EPCOR Water Services 2025-2027 Rates Application - Appendices A to P

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Appendix A

EPCOR WATER SERVICES

2025-2027 WASTEWATER SERVICES

Summary of Bylaw and Key Changes

May 31, 2024

APPENDIX A - Part 1

SUMMARY OF THE EPCOR WASTEWATER SERVICES BYLAW AND KEY CHANGES

1.0 OVERVIEW OF THE PROPOSED WASTEWATER SERVICES BYLAW

1.1 Overview

Through the Wastewater Services Bylaw, EWS seeks approval for the following:

- Extension of the PBR from April 1, 2025 to December 31,2027;
- Inclusion of a PBR formula to set rates based on routine and non-routine adjustments commencing April 1, 2025;
- The addition of seven new Service Charges in Schedule 1, Part III of the Bylaw;
- Updated Terms and Conditions of Wastewater Collection and Wastewater Treatment Services that govern the relationship between EWS and its customers. The majority of the proposed changes add clarity, improve consistency and readability and eliminate duplications. Details of the proposed amendments (except changes of a more minor nature) are summarized in the table below. The remaining minor changes are set out in the blacklined version of the Bylaw;
- Special Rate Adjustments for Wastewater Services, including special rate adjustments for: the fixed and variable charges to rebase the revenue requirement based on forecast costs for the PBR term; and for the consumption deferral account;
- The Inflation factor applied each year to prior year's Wastewater Collection Services rates to be calculated based on a weighting of 40% non-labour component and 60% labour component to represent Wastewater Collection Services operations internal cost structure (Schedule 3);
- The Inflation factor applied each year to prior year's Wastewater Treatment rates to be calculated based on a weighting of 65% non-labour component and 35% labour component to represent Wastewater Treatment operations internal cost structure (Schedule 3);
- Maintain the Efficiency factor from the previous PBR term at 0.25% for Wastewater Treatment fixed monthly service charges and consumption charges, wastewater overstrength surcharges and wastewater additional overstrength surcharges;
- Change the Efficiency factor for the 2025-2027 PBR term for Sanitary Utility fixed monthly service charges, Sanitary Utility variable monthly charges and Stormwater

Utility rates to 0.25% from the previous 0.50%; and

- Updates to Wastewater Services performance standards to ensure that the standards continue to be appropriate and achievable but also sufficiently rigorous to result in a high level of customer service. Substantive changes to the Performance Measures are described in detail in the table below and are in Schedule 3 of the Bylaw.

2.0 SUBSTANTIVE CHANGES FROM CURRENT DRAINAGE BYLAW TO PROPOSED DRAINAGE BYLAW

2.1 General

Reference:	Throughout Bylaw and Schedules
Current:	Drainage Services
Proposed:	Wastewater Collection Services
Rationale:	Throughout the Bylaw and its schedules, EWS proposes that references to “Drainage Services” be changed to “Wastewater Collection Services” in order to use nomenclature that is industry standard. In addition, with EWS providing water, wastewater collection and wastewater treatment in the City of Edmonton, the proposed terminology change reflects EWS’s carriage of the full water cycle.

Reference:	Schedule 1, Price Schedule
Current:	N/A
Proposed:	Modifications for each rate description to standardize the layout and to the extent possible, the wording
Rationale:	EWS has proposed modifications for each rate description to standardize the layout and to the extent possible, the wording. Unless otherwise documented in this Appendix A, these modifications are of a minor nature intended to improve readability. Although these changes are minor in nature, EWS has flagged them in order to explain the number of changes shown in the blacklined version of Schedule 1.

2.2 Bylaw

Reference:	Bylaw, Definitions
Current:	Addition of definitions to section 2 'Definitions'
Proposed:	"Commercial Service" means a service provided to a Premises not otherwise defined as a Residential Service or Multi-Residential Service; "Multi-Residential Service" means a service provided to a Premises used primarily for domestic purposes where more than four separate dwelling units are metered by a single water meter; "Premises" means a parcel of land and any buildings situated on that land; "Residential Service" means a service provided to a premises used primarily for domestic purposes, where no more than four separate dwelling units are metered by a single water meter and the water service line to the premises is not greater than 50 millimeters in diameter;
Rationale:	EWS forecasts and reports on revenues by customer class. To accurately reflect this and to provide consistency with the wording in Schedule 1 of EPCOR Water Services Bylaw 19626, EWS proposes these definitions be added in order to allow for the proposed amendments to Schedule 1, which are outlined below. By adding the definitions to the Bylaw, unnecessary repetition is avoided and the flow of the document is improved.

2.2.1 Schedule 1 Price Schedule

Reference:	Current: Schedule 1, Part I – Sanitary and Stormwater Rates, Rate Sheet 1 New: Schedule 1, Part I: Sanitary Utility Rates
Current:	Applicable To all domestic service Customers within the city of Edmonton
Proposed:	Applicable To all ~~domestic service~~ Residential Service, Multi-Residential Service and Commercial Service Customers within the city of Edmonton
Rationale:	EWS forecasts and reports on revenues by customer class. To accurately reflect this and to provide consistency with the wording in Schedule 1 of EPCOR Water Services Bylaw 19626, EWS proposes that the wording be amended.

Reference:	Current: Schedule 1, Part I – Sanitary and Stormwater Rates, Rate Sheet 1 New: Schedule 1, Part I: Sanitary Utility Rates
Current:	References to “flat monthly charges”
Proposed:	Changed to “fixed monthly charges”
Rationale:	EWS’s utilities have fixed and variable charges. Throughout EPCOR Drainage Services Bylaw 19627, EWS used the term ‘flat’ to describe fixed monthly charges and throughout the EPCOR Water Services Bylaw 19626, EWS uses the term fixed to describe the fixed monthly charges. In order to maintain consistency between the bylaws, EWS proposes to change the terminology in the new Wastewater Services bylaw to align with the terminology used in EPCOR Water Services Bylaw 19626. As flat has been used interchangeably with fixed, the proposed wording change does not impact the charge itself.

<table>
<tr><td>Reference:</td><td>Current: Schedule 1, Part I – Sanitary and Stormwater Rates, Rate Sheet 1, Variable Monthly Charge
New: Schedule 1, Part I: Sanitary Utility Rates, Variable Monthly Charge</td></tr>
<tr><td>Current:</td><td><table>
<tr><th>Premises</th><th>Rate per m³</th></tr>
<tr><td></td><td></td></tr>
<tr><td>All premises (except large wholesale)</td><td>$1.2493</td></tr>
<tr><td>Large Wholesale* with Collection System</td><td>$0.6996</td></tr>
</table></td></tr>
<tr><td>Proposed:</td><td><table>
<tr><th>Premises</th><th>Rate per m³</th></tr>
<tr><td>Residential Service
All consumption</td><td>$1.2891 per m³</td></tr>
<tr><td>Multi-Residential Service
All consumption</td><td>$1.2568 per m³</td></tr>
<tr><td>Commercial Service
All premises (except large wholesale)
Large Wholesale* with Collection System</td><td>
$1.1212 per m³
$0.6909 per m³</td></tr>
</table></td></tr>
<tr><td>Rationale:</td><td>In order to align with the proposed change to include customer classes, EWS proposes this table to include the specific customer classes with the Variable Monthly Charge.</td></tr>
</table>

Reference:	Current: Schedule 1, Part I – Sanitary and Stormwater Rates, Rate Sheet 1 and Rate Sheet 2 New: Schedule 1, Part I: Sanitary Utility Rates Schedule 1, Part II: Stormwater Utility Rate
Current:	Sanitary and stormwater rates are currently included together in Part I: Sanitary and Stormwater Rates, with sanitary being under Rate Sheet 1 and stormwater under Rate Sheet 2.
Proposed:	Sanitary and stormwater will each have their own part. Rate Sheet 1 will be changed to Part I: Sanitary Utility Rates. Rate Sheet 2 will be changed to Part II: Stormwater Utility Rate.
Rationale:	Although these changes are minor in nature, EWS has flagged them in order to explain the number of changes shown in the blacklined version of Schedule 1.

<table>
<tr><td>Reference:</td><td>Current: Schedule 1, Part I – Sanitary and Stormwater Rates, Rate Sheet 2
New: Schedule 1, Part II: Stormwater Utility Rate</td></tr>
<tr><td>Current:</td><td>Runoff Coefficient Tables
The following tables shall be in effect until March 31, 2025.

<u>Existing Drainage Services</u>

For Premises incurring charges for Drainage Services prior to January 1, 2024, the following shall apply:

<table>
<tr><td>R</td><td>Zoning</td></tr>
<tr><td>0.10</td><td>AG</td></tr>
<tr><td>0.20</td><td>A, RR</td></tr>
<tr><td>0.30</td><td>AP, US (schools)</td></tr>
<tr><td>0.50</td><td>RF1, RF2, RF3, RF4, RMH, IH, MA, AGU</td></tr>
<tr><td>0.65</td><td>RSL, RF5, RF6, RA7, RPL</td></tr>
<tr><td>0.75</td><td>RA8, US (except schools), PU</td></tr>
<tr><td>0.90</td><td>RA9, RMX, CNC, CSC, CB1, CHY, CO,</td></tr>
</table>
</td></tr>
</table>

	IB, IM, AGI, DC
0.95	CB2, CMX

New Drainage Services

For Premises which begin to incur charges for Drainage Services on or after January 1, 2024, the following shall apply:

R	Zoning
0.1	AG, NA
0.2	RR, A
0.3	PS, PSN
0.5	RS, FD, IH
0.65	RSF, RSM, RM, PS (schools)
0.75	UF, PU, UI
0.9	RL, BE, IM, CG, CB, CN, MU, MUN, AJ, DC, DC1, DC2

Proposed:

Runoff Coefficient Tables

The following tables shall be in effect until December 31, 2027. ~~March 31, 2025~~.

