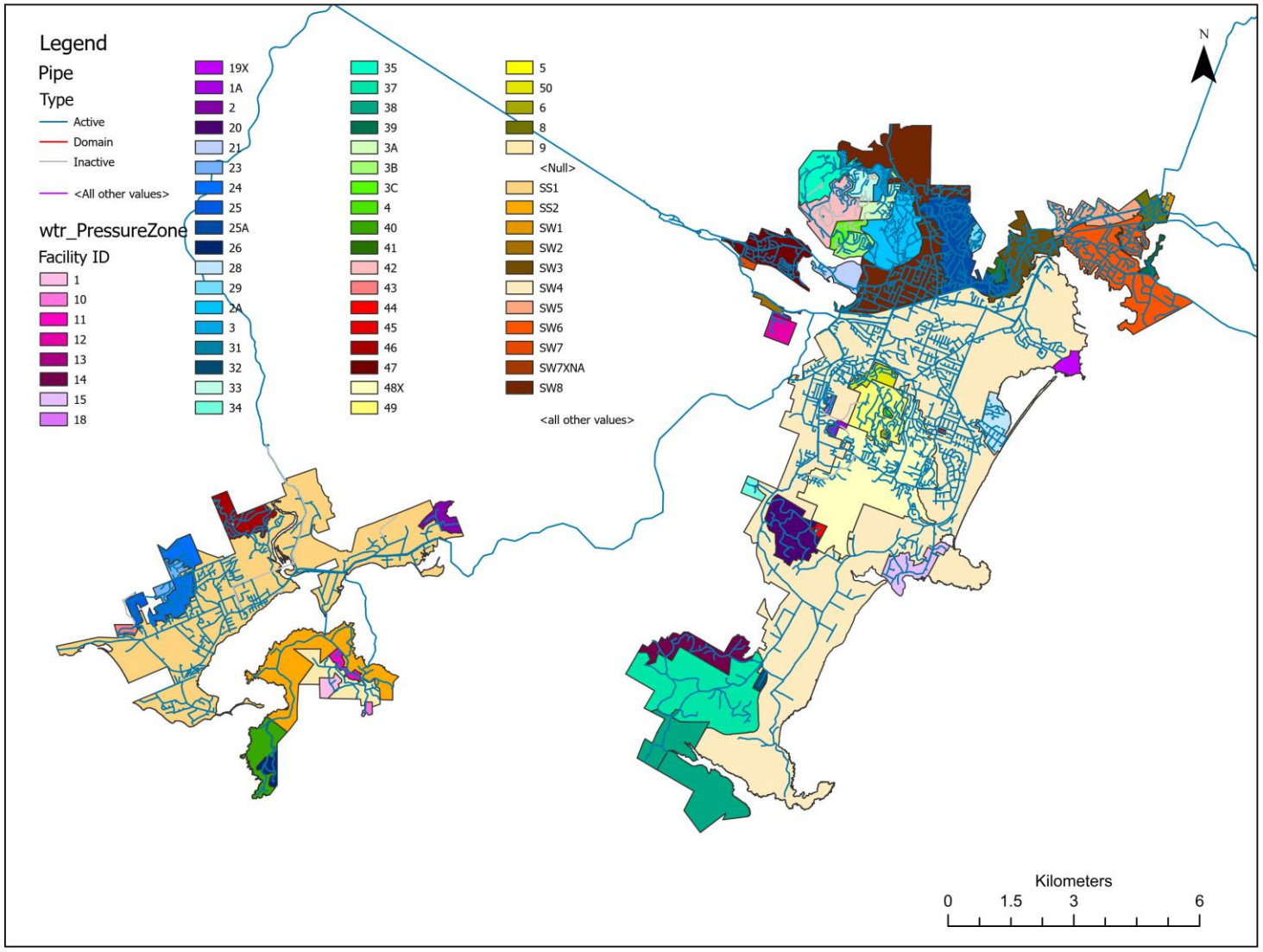


Figure 5-3: Pressure Zone Map

Table 5-7: Storage Requirement Calculation under Post-2043

Pressure Zone ID	Distribution Storage Tank	Calculated FUS Fire Flow (L/min)	Fire Flow Duration (hrs)	Fire Storage (ML)	Emergency Storage (ML)	Equalization Storage (ML)	Total Storage Requirement (ML)[1]
14	Deer Park	7,000 (117 L/s)	2	**1.20** (0.84 ML less than min. fire storage)	0.04	**0.04**	1.24
48X	Fulton	11,000 (183 L/s)	2.5	1.65	**3.94**	**3.80**	7.73
23,24,25&43	Henlyn	8,000 (133 L/s)	2	**1.20** (0.96 ML less than min. fire storage)	0.35	**0.39**	1.59
20&44	Stirrup	7,000 (117 L/s)	2	**1.20** (0.84 ML less than min. fire storage)	0.08	**0.08**	1.28
37&38	Rocky Point	8,000 (133 L/s)	2	**1.20** (0.96 ML less than min. fire storage)	0.18	**0.17**	1.37
46	Sunriver	7,000 (117 L/s)	2	**1.20** (0.84 ML less than min. fire storage)	0.14	**0.15**	1.35
26&40	Silver Spray	8,000 (133 L/s)	2	**1.20** (0.96 ML less than min. fire storage)	0.02	**0.03**	1.23
4,6,49&50	Walfred	10,000 (167 L/s)	2	**1.20**	0.47	**0.45**	1.65
3C,33,35&42	Skirt Mountain	11,000 (183 L/s)	2.5	1.65	**2.22**	**2.15**	4.37
2,SS1&SS2	Helgesen	10,000 (167 L/s)	2	1.20	**5.39**	**5.93**	11.31
2A,3A,3&5	Bear Mountain	10,000 (167 L/s)	2	1.20	**1.61**	**1.56**	3.17
1,9,10&11	Copper Mine	7,000 (117 L/s)	2	**1.20** (0.84 ML less than min. fire storage)	0.26	**0.29**	1.49
3B	Flint North	8,000 (133 L/s)	2	**1.20** (0.96 ML less than min. fire storage)	0.17	**0.17**	1.37
					TOTAL STORAGE VOLUME		**39.15**

1. Total Storage Requirement is equal to Equalization Storage Capacity plus the greater of Fire Storage and Emergency Storage. The components used following this process are shown in bold.

Table 5-8: Summary of System Evaluation and Recommendations

Pressure Zone ID	Distribution Storage Tank	Storage (ML)			Turnover Rate (days) with Total Storage Requirement for Tank Upgrade[3]	Recommendation to Meet Storage Requirement
		Total Requirement[1]	Available[2]	Surplus or Deficit		
14	Deer Park	1.24	1.66	0.42	N/A	• No capacity upgrade required
48X	Fulton[4]	7.73	4.58	-3.15	0.98	• Upgrade
23,24,25&43	Henlyn	1.59	0.22	-1.37	2.24	• A new Mountain Heights Storage Tank
20&44	Stirrup	1.28	0.24	-1.04	7.91	• Low tank turnover rate (>2 days) with the total storage capacity (1.28 ML) provided in the pressure zones. To mitigate the water storage capacity shortfall for the pressure zones, it is recommended to provide system storage in transmission system (upstream supply). • Increase Glen Forest PS/Pears PS capacity to provide fire flow supply
37&38	Rocky Point	1.37	0.55	-0.83	3.79	• Low tank turnover rate (>2 days) with the total storage capacity (1.37 ML) provided in the pressure zones. To mitigate the water storage capacity shortfall for the pressure zones, it is recommended to provide system storage in transmission system (upstream supply). • Increase Rocky Point PS capacity to provide fire flow supply
46	Sunriver	1.35	3.16	1.80	N/A	• No capacity upgrade required
26&40	Silver Spray	1.23	0.84	-0.39	24.60	• Upgrade • Consider utilizing storage capacity expansion at Helgesen Storage Tank to meet the required storage capacity
4,6,49&50	Walfred	1.65	0.56	-1.09	1.77	• Tank Upgrade • An alternative to upgrade is to consider utilizing storage capacity expansion at Fulton with Fulton fire pump upgrade to offset the storage deficit in Walfred zone.
3C,33,35&42	Skirt Mountain	4.37	6.53	2.16	N/A	• No capacity upgrade required
2,SS1&SS2	Helgesen[4]	12.74	6.97	-5.76	1.18	• Tank Upgrade
2A,3A,3&5	Bear Mountain	3.17	1.25	-1.92	0.98	• Tank Upgrade • An alternative to upgrade is to consider utilizing storage surplus at Skirt Mountain to offset the storage deficit at Bear Mountain Water Storage Tank
1,9,10&11	Copper Mine	1.49	0.46	-1.04	2.82	• Increase Copper Mine PS capacity to provide fire flow supply. (Note – completion expected 2025). • With upgrades to basin feeds the CRD could utilize storage capacity expansion at Helgesen to meet the required storage capacity although this may not prove economically viable.
3B	Flint North	1.37	2.75	1.38	N/A	• No capacity upgrade required

Note:
1. Total storage requirement is equal to Equalization Storage Capacity plus the greater of Fire Storage and Emergency Storage
2. Total storage tank capacity based on Greater Victoria Drinking Water Quality-2023 Annual Water Report
3. Although no standards or criteria were available for water turnover rate (calculated as the total storage requirement divided by the post-2043 ADD) in the water industry, it is assumed that a typical turnover criterion is 2-days. Storage Tank upgrade for the pressure zone would not be considered in order to avoid potential water quality concern if the tank turnover rate with the total storage requirement exceeds the 2-day turnover criteria.
4. Storage Tank Upgrade – this upgrade could meet additional deficits should CRD wish to investigate such an option. Tanks that can be supplemented are stated above.

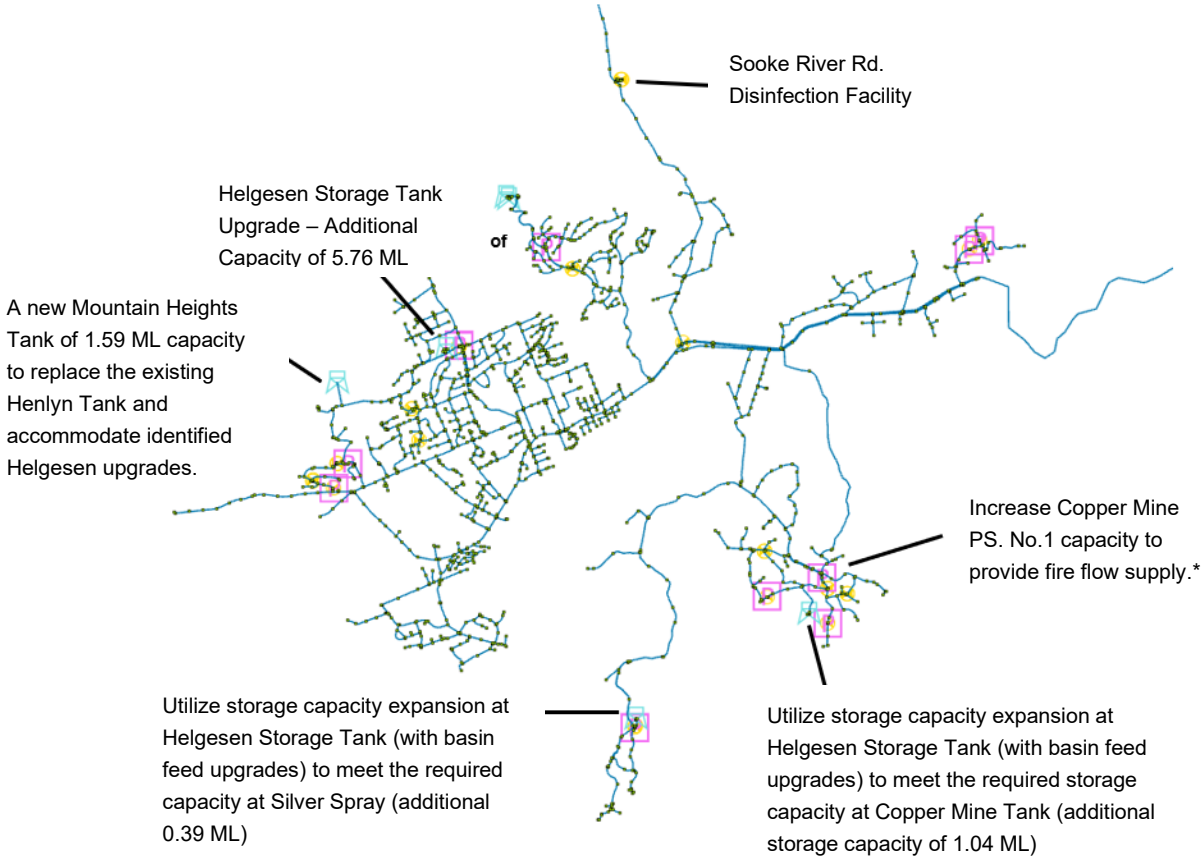


Figure 5-4: Storage Tank and Pump Station Upgrades in SRRDF System

*Note that this finding is based on the station that existed at project initiation. Additional supply will be met by the updated pump station.

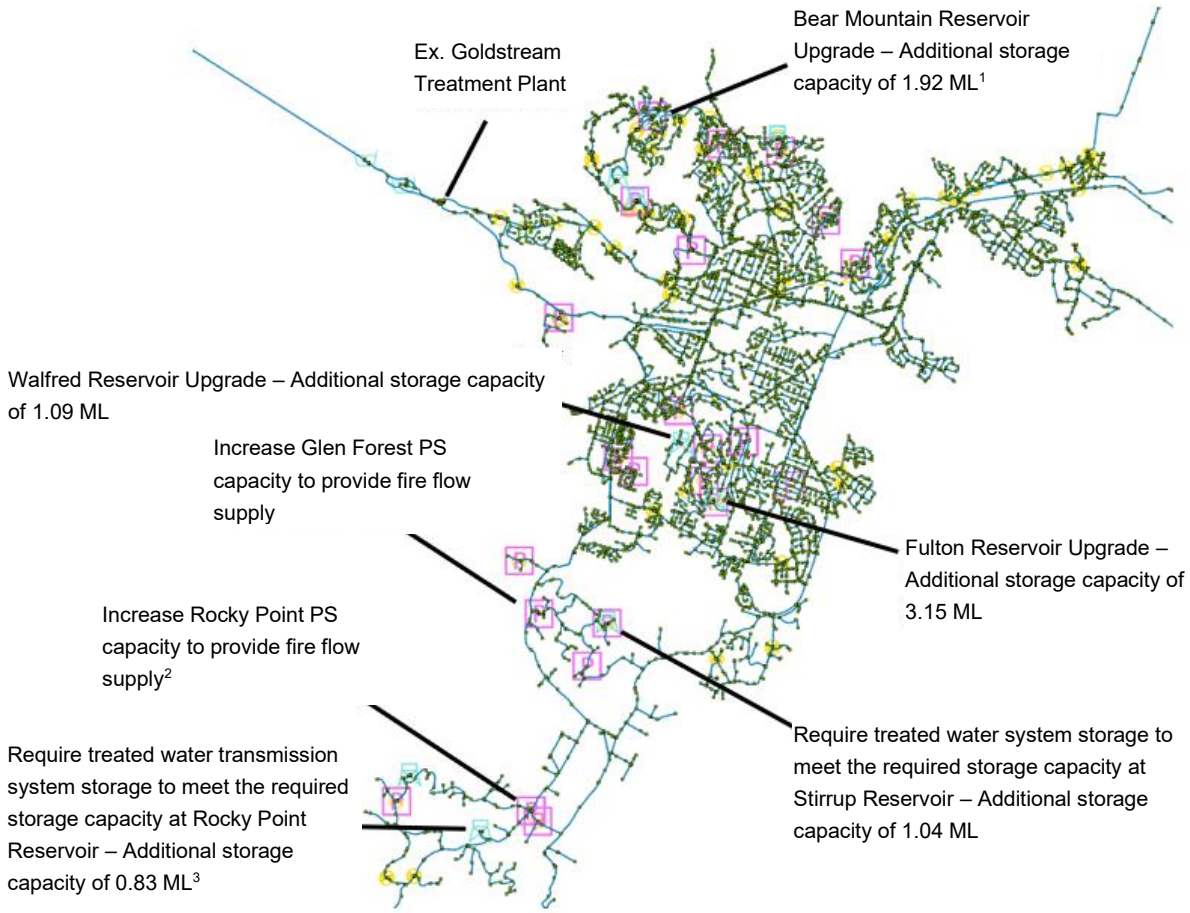


Figure 5-5: Storage Tank and Pump Station Upgrades in GWTP System

1. Based on the revised fire storage for Skirt Mountain Water Storage Tank, the Region could consider utilizing storage surplus at Skirt Mountain Water Storage Tank to offset the storage deficit at Bear Mountain Water Storage Tank as an alternative.
2. Based on the spreadsheet (JdFFacilityInformation-Res-PS-PCS-PZ_SLVT2.xls), 3 pumps exist (each pump capacity: 500gpm or 32 L/s) and is not sufficient for the required fire flow of 133 L/s.
3. Although additional storage capacity has been identified for this pressure zone the upgrade for the pressure zone would not be considered in order to avoid potential water quality concern as the tank turnover rate with the total storage requirement exceeds the 2-day turnover criteria

This conclusion of this demand evaluation is shown below in **Table 5-9** where the storage projects to resolve the identified gaps are listed.

Table 5-9: Detail of Storage Projects Required

Type	Item	Associated Storage Tank	Project Scope	Approximate requirement date
New Assets	Growth-V2	Henlyn	A new Mountain Heights Storage Tank of 1.59 ML capacity to replace the existing Henlyn Storage Tank. • New Storage Tank. • Land purchase for construction. Connection to distribution system. Approx. 160 m of 300 mm diameter pipe. Note - this asset construction appears to have been included in the DCC report as item 16 (storage tank and land acquisition.	Short Term
	Growth-V3	Stirrup	Additional fire flow supply. • Install additional fire pump of 7 m^3/min (117 L/s) at Glen Forest PS or Pears PS.	Short Term

Type	Item	Associated Storage Tank	Project Scope	Approximate requirement date
			• Lot has minor additional capacity and is zoned RR2 by the District of Metchosin for Residential use.	
Upgrade	Growth-V6	Fulton	Upgrade with additional 3.15 ML capacity. • Lot has additional capacity and is already zoned P3 by the City of Colwood for Utility. Note - this asset construction appears to have been included in the DCC report as item 4 (Storage Tank upgrade). Fire pump upgrade is not required with sufficient Storage Tank capacity.	Medium Term
	Growth-V7	Helgesen (Silverspray and Coppermine)	Install additional capacity to support Silver Spray and Copper Mine Storage Tank demands, • Additional 5.76 ML capacity Note that these upgrades are to be included in the new Mountain Heights tank.	Medium Term
	Growth-V8	Walfred	• Additional 1.09 ML capacity	Medium Term
Discounted Projects due to modelling conservatism	New Asset Growth-V1	Copper Mine	Additional fire flow supply. • Install additional fire pump of 7 m^3/min (117 L/s) at Copper Mine PS No.1 • The site (Coppermine PS 1) is undergoing existing upgrades and the remaining space available for fire pump installation in unknown at this time.	Short Term
	New Asset Growth-V4	Rocky Point	Additional fire flow supply. • Install additional fire pump of 8 m^3/min (133 L/s) at Rocky Point PS Lot has minor additional capacity and is zoned M2 by the District of Metchosin for Industrial use.	Short Term
	Upgrade Growth-V5	Bear Mountain	Upgrade with additional 1.92 ML capacity. Land parcel has minimal adjacent space for expansion and is zoned RCBM1 by the City of Langford	Long Term

5.4.2 Conveyance Evaluation

The full future requirements for the conveyance system were determined by assessing the updated hydraulic model alongside the future demand scenario. This resulted in a list of recommended projects to improve linear infrastructure and pumping capacity.

The JdF water system conveyance capacity was evaluated based on the following methodologies and assumptions:

- The 2024 hydraulic model provided by the CRD was used as a basis to perform the hydraulic modelling analysis.
- No separate peak hour demand scenarios were created. The demand patterns applied to maximum day demand simulates the peak hour demand condition as the highest point on the diurnal curve.
- For the modelling purpose to meet the increase in water demand in Sooke, the following supply strategy assumed and included in the hydraulic model based on the information provided by the CRD:
  - Existing SRRDF left as backup supply and existing GWTP supply 100% of water to Sooke once the new East-West Connector transmission main (with downstream PCS) installed along Westshore Parkway and Sooke Road, terminating at intersection of Sooke Road and Sooke River Road.
- Fire flow scenarios are assessed on a pressure zone requirement basis only. Individual fire flow scenarios (per linear asset) have not been assessed as individual zoning and growth from construction was not available.
- The future modelling baseline scenarios included currently upsizing the AC watermain along Sooke Road from Philips Road to Church Road to 500 mm, based on the information provided by the CRD.
- Post-2043 MDD Baseline scenario with existing water network in the water system were first developed and evaluated to determine system deficiencies. Assessment of the Post-2043 MDD scenario with recommended growth-related infrastructure improvements were undertaken to identify the future infrastructure requirements.

Subsequently, the existing and interim scenarios (2028, 2033, 2038, 2043) were analyzed to establish the phasing of the proposed works.

- When determining the future infrastructure upgrade requirements, utilization of existing infrastructure (existing pumps and system control valve setting and operation, e.g., SRRDF FCV and PCS) were maximized and adjusted to optimize the system supply and storage filling as well as minimize the hydraulic constraints within the system.
- Acceptable pressures and velocities are taken from CRD Engineering standards and bylaw requirements.

The hydraulic modelling analyses were completed for the JdF water system. Based on the modelling results, the JdF distribution system capacity constraints were identified under post-2043 MDD baseline scenario without the future infrastructure improvements, as shown in **Figure 5-6**. The storage levels for the JdF storage tanks within the updated model are shown in **Appendix E**.

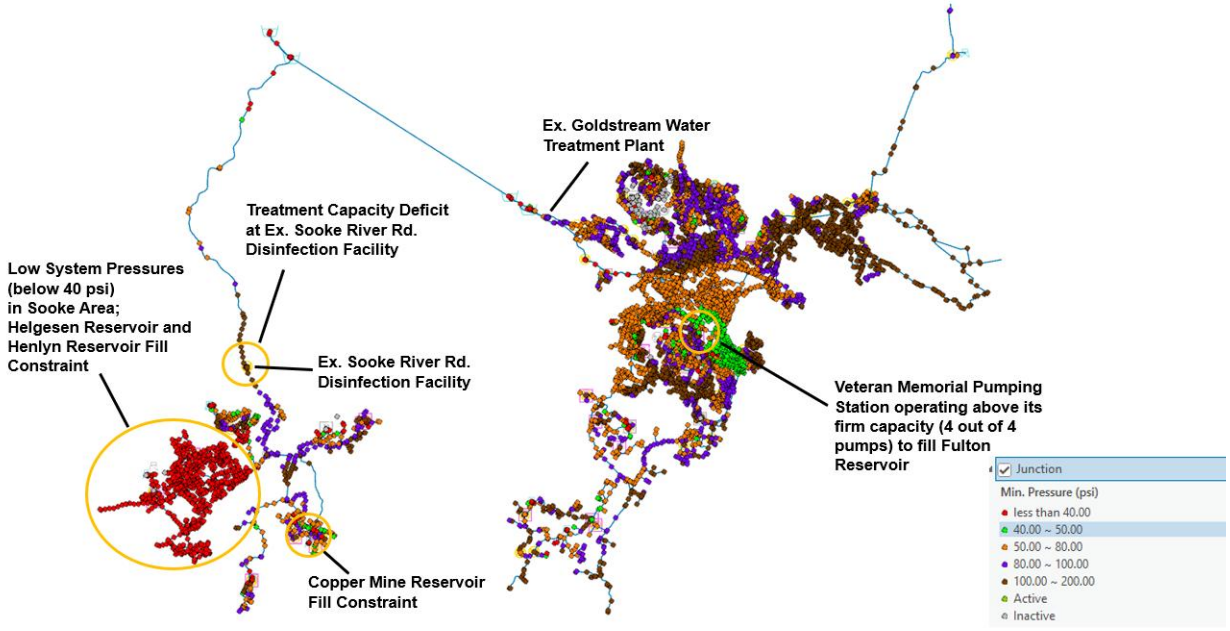


Figure 5-6: System Constraints Under Post-2043 Baseline Scenario

The low system pressure found in the Sooke area generates a project to install a new 500 mm watermain from Sooke River Rd. to Philips Rd. along Sooke Rd.

According to the noted existing JdF system water network capacity assessment results, **Figure 5-7** shows the modelled results with the implementation of the recommended new infrastructure improvements, to address the system deficiencies for projected Post-2043 growth. The model results under Post-2043 MDD with the proposed improvements confirmed that the minimum system pressure was generally maintained above 40 psi throughout the JdFWDS. In addition, storge levels for the JdFWDS storage facilities were generally balancing and cycling properly, as shown in **Appendix E.**

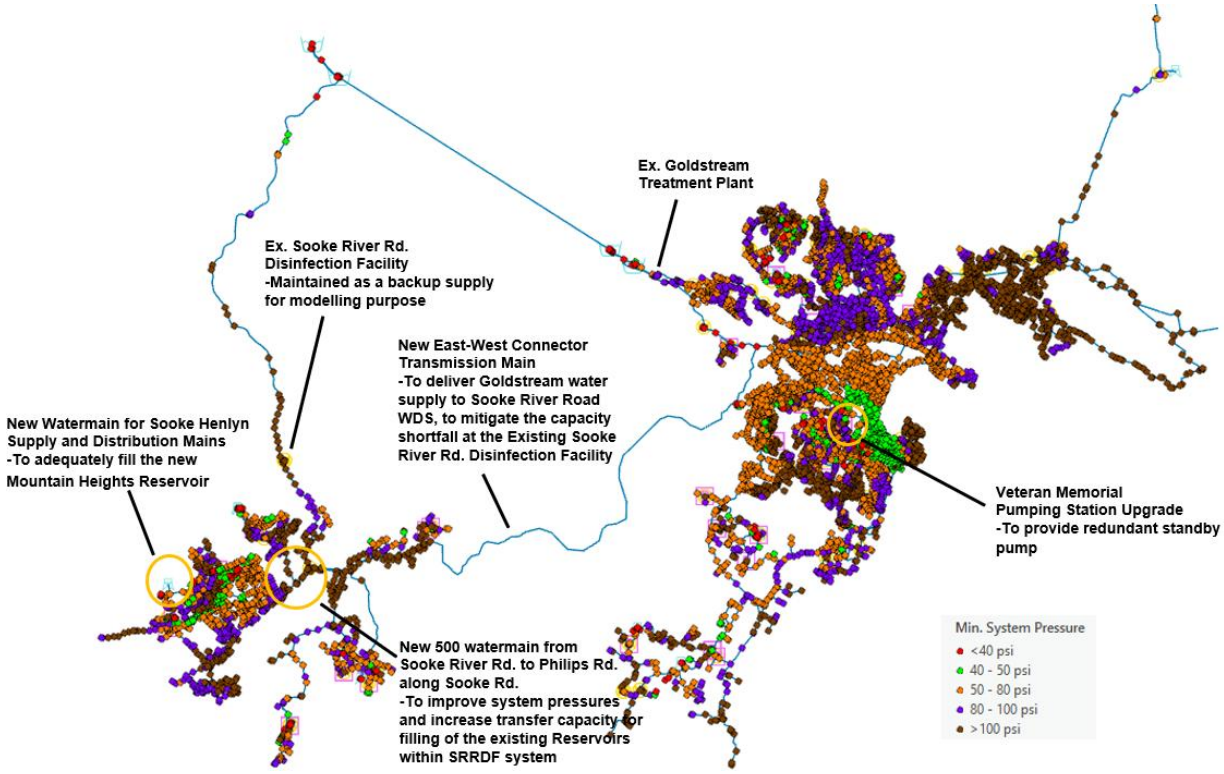


Figure 5-7: System Pressure Under Post-2043 MDD with Improvements

The phasing for the recommended future infrastructure upgrade to address the system issues was evaluated for the existing and each future interim scenario. The list of proposed works on the linear infrastructures and the pumping stations with the implementation timing are summarized in **Table 5-10**. The simulated minimum system pressures for existing and future interim scenarios with proposed improvements were shown in **Appendix E**.

Table 5-10: Summary of Recommendations for Linear and Pumping Projects

Type	Item	Proposed Works	System	Implementation Year
New Assets	N/A	East-West Connector Transmission Main* • 18,281m, 750mm, DI supply main. • Note – this is not costed as the scope is covered under the regional water supply master plan. It is only included as it has been determined that the installation is a requirement as a basis for modelling the future demand in Sooke. • The installation of the connector is recommended to allow sufficient future supply to the Sooke area. This is a high-level finding summarized in **Table 5-11**.	Regional	Long Term
	Growth-L1	New Watermain Improvement for new Mountain Heights Storage Tank. This main installation is a component of the Mountain Heights Storage Tank program and should be viewed in conjunction with the project identified as Growth -V2 in **Table 5-9**. • 441 m of 300 mm Ductile Iron distribution main to connect a new Storage Tank to the JdFWDS. Note - this asset construction appears to have been included in the DCC report as item 16 (new pipe). Material has been assumed based on CRD specifications.	JdF	Short Term
	Growth-V9	Veteran Memorial Pumping Station Upgrade (a new pump with capacity of 50 L/s as a redundant stand-by. The approximate additional equipment list is as follows. • 1x Additional Grundfos CR150-2 (same specification as current) resulting in 5 operational pumps (4 duty, 1 standby).	JdF	Long Term

Type	Item	Proposed Works	System	Implementation Year
		• Additional MCC and power supply cabinets. • Valves, piping and appurtenances. Note - this upgrade appears to have been included in the DCC report as Item 11 and as budgeted capital project 25-03.		
Upgrade	Growth-L2	Watermain Improvement from Sooke River Road to Philips Road • Upgrade asset ID PPE06455 • 534 m of 500 mm Ductile Iron distribution main to accommodate demand on the JdFWDS in downtown Sooke. Note - this asset construction appears to have been included in the DCC report as item 18 and accounts for 10% of the currently identified distribution main length identified for installation. Material has been assumed based on CRD specifications.	JdF	Medium Term

*Note: Regional Water Supply Master Plan Project for information only. Not included in financial forecasts.

It should be noted that the Sooke water supply is insufficient for future demand based on the CRD design value of 545 L/cap/d. As such the East-West Connector is a vital piece of infrastructure that Sooke will rely on in the future and has been used in models to allow further analysis.

5.5 Water Distribution System Capacity Assessment and Modelling Recommendations

The following recommendations (**Table 5-11**) have been concluded during modelling and capacity assessment. It should be noted that the capacity assessment makes no conclusions related to decommissioning, and the relationship with existing DCC projects (both covered in **Section 7**). Capacity required upgrades are discussed in detail based on the assessment findings in **Section 7.1.3**.

Table 5-11: Summary of Recommendations for Modelling and Capacity Assessment

Capability	Gap	Recommendation	Priority
Growth projects*	Network capacity is exceeded in several areas once growth forecasts have been loaded into the demand model.	Refer to **Table 5-10** for a summary of recommendations for linear and pumping projects.	Determined per project by population, growth and strategy.
Capacity Modelling	SRRDF supply cannot meet future demand using forecast population and the CRD design criteria.	The East-West Connector** is a vital piece of infrastructure that Sooke will rely on in the future and has been used in models to allow further analysis. Its installation has been assumed as certain for the future scenarios of Sooke.	High
	Fire flow scenarios are assessed on a pressure zone requirement basis only. Individual fire flow scenarios (per linear asset) have not been assessed as individual zoning and growth construction was not available	Ongoing update of the model should include input from the local municipalities to allow detailed fire flow assessment to take place.	Medium (Continuous Improvement)
	The design consumption rate is noted to be significantly higher than the actual consumption reported in the JdFWDS and results in future flexibility but also future growth projects being determined as required prior to the reality.	An accurate figure should be used to realistically determine the requirements for growth projects and a consistent conservatism factor determined that accommodates the routine fluctuations in demand and localized growth that a pressure zone may experience.	Medium (Continuous Improvement)

*Projects V1, V4, and V5 have been manually removed per the direction of CRD as the cause of these is modelling conservatism and recent works to associated assets may meet requirements pending updated operational data.
**The East-West Connector is a Regional Water Supply Master Plan Project for information only. Not included in financial forecasts.

6. Maintenance, Repair and Replacement Strategies

Effective maintenance, repair, and replacement strategies are essential to sustaining the long-term performance, reliability, and safety of the JdFWDS. This section presents a review of CRD's current maintenance practices, identifies system-wide challenges and capacity constraints, and proposes actionable recommendations to improve service delivery. The analysis begins with current-state business process maps that illustrate how maintenance activities are identified, scheduled, executed, and recorded. This is followed by a detailed examination of existing maintenance, repair, and replacement strategies across linear and non-linear assets, supported by findings from recent condition assessments, staff input, and operational data. Benchmarking insights from the Canadian Infrastructure Benchmarking Initiative (CIBI) are also integrated to assess performance relative to peer utilities and to rationalize the recommended resourcing and budget enhancements. Collectively, the findings and proposed strategies aim to modernize the JdFWDS maintenance framework, optimize lifecycle costs, and align operational capacity with growing system demands and regulatory expectations.

6.1 Current State Business Process Maps

To support the development of maintenance, repair, and replacement strategies for the JdFWDS, the current state business process map was updated to illustrate how CRD currently manages maintenance-related activities. The original process map was initially developed as part of the CRD Water Operations Review – Final Report for Scottish Water[19]. This updated process map captures the key roles, systems, and interactions involved in AM tasks carried out by CRD staff. The workflow is structured around four major process stages:

- **Identifying**: Triggers and inputs for asset maintenance needs, including new asset commissioning, Preventive Maintenance (PM) requirements, and regulatory drivers.
- **Scheduling**: Use of SAP Plant Maintenance (SAP PM) to generate and organize PM tasks based on operational planning windows.
- **Undertaking**: Execution of maintenance activities in the field, including standard procedures, safety protocols, and handling of Corrective Maintenance (CM) needs as they arise.
- **Feedback**: Updating of system records, quality assurance checks, and backlog tracking to ensure closed-loop communication and continuous data integrity.

Figure 6-1 through **Figure 6-4** present these stages in a sequential manner to illustrate the current operational processes followed by CRD's operations team in managing asset maintenance and responding to emergent issues.

[19] CRD Water Operations Review – Final Report, Water Operations Review, Scottish Water International, Capital Regional District, Integrated Water Services, Issue Version 10 (Final version) – 20 July 2018.

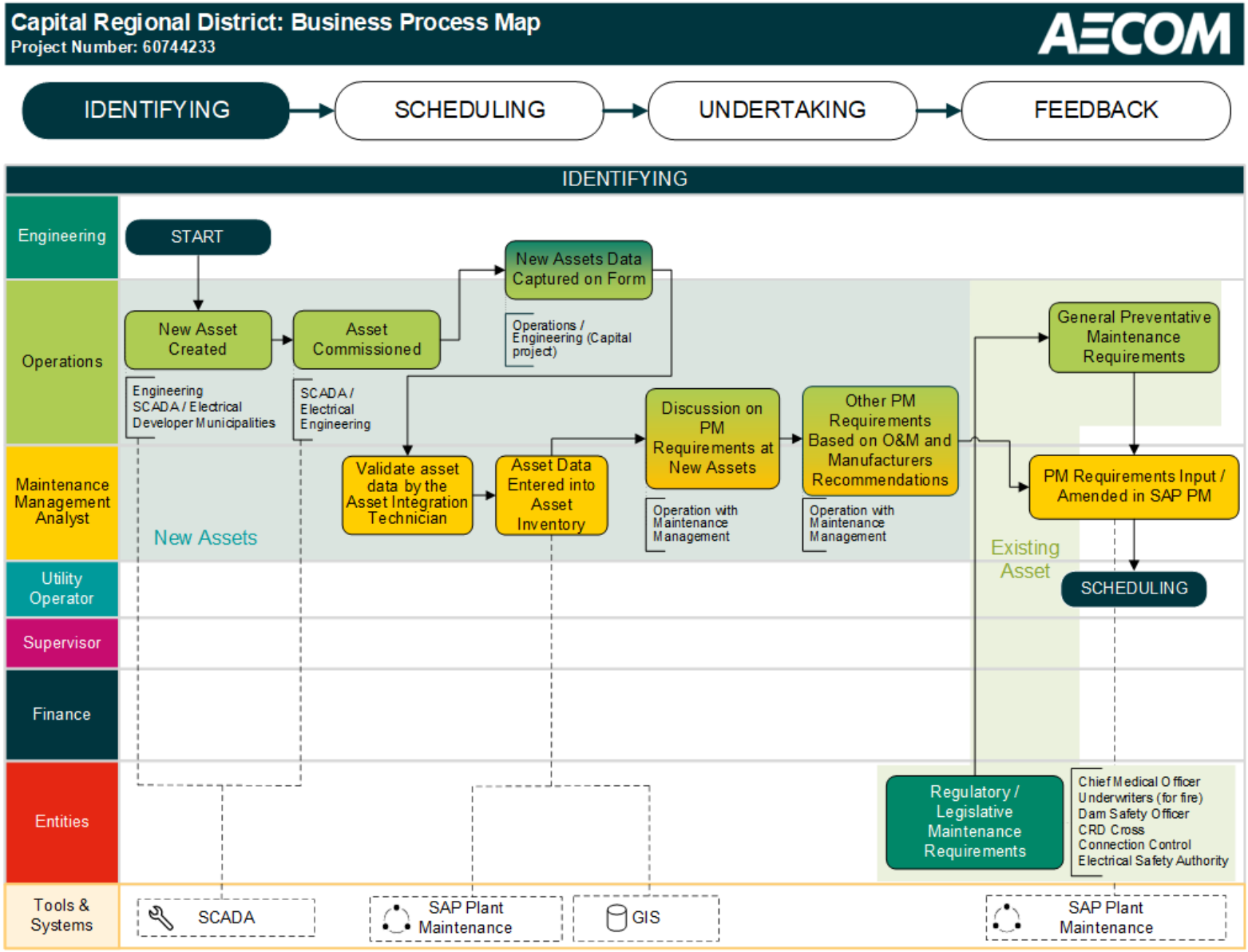


Figure 6-1: CRD Current Business Process Maps – Identifying

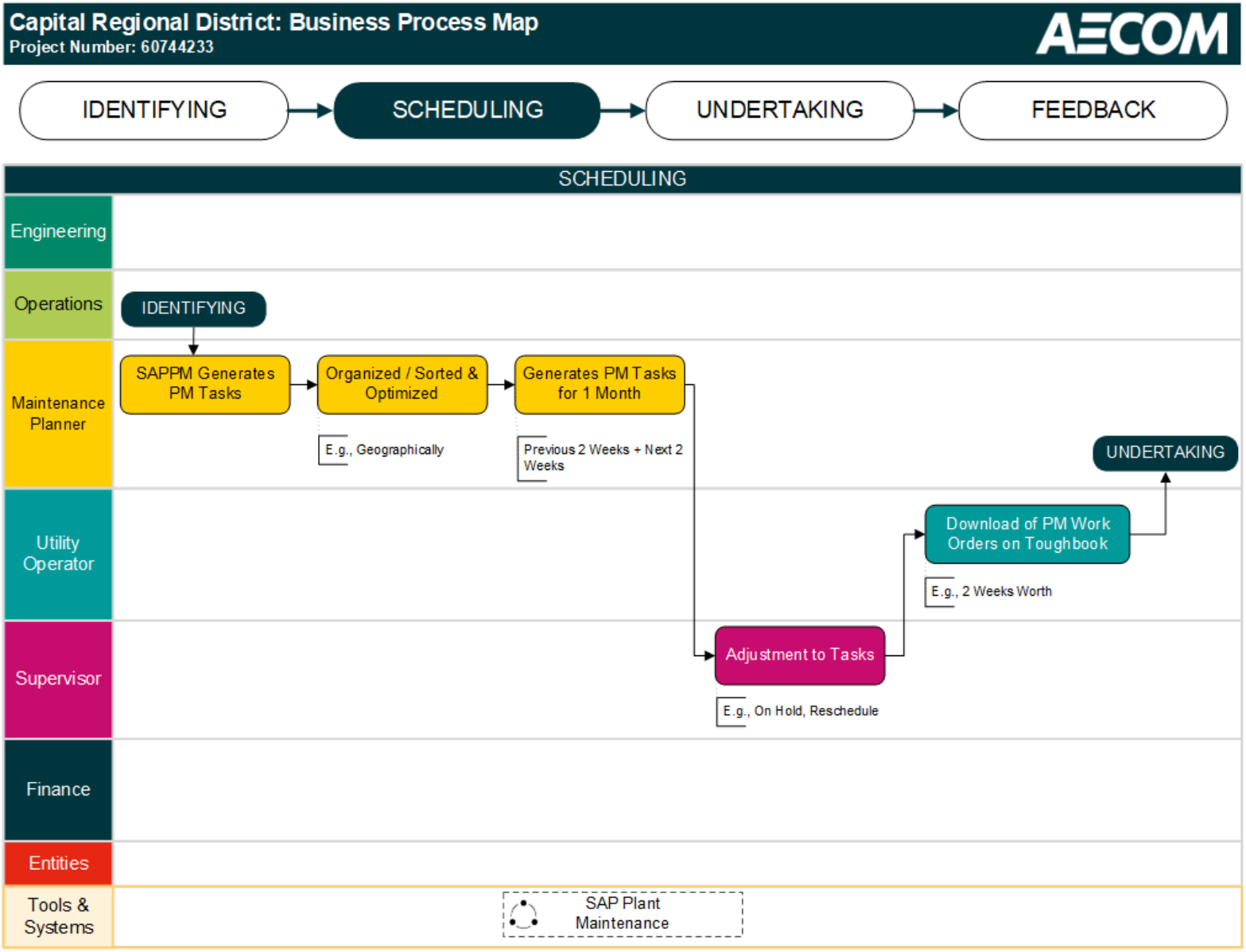


Figure 6-2: CRD Current Business Process Maps – Scheduling

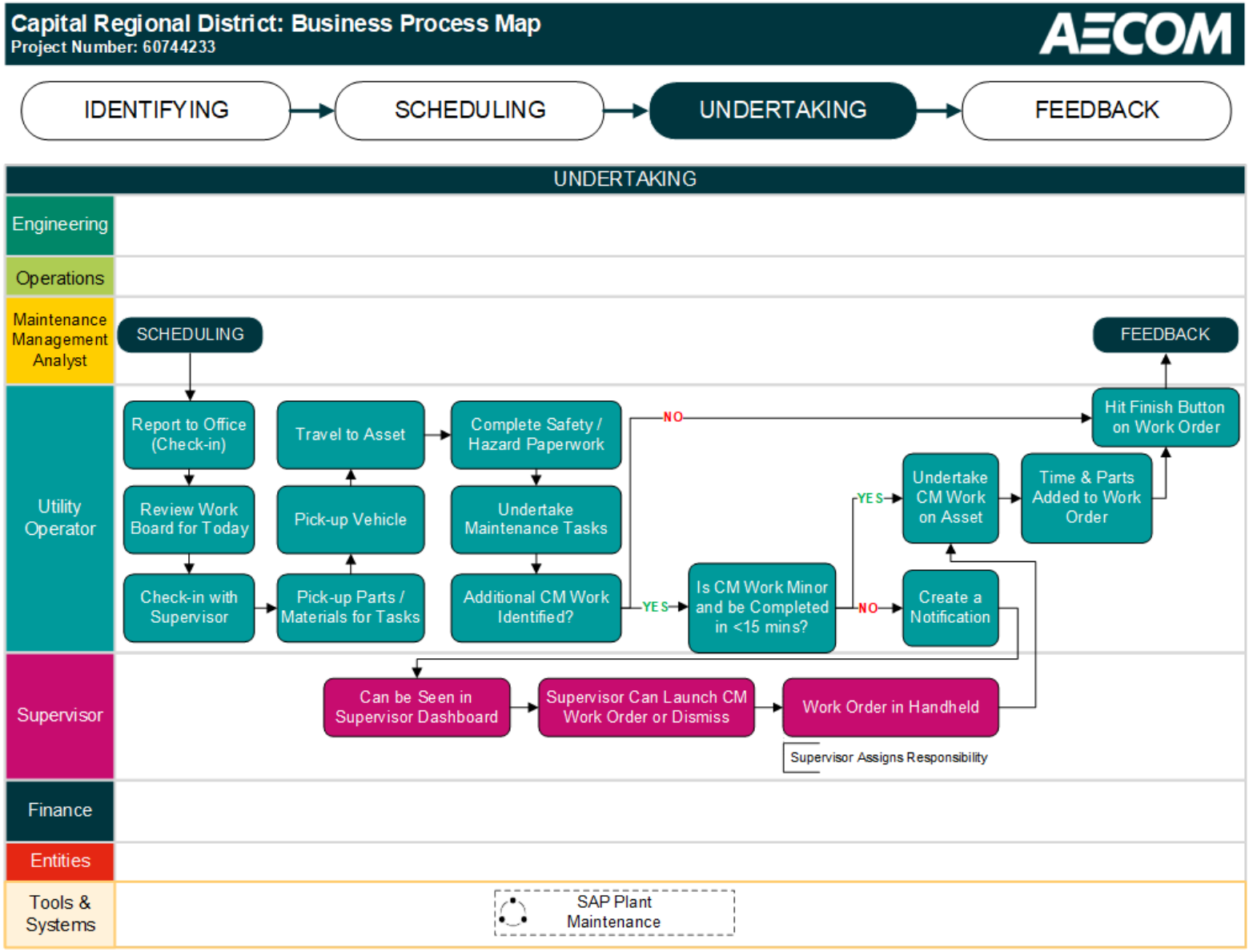


Figure 6-3: CRD Current Business Process Maps – Undertaking

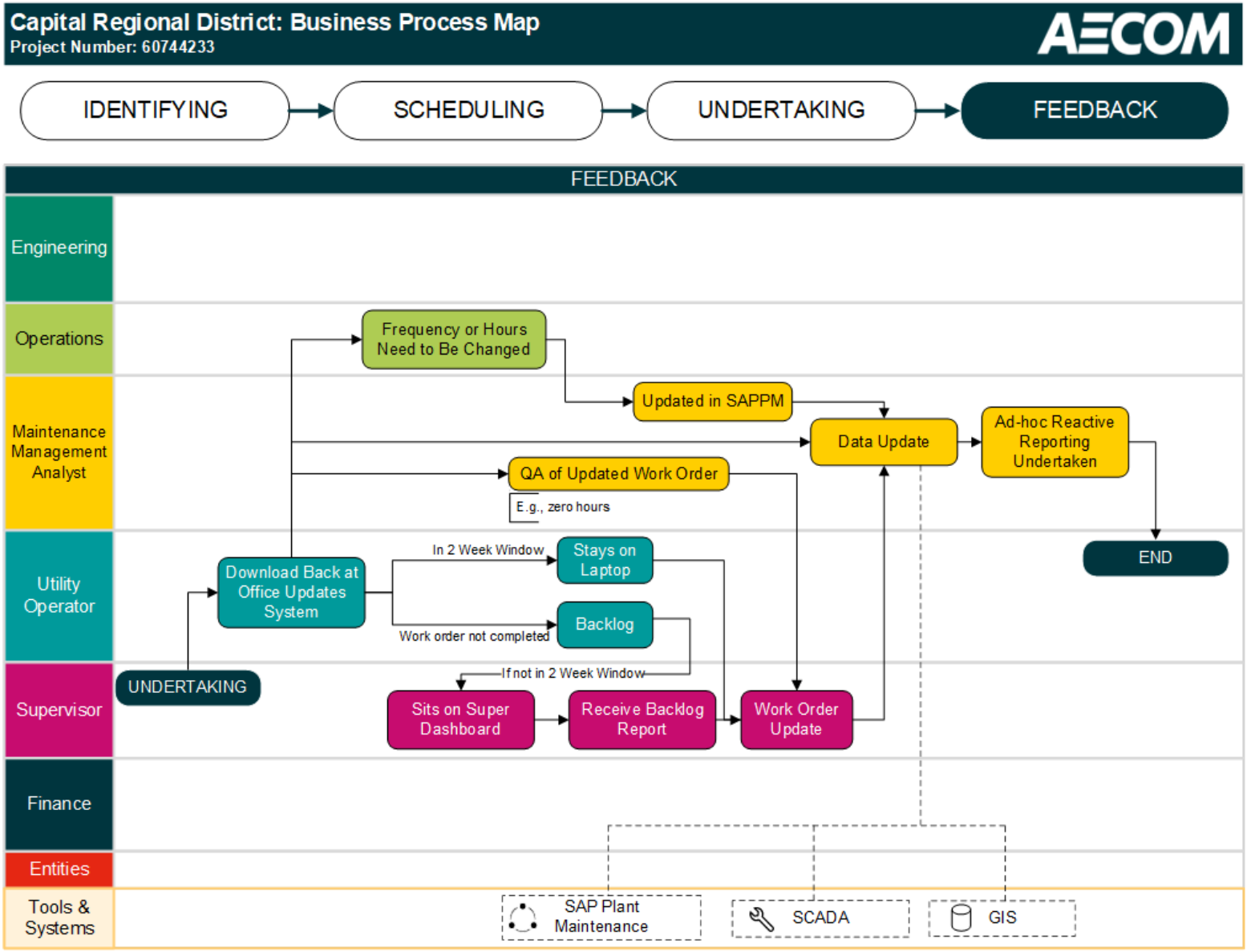


Figure 6-4: CRD Current Business Process Maps – Feedback

Based on the review of the current-state business process maps, several areas have been identified where efficiencies could be gained and documentation practices strengthened. These opportunities relate to the clarity, consistency, and formalization of existing workflows across the asset maintenance lifecycle. **Table 6-1** presents the recommended actions to improve operational efficiency and support the development of standardized maintenance procedures.

Table 6-1: Opportunities for Improved Efficiency and Documentation

Opportunity Area	Current Observations	Recommendations
Formalize PM Intake and Integration Processes	PM requirements for new assets are identified informally through staff discussions, with inconsistent documentation and data entry in SAP PM.	• Introduce a standardized PM intake form at asset commissioning, capturing manufacturer recommendations, regulatory requirements, and operational needs. • Develop a formal Standard Operating Procedure (SOP) to guide the integration of PM tasks into SAP PM. • Establish standardized templates and data entry standards to ensure consistency across asset classes and improve data quality.
Optimize Use of SAP PM for Maintenance Scheduling	Maintenance task scheduling is performed manually despite SAP PM being used to generate PM tasks.	• Leverage SAP PM capabilities or enhancement modules (e.g., geographic grouping and automated scheduling) through the ongoing Enterprise Asset Management (EAM) Project. • Establish and document scheduling protocols to promote repeatability and reduce reliance on staff knowledge.
Clarify CM Decision-Making Criteria	Field decisions on CM tasks (e.g., whether to complete on-site or escalate) are based on informal judgment, with no formal criteria or response thresholds.	• Define thresholds and triggers for minor vs. major CM tasks, including safety and timing criteria. • Create SOPs to guide field staff and supervisors on CM handling, including documentation requirements and escalation pathways.
Strengthen Feedback Loops and Data Quality Assurance	Work order closure and data entry rely on manual QA processes, with inconsistent data validation and limited formal backlog analysis.	• Implement a standardized QA checklist for work order reviews. • Introduce periodic review of backlog and feedback data to identify systemic issues and areas for process improvement.
Develop Cross-Functional SOPs to Support Workflow Integration	Maintenance activities involve multiple departments, but roles, handoffs, and communication protocols are not clearly defined.	• Develop end-to-end SOPs for workflows involving Operations, Engineering, and Finance. • Ensure SOPs are accessible, version-controlled, and used in training and onboarding programs. • Complete future state business process maps to clearly define roles, handoffs, and communication protocols.
Establish Regular Condition Assessment Program for Non-Linear Assets	Non-linear assets do not undergo routine, standardized condition assessments. Inspections are performed on an ad-hoc basis, and results are not consistently documented or integrated into the asset management system. This limits visibility into asset health trends and proactive planning.	• Develop and implement a preventive maintenance and condition assessment plan for non-linear assets. • Create SOPs to ensure condition is assessed consistently across asset types and locations. • Ensure inspection results are organized and stored in a structured format to support data analysis and long-term planning.