~~Existing Drainage Services~~

~~For Premises incurring charges for Drainage Services prior to January 1, 2024, the following shall apply:~~

~~R~~	~~Zoning~~
~~0.10~~	~~AG~~
~~0.20~~	~~A, RR~~
~~0.30~~	~~AP, US (schools)~~
~~0.50~~	~~RF1, RF2, RF3, RF4, RMH, IH, MA, AGU~~
~~0.65~~	~~RSL, RF5, RF6, RA7, RPL~~
~~0.75~~	~~RA8, US (except schools), PU~~

~~0.90~~	~~RA9, RMX, CNC, CSC, CB1, CHY, CO, IB, IM, AGI, DC~~
~~0.95~~	~~CB2, CMX~~

~~New Drainage Services~~

~~For Premises which begin to incur charges for Drainage Services on or after January 1, 2024, the following shall apply:~~

~~R~~	~~Zoning~~
~~0.1~~	~~AG, NA~~
~~0.2~~	~~RR, A~~
~~0.3~~	~~PS, PSN~~
~~0.5~~	~~RS, FD, IH~~
~~0.65~~	~~RSF, RSM, RM, PS (schools)~~
~~0.75~~	~~UF, PU, UI~~
~~0.9~~	~~RL, BE, IM, CG, CB, CN, MU, MUN, AJ, DC, DC1, DC2~~

Runoff Coefficient	Zoning Designation
0.2	A, AG, NA, RR, RVSA
0.3	PS, PSN
0.4	FD
0.5	AJ, RS/RSF(≥450m²)
0.55	DC(<700m²), PU, RM/RSM(≥450m²), RS/RSF(<450m²), UF
0.6	DC(≥700m²), RL, RM/RSM(<450m²), UI
0.65	CN, MUN
0.75	BE, CB, CG, IH, IM, MU

Rationale:	Stormwater utility charges are based on the following formula: stormwater utility charge = A x I x R x rate. In this formula, R is the runoff coefficient based on the zoning of the Premises. EWS has revised the stormwater runoff

	coefficient table in order to align with the new zones contained in Zoning Bylaw 20001, and based on an average runoff by zoning code assessment of all parcels in the city. For Premises incurring charges from January 1, 2024 onwards, the previous zoning designations would no longer apply. Accordingly, as an interim measure until the next PBR, in 2023 EWS amended the runoff coefficient table for Premises first incurring Wastewater Collection Services charges on January 1, 2024 or later in order to align with Zoning Bylaw 20001. For the term commencing April 1, 2025, EWSI will assign a runoff coefficient from the proposed table to all Premises receiving Wastewater Collection Services.

Reference:	Current: Schedule 1, Part II, Service Fees and Charges New: Schedule 1, Part III: Service Fees and Charges and Sanitary Sewer Trunk Charges
Current:	1. Application Fees
Proposed:	Wastewater Collection Services

Application Type	2022 Fee
Application to release matter	$189.58
Application to approve a compliance program	Subject to estimate based on cost of service
Records search	$142.06
Application for reduction in stormwater utility credit Initial application Renewal application	 $240.00 $225.00
Application for sanitary utility credit	$400.00

Application Type	2025 Fee
Application to release matter	~~$189.58~~ $210.00
Application to approve a compliance program	Subject to estimate based on cost of service
Records search	~~$142.06~~ $175.00
Application for stormwater intensity adjustment ~~Initial application~~ ~~Renewal application~~	$200.00 ~~$240.00~~ ~~$225.00~~
Application for sanitary utility credit	~~$400.00~~ $430.00

Rationale:

The ‘Application to release matter’ fee has been kept low, despite the cost to EWS being significantly more than $210.00. EWS is concerned that increasing it closer to EWS’s cost of service will disincentivize Customers from following the Code of Practice, potentially resulting in illegal dumping. Accordingly, the proposed increase is minimal.

The ‘Stormwater utility credit’ has been renamed to ‘Stormwater intensity adjustment’ to better reflect how the ‘I’ factor adjustment is reflecting that the parcel has a significantly different runoff pattern than the average for that zoning code and is eligible for a rate adjustment via a change to the I factor. The cost of the initial application has been reduced to reflect a streamlined approach to reviewing these applications. There is no longer a need for the renewal application as there were minimal changes seen at renewal period from original application and therefore it has been removed.

The records search cost has increased; however, EWS’s actual costs remain at approximately $200 per search. EWS is undertaking a staged adjustment to these costs to move towards a full cost of service recovery. The records application is primarily for customers requiring records on properties as part of the environmental due diligence for commercial real estate transactions.

Reference:	Current: Schedule 1, Part II, Service Fees and Charges New: Schedule 1, Part III: Service Fees and Charges and Sanitary Sewer Trunk Charges
Current:	N/A
Proposed:	Account Application Charges To all Customers who apply for a new account or change accounts for Wastewater Collection Services within the city of Edmonton boundaries. If a Customer is applying for a new Water Services account at the same time, this fee will only be charged once. 2025 Account Application Fee: $25.00
Rationale:	The proposed fee aligns with EPCOR Water Services Bylaw 19626 and allows EWS to charge an account fee for sanitary or storm only services. As described in the proposed wording, a Customer will only be charged this fee once if they are simultaneously opening a Water Services account.

Reference:	Current: Schedule 1, Part II, Service Fees and Charges New: Schedule 1, Part III: Service Fees and Charges and Sanitary Sewer Trunk Charges
Current:	N/A
Proposed:	Hauled Wastewater The account application fee for Hauled Wastewater is: 2025 Hauled Wastewater Account Application Fee: $35.00
Rationale:	The proposed fee aligns with EPCOR Water Services Bylaw 19626 as that bylaw contains an application fee for the truck fill service, which EWS considers to be an analogous service to hauled wastewater.

Reference:	Current: Schedule 1, Part II, Service Fees and Charges New: Schedule 1, Part III: Service Fees and Charges and Sanitary Sewer Trunk Charges
Current:	N/A
Proposed:	Notice to Comply Subsequent Inspection Fee To all customers in contravention of Schedule 2 Terms and Conditions of Wastewater Collection and Wastewater Treatment Services that have been issued a notice to comply by EWSI for the contravention. 2025 Notice to Comply Subsequent Inspection Fee: $250.00
Rationale:	When EWS becomes aware that a customer is in contravention of Schedule 2 Terms and Conditions of Wastewater Collection and Wastewater Treatment Services, EWS provides education to the customer, as appropriate, and issues a notice to comply in order to rectify the breach. Generally, for these breaches, EWS will attend the facility and complete a site inspection. The proposed fee is requested for instances when EWS must subsequently attend a customer's site for the same contravention and finds continued non-compliance. The fee represents the estimated costs associated with the EWS vehicle deployed for re-inspection and the cost of one hour of two EWS investigators' time.

Reference:	Current: Schedule 1, Part II, Service Fees and Charges New: Schedule 1, Part III: Service Fees and Charges and Sanitary Sewer Trunk Charges
Current:	Investigation Fee To all Customers who request EWSI to investigate sewer trouble where the result of the investigation indicates that the sewer trouble is caused by a private plumbing issue. 2022 Investigation Fee: $200.00 for second and subsequent appointments

<table>
<tr><td>Proposed:</td><td>Investigation Fee

To all Customers who request EWSI to investigate sewer trouble where the result of the investigation indicates that the sewer trouble is caused by a private plumbing issue.

<table><tr><td>2025 Initial Investigation Fee</td><td>$410.00</td></tr><tr><td>2025 Subsequent Investigation Fee</td><td>$220.00 for second and subsequent appointments</td></tr></table>
Removal of Obstruction Fee

To all Customers who request EWSI remove an obstruction caused by a private plumbing issue or on the private side of the Wastewater Collection Service. For clarity, EWSI is required to investigate prior to removing the obstruction and both fees will be applied.

<table><tr><td>2025 Obstruction Removal Fee – Removal only</td><td>$255.00</td></tr></table></td></tr>
<tr><td>Rationale:</td><td>Currently, the ‘Initial Investigation’ and ‘Removal of Obstruction Fees’ are on EWS’s website and referenced in the Drainage Services Guidelines. Although the proposed changes are to fees that are more commercial in nature, EWS, as the regulated utility provider, is often a Customer’s first call. The proposed changes will keep all sewer service investigation and removal related fees in the same location, thereby increasing clarity for Customers. For service calls, EWS informs Customers that they have the choice of service provider and they may use a private firm instead of EWS to complete the service.</td></tr>
</table>

Reference:	Current: Schedule 1, Part II, Service Fees and Charges New: Schedule 1, Part III: Service Fees and Charges and Sanitary Sewer Trunk Charges
Current:	N/A

Proposed:	EWSI Missed Appointment Credit For instances in which EWSI does not keep a scheduled appointment for a Customer without giving reasonable notice. 2025 Missed Appointment Credit | $35.00
Rationale:	This credit is in EPCOR Water Services Bylaw 19626. The proposed change increases alignment between the bylaws and provides the customer with a credit if EWS misses a scheduled appointment with insufficient notice.

Reference:	New: Schedule 1, Part III: Service Fees and Charges and Sanitary Sewer Trunk Charges
Current:	N/A
Proposed:	Customer Locate Fee To all Customers who fail to notify EWSI they have taken possession of a site and EWSI is required to conduct searches to identify the Customer. Customer Locate Fee | $20.00
Rationale:	This provision is currently in EPCOR Water Services Bylaw 19626. This change is requested to cover the costs associated with locating customers who have taken possession of a site (with storm or sanitary only accounts) but have not informed EWS. The $20.00 fee will cover the cost of obtaining the land title (approximately $10.00) and the remaining $10.00 will cover the administration costs that are involved in conducting the searches.