6.2 Maintenance, Repair, and Replacement Strategies by Asset System

The JdFWDS is maintained through Preventive Maintenance (PM) and Corrective Maintenance (CM). This section documents the current maintenance approach for each asset system, highlights the challenges identified by CRD, and sets the stage for the recommendations.

Appendix G includes a detailed activity list for each asset type. It shows ongoing maintenance activities and recommended ones, the reason each activity matters (benefit to CRD or associated legislation), how often it should happen.

6.2.1 Current Maintenance Strategy and Challenges for Linear Assets

Linear assets include distribution mains, hydrants, valves and meters. Table 6-2 summarises the current maintenance practices and the key challenges.

Table 6-2: Current Maintenance Strategy and Challenges – Linear Assets

Asset System	Current Maintenance Strategy & Practices	Challenges
Distribution mains	• Annual flushing targets 50% of the network, but coverage may drop to around 40 % due to staffing limits. • 2025 water-quality monitoring plan requires routine bacteriological, chemical and operational samples (approximately $56 k analytical cost, around 2 FTE, two sampling vehicles and portable test kits). • Break repairs are reactive; warranty inspections occur 30 days before hand-over. • Leak detection and pressure tests are reactive; no district-metering or acoustic surveys.	• Reduced flushing may allow sediment build-up and compromise water quality. • Sampling team is fully utilised; any regulatory increase will need extra resources. • Hidden losses remain un-quantified; a pilot leak-audit program needs ≥ 1 Full-Time Equivalents (FTE).
Hydrants & end-of-line flushes	• Annual inspections check operation, caps, lubrication, winter leakage and flow. • Full tear-downs only when defects are found; painting and vegetation removal bundled with inspections or outsourced.	• Only 1.5 FTE cover more than 2,600 hydrants and flush points; 3 FTE are required to meet a 4 - 5-year teardown cycle. • Hydrant failure carries high public safety and political risk.
Valves	• Valve exercising recently restarted but without a dedicated crew. • Air-valves receive virtually no proactive maintenance.	• No dedicated valve FTEs: 4 FTE (2 field, 2 support) are needed for inventory, exercising, painting and replacements. • Many air-valves are buried or inaccessible, posing operational and cross-connection risks.
Meters	• Rolling program replaces ageing residential Automated Meter Reading (AMR) meters. • Large-meter testing and cross-connection follow-up are suspended. • Corrective work (rereads, consumption complaints) consumes significant time.	• Current staffing (around 5 FTE) handles meter reading and replacements; up to 10 FTE are needed to perform testing, support Advanced Metering Infrastructure (AMI) transition and address cross-connection duties. • Based on discussions with the CRD team, it was noted that the current meter technology is being phased out and will no longer be supported by the vendor. As a result, major upgrades or replacements will be required to maintain system functionality and ensure continued operational support.

Note: "Annual Provisional" is a CRD term used for recurring tasks such as valve audits, seasonal flushing, and backflow assembly testing. These activities are included in the resourcing estimates for Preventive Maintenance.

6.2.2 Current Maintenance Strategy and Challenges for Non-Linear Assets

Non-linear assets comprise Pressure Control Stations (PCS), pump stations, Water Storage Tank, rechloramination facilities and bulk-fill stations. Table 6-3 provides the current maintenance strategy and challenges for each asset type.

Table 6-3: Current Maintenance Strategy and Challenges – Non-Linear Assets

Asset System	Current Maintenance Strategy & Practices	Challenges
Pressure Control Stations	• Critical units inspected quarterly; basket-strainer cleaning slips between monthly and three-monthly. • Control-valve tear-downs on a four-year cycle.	• PCS tasks require confined-space entry and two-person crews. • Only 2 FTEs cover PCSs and pump stations; additional 2 FTEs are needed to achieve target frequencies and support commissioning.
Pump Stations	• Routine inspections include generators, greasing and safety checks.	• PS work takes priority; doubling visit frequency depends on additional resources.

Asset System	Current Maintenance Strategy & Practices	Challenges
	• Building-envelope tasks (roof moss, gutters) are reactive.	• Multi-disciplinary inputs (electrical, SCADA) add scheduling complexity.
Water Storage Tanks	• Monthly security/condition checks. • Drain-clean-disinfect every five years; vegetation control and fall-protection tests outsourced.	• 1 FTE supports current tasks. • +0.5 FTE would shorten cleaning to a four-year cycle and improve emergency response.
Other Non-Linear	• For rechloramination stations, JdF Operations provides SCADA monitoring on only.	• No staffing gap for JdF Operations, but coordination is required when distribution work overlaps with chemical-feed outages.

6.2.3 Electrical, Instrumentation & Control (EIC) Activities

EIC technicians underpin automation, monitoring and electrical reliability across non-linear assets. **Table 6-4** compares the required work hours and the actual hours derived from 2024 work order report.

Before reviewing the numbers, note that actual EIC “time-on-tools” productivity at CRD averages ~1,600 hours per FTE per year. The relatively low figure reflects a senior workforce profile, significant vacation entitlements, overtime taken as time-off, and commitments to travel and training.

Table 6-4: Required vs Actual EIC Labour – Non-linear Facilities

Asset Type	No. of Assets	Required Total Work Hours	Required Work Hours / Asset	Actual Total Work Hours	Actual Work Hours / Asset
Pressure Control Station	29	383	13	230	8
Pump Station	35	1,441	41	929	27
Water-Storage Tank	14	553	40	412	29
Bulk-Water Station	4	42	11	21	5
Meter Chamber	1	20	4	0	0
Rechloramination Station	1	47	47	16	16
Total / Average	**88**	**2,486**	**-**	**1,608**	**-**

With the analyses of the work order report, some observations could be made:

- Overall labour gap (around 35 %): Achieving the desired PM program requires 2,486 hours/year. Actual 2024 delivery was 1,608 hours.
- Pump-station: Pump stations consume 58 % of desired EIC hours. Only two-thirds of the target is achieved (27 hours vs 41 hours), increasing the risk of nuisance alarms, VFD trips and standby-power failures.
- Control-system drift risk: Reduced PM on pressure-control stations and tank-level transducers may lead to set-point drift, unexpected pressure fluctuations and higher non-revenue water.
- Typical EIC PM tasks include SCADA point-to-point checks, flow-meter verification, analogue-signal calibration, surge-protector replacement, standby-power change-over tests and thermal imaging of motor-control centres. The EIC activity list in **Appendix G** expands on every PM and CM task (e.g., VFD parameter capture, chlorine analyser calibration) and associated frequencies.

6.2.4 System-Wide Observations

The observations below apply to every part of the water distribution system – pipes, pumps, tanks and controls alike.

- Staffing keeps falling behind demand. The network grows longer and more complex each year (refer to **Figure 6-9**), yet crew numbers have stayed almost the same. Operators spend more time reacting to emergencies and less on scheduled tasks, creating a snowball effect of backlog and fatigue.
- Information does not flow smoothly. After a job is finished, the details do not always make it into the GIS map or cost codes. Missing data make it harder to plan future work, defend budgets, and prove compliance during audits.
- Longer delivery times for spare parts. Electronics, pumps and specialty valves that once arrived in weeks can now take months. CRD stocks more spares in old facilities, tying up money and adding security and insurance concerns.
- Supporting services are also experiencing increased pressure. Each new field technician also needs a truck, fuel card, safety gear, IT licence and payroll support. These hidden costs must be included in any staffing plan to avoid new bottlenecks.
- Regulations keep tightening. Provincial and federal drinking water regulations continue to evolve, with increasingly prescriptive requirements around sampling frequency, analytical parameters, and reporting timelines. CRD must adhere to standards for water quality monitoring and documentation. Non-compliance can result in formal enforcement actions, reputational damage, and erosion of public trust. As regulatory expectations grow, so does the administrative and field effort required to maintain full compliance.

To place the recommended strategies in context, **Table 6-5** summarises the average annual O&M spending over the last five years. Costs have been grouped by asset class and normalised on a “per-asset-per-year” basis to illustrate where the current budget is most heavily committed.

Table 6-5: Historical O&M Expenditure

Asset Category	Asset	# of Assets	Unit	5-Year Annual Average O&M Total	5-Year Annual Average O&M per Asset / Year
Non-linear	Pump Station	37	Ea.	$878,000	$24,000
Non-linear	Pressure Control Station	57	Ea.	$350,000	$6,100
Non-linear	Water Storage Tank	14	Ea.	$378,000	$27,000
Non-linear	Other Non-Linear	10	Ea.	-	-
Linear	Distribution Main	548	km	$1,275,000	$2,300
Linear	Hydrant	2,632	Ea.	$412,000	$160
Linear	Meter	26,792	Ea.	$909,000	$30
Linear	Valve	11,344	Ea.	-	-
	TOTAL			**$4,202,000**	

6.2.5 Canadian Infrastructure Benchmarking Observations

As one of the participants in the Canadian Infrastructure Benchmarking Initiative (CIBI), CRD was benchmarked against a range of peer utilities across Canada in areas such as operations spending, staffing efficiency, maintenance practices, and data management per their water distribution system. The benchmarking results provide a high-level assessment of how CRD compares with its peers and reveal both existing strengths and opportunities for improvement.

The benchmarking results highlight several strengths in CRD’s current program that form a solid foundation for the recommended expansions:

- Reliable day-to-day staffing (**Figure 6-5**): Field crews record the lowest percentages of non-productive hours (vacation, sick leave, training) in the benchmarking. The high availability suggests good shift planning and strong morale, meaning additional FTEs are likely to be absorbed quickly into productive work rather than lost to admin gaps.

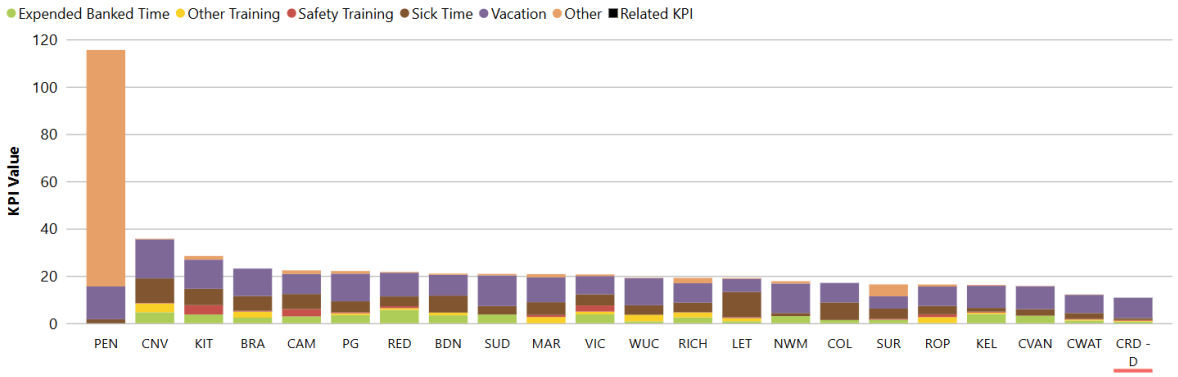


Figure 6-5: Unavailable O&M Hours / Total Paid O&M Hours (CIBI)

- Low cost of main-break repairs (**Figure 6-6**): CRD ranks the best-performing municipality for break cost to the total O&M cost, indicating either a healthy network or highly efficient repair practices. In CRD's case, this strong result is attributed to the relatively young age of the system, with a weighted average pipe age of 26 years out of an expected 78-year ESL. This implies that a majority of the network is still within its first third of ESL, where failure rates are typically low. While this creates current capacity for PM crews to focus on planned activities rather than emergency response, it also highlights the importance of ramping up PM now, before asset aging accelerates and reactive demands begin to rise over the coming decades. Maintaining this low reactive burden will free up the new PM crews to focus on planned work instead of chasing emergencies.

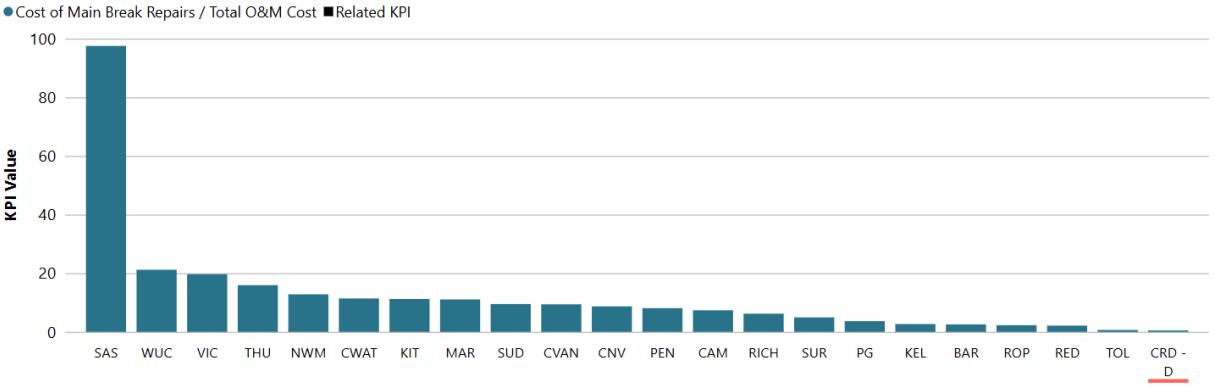


Figure 6-6: Cost of Main Break Repairs / Total O&M Cost (CIBI)

Even with these strengths, the data point to some areas where CRD can gain the most value from the proposed changes:

- Cut back overtime through planned staffing (**Figure 6-7**): At around $15 k per field FTE, overtime is absorbing funds that could otherwise pay for permanent staff. Filling the FTE gap is suggested to allow overtime to fall toward the peer-median band of $6-8 k per FTE.

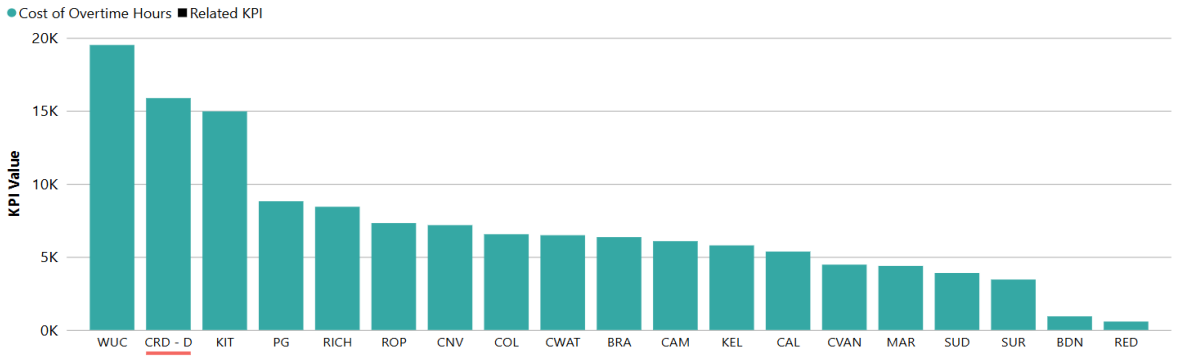


Figure 6-7: Cost of Overtime Hours (CIBI)

- Boost PM intensity (**Figure 6-8**): Corrective tasks make up roughly 44% of CRD's total maintenance hours. This moderate ratio confirms that the existing crew prioritises planned work whenever resources permit yet still spends nearly half its time responding to breakdowns, leaks and urgent callouts. Closing the staffing gaps for valve exercising, hydrant teardowns and proactive leak detection, should push the corrective share downwards, reducing overtime costs and freeing capacity for data-driven preventive program.

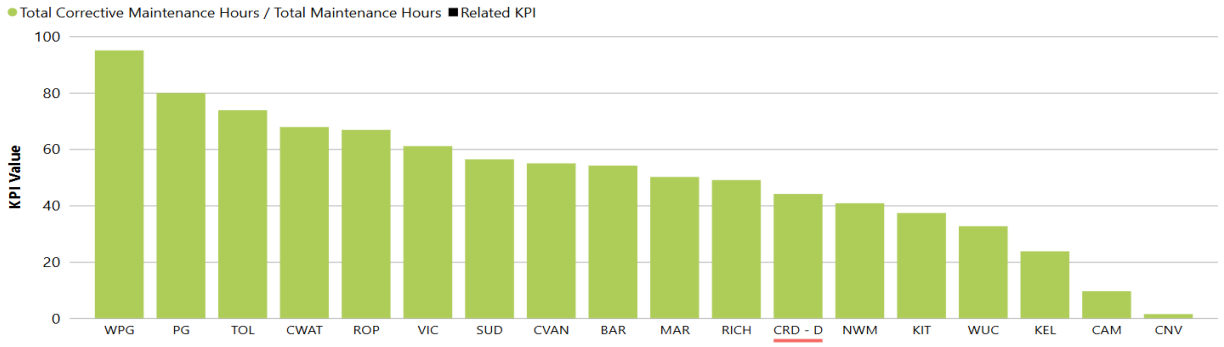


Figure 6-8: Total Corrective Maintenance Hours / Total Maintenance Hours (CIBI)

6.3 Maintenance, Repair, and Replacement Plan

To convert the maintenance challenges into a forward-looking resourcing plan and cost estimate, **Table 6-6** brings together all of the cost-building blocks with the basis of estimate described in the following:

- **Full-Time Equivalents (FTE)**: For process technicians and operators, one FTE equals 2,080 hours per year (40 hours/week) as per standard. For EIC staff, CRD's historical "time-on-tools" productivity averages 1,600 hours per FTE per year because of senior-staff vacations, banked overtime, training and travel requirements.
- **Labor rate:** An average composite rate of $45 per hour has been applied to all process and EIC hours.
- **Strategic Alliance Partners costs:** Strategic Alliance Partners currently support a variety of contracted field support and maintenance tasks that do not require a water ticket. These include landscaping and similar non-ticketed duties, as well as labour-intensive support work associated with valve and hydrant maintenance, such as removing valve box lids, vacuuming debris from sleeves, painting lids, and cutting grass around hydrants. A meaningful share of the current field-based support workload is already being delivered through the Strategic Alliance Partners, allowing CRD's certified operators to remain focused on utility-based work requiring the appropriate qualifications. Annual figures for these contractor-delivered services are shown in the Strategic Alliance Partners column.
- **Overhead allowance:** A blanket multiplier of 40% is added to capture supervisory time, tooling, safety training, administration, etc. that scale with additional labour proposed.

- **Total desired O&M cost:** The final column sums the historical five-year average O&M spend with the additional desired labor, Strategic Alliance Partners, and overhead allowances to provide a realistic annual budget target once the programme is fully staffed.

Table 6-6 shows, side-by-side, the current and desired staffing levels for both process crews and specialist EIC technicians, then monetises the additional hours using the blended labour rate and overhead factor. External contractor allowances are listed separately so that CRD can decide in future years whether to keep or retender those service packages. **Table 6-6** illustrates how each resource gap converts into dollars in the overall O&M envelope.

The staffing figures presented in **Table 6-6** should be interpreted as a gross service capacity requirement derived from the recommended maintenance, inspection, and replacement activities, rather than as a direct one-for-one increase in permanent internal CRD staffing. Part of this service need is already being addressed through the current Strategic Alliance Partners model, although the exact FTE-equivalent contribution is difficult to isolate because contractor expenditures are primarily tracked by dollars and may include both operating and capital-related work. Accordingly, the table is intended to show the scale of additional capacity required to achieve the desired maintenance program, which may be delivered through a combination of internal CRD staff and Strategic Alliance Partners support.

The recommended resourcing levels are grounded in industry standards such as the American Water Works Association (AWWA) and the National Fire Protection Association (NFPA), which support more frequent inspections and PM cycles than are currently being completed at CRD in some areas. In close collaboration with Operations and Maintenance staff, these desired resource levels were derived from the recommended activity frequencies and then translated into estimated labour hours and service capacity requirements.

This analysis identified a gross requirement of approximately **20 additional FTEs across process and EIC functions** before considering the extent to which some of this work is already being delivered through Strategic Alliance Partners. The work now embedded in **Strategic Alliance Partners** includes activities such as landscaping, concrete cutting, and other non-water-ticketed tasks, to the extent of approximately **10 FTE-equivalents on a full-time basis**. On that basis, the **remaining internal requirement of approximately 10 FTEs** could be implemented through a phased approach of approximately **2 FTEs per year over the next five years**. For EIC-related functions, it is an area where additional dedicated support is likely needed, either through expanded in-house capacity or a more deliberately defined Strategic Alliance Partners service model.

To further contextualize the service delivery model, the **gross future-state** requirement of approximately **35.5 FTE equivalents** can be understood as the combination of CRD's existing in-house workforce of approximately 15.5 FTEs and the identified additional requirement of approximately 20 FTE-equivalents. On that basis, **contractor-delivered support** would represent roughly **one-quarter of the total future-state O&M (10/35.5 FTEs)**. This number indicates the O&M work contracted out is generally on par with the CIBI Benchmarking group range (13%-50%).

Desired O&M costs were calculated based on the historical five-year annual average O&M, plus the cost of additional labour capacity, plus Strategic Alliance Partners costs, plus additional CRD overhead (vehicles, equipment, indirect); Additional Overhead Cost ($/year) is calculated by multiplying the Desired Additional Labour cost by 1.4 to account for indirect costs. The estimate was developed in collaboration with CRD operations staff through multiple meetings and document reviews, resulting in a practical resourcing framework.

For long-term planning, a simple starting point is to express the desired staffing level as FTEs per 100 km of system length (e.g., 36 FTE ÷ 548 km ≈ 6.6 FTE/100 km) for the water distribution system. This figure falls within the CIBI benchmarking range for water distribution systems of 3.6 to 7.2 FTE/100 km, which is available through the CIBI Power BI dashboard. This ratio provides a defensible baseline that can be scaled with projected system growth. Over time, it can be refined through continued benchmarking and adjusted for facility additions, regulatory changes, and desired service levels, then applied in future AMP updates to forecast staffing needs alongside asset expansion.

Table 6-6: Current and Desired Annual Staffing and O&M Budget

Asset Category	Asset	# of Assets	Unit	Current		Desired						Note
				Current FTE (Process)	Current FTE (EIC)	Desired FTE (Process)	Desired FTE (EIC)	Desired Total Labour $ / Year	Additional Strategic Alliance Partner cost $ / Year	Additional Overhead Cost $ / Year	Total O&M Cost / Year (Desired)	O&M Cost per Asset / Year (Desired)	
Linear	Distribution Main	548	km	1.75	-	3.5	-	$328,000	$60,000	$229,000	$1,728,000	$3,200	• Double the flushing crew. • Use the Strategic Alliance Partner for traffic control, excavation support and temporary surface restoration during flushing and leak-detection activities.
	Hydrant	2,632	Ea.	2	-	4	-	$374,000	$200,000	$262,000	$1,061,280	$400	• Current staff perform annual visual inspections and reactive replacements. • Add FTEs to meet American Water Works Association (AWWA) and National Fire Protection Association (NFPA) recommended inspection and teardown cycles. • Engage the Strategic Alliance Partner for excavation, backfilling, surface restoration and traffic control.
	Meter	26,792	Ea.	5	-	10	-	$936,000	$1,000,000	$655,000	$3,032,200	$110	• Increase FTEs to accelerate technological transition, resume large-meter testing and strengthen cross-connection control. • Contract the Strategic Alliance Partner for meter-pit excavation, plumbing modifications and surface restoration.
	Valve	11,344	Ea.	-	-	4	-	$374,000	$400,000	$524,000	$1,299,560	$110	• Establish a dedicated valve crew to implement a four-year exercising and air-valve servicing programme. • Use the Strategic Alliance Partner for asphalt saw-cutting, excavation, reinstatement and traffic control during valve replacements.
Non-linear	Pump Station	37	Ea.	2	0.8	4	1.2	$442,000	$50,000	$295,000	$1,433,000	$39,000	• Engage the Strategic Alliance Partner to cover O&M at new pump stations and expand building-related maintenance. • Increase inspection frequency for surge tanks and other confined-space components.
	Pressure Control Station	57	Ea.	2	0.4	4	0.6	$408,000	-	$280,000	$830,000	$15,000	• Add process FTEs to achieve quarterly site visits and eliminate deferred maintenance.
	Water Storage Tank	14	Ea.	1	0.3	3.5	0.4	$353,000	-	$337,000	$956,000	$68,000	• Allocate resources for structural inspections, safety-device testing, and vegetation management.
	Other Non-Linear	10	Ea.	0.1	0.2	0.2	0.5	$47,000	-	$39,000	$67,000	$6,700	• Current practice: four visits per bulk-water station per year (two staff for two days, addressing cleaning and graffiti). • Add FTEs for more frequent inspections and for commissioning new bulk-water stations coming online.
	TOTAL			**13.9**	**1.6**	**33.2**	**2.6**	**$3,262,000**			**$10,406,000**		
					Number of New FTE	**19+**	**1**	**= 20 New FTE**					

Note: The number of FTE's does not take Strategic Alliance Partners into account.

Figure 6-9 illustrates the sustained growth of the JDF distribution system since 2013 across all major asset classes and provides an illustrative extension of that trend beyond 2025. The historical record shows that growth has occurred in watermain length, hydrants, valves, service laterals, and metered connections that require ongoing inspection, upkeep, and maintenance support. The post-2025 projected extension is included to show that, if recent trends continue, maintenance demand will continue to rise as the system expands.

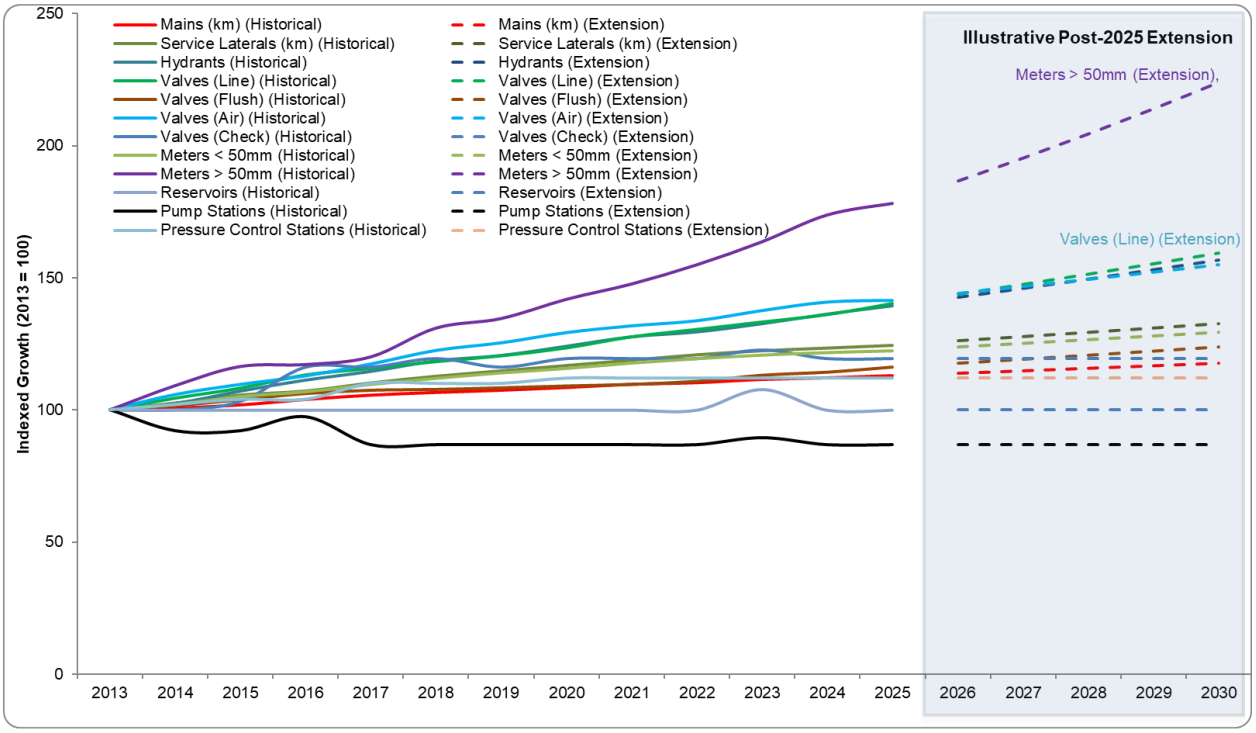


Figure 6-9: Growth in Region's System Assets

Figure 6-10 shows O&M expenditure and desired budget benchmarking comparison (per Total Replacement Cost). When O&M cost is normalized as a percentage of total asset replacement value, a common indicator of long-term reinvestment adequacy, CRD's historical expenditure sits at 0.3%, aligned with the CIBI 25th percentile. The proposed O&M budget raises this ratio to 0.5%, placing CRD slightly above the median. This metric demonstrates that, when considering the scale and value of the asset base, the proposed investment is reasonable and aligned with prudent AM practice. The increase will enable CRD to proactively manage system risks, improve reliability, and enhance service delivery, all while maintaining spending levels that are consistent with those of well-performing peer utilities. It is noted that CRD's network characteristics differ materially from many of its peers: the system is geographically dispersed across a wide service area, with some facilities located in remote or difficult-to-access zones. As a result, travel time and logistical effort per work order are significantly higher, directly contributing to elevated labour, equipment, and contractor costs. This situational factor, when combined with the current under-resourcing and deferred maintenance burden, justifies the higher O&M cost in the desired O&M budget.

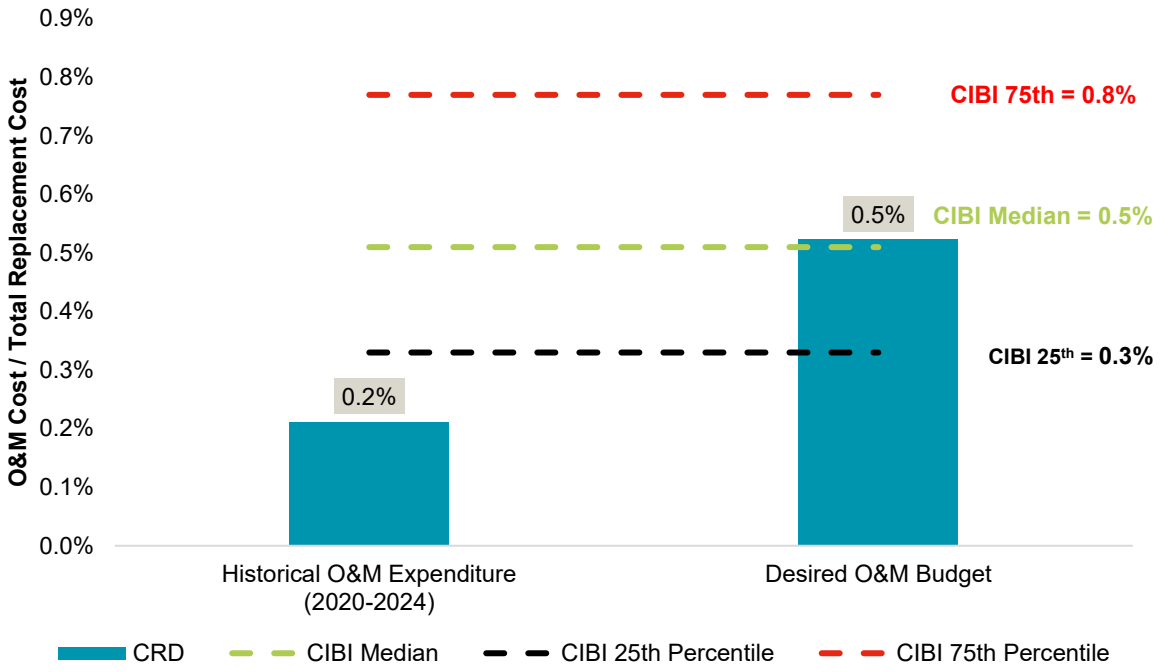


Figure 6-10: O&M Expenditure and Desired Budget Benchmarking Comparison (per Total Replacement Cost)

6.4 Gaps & Recommendations

As part of the maintenance and lifecycle management review, a range of process-level and system-wide gaps were identified that may limit CRD's ability to sustain the long-term performance of the JdFWDS. These include staffing shortfalls and high overtime costs, inconsistent PM intake and scheduling, gaps in data capture and QA, and reliance on informal decision-making and cross-departmental workflows. Broader challenges such as supply chain delays, growing regulatory requirements, and aging legacy programs (e.g., AMI migration, valve cycles, leak detection) further compound these pressures.

At the same time, benchmarking through the CIBI confirmed important strengths in CRD's operations, including low non-productive hours, strong crew morale, and low main break repair costs attributable to the relatively young system age. Addressing the identified gaps—while building on these strengths—will enable CRD to modernize its maintenance framework, strengthen preventive practices, optimize lifecycle costs, and better position the JdFWDS to meet future regulatory and service delivery expectations. **Table 6-7** summarizes key gaps along with recommended actions to support future improvements.

Table 6-7: Gaps and Recommendations Summary

Opportunity Area	Current Observations / Gaps	Proposed Recommendations	Priority Level
Staffing & Workforce Capacity	• Crew numbers have remained static despite system growth. Operators spend more time reacting to emergencies and less on scheduled tasks, creating backlog, fatigue, and overtime costs. • Supporting services (vehicles, IT licences, HR, safety) are also under pressure.	• Add 19 process FTEs and 1 EIC FTE (**Table 6-6**). Of this gross requirement, approximately 10 FTE-equivalents are assumed to be addressed through Strategic Alliance Partnership support, with the remaining approximately 10 internal FTEs to be phased at ~2 FTE per year over 5 years*. • Include trucks, IT, and training costs in future staffing plans. • Reduce overtime ($6–8k/FTE CIBI peer median).	Medium to High

Opportunity Area	Current Observations / Gaps	Proposed Recommendations	Priority Level
Preventive vs. Corrective Balance	• PM requirements for new assets are identified informally through staff discussions, with inconsistent documentation and data entry in SAP PM. • Maintenance task scheduling is performed manually despite SAP PM being used to generate PM tasks. • Corrective work still ~44% of hours, diverting crews from preventive programs.	• Introduce a standardized PM intake form at asset commissioning, capturing manufacturer recommendations, regulatory requirements, and operational needs. • Develop a formal SOP to guide the integration of PM tasks into SAP PM. • Leverage SAP PM capabilities for geographic grouping and automated scheduling; establish documented protocols to reduce reliance on staff knowledge. • Target 30/70 corrective–preventive split by expanding flushing, valve exercising, hydrant inspections, and leak detection.	Medium
Information Management & Data Quality	• Work details are not consistently entered into GIS or cost codes. • Work order closure and data entry rely on manual QA processes, with inconsistent validation and limited backlog analysis. • Missing data hampers planning, budget defense, and compliance audits.	• Implement a standardized QA checklist for work orders. • Integrate maintenance records into GIS/CMMS in near-real time. • Conduct periodic backlog and feedback reviews to identify systemic issues and improve process consistency.	High
Decision-Making & Workflow Integration	• Field decisions on CM tasks (e.g., whether to complete on-site or escalate) are based on informal judgment, with no clear thresholds. • Maintenance activities involve multiple departments, but roles, handoffs, and communication protocols are not clearly defined.	• Define thresholds and triggers for minor vs. major CM tasks, including safety and timing criteria. • Create SOPs to guide field staff and supervisors on CM handling, including escalation and documentation requirements. • Develop end-to-end SOPs for workflows involving Operations, Engineering, and Finance. • Ensure SOPs are version-controlled and embedded in training/onboarding.	Medium to High
Supply Chain & Spare Parts	• Specialty electronics, pumps, and valves that once arrived in weeks now take months. • CRD stocks more spares in older facilities, tying up money and creating security/insurance concerns.	• Establish a centralized critical-spares strategy and long-term supplier agreements. • Modernize storage facilities and strengthen inventory controls. • Use Strategic Alliance Partner contractors for excavation, traffic control, and specialised O&M where parts delays are common.	Medium
Regulatory Compliance	• Provincial and federal regulations continue to tighten, with more prescriptive sampling, analytical, and reporting requirements. • Non-compliance risks penalties, reputational damage, and loss of public trust.	• Prepare to increase monitoring and sampling capacity to align with future regulatory requirements when confirmed. • Prepare to enhance reporting and monitoring processes to ensure timely compliance with evolving regulatory requirements if requirements are updated.	High
Advancing Preventive Programs & System Modernization	• Legacy programs (AMI migration, valve cycles, proactive leak detection) face long backlogs and limited resources.	• Allocate one new FTE for district metering and acoustic leak audits and consider a pilot project to support financial justifcaiton for enhanced leak detection. • Institute a four-year valve/air-valve cycle supported by Strategic Alliance Partner services. • Accelerate AMR-to-AMI migration by doubling the meter team and supplementing with Strategic Alliance Partner resources.	Medium to High

* *The recommended 9 process FTEs and 1 EIC FTE should be phased in gradually at a pace of approximately 2 FTEs per year over a 5 year horizon, with initial emphasis on preventive activities (valves, hydrants, leak detection) and progressive backlog reduction (meters, AMR-to-AMI).*

7. Capital Projects Identification and Financial Plan

Establishing a financial plan is essential to the successful execution of the AMP. A robust financial strategy not only supports effective implementation, but also strengthens the alignment between asset management, financial planning, and budgeting. It enables the JdFWDS to leverage available infrastructure funding tools and ensures long-term sustainability in service delivery. This section is structured as follows:

Section 7.1 reviews the JdFWDS current financial plans. Specifically, **Sections 7.1.1** provides an overview of historical capital expenditures from 2020–2024, together with capital budget forecast from 2025–2029. These figures are based on existing capital plans and financial projections developed by CRD Financial Services. They provide a basis for assessing future funding needs, as the difference between these figures and the reinvestment requirements identified through the lifecycle model (presented in the subsequent sections) highlights the potential funding deficit. **Section 7.1.2** summarizes historical and future O&M expenditures based on the JdFWDS input. However, as noted in **Section 6.3**, AECOM has recommended a desired O&M budget to account for additional labor, Strategic Alliance Partner, and overhead allowances. Therefore, the recommended O&M budget will be used to assess the JdFWDS full funding need (**Section 7.7**). **Section 7.1.3** presents the growth-related capital plan for the JdFWDS for the period 2025–2029.

Sections 7.2 and **7.3** summarize the fundamental logic of the lifecycle model, which was developed to forecast and prioritize the asset reinvestment needs of JdFWDS over 10- and 20-year planning horizons. Financial projections are examined under multiple funding scenarios to illustrate the implications of different investment strategies on asset condition and service levels. The outcomes of the model are presented in **Sections 7.4** and **7.5**, which address capital needs and full funding needs, respectively. **Section 7.7** highlights the capital funding deficit. In addition, a reserve fund strategy is proposed in **Section 7.8** to support sustainable financial management. Together, the analyses and recommendations in this section establish a foundation for informed decision-making, enabling the JdFWDS to align available resources with infrastructure priorities, maintain service reliability, and meet long-term financial objectives.

7.1 Historical Capital and O&M Expenditures and Future Forecast

This section presents a summary of historical capital and O&M expenditures from 2020 to 2024 and outlines the projected capital budgets from 2025 to 2029. These investments reflect CRD's ongoing commitment to replacing aging infrastructure and renewing key system components, including linear assets such as mains, valves, hydrants, and meters, as well as non-linear assets such as pump stations, pressure control stations, and Water Storage Tank facilities. The figures provided highlight both past spending patterns and future funding priorities.

7.1.1 Capital Reinvestment – Historical Expenditure and Future Forecast

Historical capital reinvestments for JdFWDS have primarily targeted the upkeep and renewal of both linear and non-linear assets to ensure reliable service delivery and system performance. These investments have supported activities such as the replacement of aging watermains, valves, hydrants, and metering infrastructure, along with the renewal of pump stations, pressure control stations, and Water Storage Tank facilities. **Table 7-1** and **Table 7-2** present the actual and forecasted capital reinvestment expenditures. **Table 7-1** covers historical expenditures from 2020–2024, while **Table 7-2** outlines the budget forecast for 2025–2029.These figures were provided by CRD Financial Services, based on actual expenditures and capital plans.

Table 7-1: Historical Capital Expenditures (2020 – 2024)

Asset Category	Asset	2020	2021	2022	2023	2024	2020-2024 5 Year Annual Average
Linear	Hydrants	$168,000	$212,000	$123,000	$183,000	$224,000	$182,000
	Valves	-	$146,000	$120,000	$144,000	$204,000	$123,000
	Mains	$3,758,000	$2,271,000	$4,966,000	$4,746,000	$5,962,000	$4,341,000
	Meter/Service	$1,619,000	$2,031,000	$2,093,000	$2,930,000	$2,868,000	$2,308,000
	Other Linear	$294,000	$141,000	$363,000	$69,000	$262,000	$225,000
	Linear Subtotal	**$5,839,000**	**$4,800,000**	**$7,664,000**	**$8,072,000**	**$9,521,000**	**$7,179,000**
Non-Linear	Pressure Control Stations	-	-	$1,000	$156,000	$70,000	$45,000
	Water Storage Tank	$144,000	$303,000	$1,569,000	$425,000	$129,000	$514,000
	Pump Stations	$733,000	$632,000	$8,245,000	$5,680,000	$1,055,000	$3,269,000
	Other Non-Linear	$237,000	$714,000	$139,000	$2,309,000	$408,000	$761,000
	Non-Linear Subtotal	**$1,114,000**	**$1,649,000**	**$9,953,000**	**$8,569,000**	**$1,662,000**	**$4,589,000**
Total/Overall		**$6,953,000**	**$6,449,000**	**$17,617,000**	**$16,642,000**	**$11,183,000**	**$11,769,000**

Table 7-2: Future Capital Budget Forecast based on Existing Capital Plans

Asset Category	Asset	2025	2026	2027	2028	2029	2025-2029 5 Year Annual Average
Linear	All Linear	$14,115,000	$10,573,000	$11,031,000	$7,402,000	$7,834,000	$10,191,000
	Linear Subtotal	**$14,115,000**	**$10,573,000**	**$11,031,000**	**$7,402,000**	**$7,834,000**	**$10,191,000**
Non-Linear	Pressure Control Stations	$400,000	$500,000	$500,000	$500,000	$500,000	$480,000
	Bulk Water Station	$175,000	-	-	-	-	$35,000
	Water Storage Tanks	$100,000	$110,000	$121,000	$134,000	$148,000	$122,600
	Pump Stations	$4,116,000	$615,000	$2,182,000	$951,000	$2,222,000	$2,017,200
	Other Non-Linear	$2,510,000	$634,000	$360,000	$388,000	$308,000	$840,000
	Non-Linear Subtotal	**$7,301,000**	**$1,859,000**	**$3,163,000**	**$1,973,000**	**$3,178,000**	**$3,494,800**
Total/Overall		**$21,416,000**	**$12,432,000**	**$14,194,000**	**$9,375,000**	**$11,012,000**	**$13,685,800**

Figure 7-1 illustrates the capital reinvestment trend for the JdFWDS from 2020 to 2029. The historical data (2020–2024) indicates an average annual reinvestment of $11.8 million. In comparison, the projected reinvestment for 2025–2029 shows a modest increase, with an average of $13.7 million per year.

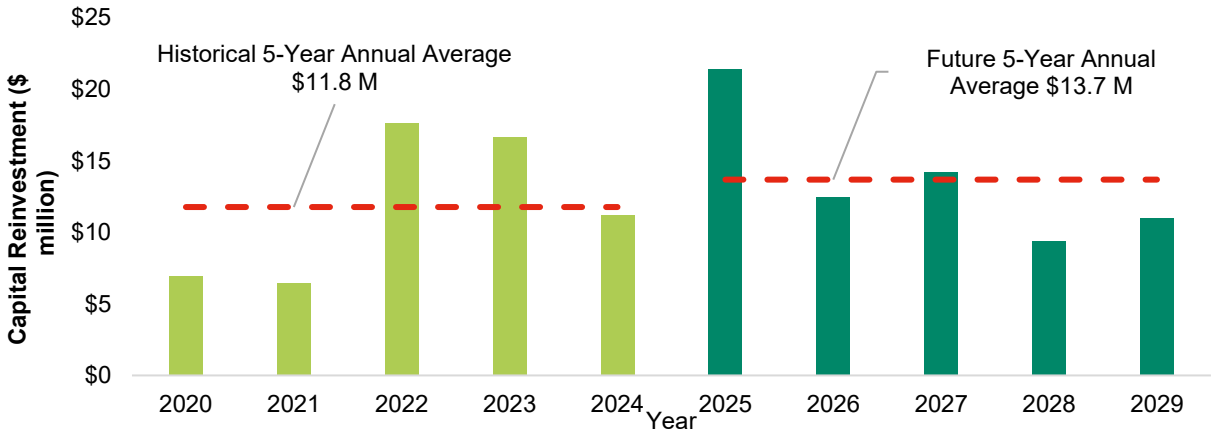


Figure 7-1: Historical Capital Expenditure and Future Budget Forecast based on Existing Capital Plans

7.1.2 O&M – Historical Expenditure and Future Forecast

Historical and projected O&M expenditures for the JdFWDS have been allocated across both linear and non-linear assets to ensure the system remains in good working condition and continues to meet service delivery expectations. The O&M expenditures cover routine maintenance activities such as inspections, servicing, and minor repairs across hydrants, mains, meters, and facility-based assets including pump stations, Pressure Control Stations, and Water Storage Tank. **Table 7-3** and **Table 7-4** present the actual O&M expenditures from 2020–2024 and the forecasted O&M budget for 2025–2029, respectively.

Table 7-3: O&M Historical Expenditure

Asset Category	Asset Type	2020	2021	2022	2023	2024	2020-2024 5 Year Annual Average
Linear	Hydrants	$449,000	$348,000	$373,000	$397,000	$492,000	$412,000
	Valves	-	-	-	-	-	-
	Mains	$1,217,000	$1,185,000	$1,271,000	$1,238,000	$1,465,000	$1,275,000
	Meter/Service	$803,000	$1,156,000	$786,000	$774,000	$1,025,000	$909,000
	Other Linear	-	-	-	-	-	-
	Linear Subtotal	**$2,470,000**	**$2,688,000**	**$2,430,000**	**$2,410,000**	**$2,982,000**	**$2,596,000**
Non-Linear	Pressure Control Stations	$328,000	$289,000	$349,000	$361,000	$421,000	$350,000
	Water Storage Tanks	$370,000	$325,000	$367,000	$392,000	$435,000	$378,000
	Pump Stations	$844,000	$818,000	$840,000	$924,000	$966,000	$878,000
	Other Non-Linear	-	-	-	-	-	-
	Non-Linear Subtotal	**$1,542,000**	**$1,431,000**	**$1,556,000**	**$1,677,000**	**$1,822,000**	**$1,606,000**
Total/Overall		**$4,011,000**	**$4,120,000**	**$3,986,000**	**$4,087,000**	**$4,804,000**	**$4,202,000**

Table 7-4: O&M Future Budget Forecast

Asset Category	Asset Type	2025	2026	2027	2028	2029	2025-2029 5 Year Annual Average
Linear	Hydrants	$453,000	$461,000	$461,000	$480,000	$489,000	$469,000
	Valves	-	-	-	-	-	-
	Mains	$1,654,000	$1,736,000	$1,736,000	$1,835,000	$1,885,000	$1,769,000
	Meter/Service	$1,293,000	$1,351,000	$1,351,000	$1,407,000	$1,435,000	$1,367,000
	Other Linear	-	-	-	-	-	-
	Linear Subtotal	**$3,400,000**	**$3,549,000**	**$3,549,000**	**$3,721,000**	**$3,810,000**	**$3,606,000**
Non-Linear	Pressure Control Stations	$472,000	$490,000	$490,000	$519,000	$534,000	$501,000
	Water Storage Tank	$473,000	$521,000	$521,000	$549,000	$564,000	$525,000
	Pump Stations	$1,163,000	$1,206,000	$1,206,000	$1,253,000	$1,279,000	$1,221,000
	Other Non-Linear	-	-	-	-	-	-
	Non-Linear Subtotal	**$2,108,000**	**$2,217,000**	**$2,217,000**	**$2,320,000**	**$2,377,000**	**$2,248,000**
Total/Overall		**$5,508,000**	**$5,766,000**	**$5,766,000**	**$6,041,000**	**$6,186,000**	**$5,853,000**

Figure 7-2 illustrates the historical and projected O&M expenditures from 2020 to 2029. The historical five-year period (2020–2024) shows an average annual expenditure of $4.2 million, while the forecasted period (2025–2029) reflects a projected increase to an average of $5.9 million annually.

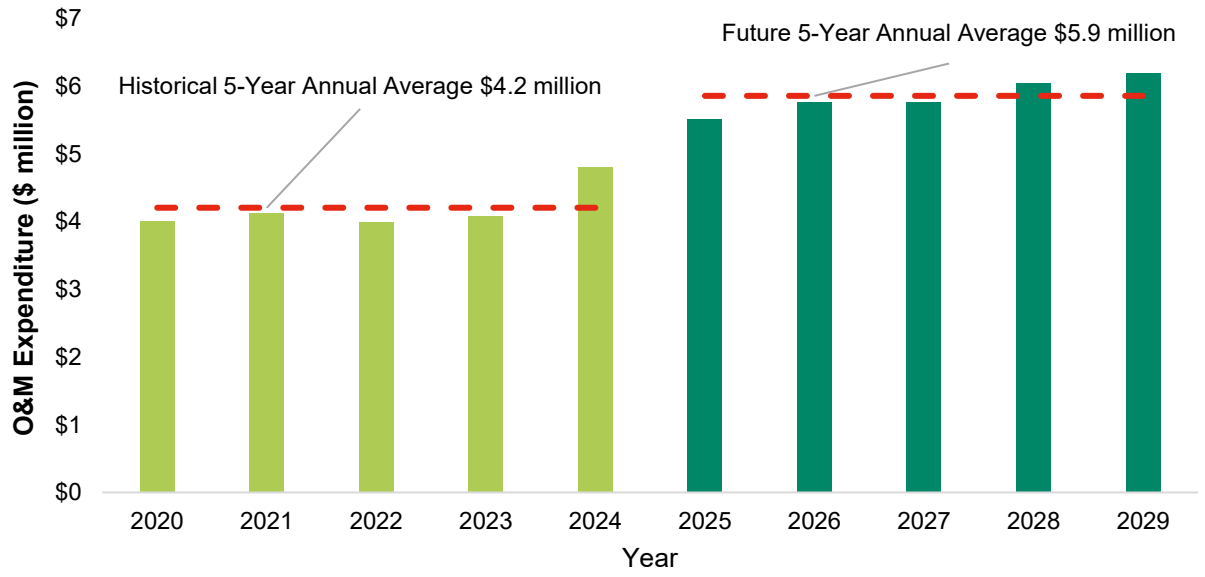


Figure 7-2: Historical O&M Expenditure and Future Budget Forecast based on Existing Plans

7.1.3 Growth-Related Capital Plan (Modelling)

Table 7-5 presents the identified growth-related works from the existing capital plan for the JdFWDS for the period 2025–2029. The table outlines planned capital projects supporting system expansion in response to development growth. Over the five-year period, an average of $544,000 per year is allocated toward growth-related infrastructure, with investments spanning both linear and non-linear assets.

Key planned linear projects include the Sooke Henlyn Supply & Distribution Mains and Throup Road Watermain Installation, totaling an average of $380,000 annually over 5 years. For non-linear assets, the plan includes VMP Pump Upgrades and growth works to increase capacity to the Centre Mountain facilities (PCS, PSx2, and Storage Tank), contributing an additional $164,000 annually. The infrastructure is built according to CRD specifications but paid for by developers and then handed over to CRD to operate (note that not all projects are funded in this manner), so that the system is equipped to accommodate new development while maintaining compliance with service standards and operational reliability.