Reference:	New: Schedule 1, Part III: Service Fees and Charges and Sanitary Sewer Trunk Charges
Current:	N/A

Proposed:	Tampering or Unauthorized Use Charge To all Customers for whom EWSI must investigate, repair, or replace damaged sanitary, storm or combined sewer infrastructure as a result of unauthorized use or tampering. 2025 Tampering Fee — Cost to repair plus $250.00
Rationale:	This charge is currently in EPCOR Water Bylaw 19626. The proposed change maintains alignment between the bylaws and allows EWS to charge third parties who have an impact on the sanitary, storm or combined systems through their actions.

Reference:	New: Schedule 1, Part III: Service Fees and Charges and Sanitary Sewer Trunk Charges
Current:	N/A
Proposed:	Late Payment Charges A late payment charge of 2.5% per month, not compounded, is applied to all charges on a Customer's account, if the Customer's payment has not been received by EWSI in full by the payment date specified on the bill. If considered to be interest payable for credit advanced, then the late payment charge is equivalent to a maximum yearly rate of 45.6%. A dishonoured cheque charge of $25.00 is applied for each cheque returned for insufficient funds.
Rationale:	This provision is currently in EPCOR Water Services Bylaw 19626. This change is requested to ensure consistency with billing between the two utilities. It allows EWS to charge for late payments for storm or sanitary only accounts.

Reference:	Current: Schedule 1, Part III: Wastewater Treatment Rates New: Schedule 1, Part IV: Wastewater Treatment Rates
Current:	Applicable — To all domestic service Customers and multi-residential service Customers located within the city of Edmonton which are serviced by or connected to the City's sewerage system.

		A domestic service is defined as a service supplied to premises used primarily for domestic purposes, where no more than four separate dwelling units are metered by a single water meter and the service line to the premises is not greater than 50 millimeters in diameter.
Proposed:	Applicable	To all ~~domestic service~~ Residential Service, Multi-Residential Service and Commercial Service Customers within the city of Edmonton who are serviced by or connected to the sanitary system. If a business is conducted from premises that otherwise fall within the ~~above~~ definition of a ~~domestic service~~ Residential Service or Multi-Residential Service, Commercial Wastewater Treatment Service rates apply; provided ~~however,~~ that if a portion of the premises from which the business is conducted is separately metered, then a Commercial Wastewater Treatment Services rate will apply only to that portion of the premises.
Rationale:	As detailed in the rationale for the proposed change to Schedule 1, Part I: Sanitary Utility Rate, EWS forecasts and reports on revenues by customer class. To accurately reflect this and to provide consistency with the wording in Schedule 1 of EPCOR Water Services Bylaw 19626, EWS proposes that the wording be amended.	

Reference:	Current: Schedule 1, Part III: Wastewater Treatment Rates New: Schedule 1, Part IV: Wastewater Treatment Rates
Current:	References to "flat monthly charges"
Proposed:	Changed to "fixed monthly charges"
Rationale:	EWS's utilities have fixed and variable charges. Throughout EPCOR Drainage Services Bylaw 19627, EWS used the term 'flat' to describe fixed monthly charges and throughout the EPCOR Water Services Bylaw 19626, EWS uses the term fixed to describe the fixed monthly charges. In order to maintain consistency between the bylaws, EWS proposes to change the terminology in the new Wastewater Services bylaw to align with

	the terminology used in EPCOR Water Services Bylaw 19626. As flat has been used interchangeably with fixed, the proposed wording change does not impact the charge itself.

Reference:	Current: Schedule 1, Part III: Wastewater Treatment Rates New: Schedule 1, Part IV: Wastewater Treatment Rates
Current:	Residential Wastewater Treatment Service . . . Consumption Charge* All consumption $1.2334 per m^3 . . . Commercial Wastewater Treatment Service . . . Consumption Charge * 0 m^3 – 10,000.0 m^3 $1.2334 per m^3 10,000.1 m^3 – 100,000.0 m^3 $0.9542 per m^3 Over 100,000.0 m^3 $0.4979 per m^3
Proposed:	~~Residential Wastewater Treatment Service~~ ~~. . .~~ ~~Consumption Charge*~~ ~~All consumption $1.2334 per m^3~~ ~~. . .~~ ~~Commercial Wastewater Treatment Service~~ ~~. . .~~ ~~Consumption Charge *~~ ~~0 m^3 – 10,000.0 m^3 $1.2334 per m^3~~ ~~10,000.1 m^3 – 100,000.0 m^3 $0.9542 per m^3~~ ~~Over 100,000.0 m^3 $0.4979 per m^3~~

	Variable Charge The Variable Charge is levied on each Premises based on metered flow, measured by one of the following: i. water consumption for the premises; ii. sewer discharge for a premises on which a sewer meter has been installed in accordance with this bylaw; or iii. water consumption for the premises as discounted by the application of a utility credit as approved in accordance with this bylaw. The Variable Rates for the period April 1, 2025 – December 31, 2025 are set out below:

Monthly Consumption	Rate per m^3
Residential Service	
All consumption	\$1.2883 per m^3
Multi-Residential Service	
All consumption	\$1.2575 per m^3
Commercial Service	
0 m^3 – 10,000.0 m^3	\$1.1486 per m^3
10,000.1 m^3 – 100,000.0 m^3	\$0.8886 per m^3
Over 100,000.0 m^3	\$0.4636 per m^3

	Variable Rates for the period January 1, 2026 to December 31, 2027 will be determined by applying the adjustment factors in Schedule 3 of this Bylaw to the rates set out above, with new rate approval and implementation occurring on an annual basis in accordance with the adjustment methodology prescribed in Section 8 of this Bylaw.
Rationale:	In order to align with the proposed change to include customer classes, EWS proposes to amend this table to include the specific customer classes with the Variable Charge.

<table>
<tr><td>Reference:</td><td>Current: Schedule 1, Part III: Wastewater Treatment Rate: Sanitary Utility Credit
New: Schedule 1, Part IV: Wastewater Treatment Rates: Sanitary Utility Credit and Excess Sanitary Use Charge</td></tr>
<tr><td>Current:</td><td>Wastewater Treatment Rate: Sanitary Utility Credit

Applicable — To non-residential wastewater treatment service Customers who can clearly demonstrate that there is a water loss experience between their water consumed and their discharges to the sanitary sewer system on a continuous monthly basis.

The Customer must submit a written application to EPCOR, as required by Schedule 2 to the Bylaw.</td></tr>
<tr><td>Proposed:</td><td>Sanitary Utility Credit and Excess Sanitary Use Charge

Applicable — To Commercial Service wastewater treatment service Customers who can clearly demonstrate that there is a water loss experience between their water consumed and their discharges to the sanitary sewer system on a continuous monthly basis.

The Customer must submit a written application to EWSI, as required by Schedule 2 to the Bylaw.

Excess Sanitary Use Charge

Applicable — Additional sanitary sewer charges may apply to Commercial Service Customers if the volume of water discharged to the sanitary sewer system from a Premises exceeds the water consumed by that Premises.</td></tr>
</table>

Rationale:	The proposed addition is to address rare instances with certain commercial customers. Certain businesses may discharge an excess amount of wastewater to the sanitary sewer system, as compared to the water consumed by that Premises. In order to accurately capture the volume, the Customer would need to have a meter in place to measure the discharge; accordingly, the instances of this are rare, but EWS would like the authority to charge the sanitary sewer charge on the excess discharge for these unique occurrences.

Reference:	Schedule 1, Part IV: Wastewater Treatment Rates
Current:	Overstrength surcharge ($) = m3{(Ob (Cxb - 300) + Oc(Cxc - Cac) + Oo(Cxo -100) + Op(Cxp - 10) + Os (Cxs - 300) + On(Cxn - 50)} 100,000 Where: • m3 is the total water consumption in cubic meters (or, if approved, sewer metering); • Ob, Oc, Oo, Op, Os and On are the Overstrength surcharge set out in Part IV for each kilogram of BOD, COD, oil and grease, phosphorus, suspended solids, and TKN, respectively. • Cxb, Cxc, Cxo, Cxp, Cxs, Csn are the average concentrations in milligrams per liter (mg/L) of BOD, COD, oil and grease, phosphorus, suspended solids and TKN, respectively, in the sampled wastewater. • Cac is 600 or double the average BOD concentration in mg/L, whichever is greater. • The additional surcharge is calculated using the above formula but substituting 3000, 400, 75, 3000 and 200 for 300, 100, 10, 300 and 50, respectively, and Cac is 6000 or double the average BOD concentration in mg/L, whichever is greater. • Where the remainder of a subtraction is a negative number, that component of the formula becomes equal to zero.
Proposed:	$S = \frac{V[P_B(C_B - 300) + P_C(C_C - C_A) + P_G(C_G - 100) + P_P(C_P - 10) + P_S(C_S - 300) + P_N(C_N - 50)]}{1000}$ Where: • S is the overstrength surcharge in dollars; • V is the total water consumption in cubic metres (m^3) (or, if approved, sewer metering);

	• P_B, P_C, P_G, P_P, P_S, and P_N are the Overstrength surcharge set out in Part IV for each kilogram of BOD, COD, oil and grease, phosphorus, suspended solids, and TKN, respectively. • C_B, C_C, C_G, C_P, C_S, and C_N are the average concentrations in milligrams per liter (mg/L) of BOD, COD, oil and grease, phosphorus, suspended solids and TKN, respectively, in the sampled wastewater. • Ca is 600 or double the average BOD concentration in mg/L, whichever is greater. • The additional surcharge is calculated using the above formula but substituting 3000, 400, 75, 3000 and 200 for 300, 100, 10, 300 and 50, respectively, and Ca is 6000 or double the average BOD concentration in mg/L, whichever is greater. • Where the remainder of a subtraction is a negative number, that component of the formula becomes equal to zero.
Rationale:	The formula has been simplified in order to provide clarity. Additionally, EWS has changed the rates of its overstrength surcharge from cents to dollars and this necessitated the change to dividing by '1000' instead of '100,000'.