Table 7-5: Growth-Related Capital Budget – Committed / Planned

Asset Category	Asset	Capital Project Number and Name	2025	2026	2027	2028	2029	5 Year Annual Average
Linear	All Linear	21-01 Sooke Henlyn Supply & Distribution Mains	$1,000,000	-	-	-	-	$200,000
		25-02 Throup Road Watermain Installation	$50,000	$850,000	-	-	-	$180,000
	Linear Subtotal		**$1,050,000**	**$850,000**	**-**	**-**	**-**	**$380,000**
Non-Linear	Pump Station	25-03 VMP Pump Upgrades	$435,000	-	-	-	-	$87,000
	Other Non-Linear	25-04 Centre Mountain (PCS, PSx2, Storage Tank)	$77,000	$77,000	$77,000	$77,000	$77,000	$77,000
	Non-Linear Subtotal		**$512,000**	**$77,000**	**$77,000**	**$77,000**	**$77,000**	**$164,000**
Total/Overall			**$1,562,000**	**$927,000**	**$77,000**	**$77,000**	**$77,000**	**$544,000**

7.1.3.1 Fire Pumps and Pump Upgrades

Fire pump installation costs have been estimated on a cost per unit capacity ($/L/s). This was calculated to be approximately $24,100 $/L/s based on the following approach:

- Calculate the average total replacement cost of fire pump only stations (Erinan, Fulton, and Ludlow). As an average this cost includes bespoke fire pump buildings and the rehabilitation of existing stations that were damaged (Ludlow).
- Determine the cost per L/s from this value.

If upon preliminary design or future iteration of this plan it is determined that upgrade is possible instead of installation of a separate fire pump, a lower cost of approximately 2/3 of the calculated $/L/s can be used. This approach is based on the difference between the average cost for an entirely new station and that calculated for a combined pump station.

7.1.3.2 Storage Tank

Storage Tank installation has been estimated on a cost per unit capacity ($/ML). This was calculated to be approximately $582,000 per ML based on the total replacement cost of the two most recently constructed storage tanks (Deer Park and Flint North). There is considerable variability in storage costs due to the significant difference between steel vertical atmospheric pressure storage tanks (estimated here) and a cast in place concrete structure as well as if there are land acquisition required. For the basis of this estimate, land costs are only included where outlined in the DCC report and it is assumed that future upgrades will be designed and built on a similar basis to the most recent storage tanks.

7.1.3.3 Project Scope and Costing

Table 7-6 Presents the growth-related projects identified from the modelling exercise carried out in Section 5. These projects are priced using the unit replacement costs used to estimate the asset replacement value (including markup) for linear assets. For non-linear assets the following rational was used. Implementation dates are based upon the modelling periods used as described in Section 5. Short term projects have been defined to start in 2028, medium term in 2033 and long term in 2038 and beyond.

Table 7-6: Growth-Related Capital Budget – Modelling

Type	Item	Project Scope	Associated Asset	Approximate Requirement Date	Related Projects	Estimated Cost
New Assets	Growth-V2	A new Mountain Heights Storage Tank of 1.59 ML capacity to replace the existing Henlyn Storage Tank. New Storage Tank, land purchase for construction, connection to distribution system, approximately. 160 m of 300 mm DI pipe	Henlyn Tank	2028	DCC-16.A/D	Not Priced - Cost from DCC report used.
New Assets	Growth-V3	Install additional fire pump of 7 m3/min (117 L/s) at Glen Forest PS or Pears PS.	Stirrup	2028	N/A	$2,410,000
New Assets	Growth-L1	441 m of 300 mm Ductile Iron distribution main to connect a new Mountain Heights Storage Tank to the JdFWDS	Henlyn	2028	DCC-16.B	Not Priced - Cost from DCC report used.
Upgrade	Growth-V6	Upgrade with additional 3.15 ML capacity	Fulton Tank	2033	DCC-4.A	Not Priced - Use 4.A from DCC report
Upgrade	Growth-V7	Additional 5.76 ML capacity[2]	Helgesen Tank	2033	N/A	$3,352,320
Upgrade	Growth-V8	Additional 1.09 ML capacity	Walfred Tank	2033	N/A	$634,380
Upgrade	Growth-V9	Veteran Memorial Pumping Station Upgrade (a new pump with capacity of 50 L/s as a redundant stand-by. The approximate additional equipment list is as follows: 1x Additional Grundfos CR150-2 (same specification as current), additional MCC and power supply cabinets, valves, piping and appurtenances.	Veteran Memorial Pump Station	2038	25-03 and DCC-11	Not Priced - Cost from DCC report used.
Upgrade	Growth-L2	534 m of 500 mm Ductile Iron distribution main to accommodate demand on the JdFWDS in downtown Sooke (Sooke River Road to Philips Road).	0	2033	DCC-18.	*Not Priced - Cost from DCC report used.

1. Based on the revised fire storage for Skirt Mountain Water Storage Tank, the Region could consider utilizing storage surplus at Skirt Mountain Water Storage Tank to offset the storage deficit at Bear Mountain Water Storage Tank as an alternative.
2. The District has current plans to add this storage requirement to the new Mountain Heights Storage Tank.

7.1.4 Growth-Related Capital Plan (DCC)

Outstanding projects and costs listed within the JdFWDS DCC report are identified in Table 7-7. The committed budgets listed previously in Table 7-5 and growth projects identified in Table 7-6 have been reviewed to conclude which DCC projects are outstanding as well as the remaining required funding. Note that where existing budget commitments cover several projects under the DCC report (e.g., Project 25-04 in Table 7-5 accounts for all items listed as DCC-5.A/B/C within Table 7-7 which have been priced separately) costs have been attributed to the remaining DCC projects on an equivalent ratio basis. As a result the combined project funding across Table 7-5 and Table 7-7 is similar to that proposed in the original DCC report but may marginally differ due to rounding.

Some projects have been identified as no longer required should other recommendations take place following growth modelling. These are:

- Fulton Storage Tank (Langford) - Fire Pump (DCC-4.B) has been identified as not required through modelling should the storage tank upgrade be carried out as proposed.

It should be also noted that the following DCC projects are not included in this section as they do not correspond to assets construction or upgrade:

- DCC-19 - Model Updates and Studies (All Areas) - $1.3 million
- DCC-20 - Walfred Servicing Debt (All Areas) - $0.33 million
- DCC-20 - Silver Creek Debt (All Areas) - $1.2 million

No projects are specifically highlighted as developer driven in the DCC report although it possible that Centre Mountain may be considered as such as all costs estimated are based upon those provided by developers. These projects are marked as such in **Table 7-7**, **Table 7-8** and **Table 7-9**.

Table 7-7: Growth-Related Capital Budget – DCC Report

Asset Category	Asset	DCC Capital Project Number	DCC Capital Project Name	Assumed Start Year	Total Cost	Existing Approved Project	Growth Proposed Project	Non-Allocated Project Cost	5 Year Annual Average
Linear	Distribution Main - New	DCC-1.A	Echo Valley Drive (Langford) - Distribution Installation	2030	$1,934,000	N/A		$1,934,000	$386,860
		DCC-15	Henlyn (Sooke) - Distribution Main	2036	$1,459,000	21-01		$459,000	$91,740
		DCC-16.A	Mountain Heights (Sooke) - Distribution Installation	2030	$641,000	N/A		$641,000	$128,180
		DCC-16.B	Mountain Heights (Sooke) - Distribution Installation	2030	$2,333,050	N/A		$2,333,050	$466,610
		DCC-18	Sooke Town Centre - Distribution piping - approx. 4,800 m	2026	$11,346,000	25-2		$10,446,000	$2,089,231
		DCC-2.A	Skirt Mountain Drive (Langford) - Distribution Installation	2030	$729,000	N/A		$729,000	$145,870
		DCC-3	Triangle Trail (Formerly Walfred Servicing) (Langford) - DI watermain	2036	$1,167,000	N/A		$1,167,000	$233,450
		DCC-4.C	Fulton Storage Tank (Langford) - Distribution Piping	2030	$753,000	N/A		$753,000	$150,510
		DCC-6.A	Klahanie Dr (Langford) - New Pipe	2036	*Captured under 6.B	N/A			N/A
		DCC-6.B	ROW (Frederic Rd to Wild Ridge Way) (Langford) - New Pipe	2036	$2,957,000	N/A		$2,957,000	$591,310
		DCC-6.C	Wild Ridge Way (Langford) - Distribution Installation	2036	*Captured under 6.B	N/A			N/A
	Distribution Main - Upgrade	DCC-10.B	Mary Anne Cres / Pattison Way (Colwood) - Pipe Upgrade	2030	$571,000	N/A		$571,000	$114,260
		DCC-13	Christie Point (View Royal) - Pipe Upgrade	2030	$805,000	N/A		$805,000	$160,950
	Supply & Distribution Mains	DCC-5.A	Centre Mountain (Langford) - Supply & Distribution Mains[1]	2030*	$5,202,000	25-04		$4,750,000	$950,062
			Linear Subtotal		**$29,895,000**			**$27,542,000**	
Non-linear	PCS	DCC-1.B	Echo Valley Drive (Langford) - PCS	2030	$364,000	N/A		$364,000	$72,800
		DCC-14	Spar Tree (Sooke) - PCS	2036	$364,000	N/A		$364,000	$72,800

Asset Category	Asset	DCC Capital Project Number	DCC Capital Project Name	Assumed Start Year	Total Cost	Existing Approved Project	Growth Proposed Project	Non-Allocated Project Cost	5 Year Annual Average
		DCC-17	Helgesen (Sooke) - PCS	2036	$89,000	N/A		$89,000	$17,800
		DCC-5.C	Centre Mountain (Langford) – PCS[1]	2030*	$1,121,000	25-04		$1,024,000	$204,800
		DCC-7	Sunheights (Langford) - PCS	2030	$87,000	N/A		$87,000	$17,400
		DCC-8	Glen Lake PCS (Langford) - PCS	2030	$500,000	N/A		$500,000	$100,000
		DCC-9	Optimized connection from RWS to distribution system (Langford) - PCS	2036	$3,872,000	N/A		$3,872,000	$774,400
	Pump Station	DCC-10.A	Mary Anne Cres / Pattison Way (Colwood) - Pump Station	2030	$2,306,000	N/A		$2,306,000	$461,200
		DCC-12	Pump Station 10 (Colwood) - Pump Station	2030	$3,735,000	N/A		$3,735,000	$747,000
		DCC-2.B	Pump Station 3 (Langford) - Pump Station	2036	$3,086,000	N/A		$3,086,000	$617,200
		DCC-4.B	Fulton Storage Tank (Langford) - Fire Pump	2030	$2,904,350	N/A		$2,904,350	$580,870
	Pump Station & Storage Tank	DCC-5.B	Centre Mountain (Langford) - Pump Station & Storage Tank[1]	2030*	$8,713,000	25-04		$7,956,000	$1,591,200
	Pump Station - Upgrade	DCC-11	VMP Pump Upgrade (Colwood) - Pump Station Upgrade	2026	$435,000	25-03		$-	$-
		DCC-16.C	Mountain Heights (Sooke) - Pump Station Upgrade	2030	$1,450,000	N/A		$1,450,000	$290,000
	Storage Tank upgrade	DCC-4.A	Fulton Storage Tank (Langford) - Storage Tank upgrade	2030	$7,787,000	N/A		$7,787,000	$1,557,400
	Storage Tank & Land Acquisition	DCC-16.D	Mountain Heights (Sooke) - Storage Tank & Land Acquisition	2030	$14,660,000	N/A		$14,660,000	$2,932,000
			Non-linear Subtotal		**$51,473,000**			**$50,184,000**	

1. Center Mountain Projects are based on detailed cost estimates within the DCC report provided by the developers.

Items and funding remain from existing budget commitments identified in **Table 7-5.*

7.1.5 Final Growth Capital Plan

The final list of growth projects and their source of determination are listed in **Table 7-8** and **Table 7-9**. Where duplicated projects have been found these have been combined into projects favouring the current committed budget, modelling growth, and DCC. For example, should a project be identified on the current committed budget and the DCC list then the cost and timing of the capital budget is used, if a project has been determined as necessary from both the growth modelling and is listed within the DCC then the time and cost associated with the project requirements from the modelling exercise has been used as the more current information. Outstanding projects and costs are based on the remaining DCC projects.

To determine the required construction date the following rational has been used:

- Where provided in the capital budget or DCC report that year has been used.
- For growth projects, short term projects have been assumed to start in 2028, medium term in 2033 and long term in 2038. Where a project has been identified in multiple locations the order of preference of date is capital plan, modelling and then DCC based on the source of the project.

Once all projects have been rationalized and combined the forecast growth capital requirement of $95.2 million which is split as follows:

- Linear assets require a total expenditure of $28.8 M over 20 years (average annual expenditure $1.4 million). This is split $16.1 M for new assets and the remaining to upgrading existing assets. See **Table 7-8**.
- Non-linear assets require a total expenditure of $58.0 M over 20 years (average annual expenditure $2.9 million). This is split $44.4 M for new assets and the remaining to upgrading existing assets. See **Table 7-9**.

It should be noted that this equates to a 3% ($2.6 M) increase to the total presented in the DCC report ($84.2 million). Of this value only 3% is currently identified in the JdFWDS capital plan (projects 21-01, 25-02/3/4).

Table 7-8: Growth Projects – Linear Assets Collated List

Project Type	Project Name & Reference	Description	Other Project Reference	Year of Enactment	Total Cost (committed as per 2025 budget)	Remaining Cost (to be Committed per original value in DCC report[2])
New	21-01 Sooke Henlyn Supply & Distribution Mains	This project has been previously scoped for submission to CRD annual budgeting	DCC-15 & 16A/B	2025	$1,000,000	
	Growth-L1 Mountain Heights Storage Tank Connection	This main installation is a component of the Mountain Heights Storage Tank program and should be viewed in conjunction with the project identified as Growth -V2. It includes 441 m of 300 mm Ductile Iron distribution main to connect a new Storage Tank to the JdFWDS. Note - this project supersedes DCC report item 16 (new pipe). Material has been assumed based on CRD specifications.	DCC-16.B	2028		$2,333,050
	DCC-1.A Echo Valley Drive (Langford) - Distribution Installation	See JdF WDS DCC Bylaw update background report (January 2025). 1.3-1.5 km of new main connecting Bear Mountain Parkway and Echo Valley Drive. Pending road construction.	N/A	2030		$1,934,000
	DCC-2.A Skirt Mountain Drive (Langford) - Distribution Installation	See JdF WDS DCC Bylaw update background report (January 2025). No required performance outlined. To be performed in parallel with DCC-2.B (Pump Station installation)	N/A	2030		$729,000
	DCC-3 Triangle Trail (Formerly Walfred Servicing) (Langford) - DI watermain	See JdF WDS DCC Bylaw update background report (January 2025). 400-450m of DI watermain installation to service new development and provide redundancy of supply.	N/A	2036		$1,167,000
	DCC-4.C Fulton Water Storage Tank (Langford) - Distribution Piping	See JdF WDS DCC Bylaw update background report (January 2025).	N/A	2030		$753,000
	DCC-5.A Centre Mountain (Langford) - Supply & Distribution Mains[1]	See JdF WDS DCC Bylaw update background report (January 2025). DI watermain installation to service new development, provide redundancy of supply. Strategic link to East-West Connector[3]. Length approximately 3 km for Happy Valley Road to Sooke Road Connector. Delem Drive segment 0.85-0.92 km dependant on design. Reservoir connector approximately 0.6km dependant on final reservoir location.	25-04	2030*		$4,750,000
	DCC-6.A Klahanie Dr (Langford) - New Pipe	See JdF WDS DCC Bylaw update background report (January 2025). Approximately 1 km.to connect Latoria Road to end of Frederic Road to service new development and provide supply redundancy.	N/A	2036		
	DCC-6.B ROW (Frederic Rd to Wild Ridge Way) (Langford) - New Pipe	See JdF WDS DCC Bylaw update background report (January 2025). Approximately 0.14 km from Frederic Road to Wild Ridge Way to service new development and provide supply redundancy	N/A	2036		$2,957,000
	DCC-6.C Wild Ridge Way (Langford) - Distribution Installation	See JdF WDS DCC Bylaw update background report (January 2025). Approximately 0.38 km from ROW joining Wild Ridge Way to Wild Berry Bend junction to service new development and provide supply redundancy	N/A	2036		
	DCC-15 Henlyn (Sooke) - Distribution Main	See JdF WDS DCC Bylaw update background report (January 2025). Approximately 0.54 km from new PCS to new main connecting new storage tank.	21-01	2036		$459,000
Upgrade	25-02 Throup Road Watermain Installation	This project has been previously scoped for submission to CRD annual budgeting.	DCC-18	2025-2026	$900,000	
	DCC-10.B Mary Anne Cres / Pattison Way (Colwood) - Pipe Upgrade	See JdF WDS DCC Bylaw update background report (January 2025). Approximately 0.65 km of pipe upgrade to service additional development.	N/A	2030		$571,000
	DCC-13 Christie Point (View Royal) - Pipe Upgrade	See JdF WDS DCC Bylaw update background report (January 2025). Approximately 0.16 km of pipe upgrade to service additional development.	N/A	2030		$805,000
	DCC-18 Sooke Town Centre - approx. 4,800 m	See JdF WDS DCC Bylaw update background report (January 2025). 5 Segments identified of note: 0.52 km of main that crosses Sooke River. 1.6 km of main from Sooke River Road (main from SRRDF), across Sooke River and along Throup Road to support development and increase system redundancy. 1.2 km of main along Otter Point Road to Helgesen Pump Station. Two segments along Grant Road (0.29 km and 0.37 km). These segments account for 4 km. The outstanding difference is not provided in the DCC report and may result from different measurements from satellite imagery and CCRD GIS.	25-2	2026		$10,446,000
				TOTAL	**$1,900,000**	**$26,902,000**
					TOTAL (overall)	**$28,802,000**

1. Center Mountain Projects are based on detailed cost estimates within the DCC report provided by the developers.
2. Remaining cost is the funding identified as required but not outlined in the CRD JdFWDS capital project budgets.
3. Regional Water Supply Master Plan Project for information only. Not included in financial forecasts.

Table 7-9: Growth Projects – Non-linear Assets Collated List

Project Type	Project Name & Reference	Description	Other Project Reference	Year of Enactment	Total Cost	Remaining Cost (to be Committed per original value in DCC report[2])
New	25-04 Centre Mountain (PCS, PSx2, Water Storage Tank)[1]	This project has been previously scoped for submission to CRD annual budgeting	DCC-5.B	2025-2029	$385,000	
	Growth-V2 Mountain Heights Storage Tank	A new Mountain Heights Storage Tank of 1.59 ML capacity to replace the existing Henlyn Storage Tank. Scope requires new Storage Tank, land purchase for construction, and connection to distribution system (approx. 160 m of 300 mm diameter pipe). Note - this project supersedes DCC report item 16 (storage tank and land acquisition).	DCC-16.A/D	2028		$15,301,000
	Growth-V3 Glen Forest Fire Pump	Install additional fire pump of 7 m3/min (117 L/s) at Glen Forest PS or Pears PS	N/A	2028		$2,410,000
	DCC-1.B Echo Valley Drive (Langford) – PCS	See JdF WDS DCC Bylaw update background report (January 2025). PRV/PCS to support connection between Bear Mountain Parkway and Echo Valley Drive.	N/A	2030		$364,000
	DCC-2.B Pump Station 3 (Langford) - Pump Station	See JdF WDS DCC Bylaw update background report (January 2025). No specification outlined. To be performed in parallel with DCC-2.A (Distribution Main Installation)	N/A	2036		$3,086,000
	DCC-4.B Fulton Water Storage Tank (Langford) - Fire Pump	See JdF WDS DCC Bylaw update background report (January 2025). Note that Fire pump upgrade is not required with sufficient Storage Tank capacity per project Growth-V6.	N/A	2030		$2,904,000
	DCC-5.B Centre Mountain (Langford) - Pump Station & Storage Tank[1]	See JdF WDS DCC Bylaw update background report (January 2025). Pump station to provide consistent service and allow filling of new storage tank. Storage tank for consistency of supply per CRD engineering standards and fire storage.	25-04	2030*		$7,956,000
	DCC-5.C Centre Mountain (Langford) - PCS[1]	See JdF WDS DCC Bylaw update background report (January 2025). Pressure Control Stations (3x) to reduce service pressure.	25-04	2030*		$1,024,000
	DCC-7 Sunheights (Langford) - PCS	See JdF WDS DCC Bylaw update background report (January 2025). Pressure Control Station (1x) to reduce service pressure.	N/A	2030		$87,000
	DCC-8 Glen Lake PCS (Langford) - PCS	See JdF WDS DCC Bylaw update background report (January 2025). Pressure Control Station (1x) to reduce service pressure.	N/A	2030		$500,000
	DCC-9 Optimized connection from RWS to distribution system (Langford) - PCS	See JdF WDS DCC Bylaw update background report (January 2025). No specification provided. Includes Pressure Control Station (1x) to reduce service pressure.	N/A	2036		$3,872,000
	DCC-10.A Mary Anne Cres / Pattison Way (Colwood) - Pump Station	See JdF WDS DCC Bylaw update background report (January 2025). No specification outlined.	N/A	2030		$2,306,000
	DCC-12 Pump Station 10 (Colwood) - Pump Station	See JdF WDS DCC Bylaw update background report (January 2025). No specification outlined.	N/A	2030		$3,735,000
	DCC-14 Spar Tree (Sooke) - PCS	See JdF WDS DCC Bylaw update background report (January 2025). No specification provided. Includes Pressure Control Station (1x) to reduce service pressure. Note that location is 250m uphill from the nearest CRD Pump Station.	N/A	2036		$364,000
	DCC-17 Helgesen (Sooke) - PCS	See JdF WDS DCC Bylaw update background report (January 2025). Assumed modification to existing Helgesen Pump Station. Includes Pressure Control Station (1x) to reduce service pressure.	N/A	2036		$89,000
Upgrade	25-03 VMP Pump Upgrades	Veteran Memorial Pumping Station Upgrade (a new pump with capacity of 50 L/s) as a redundant stand-by. The approximate additional equipment list is as follows. 1x Additional Grundfos CR150-2 (same specification as current), additional MCC and power supply cabinets, valves, piping and appurtenances. Note - this upgrade supersedes DCC report Item 11. (4 pumps total are required at VMPS).	DCC-11, Growth-V9	2025	$435,000	
	Growth-V6 Fulton Storage Tank Upgrade	Upgrade with additional 3.15 ML capacity. Note – supersedes DCC report item 4 (Storage Tank upgrade). Fire pump upgrade is not required with sufficient Storage Tank capacity	DCC-4.A	2033		$7,787,000
	Growth-V7 Helgesen Storage Tank Upgrade[3]	Install additional capacity to support Silver Spray and Copper Mine Storage Tank demands. Additional 5.76 ML capacity required.	N/A	2033		$3,352,320
	Growth-V8 Walfred Storage Tank Upgrade	Additional 1.09 ML capacity required.	N/A	2033		$634,380
	DCC-16.C Mountain Heights (Sooke) - Pump Station Upgrade	See JdF WDS DCC Bylaw update background report (January 2025). No specification provided. Note that pump station is along Henlyn Drive and is 250m downhill from DCC-15 scope.	N/A	2030		$1,450,000
				TOTAL	**$820,000**	**$57,221,700**
				TOTAL (overall)		**$58,041,700**

1. Center Mountain Projects are based on detailed cost estimates within the DCC report provided by the developers.
2. Remaining cost is the funding identified as required but not outlined in the CRD JdFWDS capital project budgets.
3. The District has current plans to add this storage requirement to the new Mountain Heights Storage Tank.

7.2 Financial Plan and Budget Forecast

An asset lifecycle model was developed to forecast the JdFWDS water capital reinvestment needs and asset condition, as illustrated in the following sections.

7.2.1 Prioritization Methodology

A lifecycle model was developed to forecast and prioritize the JdFWDS water asset reinvestment needs over 10- and 20-year planning horizons. As presented in **Figure 7-3**, the core logic of this lifecycle model is to prioritize asset replacement based on customized criteria and to allocate available funding until the budget constraint is met. Details of the budget constraint are provided in **Section 7.3**. Assets are prioritized for treatment using a multi-level sorting logic that considers risk, condition, and replacement value. Specifically, assets are first sorted in descending order of risk score, followed by descending condition score, and then by descending replacement value. This ensures that assets with the highest risk are considered first. If multiple assets have the same risk score, those in poorer condition (i.e., higher condition score) are prioritized. If risk and condition scores are tied, the asset with the higher replacement value is ranked higher. Treatment is only triggered for assets that meet predefined thresholds (risk score >=16 or condition score >=3.5). The budget is allocated starting with the highest priority asset and continues until the available funds are exhausted. Assets that are triggered but cannot be funded within the current budget cycle are deferred to the next cycle, where the same prioritization logic is reapplied. This approach enables JdFWDS to systematically prioritize capital work by aligning limited financial resources with the highest risk or most urgent infrastructure needs. The results of the lifecycle model were generated in AECOM proprietary Power BI model.

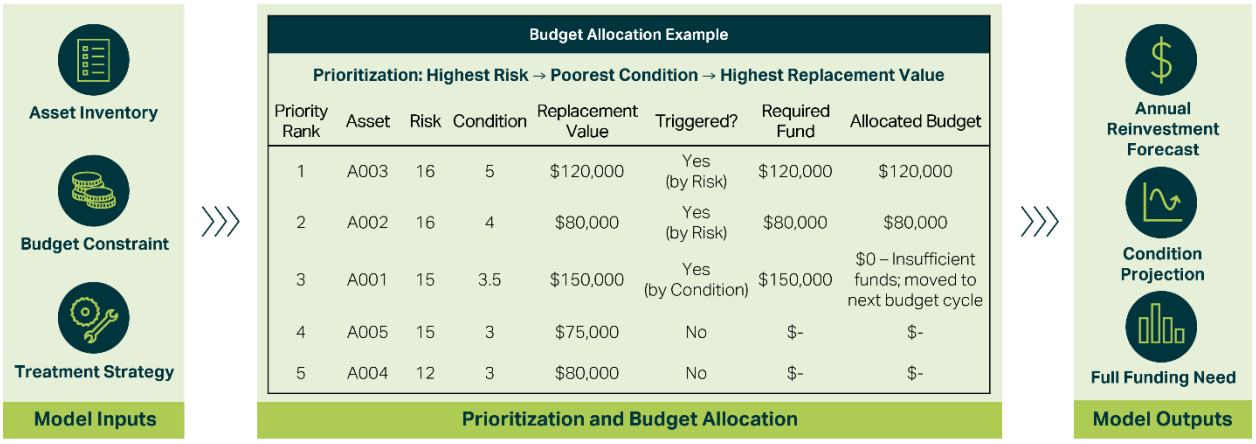


Figure 7-3: Use Risk and Condition to Prioritize Asset Renewal

7.2.2 Key Assumptions and Parameters

Before interpreting the results of the asset lifecycle model, it is important to review the underlying assumptions. These assumptions define how asset performance, deterioration, and reinvestment needs are estimated. Ensuring a shared understanding of these inputs helps align expectations, supports transparency, and strengthens confidence in the model's outputs for decision-making.

The key assumptions and parameters adopted in the lifecycle model are listed below:

- Base year: The base year for the financial model is set to 2026.
- Analysis period: The financial model is designed to provide 10- and 20-year forecast, covering the period from 2026 to 2045. It also has the capability to focus on any specific year within this range.
- Inflation rate: The inflation rates adopted for the financial model are presented in **Table 7-10**, which are based on AECOM's analysis and has been reviewed by JdFWDS.

Table 7-10: Inflation Rate

Year	Inflation Rate
2026	5%
2027	4%
2028	4%
2029 - 2045	3%

- Mark-up: As mentioned in **Section 2.4**, the mark-up value adopted in the analysis is 45%, accounting for construction contingency, engineering and project management.
- Asset condition and apparent age: As stated in **Section 2.1.2**, the Weibull probability distribution was used to model asset deterioration and predict future condition over time. Conversely, when a condition assessment score was available, the Weibull distribution was applied in reverse to calculate the asset's apparent age (see **Equation 2** for the detailed formula). In such cases, apparent age takes precedence over chronological (real) age in the model. This is because condition assessments reflect the actual observed state of the asset, which may differ from its chronological age due to variations in usage, maintenance practices, or environmental exposure. For example, if the concrete masonry unit wall of a Pressure Control Station was constructed in 2000, its chronological age in 2026 would be 26 years. However, if the condition assessment indicates it is in poor condition, then based on the Weibull distribution and its ESL of 75 years, the apparent age of this asset would be approximately 69. The model would therefore use 69 as the asset's age in 2026. This approach ensures that the model incorporates field condition assessment results and better aligns projected asset needs with observed conditions.

$$Apparent\ Age\ =\ ESL\ \cdot \left(-l_n\left(1-\frac{C-1}{4}\right)\right)^{\frac{1}{k}} \quad [2]$$

Where: C = condition score (between 1 and 5)

ESL = expected service life of the asset

k = Weibull shape parameter (set to 6 in this study)

- Asset reinvestment types: This model includes three types of asset reinvestment:
  - **Replace**: Most assets are scheduled for like-for-like replacement when they are categorized as very high risk (risk scores >=16) or in very poor condition (Weibull condition scores >=3.5).
  - **Replace to Upgrade**: This applies specifically to asbestos concrete (AC) mains, where a like-for-like replacement is not appropriate due to their known deterioration characteristics. Therefore, when these mains are due for renewal, they will be upgraded to PVC, which offers an extended ESL of 80 years.
  - **Annual Reinvest**: In cases where both the installation date and condition assessment scores are unavailable, such as for service connections, an annual reinvestment approach is used to estimate the reinvestment needs of those assets. The annual reinvestment rate is calculated as 1/ESL × 100%, based on the assumption that the asset will be gradually reinvested over its ESL and fully replaced or restored to a very good condition by the end of that period. Based on inputs from CRD, this approach applies to 70% of service connections, while the remaining 30% are assumed to be replaced together with meters. The unit cost of meters has been increased to reflect this adjustment.
- Asset bundling: To streamline renewal planning and minimize service disruptions, hydrants, valves, and laterals have been bundled with their associated watermain segments. This means their replacement will occur in coordination with the scheduled renewal of the corresponding watermain. For the purposes of the following analysis, these assets will be collectively referred to as "mains and appurtenances".
- Other funding needs (refer to Section 7.6 for details):

- Growth-related funding needs: Growth needs are identified through outstanding DCC projects and hydraulic modelling.
- Decommissioning funding needs: To account for asset decommissioning costs, one percent of the annual capital needs has been added to the total funding requirement.

7.3 Funding Scenarios

Table 7-11 outline the funding scenario settings used in the model for linear and non-linear assets, respectively. Scenario 1 (S1) represents a “Do Nothing” approach with zero expenditure. Scenario 2 (S2) reflects an ideal, unconstrained budget scenario in which JdFWDS is able to reinvest in assets as needed. As previously noted, reinvestment may take the form of like-for-like replacement, replacement with upgrade, or annual reinvestment. Scenario 3 (S3) represents the JdFWDS defined budget, consisting of $10 M for linear assets (20% for meters and 80% for other linear assets) and $3.5 M for non-linear assets in 2026, based on the 2025 to 2029 five year annual average shown in Table 7-2. Budgets for subsequent years are adjusted for inflation using the rates provided in Table 7-11, with 2026 serving as the base year.

Table 7-11: Funding Scenarios

Funding Scenario		Description	Budgets	
			Linear Assets	Non-Linear Assets
S1	**Do Nothing**	Spend Nothing	$0 million	$0 million
S2	**Unconstrained Budget**	Spend as needed	Unconstrained	Unconstrained
S3	**Defined Budget for JdFWDS**	Budget planned for JdFWDS	$10 million in 2026, adjusted for inflation in subsequent years. Equivalent to approximately $13.7 million per year after inflation.	$3.5 million in 2026, adjusted for inflation in subsequent years. Equivalent to approximately $4.8 million per year after inflation.

7.4 20-Year Financial Plan

7.4.1 Linear Assets

When the budget is unconstrained (funding scenario S2), the average annual reinvestment estimate for the JdFWDS linear assets is $26.6 million over the next 20 years, inclusive of projected inflation. This is equivalent to a total of approximately $531.3 million over the next 10-year period, as presented in Figure 7-4. A spike in reinvestment is observed in 2026, totaling approximately $96.1 million. This peak is primarily driven by a substantial backlog of deferred reinvestment needs requiring immediate attention. Of this total, meters account for the largest share (approximately $62.8 million), reflecting the reinvestment needs of meters installed before 2000. An additional $30.2 million is needed for mains and appurtenances, the majority of which will be used to upgrade AC mains to PVC. Following 2026, reinvestment levels stabilize at around $22.9 million per year, which includes approximately $4.3 million annually for service connection reinvestments.

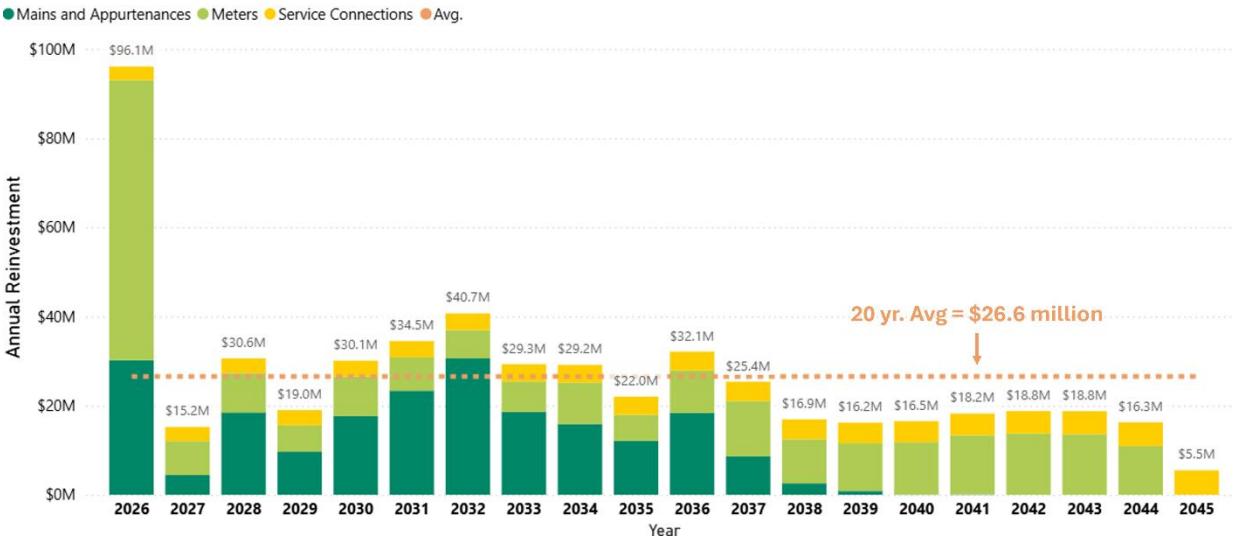


Figure 7-4: 20-Year Funding Need for Linear Assets – Unconstrained Budget Scenario (S2)

Figure 7-5 presents the 20-year forecast under the JdFWDS defined budget scenario (S3), which is limited to an average of $13.7 million annually. As noted in **Section 7.2.1**, when funding is constrained, the model prioritizes assets with the highest risk and poorest condition. As a result, mains consistently dominate the reinvestment profile throughout the planning period, since they are generally associated with higher risks than other linear assets. In certain years, such as 2032 and 2034, the annual budget was underspent and carried forward to accommodate large-ticket items in subsequent years. It is also worth noting that service connections are not prioritized for reinvestment during the planning period, as they lack both risk ratings and condition scores.

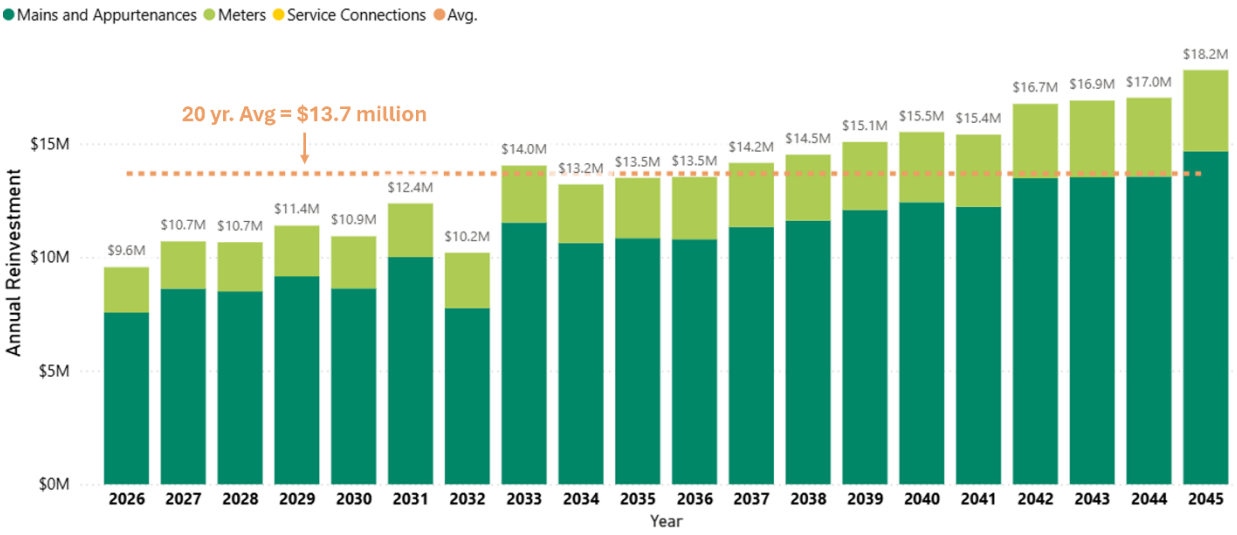


Figure 7-5: 20-Year Funding Need for Linear Assets – the JdFWDS Defined Budget Scenario (S3)

There is a clear and significant gap between the reinvestment needs forecasted under S2 and S3, which represent the ideal funding level and current budgeted funding level, respectively. However, simply presenting the numerical difference is not sufficient to convey the full impact of this gap on the JdFWDS AM service delivery. A more meaningful perspective is to examine how each funding scenario affects the ability of JdFWDS to maintain its desired LoS performance.

Figure 7-6 presents the projected condition of linear assets under three funding scenarios. Currently, 78% of the assets are in fair or better condition. Under S1, the service level declines steadily to 66% by 2045. With an unconstrained budget (S2) (equivalent to $26.6 million annually), the overall asset condition improves slightly, reaching 83% at the end of the period. Under the JdFWDS current budget (S3) of $13.7 million annually, the service level declines to 76% by 2045. These results highlight the direct relationship between funding levels and long-term

asset condition. While the current funding level is sufficient to maintain LoS performance at a reasonable level over the next 20 years, it is important to note that this is largely due to the relative youth of the JdFWDS linear assets, with over 50% of them installed after the 1990s. As these assets approach the end of their service life, their deterioration accelerates, which may lead to sharper declines in condition and service levels if reinvestment is not increased accordingly.

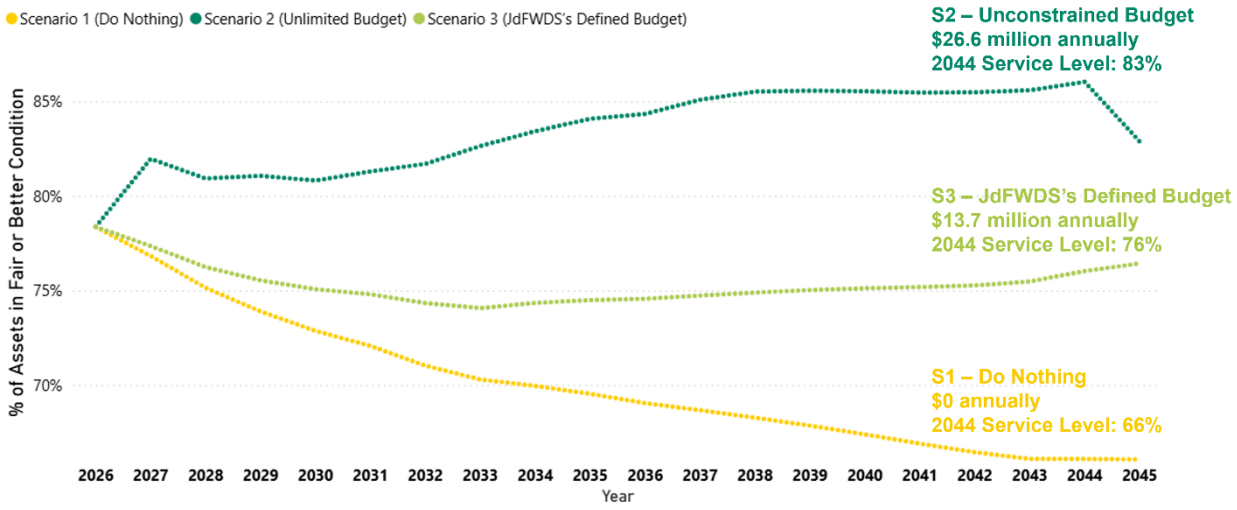


Figure 7-6: % of Linear Assets in Fair or Better Condition Over the Next 20 Years for All Budget Scenarios

Table 7-12 summarizes the reinvestment needs for linear assets under two funding scenarios. Notably, the 20-year total under the current budget for linear assets ($273.6 million) is approximately half of the amount projected under Scenario 2 ($531.3 million).

Table 7-12: Linear Asset Funding Scenario Summary and Comparison

Linear Asset Reinvestment Needs	Funding Scenario S2 ($ million)	Funding Scenario S3 ($ million)
10-Year Annual Avg.	34.7	Limited to 11.7
10-Year Total	346.7	Limited to 116.5
20-Year Annual Avg.	26.6	Limited to 13.7
20-Year Total	531.3	Limited to 273.6
% of Assets in Fair or Better Condition after 20 Year	83%	76%

7.4.2 Non-Linear Assets

Figure 7-7 presents the 20-year reinvestment forecast for non-linear assets, revealing a highly variable spending pattern with several noticeable spikes that reflect the cyclical nature of major asset renewals. Peak reinvestment years include 2033, 2035, and 2037, primarily driven by large-scale renewals in water storage tanks and pressure control stations. In contrast, several years, such as 2026, 2036, 2039, 2041 and 2044, show minimal or no reinvestment, indicating that major renewal cycles were completed in prior years. The average annual reinvestment need over the 20-year period is estimated at approximately $8.9 million. This uneven distribution highlights the importance of long-term planning and budget flexibility to accommodate high-cost renewal years while maintaining overall system reliability.

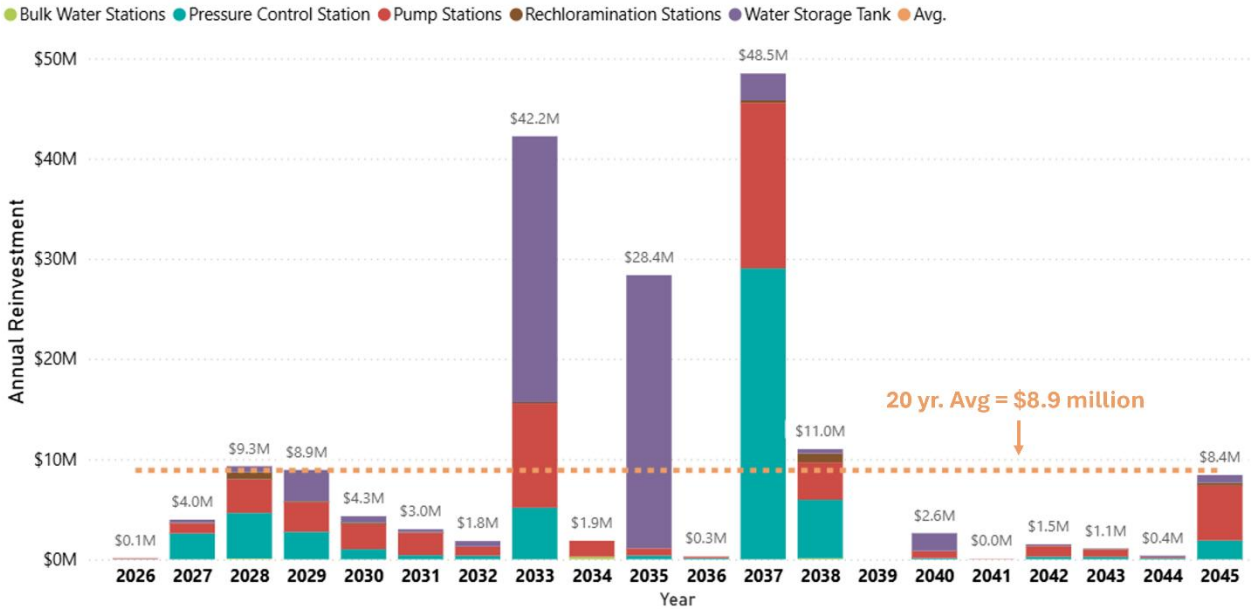


Figure 7-7: 20-Year Funding Need for Non-Linear Assets – Unconstrained Budget Scenario (S2)

Under the constrained funding scenario (S3) with an average annual budget limit of $4.8 million, the reinvestment profile for non-linear assets shows a more controlled and strategic spending pattern, as illustrated in **Figure 7-8**. In this scenario, some reinvestment must be deferred to accumulate sufficient funds for large-ticket items in peak years. Notably, reinvestment is minimal in 2033 to 2035, 2037, and 2041, which allows the budget to be carried to subsequent years. Specifically, this enables higher-cost projects in years like 2036 ($16.5 million), 2038 ($11.9 million), and 2042 ($9.7 million) to proceed without exceeding the long-term funding cap. Water storage tanks, particularly Helgesen Storage Tank that requires reinvestments of $16.5 million in 2036 and $8.7 million in 2038, dominate the major peaks and drive the need for this budgeting flexibility.

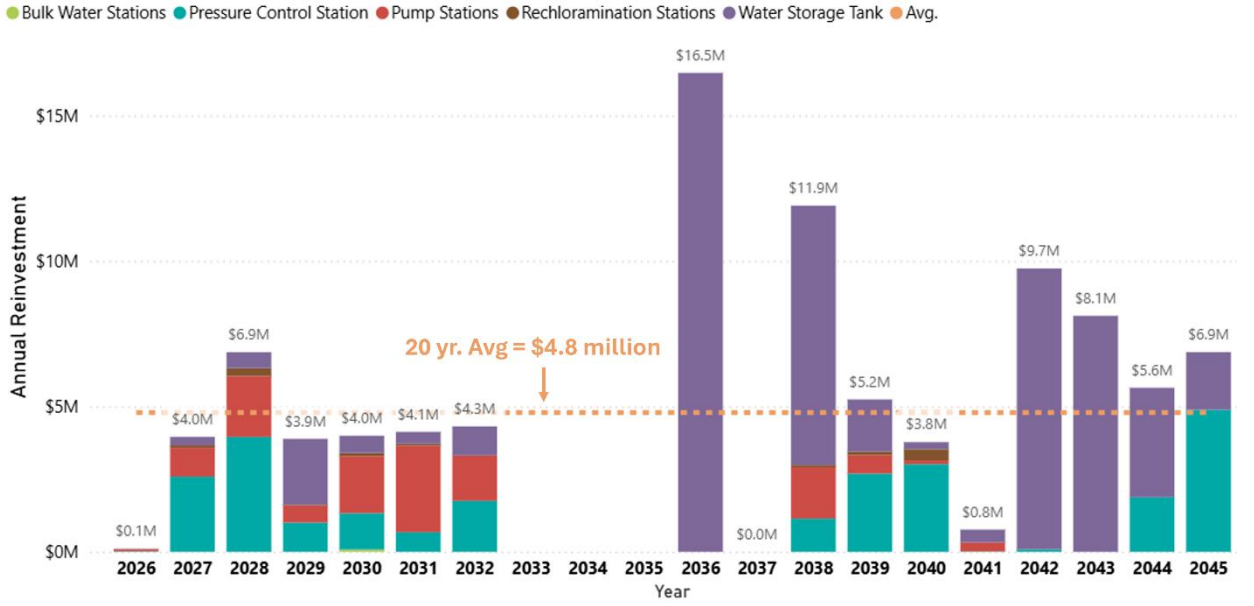


Figure 7-8: 20-Year Funding Need for Non-Linear Assets – the JdFWDS Defined Budget Scenario (S3)

Similarly to linear assets, the condition of non-linear assets has been projected under three funding scenarios, as presented in **Figure 7-9.** In 2026, field condition assessments indicate that approximately 97% of non-linear assets are in fair or better condition. Under S2, which assumes an annual reinvestment of $8.9 million, this percentage fluctuates and stabilizes over time at 82% by 2044. The JdFWDS defined budget (S3), on the other hand, allocates $4.8 million annually and results in a reduction in service level, with the percentage decreasing to around 40% by the

end of the planning period. The significant gap in ending conditions between S2 and S3 can be partly attributed to the shorter ESL of non-linear assets. As a result, their condition is more sensitive to funding levels and responds more noticeably to reinvestment. However, since non-linear assets are more accessible, it is strongly recommended that future renewal decisions for non-linear assets continue to be guided by field condition assessments. Validating modeled condition with actual inspection data is essential before committing to reinvestment, and renewal priorities should be informed by asset risk scores to ensure that limited funding is directed toward the assets with the highest consequence and probability of failure.

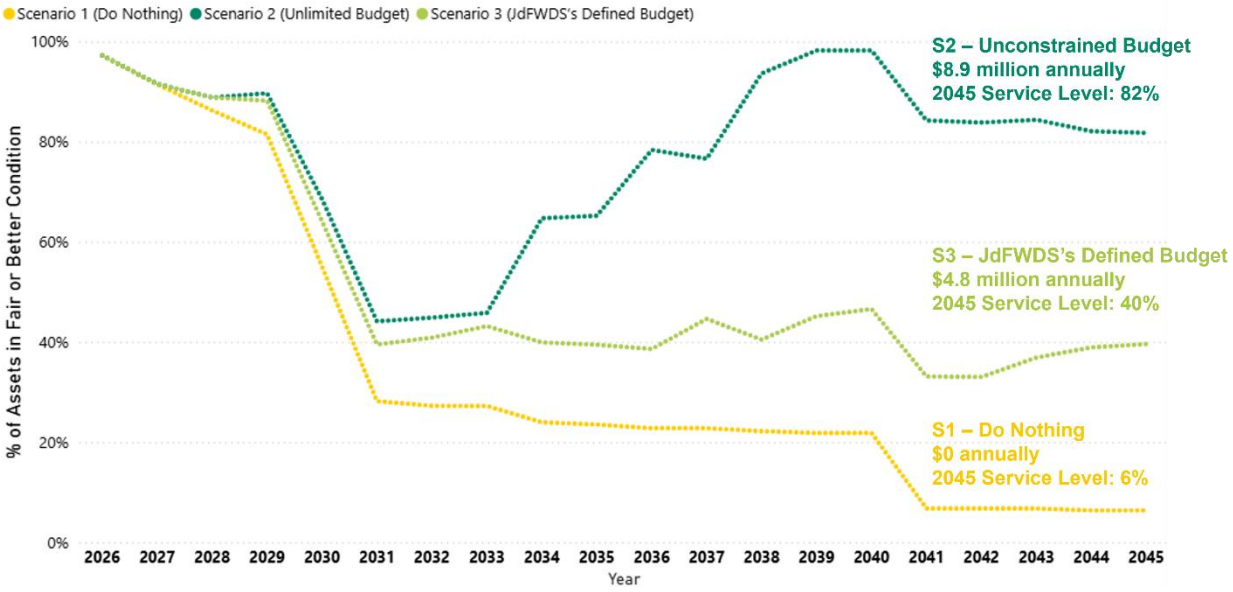


Figure 7-9: % of Non-Linear Assets in Fair or Better Condition Over the Next 20 Years for All Budget Scenarios

Table 7-13 summarizes the reinvestment needs for non-linear assets under two funding scenarios. As noted previously, the JdFWDS current budget for non-linear assets ($95.8 million over 20 years) is significantly lower than the projected need of $177.5 million over the same period. As a result, the proportion of non-linear assets in fair or better condition after 20 years differs substantially, from 82% under S2 to 40% under S3.