2.2.2 Schedule 2 Terms and Conditions of Drainage Services

The following contains explanations for the more substantive changes to Schedule 2 – Terms and Conditions of Drainage Services.

General

Reference:	Schedule 2 – Terms and Conditions of Wastewater Collection and Wastewater Treatment Services
Proposed:	Schedule 2 was reviewed and minor changes have been to clean-up the Terms and Conditions, including by adding capitalized terms not previously defined, changing Drainage Services to Wastewater Collection Services and adding Wastewater Treatment Services where required.

Article 1 – Definitions and Interpretation

Reference:	1.1 Definitions
Current:	"Flow Monitoring Point" means an access point to Sewer Service or Private Drainage System for a premises, examples of which include manholes and dip wells;
Proposed:	"Flow Monitoring Point" means an access point to Sewer Service or Private Drainage System for a premises, examples of which include ~~manholes~~ maintenance holes and dip wells;
Rationale:	This change is requested to ensure diversity and inclusion by employing gender neutral language.

Article 4 – Sewer Connection Regulations

Reference:	5.7 Large Volume Releases
Current:	(a) No Person shall Release Wastewater that exceeds a volume of 10 cubic metres, into the Sewerage System except as permitted in this Article. (b) A Person may Release Wastewater that exceeds a volume of 10 cubic metres, into the Sewerage System if the Release is performed in accordance with the Large Volume Releases Code of Practice as established in the Drainage Service Guidelines established by EWS.
Proposed:	(a) No Person shall Release Wastewater that exceeds a cumulative volume of

	10 cubic metres in a 24 hour period, into the Sewerage System except as permitted in this Article. (b) A Person may Release Wastewater that exceeds a cumulative volume of 10 cubic metres in a 24 hour period, into the Sewerage System if the Release is performed in accordance with the Large Volume Releases Code of Practice as established in the Drainage Service Guidelines established by EWS.
Rationale:	The current wording lacks specificity as there is no time frame for the release and EWS has received customer feedback on the lack of time frame. The proposed change will provide clarity for customers.

2.2.3 Schedule 3 Performance Based Drainage Rates

2.2.3.1 Overview

1. EWS is proposing significant changes to Schedule 3 of the Bylaw. Rather than detailing each proposed change (which is set out in the blacklined version of the Bylaw), the information below identifies the substantive changes and provides a rationale for each change. The majority of these changes are driven by amendments to the performance indices and measures.

2.2.3.2 Wastewater Collection Services Quality

2. The following tables provide a summary of substantive proposed revisions to the Wastewater Collection System Service Quality performance indices in Section 3.0 of Schedule 3, including updates and the rationale for changes, as appropriate. The current performance measures for Wastewater Collection Services were introduced in January of 2020 and have only completed two partial reporting cycles.

3. EWS is proposing the following changes for specific performance measures:

Index	Measure	Description of Change	Rationale
Environmental	Green Hectares	Remove from PBR	Momentum for low impact development (key aspect of the Stormwater Integrated Resource Plan (SIRP)) largely achieved.
Environmental	Stormwater Rebate Projects	New Environmental Measure	New measure to shift focus towards building momentum to encourage additional low impact development

			investment on private properties.
Customer Service	Service Maintenance Calls	Move to System Reliability & Optimization	Measure reclassified as a system reliability & optimization measure.
Customer Service	Emergency Dig-Ups	Move to System Reliability & Optimization	Measure reclassified as a system reliability & optimization measure.
Customer Service	Sewer Odour Hotspots	Move to System Reliability & Optimization	Measure reclassified as a system reliability & optimization measure.
Customer Service	Stormwater Facility Response Time	New Customer Service Measure	New measure to assess response time to customer raised concerns regarding stormwater facilities.
Customer Service	Deficient Appurtenances Response Time	New Customer Service Measure	New measure to assess response time to customer raised concerns regarding deficient appurtenances on the wastewater collection system.
Customer Service	Sewer Odour Response Time	New Customer Service Measure	New measure to assess response time to customer raised concerns regarding odours attributed to the sewer system.
System Reliability & Optimization	Blocked Sewers	Remove from PBR	Blockages are the result of many factors outside the utility's control and EWS's maintenance practices will not show improved performance in short term. Other measures are in place to assess EWS's response to customers' immediate concerns.
System Reliability & Optimization	Sewer Renewal	Remove from PBR	The measure was developed on activities that have changed significantly. Project activity has decreased due to changes in risk-based investment needs.
System Reliability & Optimization	Infrastructure Condition Rating	Remove from PBR	Target was achieved and accordingly, no significant improvement in performance is expected.

4. Finally, the descriptions for Indices and Measures have been revised to provide clarity.

5. The following revisions are proposed to the existing program for the 2025-2027 PBR term:

Reference:	3.1 Environment Index, 3.2 Customer Service Index, 3.3 System Reliability & Optimization Index and 3.4 Safety Index
Current:	The formulas for calculation of the "factors" (ratios of actual results compared to the standards) are presented for each Performance Measure in the sub-sections that describe each Performance Measure.
Proposed:	The formulas for calculation of the "factors" (ratios of actual results compared to the standards) are presented for all Performance Measures together within the sections that describe each Index.
Rationale:	The calculation of the "factors" (ratios of actual results compared to the standards) for each Performance Measure is required to determine the points for each Index and is not part of the Performance Measure calculation itself. For this reason, separation of each calculation of each Performance Measure result from the "factors" used to assess the points was done for clarity.

Reference:	3.1.1 - 3.1.3 - Environment Index Measures, 3.2.1 - 3.2.4 - Customer Service Index Measures, 3.3-1 - 3.3.4 - System Reliability & Optimization Index Measures, and 3.4.1 - 3.4.4 - Safety Index Measures
Current:	Calculation of measure results are combined with assessment of measure results relative to measure benchmarks.
Proposed:	Only the results for a measure are calculated. Additional information for assessment of the result is provided which includes the performance standard (previously referred to as a benchmark) as well as the significance of the standard (minimum or maximum) but the assessment is not calculated here.
Rationale:	For each measure, only the result is calculated which is then used for assessment in the Index section. The performance standard defines what is expected. Change of the term 'benchmark' to the term 'performance standard' was made as benchmark implies aspirational performance which can result in increased costs and diversion of resources with no cost-effective gains. The

	standard is the expectation for performance.

Reference:	3.1.1 Stormwater Flow Monitoring Performance Measure - Environmental Index
Current:	Stormwater Flow Monitoring – current standard is 63.0% (minimum, annually)
Proposed:	Stormwater Flow Monitoring – increase standard to 70.0% (minimum, annually)
Rationale:	EWS is proposing to increase the performance standard to 70.0% (minimum) which is just above the 5-year average of 66.7%.

Reference:	3.1.2 Reportable Environmental Incidents Performance Measure - Environmental Index
Current:	3.1.2 Environmental Incident Management – current standard is 50 (maximum, annually)
Proposed:	3.1.2 Reportable Environmental Incidents Performance Measure – revise the standard to 30 (maximum, annually)
Rationale:	EWS is proposing to change the name to reflect that only reportable environmental incidents are included. This is not a change in reporting but rather an alignment of the name with the measure. The change in the standard from 50 to 30 (maximum) reflects an increase in performance and is set at approximately 50% above the 4-year average (20 incidents). The proposed change reflects that the number of incidents are highly dependent upon operational parameters and procedures, complexity of the operation, regulatory approval requirements and other factors.

Reference:	New Measure - 3.1.3 Stormwater Rebates Projects Performance Measure - Environmental Index
Current:	N/A
Proposed:	Stormwater Rebates Projects Performance Measure - 150 rebates (minimum, annually) Rebates issued to customers to reduce runoff entering the wastewater

	collection system during storm events
Rationale:	The Stormwater Rebates Projects is a measure of EWS's success to meet the objectives of the "Slow" theme from the Stormwater Integrated Resource Plan (SIRP) through customer level participation. This will take the form of a coordinated rebate program for customers to complete on-site stormwater management activities to reduce the runoff entering the collection system during storm events. The proposed standard is set at 150 rebates per year (minimum).

Reference:	New Measure - 3.2.1 Stormwater Facility Response Time Performance Measure - Customer Service Index
Current:	N/A
Proposed:	Stormwater Facility Response Time Performance Measure – 96.0% (minimum, annually) Stormwater Facility Response Time is a measure of the time it takes for an EWS crew to attend a stormwater management facility when a third party contacts the EWS dispatch office to report a concern.
Rationale:	This is a direct measure of customer service. The Stormwater Facility Response Time Result is the percentage of stormwater facility trouble calls investigated within four business days. The proposed standard is set at 96.0% (minimum) based on limited historical data.

Reference:	New Measure - 3.2.2 Deficient Appurtenances Response Time Performance Measure - Customer Service Index
Current:	N/A
Proposed:	Deficient Appurtenances Response Time – 95.0% (minimum, annually) This is a direct measure of customer service. Deficient Appurtenances Response Time is a measure of the time it takes for an EWS crew to attend a location when a third-party contact the EWS dispatch office to report a concern with a deficient appurtenance that forms part of the sewer system.
Rationale:	The Deficient Appurtenances Response Time Result is the percentage of deficient appurtenance sewer trouble calls investigated within 24 hours. The standard is set at 95.0% (minimum) based on limited historical data.

Reference:	New - 3.2.3 Sewer Odour Response Time Performance Measure - Customer Service Index
Current:	N/A
Proposed:	Sewer Odour Response Time Performance Measure – 95.0% (minimum, annually) This is a direct measure of Customer service. Sewer Odour Response Time is a measure of the time it takes for an EWS crew to attend a location when a third party contacts the EWS dispatch office to report a concern with an odour they attribute to the sewer system.
Rationale:	The Sewer Odour Response Time result is the percentage of sewer odour trouble calls investigated within eight hours. The standard is set at 95.0% (minimum) based on limited historical data. and process changes being made to ensure improved responsiveness

Reference:	3.2.4 Service Connections Average Time Performance Measure - Customer Service Index
Current:	Service Connections – current standard is 85.0% (minimum, annually)
Proposed:	Service Connections – maintain standard at 85.0% (minimum, annually)
Rationale:	EWS proposes to maintain the standard at 85.0% (minimum) which is just below the 10-year average.