Table 7-13: Non-Linear Asset Funding Scenario Summary and Comparison

Non-Linear Asset Reinvestment Needs	Funding Scenario S2 ($ Million)	Funding Scenario S3 ($ Million)
10-Year Annual Avg.	10.4	Limited to 2.7
10-Year Total	103.8	Limited to 27.2
20-Year Annual Avg.	8.9	Limited to 4.8
20-Year Total	177.5	Limited to 95.8
% of Assets in Fair or Better Condition after 20 Year	82%	40%

7.5 5-Year Capital Projects

Capital projects were identified by aggregating forecasted renewal spending from the unconstrained funding scenario (S2) at the desired asset level (segment level for linear assets and facility level for non-linear assets). Costs were then concentrated into peak years within five-year blocks to reflect realistic delivery cycles while preserving total investment needs. This approach is particularly important for non-linear assets because it is not practical for JdFWDS to return to the same facility year after year to address isolated minor renewals. Grouping work in this manner supports efficient mobilization and minimizes operational disruption. For each project, the risk score and condition score were aggregated using asset replacement value as the weighting factor. This weighted approach allows condition and risk profiles to be rolled up meaningfully to the project level and enables projects to be prioritized so that funding is directed first to the highest risk needs. Finally, annual spending caps were applied to smooth the reinvestment profile and avoid spikes in any given year, with approximately $13 million for meters, $12 million for

other linear assets, and $9 million for non-linear assets. If the determined capital projects require more funding than the annual cap allows, higher priority projects are scheduled first and lower priority projects are deferred to later years to maintain a practical and balanced delivery program. On the other hand, if funding is underspent in a given year, projects may be advanced from future years to make efficient use of available resources while maintaining prioritization.

The complete capital project list is included as **Appendix H**. The tables below show a summary of the first five year (2026-2030) for linear and non-linear assets respectively.

Table 7-14: Linear Asset 5-year Capital Project Summary

Funding Need ($ Million)	2026	2027	2028	2029	2030	Total
Mains and Appurtenances	**24.0**	**12.3**	**14.2**	**12.1**	**21.1**	**83.7**
AC Main Replace/Upgrade	-	6.3	7.7	3.4	6.0	23.3
Growth	12.3	-	2.3	-	9.5	24.2
Renewal	11.6	6.1	4.2	8.7	5.5	36.1
Meters	**13.1**	**13.1**	**13.1**	**13.1**	**13.0**	**65.4**
Renewal	13.1	13.1	13.1	13.1	13.0	65.4
Grand Total	**37.0**	**25.4**	**27.3**	**25.2**	**34.1**	**149.0**

Table 7-15: Non-Linear Asset 5-year Capital Project Summary

Year and Type	Priority Number	Capital Project Details	Funding Need ($ Million)
2026			
	No projects scheduled		
2027			
Growth	No projects scheduled		
Renewal	1	Leigh PCS (PRS-Leigh at Dunford)	0.4
	2	Lake End PCS	0.3
	3	Atkins PCS (PRS-Atkins @ Selwyn)	0.3
	4	Bishops PCS	0.3
	5	Goldstream PCS (PRS-Goldstream at Leigh)	0.2
	6	Haida PCS	0.2
	7	Highland PCS (PRS-Highland at Marler)	0.4
	8	Creed PCS (PRS Creed @ Watkiss)	0.2
	9	Hatley PCS	0.2
	10	Thetis Lake PCS (PRS-TCH at Thetis)	0.2
	11	TCH PCS (PRS-TCH at Westshore Parkway)	0.4
	12	St Giles PCS	0.2
	13	Mt Wells PCS (PRS Humpback @ Mt Wells)	0.4
	14	Crystalview PCS (PRS Atkins @ Crystalview)	0.4
	15	Eaton PCS (PRS Burnside W @ Eaton)	0.2
	16	McCallum PCS	0.1
	17	Sunheights PCS	0.4
	18	Helmcken PCS (PRS-Helmcken @ Eagle Creek)	0.6
	19	BMP East PCS	0.2
	20	Lagoon PCS	0.4
	21	Walfred PCS	0.5
	22	Nicklaus North PCS	0.2
	23	Iron Mine Hill Rechloramination Plant (WTP IRON MINE HILL)	0.6
	24	BMP Middle PCS	0.6
	25	Stirrup PS	0.4
	26	Players PCS	0.3
	27	Sooke Lake PCS	0.3

Year and Type	Priority Number and Capital Project Details		Funding Need ($ Million)
Renewal Total			**8.9**
2028			
Growth	Growth-V2	Mountain Heights Storage Tank	15.3
	Growth-V3	Glen Forest PS or Pears PS	2.4
Growth Total			**17.7**
Renewal	28	Neild PS	0.5
	29	Lakehurst PCS	0.3
	30	Gourman PS (Gourman at Rason)	0.7
	31	Andover PS	0.4
	32	Latoria South PCS	0.9
	33	BMP Lower PCS	0.7
	34	Rocky Point Rechloramination Station (WTP Rocky Point)	0.6
	35	Arngask PCS	0.3
	36	Sunriver PCS	0.3
	37	Natures PCS	0.3
	38	Flint North PS	0.4
	39	Duke PCS (PRS Duke @ Dutnall)	0.2
	40	Cliff PCS (PRS Duke West @ Cliff)	0.1
	41	Hoylake PCS	0.3
	42	Bear Mountain Water Storage Tank	0.3
	43	Maple PCS	0.3
	44	Brecon PCS (aka Raglan)	0.3
	45	Creekside PCS (PRS Ravens View)	0.1
	46	Hoffman PCS (PRS-Hoffman at Winster)	0.1
	47	Henlyn PS	0.3
Renewal Total			**7.4**
2029			
Growth	No projects scheduled		
Renewal	48	Bear Mountain PS	2.1
	49	Peacock PS (PST-Gourman at Peacock)	0.2
	50	Glen Forest PS	0.6
	51	Sue Mar PS	0.1
	52	Lombard PS (PST-Lombard at Tavane)	0.4
	53	Ludlow Fire PS	0.1
	54	Fort Rodd Hill PCS	0.6
Renewal Total			**4.1**
2030			
Growth	DCC-1.B	Echo Valley Drive Distribution Installation	0.4
	DCC-4.B	Fulton Water Storage Tank	2.9
	DCC-5.B	Centre Mountain (PS, Water Storage Tank)	8.0
	DCC-5.C	Centre Mountain PCS	1.0
	DCC-7	Sunheights PCS	0.1
	DCC-8	Glen Lake PCS	0.5
	DCC-10.A	Mary Anne Cres / Pattison Way (Colwood) PS	2.3
	DCC-12	Pump Station 10 (Colwood) PS	3.7
	DCC-16.C	Mountain Heights PS	1.5
Growth Total			**20.3**
Renewal	No projects scheduled		

7.6 Full Funding Need

This section presents an overview of the JdFWDS full funding forecast over the next 20 years, as a clear understanding of total funding requirements is essential for effective long term financial planning. Capital needs are categorized by reinvestment type ("Replace," "AC Main Replace/Upgrade," and "Service Connection Annual Reinvest"). These estimates are based on the funding scenario S2 (refer to **Section 7.4**, **Figure 7-4**, and **Figure 7-7**). The capital needs are presented together with the recommended O&M expenditures (refer to **Table 6-6** for details). In addition, growth-related funding needs identified through DCC projects and with the need also identified by hydraulic modelling have been added to the total funding requirement. Projects identified by DCC requirement but not with modelling are labelled as "Outstanding Growth-Related Projects" (refer to **Table 7-8** and **Table 7-9** for details). To account for asset decommissioning costs, one percent of the annual capital needs has also been included. With these adjustments, the total funding requirement for the JdFWDS linear and non-linear assets rises to approximately $1,118.4 million over 20 years, averaging $55.9 million per year. A detailed breakdown of these full funding needs is provided in **Table 7-16**, **Figure 7-10** and **Figure 7-11**.

Table 7-16: JdFWDS Full Funding Need Summary

Funding Need	Capital ($ Million)			O&M ($ Million)	Outstanding Growth-Related Projects ($ Million)	Decommission ($ Million) *	Total ($ Million)
	Replace	AC Main Replace/Upgrade	Service Connection Annual Reinvest				
Linear							
20-Year Annual Avg	11.9	10.4	4.2	10.8	1.3	0.3	39.0
20-Year Total	238.6	208.7	84.0	216.9	26.9	5.3	780.4
Non-Linear							
20-Year Annual Avg	8.9	-	-	5.0	2.9	0.1	16.9
20-Year Total	177.5	-	-	100.1	58.0	2.2	337.9
Full Funding Need over 20 years	**416.1**	**208.7**	**84.0**	**317.0**	**84.9**	**7.6**	**1,118.4**

** The decommissioning cost of the Peacock Storage Tank ($0.3 million) has been added to 2026. Although there is no national dataset on water storage tank demolition costs, documented Canadian municipal projects indicate that decommissioning expenses typically range from $0.2 million to $0.3 million[2021]. For planning purposes, a cost of $0.3 million is assumed to cover site specific demolition activities, subject to refinement based on local tender information.*

[20] Daily Commercial News. Tearing down an iconic Sudbury, Ontario tower. Tearing down an iconic Sudbury, Ontario tower. Retrieved on Oct 29, 2025.
[21] Town of Shelburne. Elevated Water Storage Tower Project. sba2021-04-elevated-water-storage-tower-project-complete-report.pdf. Retrieved on Oct 29, 2025.

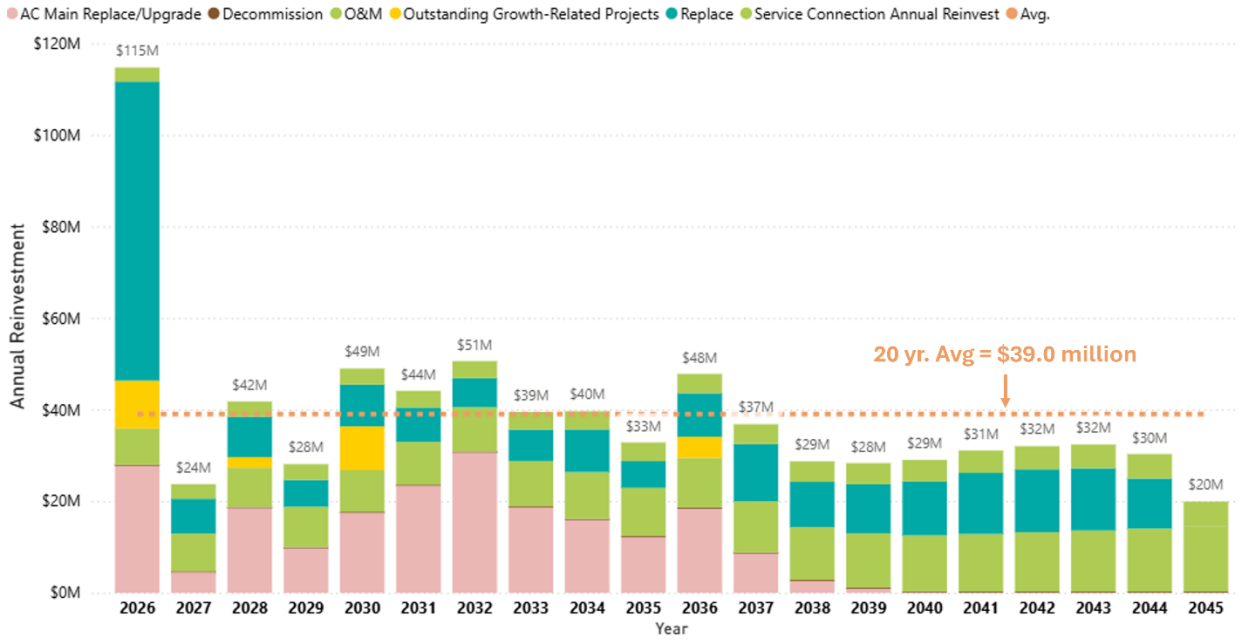


Figure 7-10: Linear Asset Full Funding Need Profile

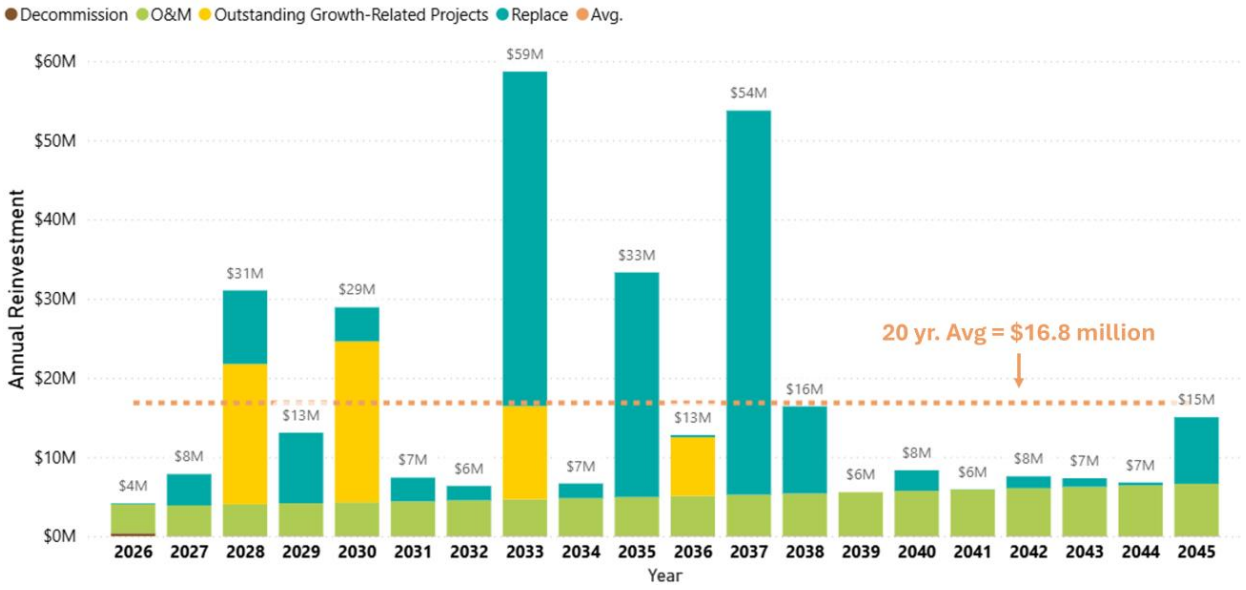


Figure 7-11: Non-Linear Asset Full Funding Need Profile

7.7 Asset Renewal Expenditure Benchmarking

To provide an insightful comparison, **Figure 7-12** presents the JdFWDS capital reinvestment as a percentage of total replacement cost (including all assets), benchmarked against results from the CIBI. Under the unconstrained funding scenario (S2), JdFWDS achieves a reinvestment rate of 1.8%, which is above the CIBI 75th percentile value of 1.22%, indicating a strong level of reinvestment relative to national benchmarks. Under the defined budget scenario (S3), the reinvestment rate drops to 0.94%, which remains above the CIBI median of 0.53% but below the 75th percentile, suggesting that while the defined budget supports a moderate level of asset renewal, it may not be sufficient to sustain long term infrastructure performance at the highest benchmark levels. It is recommended that JdFWDS maintain a reinvestment rate above 1% of total replacement cost, which would enable the renewal of the entire asset portfolio over a 100-year cycle and help ensure long term system sustainability.

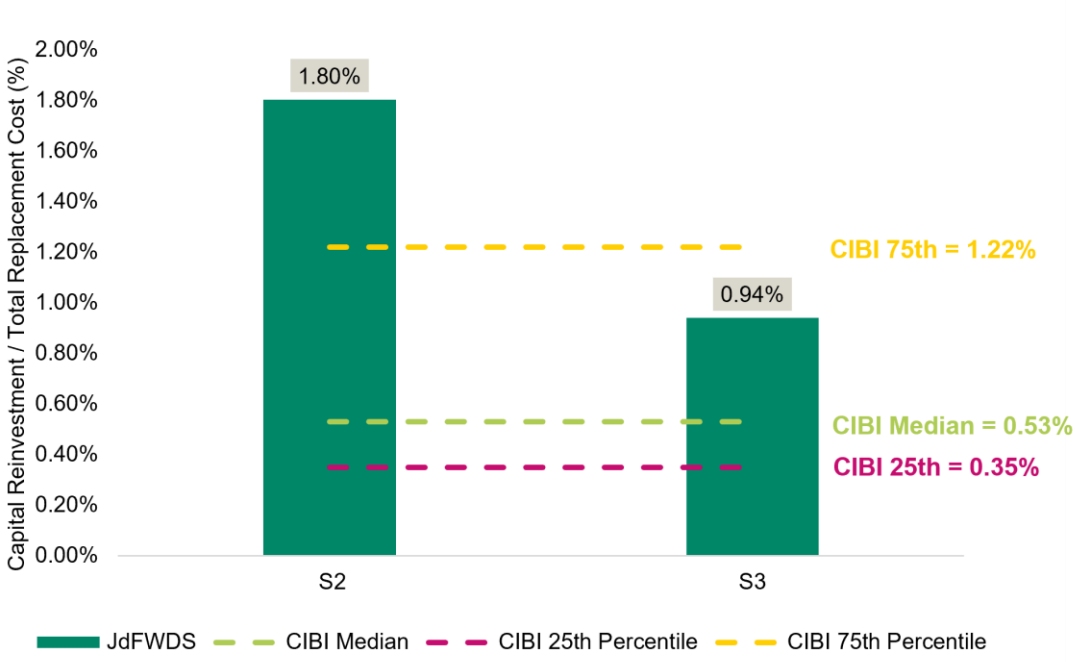


Figure 7-12: Capital Reinvestment Rate Benchmarking Comparison

7.8 Revenues

The JdFWDS supplies drinking water from the regional system to approximately 58,000 residential and business customers across Colwood, Langford, Metchosin, View Royal, Sooke, and parts of the Highlands and East Sooke electoral area. Flat water rates are charged, forming the basis for revenue generation through water sales, with the 2025 rate set at $2.84 per cubic metre. **Figure 7-13** compares the JdFWDS water rate with the CIBI benchmarks. For a typical residential connection consuming 210 m³/year, the annual water charge under JdFWDS is $596, which is slightly above the CIBI median of $560, but below the 75th percentile benchmark of $720. This positioning indicates that JdFWDS rates are within the mid to upper range of comparable utilities across Canada, reflecting a balance between cost recovery and customer affordability, while also suggesting potential room for future rate increases to further support system sustainability and infrastructure renewal.

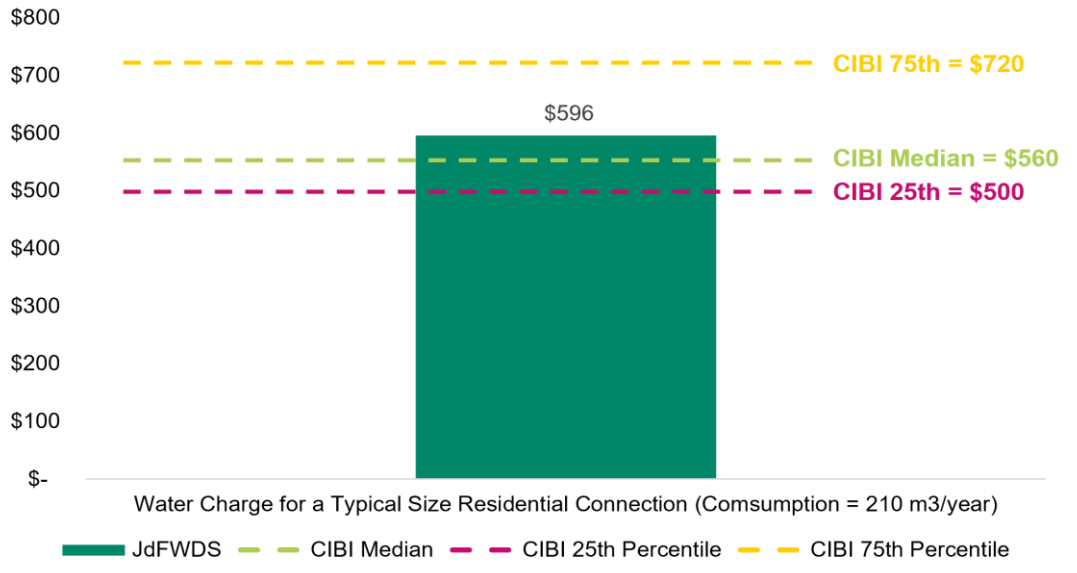


Figure 7-13: Water Rates Benchmarking Comparison

While the JdFWDS current water rate structure provides a stable foundation for revenue generation, the effectiveness of this system also depends on the accurate measurement of water consumption. The portion of water produced but not billed to customers, referred to as nonrevenue water, can result from leaks, unauthorized use, or inaccurate metering. Among these factors, meter inaccuracies often account for a significant share of non-revenue water, as aging or underperforming meters tend to under-record actual usage, particularly at low flow rates. This under-measurement directly reduces billed volumes and leads to ongoing revenue loss for the utility. To address this issue, the JdFWDS can benefit from investing in Advanced Metering Infrastructure (AMI), which enables precise and real-time tracking of water consumption. AMI not only improves billing accuracy and revenue recovery but also supports leak detection, demand forecasting, and customer awareness, which enhances both operational efficiency and long-term financial sustainability.

7.9 Capital Reserve Fund Strategy

As part of the long-term financial planning for the JdFWDS, this strategy outlines a framework for managing capital reserves to ensure sustainable service delivery through prudent financial management. This approach aligns with the CRD's asset hierarchy and capital planning objectives.

Current Practice & Challenges. Currently, the CRD maintains capital and equipment replacement reserves (ERF). Capital reserves are used to fund planned infrastructure upgrades and renewals, while ERFs support the replacement of lower-value, short-lived assets such as valves. However, there is no dedicated operating reserve for the JdFWDS. Surplus funds are typically redirected to capital programs, which limits flexibility in responding to unplanned events or revenue fluctuations. Additionally, financial reporting has historically emphasized forecasted capital expenditures over available reserve balances, making it difficult to assess financial readiness. To improve transparency and planning accuracy, future reporting should clearly distinguish between actual reserve balances and planned outflows.

Table 7-17 provides a five-year outlook on Capital Funds on Hand and ERF, offering insight into the projected availability of internal funding sources. This information is essential for evaluating the timing and scale of future capital investments, identifying funding gaps, and determining the need for external financing or rate adjustments. By aligning reserve forecasts with asset lifecycle needs and capital project timelines, the CRD can ensure that financial resources are available when needed, minimizing reliance on debt and enhancing long-term service sustainability.

Table 7-17: Funding Sources & Reserves

Reserve Funding Source	2025	2026	2027	2028	2029
Capital Funds on Hand	$17,521,000	$8,679,000	$8,924,000	$9,513,000	$10,159,000
Equipment Replacement Reserves	$1,670,000	$774,000	$710,000	$750,000	$250,000

Key Principles for Reserve Policy Design. To guide the development of a robust reserve fund strategy, the following principles are recommended based on industry practices:

- **Stability**: Support consistent service delivery through economic and environmental fluctuations.
- **Sufficiency**: Ensure reserves are adequate to meet both planned and unforeseen needs.
- **Transparency**: Clearly define the purpose, contribution rules, and target balances for each reserve.
- **Accountability**: Regularly monitor and report reserve levels relative to established targets and risks.

Reserve Strategy Industry Practice from Canadian Water Utilities. The following industry practices from Canadian water utilities can serve as a reference to inform the CRD in promoting its reserve strategy for JdFWDS,

drawing on the MFOA's Asset Management Framework[22], the CIBI[23], and practices from other Canadian municipalities:

- **Transfer Annual Budget Surpluses**: Redirect annual surpluses into dedicated reserve funds (capital, equipment replacement, and operating) within each self-sustaining fund.
- **Preserve Debt Servicing Allocations**: Maintain debt servicing allocations in the budget even after debts are retired, redirecting these funds to reserves to build long-term financial capacity.
- **Establish an Operating & Maintenance (O&M) Reserve**: Create an operating reserve equivalent to at least one year of operating costs to buffer against emergencies such as climate shocks, pandemics, or revenue shortfalls.
- **Separate Reserve Categories**: Maintain distinct reserves for capital renewal, growth-related infrastructure, and service enhancements to ensure targeted and transparent use.
- **Integrate Reserve Forecasting**: Align reserve contributions and drawdowns with the long-term capital and asset management plan to ensure funding availability for lifecycle investments.

Strengthening the CRD JdFWDS Reserve Strategy. It is recommended that the CRD JdFWDS strengthen its reserve fund strategy to support the financial sustainability of the JdFWDS. To do so, the following actions should be considered:

- Strengthen reserve policies: purpose, targets, contributions, and withdrawal rules.
- Maintain separate reserves for capital renewal, growth, emergencies, and rate stabilization., etc.
- Integrate reserve planning into long-term financial and asset management plans.
- Establish performance targets (e.g., reserve-to-asset value ratios, funding gap indicators).
- Promote communications with Council and the public on reserve fund status & use.
- Review and update reserve strategies regularly to meet evolving need.

7.10 Gaps & Recommendations

Table 7-18 summarizes the key gaps and corresponding recommendations identified through the financial analysis.

Table 7-18: Financial Planning Gaps & Recommendations

Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
Maintain Target Asset Condition Levels	Under the current planned budget; • The percentage of linear assets in fair or better condition is forecast to remain steady at approximately 74% to 76% over the planning period. • The percentage of non-linear assets in fair or better condition is expected to gradually decline from 97% to 40% by the end of the planning period.	• Many water utilities aim to maintain approximately 80% of their assets in fair or better condition[24], as research and peer practices suggest this range supports cost-effective lifecycle management while avoiding steep renewal spikes. Maintaining asset health within this band provides a defensible foundation for long-term service reliability and cost stability.	High
Establish Minimum Annual Reinvestment Rate	• Under the current budget, the capital reinvestment rate is 0.94%, which represents the percentage of total	• Maintain a minimum annual reinvestment rate of 1% of replacement value would allow the JdFWDS to renew the system over a	High

[22] Municipal Finance Officers' Association (MFOA) Asset Management Plan Framework
[23] Canadian Infrastructure Benchmarking Initiative
[24] Municipality of Bluewater. Asset Management Plan (2024). 20240812-fin-amp-2024-bluewater-asset-management-plan-psd-final.pdf. Retrieved on Oct 29, 2025.
Region of Waterloo. Asset Management Plan (2025). 2025 ASSET MANAGEMENT PLAN. Retrieved on Oct 29, 2025.
Municipality of Leamington. Asset Management Plan (2025). 2025-Asset-Management-Plan---Final.pdf. Retrieved on Oct 29, 2025.

Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
	replacement value reinvested annually in system assets.	100-year lifecycle and support sustainable long-term asset condition.	
Risk-Based Capital Prioritization	• Current budgeting practices do not explicitly apply risk-based prioritization to capital reinvestment decisions.	• Prioritize projects using risk-based criteria to ensure funding is directed to assets with the greatest impact on service and risk reduction. • For linear assets, if funding is constrained, prioritize legacy AC main upgrades and aging meter replacement to reduce operating risk, improve reliability, and enhance billing accuracy.	High
Phased Planning for Large-Ticket Items	• Upcoming large-ticket renewal needs (e.g., Water Storage Tanks) may exceed short-term delivery capacity and budget flexibility. Executing all major renewals immediately is not feasible given resource and market constraints.	• Develop a phased capital planning and delivery strategy for major renewal projects, spreading large-ticket investments over a multi-year horizon. This will align project scheduling with internal capacity, contractor availability, and annual funding growth.	Medium

8. Performance Tracking

Performance tracking is a critical component of a sustainable and effective AM. It ensures that the AMP remains a living document—responsive to changes in system condition, funding, risk, and service expectations. This task outlines a framework for monitoring and evaluating the effectiveness of the AMP over time, with the goal of enabling data-driven decision-making, supporting continuous improvement, and maintaining alignment with CRD's strategic objectives.

8.1 The Plan-Do-Check-Act Cycle

Performance tracking is a foundational component of effective asset management. It enables the CRD to monitor progress, evaluate outcomes, and adapt its asset management practices over time to better meet service, risk, and affordability objectives. The Plan-Do-Check-Act (PDCA) cycle, shown in **Figure 8-1**, is a recognized framework aligned with ISO 55000 and supports continual improvement. In its simplest form, the PDCA cycle can be applied to the JDFWDS AM planning process as follows:

- **Plan:** Any planning related to the JDFWDS that sets out the objectives and roadmap (activities and budgets) for the short- (1–5 year) to long-term (20+ years). These plans could include master plans, annual financial plans, service level strategic and service plans, capital plans, maintenance plans, and the AMP.
- **Do:** Execution of the activities identified within the aforementioned plans.
- **Check:** Confirming whether the execution of the various plans has delivered / is delivering the required results. Use key performance indicators (KPIs) to track progress. KPIs should be SMART indicators (specific, measurable, achievable, realistic, and time-bound) to effectively monitor and track performance.
- **Act:** Depending on the results of the "Check" stage, course corrections might be needed to ensure that the CRD is on track to realize the objectives set out in the "Plan" stage.

Figure 8-1: The Plan-Do-Check-Act Cycle

Regular performance reviews will ensure the AMP remains a living document—relevant, actionable, and aligned with current service, risk, and affordability priorities. The AMP should be reviewed annually to inform budget updates and support timely adjustments. A comprehensive update is recommended every 5 to 7 years to incorporate performance outcomes, evolving needs, and continuous improvement. This review cycle enables the CRD to assess whether previous recommendations have been implemented, monitor trends in asset condition, and identify any emerging risks related to asset performance or maintenance practices. Consistent measurement and reporting will help embed asset management into CRD's organizational culture and decision-making processes.

8.2 Performance Measures for Monitoring and Tracking the AMP

Measuring and reporting on AM performance demonstrates value for money and confirms that the CRD is delivering agreed service outcomes to its stakeholders. Performance evaluation and continual improvement are critical for successfully implementing this JdFWDS AMP and for strengthening the overall maturity and effectiveness of AM practices across the organization.

A best practice in performance monitoring is to use a balanced set of qualitative and quantitative indicators to track AMP implementation. These performance measures should be reviewed and updated annually, with results used to inform decisions and adjust course as needed between full AMP updates (every 5–7 years). Tracking efforts should be coordinated with CRD staff in Infrastructure Engineering, Operations, and Corporate Asset & Maintenance Management.

Recommended performance measures for monitoring include:

- **Levels of Service:** The CRD JdFWDS service level metrics, identified in **Section 3** and **Appendix B** present an ideal starting point for evaluating the overall performance of the CRD JdFWDS. As a minimum, the CRD should be tracking and reporting on these metrics regularly.

  The LoS framework developed in this AMP includes a mix of CIBI-aligned indicators and additional measures derived from the analysis. Where available, recent performance data has been included to establish a baseline. Service level performance should be recorded on a regular basis to track changes over time, identify trends, and support forecasting. Performance measures should be reviewed and updated as needed. Proposed LoS should also be reviewed periodically to ensure alignment with evolving community needs, regulatory requirements, organizational priorities, available resources, and performance trends—enabling adaptive and relevant service delivery.

- **JdFWDS Risk Profile:** **Section 4** and **Appendix A** provide the current risk profile for the JdFWDS assets. The CRD should review and update this risk profile regularly. If the recommended asset renewals in **Section 7** and **Appendix G** are implemented, the number of **Very High Risk** assets should be significantly reduced, maintaining an acceptable risk level as per the risk management strategies decision matrix in **Table 4-17**. Tracking changes in the risk profile can also reveal the effectiveness of renewal strategies, guide PM planning, and provide transparency when communicating with senior management or the public about system vulnerabilities and improvements.

- **Capital Renewal Investment and Service Alignment:** The CRD should track actual annual capital renewal expenditures against this target to assess whether it is keeping pace with the financial requirements identified in the 2025 AMP. Additionally, **Section 7.4** shows the projected service level trends under both the unconstrained funding scenario (based on identified needs) and the constrained funding scenario (based on planned budget levels). This comparison provides insight into the expected asset condition and service level outcomes under different investment levels. Since risk was a key prioritization factor in the lifecycle model analysis, the figure clearly illustrates whether planned expenditures are sufficient to maintain or improve service levels without introducing significant risk or compromising affordability. Regularly updating and reviewing these trends will support evidence-based discussions around budget requirements, service trade-offs, and long-term financial sustainability.

  As part of tracking implementation progress, the CRD is suggested to measure the % of capital projects completed within the recommended timeframe and budget, as this serves as a key indicator of effective AMP execution and overall capital project delivery performance.

- **Capital Growth and Upgrade Needs:** **Section 5** and **Appendix G** present the analysis of capital upgrade requirements, combined with DCC report findings, to accommodate projected growth in the JdFWDS. These needs include upsizing or expanding infrastructure to maintain service levels and system reliability under increasing demand. Performance tracking in this area should consider whether growth-driven investments are proceeding as planned and effectively supporting long-term capacity objectives.

  For the JdFWDS, the CRD must carefully balance capital investments between renewing aging infrastructure and upgrading assets to support future growth. Growth-related capital projects will also expand the asset base, requiring increased O&M funding to ensure new assets meet defined service level standards. Planning for both

the capital and operating implications of growth ang upgrade is essential to sustaining long-term service delivery and affordability.

- **Maintenance, Repair & Replacement Efficiency:** The business-process maps set out in **Section 6** provide a standardised workflow that underpins consistent data capture in SAP PM. To keep these processes current and compliant, CRD should institute an annual contingency- and regulatory-driven review: any change in legislation, industry guidance, or operational risk profile automatically triggers a review of the relevant process steps, documentation templates, and approval gates. Embedding this review cycle in the quality-management system ensures that work orders remain aligned with statutory obligations while retaining the flexibility to address emerging risks.

  Appendix G lists the ongoing and recommended maintenance activities for each asset type, explaining why each task matters, whether to satisfy legislation, mitigate operational risk, or extend asset life, and stating the required frequency. The regulatory review trigger should apply to this catalogue: when a new risk scenario or regulatory amendment is identified, the activity list is revisited, frequencies are recalibrated, and the justification column updated. This disciplined maintenance planning framework gives the operations team clear instructions, supports auditability, and feeds accurate cost and resource forecasts into the AMP's financial model.

  Implementation success can also be measured through the KPIs being tracked by the LOS framework:

  – **Total Corrective Maintenance Hours / Total Maintenance Hours** will track the shift from reactive to proactive work, providing direct evidence of improved maintenance planning.

  – **Pipe O&M Cost per km**, together with **Capital Reinvestment Rate** and **Debt / Annual Revenue**, will indicate whether productivity gains achieved through better planning translate into sustainable cost-to-serve and funding levels.

  – Reliability and risk outcomes will be monitored through the **% of high and very high risk watermains** and **nonlinear assets**, and water-quality compliance KPIs (**% of water samples within health** and **aesthetic parameters**). Risk profile can also be updated to show how maintenance interventions are reducing high-risk exposure.

  By integrating the recommendations from the business process, the updated maintenance activity catalogue, and the established KPIs, CRD can demonstrate that improvements in day-to-day maintenance practice are translating into measurable service, risk, and cost benefits across the JdFWDS.

- **AM Plan Tracking:** While service level metrics are used to assess how well the system is meeting customer and strategic expectations, the AMP must also track its own implementation success—ensuring that the recommended actions and investments are being carried out effectively.

  For this purpose, a set of performance indicators specific to AMP execution should be used. These indicators help benchmark year-over-year progress and support continuous improvement in AM practices. They include measures such as alignment between actual and planned renewal spending, and improvements in asset data quality. Examples of performance indicators for an AM Plan are included in **Table 8-1**.

Table 8-1:AM Plan Performance Monitoring Indicators

AMP Component	Performance Monitoring Indicators	Review Frequency
State of Infrastructure	% of JdFWDS assets in fair or better condition.	Annual
Levels of Service	% of LoS performance measures of which current performance is recorded. % of LoS performance measures for which current performance meets / exceeds target performance.	Annual
Risk Management	% of high and very high-risk assets	Every Two Years
Lifecycle Strategies & Financial Plan	Asset reinvestment rate (%) for JdFWDS Asset expansion rate (%) for JdFWDS Forecasted annual expenditure ($) for JdFWDS Funding Gap (% or $) for JdFWDS	Annual
Continuous Improvement	% of high priority improvement initiatives implemented.	Annual

9. Asset Management Maturity

The CRD requested that a maturity assessment of the JdFWDS was carried out in accordance with the Institute of Asset Management maturity scale. The results of this assessment are discussed below.

9.1 IAM Maturity Assessment Process

The Institute of Asset Management (IAM) has identified ten key Asset Management (AM) capabilities that organizations should develop to manage assets effectively. Each capability focuses on a specific domain, collectively covering a broad range of disciplines essential for maximizing value, performance, and asset longevity. These capabilities serve as a strategic framework, guiding asset managers in aligning resources, managing risk, and making informed decisions to achieve both organizational and sustainability objectives.

Each of the ten capabilities is further broken down into specific subjects, offering detailed guidance and deeper insight into the practical aspects of AM. These subjects provide a granular view of what each capability entails, helping organizations understand and implement best practices in asset management.

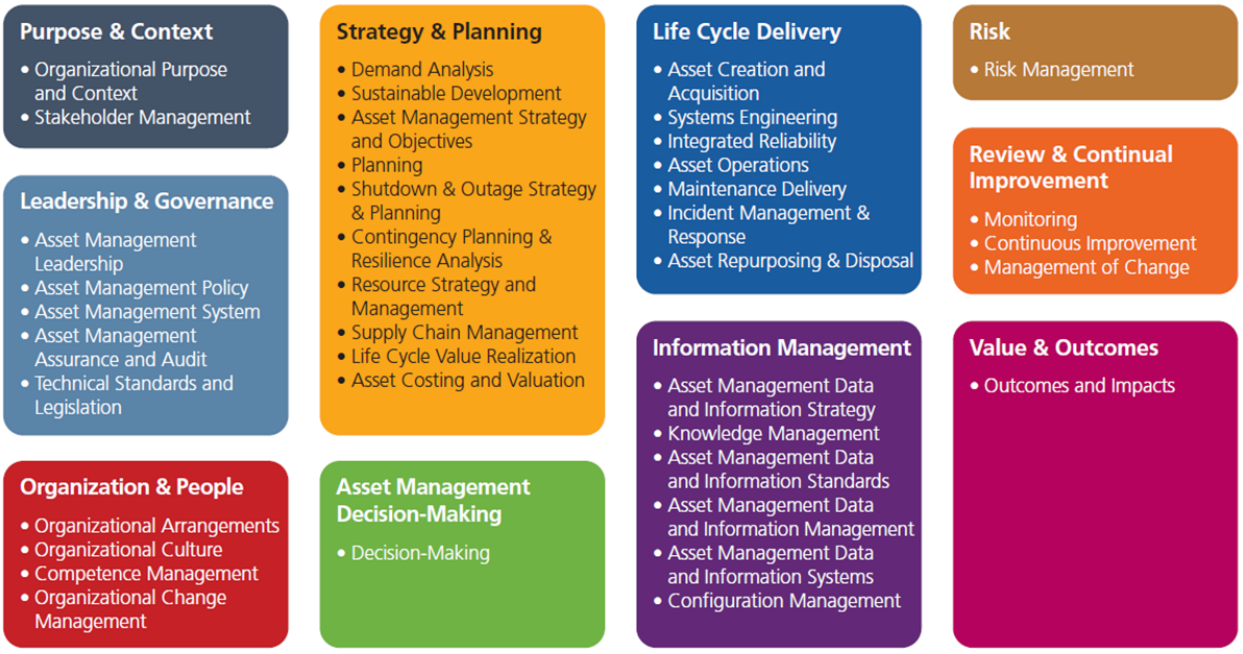


Figure 8-2: The IAM's 40 AM Subject Areas[25]

IAM has developed a six-point Asset Management (AM) maturity scale, which AECOM utilized to assess the capabilities and maturity of the CRD JdFWDS AECOM mapped 40 targeted assessment questions to this scale to evaluate current practices. **Table 8-2** below presents the maturity scale definitions alongside the corresponding survey responses. To enable as many responses as possible the IAM definition was converted into a corresponding survey response.

[25] IAM (2025) The IAM 10-box model

Table 8-2: The IAM Six-point AM Maturity Scale

Scale	Definition	Corresponding CRD Survey Response
0 – Innocent	The organisation has not recognised the need for this requirement and/or there is no evidence of commitment to put it in place.	We don't have this or don't recognize the need to have it.
1 – Aware	The organisation has identified the need for this requirement, and there is evidence of intent to progress it.	We are aware of the need but don't have it.
2 – Developing	The organisation has identified the means of systematically and consistently achieving the requirements and can demonstrate that these are being progressed with credible and resourced plans in place.	We've started this but it is very basic/immature.
3 – Competent	The organisation can demonstrate that it systematically and consistently achieves relevant requirements set out in ISO 55001.	We have this or do this. It works but can be improved.
4 – Optimizing	The organisation can demonstrate that it is systematically and consistently optimizing its Asset Management practice, in line with the organisation's objectives and operating context.	We're doing it well. The system works and improvements are carried out as necessary.
5 - Excellent	The organisation can demonstrate that it employs the leading practices and achieves maximum value from the management of its assets, in line with the organisation's objectives and operating context.	We're excelling. We are proud if this and would share and present if asked.
N/A	N/A (not included in the IAM model)	I don't know / can't answer.

A survey was developed based on the IAM's subject areas and maturity scale, with AECOM tailoring the framework specifically for potable water asset management. This customization ensures that the results are both relevant and easily interpretable by technical staff. By aligning the survey questions with the operational and maintenance realities of potable water systems, the responses become more meaningful, addressing challenges that operators encounter daily.

This targeted approach provides actionable insights that support informed decision-making, effective resource allocation, and the development of focused improvement strategies. The survey was distributed across departments and divisions within the CRD involved in potable water management. The results serve as a foundation for AECOM to develop a list of recommendations aimed at advancing AM maturity and enhancing the management of potable water assets at CRD.

The following sections present the survey results in detail and outline the next steps for continuous improvement.

9.2 AM Maturity – Functional Area Assessment

Table 8-3 shows the 40 questions participants were asked in the survey along with the corresponding subject area.

Table 8-3: Survey Questions

#	Corresponding Subject Area	Question
1	Asset Management Leadership	Does leadership promote a whole life cycle asset management approach for potable water assets?
2	Asset Management Policy	Do you have an asset management (AM) policy that formalizes the organization's asset management objectives?
3	Asset Management System	Do you have processes to review that potable water assets are meeting their objectives?
4	Asset Management Assurance and Audit	Do you have processes to review and update asset management policies and objectives?
5	Technical Standards and Legislation	Do you have a process to ensure that all activities are compliant with relevant technical standards, regulations, and legislation?
6	Organizational Arrangements	How well are resources managed across multiple divisions involved in potable water?
7	Organizational Arrangements	Are the roles and responsibilities for the management of potable water and potable water assets clearly defined across the JdFWDS?
8	Organizational Culture	Is there a culture that supports asset management within the JdFWDS?
9	Competence Management	Does staffing have sufficient knowledge and skills for managing potable water and potable water assets?
10	Competence Management	Is their sufficient staffing for managing potable water and potable water assets?
11	Organizational Change Management	Are changes managed at CRD (e.g., changes in organization, technology etc.)?
12	Demand Analysis	Are there processes for projecting future demands on potable water assets (e.g. climate change, development etc.)?
13	Sustainable Development	Are economic, environmental and social goals considered in potable water management?
14	Asset Management Strategy & Objectives	Is there an overarching asset management strategy?
15	Planning	Is there a plan that identifies potable water asset needs (e.g., maintenance and renewal) over time?
16	Shutdown & Outage Strategy & Planning	Do you have plans for managing outages that may impact potable water service delivery?
17	Contingency Planning & Resilience Analysis	Is there a plan for preparing for, responding to and recovering from hazardous events (e.g., storms, fires, earthquakes etc.).
18	Resource Strategy & Management	Do you have a strategy for getting enough staff to deliver potable water services?
19	Supply Chain Management	Do you have a procurement strategy for acquiring the necessary equipment and materials to deliver potable water services?
20	Life Cycle Value Realization	Are decisions made to maximize the full value of assets over their whole life cycle (e.g., beyond purchase/construction cost)?
21	Asset Costing and Valuation	No question
22	Decision-making	Does the JdFWDS have the tools, information, criteria and processes needed to make good asset related decisions?
23	Asset Creation and Acquisition	Do you have the processes for choosing, creating, acquiring, installing, and commissioning new potable water assets?
24	Systems Engineering	Do you use an interdisciplinary, collaborative approach to potable water management?
25	Integrated Reliability	Do you conduct activities (e.g., inspections) to ensure the reliability of potable water assets (e.g., prevent failures) over their lifecycle?

#	Corresponding Subject Area	Question
26	Asset Operations	Do you operate its potable water assets in consideration of overall asset objectives?
27	Maintenance Delivery	Are potable water maintenance plans based on data (e.g., asset condition)?
28	Incident Management & Response	Do you have a structured approach to addressing incidents such as spills?
29	Asset Repurposing & Decommissioning	Do you have processes in place for the decommissioning and disposal of potable water assets?
30	Asset Management Data and Information Strategy	Do you have a strategic approach to defining, collecting, maintaining, and reporting potable water asset data?
31	Knowledge Management	Are there processes in place for retaining knowledge of JdFWDS potable water assets?
32	Asset Data and Information Standards	Do you have a consistent structure for potable water asset data?
33	Asset Management Data and Information Management	No question.
34	Asset Management Data and Information Systems	Do asset data and information systems sufficiently support potable water related decisions?
35	Configuration Management	No question.
36	Risk	Do you have a documented approach for identifying, quantifying and mitigating risks that is applied to potable water asset management?
37	Monitoring	Do you use data and metrics to evaluate the value realized from potable water assets to help inform future asset decisions?
38	Continuous Improvement	Do you review potable water asset performance to identify opportunities for improving potable water services?
39	Management of Change	No question.
40	Outcomes & Impacts	Do you assess the effectiveness of your Asset Management activities?

Each area resulted in a performance score gathered from the results of the participants. **Figure 8-3** shows the summary of results which indicates the current AM maturity position of the CRD. The region has greater maturity in purpose and context, however, to successfully reach the AM Readiness Target Level, improvements in Asset Management Decision Making and Lifecycle Delivery is essential.

Figure 8-3: Results Summary

The official scores based on the maturity framework are listed in **Table 8-4** along with the appropriate target determined following the maturity assessment.

Table 8-4: IAM Maturity Summary

Capability Area		Current	Target	Max
Purpose & Context		3.50	4.50	5.00
Leadership & Governance		2.20	3.20	5.00
Organization & People		2.50	3.50	5.00
Strategy & Planning		2.78	3.78	5.00
Asset Management Decision Making		2.00	3.00	5.00
Lifecycle Delivery		2.29	3.28	5.00
Information Management		2.00	3.00	5.00
Risk, Improvement, and Outcomes		1.75	2.75	5.00
	AVERAGE	**2.4 / 5**	**3.4 / 5**	

The Purpose & Context capability received an average score of 3.5, indicating a relatively strong alignment between asset management activities and the organization's strategic direction. In contrast, the Decision-Making and Lifecycle Delivery capabilities both scored an average of 2, highlighting key areas for development. Key improvement priorities include optimizing the use of the CMMS to support resource tracking and maintenance planning, while developing standardized procedures for work order management and document control. The worst performing area was risk, improvement and outcomes.

9.2.1 Purpose & Context

The Purpose & Context capability ensures that asset management activities are aligned with the organization's strategic direction, operational realities, and stakeholder expectations. For the CRD, this capability is critical in maintaining a clear connection between its mission to deliver safe, reliable potable water and the day-to-day decisions made across departments.

Survey results show that CRD is performing at an optimizing level, which reflects a strong understanding of their organization. However, there are several opportunities to be strengthened to further improve. A key theme was the need to ensure adequate staffing and resources to support long-term system sustainability as infrastructure ages and service demands grows. While partnerships with stakeholders have helped capacity, the limitation in the current CMMS makes it difficult to plan resources efficiently.

While CRD maintains a strong informal relationship with internal and external stakeholders, stakeholder management scored at a competent level. There is currently no formal engagement plan in place, leading to an unstandardized process with the potential to become disorganised.

Table 8-5 illustrates the regions Purpose and Context AM Readiness Level across the two outcome areas: Organizational Purpose & Context and Stakeholder Management. In accordance with **Table 8-6**, organizational purpose & context scored a 4 (Optimizing), meaning there is continuous improvement within the organization and is being used effectively. While stakeholder management scored a 3 (Competent), which shows it is meeting ISO 55001 standards but can be further refined.

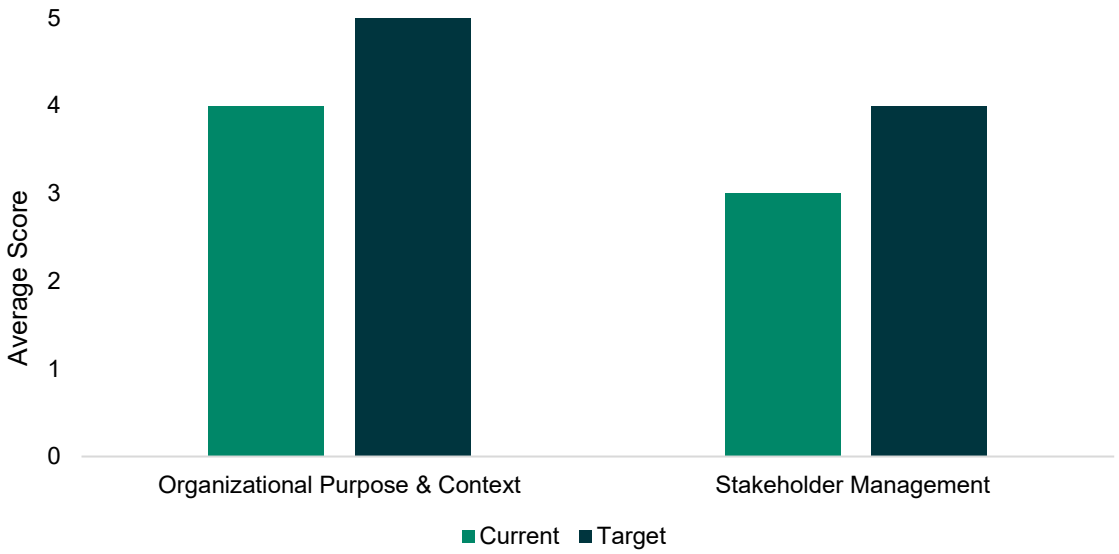


Table 8-5: Purpose & Context Subject Area Scores

CRD demonstrated a relatively high level of maturity in the "Organizational Purpose & Context" capability, with many responses scoring at 4. However, the presence of lower scores indicates variability across departments and highlights the need for greater standardization. Ensuring consistent understanding and application of organizational purpose across all teams will help elevate overall performance. In contrast, the "Stakeholder Management" capability scored one lower on average, which aligns with the identified gap in formal engagement plans.

Table 8-6: Purpose & Context – Subject Area Summary

Subject Area	Current Score	Current Performance Status	Target Score
Organizational Purpose & Context	4	The AM department continues to align with the organization's goals. However, limitations in the use of the CMMS hinder effective resource planning and maintenance scheduling.	5
Stakeholder Management	3	The AM department maintains strong informal relationships with stakeholders, enabling effective communication. However, the absence of formal engagement plans limits consistency and documentation of stakeholder interactions.	4

The following immediate/short term improvement actions are needed to secure current scores and allow for further development towards higher maturity levels:

- Develop an external stakeholder communications plan that formalizes existing informal relationships with regulators, municipalities, and others.
- Create an internal stakeholder prioritization plan which identifies key internal stakeholders (IT, fleet, finance, and more) and their criticality to service delivery at the CRD.

The following medium/long term improvement actions are needed to achieve the target score:

- Conduct a study on resource use to quantify how much staffing and support is required for system growth and maintain aging infrastructure. For example, a productive time or "wrench time" for field staff may discover inefficiencies that can be easily resolved.
- Establish a CMMS work order standard that shows status progression, closure criteria, and other information for accurate tracking. Use the standard work order status in SAP to track workflow progression and understand outstanding and overdue workload.

9.2.2 Leadership & Governance

The Leadership & Governance capability ensures that AM is embedded into the organization's culture, with clear direction, accountability, and oversight from senior leadership. For the CRD, this capability is essential to ensure that asset management practices are consistently applied and aligned with regulatory requirements, organizational goals, and service delivery expectations.

Workshop discussions showed that while the CRD has an AM Policy in place, it was developed in 2019 and is now outdated. The policy is written from a strategic perspective and primarily serves senior management, limiting its practical application for operational staff. This gap reduces the ability to track AM effectiveness and ensure compliance with technical standards and legislation. There is also a lack of formal documentation, such as an operational guide or "water bible," which would support onboarding and consistent practices across departments.