Reference:	3.3.1 Service Maintenance Calls Performance Measure - System Reliability & Optimization Index
Current:	3.2.1 Service Maintenance Calls – current standard is 80.0% (minimum, annually)
Proposed:	3.3.1 Service Maintenance Calls – new standard increased to 90.0% (minimum, annually)
Rationale:	EWS proposes to increase the standard to 90.0% (minimum), based on limited history.

Reference:	3.3.2 Emergency Dig Ups – Service Restored - System Reliability & Optimization Index
Current:	3.2.2 Emergency Dig-Ups Service Restored – current standard is 98.0% (minimum, annually)

Proposed:	3.3.2 Emergency Dig Ups – Service Restored – maintain current standard at 98.0%
Rationale:	EWS proposes to maintain the standard at 98.0% (minimum, annually) which is just below the 10-year average.

Reference:	3.3.3 Sewer Odour Hotspots - System Reliability & Optimization Index
Current:	3.2.4 Sewer Odour Hotspots – current standard is <14.0% for 2024.
Proposed:	3.3.3 Sewer Odour Hotspots – new standard changed to 10.0% (maximum)
Rationale:	EWS proposes to revise the standard to 10.0% (maximum) which is at the 10-year history.

Reference:	3.3.4 Full Property Flood Proofing Inspections - System Reliability & Optimization Index
Current:	3.3.4 Full Property Flood Proofing Inspections – 750 inspections (minimum, annually)
Proposed:	3.3.4 Full Property Flood Proofing Inspections –1,000 inspections (minimum, annually)
Rationale:	EWS proposes to increase the standard to 1,000 inspections (minimum, annually). Higher performance was achieved in 2023. However, there are limitations due to resources being redirected to work in higher priority areas such as stormwater ponds and monitoring and addressing odour concerns as well as limited customer involvement.

Reference:	3.4.1 Near Miss & Hazard Identification Performance Measure - Safety Index
Current:	3.4.1 Near Miss Reporting Factor – current standard 750 reports (minimum, annually) for Wastewater Collection Services only.
Proposed:	3.4.1 Near Miss & Hazard Identification (name changed) and full EWS involvement (i.e., not limited to Wastewater Collection Services only) – revised standard 2,600 reports (minimum, annually)
Rationale:	EWS proposes to change the name to Near Miss & Hazard Identification to reflect inclusion of both types of events. EWS underwent a reorganization on July 1, 2023 during which Water Treatment, Wastewater Treatment and Wastewater Collection Services

	were combined into a single entity. Therefore, for the 2025-2027 PBR term, EWS is proposing to have common safety measures across Wastewater Treatment and Wastewater Collection Services in order to drive consistency in approach and comparability of results. EWS proposes to change the standard from only Wastewater Collection Services to all of EWS. The annual standard of 2,600 (minimum) was chosen which reflects the 5-year history for EWS.

Reference:	3.4.2 Work Site Inspections & Observations Reporting Performance Measure - Safety Index
Current:	3.4.2 Work Site Inspections & Observations Factor –1,300 (minimum, annually for Wastewater Collections only)
Proposed:	3.4.2 Worksite Inspections & Observations Reporting Performance Measure – (minimum, annually for all of EWS).
Rationale:	EWS underwent a reorganization on July 1, 2023 during which Water Treatment, Wastewater Treatment and Wastewater Collection Services were combined into a single entity. Therefore, for the 2025-2027 PBR term, EWS proposes common safety measures across Wastewater Treatment and Wastewater Collection Services to drive consistency in approach and comparability of results. EWS proposes to change the standard from only Wastewater Collection Services to all EWS. The annual standard of 6,000 (minimum) was chosen which reflects the 5-year history for EWS.

Reference:	3.4.3 All Injury Frequency Rate Performance Measure – Safety Index
Current:	3.4.4 All injury Frequency Rate Factor – standard 0.75 (maximum, annually for Wastewater Collection Services only)
Proposed:	3.4.3 All Injury Frequency Rate Performance Measure – standard 1.15 (maximum, annually for all of EWS)
Rationale:	EWS underwent a reorganization on July 1, 2023 during which Water Treatment, Wastewater Treatment and Wastewater Collection Services were combined into a single entity. Therefore, for the 2025-2027 PBR term, EWS is proposing to have common safety measures across Wastewater

	Treatment and Wastewater Collection Services to drive consistency in approach and comparability of results. Standard was changed from only Wastewater Collection Services to all EWS. The annual standard of 1.15 (maximum) was chosen which is below the 5-year history for Wastewater Collection but at the internal standard set for all of EWS.

2.2.3.3 Wastewater Treatment Service Quality

6. The following tables provide a summary of proposed revisions to the Wastewater System Service Quality performance indices in Section 4.0 of Schedule 3, including updates and the rationale for changes, as appropriate. The current performance measures for Wastewater Treatment Services were introduced in January of 2012. EWS is proposing to replace one performance measure – Biosolids Inventory Reduction to Biosolids Management. Finally, the descriptions for Indices and Measures have been revised to provide clarity.

7. The following revisions are proposed to the existing program for the 2025-2027 PBR term:

Reference:	4.1 Wastewater Quality & Environment Index, 4.2 Customer Service Index, 4.3 System Reliability & Optimization Index, and 4.4 Safety Index
Current:	The formulas for calculation of the “factors” (ratios of actual results compared to the standards) are presented for each Performance Measure in the sub-sections that describe each Performance Measure.
Proposed:	The formulas for calculation of the “factors” (ratios of actual results compared to the standards) are presented for all Performance Measures together within the sections that describe each Index.
Rationale:	The calculation of the “factors” (ratios of actual results compared to the standards) for each Performance Measure is required to determine the points for each Index and is not part of the Performance Measure calculation itself. For this reason, separation of each the calculation of each Performance Measure result from the “factors” used to assess the points was done for clarity.

Reference:	4.1.1 - 4.1.2 - Wastewater Quality & Environment Index Measures, 4.2.1 - 4.2.3 - Customer Service Index Measures, 4.3-1 - 4.3.3 - System Reliability & Optimization Index Measures, and 4.4.1 - 4.4.4 - Safety Index Measures
Current:	Calculation of measure results are combined with assessment of measure results relative to measure benchmarks.
Proposed:	Only the results for a measure are calculated. Additional information for assessment of the result is provided which includes the performance standard (previously referred to as a benchmark) as well as the significance of the standard (minimum or maximum) but the assessment is not calculated here.
Rationale:	For each measure, only the result is calculated which is then used for assessment in the Index section. The performance standard defines what is expected. Change of the term ‘benchmark’ to the term ‘performance standard’ was made as benchmark implies aspirational performance which can result in increased costs diversion of resources with no cost-effective gains. The standard is the expectation for performance.

Reference:	4.1.1 Wastewater Effluent Limit Performance Measure – Wastewater Quality Wastewater Quality & Environmental Incidents Index
Current:	4.1.1 WELPI Factor - <= 26.0 YTD
Proposed:	4.1.1 Wastewater Effluent Limit Performance Measure – 26.0% (maximum, annually)
Rationale:	EWS proposes to change the name to Wastewater Effluent Limit Performance (WELP) as well as adding exception events. WELP more clearly aligns with the measure which intended to demonstrate the overall effectiveness of the wastewater treatment processes. The Standard will remain at 26.0% (maximum) which is above the 10-year average. Exception events have been added which may be considered during specified process shutdown events which may impact WELP but would not violate the Approval to Operate. Exception events identified include: (i) capital work on

	secondary treatment trains of the UV disinfection system; (ii) completion of corrective actions to address process upsets; or (iii) accommodation of regulatory agency requests.

Reference:	4.1.2 Environment Incidents Performance Measure – Environmental Index
Current:	4.1.2 – Environmental Incident Factor – <=5 YTD
Proposed:	4.1.2 – Environmental Incidents Performance Measure – 5 (maximum, annually)
Rationale:	EWS is proposing to maintain the standard at 5 (maximum, annually) which is the 10-year average.

Reference:	4.2.1 H_2S – 1 Hour Exceedance Performance Measure – Customer Service Index
Current:	4.2.1 H_2S – 1 Hour Exceedance Factor - <=4 YTD
Proposed:	4.2.1 H_2S – 1 Hour Exceedance Performance Measure – 4.0 (maximum, annually)
Rationale:	EWS is proposing to maintain the Standard at 4.0 (maximum) which is consistent with the 10-year average.

Reference:	4.2.2 H_2S – 24 Hour Exceedance Performance Measure – Customer Service Index
Current:	4.2.2 H_2S – 24 Hour Exceedance Factor <=1.0 YTD
Proposed:	4.2.2 H_2S - 24 Hour Exceedance Performance Measure - 1.0 (maximum, annually)
Rationale:	EWS is proposing to maintain the standard at 1.0 (maximum, annually) which is consistent with the 10-year average.

Reference:	4.2.3 Scrubber Uptime Performance Measure – Customer Service Index
Current:	4.2.3 Scrubber Uptime Factor – 96.0% (maximum, annually)
Proposed:	4.2.3 Scrubber Uptime Performance Measure – 96.0% (maximum, annually)

Rationale:	EWS is proposing maintain the standard at 96.0% (minimum, annually) which is just below the 7-year average of 97.0%. Two additional scrubbers will be added to system in 2024 which will provide some redundancy and allow for operational flexibility but will not increase uptime.

Reference:	4.3.1 Enhanced Primary Treatment Performance Measure – System Reliability & Optimization Index
Current:	4.3.1 Enhanced Primary Treatment Factor – 94.0% (maximum, annually)
Proposed:	4.3.1 Enhanced Primary Treatment Factor – 97.0% (maximum, annually)
Rationale:	EWS proposes increasing the Enhanced Primary Treatment Standard to 97.0% as well as adding exception events. The increase in the standard to 97.0% (minimum) reflects an increase in performance and is based on the 10-year average of historic performance. Exception events have been added which may be considered during specified process shutdown events which might impact Enhanced Primary Treatment performance but would not violate the Approval to Operate. Exception events identified include: 1) capital work on alum or polymer systems, clarifiers, or sludge/scum collection systems; 2) completion of corrective actions to address process upsets; or 3) accommodation of regulatory agency requests.

Reference:	New Measure - 4.3.2 Biosolids Inventory Reduction – System Reliability & Optimization Index
Current:	N/A
Proposed:	4.3.2 Biosolids Management Performance Measure – 25,000 dry tonnes (minimum, annually)
Rationale:	Biosolids Management is a measure of EWS's utilization of biosolids from the wastewater treatment process and is calculated based on the total dry tonnes of biosolids transferred from the biosolids storage basins at the Clover Bar Biosolids Resource Recovery Facility to beneficial use programs such as compost or land application. The proposed standard is set at 25,000

	dry tonnes (minimum).

Reference:	4.3.3 Energy Efficiency Performance Measure – System Reliability & Optimization Index
Current:	4.3.3 Energy Efficiency Factor – 508 (maximum, annually)
Proposed:	4.3.3 Energy Efficiency Performance Measure – 508 (maximum, annually)
Rationale:	EWS is proposing to maintain the standard at 508.0 which reflects performance at the historic average of the past 10 years.

Reference:	4.4.1 Near Miss & Hazard Identification Reporting Measure - Safety Index
Current:	4.4.1 Near Miss Reporting Factor – 220 reports (minimum, annually for only Wastewater Treatment Services)
Proposed:	4.4.1 Near Miss & Hazard Identification (name changed) and full EWS involvement (i.e., not limited to Wastewater Collection Services only) – revised standard 2,600 reports (minimum, annually)
Rationale:	EWS has proposed to change the name to reflect inclusion of both Near Misses and Hazard Identification events. EWS underwent a reorganization on July 1, 2023 during which Water Treatment, Wastewater Treatment and Wastewater Collection Services were combined into a single entity. Therefore, for the 2025-2027 PBR term, EWS is proposing to have common safety measures across Wastewater Treatment and Wastewater Collection Services in order to drive consistency in approach and comparability of results. The proposed standard was changed from only Wastewater Treatment Services to all EWS. The annual standard of 2,600 (minimum) was chosen which reflects the 5-year history for EWS.

Reference:	4.4.2 Worksite Inspections & Observations Performance Measure - Safety Index

Current:	4.4.2 Worksite Inspections and Observations Factor – 919 (minimum, annually for only Wastewater Treatment Services)
Proposed:	4.4.2 Worksite Inspections & Observations Performance Measure – 6,000 (minimum, annually for all of EWS)
Rationale:	EWS underwent a reorganization on July 1, 2023 during which Water Treatment, Wastewater Treatment and Wastewater Collection Services were combined into a single entity. Therefore, for the 2025-2027 PBR term, EWS proposes common safety measures across Wastewater Treatment and Wastewater Collection Services to drive consistency in approach and comparability of results. The proposed standard was changed from only Wastewater Treatment Services to all EWS. The annual standard of 6,000 (minimum) was chosen which reflects the 5-year history for EWS.

Reference:	4.4.3 All Injury Frequency Rate Performance Measure - Safety Index
Current:	4.4.3 Lost Time Injury Frequency Factor – 0.75 (maximum, annually for only Wastewater Treatment)
Proposed:	4.4.3 All Injury Frequency Rate Performance Measure – 1.15 (maximum, annually for all EWS)
Rationale:	EWS underwent a reorganization on July 1, 2023 during which Water Treatment, Wastewater Treatment and Wastewater Collection Services were combined into a single entity. Therefore, for the 2025-2027 PBR term, EWS is proposing to have common safety measures across Wastewater Treatment and Wastewater Collection Services in order to drive consistency in approach and comparability of results. The standard was changed from only Wastewater Treatment Services to all EWS. The proposed annual standard of 1.15 (maximum) was chosen which is above the 10-year history for Wastewater Treatment Services, but at the internal standard set for all of EWS.

Appendix B

EPCOR WATER SERVICES

Utility Committee Motions and Directives

May 31, 2024

APPENDIX B
UTILITY COMMITTEE MOTIONS AND DIRECTIVES

1.0 UTILITY COMMITTEE MOTIONS

1. On July 9, 2021, the Utility Committee passed the following motion regarding the upcoming PBR Applications:

> *"That Administration work with EPCOR to bring forward reports prior to the next Performance Based Rates term for Drainage Services and Wastewater Treatment effective April 1, 2025, providing further background and the appropriate regulatory treatment for the following items:*
>
> 1. *Improved disclosure of changes in accounting and capitalization policies and treatment;*
> 2. *Reporting the size of the workforce including actual and forecast full-time equivalents;*
> 3. *A review of how long-term debt interest rates are set for EPCOR Water Services Inc.;*
> 4. *A review of the performance measures to ensure they are increasingly stringent and challenging over time; and*
> 5. *A review of the deferral account and other adjustment mechanisms to deal with variations in usage."*

2. EWS complied with the following two items from the above motion as presented to the Utility Committee on November 04, 2022:

- *Improved disclosure of changes in accounting and capitalization policies and treatment; and*
- *A review of how long-term debt interest rates are set for EPCOR Water Services Inc.*

3. There were no changes to the accounting and capitalization policies during the 2022-2024 PBR term and as a result, additional disclosure was not required. Section 4.1 of the Application describes the changes to the capital overhead methodology proposed for the 2025-2027 PBR Application. Section 4.3.2 of the Application describes the process of establishing the cost of new long-term debt.

4. In addition, on November 04, 2022, EWS presented its recommendation to include headcount information in future PBR Applications to comply with the third item from the motion issued on July 9, 2021.

5. On November 04, 2022, Utility Committee passed the following subsequent motion to report the size of EWS' workforce:

> *"That Administration work with EPCOR Water Services Inc. to include the size of the workforce including actual and forecast full-time equivalents (FTEs) in its future Performance Based Rates (PBR) applications."*

6. EWS confirms that the 2025-2027 Wastewater PBR Application has been submitted to the City in compliance with the motion issued on November 04, 2022.

7. On May 06, 2024, EWS presented its recommendation to comply with the following two final items from the motion issued on July 9, 2021:

- *"A review of the performance measures to ensure they are increasingly stringent and challenging over time".*
- *"A review of the deferral account and other adjustment mechanisms to deal with variations in usage."*

8. EWS further confirms that the 2025-2027 Wastewater PBR Application has been submitted to the City in compliance with the motion issued on May 06, 2024.

Appendix C

EPCOR WATER SERVICES

Credit Rating Report

May 31, 2024

APPENDIX C
Credit Rating Report

1. EWS reflects new debt issuances from its parent company, EUI, through deemed inter-company loans. Like other regulated utilities of EUI, EWS calculates the cost of new long-term debt based on the stand-alone principle. This means that the cost of new debt for regulatory purposes reflects the credit rating of EWS' regulated Edmonton operations (which includes Water, Wastewater Treatment, and Wastewater Collection) rather than the credit rating of the legal entity EWS, which covers both regulated and non-regulated operations. The stand-alone principle ensures that ratepayers are responsible for costs that are proportional to the utility's risks.

2. In the past, EWS has relied on Dominion Bond Rating Service (DBRS) to obtain a one-time private stand-alone credit rating to calculate its forecast cost of new long-term debt. However, starting in 2022, DBRS and other rating agencies have declined to provide such ratings to regulated utilities, including AUC regulated utilities, if their ratings and reports are publicly disclosed in regulatory proceedings. As a result, EWS has used its historical credit rating of A (low), previously issued by DBRS and relied upon by EWS' Regulator until 2021, as a proxy to calculate the forecast cost of new long-term debt. Notably, there have been no material changes in EWS' operational, regulatory, or financial environment since the previous rating issued by DBRS. In addition, EUI has historically applied a 0% risk premium for EWS over EUI's cost of debt. Currently, EUI has an A (low) rating from DBRS and an A- rating from S&P.

Appendix D

EPCOR WATER SERVICES

Return on Equity Report

May 31, 2024

CITY OF EDMONTON
DETERMINATION OF COST-OF-CAPITAL

REPORT
OF
DYLAN W. D'ASCENDIS
PARTNER
SCOTTMADDEN, INC.

ON BEHALF OF

EPCOR WATER SERVICES INC.

May 31, 2024

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I. INTRODUCTION

My name is Dylan W. D'Ascendis. I am a Partner at ScottMadden, Inc. My business address is 3000 Atrium Way, Suite 200, Mount Laurel, NJ 08054. I hold a Bachelor's degree in Economic History from the University of Pennsylvania, and an MBA with concentrations in Finance and International Business from Rutgers University. I am a member of the Society of Utility and Regulatory Financial Analysts ("SURFA"). In 2011, I was awarded the professional designation "Certified Rate of Return Analyst" by SURFA, which is based on education, experience, and the successful completion of a comprehensive written examination. I am also a member of the National Association of Certified Valuation Analysts ("NACVA") and was awarded the professional designation "Certified Valuation Analyst" by NACVA in 2015

I have worked in regulated industries for over 15 years, offering expert testimony in over 150 proceedings regarding various financial and regulatory matters, including issues relating to capital structure, return on common equity ("ROE"), class cost of service, and valuation. A summary of my professional and educational background, including a list of my testimony in prior proceedings, is included in Appendix A to this Report.