The absence of a structured approach to reliability engineering and the reliance on "tribal knowledge" further highlight the need for improved governance mechanisms. While leadership is supportive of AM initiatives, the current systems do not enable easy tracking of performance metrics like equipment uptime or regulatory compliance. A CMMS function review and policy update were identified as key actions to strengthen this capability.

Figure 8-4 illustrates the region's Leadership & Governance AM Readiness Level across all outcome areas: AM Leadership, AM Policy, AM Systems, AM Assurance and Audit, and Technical Standards and Legislation. In accordance with **Table 8-7**, the AM Policy scored the highest with 3 (Competent), indicating alignment with ISO 55001 standards, while all other subject areas scored 2 (Developing), suggesting that improvements are needed to formalize and document compliance processes.

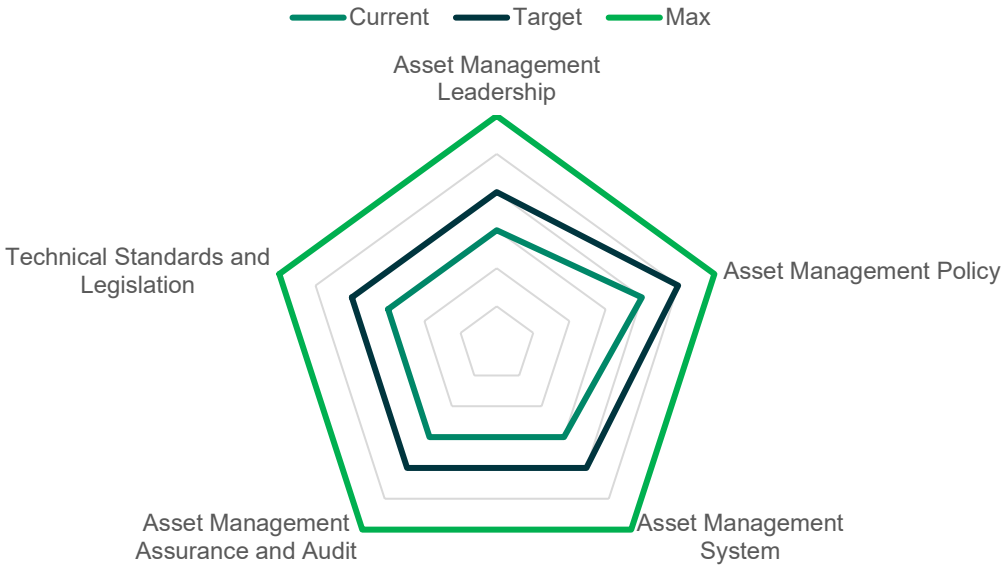


Figure 8-4: Leadership & Governance Subject Area Scores

The CRD demonstrates a developing level of maturity across all subject areas, with most responses falling within the 2–3 range; however, the wide spread of scores, from 0 to 4, indicates significant variability and highlights the need for clearer organizational direction regarding policy and regulatory alignment. To foster consistency and support staff at all levels, it is essential to update existing policies and develop structured guidance for new employees. While the region is still progressing in terms of Leadership and Governance maturity, there are clear opportunities for advancement through targeted policy improvements and the implementation of data tracking systems, which will help drive greater coherence and long-term success.

Table 8-7: Leadership & Governance – Subject Area Summary

Subject Area	Current Score	Current Performance Status	Target Score
Asset Management Leadership	2	Leadership is in place, but systems require “operationalisation”.	3
Asset Management Policy	3	The AM department has a policy in place that demonstrates strategic intent and organizational commitment. However, the policy was developed in 2019 and remains at a strategic level, limiting its usefulness for staff without an operational update.	4
Asset Management System	2	The framework requires formalization.	3
Asset Management Assurance and Audit	2	Minimum audit function takes place. There is no audit of critical functions such as work enactment at a maintenance level. As a result, leadership cannot demonstrate the CRD is in compliance with its own processes.	3
Technical Standards and Legislation	2	The organization has a team of staff with extensive knowledge across all operational areas to keep assets functioning effectively. However, this creates a heavy reliance on experienced individuals, increasing the risk of knowledge loss during staff turnover.	3

The following immediate/short term improvement actions are needed to secure current scores and allow for further development towards higher maturity levels:

- Conduct a CMMS Function Review to include breakdown work order failure codes to allow reliable reporting, required regulatory work order tracking, and work order prioritization standards.
- Review and update the existing AM policy from 2019, making sure it reflects current operational needs and is still appropriate for staff.

The following medium/long term improvement actions are needed to achieve the target score:

- Develop clear operational guidelines to support current and future staff that will serve as a reference for operations, standards, and procedures (“Water Bible”).

9.2.3 Organization & People

Organization & People capability ensures that the right people, skills, and structures are in place to support effective AM across the organization. For the CRD, this is essential to maintain operational continuity, transfer knowledge, and adapt to evolving service demands.

Looking at survey results and workshop discussions, it is shown that CRD is performing at a developing to competent level in this area with an average score of 2.5. While the organization benefits from a knowledgeable and experienced workforce, there is a heavy reliance on key staff (one was named particular showing their impact across the organization), posing a risk of knowledge loss during staff turnover. Having staff rotation helps build familiarity and retention of workers, but current practices are reactive, based on short-term backlogs rather than the future. The lack of a succession plan and knowledge transfer procedures are key areas of improvement.

An absence of defined planning windows limits the ability to proactively manage future workloads and pre-emptively develop staff capabilities. A key improvement opportunity is to establish succession planning for critical roles and develop planning/scheduling standards from 2 weeks to longer-term like monthly, quarterly, and beyond. These steps will help build resilience and ensure that CRD AM practices are consistent across departments.

Figure 8-5 illustrates the Organization & People AM Readiness Level across all outcome areas: Organizational Arrangements, Organizational Culture, Competence Management and Organizational Change Management. In accordance with **Table 8-8**, Competence Management scored the highest with 4 (Optimizing), meaning there is continuous improvement within the organization and is being used effectively. While other areas scored a 2 (Developing), indicating that while foundational practices are in place, further development is needed to ensure sustainability and adaptability.

Figure 8-5: Organization & People Subject Area Scores

CRD shows a developing level of maturity across all subject areas with a deeper understanding about Competence Management. However, the spread of scores ranged from 0 to 5, indicating high variability and an alignment needed within to fully fill the gaps, for the present and future, within the organization. Incorporating proper succession planning for key roles to allow for knowledge transfer and growth will allow for resiliency during all types of events. While planning for future with defined windows allows for dealing with problems before they become bigger.

Table 8-8: Organization & People – Subject Area Summary

Subject Area	Current Score	Current Performance Status	Target Score
Organizational Arrangements	2	Lack of succession planning and knowledge retention.	3
	2		3
Organizational Culture	3	No detailed discussion.	4
Competence Management	2	The organization has key personnel with extensive operational and maintenance knowledge, which supports day-to-day performance. However, the absence of a formal succession plan limits the ability to transfer this knowledge, creating a risk of gaps if experienced staff were to leave.	3
Competence Management	4	No detailed discussion.	5
Organizational Change Management	2	Staff rotate through various roles, which helps build system-wide understanding and supports staff retention. However, planning and scheduling roles are typically filled by those already familiar with operations, which can lead to individuals being stretched across multiple responsibilities and limit the opportunity to develop specialized planning capacity.	3

The following immediate/short term improvement actions are needed to secure current scores and allow for further development towards higher maturity levels:

- Implement succession planning for key roles and shadowing of critical personnel to help retain knowledge.

The following medium/long term improvement actions are needed to achieve the target score:

- Establish planning and scheduling standards with defined windows that evolve from the current two week look-ahead to the more structured intervals such as monthly, quarterly, and eventually 6, 12, and 18 months to support proactive maintenance planning and resource allocation.

9.2.4 Strategy & Planning

The Strategy & Planning capability ensures that asset management objectives are clearly defined, prioritized, and aligned with the organization's long-term goals and service delivery expectations. For the CRD JdFWDS this capability is essential to guide investment decisions, manage risk, and ensure sustainable service delivery as infrastructure ages and demand increases.

Workshop discussions and survey results indicate that CRD is performing at a competent level in this area, with an average score of 2.8. While the organization has an Asset Management Strategy in place, it lacks a clear roadmap to prioritize actions, which has made implementation and communication of the strategy challenging. Staff awareness of the strategy is limited, and there is hesitation to commit to specific metrics due to concerns about accountability and resource constraints. This has led to uncertainty around how strategic goals cascade into operational activities.

The absence of a formal lifecycle management approach was also noted, with asset decisions often based on extending life as long as possible rather than structured planning from acquisition to disposal. However, recent efforts to introduce predictive maintenance practices, such as vibration analysis and oil sampling, show progress toward more proactive asset management.

Figure 8-6 illustrates the Strategy & Planning AM Readiness Level across the outcome areas: Demand Analysis, Sustainable Development, AM Strategy & Objectives, Planning, Shutdown & Outage Strategy & Planning, Contingency Planning & Resilience Analysis, Resource Strategy & Management, Supply Chain Management, and Lifecycle Value Realization.

In accordance with **Table 8-9**, Contingency Planning & Resilience Analysis and Shutdown & Outage Strategy & Planning scored a 4 (Optimizing), while Lifecycle Value Realization, Planning, Resource Strategy & Management, and Supply Chain Management all scored a 2 (Developing), indicating that while foundational practices are in place, further development is needed to fully integrate lifecycle thinking and strategic planning into daily operations.

Figure 8-6: Strategy & Planning Subject Area Scores

CRD demonstrates a high level of competency in strategy and planning, particularly in areas such as contingency planning and outage response. However, the wide distribution of maturity scores received, **from 0 to 5, with notable concentrations at levels 2 and 3, indicates variability in understanding and application across the organization. This spread highlights the need for greater internal alignment to ensure consistent planning practices that support both current operations and future growth. Improving prioritization and defining responsibilities will strengthen resource strategies and support long-term sustainability.**

Table 8-9: Strategy & Planning – Subject Area Summary

Subject Area	Current Score	Current Performance Status	Target Score
Demand Analysis	3	The CRD benefits from a dedicated demand management group, which supports informed responses to system demand.	4
Sustainable Development	3	No specific conversation held.	4
Asset Management Strategy & Objectives	3	The organization has an AM strategy which lists actions that should be done. However, it lacks a roadmap, making it difficult to prioritize important actions.	4
Planning	2	No specific conversation held.	3
Shutdown & Outage Strategy & Planning	4	No specific conversation held.	5
Contingency Planning & Resilience Analysis	4	No specific conversation held.	5
Resource Strategy & Management	2	No specific conversation held.	3
Supply Chain Management	2	No specific conversation held.	3
Life Cycle Value Realization	2	Assets are currently maintained for as long as possible by following manufacturer guidelines. However, predictive analysis methods, such as vibration monitoring and oil sampling, offer the potential to tailor maintenance to asset conditions, helping to extend asset life and optimize performance.	3
Asset Costing and Valuation	3	No specific conversation held.	4

The following immediate/short term improvement actions are needed to secure current scores and allow for further development towards higher maturity levels:

- Improve communication and prioritization within the AM strategy.
- Define clear roles and responsibilities for AM practices and procedures to reduce duplication of effort. A simple RACI would clarify ownership.

The following medium/long term improvement actions are needed to achieve the target score:

- Support planning and scheduling by establishing accurate resourcing requirements to enable the organisation to identify and address shortfalls.

9.2.5 Asset Management Decision-Making

The Decision-Making capability ensures that asset-related decisions are informed by reliable data, risk assessments, and long-term planning to support sustainable service delivery. For the CRD, this capability is essential to prioritize investments, allocate resources effectively, and ensure transparency in how decisions are made across the asset lifecycle.

Workshop discussions revealed that CRD is currently performing at a developing level in this area, with an average score of 2. Staff noted challenges in accessing historical asset data due to limitations in the CMMS, which makes it

difficult to generate insights and support evidence-based decisions. Much of the decision-making process is reactive, relying on manual data pulls rather than automated reporting or dashboards. This limits the ability to evaluate asset performance, plan replacements, or justify long-term financial decisions.

The organization intends to leverage the outcomes of the current AMP to improve decision-making, particularly by using LoS, asset valuation, and risk data to guide prioritization. However, the absence of a single, reliable source of asset history and the lack of integration between systems like SAP and GIS continue to hinder progress.

Figure 8-7 illustrates the region's Decision-Making AM Readiness in the decision-making subject area. In accordance with **Table 8-10**, the area scored 2 (Developing), indicating that while foundational practices are in place, further development is needed to support consistent, data-driven decision-making across the organization.

Figure 8-7: Asset Management Decision Making Subject Area Scores

The CRD is currently developing its decision-making capability, with survey responses concentrated at level 2 and no responses above that level, indicating a consistent perception of underdeveloped practices. While there is intent to use the AMP to guide long-term decisions, having a unified asset registry and integration between systems like SAP and GIS is essential to make informed, transparent choices. Addressing these gaps will be essential for CRD to build a more consistent, accountable, and forward-looking decision-making framework.

Table 8-10: Asset Management Decision Making – Subject Area Summary

Subject Area	Current Score	Current Performance Status	Target Score
Decision-making	2	The organization currently uses a CMMS to support asset-related decisions. However, difficulty accessing and interpreting data has limited its effectiveness, making the process feel more like pulling information manually than receiving timely, actionable insights.	3

The following immediate/short term improvement actions are needed to secure current scores and allow for further development towards higher maturity levels:

- Use asset risk to inform and improve decision making and prioritization to ensure that resources are spent wisely.

The following medium/long term improvement actions are needed to achieve the target score:

- Leverage the AMP LoS, valuation data, and asset registry to establish a single, reliable source for asset history.

9.2.6 Life Cycle Delivery

The Lifecycle Delivery capability ensures that assets are managed effectively from acquisition through to disposal, maximizing value and minimizing risk throughout their useful life. For the CRD, this capability is essential to ensure that infrastructure continues to meet service expectations while adapting to aging systems and evolving operational needs.

Workshop discussions revealed that CRD is performing at a developing level in this area, with an average score of 2.3. While the system is generally well-managed, the lowest scoring area was asset disposal and repurposing, where no formal standards currently exist. Decisions around decommissioning or isolating assets are largely operational and depend on staff awareness rather than documented procedures. This reliance on informal knowledge increases the risk of inconsistency and inefficiency in managing redundant or offline equipment.

Incident management and emergency response scored higher, reflecting strong institutional knowledge and staff familiarity with the system. However, this strength is not underpinned by formalized plans or risk-based mitigation strategies. The organization currently responds reactively to major failures, and there is an opportunity to develop layered emergency response plans guided by risk and consequence of failure (CoF) assessments.

Figure 8-8 illustrates the region's Lifecycle Delivery AM Readiness Level across the outcome areas: Asset Creation & Acquisition, Systems Engineering, Integrated Reliability, Asset Operations, Maintenance Delivery, Incident Management & Response, and Asset Repurposing & Disposal. In accordance with **Table 8-11**, Incident Management scored a 4 (Optimizing), while Asset Disposal scored a 2 (Developing), indicating that while operational response is strong, formal lifecycle planning and disposal standards require further development to ensure consistency and long-term sustainability.

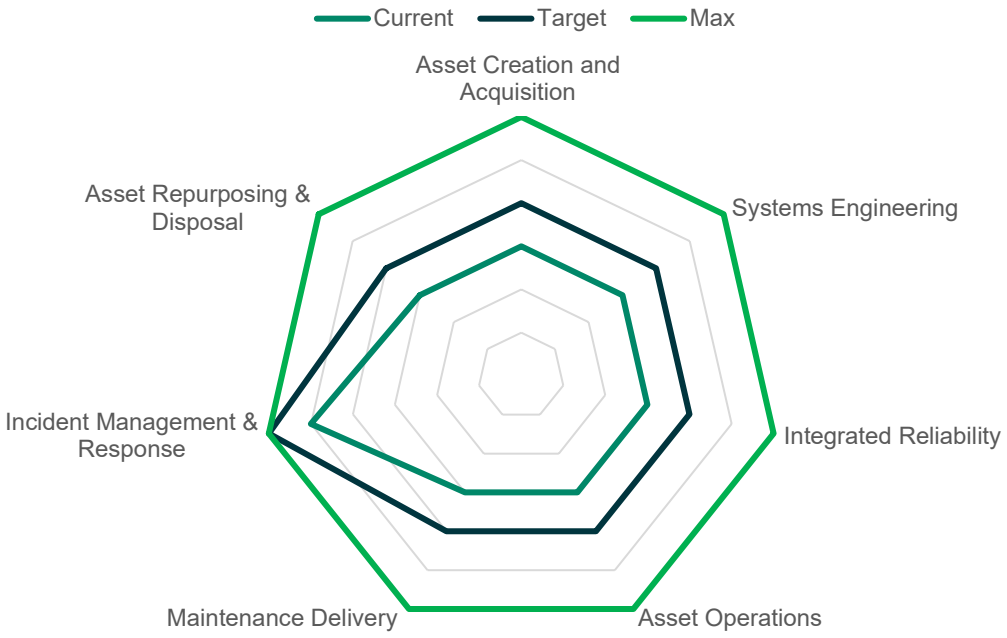


Figure 8-8: Life Cycle Delivery Subject Area Scores

The CRD is in the early stages of developing its lifecycle delivery capability, with survey responses indicating low maturity in understanding lifecycle costs and tracking asset performance. Responses to key questions showed frequent responses at levels 2 to 3, with some in the "don't know" category, reflecting limited or poorly circulated knowledge. While the organization is generally well-managed, there are no formal standards for asset disposal or repurposing, and decisions are often driven by operational awareness rather than structured lifecycle planning. The

absence of consistent tracking for asset failures and performance data further limits the ability to optimize asset value from acquisition through disposal. Establishing clear standards for asset decommissioning, performance monitoring, and long-term planning will be essential to improve lifecycle delivery and ensure sustainable asset management practices.

Table 8-11: Life Cycle Delivery – Subject Area Summary

Subject Area	Current Score	Current Performance Status	Target Score
Asset Creation and Acquisition	2	No specific conversation held.	3
Systems Engineering	2	No specific conversation held.	3
Integrated Reliability	2	No specific conversation held.	3
Asset Operations	2	No specific conversation held.	3
Maintenance Delivery	2	No specific conversation held.	3
Incident Management & Response	4	The organization benefits from a high level of emergency response awareness among experienced staff, which supports incident management. However, this capability is largely driven by practical experience and system failures rather than standards or procedures.	5
Asset Repurposing & Disposal	2	There is general awareness among staff of which assets need to be taken offline, but without a formal decommissioning plan, the process relies heavily on “tribal knowledge” and individual experience.	3

The following immediate/short term improvement actions are needed to secure current scores and allow for further development towards higher maturity levels:

- Define disposal standards for large and small equipment like standards for long-term isolations, mothballing, and management of redundant assets to set requirements for management and divestment.
- Develop emergency response and mitigation plans based on asset risk and CoF.

9.2.7 Information Management

The Information Management capability ensures that asset data is accurate, accessible, and consistently used to support decision-making and operational efficiency. For the CRD, this capability is critical to ensure that asset-related information is reliable, standardized, and integrated across systems to support effective asset management practices.

Workshop discussions revealed that CRD is currently performing at a developing level in this area, with an average score of 2. Staff noted that while there are processes in place for entering asset data into systems like SAP and GIS, these processes are inconsistent and heavily reliant on individual knowledge and manual effort. There is no single source of truth for asset information, and systems such as SAP, GIS, SharePoint, and network drives operate in silos, leading to duplication and confusion. Smaller assets are often not tracked consistently, and data quality varies depending on who enters it.

The lack of clear standards for data entry, work order status updates, and document management further complicates efforts to maintain reliable asset records. When CRD transitioned to SAP, the system was configured to mimic legacy processes, which has limited its functionality and created challenges in tracking work order completion and cost data. Staff also reported difficulty accessing or locating the correct data, particularly for those unfamiliar with SAP.

Figure 8-9 illustrates the Information Management AM Readiness Level across the three outcome areas: Asset Management Data & Information Strategy, Asset Information & Standards, and Systems Integration. In accordance with **Table 8-12**, all areas scored a 2 (Developing), indicating that while foundational systems are in place, significant improvements are needed to standardize data practices, integrate systems, and ensure consistent, organization-wide access to reliable asset information.

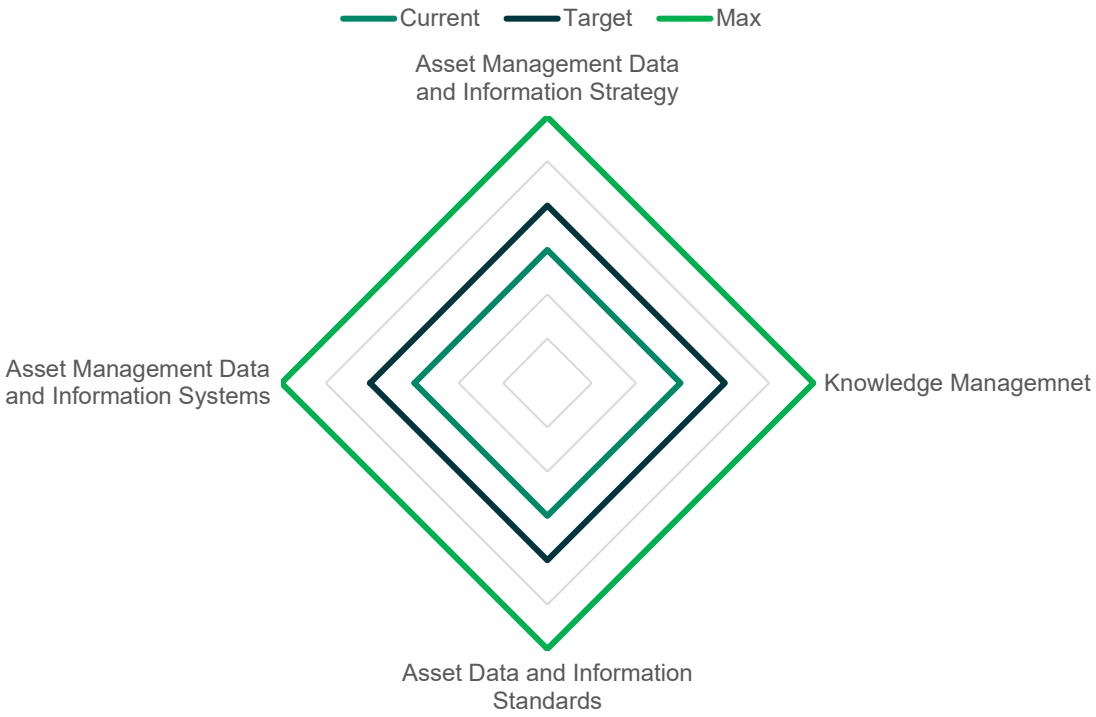


Figure 8-9: Information Management Subject Area Scores

The CRD is currently developing its information management capability, with survey responses concentrated at levels 1 and 2, and minimal scores in the next levels, indicating limited maturity in data practices across the organization. While systems like SAP and GIS are in place, they are people driven, and asset data entry is inconsistent, often relying on individual knowledge rather than standardized processes. The absence of a single source of truth and clear data standards has led to duplication, gaps in documentation, and challenges in tracking asset performance. Addressing these issues through system integration, standardized data entry protocols, and improved document management will be critical to enabling reliable, organization-wide access to asset information.

Table 8-12: Information Management – Subject Area Summary

Subject Area	Current Score	Current Performance Status	Target Score
Asset Management Data and Information Strategy	2	CRD (Juan De Fuca WDS) currently has processes to close out projects, however, they are human centered which lacks consistency and relies on individuals to be consistent with other departments.	3
Knowledge Management	2	Although a CMMS has been implemented, its functionality presents challenges that hinder accurate tracking of asset and maintenance information. Inconsistent use of system features, such as work order statuses and data entry standards, limits the ability to generate reliable reports and undermines confidence in the system as a dependable source of truth	3
Asset Data and Information Standards	2	No specific conversation held.	3
Asset Management Data and Information Management	-	No specific conversation held.-	-
Asset Management Data and Information Systems	2	No specific conversation held.	3
Configuration Management	-	No specific conversation held.	-

The following immediate/short term improvement actions are needed to secure current scores and allow for further development towards higher maturity levels:

- Establish a work order data standard that defines the purpose of each data field within the CMMS and who is responsible. For corrective maintenance work orders an example may be that the following date fields are standardized and recorded to allow tracking of work order progress:
  - Original notification date – the date a deficiency is reported.
  - Scheduled start date – the automatically scheduled start date based upon the scheduled end date and the forecast duration.
  - Scheduled end date - the automatically scheduled end date based upon the risk of the deficiency and the risk tolerance of the CRD.
  - Actual start date – when work is put into a realistic schedule to be executed.
  - Actual end date – used to determine how long a work order took to execute and how long the CRD accepted the risk associated.
  - Work order completion date – when corrective work has been fully executed.
  - Work order close-out date – the date that a work order has been fully executed and data fields completed.
- Develop standardized procedures for document management such as required final submission dates, and live drawing update requirements.

The following medium/long term improvement actions are needed to achieve the target score:

- Define standards for inputting and updating asset registries across all business systems for consistency to help with maintain accurate asset data.

9.2.8 Risk

The Risk, Improvement & Outcomes capability ensures that asset-related risks are identified, managed, and used to drive continuous improvement and deliver value to stakeholders. For the CRD (Juan de Fuca WDS), this capability is essential to ensure that asset management practices are resilient, adaptive, and focused on achieving measurable outcomes.

Figure 8-10 illustrates the region's Risk, Improvement & Outcomes AM Readiness Level across the outcome areas: Risk, Monitoring, Continuous Improvement, and Outcomes & Impacts. In accordance with **Table 8-13**, these areas scored on average 2 (Developing), highlighting the need for structured processes and performance tracking to support long-term improvement and accountability.

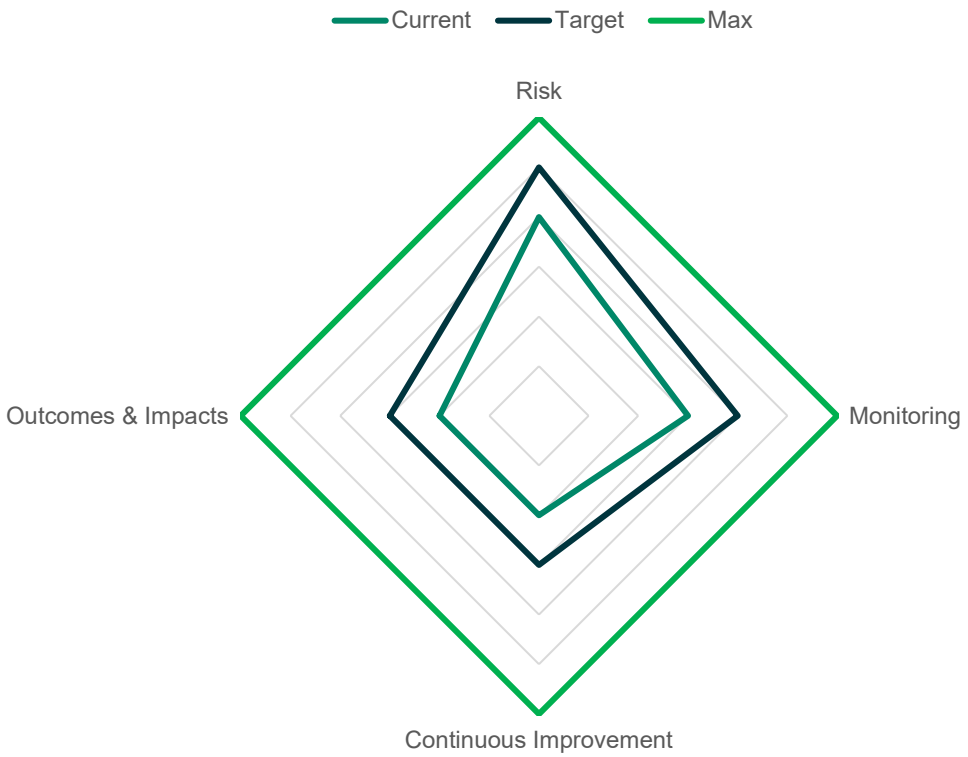


Figure 8-10: Risk Subject Area Scores

Table 8-13: Risk – Subject Area Summary

Subject Area	Current Score	Current Performance Status	Target Score
Risk	3	Basic risk assessment and project prioritisation takes place but use of risk to support decision is limited. No consistent framework exists for risk mitigation and risk tolerance at the CRD is determined at an individual level rather than by the organization.	4
Monitoring	2	Minimal live risk monitoring is carried out. AECOMs risk framework is the first usage of property based CoF and PoF determination	3
Continuous Improvement	1	No discussion held.	2
Management of Change	-	No discussion held.	-
Outcomes & Impacts	1	Outcomes of risk assessment and impacts to AM strategy are often not	2

The following immediate/short term improvement actions are needed to secure current scores and allow for further development towards higher maturity levels:

- Fully implement an asset risk framework for tactical risk analysis to assist with prioritization and decision making.
- Escalate strategic risks from this AMP to enterprise risk for consideration and formalise the risk escalation methodology and responsibilities. A clear definition of organizational risk tolerance will support risk escalation.

The following medium/long term improvement actions are needed to achieve the target score:

- Implement a defined Management of Change procedure that should be followed for asset changes.

10. Recommended Improvement Initiatives and Roadmap

Throughout the course of the project several gaps and opportunities have been identified through discussions, workshops, and surveys. Those gaps have been clearly stated within each area of this AMP and are summarized in **Table 10-1** (the maturity improvement roadmap, referred to as the Strategic Actions) and in **Table 10-2** (the AMP sections, referred to as the Tactical Actions).

It is recommended that short term actions are done within 2-years (prior to the end of 2027) and long-term actions within 5-years (prior to the end of 2030). The objective should be to complete the actions listed prior to the next AMP update to maximize value from the AM planning process.

Tactical actions are listed alongside a recommended priority defined during the creation of the relevant section of the AMP. To align with the strategic actions the following timeline is recommended:

- Low – Complete by the end of the AMP cycle and prior to update of the AMP.
- Medium – Complete by the mid point of the AMP cycle.
- High – Complete within 12 months or have plans in place with 12 months to enact based upon resourcing and perceived benefit of each activity.

Table 10-1: Strategic Actions - AM Maturity Short and Long-Term Action Summary

Capability	Short Term Action	Long Term Action
Purpose & Context	• Develop an external stakeholder communications plan that formalizes existing informal relationships with regulators, municipalities, and others. • Create an internal stakeholder prioritization plan which identifies key internal stakeholders (IT, fleet, finance, and more).	• Conduct a study on resource use to quantify how much staffing and support is required for system growth and maintain aging infrastructure. • Establish a CMMS work order standard that shows status progression, closure criteria, and other information for accurate tracking.
Leadership & Governance	• Conduct a CMMS Function Review to include breakdown work order failure codes to allow reliable reporting, required regulatory work order tracking, and work order prioritization standards. • Review and update the existing AM policy from 2019, making sure it reflects current operational needs and is still appropriate for staff.	• Develop clear operational guidelines to support current and future staff that will serve as a reference for operations, standards, and procedures (“Water Bible”).
Organization & People	• Implement succession planning for key roles and shadowing of critical personnel to help retain knowledge.	• Establish planning and scheduling standards with defined windows that evolve from the current two week look-ahead to the more structured intervals such as monthly, quarterly, and eventually 6, 12, and 18 months to support proactive maintenance planning and resource allocation
Strategy & Planning	• Improve communication and prioritization within the AM strategy. • Define clear roles and responsibilities for AM practices and procedures to reduce duplication of effort.	• Support planning and scheduling by establishing accurate resourcing requirements to enable the organisation to identify and address shortfalls
Asset Management Decision-Making	• Use asset risk to inform and improve decision making and prioritization to ensure that resources are spent wisely.	• Leverage the AMP LoS, valuation data, and asset registry to establish a single, reliable source for asset history.
Life Cycle Delivery	• Define disposal standards for large and small equipment like standards for long-term isolations, mothballing, and management of redundant assets to set requirements for management and divestment. • Develop emergency response and mitigation plans based on asset risk and CoF.	

Capability	Short Term Action	Long Term Action
Information Management	• Establish a work order date standard that defines the purpose of each data field within the CMMS and who is responsible. • Develop standardized procedures for document management like .	• Define standards for inputting and updating asset registries across all business systems for consistency to help with maintain accurate asset data.
Risk	• Fully implement an asset risk framework for tactical risk analysis to assist with prioritization and decision making. • Escalate strategic risks from this AMP to enterprise risk for consideration and formalise the risk escalation methodology and responsibilities.	• Implement a defined Management of Change procedure that should be followed for asset changes.

In addition to the previously identified actions, **Table 10-2** consolidates the recommendations and mitigation tasks derived from the discussions presented in the previous sections.

Table 10-2: Tactical Actions – AMP Improvement Initiatives

AMP Area	Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
State of Infrastructure	Linear -General	• No Global ID Included in the source GIS database	• Global IDs have been produced and assigned as part of the consolidated asset inventory to ensure consistent identification across datasets. In addition, Global IDs have been incorporated into the source GIS data provided by JdFWDS. The provided Global IDs can be used as a starting point for ongoing data management, or alternatively, JdFWDS may choose to regenerate Global IDs based on their preferred convention, provided that consistency is maintained across all systems	Medium
	Linear – Water Meters	• Inconsistency between attribute names	• Update the meter information stored in SAP ISU to include Global IDs by cross-referencing with the GIS layer and establish consistent naming conventions and attribute structures across SAP and GIS to support data integration and accuracy.	High
	Linear – Service Connections	• No data currently available for service connections • No installation date data and no condition data.	• Collect and input core service connection data, starting with inventory, to enable assignment of Global IDs in the future.	High
			• Obtain installation dates from as-built records or historical documentation, where available; otherwise, estimate based on adjacent main installation dates.	High
			• Establish a process for collecting and tracking service connection condition data (e.g., through inspections or age-based proxies).	High
	Linear - Watermains	• Duplicate IDs	• Review and resolve duplicate entries in the CRD Model ID field to ensure each asset is uniquely identified. It is recommended to implement a data validation process to prevent future duplication during data entry or system integration.	High
	Non-Linear – Bulk Water Station	• No original asset records • No ID assigned	• The bulk water station assets were not included in the region's existing asset inventory. AECOM developed corresponding asset records to capture key components such as electrical, plumbing, and superstructure elements. • It is recommended to maintain the bulk water station assets in the inventory, refine the listings with detailed asset information, and assign unique asset IDs to each station.	High
	Non-Linear – Pressure Control Stations	• Only 28% of assets have an Equipment ID assigned	• Approximately 28% of the assets within the Pressure Control Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Pressure Control Station assets and affix identification labels to the corresponding physical equipment.	High
	Non-Linear – Pump Stations	• Only 35% of assets have an Equipment ID assigned	• Approximately 35% of the assets within the Pump Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Pump Station assets and affix identification labels to the corresponding physical equipment.	High
	Non-Linear – Rechloramination Stations	• Only 30% of assets have an Equipment ID assigned	• Approximately 30% of the assets within the Rechloramination Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Rechloramination Stations assets and affix identification labels to the corresponding physical equipment.	High High
	Non-Linear – Water Storage Tanks	• Only 21% of assets have an ID assigned.	• Approximately 21% of the assets within the Water Storage Tanks, including valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Water Storage Tank assets and affix identification labels to the corresponding physical equipment.	High
Level of Service	Target Setting / Review	• Some LoS targets exist (e.g., from CIBI), but not all measures have defined targets.	• Review existing targets against CRD's service goals and historical performance; establish targets for measures without one. Where a target is not feasible, set desired trends.	High
	Refine and Review Measures	• A preliminary list of LoS has been established, however it should be regularly reviewed going forward.	• Implement regular reviews (e.g., annually or every 4 years) to assess performance, verify data quality, and confirm alignment with strategic goals.	High
	Incorporate Customer Feedback	• Current LoS framework does not capture direct customer input.	• Introduce customer feedback mechanisms (e.g., surveys) to identify service expectations, gaps, and areas where CRD may be exceeding expectations.	Medium
	Evaluate Risks with LoS	• Risks associated with not meeting LoS have not been considered.	• Assess risks of not achieving LoS to better inform both capital planning and O&M prioritization.	Medium
Asset Criticality & Risk Management	Improved methodology	• CoF scores for pump stations and pressure control station assets are mostly directed by the CRD's operation team.	• Develop repeatable rules for determining station criticality for PCS and PS, building on efforts already carried out by CRD. • It is recommended to improve the framework by incorporating additional quantitative and system-based factors, such as: – Population or customers served: Weight stations by the number of people or service connections dependent on them. – Elevation and hydraulic criticality: Include factors such as elevation head, system pressure influence, and storage tank dependency.	Medium
	Improved methodology	• CoF scores for water storage tank assets are mostly directed by the Region'ssubject matter experts (SMEs)	• Consideration should be given to developing a more standardized and transparent framework for assessing water storage tanks criticality, ensuring consistent evaluation across the system. The framework could incorporate the following key factors: – Location: Water storage tanks situated in more remote or upstream areas (e.g., Sooke) typically have a higher Consequence of Failure (CoF) due to their importance in maintaining supply continuity and limited alternative sources.	Medium

AMP Area	Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
			– Valve System Configuration: The degree of system isolation and control—such as the availability and reliability of inlet/outlet valves, bypass arrangements, and pressure zones—can significantly influence the operational flexibility and response time during an outage. – Population Served: water storage tanks supplying larger populations or critical service areas (e.g., hospitals, emergency services, or dense residential zones) should be assigned higher criticality scores, reflecting their greater social and service impacts. – Redundancy: The presence (or absence) of backup water storage tanks, interconnections, or alternative supply routes affects the system's resilience. Water storage tanks without redundancy should be deemed more critical due to the higher risk of service interruption.	
	Improved methodology	• CoF and PoF scores for watermains are equally weighted	• Establish weightings for CoF and PoF criteria to reflect CRDs expectations regarding what should drive PoF and CoF scores	Medium
	Risk framework application	• Asset-level risk management strategies	• Incorporate asset-level risk and CoF management strategies into future corporate risk management initiatives or update existing documents such as the ARMF and risk management policy.	Medium
	Risk Analysis	• Meter assets were excluded from this specific risk analysis as they are managed through the SAP dataset, which provides a more detailed basis for future integration.	• Meter assets were analyzed separately using the SAP-based inventory, which provided more detailed attribute information than the GIS dataset. For the next update, the existing unique identifier can be leveraged to enhance integration between the SAP and GIS datasets, allowing the risk analysis to draw on both spatial and attribute information. This approach will strengthen data alignment and enable a more comprehensive inclusion of meters within the overall risk framework.	Medium
Capacity Modelling	Growth projects	• Network capacity is exceeded in several areas once growth forecasts have been loaded into the demand model.	• Refer to **Table 5-10** for a summary of recommendations for linear and pumping projects.	Determined per project
	Capacity Modelling	• SRRDF supply cannot meet future demand using forecast population and the CRD design criteria.	• The East-West Connector* is a vital piece of infrastructure that Sooke will rely on in the future and has been used in models to allow further analysis. Its installation has been assumed as certain for the future scenarios of Sooke.	High
		• Fire flow scenarios are assessed on a pressure zone requirement basis only. Individual fire flow scenarios (per linear asset) have not been assessed as individual zoning and growth construction was not available	• Ongoing update of the model should include input from the local municipalities to allow detailed fire flow assessment to take place.	Medium
		• The design consumption rate is noted to be significantly higher than the actual consumption reported in the JdFWDS and results in future flexibility but also future growth projects being determined as required prior to the reality.	• An accurate figure should be used to realistically determine the requirements for growth projects and a consistent conservatism factor determined that accommodates the routine fluctuations in demand and localized growth that a pressure zone may experience.	Medium
Maintenance, Repair and Replacement Strategies	Staffing & Workforce Capacity	• Crew numbers have remained static despite system growth. Operators spend more time reacting to emergencies and less on scheduled tasks, creating backlog, fatigue, and overtime costs. • Supporting services (vehicles, IT licences, HR, safety) are also under pressure.	• Add 19 process FTEs and 1 EIC FTE (**Table 6-6**). Of this gross requirement, approximately 10 FTE-equivalents are assumed to be addressed through Strategic Alliance Partners support, with the remaining approximately 10 internal FTEs to be phased at ~2 FTE per year over 5 years. • Include trucks, IT, and training costs in future staffing plans. • Reduce overtime ($6–8k/FTE CIBI peer median).	Medium to High
	Preventive vs. Corrective Balance	• PM requirements for new assets are identified informally through staff discussions, with inconsistent documentation and data entry in SAP PM. • Maintenance task scheduling is performed manually despite SAP PM being used to generate PM tasks. • Corrective work still ~44% of hours, diverting crews from preventive programs.	• Introduce a standardized PM intake form at asset commissioning, capturing manufacturer recommendations, regulatory requirements, and operational needs. • Develop a formal SOP to guide the integration of PM tasks into SAP PM. • Leverage SAP PM capabilities for geographic grouping and automated scheduling; establish documented protocols to reduce reliance on staff knowledge. • Target 30/70 corrective–preventive split by expanding flushing, valve exercising, hydrant inspections, and leak detection.	Medium
	Information Management & Data Quality	• Work details are not consistently entered into GIS or cost codes. • Work order closure and data entry rely on manual QA processes, with inconsistent validation and limited backlog analysis. • Missing data hampers planning, budget defense, and compliance audits.	• Implement a standardized QA checklist for work orders. • Integrate maintenance records into GIS/CMMS in near-real time. • Conduct periodic backlog and feedback reviews to identify systemic issues and improve process consistency.	High
	Decision-Making & Workflow Integration	• Field decisions on CM tasks (e.g., whether to complete on-site or escalate) are based on informal judgment, with no clear thresholds. • Maintenance activities involve multiple departments, but roles, handoffs, and communication protocols are not clearly defined.	• Define thresholds and triggers for minor vs. major CM tasks, including safety and timing criteria. • Create SOPs to guide field staff and supervisors on CM handling, including escalation and documentation requirements. • Develop end-to-end SOPs for workflows involving Operations, Engineering, and Finance. • Ensure SOPs are version-controlled and embedded in training/onboarding.	Medium to High
	Supply Chain & Spare Parts	• Specialty electronics, pumps, and valves that once arrived in weeks now take months. • CRD stocks more spares in older facilities, tying up money and creating security/insurance concerns.	• Establish a centralized critical-spares strategy and long-term supplier agreements. • Modernize storage facilities and strengthen inventory controls. • Use Strategic Alliance Partner contractors for excavation, traffic control, and specialised O&M where parts delays are common.	Medium
	Regulatory Compliance	• Provincial and federal regulations continue to tighten, with more prescriptive sampling, analytical, and reporting requirements.	• Increase monitoring and sampling capacity to align with evolving regulatory requirements. • Enhance reporting and monitoring processes to ensure timely compliance with evolving regulatory requirements.	High

AMP Area	Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
		• Non-compliance risks penalties, reputational damage, and loss of public trust.		
	Advancing Preventive Programs & System Modernization	• Legacy programs (AMI migration, valve cycles, proactive leak detection) face long backlogs and limited resources.	• Allocate one new FTE for district metering and acoustic leak audits and consider a pilot project to support financial justifcaiton for enhanced leak detection.. • Institute a four-year valve/air-valve cycle supported by Strategic Alliance Partner asphalt services. • Accelerate AMR-to-AMI migration by doubling the meter team and supplementing with Strategic Alliance Partner plumbing resources.	Medium to High
Capital Projects and Financial Plan	Maintain Target Asset Condition Levels	Under the current planned budget: • The percentage of linear assets in fair or better condition is forecast to remain steady at approximately 74% to 76% over the planning period. • The percentage of non-linear assets in fair or better condition is expected to gradually decline from 97% to 40% by the end of the planning period.	• Many water utilities aim to maintain approximately 80% of their assets in fair or better condition[26], as research and peer practices suggest this range supports cost-effective lifecycle management while avoiding steep renewal spikes. Maintaining asset health within this band provides a defensible foundation for long-term service reliability and cost stability.	High
	Establish Minimum Annual Reinvestment Rate	• Under the current budget, the capital reinvestment rate is 0.94%, which represents the percentage of total replacement value reinvested annually in system assets.	• Maintain a minimum annual reinvestment rate of 1% of replacement value would allow the JdFWDS to renew the system over a 100-year lifecycle and support sustainable long-term asset condition.	High
	Risk-Based Capital Prioritization	• Current budgeting practices do not explicitly apply risk-based prioritization to capital reinvestment decisions.	• Prioritize projects using risk-based criteria to ensure funding is directed to assets with the greatest impact on service and risk reduction. • For linear assets, if funding is constrained, prioritize legacy AC main upgrades and aging meter replacement to reduce operating risk, improve reliability, and enhance billing accuracy.	High
	Phased Planning for Large-Ticket Items	• Upcoming large-ticket renewal needs (e.g., Water Storage Tanks) may exceed short-term delivery capacity and budget flexibility. Executing all major renewals immediately is not feasible given resource and market constraints.	• Develop a phased capital planning and delivery strategy for major renewal projects, spreading large-ticket investments over a multi-year horizon. This will align project scheduling with internal capacity, contractor availability, and annual funding growth.	Medium

* Note – The East-West Connector is a Regional Water Supply Master Plan Project

[26] Municipality of Bluewater. Asset Management Plan (2024). 20240812-fin-amp-2024-bluewater-asset-management-plan-psd-final.pdf. Retrieved on Oct 29, 2025.
Region of Waterloo. Asset Management Plan (2025). 2025 ASSET MANAGEMENT PLAN. Retrieved on Oct 29, 2025.
Municipality of Leamington. Asset Management Plan (2025). 2025-Asset-Management-Plan---Final.pdf. Retrieved on Oct 29, 2025.

APPENDIX A

Asset Inventory

Appendix A - Asset Inventory

The complete asset inventory is provided as a separate Microsoft Excel spreadsheet.

An updated GIS database including Global ID is also provided as a separate folder.

APPENDIX B

Levels of Service

B

Appendix B - Levels of Service

The full list of LoS measures is provided here.