I have been retained by EPCOR Water Services Inc. ("EWS" or the "Company") to provide my expert opinion before the City of Edmonton's Utility Committee (the "Utility Committee") regarding the appropriate cost of capital for EWS in its Performance Based Regulation ("PBR") application for the 2025 through 2027 term.

The supporting schedules and workpapers on which my evidence is based are being filed concurrently with this Report.

II. SUMMARY

It is my opinion that the appropriate weighted average cost of capital for EWS to implement in its PBR application for the 2025 through 2027 term is 6.76%, based on a capital structure consisting of 60.00% debt at a 2027 debt cost rate of 4.07%, and 40.00% common equity at a recommended ROE of 10.80%, as summarized in Table 1 below:

Table 1: Summary of the Weighted Average Cost of Capital[1]

Type of Capital	Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	60.00%	4.07%	2.44%
Common Equity	40.00%	10.80%	4.32%
Total	100.00%		6.76%

In recommending an ROE of 10.80% I applied multiple cost of common equity models, specifically, the Discounted Cash Flow ("DCF") model, the Risk Premium Model ("RPM"), and the Capital Asset Pricing Model ("CAPM") to the market data of two proxy groups of utility companies; one comprised of U.S. water utility companies ("U.S. Water Utility Proxy Group"), and one comprised of Canadian utility companies ("Canadian Utility Proxy Group"). The use of U.S. and Canadian utilities in an ROE analysis reflects the financial principles of risk and return and the fact that both economies are interdependent, as will be discussed in detail below. The results of the DCF model, RPM, and CAPM are presented in Table 2 below:

Table 2: Cost of Common Equity Model Results[2]

	Canadian Utility Proxy Group	U.S. Water Utility Proxy Group
Discounted Cash Flow Model	9.24%	10.00%
Risk Premium Model	10.81%	11.17%
Capital Asset Pricing Model	9.15%	11.70%
Indicated Cost of Common Equity before Flotation Cost Adjustment	10.00% - 11.70%	
Flotation Cost Adjustment[3]	0.50%	
Indicated Cost of Common Equity before Flotation Cost Adjustment	10.50% - 12.20%	
Recommended Cost of Common Equity	10.80%	

As can be gleaned from Table 2, the indicated range of common equity cost rates are based on the results of the U.S. Water Utility Proxy Group results. As will be discussed in Section IV,

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1 Schedule 1, page 1.
2 Schedule 1, page 2.
3 The Utility Committee has historically approved ROEs inclusive of a 50-basis point flotation cost adjustment.

there are clear operational differences between water utilities, such as EWS, and energy utilities, such as the Canadian Utility Proxy Group, that must be accounted for.

One can also observe from Table 2 that the results of the Canadian Utility Proxy Group and the U.S. Water Utility Proxy Group overlap from 10.00% to 10.81% and 10.50% to 11.31%, before and after accounting for flotation costs, respectively. My recommended ROE falls within this range, which is subsequently at the low end of the indicated range of common equity cost rates of 10.50% to 12.20%. This approach recognizes that primary weight must be applied to the results based on the U.S. Water Utility Proxy Group results due to operational comparability, while also recognizing that geographical similarities between EWS and the Canadian Utility Proxy Group must also be accounted for.

Further, while I appreciate that EWS's ROE has previously been determined with reference to returns authorized by the Alberta Utilities Commission ("AUC"), that approach fails to adequately reflect the long-standing regulatory principles discussed in Section III below.

Lastly, my recommended capital structure consisting of 40.00% common equity is unchanged from that approved most recently from EWS. Given the capital structures in place at the proxy groups, a capital structure of 40.00% common equity is reasonable and in line with those in place at the proxy group companies.

The items summarized above are addressed in the remainder of this Report as follows:

Section III	Provides a summary of the general principles pertinent to fair rate of return;
Section IV	Explains my selection of the U.S. Water Utility Proxy Group and the Canadian Utility Proxy Group;
Section V	Describes the cost of common equity analyses on which my recommendation is based;
Section VI	Discusses the application of a flotation cost adjustment;
Section VII	Discusses the Company's capital structure and cost of long-term debt; and
Section VIII	Presents my conclusions.

III. GENERAL PRINCIPLES REGARDING FAIR RATE OF RETURN

In general terms, the ROE is the return investors require to make an equity investment in a firm. That is, investors will only provide funds if the return that they expect to receive is equal to, or greater than, the return that they require considering the risks assumed in making the investment. That required return, whether it is provided to debt or equity investors, is a cost to the utility. Individually, I speak of the "cost of debt" and the "cost of common equity"; together, they are referred to as the "cost of capital."

The cost of capital (including the costs of both debt and equity) is based on the economic principle of "opportunity costs." Investing in any asset, whether debt or equity securities, implies a forgone opportunity to invest in alternative assets. For any investment to be sensible, its expected return must be at least equal to the return expected on alternative, comparable investment opportunities. Because investments with like risks should offer similar returns, the opportunity cost of an investment should equal the return available on an investment of comparable risk.

Although both debt and equity have required costs, they differ in certain fundamental ways. Most noticeably, the cost of debt is contractually defined and can be directly observed as the interest rate or yield on debt securities. The cost of common equity, on the other hand, is neither directly observable nor a contractual obligation. Rather, equity investors have a claim on cash flows only after debt holders are paid; the uncertainty (or risk) associated with those residual cash flows determines the cost of common equity. Because equity investors bear the "residual risk", they require higher returns than debt holders. In that basic sense, equity and debt investors are distinct: they invest in different securities, face different risks, and require different returns.

In unregulated industries, marketplace competition is the principal determinant of the price of goods and services. For regulated public utilities, regulation must act as a substitute, or surrogate, for competition. Assuring the utility can fulfill its obligations to the public while providing safe and reliable service requires a level of earnings sufficient to maintain its financial integrity, and to permit the attraction of capital at reasonable costs and terms. Doing so is consistent with the concept of a fair rate of return.

The standards of fair rate of return have been established by the *Northwestern* and *TransCanada* cases in Canada, and the *Hope* and *Bluefield* cases in the U.S.

Those standards have informed the rate of return decision making of regulatory commissions throughout Canada and the United States for nearly 100 years. In 1929, the Supreme Court of Canada reinforced the fair rate of return standards in *Northwestern*, which involved the City of Edmonton, when it stated:

> The duty of the Board was to fix fair and reasonable rates; rates which, under the circumstances, would be fair to the consumer on the one hand, and which, on the other hand, would secure to the company a fair return for the capital invested. By a fair return is meant that the company will be allowed as large a return on the capital invested in its enterprise (which will be net to the company) as it would receive if it were investing the same amount in other securities possessing an attractiveness, stability and certainty equal to that of the company's enterprise. In fixing this net return the Board should take into consideration the rate of interest which the company is obliged to pay upon its bonds as a result of having to sell them at a time when the rate of interest payable thereon exceeded that payable on bonds issued at the time of the hearing. To properly fix a fair return the Board must necessarily be informed of the rate of return which money would yield in other fields of investment. [4]

In 2004, the Federal Court of Appeal (Canada) in 2004 FCA 149 reaffirmed the fair rate of return standards when it stated:

> [6] The cost of capital to a utility is equivalent to the aggregate return on investment investors require in order to keep their capital invested in the utility and to invest new capital in the utility. That return will be made in the form of interest on debt and dividends and capital appreciation on equity. Usually, that return is expressed as the rate of return investors require on their debt or equity investments.
>
> [12] Even though cost of capital may be more difficult to estimate than some other costs, it is a real cost that the utility must be able to recover through its revenues. If the Board does not permit the utility to recover its cost of capital, the utility will be unable to raise new capital or engage in refinancing as it will be unable to offer investors the same rate of return as other investment of similar risk. As well, existing shareholders will insist that retained earnings not be reinvested in the utility.

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[4] Northwestern (1929) S.C.R. 186, at 192-193.

> [13] In the long run, unless a regulated enterprise is allowed to earn its cost of capital, both debt and equity, it will be unable to expand its operations or even maintain existing ones. Eventually, it will go out of business. This will harm not only its shareholders, but also the customers it will no longer be able to service. The impact on customers and ultimately consumers will be even more significant where there is insufficient competition in the market to provide adequate service. [5]

The fair return standard has been interpreted numerous times by both the AUC[6] and by the National Energy Board ("NEB").

The AUC specifically stated:

> The requirements of comparable investments, financial integrity, and capital attraction remain fundamental to setting a fair return. The Commission and its predecessors have employed these principles in setting rates of return, and other regulators apply these principles. All three components must be satisfied to arrive at a fair return.[7]

The NEB specifically noted:

> The Board is of the view that the fair return standard can be articulated by having reference to three particular requirements. Specifically, a fair or reasonable return on capital should:
>
> - be comparable to the return available from the application of the invested capital to other enterprises of like risk (the comparable investment standard);
> - enable the financial integrity of the regulated enterprise to be maintained (the financial integrity standard); and
> - permit incremental capital to be attracted to the enterprise on reasonable terms and conditions (the capital attraction standard).

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5 TransCanada, 2004 FCA 149 [6] [12] [13].

6 *See*, for example, Alberta Utilities Commission, 2018 Generic Cost of Capital, Decision 22570-D01-2018, dated August 2, 2018, pp. 38 at 8.