LoS #	System	Asset Class	CRD Strategic AM Objectives	CRD Water Supply Strategic Plan Commitment	LoS Measures	Unit	Recent Performance	Performance Target (CIBI 2023 Group Median)	Currently Tracking?	KPI Source
1	**JdFWDS**	**Whole System**	**Sustainability**	**Provide an adequate, long-term supply of drinking water**	**Cost of Water Conservation Program**	**$ / Population Served**			**No**	**2025 AMP (Proposed)**
2	**JdFWDS**	**Whole System**	**Sustainability**	**Provide an adequate, long-term supply of drinking water**	**Cost of Leak Detection Program**	**$ / km Length**		**20.87**	**No**	**CIBI**
3	**JdFWDS**	**Whole System**	**Sustainability**	**Provide an adequate, long-term supply of drinking water**	**Average Residential Daily Consumption**	**m3**			**Yes**	**CIBI**
4	**JdFWDS**	**Mains**	**Financial Strategy**	**Provide a reliable and efficient drinking water transmission system**	**Pipe O&M Cost per km**	**('000 $) / km Length**	**6.35**	**6.35**	**Yes**	**CIBI**
5	**JdFWDS**	**Whole System**	**Financial Strategy**	**Provide a reliable and efficient drinking water transmission system**	**Capital Reinvestment Rate**	**%**	**2.04**	**0.75**	**Yes**	**CIBI**
6	**JdFWDS**	**Whole System**	**Financial Strategy**	**Provide a reliable and efficient drinking water transmission system**	**Debt / Annual Revenue**	**%**	**6.98**	**37.00**	**Yes**	**CIBI**
7	**JdFWDS**	**Whole System**	**Continual Improvement**	**Provide a reliable and efficient drinking water transmission system**	**Distribution of Workforce by Age**	**NA**	**-**	**-**	**Yes**	**CIBI**
8	**JdFWDS**	**Whole System**	**Sustainability**	**Provide a reliable and efficient drinking water transmission system**	**GHG Emissions / ML water delivered**	**tCO2e / ML**			**No**	**2025 AMP (Proposed)**
9	**JdFWDS**	**Whole System**	**Sustainability**	**Provide a reliable and efficient drinking water transmission system**	**Energy use / ML water delivered**	**kWh / ML**			**No**	**2025 AMP (Proposed)**
10	**JdFWDS**	**Whole System**	**Sustainability**	**Provide a reliable and efficient drinking water transmission system**	**Non-revenue water**	**ML**	**86.00**	**1831.00**	**Yes**	**CIBI**
11	**JdFWDS**	**Whole System**	**Service Delivery & Community**	**Provide a reliable and efficient drinking water transmission system**	**Preventive Maintenance Planned / Preventive Maintenance Completed**	**%**			**No**	**2025 AMP (Proposed)**
12	**JdFWDS**	**Whole System**	**Service Delivery & Community**	**Provide a reliable and efficient drinking water transmission system**	**% of properties where fireflow is available**	**%**			**Yes**	**O.Reg 588/17**
13	**JdFWDS**	**Whole System**	**Service Delivery & Community**	**Provide a reliable and efficient drinking water transmission system**	**% of watermains in fair or better condition**	**%**			**Yes**	**2025 AMP (Proposed)**
14	**JdFWDS**	**Mains**	**Service Delivery & Community**	**Provide a reliable and efficient drinking water transmission system**	**% of non-linear assets in fair or better condition (Water Storage Tanks, pump stations, PCSs)**	**%**			**Yes**	**2025 AMP (Proposed)**
15	**JdFWDS**	**Whole System**	**Risk & Resiliency**	**Provide an adequate, long-term supply of drinking water**	**Hours of Water Storage Tank at Average Day Demand**	**#**	**26.92**	**27.25**	**Yes**	**CIBI**
16	**JdFWDS**	**Mains**	**Risk & Resiliency**	**Provide a reliable and efficient drinking water transmission system**	**% of high and very high risk watermains**	**%**			**Yes**	**2025 AMP (Proposed)**
17	**JdFWDS**	**Non-linear Assets**	**Risk & Resiliency**	**Provide a reliable and efficient drinking water transmission system**	**% of high and very high-risk non-linear assets (Water Storage Tanks, pump stations, PCSs)**	**%**			**Yes**	**2025 AMP (Proposed)**
18	**JdFWDS**	**Whole System**	**Service Delivery & Community**	**Provide high quality, safe drinking water**	**% of water samples within health parameters**	**%**			**Yes**	**2025 AMP (Proposed)**
19	**JdFWDS**	**Whole System**	**Service Delivery & Community**	**Provide high quality, safe drinking water**	**% of water samples within aesthetic parameters**	**%**			**Yes**	**2025 AMP (Proposed)**
20	JdFWDS	Pump Stations	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Water Pressure Complaints by Customers	# / 1,000 People Served		0.32	No	CIBI
21	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Water Quality Customer Complaints	# / 1,000 People Served	0.35	0.34	Yes	CIBI
22	JdFWDS	Whole System	Financial Strategy		Annual O&M Cost as a Percentage of Replacement Value	%	0.86	0.51	Yes	CIBI
23	JdFWDS	Meters	Financial Strategy		Average Unit Cost of Meters Replaced	$ / meter		$421.49	No	CIBI
24	JdFWDS	Whole System	Financial Strategy		Breakdown of Utility Revenue	%	100.00	100.00	Yes	CIBI
25	JdFWDS	Whole System	Financial Strategy		Cost of Customer Billing	$ / Number of Service Connections	$21.90	$9.39	Yes	CIBI
26	JdFWDS	Hydrants	Financial Strategy		Cost of Fire Hydrant O&M	$ / hydrant	$154.76	$112.78	Yes	CIBI
27	JdFWDS	Mains	Financial Strategy		Cost of Main Break Repairs / Total O&M Cost	%	0.49	8.40	Yes	CIBI
28	JdFWDS	Meters	Financial Strategy		Cost of Meter Reading	$ / meter	$4.75	$6.11	Yes	CIBI
29	JdFWDS	Mains	Financial Strategy		Cost of Performing Locates	$ / km Length	$17.65	$320.17	Yes	CIBI

LoS #	System	Asset Class	CRD Strategic AM Objectives	CRD Water Supply Strategic Plan Commitment	LoS Measures	Unit	Recent Performance	Performance Target (CIBI 2023 Group Median)	Currently Tracking?	KPI Source
30	JdFWDS	Whole System	Financial Strategy		Cost to Provide Water	$ / Population Served	$255.78	$228.90	Yes	CIBI
31	JdFWDS	Whole System	Financial Strategy		Debt / Annual Revenue	%	6.98	37.03	Yes	CIBI
32	JdFWDS	Whole System	Financial Strategy		Debt Payment	$	$1,848,190	$1,848,190	Yes	CIBI
33	JdFWDS	Whole System	Financial Strategy		Debt Ratio	%	0.31	0.88	Yes	CIBI
34	JdFWDS	Whole System	Financial Strategy		FTEs	# / 100 km Length	1.93	5.61	Yes	CIBI
35	JdFWDS	Whole System	Financial Strategy		Indirect Costs	$ / Population Served	$7.90	$15.82	Yes	CIBI
36	JdFWDS	Whole System	Financial Strategy		Internal Laboratory Services Cost / Population Served	$ / 1,000 People Served	$522.33	$1,211.41	Yes	CIBI
37	JdFWDS	Whole System	Financial Strategy		Internal Laboratory Services Cost / Total Internal Parameters Analyzed	$ / Total Internal Parameters Analyzed	$3.84	$11.80	Yes	CIBI
38	JdFWDS	Meters	Financial Strategy		Metering O&M Cost	$ / meter	$26.54	$20.01	Yes	CIBI
39	JdFWDS	Whole System	Financial Strategy		O&M Cost	('000 $) / km Length	9.39	9.35	Yes	CIBI
40	JdFWDS	Whole System	Financial Strategy		O&M Cost + Capital Reinvestment	('000 $) / km Length	31.61	25.69	Yes	CIBI
41	JdFWDS	Mains	Financial Strategy		Pipe and Pump O&M Cost	('000 $) / km Length	8.05	8.00	Yes	CIBI
42	JdFWDS	Mains	Financial Strategy		Pipe O&M Cost	('000 $) / km Length	6.35	6.35	Yes	CIBI
43	JdFWDS	Pump Stations	Sustainability		Pump Station Energy Consumed	('000 kWh) / Total PS HP	858.89	941.03	Yes	CIBI
44	JdFWDS	Pump Stations	Financial Strategy		Pump Station O&M Cost	$ / HP	$357.48	$355.96	Yes	CIBI
45	JdFWDS	Mains	Service Delivery & Community		System Length / Population Served	km Length / 1,000 Population Served	4.82	3.90	Yes	CIBI
46	JdFWDS	Whole System	Financial Strategy		Total Laboratory Services Costs	$	$58,961	$87,830	Yes	CIBI
47	JdFWDS	Whole System	Financial Strategy		Total Laboratory Services Costs / Population Served	$ / Population Served	$0.52	$0.88	Yes	CIBI
48	JdFWDS	Whole System	Financial Strategy		Total Replacement Value	$	$593,580,000	N / A	Yes	CIBI
49	JdFWDS	Whole System	Financial Strategy		Total Replacement Value / Population Served	$ / Population Served	$5,258	N / A	Yes	CIBI
50	JdFWDS	Whole System	Sustainability		Water Charge for a Typical Size Residential Connection Using Canadian Average Consumption Rate (210m^3/year)	$	$370.00	$530.00	Yes	CIBI
51	JdFWDS	Whole System	Sustainability		Water Charge for an Average Residence Using Local Consumption Rate	$	$369.64	$631.00	Yes	CIBI
52	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Average value for THMs	mg / L	0.02	0.03	Yes	CIBI
53	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Average Value for Turbidity	NTU	0.25	0.21	Yes	CIBI
54	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Boil Water Advisory Days	#	0.00	0.00	Yes	CIBI
55	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Connections Affected by Boil Water Advisory	# / 1,000 Service Connections	0.00	0.00	Yes	CIBI
56	JdFWDS	Mains	Financial Strategy		Cost of Cross-Connection Control Program	$ / Total # of Service Connections	$1.59	$2.82	Yes	CIBI
57	JdFWDS	Mains	Service Delivery & Community	Provide high quality, safe drinking water	Cumulative Length Cleaned by All Methods / System Length	%	61.25	7.04	Yes	CIBI
58	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Days with Total Coliform over Group Target	#	0.00	2.00	Yes	CIBI
59	JdFWDS	Mains	Service Delivery & Community	Provide high quality, safe drinking water	Length of System Cleaned by All Methods (Single Pass) / System Length	%	46.92	6.25	Yes	CIBI

LoS #	System	Asset Class	CRD Strategic AM Objectives	CRD Water Supply Strategic Plan Commitment	LoS Measures	Unit	Recent Performance	Performance Target (CIBI 2023 Group Median)	Currently Tracking?	KPI Source
60	JdFWDS	Water Storage Tank	Service Delivery & Community	Provide high quality, safe drinking water	Percent of Storage Water Storage Tanks Cleaned	%	7.14	20.00	Yes	CIBI
61	JdFWDS	Whole System	Sustainability	Provide an adequate, long-term supply of drinking water	Average Residential Daily Consumption	L / Cap / day	200.72	181.63	Yes	CIBI
62	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Breakdown of Internal Accredited Lab Parameters Analyzed	%	100.00	100.00	Yes	CIBI
63	JdFWDS	Whole System	Financial Strategy		Cost of Water Conservation Program	$ / Population Served		$0.11	No	CIBI
64	JdFWDS	Whole System	Service Delivery & Community	Provide an adequate, long-term supply of drinking water	Days of Water Restrictions	#	153.00	120.00	Yes	CIBI
65	JdFWDS	Whole System	Transparency	Provide high quality, safe drinking water	Number of Lab Non-Conformances	# / 1,000 Samples	0.88	0.35	Yes	CIBI
66	JdFWDS	Whole System	Service Delivery & Community	Provide an adequate, long-term supply of drinking water	Peaking Factor	MDD / ADD	1.29	1.47	Yes	CIBI
67	JdFWDS	Whole System	Service Delivery & Community		Percent Metered	%	100.00	100.00	Yes	CIBI
68	JdFWDS	Whole System	Financial Strategy		Cost of Overtime Hours	$ / O&M Field FTE	$15,872	$6,354	Yes	CIBI
69	JdFWDS	Whole System	Service Delivery & Community		Distribution of Workforce by Age	%		100.00	No	CIBI
70	JdFWDS	Whole System	Service Delivery & Community		Field Incidents with Lost Time	# / 1,000 O&M Field Hours	0.00	0.05	Yes	CIBI
71	JdFWDS	Whole System	Service Delivery & Community		Lost Hours due to Field Incidents	# / 1,000 O&M Field Hours	0.00	1.64	Yes	CIBI
72	JdFWDS	Whole System	Service Delivery & Community		Safety Training Hours	Hours / Employee	6.34	4.75	Yes	CIBI
73	JdFWDS	Whole System	Service Delivery & Community		Sick Days Taken	# / O&M Employee	1.87	7.59	Yes	CIBI
74	JdFWDS	Whole System	Service Delivery & Community		Total Available O&M Hours / Total Paid O&M Hours	%	89.19	80.06	Yes	CIBI
75	JdFWDS	Whole System	Service Delivery & Community		Total Overtime Hours / Total Paid O&M Hours	%	4.36	4.78	Yes	CIBI
76	JdFWDS	Whole System	Service Delivery & Community		Unavailable O&M Hours / Total Paid O&M Hours	%	10.81	19.94	Yes	CIBI
77	JdFWDS	Whole System	Service Delivery & Community		Utility Staff Turnover Rate	%		9.41	No	CIBI
78	JdFWDS	Service Connections	Service Delivery & Community		# Service Connection Repairs & Replacements / # of Service Connections	%		0.27	No	CIBI
79	JdFWDS	Pump Stations	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Average Number of Failures per Pump Station	#	0.00	0.00	Yes	CIBI
80	JdFWDS	Whole System	Financial Strategy	Provide a reliable and efficient drinking water transmission system	Capital Reinvestment / Replacement Value	%	2.04	0.75	Yes	CIBI
81	JdFWDS	Whole System	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Customer Days Without Service	Days / Total # of Service Connections	0.00	0.00	Yes	CIBI
82	JdFWDS	Hydrants	Service Delivery & Community		Hydrants Inspected	%	98.29	98.29	Yes	CIBI
83	JdFWDS	Hydrants	Sustainability		Inoperable or Leaking Hydrants	%	0.00	0.74	Yes	CIBI
84	JdFWDS	Valves	Sustainability		Inoperable or Leaking Valves	%	0.00	0.30	Yes	CIBI
85	JdFWDS	Mains	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Main Breaks	# / 100 km Length	0.92	3.65	Yes	CIBI
86	JdFWDS	Mains	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Main Length Replaced or Relined	%	0.00	0.48	Yes	CIBI
87	JdFWDS	Mains	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Metallic Main Breaks	# / 100 km of Metallic Mains	0.00	7.56	Yes	CIBI
88	JdFWDS	Meters	Service Delivery & Community		Meter Re-reads	%		0.38	No	CIBI

LoS #	System	Asset Class	CRD Strategic AM Objectives	CRD Water Supply Strategic Plan Commitment	LoS Measures	Unit	Recent Performance	Performance Target (CIBI 2023 Group Median)	Currently Tracking?	KPI Source
89	JdFWDS	Mains	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Non-Metallic Main Breaks	# / 100 km of Non-Metallic Mains	0.78	0.77	Yes	CIBI
90	JdFWDS	Whole System	Financial Strategy	Provide a reliable and efficient drinking water transmission system	Non-Revenue Water	ML	86.00	1831.72	Yes	CIBI
91	JdFWDS	Service Connections	Service Delivery & Community		Percent of Curbstops Replaced	%		0.11	No	CIBI
92	JdFWDS	Whole System	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Preventive and Corrective Maintenance Hours	Hours / km Length	26.12	29.24	Yes	CIBI
93	JdFWDS	Whole System	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Total Corrective Maintenance Hours / Total Maintenance Hours	%	44.07	52.12	Yes	CIBI
94	JdFWDS	Whole System	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Unplanned System Interruptions	# / 100 km Length		6.70	No	CIBI
95	JdFWDS	Valves	Service Delivery & Community	Provide a reliable and efficient drinking water transmission system	Valves Cycled	%		17.14	No	CIBI
96	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Manganese	mg / L		120.00	Yes	Canadian Drinking Water Quality Guidelines
97	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	pH	#		6.5 to 8.5	Yes	Canadian Drinking Water Quality Guidelines
98	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Turbidity	NTU		<1NTU	Yes	BC & Canada Drinking Water Protection Guidelines / Regulation
99	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Iron	mg / L		<=300	Yes	BC & Canada Drinking Water Protection Guidelines / Regulation
100	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	90% of samples have no detectable total coliform bacteria per 100 ml	Yes / No		No more than 10% of the samples in a 30 day period should be positive for total coliform bacteria when more than one sample is collected	Yes	BC Drinking Water Protection Regulation
101	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Number of samples with coliform bacteria per 100 ml	# / 100 ml		No sample should contain more than 10 total coliform bacteria per 100 mL	Yes	BC Drinking Water Protection Regulation
102	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Detectable Escherichia coli (E. coli) per 100 ml	#		No detectable Escherichia Coli per 100 mL	Yes	BC Drinking Water Protection Regulation
103	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Detectable fecal coliform bacteria per 100 ml	#		No detectable fecal coliform bacteria per 100 mL	Yes	BC Drinking Water Protection Regulation
104	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Chlorine Residual	millilitre (mL)		minimum free chlorine residual of 0.2 mg/L	Yes	Canadian Drinking Water Quality Guidelines
105	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Trihalomethanes (TTHMs)	mg / L		Maximum Acceptable Concentration (MAC) value of 100 parts per billion	Yes	Canadian Drinking Water Quality Guidelines
106	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Haloacetic Acids (THAAs)	mg / L		Maximum Acceptable Concentration (MAC) value of 80 parts per billion	Yes	Canadian Drinking Water Quality Guidelines
107	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Metals	mg / L		refer to table 3 of the Federal Guidelines for Canadian Drinking Water Quality	Yes	Canadian Drinking Water Quality Guidelines
108	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Vinyl Chloride	mg / L		< 0.002 mg/L	Yes	Canadian Drinking Water Quality Guidelines
109	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Lead	mg / L		5 (ALARA)	Yes	Canadian Drinking Water Quality Guidelines
110	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Giardia and Cryptosporidium	TBD		achieve a 3 log removal or inactivation of Giardia, and a minimum 2-log removal or inactivation of Cryptosporidium	Yes	Canadian Drinking Water Quality Guidelines

LoS #	System	Asset Class	CRD Strategic AM Objectives	CRD Water Supply Strategic Plan Commitment	LoS Measures	Unit	Recent Performance	Performance Target (CIBI 2023 Group Median)	Currently Tracking?	KPI Source
111	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	PFOS and PFOA	ng/L		MAC for PFOS is 600ng/L and 200ng/L for PFOA	Yes	Canadian Drinking Water Quality Guidelines
112	JdFWDS	Whole System	Service Delivery & Community	Provide high quality, safe drinking water	Heterotrophic plate count (HPC) <500CFU	CFU		<500CFU	Yes	BC & Canada Drinking Water Protection Guidelines / Regulation

APPENDIX C

Linear Risk Model

C

Appendix C - Linear Risk Model (Watermains)

The linear risk model is provided as a separate Microsoft Excel spreadsheet.

APPENDIX D

Hydraulic Model Update

Appendix D - Hydraulic Model Update

This is provided as a separate .zip file.

APPENDIX E

JdFWDS Capacity Assessment Results

E

Appendix E - JdFWDS Storage Capacity Assessment Results

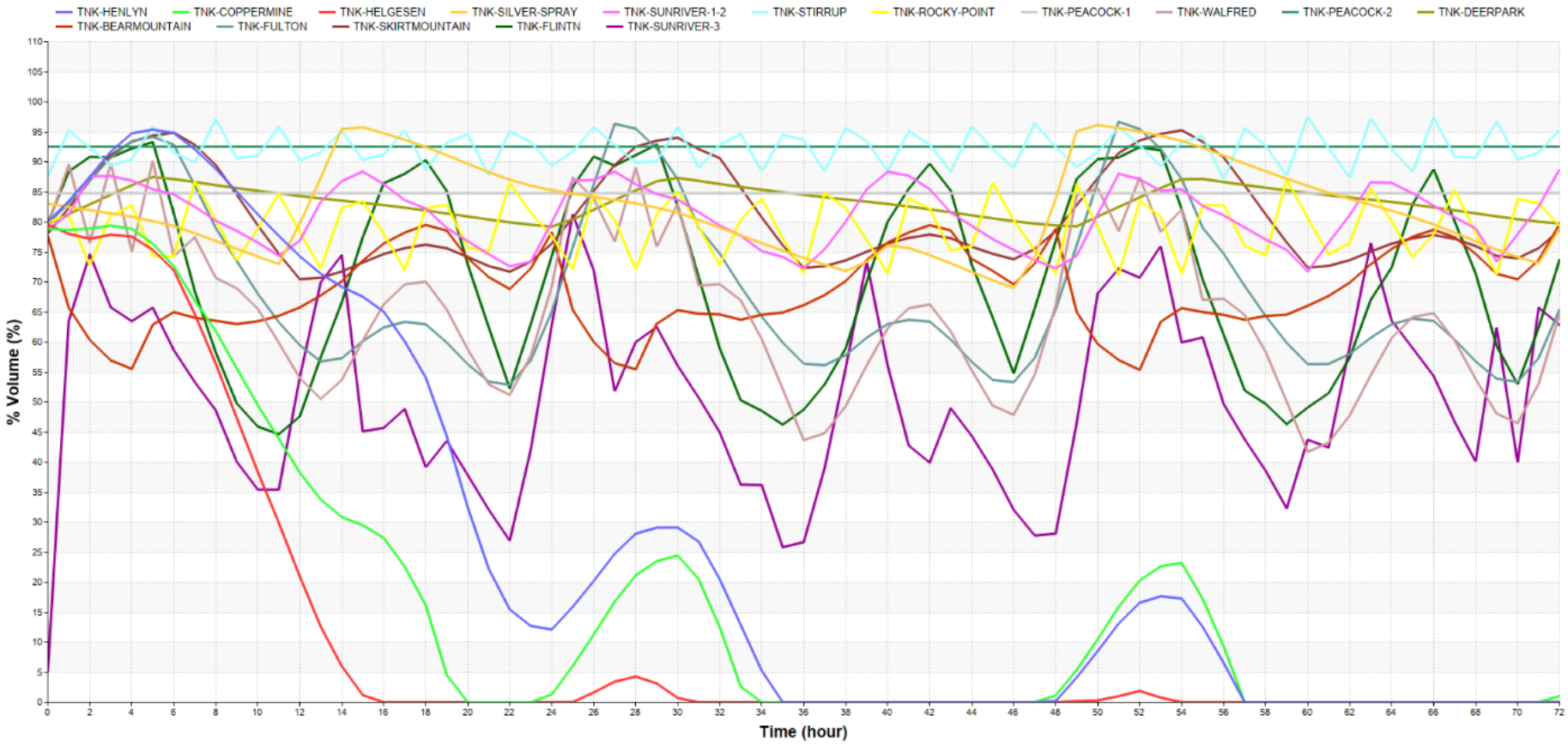


Figure E-1: JdFWDS Storage Water Storage Tanks Level - Post-2043 Baseline Scenario

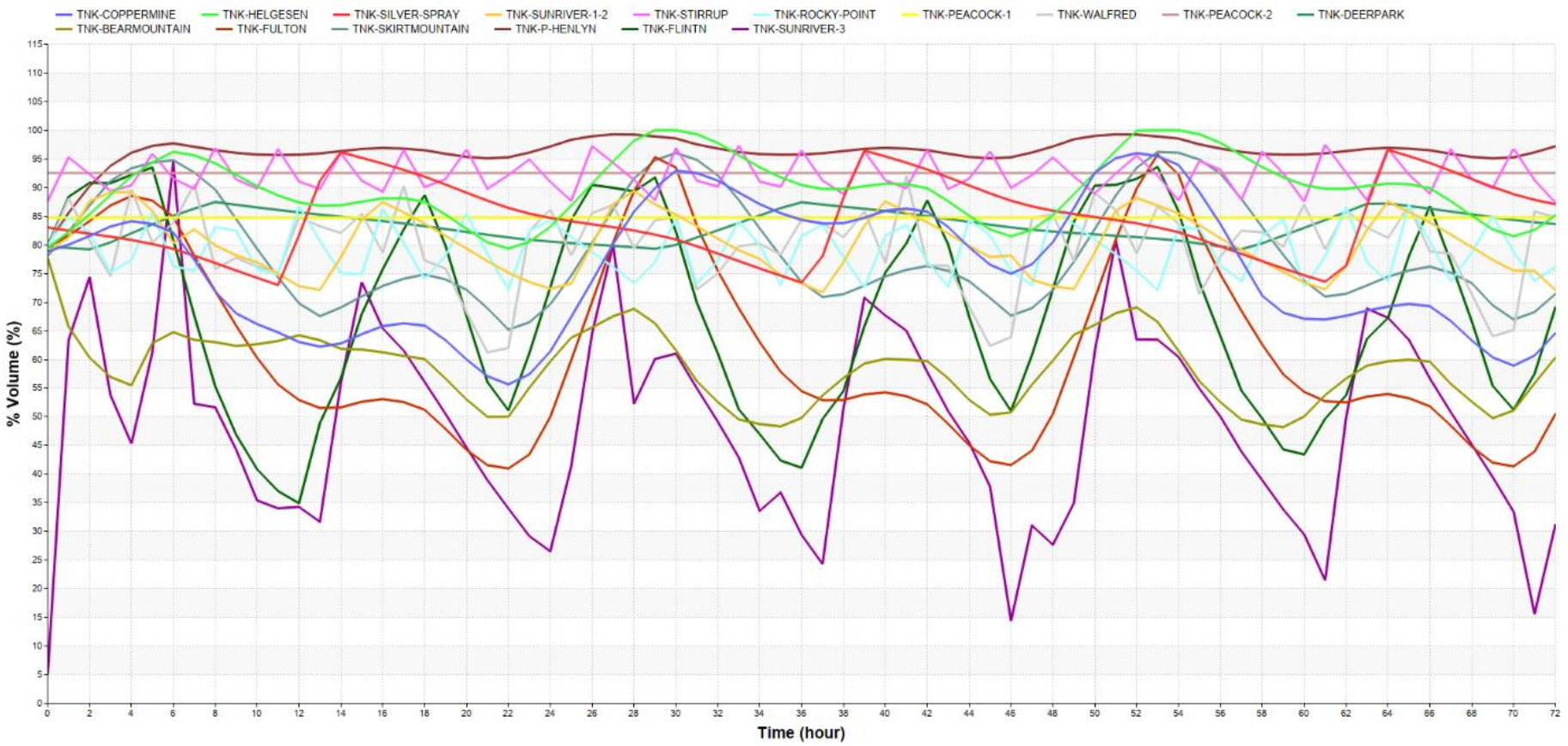


Figure E-2: JdFWDS Storage Water Storage Tanks Level - Post-2043 Improvement Scenario

APPENDIX F

Methodology for Population and Demand Evaluation and Model Update Memo

F

Appendix F - Methodology for Population and Demand Evaluation and Model Update Memo

This is provided as a separate PDF file.

APPENDIX G

Asset Maintenance Activities

Appendix G - Asset Maintenance Activities

The detailed asset maintenance activity lists are provided in the table below.

Table G-1: Pressure Control Stations Maintenance Activities

#	Currently Conducting?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
1	Y	Non-Linear	Pressure Control Stations	Air Valve Maintenance	Inspection and servicing of air valves to ensure proper air release and intake during system operation.	Protects against pressure surges and maintains efficient system performance.	Preventive Maintenance	Amber: Quarterly Green: 6 months
2	Y	Non-Linear	Pressure Control Stations	Backflow Testing	Testing of backflow prevention devices to verify functionality.	Prevents contamination and ensures compliance with drinking water regulations.	Preventive Maintenance	Annually
3	Y	Non-Linear	Pressure Control Stations	Basket Strainers Cleaning	Cleaning and inspection of basket strainers	Ensures proper filtration and prevents clogging that affects system pressure.	Preventive Maintenance	Amber: Quarterly Green: 6 months
4	Y	Non-Linear	Pressure Control Stations	CL2 Analyzer Calibration	Calibration of chlorine analyzers used to monitor residual disinfection levels.	Ensures accurate disinfection monitoring and regulatory compliance.	CO Maintenance	3 months
5	Y	Non-Linear	Pressure Control Stations	Crane/Hoist Inspection	Inspection of lifting devices such as cranes or hoists used in the station.	Ensures lifting equipment is safe and operational; meets WorkSafeBC requirements.	Preventive Maintenance	Annually
6	Y	Non-Linear	Pressure Control Stations	Flushing	Flushing of system to remove stagnant water and maintain water quality.	Helps maintain chlorine residuals and minimizes risk of water quality degradation.	Preventive Maintenance	2 Months
7	Y	Non-Linear	Pressure Control Stations	Hatch Channel	Inspection and cleaning of station hatch channels for drainage and access.	Ensures safe entry and prevents water ingress that can damage electrical components.	Preventive Maintenance	Monthly
8	Y	Non-Linear	Pressure Control Stations	Inflow Prevention Test	Testing of backflow/inflow mechanisms to prevent undesired water entry.	Prevents contamination and maintains safe hydraulic conditions.	Preventive Maintenance	Annually
9	Y	Non-Linear	Pressure Control Stations	Inspection - Station	Inspection of facility and equipment for cleanliness, leaks, corrosion and damage. The lights, ventilation fans, heater, sump pump and drains are also checked for operation. The pump meters are read and, where applicable, fire pumps are tested.	Ensures the facility and equipment are in good operating condition; allows crews to identify any CM required.	Preventive Maintenance	Amber: Quarterly Green: 6 months
10	Y	Non-Linear	Pressure Control Stations	Instrumentation Inspection	Inspection of instrumentation devices (e.g., sensors, indicators).	Ensures instruments provide accurate operational data.	Preventive Maintenance	Annually
11	Y	Non-Linear	Pressure Control Stations	Lamp Inspect/Replace	Inspection and replacement of interior and exterior station lighting.	Maintains visibility and safety for operations and inspections.	Preventive Maintenance	Annually
12	Y	Non-Linear	Pressure Control Stations	Main Service Combination	Inspection of main electrical panel components.	Ensures reliable power supply and identifies potential electrical issues.	Preventive Maintenance	Annually
13	Y	Non-Linear	Pressure Control Stations	Meter Test	Testing of flow or pressure meters for accuracy.	Confirms measurement integrity; supports operational decisions and reporting.	Preventive Maintenance	Annually
14	Y	Non-Linear	Pressure Control Stations	Operational Test	Testing of Pressure Control Stations components under normal operating conditions.	Verifies functionality of key equipment and supports early issue identification.	Preventive Maintenance	Annually
15	Y	Non-Linear	Pressure Control Stations	Sump Pump Test	Testing of sump pump to confirm operational readiness.	Prevents water accumulation and equipment flooding.	Preventive Maintenance	3 Months
16	Y	Non-Linear	Pressure Control Stations	Surge Anticipator Test	Inspection and testing of surge control devices.	Protects against pressure transients and equipment damage.	Preventive Maintenance	Monthly
17	Y	Non-Linear	Pressure Control Stations	Test Mag Meter	Functional test of magnetic flow meter for accuracy and responsiveness.	Ensures reliable flow measurement critical to system control.	Preventive Maintenance	Annually
18	Y	Non-Linear	Pressure Control Stations	Valve Exercising	Routine operation of valves to verify functionality and prevent seizing.	Ensures valves remain operable during emergencies and reduces risk of failure due to corrosion or buildup.	Preventive Maintenance	Amber: Quarterly Green: 6 months
19	Y	Non-Linear	Pressure Control Stations	Y Strainers	Cleaning and inspection of basket strainers	Ensures proper filtration and prevents clogging that affects system pressure.	Preventive Maintenance	Amber: Quarterly Green: 6 months
20	Y	Non-Linear	Pressure Control Stations	General building envelope maintenance	e.g., moss removal, gutter cleaning, power washing, floor drainage; often done by third party	Ensures reliable system performance	Corrective Maintenance	As needed
21	Y	Non-Linear	Pressure Control Stations	PCS Emergency Maintenance	Emergency repairs to Pressure Control Stations or equipment; usually triggered by customer calls or SCADA system alarms.	Restores service and/or reduces risk of damage to system.	Corrective Maintenance	As needed

#	Currently Conducting?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
22	Y	Non-Linear	Pressure Control Stations	Communication Troubleshooting	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
23	Y	Non-Linear	Pressure Control Stations	E&I Instrumentation Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
24	Y	Non-Linear	Pressure Control Stations	General Control Panel Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
25	Y	Non-Linear	Pressure Control Stations	Heater Replacement	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
26	Y	Non-Linear	Pressure Control Stations	Mag Meter Test	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
27	Y	Non-Linear	Pressure Control Stations	Main Service Combination/Breaker Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
28	Y	Non-Linear	Pressure Control Stations	Other	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
29	Y	Non-Linear	Pressure Control Stations	Other	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
30	Y	Non-Linear	Pressure Control Stations	SCADA Equipment Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
31	Y	Non-Linear	Pressure Control Stations	UPS Replacement/Troubleshooting	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
32	N	Non-Linear	Pressure Control Stations	PCS Teardown	Disassembly, inspection and cleaning of the PCS body and internals.	Extends PCS life, restores functionality and prevents failure.	Preventive Maintenance	4 years
33	N	Non-Linear	Pressure Control Stations	PCS Corrective Maintenance	Planned upgrades and/or repairs to Pressure Control Stations and equipment to ensure proper continued operation.	Ensures equipment operates as intended; prevents failure and potential loss of service.	Corrective Maintenance	As needed

Table G-2: Pump Station Maintenance Activities

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
1	Y	Non-Linear	Pump Station	Air Valve Maintenance	Inspect and operate air valves to ensure proper air release and intake.	Maintains pressure stability and protects the system from vacuum or surge damage.	Preventive Maintenance	Amber: Quarterly Green: 6 months
2	Y	Non-Linear	Pump Station	Ammonia Chiller Inspection	Inspect ammonia chiller for functionality, refrigerant levels, and temperature control.	Ensures reliable cooling for chemical processes and safe equipment operation.	Preventive Maintenance	3 months
3	Y	Non-Linear	Pump Station	Backflow Prevention Test	Activities needed to ensure that backflow devices are working properly. Activities could include dismantling devices for tear and wear and checking moving parts are not worn down	Ensure the devices are working properly (AWWA M8 Pumping Stations, Pumps, and Appurtenances: AWWA Distribution Manual)	Preventive Maintenance	Annually
4	Y	Non-Linear	Pump Station	Basket Strainer Cleaning	Cleaning and inspection of basket strainers	Ensures proper filtration and prevents clogging that affects system pressure.	Preventive Maintenance	Amber: Quarterly Green: 6 months
5	Y	Non-Linear	Pump Station	Blower Maintenance	Inspect and service blowers; check belts, bearings, and motor function.	Ensures consistent ventilation and prevents overheating of critical components.	Preventive Maintenance	6 months
6	Y	Non-Linear	Pump Station	Booster Pump Inspection	Inspect pump seals, couplings, bearings, and motor operation.	Confirms pump reliability and identifies early signs of mechanical failure.	Preventive Maintenance	Annually
7	Y	Non-Linear	Pump Station	Brine Tank/Pump Clean	Clean out brine tank and associated pump to remove scaling or sediment.	Improves chemical dosing accuracy and protects pump longevity.	Preventive Maintenance	Annually
8	Y	Non-Linear	Pump Station	CL2 Analyzer Test	Perform functional test of chlorine analyzer sensors and alarms.	Maintains compliance with disinfection standards and ensures public health protection.	Preventive Maintenance	Monthly - 3 months

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
9	Y	Non-Linear	Pump Station	Check Valve Test	Operate and inspect check valve closure and responsiveness under flow conditions.	Prevents reverse flow and maintains hydraulic integrity.	Preventive Maintenance	Amber: Quarterly Green: 6 months
10	Y	Non-Linear	Pump Station	Clean Injection Quills	Clean chemical injection nozzles and ports to remove buildup or scaling.	Ensures accurate chemical feed and avoids clogging of process equipment.	Preventive Maintenance	Annually
11	Y	Non-Linear	Pump Station	Control Panel Maintenance	Inspect and test relays, switches, and indicators in electrical control panels.	Supports reliable system control and reduces the likelihood of electrical faults.	Preventive Maintenance	Annually
12	Y	Non-Linear	Pump Station	Coordinate Load Test & Drive Unit	Simulate load transfer and observe drive unit response.	Verifies redundancy and ensures reliable switching between power supplies or pump drives.	Preventive Maintenance	Annually
13	Y	Non-Linear	Pump Station	Cranes/Hoist Inspection	Inspect lifting devices for structural integrity, load testing, and mechanical wear.	Ensures safe lifting during maintenance activities and compliance with safety standards.	Preventive Maintenance	Annually
14	Y	Non-Linear	Pump Station	Dehumidifier Maintenance	Inspect and service dehumidifiers; clean filters and check controls.	Controls humidity in control rooms to prevent electrical equipment corrosion or failure.	Preventive Maintenance	6 months - Annually
15	Y	Non-Linear	Pump Station	Deisel Fire Pump Inspection	Inspect diesel engine components and pump operation; test for start-up readiness.	Ensures emergency fire protection system is operational and compliant with fire codes.	Preventive Maintenance	Annually
16	Y	Non-Linear	Pump Station	Dosing Systems-List	Inspect and verify function of dosing system components (pumps, tubing, valves).	Supports accurate chemical dosing and process control.	Preventive Maintenance	6 months
17	Y	Non-Linear	Pump Station	Electric Fire Pump Inspection/Maintenance	Inspect and test electric fire pump for operation, including start-up and pressure delivery.	Maintains fire protection readiness in accordance with NFPA standards.	Preventive Maintenance	Annually/4 Yr
18	Y	Non-Linear	Pump Station	Emergency Light/Smoke/CO	Test and inspect emergency lighting, smoke detectors, and CO monitors.	Ensures life-safety systems are functional in case of emergency.	Preventive Maintenance	Amber: Quarterly Green: 6 months
19	Y	Non-Linear	Pump Station	Engine/Fire Pump Maintenance	Perform full service on engine-driven fire pumps including oil, filters, belts.	Sustains reliability and readiness of emergency response equipment.	Preventive Maintenance	Annually
20	Y	Non-Linear	Pump Station	Exhaust Fan	Inspect exhaust fan motors and blades; clean and check airflow.	Maintains safe ventilation in enclosed spaces and prevents buildup of hazardous gases.	Preventive Maintenance	Annually
21	Y	Non-Linear	Pump Station	Eyewash and Shower Maintenance	Test operation and clean eyewash and emergency shower stations.	Ensures worker safety in compliance with occupational health standards.	Preventive Maintenance	Weekly
22	Y	Non-Linear	Pump Station	Fire Pump/Engine Maintenance	Perform maintenance on entire fire pump system including mechanical and control checks.	Ensures compliance with NFPA requirements and maintains critical fire suppression system.	Preventive Maintenance	Annually
23	Y	Non-Linear	Pump Station	Fire Pump Test	Conduct weekly or monthly fire pump performance tests under flow.	Verifies fire protection capability and compliance with fire code regulations.	Preventive Maintenance	Weekly – Monthly
24	Y	Non-Linear	Pump Station	Formal Safety Inspection	Conduct structured safety walkthroughs of facility and equipment areas.	Identifies hazards and documents compliance with safety regulations and WorkSafeBC.	Preventive Maintenance	Monthly
25	Y	Non-Linear	Pump Station	Fuel Run	Run fuel systems to confirm availability and quality; check for leaks.	Maintains emergency generator readiness and avoids fuel degradation.	Preventive Maintenance	Annually
26	Y	Non-Linear	Pump Station	Generator & Transfer Switch	Test automatic transfer switches and inspect generator system function.	Ensures standby power activates during outages to maintain critical operations.	Preventive Maintenance	Annually/2Y/4Y
27	Y	Non-Linear	Pump Station	Generator Test	Start and run generator to verify response and load capability.	Ensures backup power is functional and ready for deployment.	Preventive Maintenance	Monthly
28	Y	Non-Linear	Pump Station	Hoist Maintenance	Lubricate and inspect manual and electric hoists used in pump stations.	Prevents mechanical failure during lifting operations.	Preventive Maintenance	Monthly – 6 months
29	Y	Non-Linear	Pump Station	Hot Water Tank Maintenance	Inspect tank condition, check thermostat and heating elements.	Ensures consistent hot water supply for process or cleaning needs.	Preventive Maintenance	Monthly – Annually
30	Y	Non-Linear	Pump Station	Hydropneumatic Tank Maintenance	Inspect internal and external tank condition, verify pressure settings.	Maintains consistent pressure buffering in water system and protects against surge.	Preventive Maintenance	Amber: Quarterly Green: 6 months
31	Y	Non-Linear	Pump Station	Inspection - Station	Inspection of facility and equipment for cleanliness, leaks, corrosion, and damage. The lights, ventilation fans, heater, sump pump and drains are also checked	To ensure that the station is operating properly and that potential maintenance issues are identified and prioritized for repair to avoid equipment failure.	Preventive Maintenance	Amber: Quarterly Green: 6 months

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
					for operation. The pump meters are read and, where applicable, fire pumps are tested.			
32	Y	Non-Linear	Pump Station	Instrumentation Inspection	Inspect condition and calibration of instrumentation devices.	Ensures accurate monitoring and system control.	Preventive Maintenance	Annually
33	Y	Non-Linear	Pump Station	IR Scanning	Perform infrared thermographic scan of electrical panels and components.	Identifies overheating components before failure, improving safety and reliability.	Preventive Maintenance	Annually
34	Y	Non-Linear	Pump Station	LEL Gas Detector Bump Test	Quick check to confirm LEL sensor response to gas presence.	Verifies operational readiness of gas monitoring systems for confined space safety.	Preventive Maintenance	Monthly
35	Y	Non-Linear	Pump Station	LEL Gas Detector Calibrate	Adjust detector response using calibration gas to ensure accuracy.	Ensures compliance with safety protocols and reliable gas detection.	Preventive Maintenance	6 months
36	Y	Non-Linear	Pump Station	Mag Meter Test	Test magnetic flow meters to confirm signal integrity and accuracy.	Supports accurate flow measurement for operational and billing needs.	Preventive Maintenance	Annually
37	Y	Non-Linear	Pump Station	Main Service Combination	Inspect main power entry and protective devices.	Ensures reliable electrical supply and protection of station equipment.	Preventive Maintenance	Annually
38	Y	Non-Linear	Pump Station	Motor Control Center Maintenance	Inspect and clean MCC panels; test breakers and contactors.	Prevents electrical failures and extends lifespan of major control systems.	Preventive Maintenance	Annually
39	Y	Non-Linear	Pump Station	PCS Teardown	Disassemble and inspect pressure-reducing valve components.	Identifies internal wear and supports reliable pressure management.	Preventive Maintenance	4 years
40	Y	Non-Linear	Pump Station	Pump Certification and load test	Perform pump performance test under standard load conditions.	Validates pump capacity and compliance with fire/life safety standards.	Preventive Maintenance	Annually
41	Y	Non-Linear	Pump Station	Pump Inspection	Visual inspection and operational check of pump seals, bearings, and motor.	Detects early signs of failure and supports proactive maintenance planning.	Preventive Maintenance	Annually
42	Y	Non-Linear	Pump Station	Secondary Transformer	Inspect transformer housing and connections; check for overheating or corrosion.	Supports electrical safety and ensures voltage regulation for sensitive loads.	Preventive Maintenance	Annually
43	Y	Non-Linear	Pump Station	Secondary Panel	Inspect wiring, terminals, and breakers in secondary panels.	Ensures safe power distribution and reduces risk of electrical incidents.	Preventive Maintenance	Annually
44	Y	Non-Linear	Pump Station	Starters and Ancillary Equip	Test and inspect starters, relays, and timers.	Ensures dependable motor startup and protection systems.	Preventive Maintenance	Annually
45	Y	Non-Linear	Pump Station	Set Timers Fall/Spring	Adjust programmable timers for seasonal daylight savings changes.	Maintains synchronization of lighting, ventilation, or automation controls.	Preventive Maintenance	6 Months
46	Y	Non-Linear	Pump Station	Valve Exercising	Operate and rotate valves through full range of motion.	Prevents seizing and ensures isolation valves function during emergencies.	Preventive Maintenance	Annually – 2 Years
47	Y	Non-Linear	Pump Station	Y-Strainers	Cleaning and inspection and Y-strainers (where applicable).	Ensures proper filtration and prevents clogging that affects system pressure.	Preventive Maintenance	Amber: Quarterly Green: 6 months
48	Y	Non-Linear	Pump Station	General building envelope maintenance	e.g., moss removal, gutter cleaning, power washing, floor drainage; often done by third party	Ensures reliable system performance	Corrective Maintenance	As needed
49	Y	Non-Linear	Pump Station	Greasing Pumps	Application of grease/lubricants to increase the viscosity needed for the pump bearings to avoid failure of moving parts	Avoid failure of moving parts (AWWA M8 Pumping Stations, Pumps, and Appurtenances: AWWA Distribution Manual)	Corrective Maintenance	As needed
50	Y	Non-Linear	Pump Station	Pump Station Corrective Maintenance	Repairs to pump station and equipment to ensure proper continued operation. No immediate concern over loss of service	Lift station response due to alarm or reported failure but redundancy or back up system is available.	Corrective Maintenance	As needed
51	Y	Non-Linear	Pump Station	Emergency Pump Station Maintenance	Emergency repairs to facility or equipment; usually triggered by customer calls or SCADA system alarms. Emergency back or redundancy may not be available.	Pump station response due to failure alarm or reported failure. Immediate response is required to restore or maintain service.	Corrective Maintenance	As needed
52	Y	Non-Linear	Pump Station	Battery Replacement/Troubleshooting	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
53	Y	Non-Linear	Pump Station	Cl2 Analyzer Calibration	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	3 Months
54	Y	Non-Linear	Pump Station	Communication Troubleshooting	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
55	Y	Non-Linear	Pump Station	E&I Instrumentation Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
56	Y	Non-Linear	Pump Station	General Control Panel Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
57	Y	Non-Linear	Pump Station	General Troubleshooting	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
58	Y	Non-Linear	Pump Station	Heater Replacement	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
59	Y	Non-Linear	Pump Station	MCC Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
60	Y	Non-Linear	Pump Station	MCC Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
61	Y	Non-Linear	Pump Station	Mag Meter Test	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
62	Y	Non-Linear	Pump Station	Main Service Combination/Breaker Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
63	Y	Non-Linear	Pump Station	Other	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
64	Y	Non-Linear	Pump Station	Other	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	3 Months - Annually
65	Y	Non-Linear	Pump Station	Pump Control Panel Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
66	Y	Non-Linear	Pump Station	SCADA Equipment Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
67	Y	Non-Linear	Pump Station	Starters & Ancillary Equipment Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
68	Y	Non-Linear	Pump Station	UPS Replacement/Troubleshooting	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
69	Y	Non-Linear	Pump Station	VFD Fault/Replacement	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed

Table G-3: Water Storage Tank Maintenance Activities

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
1	Y	Non-Linear	Water Storage Tank	Water Storage Tank Security and Maintenance Inspection (in accordance with SOP)	Inspection of general condition of Water Storage Tank, including vent screens, overflows, dry well, control chamber, piping, and valves. Security is checked (locks, fence) and cleaning is done as required.	Ensures the security of the water supply; checks that facility and equipment are in good operating condition; allows crews to identify any corrective maintenance required.	Preventive Maintenance	Monthly
2	Y	Non-Linear	Water Storage Tank	Water Storage Tank Draining and Cleaning (in accordance with SOP)	Periodic draining, cleaning and re-disinfection of Water Storage Tank.	Ensures water quality.	Preventive Maintenance	Every 5 years
3	Y	Non-Linear	Water Storage Tank	Water Storage Tank and Equipment Corrective Maintenance	Planned upgrades and/or repairs to critical equipment to ensure proper continued operation.	Ensures equipment operates as intended; prevents failure and potential loss of service.	Corrective Maintenance	As needed
4	Y	Non-Linear	Water Storage Tank	Water Storage Tank and Equipment Emergency Maintenance	Unplanned upgrades and/or repairs to facility or equipment; usually triggered by customer calls or SCADA system alarms.	Prevents loss of service or restores service that has been lost.	Corrective Maintenance	As needed
5	Y	Non-Linear	Water Storage Tank	General building envelope maintenance	e.g., moss removal, gutter cleaning, power washing, floor drainage; often done by third party	Ensures reliable system performance	Corrective Maintenance	As needed
6	Y	Non-Linear	Water Storage Tank	Vegetation Control	Clearing vegetation around Water Storage Tank.	Ensures facilities are accessible and appear well-maintained.	Preventive Maintenance	Monthly seasonal
7	Y	Non-Linear	Water Storage Tank	Battery Replacement/Troubleshooting	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
8	Y	Non-Linear	Water Storage Tank	Cl2 Analyzer Calibration	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	3 Months
9	Y	Non-Linear	Water Storage Tank	E&I Instrumentation Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
10	Y	Non-Linear	Water Storage Tank	General Control Panel Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
11	Y	Non-Linear	Water Storage Tank	MCC Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
12	Y	Non-Linear	Water Storage Tank	Main Service Combination/Breaker Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
13	Y	Non-Linear	Water Storage Tank	Other	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	
14	Y	Non-Linear	Water Storage Tank	Other	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
15	Y	Non-Linear	Water Storage Tank	Renewable Energy Equipment Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
16	Y	Non-Linear	Water Storage Tank	Renewable Energy Equipment Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	6 Months
17	Y	Non-Linear	Water Storage Tank	SCADA Equipment Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
18	Y	Non-Linear	Water Storage Tank	Seismic Actuator/Valve Check	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	
19	Y	Non-Linear	Water Storage Tank	Starters & Ancillary Equipment Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually
20	Y	Non-Linear	Water Storage Tank	UPS Replacement/Troubleshooting	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
21	Y	Non-Linear	Water Storage Tank	VFD Fault/Replacement	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed

Table G-4: Other Non-Linear Asset Maintenance Activities

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
1	Y	Non-Linear	Bulk Water Station	Backflow inspection and test	Activities needed to ensure that backflow devices are working properly. Activities could include dismantling devices for tear and wear and checking moving parts are not worn down	Ensure the devices are working properly (AWWA M8 Pumping Stations, Pumps, and Appurtenances: AWWA Distribution Manual)	Preventive Maintenance	Annually
2	Y	Non-Linear	Bulk Water Station	Bulk fill stations	General inspection of bulk water fill stations including hose connections, signage, and valve checks	Ensures safe, sanitary, and accessible public water dispensing service.	Corrective Maintenance	As needed
3	Y	Non-Linear	Rechloramination Stations	Water Treatment (Mike Weaver) Inspection (Iron Mine)	Inspection of rechloramination equipment including analyzers, pumps, tanks, and chemical feed systems.	To ensure that the station is operating properly and that potential maintenance issues are identified and prioritized for repair to avoid equipment failure.	Preventive Maintenance	Monthly; not conducted by CRD
4	Y	Non-Linear	Rechloramination Stations	General building envelope maintenance	Cleaning and upkeep of the station exterior and access areas, such as gutter cleaning and pressure washing.	Ensures reliable system performance	Corrective Maintenance	As needed; not conducted by CRD
5	Y	Non-Linear	Bulk Water Station	Cell Modem Installation	Electrical Instrumentation & Control	Ensure electrical component working properly	Corrective Maintenance	As needed
6	Y	Non-Linear	Bulk Water Station	E&I Instrumentation Inspection	Electrical Instrumentation & Control	Ensure electrical component working properly	Preventive Maintenance	Annually

Table G-5: Distribution Main Maintenance Activities

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
1	Y	Linear	Distribution Main	Mains Flushing	Seasonal pressure flushing of watermain to remove	Improves water quality, prevents damage to pipe/hydrant infrastructure	Preventive Maintenance	40% Annually
2	Y	Linear	Distribution Main	Main Repairs	Planned repairs to facility or equipment to ensure proper continued operation.	Ensures main operates as intended; prevents failure and potential loss of service.	Corrective Maintenance	As needed
3	Y	Linear	Distribution Main	Water Quality Testing	Regular water sampling and testing based on regulatory requirements to ensure water quality	Identifies water quality issues so that immediate action can be taken to protect public health	Preventive Maintenance	
4	Y	Linear	Distribution Main	Leak Detection / Pressure test	Regular testing detects leaks in order to prevent loss of water from the system	Prevents water lost and reduced cost of treating and pumping water	Corrective Maintenance	As needed

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
5	N	Linear	Distribution Main	Inspection of Exposed Mains	Checks condition of expansion joints, hangers, supports, wrapping and casing. Identifies any cleaning, vegetation control or repairs required.	Ensures exposed mains are in good condition.	Preventive Maintenance	
6	N	Linear	Distribution Main	Warranty Bond Inspection	Final inspection of mains, valves, hydrants, etc. 30 days prior to expiration of warranty	Ensures systems are in good condition when the CRD assumes maintenance responsibilities.	Preventive Maintenance	
7	N	Linear	Distribution Main	Mains - Replacements (Asset Betterment)	Replacement of mains that have deteriorated	To replace mains that have come to the end of their useful life before they fail and cause disruptions to service.	Corrective Maintenance	
8	N	Linear	Distribution Main	Mains - Relining (Asset Betterment)	Relining mains that have deteriorated as a cost-effective alternative to full main replacement	To reline mains that have come to the end of their useful life before they fail and cause disruptions to service.	Corrective Maintenance	
9	N	Linear	Distribution Main	Main Repairs and Break Response	Immediate repairs to watermain breaks required to maintain or restore service to customer and to protect property and public safety.	Restores service or isolates break so that complete repair can be safely conducted.	Corrective Maintenance	
10	N	Linear	Distribution Main	Chlorinate	A chemical disinfection method using chlorine or chlorine-containing substances to eliminate pathogens from water, ensuring it is safe for public consumption.	Prevents waterborne diseases, ensuring the safety and quality of the municipal water supply, and maintaining public health standards.	Preventive Maintenance	
11	N	Linear	Distribution Main	Cathodic protection	Installing sacrificial anodes to metallic watermains to prevent corrosion, thus extending their service life by protecting them from rust and physical deterioration.	Reduces maintenance and repair costs by prolonging the lifespan of water infrastructure, ensuring a more reliable and efficient water distribution system.	Preventive Maintenance	

Table G-6: Hydrant Maintenance Activities

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
1	Y	Linear	Hydrant	Hydrant Annual Inspection	Hydrant checks can include checking operation, caps, oil, pressure, sounding access, winter leakage, freezing, and string test.	Ensures hydrants are in good working condition. Hydrant checks are required by the Fire Code	Preventive Maintenance	(2600 per year in 2024, 2025 so as many as time and money permits)
2	Y	Linear	Hydrant	Hydrant Corrective Maintenance	Planned repairs to hydrants that have been identified as potentially defective to ensure proper continued operation.	Restores hydrant operability. Maintain public safety from the threat of fire	Corrective Maintenance	Repair as needed
3	Y	Linear	Hydrant	Hydrant Emergency Maintenance	Repairs or replacement of hydrants that are defective or that have been accidentally damaged.	Respond to broken hydrants that may be causing local damage through flooding	Corrective Maintenance	Repair as needed
4	Y	Linear	Hydrant	Hydrant Tear-Down	Disassemble hydrant, check threads, seals, alignment, etc., replace worn parts, lubricate, and reassemble.	Maintain public safety from the threat of fire. Ensures hydrants are in good working condition.	Corrective Maintenance	In response to annual inspection
5	Y	Linear	Hydrant	Hydrant Painting	Paint hydrants, done under contract. Re-numbering and inspections done by staff	Ensures the continued high visibility and long life of the fire hydrants	Preventive Maintenance	
6	Y	Linear	Hydrant	Hydrant Flow Test	Measure the pressure and flow of a pipe to make sure minimum available fire flow is achieved	Ontario Regulation 213/07 Fire Code	Preventive Maintenance	Semi-annually - Annually
7	Y	Linear	Water Lateral	Service Replacement and Renewals (Betterment)	Replace Service Connections prior to failure as a result of deterioration	Prevents future breakdowns of services, ensuring the proper function of service connections.	Corrective Maintenance	As needed
8	Y	Linear	Water Lateral	Connection Corrective Maintenance	Repairs to connections that have been identified as potentially defective to ensure proper continued operation.	Restores connection operability. Maintains water service to customer	Corrective Maintenance	As needed
9	Y	Linear	Water Lateral	Connection Emergency Maintenance	Repairs or replacement of connections that are defective or that have been accidentally damaged.	Respond to broken connection to restore service to customer	Corrective Maintenance	As needed

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
10	Y	Linear	Water Lateral	Flushers	Operate flushing points to remove stagnant water and maintain chlorine residuals.	Improves water quality, maintains disinfectant levels, and reduces customer complaints.	Preventive Maintenance	
11	N	Linear	Hydrant	Vegetation Control	Removable of unwanted vegetation surrounding Fire Hydrants	Ensures that all Hydrants remain easily visible and accessible	Preventive Maintenance	
12	N	Linear	Hydrant	Hydrant Replacement (Betterment)	Replacement of hydrants that have deteriorated to the point where they are not reliable to support fire fighting	Maintain public safety from the threat of fire	Corrective Maintenance	
13	N	Linear	Water Lateral	Water Service Box Inspect	Pressure/Leak checks	Ensures the continued reliability and proper functioning of Service Connections	Preventive Maintenance	
14	N	Linear	Water Lateral	Locate Service Boxes	Water crews to locate difficult to find service boxes on request	Ensures that service boxes are not accidently damaged from local excavation or construction activities	Corrective Maintenance	
15	N	Linear	Water Lateral	Water Connection Repair	Scheduled repairs to Water Services, on City property and under City jurisdiction	Ensures the continued reliability and proper functioning of Service Connections throughout the City	Corrective Maintenance	
16	N	Linear	Water Lateral	Water Service Turn On/Off	Water Service Shut Offs/Turn ones under City Responsibility	Provides a high level of customer service	Preventive Maintenance	
17	N	Linear	Water Lateral	Water Service Box Inspect/Repair	Repairs to Water Services boxes	Ensures the continued reliability and proper functioning of Service Connections	Preventive Maintenance	

Table G-7: Meter Maintenance Activities

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
1	Y	Linear	Meter	Backflow Prevention	Program to maintain and repair City owned Backflow Prevention devices	Prevents Backflow into the water system, ensuring its continuous and proper functioning	Preventive Maintenance	Inspected and tested annually
2	Y	Linear	Meter	Meter Replacement (Betterment)	Replacement of water meters that have deteriorated to the point where they are not reliable or are obsolete	Ensures billing accuracy	Corrective Maintenance	As needed
3	Y	Linear	Meter	Meter Corrective Maintenance	Planned upgrades and/or repairs to meters that are not recording water flow correctly (or have been damaged)	Ensures billing accuracy	Corrective Maintenance	As needed
4	Y	Linear	Meter	Meter Emergency Maintenance	Repairs to faulty or broken meters; usually triggered by customer calls.	Ensures billing accuracy	Corrective Maintenance	As needed
5	Y	Linear	Meter	Meter Reading	Meter reading	Ensures accurate billing and reading of residential water meters	Preventive Maintenance	
6	Y	Linear	Meter	Requested Read	Read meters and provide reports to lawyers for conveyancing purposes	Ensures customers are invoiced correctly	Corrective Maintenance	As needed
7	Y	Linear	Meter	Consumption Complaints	Time spent dealing with customer concerns	High level of customer service	Corrective Maintenance	As needed
8	N	Linear	Meter	Testing and Calibration (Large Meters)	Testing and calibrating large meters.	Ensures reliability of meters and accuracy of water flow recordings.	Preventive Maintenance	
9	N	Linear	Meter	Cross Connection Control	Purchase double check valve setters on services that are not protected	Ensure that private properties have proper control devices and that they are in working order; by-law required	Preventive Maintenance	
10	N	Linear	Meter	Re-Reads	Call back to re-check meter reads (based on customer requests)	Ensures accurate billing and reading of residential water meters	Corrective Maintenance	
11	N	Linear	Meter	Meter Inspections	Meter box inspections for new services and development	Ensures meters and boxes are in good working order	Preventive Maintenance	

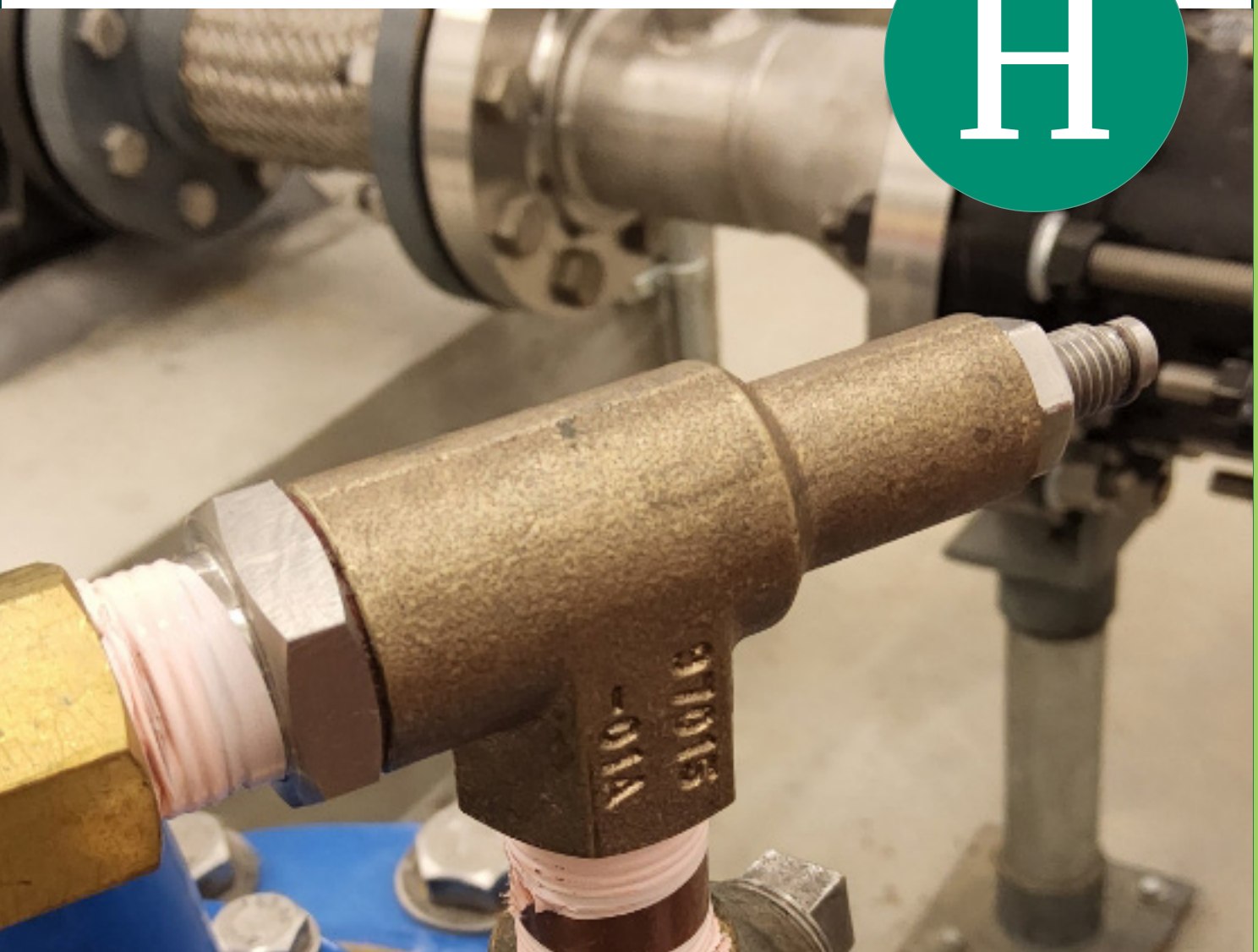
#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
12	N	Linear	Meter	Large meters	Testing, inspection, pumping out and replacement for large meters in confined spaces, mechanical rooms, and underground vaults.	Ensures reliable operation and accuracy of large-volume billing meters in critical locations.	Preventive Maintenance	

Table G-8: Valve Maintenance Activities

#	Currently Conducing?	Asset Category	Asset	Maintenance Activity	Activity Definition	Benefit to CRD/Regulation	Maintenance Priority	Frequency
1	Y	Linear	Valve	Valve Emergency Maintenance	Emergency repair or replacement of inoperable or broken valve that is putting service or system at immediate risk.	Prevents loss of service or restores service that has been lost.	Corrective Maintenance	As needed
2	N	Linear	Valve	Valve Exercising (in accordance with SOP)	Periodic maintenance to exercise the valve, clean out valve box, paint valve lid, and record data about the valve.	Ensures that valves can be easily located and operated when and as needed	Preventive Maintenance	NA
3	N	Linear	Valve	Valve Replacement (Betterment)	Replacement of valves that have deteriorated or that have broken during exercising	Maintain the functionality of the system by ensuring all valves are operable.	Corrective Maintenance	NA
4	N	Linear	Valve	Valve Box Install/Repair (Mainline)	Repair or replace faulty valve boxes	Ensures valves are accessible when needed	Corrective Maintenance	NA
5	N	Linear	Valve	Valve Repair Direct Bury Excavation	Repair valve to ensure proper continued operation.	Ensures valve operates as intended; prevents failure and potential loss of service.	Corrective Maintenance	NA
6	N	Linear	Valve	Valve Repair (In Chamber) / Valve Chamber Repair	Repair value to ensure proper continued operation / Repair valve chamber to ensure proper continued operation	Ensures valve operates as intended; prevents failure and potential loss of service.	Corrective Maintenance	NA
7	N	Linear	Valve	Valve Inspection (Combination Valves)	Inspect, clean and exercise valves.	Ensures the continued operation and reliability of combination valves.	Preventive Maintenance	NA
8	N	Linear	Valve	Install Check/Gate Valves	Install valves where required	Assists with smaller areas affected by shut down	Preventive Maintenance	NA
9	N	Linear	Valve	Air valve activities	Inspection, locating, cleaning, painting	Ensures air valves function correctly, helping release trapped air and prevent water hammer.	Preventive Maintenance	NA

APPENDIX H

Capital Project List 2026 - 2035



Appendix H - Capital Project List 2026 - 2035

The full 10-year capital project list is included as a separate MS Excel spreadsheet. The maps below show the locations of the watermain capital projects.

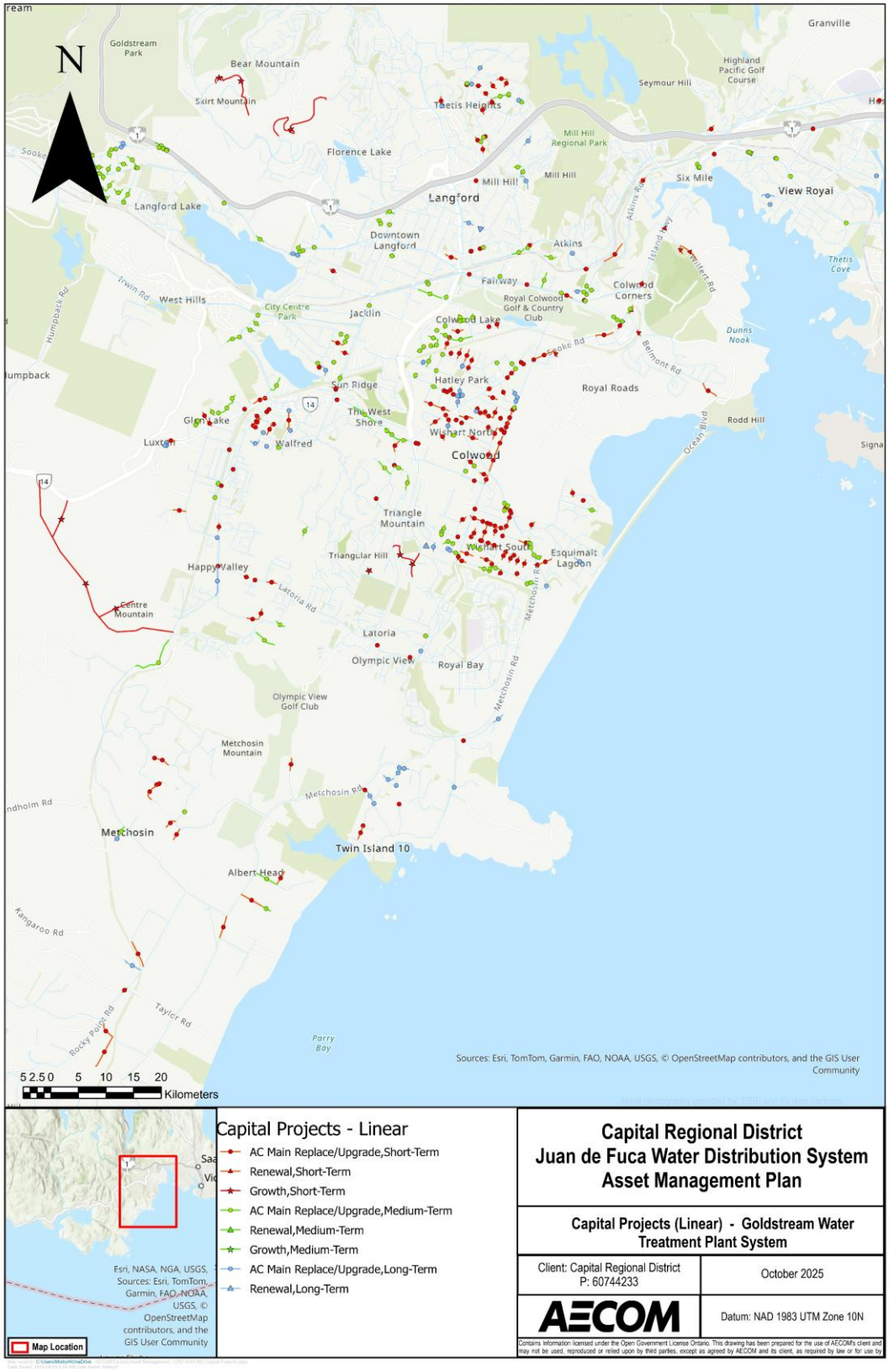


Figure H-1: Watermain Renewal Capital Project Map under the Defined Budget – Goldstream Water Treatment Plant System

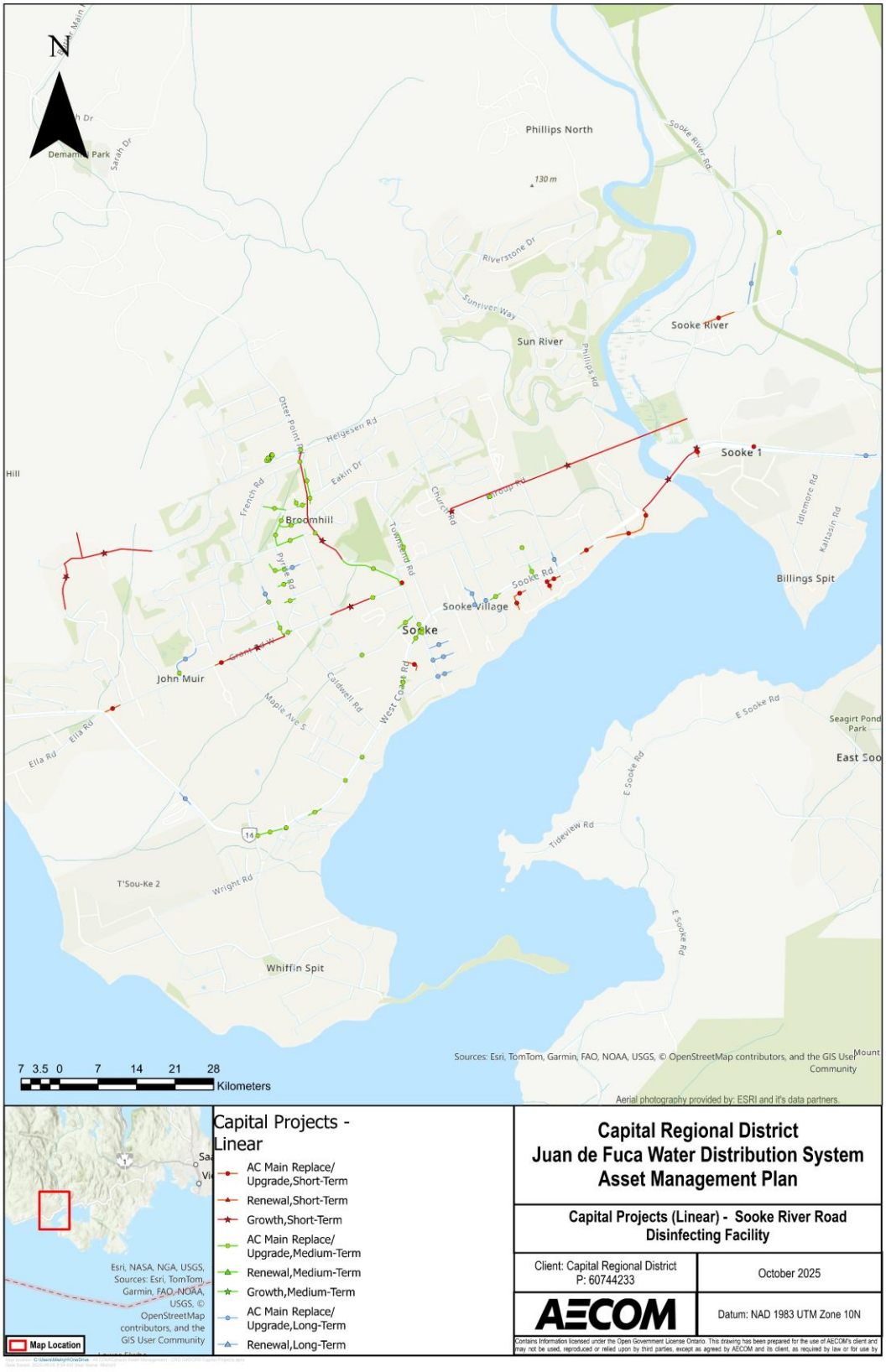


Figure H-2: Watermain Renewal Capital Project Map under the Defined Budget – Sooke River Road Disinfecting Facility

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REPORT TO JUAN DE FUCA WATER DISTRIBUTION COMMISSION
MEETING OF MAY 5, 2026

SUBJECT **2027 Service Delivery – Staffing Requirements**

ISSUE SUMMARY

To outline the 2027 staffing requirements needed to maintain current service levels as the Juan de Fuca system expands and aging infrastructure increases operational demands.

BACKGROUND

At the April 8, 2026, Capital Regional District (CRD) Board meeting, the Chief Administrative Officer (CAO) informed the Board that staff had been directed to limit requests for staffing resources and other budget requests to initiatives that have been: A.) explicitly directed to advance by the CRD Board to support Board priorities, new service establishment or major project delivery, or B.) critical programs where deferral would result in significant service disruptions or negative impacts (for example, legal, safety or risk impacts). This was to maintain a proactive focus on fiscal discipline and to pave the way for a period of transition in late 2026 when a new Board will set its priorities for the next term. It was also noted that programs and associated resources that have been prioritized and recommended by a Commission or Standing Committee could also be incorporated in the 2027 financial planning process for the Board's consideration.

As part of the annual service planning process, the CRD Board receives information in the fall about proposed new initiatives that have resources and staffing implications for the subsequent year and approves the updated Five-Year Financial Plan.

To support this process, Infrastructure & Water Services (IWS) staff have reviewed the potential impacts of system growth and aging infrastructure on service delivery, and have identified the staffing needs required to mitigate service level risks in 2027. The following sections outline proposed initiatives that have impacts on the Juan de Fuca (JDF) Water Distribution budget. This includes one new position, 1.0 Full-Time Equivalent (FTE), which was forecasted in 2025, for the JDF/Regional Water Service (RWS) Utility Operator Program. Staff are also forecasting one additional position in 2028. Summaries of each initiative are included below and in Table 1.

Table 1. Overview of Proposed Staffing Changes

2027 (1 FTE)	*Utility Operator (Water Operations Division):* Aging metering infrastructure is causing increased emergency repairs, customer complaints, and revenue loss. This position will focus on increasing our proactive meter replacements.
2028 (1 FTE)	*Reliability Engineers (Corporate Asset and Maintenance Management Division):* Required to establish a dedicated reliability function to optimize asset performance and mitigate asset risks, ensuring dependable service delivery and strategic maintenance and capital replacement planning. This function collaborates with operations and engineering teams to integrate reliability insights into decision-making for capital projects.

2b-2.5 Utility Operator Program (JDF/RWS)

Currently, there are 27,100 water meters in the JDF system. Over the next seven to nine years, approximately 19,000 meters are projected to reach the end of their expected service life. Many meters are already beyond their service life and at risk of failure at any time. This raises the risk of customer complaints, unmeasured consumption, inaccurate billing and potential revenue loss.

To address this, IWS has initiated a multi-year phased program, combining operating and capital investments, to gradually increase the annual meter replacement rate from the current rate of 1,000 unit/year to 2,500 units/year, implemented over a two-year period starting 2026. This supports the goal of returning to a proactive 25-year replacement cycle by 2036 and aligns with the recommendations outlined in the JDF Water Distribution Asset Management Plan, which recommends increased meter replacement rates (Appendix A).

Prior to 2026, staff budgeted $1.8 million annually for the meter replacement program and staff targeted a replacement rate of approximately 1,000 units/year. In 2026, the meter replacement program budget was increased by $1.2 million to $3 million, and a new Utility Operator (Water Operations) role was created to increase the replacement rate to approximately 1,750 units/year. Since the beginning of this year, staff have been actively progressing the meter replacement program and are on track to achieve the approved replacement targets for the year.

In 2027, staff are proposing to further increase the rate of replacement to the targeted 2,500 units/year. This will be achieved by adding another $1.2 million in capital funding, for a total 2027 capital budget of $4.2 million, and by creating a second regular ongoing Utility Operator (Water Operations) position.

This phased addition of Utility Operators will increase operational capacity, improve response readiness and support system growth.

Deferring the Utility Operator position would risk unsustainable operations and staffing levels. Current staff would struggle to meet growing demands, increasing the likelihood of unplanned, reactive work, reducing efficiency, and delaying planned tasks. This heightens the risk of meter failures, deferred maintenance, unmeasured consumption and lost revenue.

Initiatives Planned for Future Years (2028)

In addition to the initiatives listed above that have staffing implications in 2027, the following initiative is proposed for 2028. Although future-year initiatives are normally incorporated into budgets, capacity constraints arising from the upcoming election preclude its inclusion this year, so it is presented for information purposes only.

2b-2.9 Reliability Engineers/Performance Optimization

This initiative will aim to enhance asset performance and system reliability by creating a dedicated function in the Corporate Asset & Maintenance Management Division focused on optimizing asset performance and overall system reliability.

It will support key actions in the Corporate Asset Management Strategy, including condition and criticality assessments and structured data capture programs. The initiative will also directly support actions in the RWS Strategic Plan under Commitment 3 and Priority 1 "to make evidence-based and community-responsive infrastructure decisions to ensure reliable system performance and sustainability". The new positions will also help lead and address some of the recommended actions for Asset Management Maturity Improvement (Table ES-5) outlined in the JDF Water Distribution Asset Management Plan.

To advance this initiative, staff will propose to create a new regular ongoing Reliability Engineer positions dedicated to the JDFWD service in 2028. The roles will be foundational to establishing a reliability function that uses data to drive maintenance and capital decisions, leading to efficiency and optimization within the service. In addition, the roles will work to decrease reactive maintenance demands and shift to more proactive maintenance and sustainable budgets.

This position will be re-considered through the annual service planning process next year.

NEXT STEPS

Financial Implications

The proposed staffing addition for 2027 reflects an estimated incremental cost increase of $230,000 in the 2027 operating budget. These costs represent only new FTEs planned for hire in 2027.

A high-level estimate of projected salary and associated costs, such as benefits, training, and equipment is provided in Table 2.

Table 2: Estimated Staffing Costs

Cost Distribution by IBC	2027
2026 IBC: 2b-2.5 Utility Operator Program (JDF/RWS)	
Total Operating Budget Increase	**$ 230,000**

These costs will be integrated into the operating budget. Funding will be sourced through water sales revenue.

If the Utility Operator position is to be advanced in 2027, there would also need to be an additional $1.2M added to Capital Project 21-04, which is the annual provisional allowance for the replacement of residential services and meters. In 2026 the budget for this program was $3.0M, this would be increased to $4.2M. By investing in these positions, the organization is taking proactive steps to protect revenue, ensure accurate billing, and maintain the long-term reliability of the JDF metering system.

CONCLUSION

As the Juan de Fuca water distribution system expands and its infrastructure continues to age, sustaining existing service levels will depend on continued investment in operational resources. The proposed Utility Operator position for 2027 is essential to mitigating near-term operational risks, improving system reliability, and safeguarding revenue. This role will enhance the Capital Regional District's capacity to manage growing workloads, shift away from reactive maintenance, and strengthen compliance with regulatory and safety requirements.

RECOMMENDATION

There is no recommendation. This report is for information only.

Submitted by:	Alicia Fraser, P. Eng., General Manager, Infrastructure and Water Services
Concurrence:	Nelson Chan, MBA, FCPA, FCMA, Chief Financial Officer & General Manager, Finance & Technology
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT(S)

Appendix A: JDFWDS Asset Management Plan – Executive Summary

Executive Summary

Background

The Juan de Fuca Water Distribution System (JdFWDS) provides potable water to ten communities in the western region of Greater Victoria, British Columbia, including the City of Langford, City of Colwood, Town of View Royal, District of Metchosin, District of Sooke, Scia'new Nation, T'Souke Nation, Songhees Nation, portions of Highlands, and the Juan de Fuca (JdF) Electoral Area. As a critical component of the Capital Regional District (CRD)'s infrastructure, the system's long-term functionality and sustainability are essential for maintaining service reliability and supporting future growth. CRD has engaged AECOM Canada ULC (AECOM) to develop an Asset Management Plan (AMP) for the JdFWDS. The objective of this AMP is to establish a structured framework and provide a financial and technical roadmap for the effective management of JdFWDS assets.

Current State of the Infrastructure

The CRD's JdFWDS has an estimated total replacement value of approximately **$2 billion**. Table ES-1 shows the replacement costs (in 2025 dollars) of the JdFWDS water infrastructure.

Table ES-1: JdFWDS Current Replacement Value (2025)

Asset Class	Asset Category	Asset Subsystem	Quantity	Unit	Unit Replacement Value Range ($ / Unit)	Total Replacement Value
Linear	Watermains	Hydrants	5,259 (2,622 hydrants and 2,637 hydrant valves)	Ea.	Hydrant = $17,400 Hydrant Valve = $867 - $2,603	$50,199,000
	Watermains	Laterals	13,093	m	$2,900	$37,969,000
	Watermains	Mains	547,454	m	$1,740 - $7,540	$1,267,265,000
	Water Meters	Meters	26,775	Ea.	$2,900 – $8,700	$84,399,000
	Water Meters	Service Connections	242,000	m	$1,450	$350,900,000
	Watermains	Valves	8,672	Ea.	$867 - $9,763	$19,924,000
	Total of Linear					**$1,810,655,000**
Non-Linear	Bulk Water Stations	-	4	Ea.	$66,700	$267,000
	Pressure Control Stations	-	55	Ea.	$180,515 - $2,104,245	$45,622,000
	Pump Stations	-	32	Ea.	$613,970 - $3,513,066	$51,604,000
	Rechloramination Stations	-	2	Ea.	$673,896 - $1,046,119	$1,720,000
	Water Storage Tanks	-	14	Ea.	$295,053 - $19,515,729	$55,590,000
	Total of Non-Linear					**$154,803,000**
Grand Total						**$1,965,458,000**

Figure ES-1 summarizes condition rating of all the JdFWDS assets with associated replacement values. Almost two thirds of the total replacement value is attributed to assets in Very Good condition (64%). Only 6% are rated Poor or Very Poor with a significant portion of these belonging to the meter category, and 18% of total replacement value is related to the assets with unknown condition rating, such as service laterals.

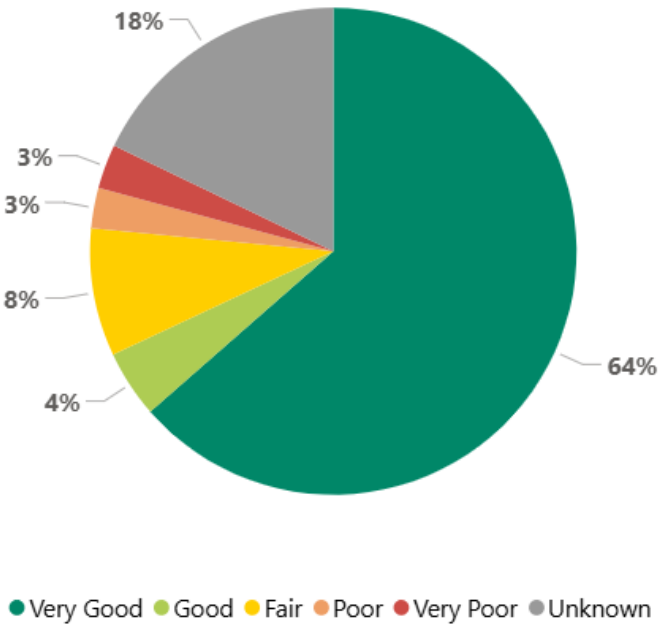

Figure ES-1: JdFWDS Overall Condition Summary

Additionally, **Figure ES-2** shows the condition of the assets based on different asset categories (non-linear) and subsystems (linear). Linear assets are largely in Very Good or Good condition with the exception of Meters which show significant deterioration, with over 30% in Poor or Very Poor condition (the linear meters include all linear conveyance segments and chambers as well). Condition information for service connections is not yet available and may be considered for future data collection. The condition distribution reflects the results of the non-linear asset condition assessments, which were completed through visual inspections by AECOM assessors from January 13–17 and February 24–28, 2025. The assessment covered 107 facilities, including bulk water stations, pressure control stations, pump stations, rechloramination stations, and water storage tanks (detailed breakdown is provided in **Table ES-1**). Additional information on the state of the infrastructure analysis can be found in **Section 2**.

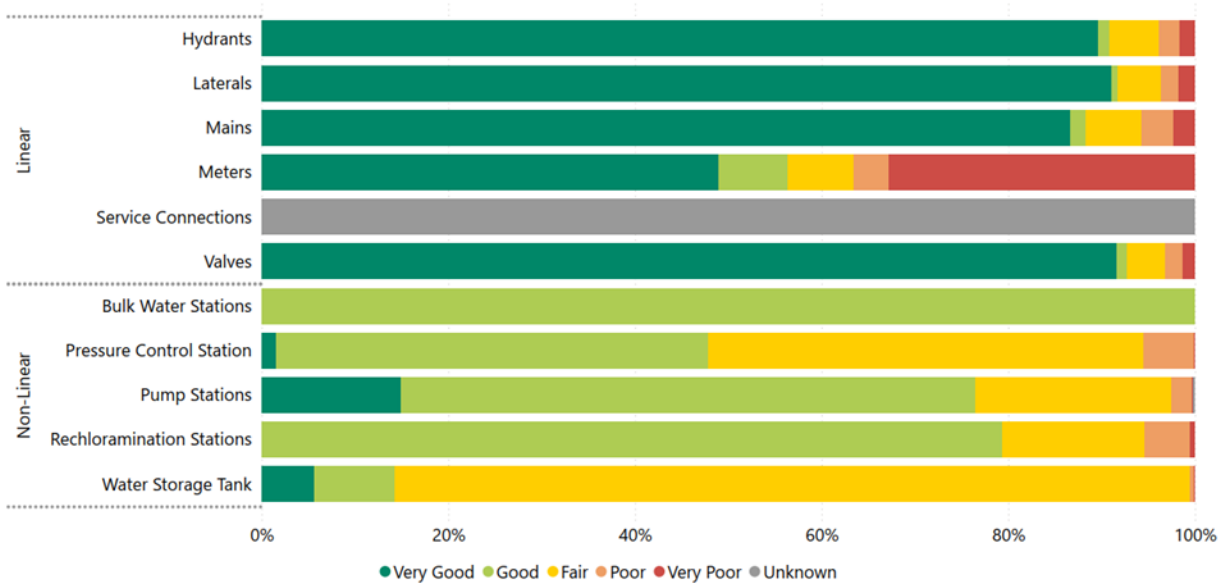

Figure ES-2: JdFWDS Condition Distribution by Asset Category and Subsystem

Levels of Service (LoS)

Levels of Service (LoS) measure the extent and quality of a given service. With a well-defined LoS framework, the CRD JdFWDS can leverage LoS to inform operations and maintenance planning, service delivery, resource planning, capital planning, and track progress on corporate or department-wide strategic initiatives.

Defined LoS may be any combination of parameters deemed important by the CRD and represent service-cost trade-offs, established in a flexible, rational, and transparent manner, as follows:

- LoS assist and support decision-making and investment planning related to the planning, development, operation, maintenance, renewal, and replacement of municipal infrastructure.
- LoS promote good practice, sustainable development, and environmental stewardship.
- LoS facilitate community involvement and a public sense of ownership and incorporate community values.
- LoS supports the implementation of a corporate continuous improvement program to further optimize AM across all service areas.

The process for identifying and developing the CRD JdFWDS LoS Framework included several steps. It began with a scan of existing CRD documents, including the 2019 Corporate Asset Management Strategy and the Water Supply Strategic Plan, to identify relevant goals and objectives. The team also reviewed the Canadian Infrastructure Benchmarking Initiative (CIBI) key performance indicators (KPIs) that CRD collects for the JdFWDS. In addition, the framework development included compiling additional measures to ensure all pertinent objectives were reflected in the LoS. AECOM supported the development of a list of 19 measures, presented in **Table 3-4**, by facilitating a LoS workshop with CRD staff and holding a meeting to review CIBI KPIs. Detailed information on LoS framework and performance measures can be found in **Section 3** and **Appendix B**.

Several future demand drivers that might have an impact on the JdFWDS LoS were identified.

- Aging infrastructure.
- Regulatory changes.
- Staff availability (i.e., technical skill availability, skill gaps from changing technology, etc.).
- Succession management & skills transfer (i.e., succession plan to have experienced operators to operate the system, etc.).
- Funding (i.e., ensuring appropriate asset management planning and sustainable financial strategies to support service delivery).
- Contractor availability (i.e., contractors' availability for executing large projects, etc.).
- Climate change (i.e., droughts, sea level rise, etc.).
- Supply chain issues (i.e., material and equipment availability for capital projects, technology, etc.).
- Fluctuations on contract pricing (i.e., impact of inflation, supply chain considerations, etc.).
- Changing demographics (i.e., aging population is resistant to change).
- Population growth

Despite the wide range of future demand drivers identified above, the CRD has foundational programs in place that support proactive management of system pressures, including its established water conservation education and outreach program. While demand management in this context primarily relates to influencing customer water use, the CRD continues to monitor external drivers and adjust plans, budgets, and strategies to maintain service delivery as conditions evolve.

Asset Criticality and Risk Management

Risk-based planning and decision-making serves as the foundation for modern, tactical asset management. Through gaining an understanding of its risk exposure, an organization can identify vulnerable assets and target its O&M and capital investments to reduce that exposure most effectively and ultimately improve the resiliency of its assets. Risk exposure is assessed based on the probability and consequences of an asset failure and is used to drive the selection and prioritization of appropriate actions, based on risk tolerance thresholds and funding availability.

The risk score reflects the probability (or likelihood) and consequence of failure (or criticality) and is ultimately used to identify assets which require immediate attention and provides opportunities to reduce risk exposure. AECOM

developed the risk model for JdFWDS watermains and non-linear assets. **Table ES-2** shows that the majority of assets (by replacement value) are in the low-risk category (68%), followed by 8% being characterized as medium risk, with the remaining 1% in the high and very high-risk categories. About 22% of assets have unknown risk at this stage, mostly for meters and service connections. Future integration of additional data sources will help refine these ratings.

Table ES-2: Risk Thresholds and Asset Risk by Replacement Cost – All Assets

Risk Level (Score Thresholds)	Replacement Cost	% of Replacement Cost
Low (0 ≤ Score < 5)	$1,340,924,000	68.2%
Medium (5 ≤ Score < 11)	$165,720,000	8.4%
High (11 ≤ Score < 16)	$22,965,000	1.2%
Very High (16 ≤ Score ≤ 25)	$0	0%
Unknown	$435,849,000	22.2%
Total	**$1,965,458,000**	**100%**

Figure ES-3 shows that the non-linear assets have a much higher proportion of assets in the medium and high categories, whereas the majority of watermains have been characterized as low risk. **Appendix A** and **Appendix C** provide more details on the risk score for JdFWDS assets. Meters and service connections were not included in the risk analysis. Meters were excluded because, although GIS data was provided, the Excel/SAP dataset contains more detailed meter information. Service connections were omitted due to the absence of a complete service connection inventory within the available asset data. Refer to **Section 4** for more information.

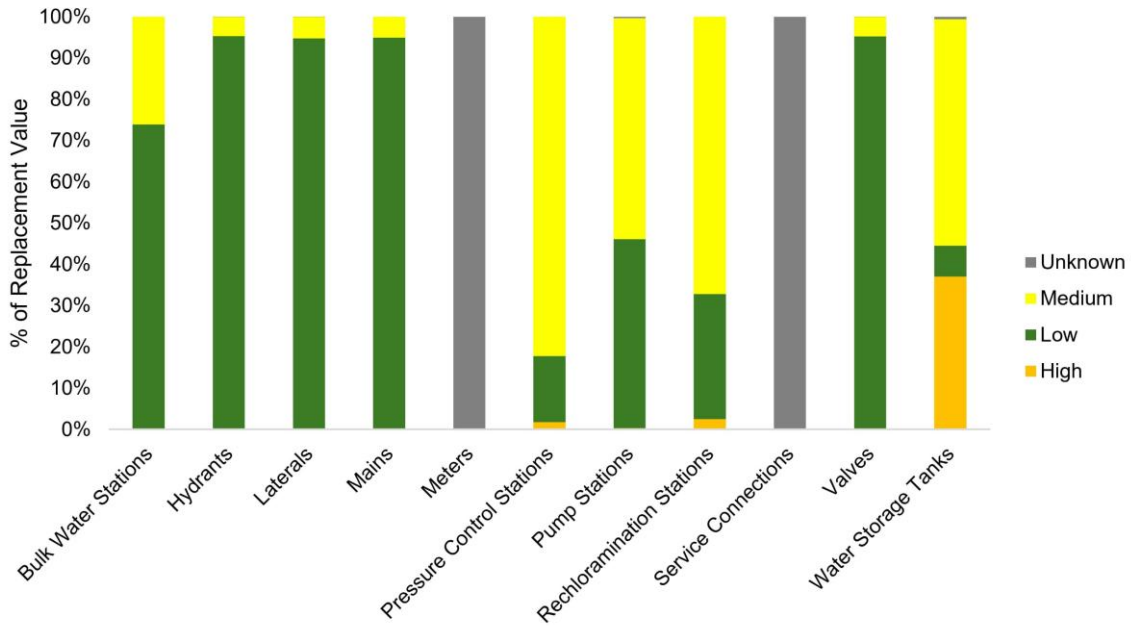

Figure ES-3: Risk by Asset Category

Water Distribution System Capacity Assessment

To model the current and future capacity requirements of the JdFWDS, AECOM has followed the process outlined below:

- **Review and understand the current model and the available data.** This activity was to determine what work needs to be done upfront to build a reliable model. This preliminary review assessed the available information with the aim of ensuring that the model is updated to reflect current conditions and infrastructure.
- **Define the current system demand**. This activity was to understand the current system demand to ensure an accurate baseline scenario with which to compare future scenarios against.
- **Determine the service gaps**. Identify and quantify the forecast gaps between the current demand and each future demand scenario. To support this, a set of scenarios was created (this approach was summarized in the technical memo presented in **Appendix F** and agreed with the CRD) and the changes to population and demand were identified through to the end of the AMP's horizon.

The hydraulic model is supplied in **Appendix D** with key assessment results presented in **Appendix E** and a full methodology in **Appendix F**. The high-level findings of the capacity assessment are shown in **Table ES-3**.

Table ES-3: Capacity Assessment Findings

Capability	Gap	Recommendation	Priority
Growth projects	Network capacity is exceeded in several areas once growth forecasts have been loaded into the demand model.	Refer to **Table 5-10** for a summary of recommendations for linear and non-linear projects.	Determined per project by population, growth and strategy.
Capacity Modelling	The Sooke River Road Disinfecting Facility (SRRDF) supply cannot meet future demand using forecast population and the CRD design criteria.	The East-West Connector* is a vital piece of infrastructure that Sooke will rely on in the future and has been used in models to allow further analysis. Its installation has been assumed as certain for the future scenarios of Sooke.	High
	Fire flow scenarios are assessed on a pressure zone requirement basis only. Individual fire flow scenarios (per linear asset) have not been assessed as individual zoning and growth construction was not available	Ongoing update of the model should include input from the local municipalities to allow detailed fire flow assessment to take place.	Medium (Continuous Improvement)
	The design consumption rate is noted to be significantly higher than the actual consumption reported in the JdFWDS and results in future flexibility but also future growth projects being determined as required prior to the reality.	An accurate figure should be used to realistically determine the requirements for growth projects and a consistent conservatism factor determined that accommodates the routine fluctuations in demand and localized growth that a pressure zone may experience.	Medium (Continuous Improvement)

* Note – The East-West Connector is a Regional Water Supply Master Plan Project

Maintenance, Repair and Replacement Strategies

Effective maintenance, repair, and replacement strategies are essential to sustaining the long-term performance, reliability, and safety of the JdFWDS. AECOM began with the analysis of current-state business process maps that illustrate how maintenance activities are identified, scheduled, executed, and recorded (**Section 6 Figure 6-1** to **Figure 6-4**).

This was followed by a detailed examination of existing maintenance, repair, and replacement strategies across linear and non-linear assets, supported by findings from recent condition assessments, staff input, and operational data.

Benchmarking insights from the Canadian Infrastructure Benchmarking Initiative (CIBI) were also integrated to assess performance relative to peer utilities and to rationalize the recommended resourcing and budget enhancements. In summary, the following high-level recommendations draw together the resourcing plan (**Table 6-6**) and the benchmarking insights to provide a focused roadmap for the future.

Recommendations are as follows.

- **Close the labour gaps as recommended in Table 6-6**. The additional 19.4 process FTE and 1 EIC FTE, estimated through a rigorous review with CRD staff (meetings with operations staff, analysis of work order hours, and benchmarking), will help achieve industry-guided targets for flushing, valve exercising, hydrant teardown, and meter-testing cycles. However, of this gross requirement of approximately 20 additional FTEs, approximately 10 FTE-equivalents are assumed to be addressed through Strategic Alliance Partners support, with the remaining ~10 internal FTEs to be phased at ~2 FTE per year over 5 years.
- **Continue to Leverage Strategic Alliance Partners.** Further to the previous recommendation, Strategic Alliance Partners currently supports a variety of contracted field support and maintenance tasks that do not require a water ticket. These include landscaping and similar non-ticketed duties, as well as labour-intensive support work associated with valve and hydrant maintenance, such as removing valve box lids, vacuuming debris from sleeves, painting lids, and cutting grass around hydrants. A meaningful share of the current field-based support workload is already being delivered through the Strategic Alliance Partners, allowing CRD's certified operators to remain focused on utility-based work requiring the appropriate qualifications.
- **Target a 30/70 corrective–preventive split.** With the added staff, the CRD should shift work plans so that corrective maintenance hours drop from approximately 45% toward the <30% benchmark shown by top-quartile peers (**Figure 6-8**).
- **Reduce overtime costs.** Filling daytime positions should pull overtime spend down from $15,000 to the peer median $6,000–8,000 per field FTE within three years, freeing a further $200,000+ annually for proactive work.
- **Expand proactive leak detection**. Allocate staff time to district metering and acoustic leak audits to begin quantifying non-revenue water and prioritising leak fixes and main renewals. As Non-Revenue Water and Infrastructure Leakage Index are not analyzed in detail, proactive leak detection is not financially justified by this AMP. However, early discovery of leaks provides benefits such as assisting in an improved maintenance split and reduced overtime costs which could be easily measured with a pilot project.
- **Institute a four-year valve and air-valve cycle**. Establish the dedicated valve crew and use Strategic Alliance Partners support to ensure every valve group is located, exercised, and documented at least once per cycle.

Capital Projects Identification and Financial Plan

In order to support the development of a 20-year financial plan, a lifecycle reinvestment model was developed. Financial projections are presented under three funding scenarios to illustrate the implications of different investment strategies on asset condition and service level outcomes:

- Funding Scenario 1 (S1): Do nothing, with no capital investment.
- Funding Scenario 2 (S2): an unconstrained budget, allowing the JdFWDS to reinvest in assets as required.
- Funding Scenario 3 (S3): the defined budget scenario, allowing $10 millions for linear assets and $3.5 millions for non-linear assets in 2026, escalated for inflation in subsequent years.

Under the unconstrained funding scenario (S2), the total funding requirement for the JdFWDS linear and non-linear assets is approximately $1.1 billion dollars over 20 years (including inflation). This averages $56.3 million dollars per year, with $39 million dollars for linear assets (**Figure ES-4**) and $16.8 million dollars for non-linear assets (**Figure ES-5**). Of the total funding requirement, approximately $708.8 million dollars is allocated to capital projects (63 % of the total, see **Section 7.6** for details). The summary of capital projects identified under S2 are provided in **Section 7.5**, with complete project lists available in **Appendix H**.

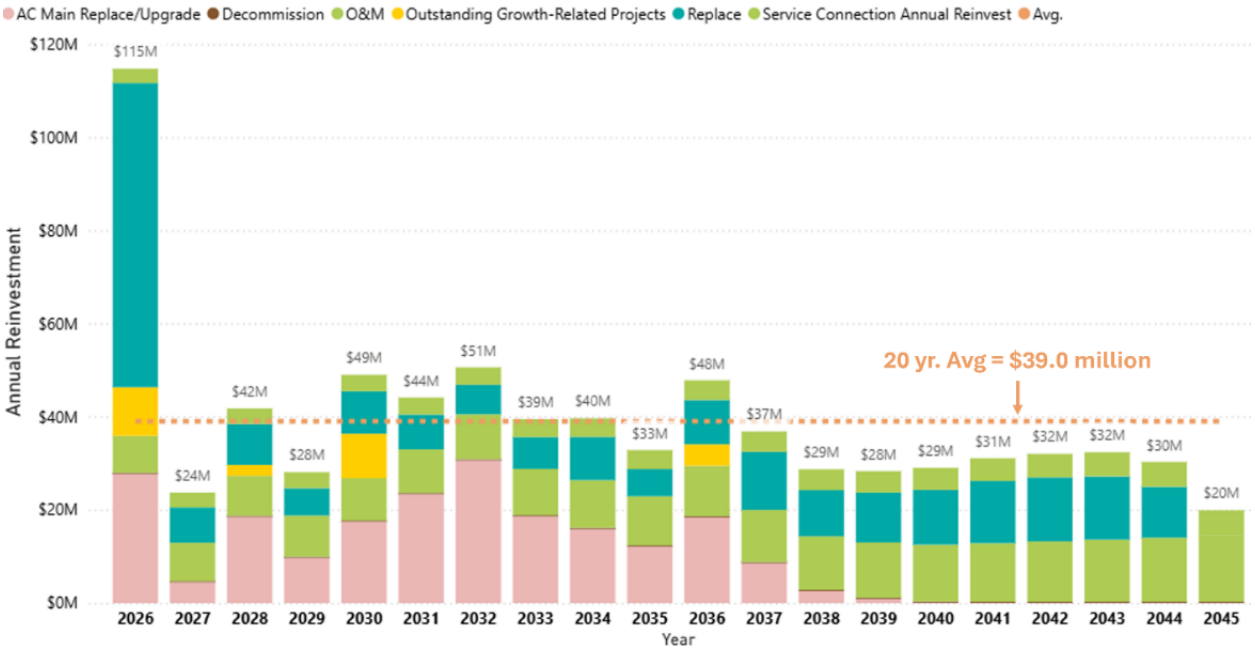

Figure ES-4: Linear Asset Full Funding Need Profile

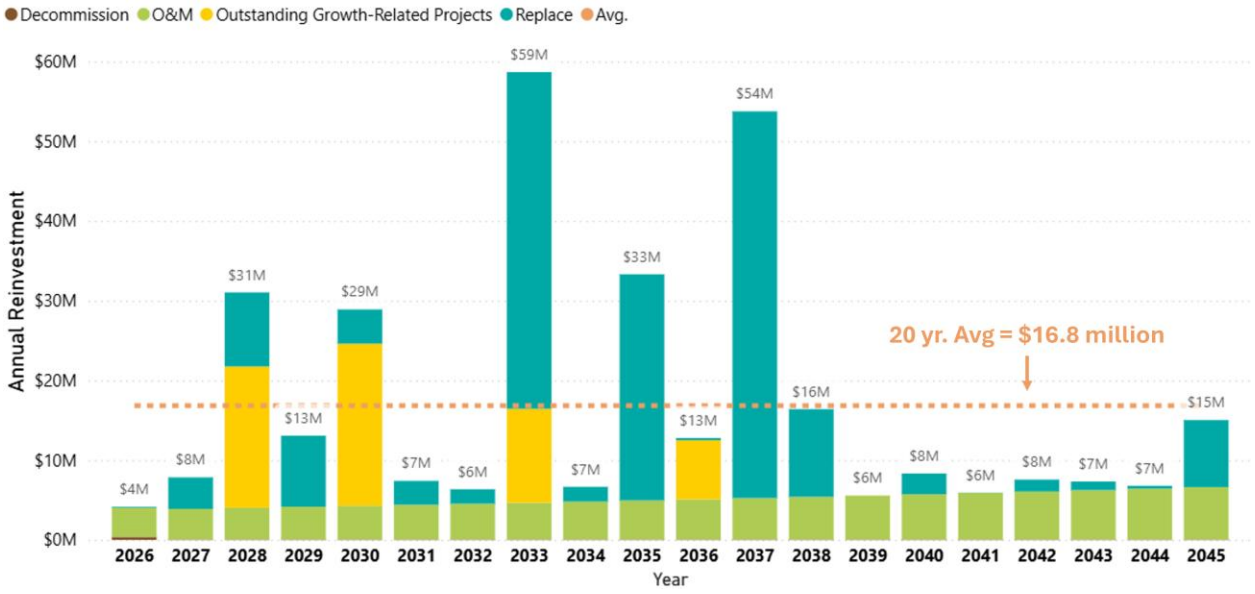

Figure ES-5: Non-Linear Asset Full Funding Need Profile

While S2 identifies the ideal long-term funding need, this level of reinvestment is not expected to be achievable. The following analysis therefore focuses on how each funding scenario affects the ability of JdFWDS to sustain the desired levels of service. In this context, level of service is defined as the percent of assets in fair or better condition.

For linear assets (**Figure ES-6**), the current funding level is approximately sufficient to maintain service levels at approximately 76% over the next 20 years. As the broader main inventory ages and deterioration accelerates, higher investment will be required to avoid sharper declines in condition and service performance.

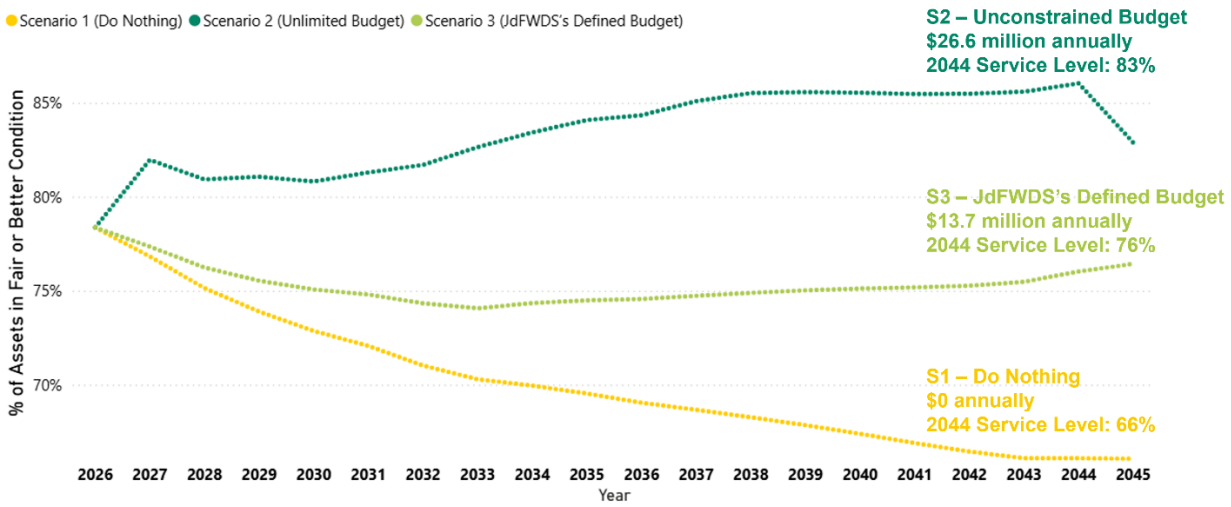

Figure ES-6: % of Linear Assets in Fair or Better Condition Over the Next 20 Years for All Budget Scenarios

For non-linear assets (**Figure ES-7**), the gap between S2 and S3 is more pronounced. Under S2, condition stabilizes at approximately 82% by 2044, while under S3 it declines to approximately 40%. This difference can be partly attributed to the shorter Expected Service Lives (ESLs) of non-linear assets, which makes their condition more sensitive to funding levels and more responsive to reinvestment. Because non-linear assets are easier to access and inspect, renewal decisions should continue to rely on field condition assessments and risk scoring. The most recent assessment, completed in 2025, provides the current basis for prioritizing limited funding toward the highest-priority assets.

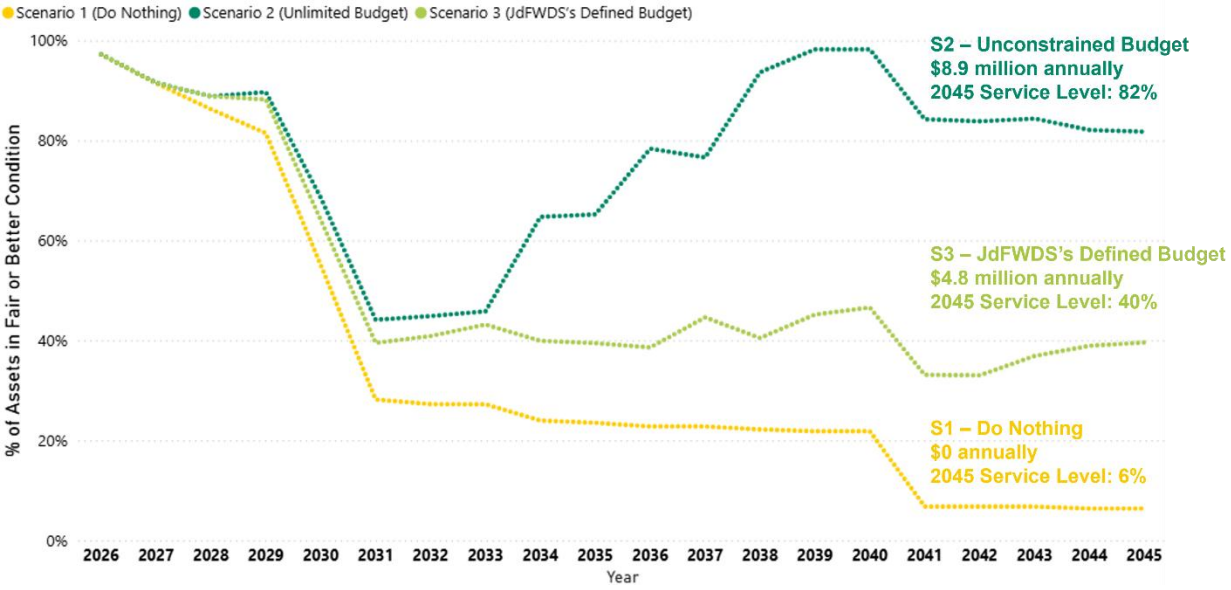

Figure ES-7: % of Non- Linear Assets in Fair or Better Condition Over the Next 20 Years for All Budget Scenarios

In summary, to support long-term service reliability and cost-effective asset management, it is recommended that the JdFWDS adjust funding levels to maintain approximately 80% of assets in fair or better condition, particularly for non-linear assets. This target aligns with peer utility practices and research, and strikes a balance between acceptable service performance and financial efficiency. In addition, major renewal projects should be planned and delivered in phases to spread large investments over multiple years and smooth budget requirements.

Performance Tracking

Performance tracking is a critical component of a sustainable and effective asset management. It ensures that the AMP remains a living document, responsive to changes in system condition, funding, risk, and service expectations. AECOM outlined a framework for monitoring and evaluating the effectiveness of the AMP over time, with the goal of enabling data-driven decision-making, supporting continuous improvement, and maintaining alignment with CRD's strategic objectives. A set of proposed performance indicators specific to AMP execution is summarized in **Table ES-4**.

Table ES-4: AM Plan Performance Monitoring Indicators

AMP Component	Performance Monitoring Indicators
State of Infrastructure	% of assets from JdFWDS in fair or better condition
Levels of Service	% of LoS performance measures of which current performance is recorded % of LoS performance measures for which current performance meets / exceeds target performance
Risk Management	% of high and very high-risk assets
Lifecycle Strategies & Financial Plan	Asset reinvestment rate (%) for JdFWDS Asset expansion rate (%) for JdFWDS Forecasted annual expenditure ($) for JdFWDS Funding Gap (% or $) for JdFWDS
Continuous Improvement	% of high priority improvement initiatives implemented

Asset Management Maturity

The CRD requested that a maturity assessment of the JdFWDS be carried out using the Institute of Asset Management (IAM) maturity scale. This eight-point scale was used by AECOM to assess the capabilities and maturity of the CRD's JdFWDS. AECOM mapped 40 targeted assessment questions to the scale to evaluate current practices.

Figure ES-8 shows the summary of results which indicates the current AM maturity position of the JdFWDS. The JdFWDS has greater maturity in Purpose and Context, however, to successfully reach the AM Readiness Target Level, improvements in Asset Management Decision Making and Lifecycle Delivery is essential.

Figure ES-8: AM Maturity Assessment Results

Table ES-5 shows a summary of the action items to improve AM maturity, gathered from discussions, workshops, and surveys.

Table ES-5: Summary of Short and Long-Term Actions for AM Maturity Improvement

Capability	Short Term Action	Long Term Action
Purpose & Context	• Develop an external stakeholder communications plan that formalizes existing informal relationships with regulators, municipalities, and others. • Create an internal stakeholder prioritization plan which identifies key internal stakeholders (IT, fleet, finance, and more).	• Conduct a study on resource use to quantify how much staffing and support is required for system growth and maintain aging infrastructure. • Establish a CMMS work order standard that shows status progression, closure criteria, and other information for accurate tracking.
Leadership & Governance	• Conduct a CMMS Function Review to include breakdown work order failure codes to allow reliable reporting, required regulatory work order tracking, and work order prioritization standards. • Review and update the existing AM policy from 2019, making sure it reflects current operational needs and is still appropriate for staff.	• Develop clear operational guidelines to support current and future staff that will serve as a reference for operations, standards, and procedures (“Water Bible”).
Organization & People	• Implement succession planning for key roles and shadowing of critical personnel to help retain knowledge.	• Establish planning and scheduling standards with defined windows that evolve from the current two week look-ahead to the more structured intervals such as monthly, quarterly, and eventually six, 12, and 18 months to support proactive maintenance planning and resource allocation
Strategy & Planning	• Improve communication and prioritization within the AM strategy. • Define clear roles and responsibilities for AM practices and procedures to reduce duplication of effort.	• Support planning and scheduling by establishing accurate resourcing requirements to enable the organisation to identify and address shortfalls
Asset Management Decision-Making	• Use asset risk to inform and improve decision making and prioritization to ensure that resources are spent wisely.	• Leverage the AMP LoS, valuation data, and asset registry to establish a single, reliable source for asset history.
Life Cycle Delivery	• Define disposal standards for large and small equipment like standards for long-term isolations, mothballing, and management of redundant assets to set requirements for management and divestment. • Develop emergency response and mitigation plans based on asset risk and CoF.	• Not Applicable.
Information Management	• Establish a work order date standard that defines the purpose of each data field within the CMMS and who is responsible. • Develop standardized procedures for document management.	• Define standards for inputting and updating asset registries across all business systems for consistency to help with maintain accurate asset data.
Risk	• Fully implement an asset risk framework for tactical risk analysis to assist with prioritization and decision making. • Escalate strategic risks from this AMP to enterprise risk for consideration and formalise the risk escalation methodology and responsibilities.	• Implement a defined Management of Change procedure that should be followed for asset changes.

Recommended Improvement Initiatives and Roadmap

Measuring and reporting AM performance reflects CRD's commitment to delivering JdFWDS services effectively and in alignment with defined service objectives. The successful implementation of this AMP relies on ongoing performance evaluation and continuous improvement. This includes executing recommended improvement initiatives that support long-term, sustainable service delivery. In summary, the improvement initiatives are described in **Table ES-6**.

Table ES-6: Recommended Improvement Initiatives

AMP Area	Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
State of Infrastructure	**Linear – General**	• No Global ID Included in the source GIS database	• Global IDs have been produced and assigned as part of the consolidated asset inventory to ensure consistent identification across datasets. In addition, Global IDs have been incorporated into the source GIS data provided by JdFWDS. The provided Global IDs can be used as a starting point for ongoing data management, or alternatively, JdFWDS may choose to regenerate Global IDs based on their preferred convention, provided that consistency is maintained across all systems	Medium
	Linear – Water Meters	• Inconsistency between attribute names	• Update the meter information stored in SAP ISU to include Global IDs by cross-referencing with the GIS layer and establish consistent naming conventions and attribute structures across SAP and GIS to support data integration and accuracy.	High
	Linear – Service Connections	• No data currently available for service connections • No installation date data and no condition data.	• Collect and input core service connection data, starting with inventory, to enable assignment of Global IDs in the future.	High
			• Obtain installation dates from as-built records or historical documentation, where available; otherwise, estimate based on adjacent main installation dates.	High
			• Establish a process for collecting and tracking service connection condition data (e.g., through inspections or age-based proxies).	High
	Linear – Watermains	• Duplicate IDs	• Review and resolve duplicate entries in the CRD Model ID field to ensure each asset is uniquely identified. It is recommended to implement a data validation process to prevent future duplication during data entry or system integration.	High
	Non-Linear – Bulk Water Station	• No original asset records • No ID assigned	• The bulk water station assets were not included in the region's existing asset inventory. AECOM developed corresponding asset records to capture key components such as electrical, plumbing, and superstructure elements. • It is recommended to maintain the bulk water station assets in the inventory, refine the listings with detailed asset information, and assign unique asset IDs to each station.	High
	Non-Linear – Pressure Control Stations	• Only 28% of assets have an Equipment ID assigned	• Approximately 28% of the assets within the Pressure Control Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Pressure Control Station assets and affix identification labels to the corresponding physical equipment.	High
	Non-Linear – Pump Stations	• Only 35% of assets have an Equipment ID assigned	• Approximately 35% of the assets within the Pump Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Pump Station assets and affix identification labels to the corresponding physical equipment.	High
	Non-Linear – Rechloramination Stations	• Only 30% of assets have an Equipment ID assigned	• Approximately 30% of the assets within the Rechloramination Stations, including pumps, valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Rechloramination Stations assets and affix identification labels to the corresponding physical equipment.	High
	Non-Linear – Water Storage Tanks	• Only 21% of assets have an ID assigned.	• Approximately 21% of the assets within the Water Storage Tanks, including valves, and RTUs, have been assigned Equipment IDs (e.g., 6006468). • The remaining assets, including those documented during the 2025 condition assessment, have not yet been assigned Equipment IDs. • It is recommended to complete the assignment of unique asset IDs for all Water Storage Tank assets and affix identification labels to the corresponding physical equipment.	High
Level of Service	**Target Setting / Review**	• Some LoS targets exist (e.g., from CIBI), but not all measures have defined targets.	• Review existing targets against CRD's service goals and historical performance; establish targets for measures without one. Where a target is not feasible, set desired trends.	High
	Refine and Review Measures	• A preliminary list of LoS has been established, however it should be regularly reviewed going forward.	• Implement regular reviews (e.g., annually or every 4 years) to assess performance, verify data quality, and confirm alignment with strategic goals.	High
	Incorporate Customer Feedback	• Current LoS framework does not capture direct customer input.	• Introduce customer feedback mechanisms (e.g., surveys) to identify service expectations, gaps, and areas where CRD may be exceeding expectations.	Medium
	Evaluate Risks with LoS	• Risks associated with not meeting LoS have not been considered.	• Assess risks of not achieving LoS to better inform both capital planning and O&M prioritization.	Medium
Asset Criticality & Risk Management	**Improved methodology**	• CoF scores for pump stations and pressure control station assets are mostly directed by the operation team.	• Develop repeatable rules for determining station criticality for PCS and PS, building on efforts already carried out by CRD. • It is recommended to improve the framework by incorporating additional quantitative and system-based factors, such as: – Population or customers served: Weight stations by the number of people or service connections dependent on them.	Medium

AMP Area	Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
			– Elevation and hydraulic criticality: Include factors such as elevation head, system pressure influence, and storage tank dependency.	
	Improved methodology	• CoF scores for water storage tank assets are mostly directed by the CRD's subject matter experts (SMEs)	• Consideration should be given to developing a more standardized and transparent framework for assessing water storage tanks criticality, ensuring consistent evaluation across the system. The framework could incorporate the following key factors: – Location: Water storage tanks situated in more remote or upstream areas (e.g., Sooke) typically have a higher Consequence of Failure (CoF) due to their importance in maintaining supply continuity and limited alternative sources. – Valve System Configuration: The degree of system isolation and control—such as the availability and reliability of inlet/outlet valves, bypass arrangements, and pressure zones—can significantly influence the operational flexibility and response time during an outage. – Population Served: water storage tanks supplying larger populations or critical service areas (e.g., hospitals, emergency services, or dense residential zones) should be assigned higher criticality scores, reflecting their greater social and service impacts. – Redundancy: The presence (or absence) of backup water storage tanks, interconnections, or alternative supply routes affects the system's resilience. Water storage tanks without redundancy should be deemed more critical due to the higher risk of service interruption.	Medium
	Improved methodology	• CoF and PoF scores for watermains are equally weighted	• Establish weightings for CoF and PoF criteria to reflect CRDs expectations regarding what should drive PoF and CoF scores	Medium
	Risk framework application	• Asset-level risk management strategies	• Incorporate asset-level risk and CoF management strategies into future corporate risk management initiatives or update existing documents such as the ARMF and risk management policy.	Medium
	Risk Analysis	• Meter assets were excluded from this specific risk analysis as they are managed through the SAP dataset, which provides a more detailed basis for future integration.	• Meter assets were analyzed separately using the SAP-based inventory, which provided more detailed attribute information than the GIS dataset. For the next update, the existing unique identifier can be leveraged to enhance integration between the SAP and GIS datasets, allowing the risk analysis to draw on both spatial and attribute information. This approach will strengthen data alignment and enable a more comprehensive inclusion of meters within the overall risk framework.	Medium
Capacity Modelling	**Growth projects**	• Network capacity is exceeded in several areas once growth forecasts have been loaded into the demand model.	• Refer to **Table 5-10** for a summary of recommendations for linear and pumping projects.	Determined per project
	Capacity Modelling	• SRRDF supply cannot meet future demand using forecast population and the CRD design criteria.	• The East-West Connector* is a vital piece of infrastructure that Sooke will rely on in the future and has been used in models to allow further analysis. Its installation has been assumed as certain for the future scenarios of Sooke.	High
		• Fire flow scenarios are assessed on a pressure zone requirement basis only. Individual fire flow scenarios (per linear asset) have not been assessed as individual zoning and growth construction was not available	• Ongoing update of the model should include input from the local municipalities to allow detailed fire flow assessment to take place.	Medium
		• The design consumption rate is noted to be significantly higher than the actual consumption reported in the JdFWDS and results in future flexibility but also future growth projects being determined as required prior to the reality.	• An accurate figure should be used to realistically determine the requirements for growth projects and a consistent conservatism factor determined that accommodates the routine fluctuations in demand and localized growth that a pressure zone may experience.	Medium
Maintenance, Repair and Replacement Strategies	**Staffing & Workforce Capacity**	• Crew numbers have remained static despite system growth. Operators spend more time reacting to emergencies and less on scheduled tasks, creating backlog, fatigue, and overtime costs. • Supporting services (vehicles, IT licences, HR, safety) are also under pressure.	• Add 19 process FTEs and 1 EIC FTE (**Table 6-6**). Of this gross requirement, approximately 10 FTE-equivalents are assumed to be addressed through Strategic Alliance Partners support, with the remaining approximately 10 internal FTEs to be phased at ~2 FTE per year over 5 years. • Include trucks, IT, and training costs in future staffing plans. • Reduce overtime (current $15 k per field FTE vs $6–8k/FTE as per CIBI peer median).	Medium to High
	Preventive vs. Corrective Balance	• PM requirements for new assets are identified informally through staff discussions, with inconsistent documentation and data entry in SAP PM. • Maintenance task scheduling is performed manually despite SAP PM being used to generate PM tasks. • Corrective work still ~44% of hours, diverting crews from preventive programs.	• Introduce a standardized PM intake form at asset commissioning, capturing manufacturer recommendations, regulatory requirements, and operational needs. • Develop a formal SOP to guide the integration of PM tasks into SAP PM. • Leverage SAP PM capabilities for geographic grouping and automated scheduling; establish documented protocols to reduce reliance on staff knowledge. • Target 30/70 corrective–preventive split by expanding flushing, valve exercising, hydrant inspections, and leak detection.	Medium
	Information Management & Data Quality	• Work details are not consistently entered into GIS or cost codes. • Work order closure and data entry rely on manual QA processes, with inconsistent validation and limited backlog analysis. • Missing data hampers planning, budget defense, and compliance audits.	• Implement a standardized QA checklist for work orders. • Integrate maintenance records into GIS/CMMS in near-real time. • Conduct periodic backlog and feedback reviews to identify systemic issues and improve process consistency.	High
	Decision-Making & Workflow Integration	• Field decisions on CM tasks (e.g., whether to complete on-site or escalate) are based on informal judgment, with no clear thresholds.	• Define thresholds and triggers for minor vs. major CM tasks, including safety and timing criteria. • Create SOPs to guide field staff and supervisors on CM handling, including escalation and documentation requirements. • Develop end-to-end SOPs for workflows involving Operations, Engineering, and Finance.	Medium to High

AMP Area	Opportunity Area	Current Observation / Gap	Proposed Recommendation	Priority Level
		• Maintenance activities involve multiple departments, but roles, handoffs, and communication protocols are not clearly defined.	• Ensure SOPs are version-controlled and embedded in training/onboarding.	
	Supply Chain & Spare Parts	• Specialty electronics, pumps, and valves that once arrived in weeks now take months. • CRD stocks more spares in older facilities, tying up money and creating security/insurance concerns.	• Establish a centralized critical-spares strategy and long-term supplier agreements. • Modernize storage facilities and strengthen inventory controls. • Use Strategic Alliance Partner contractors for excavation, traffic control, and specialised O&M where parts delays are common.	Medium
	Regulatory Compliance	• Provincial and federal regulations continue to tighten, with more prescriptive sampling, analytical, and reporting requirements. • Non-compliance risks penalties, reputational damage, and loss of public trust.	• Prepare to increase monitoring and sampling capacity to align with future regulatory requirements when confirmed. • Prepare to enhance reporting and monitoring processes to ensure timely compliance with evolving regulatory requirements if requirements are updated.	High
	Advancing Preventive Programs & System Modernization	• Legacy programs (AMI migration, valve cycles, proactive leak detection) face long backlogs and limited resources.	• Allocate one new FTE for district metering and acoustic leak audits and consider a pilot project to support financial justification for enhanced leak detection. • Institute a four-year valve/air-valve cycle supported by Strategic Alliance Partner asphalt services. • Accelerate AMR-to-AMI migration by doubling the meter team and supplementing with Strategic Alliance Partner plumbing resources.	Medium to High
Capital Projects and Financial Plan	**Maintain Target Asset Condition Levels**	• Under the current planned budget: • The percentage of linear assets in fair or better condition is forecast to remain steady at approximately 74% to 76% over the planning period. • The percentage of non-linear assets in fair or better condition is expected to gradually decline from 97% to 40% by the end of the planning period.	• Many water utilities aim to maintain approximately 80% of their assets in fair or better condition[1], as research and peer practices suggest this range supports cost-effective lifecycle management while avoiding steep renewal spikes. Maintaining asset health within this band provides a defensible foundation for long-term service reliability and cost stability.	High
	Establish Minimum Annual Reinvestment Rate	• Under the current budget, the capital reinvestment rate is 0.94%, which represents the percentage of total replacement value reinvested annually in system assets.	• Maintain a minimum annual reinvestment rate of 1% of replacement value would allow the JdFWDS to renew the system over a 100-year lifecycle and support sustainable long-term asset condition.	High
	Risk-Based Capital Prioritization	• Current budgeting practices do not explicitly apply risk-based prioritization to capital reinvestment decisions.	• Prioritize projects using risk-based criteria to ensure funding is directed to assets with the greatest impact on service and risk reduction. • For linear assets, if funding is constrained, prioritize legacy AC main upgrades and aging meter replacement to reduce operating risk, improve reliability, and enhance billing accuracy.	High
	Phased Planning for Large-Ticket Items	• Upcoming large-ticket renewal needs (e.g., Water Storage Tanks) may exceed short-term delivery capacity and budget flexibility. Executing all major renewals immediately is not feasible given resource and market constraints.	• Develop a phased capital planning and delivery strategy for major renewal projects, spreading large-ticket investments over a multi-year horizon. This will align project scheduling with internal capacity, contractor availability, and annual funding growth.	Medium

* Note – The East-West Connector is a Regional Water Supply Master Plan Project

[1] Municipality of Bluewater. Asset Management Plan (2024). 20240812-fin-amp-2024-bluewater-asset-management-plan-psd-final.pdf. Retrieved on Oct 29, 2025.
Region of Waterloo. Asset Management Plan (2025). 2025 ASSET MANAGEMENT PLAN. Retrieved on Oct 29, 2025.
Municipality of Leamington. Asset Management Plan (2025). 2025-Asset-Management-Plan---Final.pdf. Retrieved on Oct 29, 2025.

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EEP 26-24

REPORT TO JUAN DE FUCA WATER DISTRIBUTION COMMISSION
MEETING OF TUESDAY, MAY 5, 2026

SUBJECT **Monthly Drinking Water Quality Dashboard**

ISSUE SUMMARY

To inform the Juan de Fuca Water Distribution Commission of the launch of a new dashboard that provides monthly updates on key drinking water quality parameters across the Greater Victoria Drinking Water System (GVDWS).

BACKGROUND

The Capital Regional District (CRD) monitors and reports on drinking water quality across the GVDWS, including source water, treatment performance, transmission, and distribution system metrics. Previously reported to the Regional Water Supply Commission, some key water quality data will now also be shared with other Commissions for information.

In response to increasing interest in timely water quality information and to support transparency and operational responsiveness, staff have developed a new Monthly Drinking Water Quality Dashboard (Appendix A). This dashboard summarizes key water quality indicators and will be issued monthly, then provided as an attachment to Juan de Fuca Water Distribution Commission meeting agendas. The dashboard does not replace formal reporting obligations under the *Drinking Water Protection Regulation* but serves as a supplementary communication tool for various commissions and the public. Members of the public can access this dashboard through the publication of the meeting agendas. It is also planned to post these dashboards monthly on the CRD website later this year.

IMPLICATIONS

Alignment with Board & Corporate Priorities

This initiative supports the CRD Board's strategic priorities related to service delivery excellence, transparency, and climate resilience. By enhancing access to drinking water quality data and enabling informed decision-making, the dashboard contributes to the CRD's commitment to evidence-based governance, proactive infrastructure management, and public trust in regional water supply services.

Social Implications

The dashboard promotes public confidence and environmental awareness by supporting informed, transparent communication about regional drinking water quality.

Service Delivery Implications

This newly introduced water quality information distribution will provide regular access to key data, enabling more timely oversight and discussion by this Commission.

CONCLUSION

The CRD is committed to service excellence including communicating water quality information in a transparent manner. Staff have developed a new reporting tool for key water quality parameters that will allow for more timely oversight and discussion. The dashboard report will be produced monthly and will be available on the CRD website later this year.

RECOMMENDATION

There is no recommendation. This report is for information only.

Submitted by:	Glenn Harris, Ph.D., R.P. Bio., Senior Manager, Environmental Protection
Concurrence	Alicia Fraser, P. Eng., General Manager, Infrastructure and Water Services
Concurrence:	Luisa Jones, MBA, General Manager, Parks, Recreation & Environmental Services
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT

Appendix A: Monthly Drinking Water Quality Dashboard (February and March 2026)

Monthly Drinking Water Quality Dashboard

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Water Quality Operations

Capital Regional District | February 2026

1. **Treated Water** | Monthly Compliance

The following table summarizes the main regulatory parameters across the various transmission and distribution systems in the Greater Victoria Drinking Water System (GVDWS). Drinking water systems in British Columbia are required to comply with the BC Drinking Water Protection Regulation and are expected to operate in accordance with recognized industry standards.

Monthly Water Quality Compliance Results by Municipality								
Municipality	**Required Samples**	**Actual Samples Collected**	**Percent Total Coliform Samples >1 CFU/100 ml**	**Total Coliform Samples >10 CFU/100 ml**	**E.coli Samples >1 CFU/ 100 mL**	**Turbidity Samples >1 NTU**	**Chlorine Residual Median mg/L**	**Water Temp. Median ºC**
Central Saanich	17	22	0	0	0	0	1.66	8.5
Saanich	94	97	0	0	0	0	1.54	8.3
North Saanich	13	18	0	0	0	0	1.5	8.5
Victoria / Esquimalt	93	95	0	0	0	0	1.66	8.3
Oak Bay	20	22	0	0	0	0	1.62	8.7
Sidney	14	16	0	0	0	0	1.63	8.6
Sooke / East Sooke	17	31	0	0	0	0	1.46	8.0
Westshore	82	84	0	0	0	0	1.6	7.9
Transmission Mains	n/a	68	0	0	0	0	1.93	7.5
Transmission Reservoirs	n/a	20	0	0	0	0	1.66	8.0
Total	**350**	473	0	0	0	0	1.63	8.3

GREEN – Compliance with industry and/or health standards

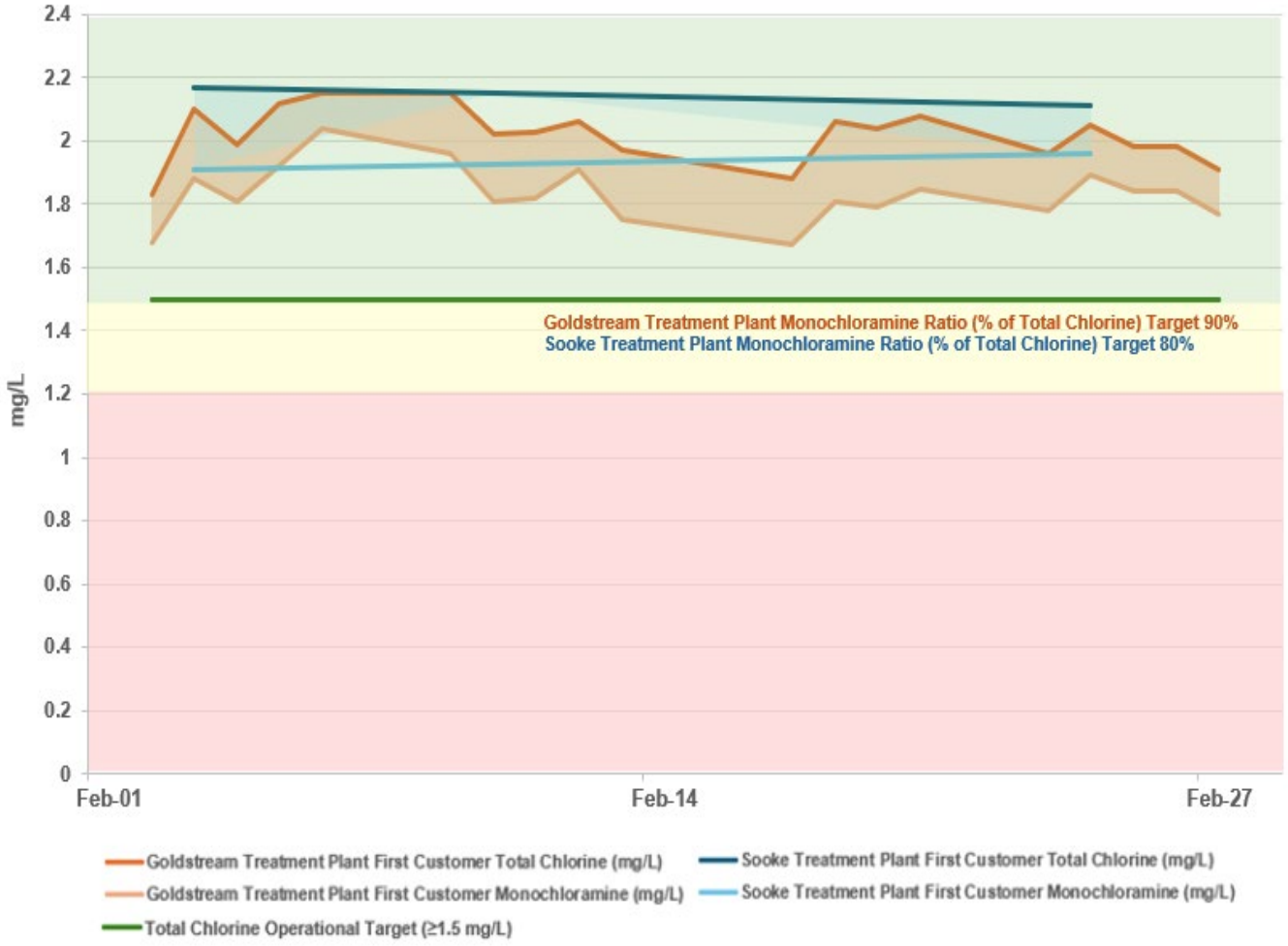
YELLOW – Exceedance of operational and/or asthetic objectives

RED – Exceedance of industry and/or health standards

In February 2026, all GVDWS systems met provincial requirements and industry standards with overall excellent drinking water quality throughout. All main parameters were within target or the optimal target range.

2. **Treated Water** | Goldstream Treatment Plant First Customer and Sooke Treatment Plant First Customer, Total Chlorine and Monochloramine

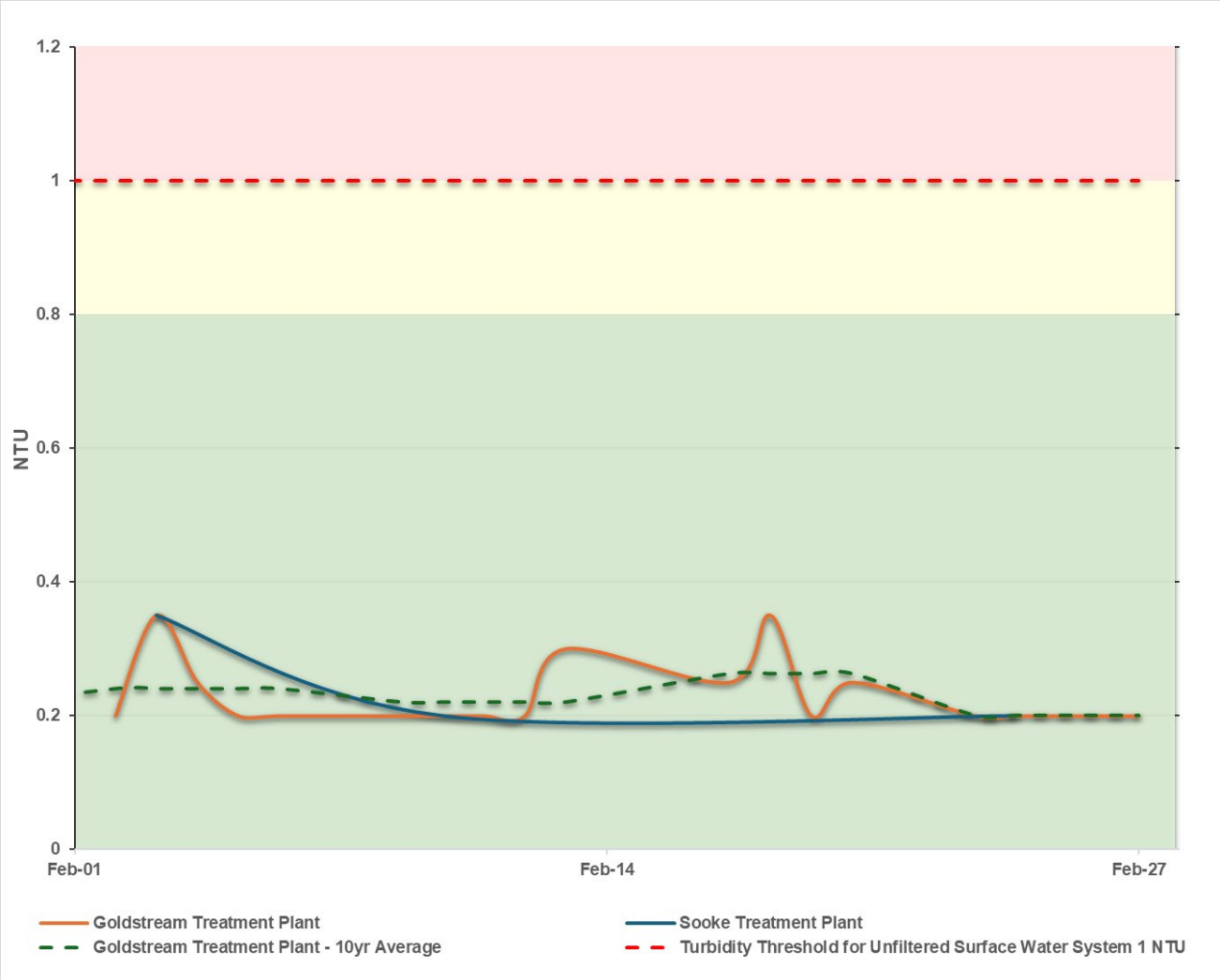
The following graph shows the daily measured total chlorine and monochloramine concentrations at the first treated water sampling stations downstream of the two CRD water treatment plants.



In February 2026, both plants met the target total chlorine concentration of 1.5 mg/L. The Sooke Treatment Plant met consistently its monochloramine target (80%). The Goldstream Treatment Plant met its monochloramine target (90%) on 74% of the sampling days. On 5 sampling days during mid February this target was not achieved and instead ranged between 88-89%. The improvements towards the end of the month were achieved by adjusting the ammonia – chlorine mixture at the Goldstream Treatment Plant. Lower monochloramine ratios affect the chemical stability and longevity of the chloramines which provide secondary disinfection in the distribution systems. Staff are monitoring chloramine residuals in all parts of the system and address localized low residuals with operational measures to maintain good drinking water quality.

3. **Raw Water Turbidity |** Goldstream Treatment Plant and Sooke Treatment Plant

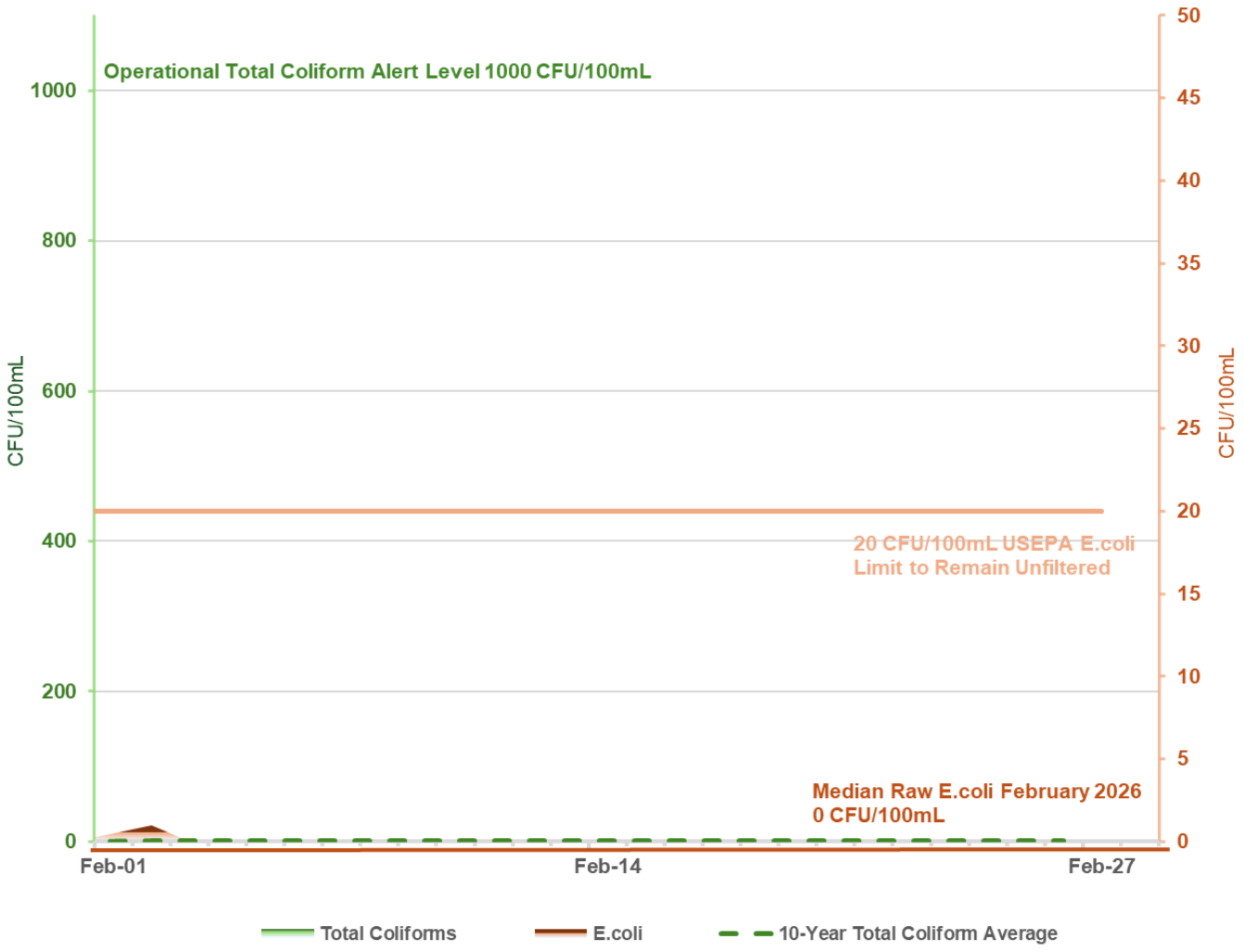
The following graph shows the raw water turbidity measured at both water treatment plants.



The GVDWS, an unfiltered surface water system, must consistently achieve turbidity levels under 1 NTU to meet regulatory standards. The turbidity levels at both plants were consistently below 1 NTU and within compliance.

4. Raw Water Biological Parameters | Total Coliforms and E. coli at Goldstream Treatment Plant

The following depicts the concentrations of key bacteria in the raw water.



As typical during the winter month, concentrations of total coliform and E. coli bacteria in the raw water were low and remained below the USEPA limit for unfiltered surface water systems.

Monthly Drinking Water Quality Dashboard

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Water Quality Operations

Capital Regional District | March 2026

1. **Treated Water** | Monthly Compliance

The following table summarizes the main regulatory parameters across the various transmission and distribution systems in the Greater Victoria Drinking Water System (GVDWS). Drinking water systems in British Columbia are required to comply with the BC Drinking Water Protection Regulation and are expected to operate in accordance with recognized industry standards.

Monthly Water Quality Compliance Results by Municipality								
Municipality	**Required Samples**	**Actual Samples Collected**	**Percent Total Coliform Samples >1 CFU/100 ml**	**Total Coliform Samples >10 CFU/100 ml**	**E.coli Samples >1 CFU/ 100 mL**	**Turbidity Samples >1 NTU**	**Chlorine Residual Median mg/L**	**Water Temp. Median ºC**
Central Saanich	17	22	0	0	0	2	1.55	8.5
Saanich	94	97	0	0	0	0	1.47	8.7
North Saanich	13	19	0	0	0	0	1.36	8.8
Victoria / Esquimalt	93	106	0	0	0	0	1.50	9.0
Oak Bay	20	23	0	0	0	0	1.44	9.0
Sidney	14	16	0	0	0	0	1.53	8.8
Sooke / East Sooke	17	45	0	0	0	1	1.36	8.0
Westshore	82	84	0	0	0	0	1.43	8.8
Transmission Mains	n/a	78	0	0	0	0	1.81	7.1
Transmission Reservoirs	n/a	18	0	0	0	0	1.47	7.6
Total	**350**	508	0	0	0	3	1.49	8.4

GREEN – Compliance with industry and/or health standards

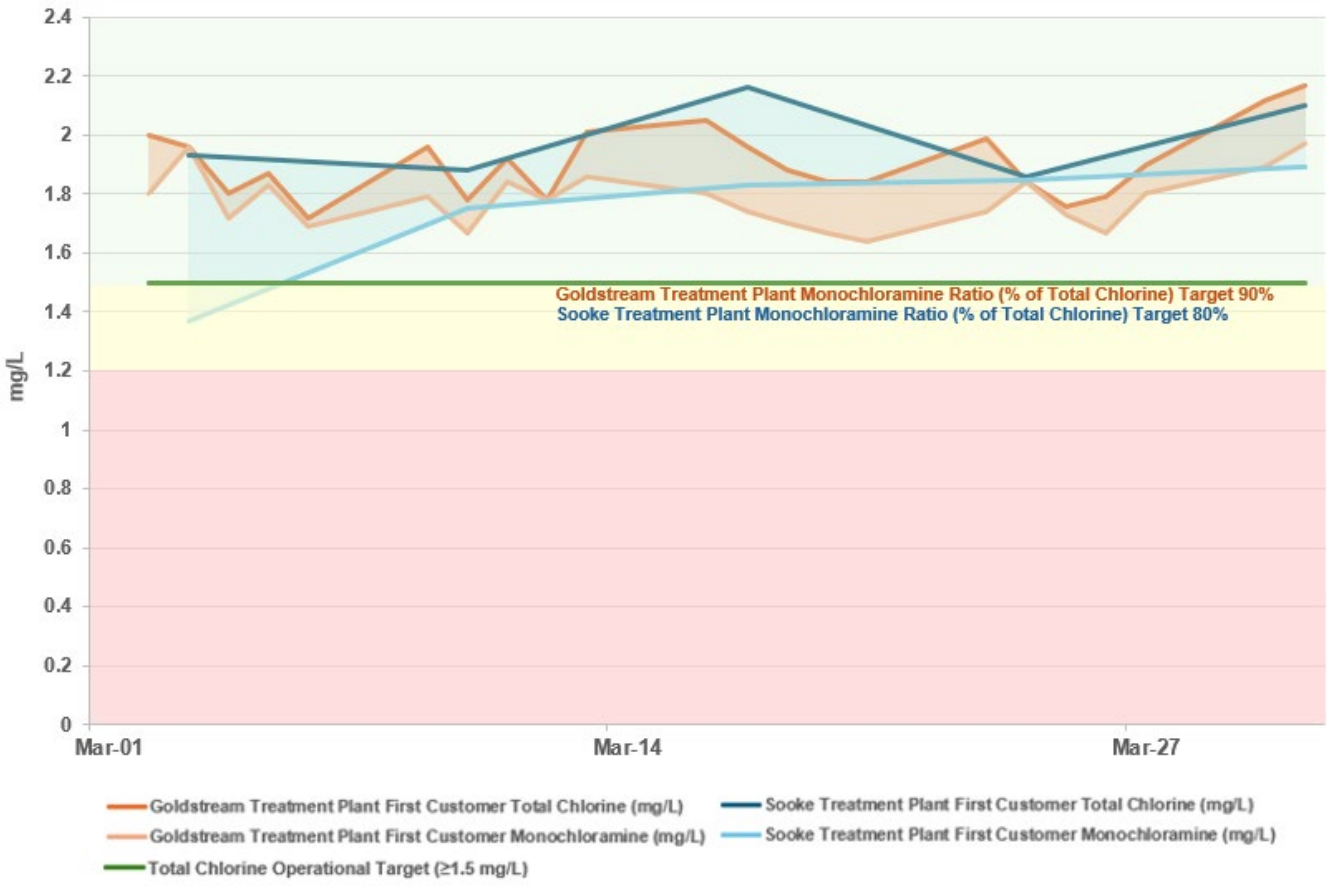
YELLOW – Exceedance of operational and/or asthetic objectives

RED – Exceedance of industry and/or health standards

In March 2026, all GVDWS systems met provincial requirements and industry standards with overall excellent drinking water quality throughout. Two distribution system samples from Central Saanich and one from Sooke/East Sooke had slightly elevated turbidity. Likely causes of these aesthetic exceedances include seasonal main flushing activities or sediment accumulation during low-demand periods at system extremities. Targeted spot flushing was carried out to address them.

2. **Treated Water** | Goldstream Treatment Plant First Customer and Sooke Treatment Plant First Customer, Total Chlorine and Monochloramine

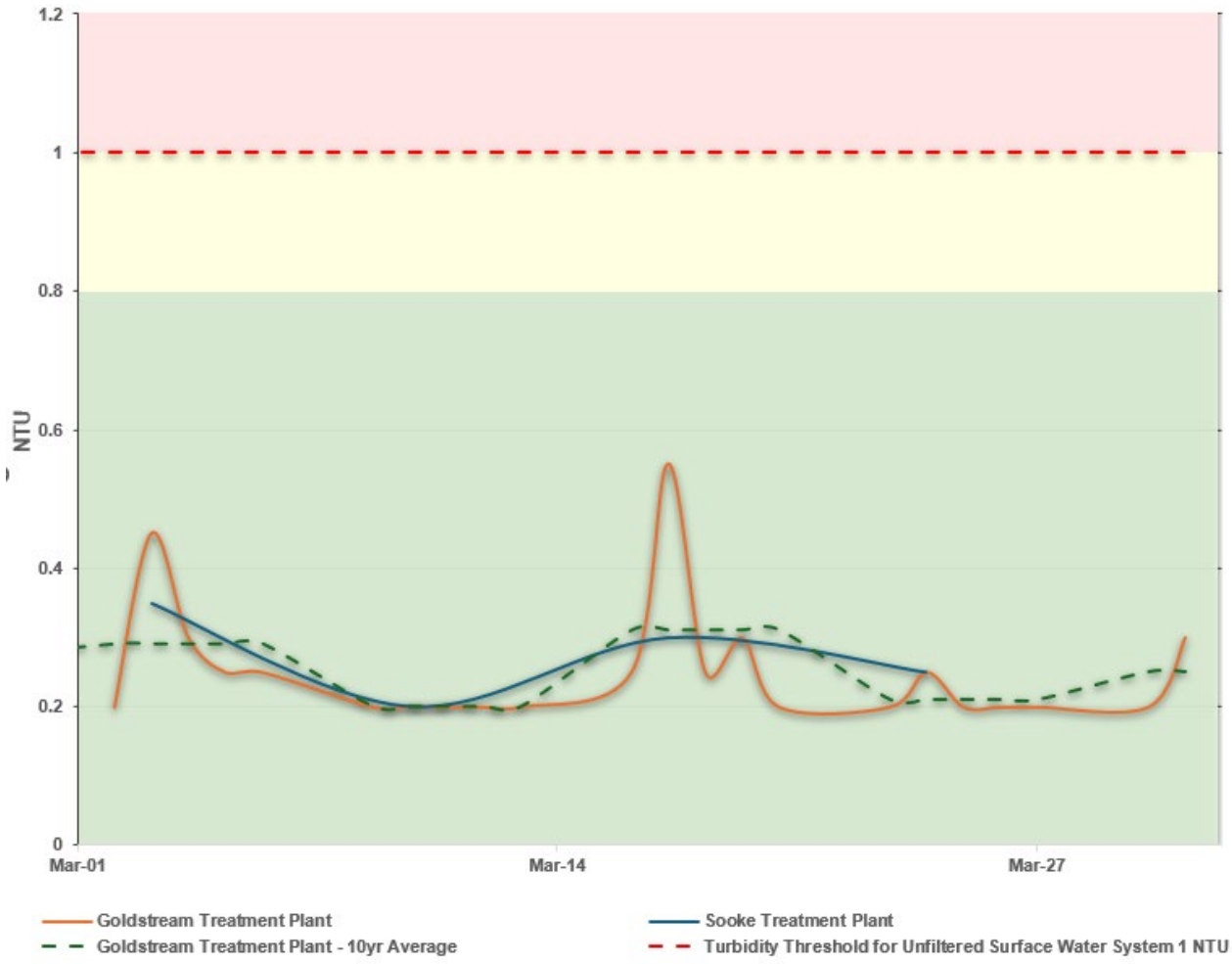
The following graph shows the daily measured total chlorine and monochloramine concentrations at the first treated water sampling stations downstream of the two CRD water treatment plants.



In March 2026, both plants met the target total chlorine concentration of 1.5 mg/L. The Sooke Treatment Plant fell slightly short of its monochloramine target (80%) during the first few days of the month but was within target range for the rest of the month. The Goldstream Treatment Plant met its monochloramine target (90%) on most days except for 4 days during mid March. The improvements were achieved by adjusting the ammonia – chlorine mixture at the treatment plants. Lower monochloramine ratios affect the chemical stability and longevity of the chloramines providing the secondary disinfection in the distribution systems.

3. **Raw Water Turbidity |** Goldstream Treatment Plant and Sooke Treatment Plant

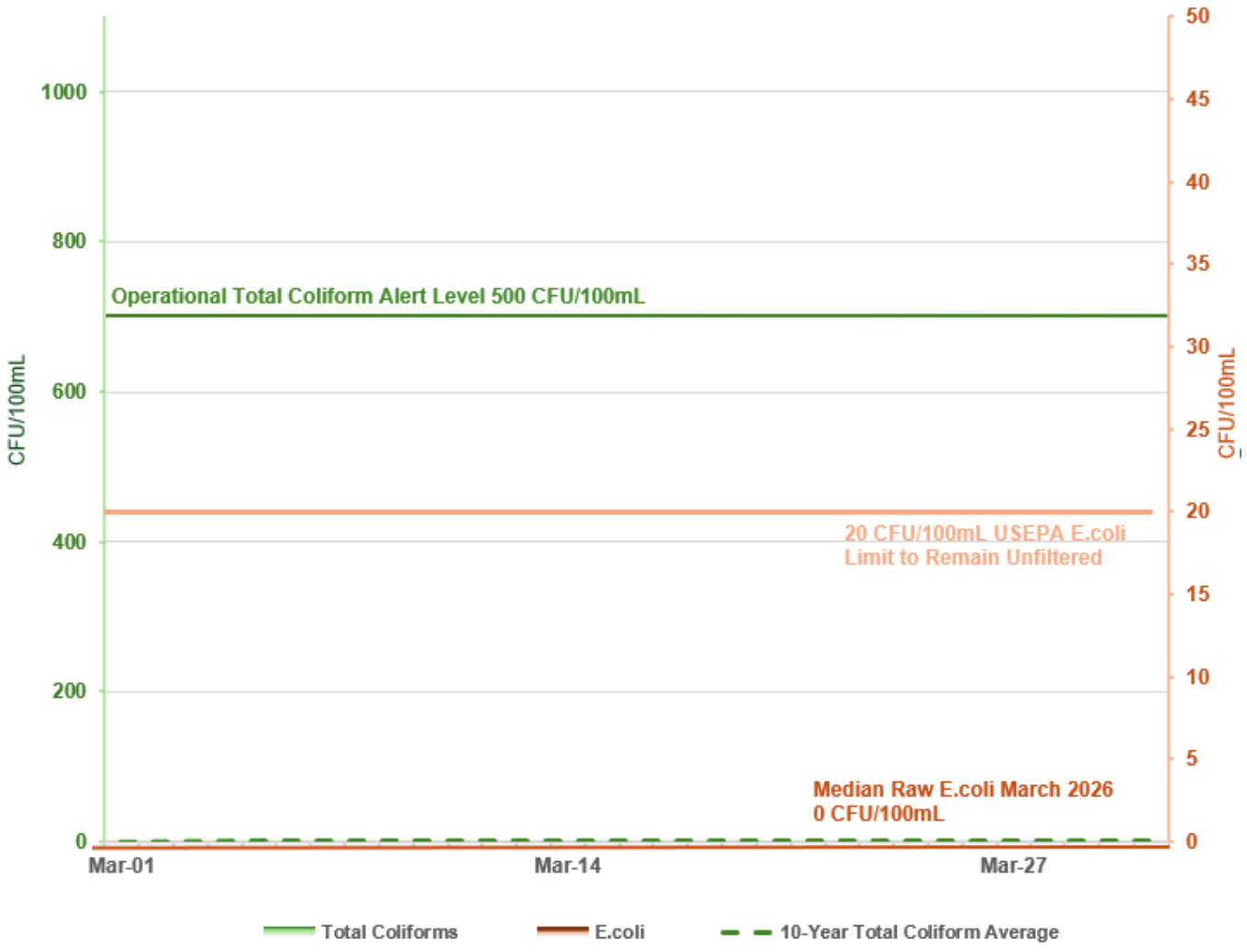
The following graph shows the raw water turbidity measured at both water treatment plants.



The GVDWS, an unfiltered surface water system, must consistently achieve turbidity levels under 1 NTU to meet regulatory standards. The turbidity levels at both plants were consistently low and well within compliance.

4. Raw Water Biological Parameters | Total Coliforms and E. coli at Goldstream Treatment Plant

The following depicts the concentrations of key bacteria in the raw water.



As typical during the winter month, the concentrations of total coliform and E. coli bacteria in the raw water were extremely low and remained well below the USEPA limit for unfiltered surface water systems. The operational total coliform alert level was reduced from 1,000 to 500 CFU/100 mL following a risk review informed by 2025 summer data.