7 Decision 27084-D02-2023, Determination of the Cost-of-Capital Parameters in 2024 and Beyond, at para. 21 (October 9, 2023)(footnotes omitted)

The findings of comparable investments, capital attraction, and financial integrity are consistent with long-standing precedent in the United States. As noted by the U.S. Supreme Court's decision in *Bluefield*:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises of speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions generally. [8]

The U.S. Supreme Court affirmed the fair rate of return standards in *Hope*, when it stated:

> The rate-making process under the Act, *i.e.*, the fixing of 'just and reasonable' rates, involves a balancing of the investor and the consumer interests. Thus we stated in the Natural Gas Pipeline Co. case that 'regulation does not insure that the business shall produce net revenues.' 315 U.S. at page 590, 62 S.Ct. at page 745. But such considerations aside, the investor interest has a legitimate concern with the financial integrity of the company whose rates are being regulated. From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock. Cf. Chicago & Grand Trunk R. Co. v. Wellman, 143 U.S. 339, 345, 346 12 S.Ct. 400,402. By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital. [9]

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8 *Bluefield*, 262 U.S. 679 (1923), at 692-693.
9 *Hope*, 320 U.S. 591 (1944), at 603.

In summary, Canadian and U.S. courts have found a return that is adequate to attract capital at reasonable terms enables the utility to provide service while maintaining its financial integrity. As discussed above, and in keeping with established regulatory standards, that return should be commensurate with the returns expected elsewhere for investments of equivalent risk. The Utility Committee's decision regarding the Company's ROE in this proceeding, therefore, should provide the Company with the opportunity to earn a return that is: (1) adequate to attract capital at reasonable cost and terms; (2) sufficient to ensure their financial integrity; and (3) commensurate with returns on investments in enterprises having corresponding risks.

Investors see the principal regulatory guidelines establishing the fair rate of return as the "comparable risk", "financial integrity", and "capital attraction" standards. Investors also understand the long-standing regulatory principle that "[u]nder the statutory standard of 'just and reasonable', it is the result reached not the method employed which is controlling."[10] A reasonable ROE estimate therefore considers alternative methods, quantitative and qualitative market data, and the reasonableness of empirical results relative to relevant, observable benchmarks.

Whereas the "capital attraction" and "financial integrity" standards may be viewed, to some extent, from the perspective of debt investors, the "comparable risk" standard makes clear that the relevant assessment of equity risk, and the fair return on common equity, relates to equity investors. Although observations and analyses regarding rating agency actions (or inactions) and *pro forma* estimates of credit metrics are informative for that purpose, they are not full measures of the risk assessments and return requirements of equity investors. As discussed later in this Report, for example, because common equity represents a perpetual claim on residual cash flows (that is, cash flows available after debtholders are paid), equity investors are exposed to business risks whose probability and effect may be difficult to quantify. That does not mean, however, that those risks are of no consequence to equity investors, or that they should not be reflected in the authorized ROE.

Lastly, the required return for a regulated public utility is established on a stand-alone basis. Parent entities, like other investors, have capital constraints and must look at the attractiveness of the expected risk-adjusted return of each investment alternative in their capital budgeting process.

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[10] *Ibid*, at 602.

The opportunity cost concept applies regardless of the source of the funding. When funding is provided by a parent entity, the return still must be sufficient to provide an incentive to allocate equity capital to the subsidiary or business unit rather than other internal or external investment opportunities. That is, the regulated subsidiary must compete for capital with all the parent company's affiliates, and with other, similarly situated utility companies. In that regard, investors value corporate entities on a sum-of-the-parts basis and expect each division within the parent company to provide an appropriate risk-adjusted return. It therefore is important that the authorized ROE reflects the risks and prospects of the utility's operations and supports the utility's financial integrity from a stand-alone perspective. Consequently, the ROE authorized in this proceeding should be sufficient to support the Company's operations and financing of their utility operations on a stand-alone basis.

i. *Importance of Considering Multiple Cost of Common Equity Models*

Each model used to estimate the ROE is subject to assumptions that may become more, or less, applicable as market conditions change, and each provides a perspective on investors' return requirements. The choice of models (including their inputs), the selection of proxy companies, and the interpretation of the model results all require the application of reasoned judgment. That judgment should consider data and information that is not directly included in the models themselves. The estimated ROE should reflect the return that investors require in light of the subject company's risks, capital market conditions, and the returns available on comparable investments. Although we cannot observe how investors estimate the cost of common equity as a component of valuation models at all times, it stands to reason that no relevant information would be systematically ignored by them. Therefore, we can conclude that no one method to estimate cost of common equity prevails across all investors, and no single measure of value remains constant over time.

The use of multiple methods in estimating the cost of common equity is well-supported in academic literature. As Roger A. Morin[11] notes:

[11] Roger A. Morin has taught as the Distinguished Professor of Finance for Regulated Industry at the Center for the Study of Regulated Industry at Georgia State University, the Wharton School of Finance at the

Each methodology requires the exercise of considerable judgment on the reasonableness of the assumptions underlying the methodology and on the reasonableness of the proxies used to validate a theory. The inability of the DCF model to account for changes in relative market valuation, discussed below, is a vivid example of the potential shortcomings of the DCF model when applied to a given company. Similarly, the inability of the CAPM to account for variables that affect security returns other than beta tarnishes its use.

No one individual method provides the necessary level of precision for determining a fair return, but each method provides useful evidence to facilitate the exercise of an informed judgment. Reliance on any single method or preset formula is inappropriate when dealing with investor expectations because of possible measurement difficulties and vagaries in individual companies' market data. (emphasis added)

* * *

There is ample academic support in the financial literature for the need to rely upon several financial models in arriving at a recommended common equity cost rate. Professor Eugene Brigham, a widely respected scholar and finance academician, asserts(footnote omitted):

> *Three methods typically are used: (1) the Capital Asset Pricing Model (CAPM), (2) the discounted cash flow (DCF) method, and (3) the bond-yield-plus-risk-premium approach.* ***These methods are not mutually exclusive – no method dominates the others****, and all are subject to error when used in practice. Therefore, when faced with the task of estimating a company's cost of equity, we generally use all three methods and then choose among them on the basis of our confidence in the data used for each in the specific case at hand. (italics in original) (emphasis added)*

Another prominent finance scholar, Professor Stewart Myers, in an early pioneering article on regulatory finance, stated(footnote omitted):

> *Use more than one model when you can. Because estimating the opportunity cost of capital is difficult,*

University of Pennsylvania, the Amos Tuck School of Business at Dartmouth College, Drexel University, McGill University, among others. He has authored or co-authored articles published in academic journals on the subject of finance, including *The Journal of Finance*, *The Journal of Business Administration*, and *International Management Review*.

> ***only a fool throws away useful information**. That means you should not use any one model or measure mechanically and exclusively. Beta is helpful as one tool in a kit, to be used in parallel with DCF models or other techniques for interpreting capital market data. (italics in original) (emphasis added)*
>
> * * *
>
> Reliance on multiple tests recognizes that no single methodology produces a precise definitive estimate of the cost of equity. As stated in Bonbright, Danielsen, and Kamerschen (1988), '*no single or group test or technique is conclusive.*' (italics in original)
>
> * * *
>
> While it is certainly appropriate to use the DCF methodology to estimate the cost of equity, there is no proof that the DCF produces a more accurate estimate of the cost of equity than other methodologies. Sole reliance on the DCF model ignores the capital market evidence and financial theory formalized in the CAPM and other risk premium methods. The DCF model is one of many tools to be employed in conjunction with other methods to estimate the cost of equity. It is not a superior methodology that supplants other financial theory and market evidence. The broad usage of the DCF methodology in regulatory proceedings in contrast to its virtual disappearance in academic textbooks does not make it superior to other methods. The same comments are equally applicable to the Risk Premium and CAPM methodologies.[12]

Professor Eugene Brigham, a widely respected scholar and finance academician, recommends the CAPM, DCF, and Bond Yield Plus Risk Premium approaches:

> However, three methods typically can be used: (1) the Capital Asset Pricing Model (CAPM), (2) the discounted cash flow (DCF) method, and (3) the bond-yield-plus-risk-premium approach. These methods are not mutually exclusive – no method dominates the others, and all are subject to error when used in practice. Therefore, when faced with the task of estimating a company's cost of equity, we generally use all three methods and then choose among them on the basis of our confidence in the data used for each in the specific case at hand.[13]

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12 Roger A. Morin, PhD, Modern Regulatory Finance, PUR books 2021 ("Morin"), at 476-480.
13 Eugene Brigham, Louis Gapenski, Financial Management: Theory and Practice, 7th Ed., 1994, at 341.

Similarly, Morin (quoting, in part, Professor Stewart Myers), stated:

> *Use more than one model when you can. Because estimating the opportunity cost of capital is difficult, only a fool throws away useful information. That means you should not use any one model or measure mechanically and exclusively. Beta is helpful as one tool in a kit, to be used in parallel with DCF models or other techniques for interpreting capital market data.*
>
> ***
>
> While it is certainly appropriate to use the DCF methodology to estimate the cost of equity, there is no proof that the DCF produces a more accurate estimate of the cost of equity than other methodologies. Sole reliance on the DCF model ignores the capital market evidence and financial theory formalized in the CAPM and other risk premium methods. The DCF model is one of many tools to be employed in conjunction with other methods to estimate the cost of equity. It is not a superior methodology that supplants other financial theory and market evidence. The broad usage of the DCF methodology in regulatory proceedings in contrast to its virtual disappearance in academic textbooks does not make it superior to other methods. The same is true of the Risk Premium and CAPM methodologies.[14]

In addition, regulators throughout the U.S. and Canada frequently consider multiple models in determining authorized returns. For example, the Ontario Energy Board (the "OEB") stated that "[t]he Board agrees that **the use of multiple tests to directly and indirectly estimate the ERP is a superior approach to informing its judgment than reliance on a single methodology**."[15] The AUC has also relied on the results of multiple models, recently noting that:

> In this section, the Commission determines the notional ROE of 9.0 per cent using current market data and considering results of well-known and widely accepted empirical models to estimate the required return such as the CAPM, constant growth discounted cash flow (DCF), and multi-stage DCF.[16]

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14 Morin at 476 – 480 (emphasis in original)

15 Ontario Energy Board, EB-2009-0084, Report of the Board on the Cost of Capital for Ontario's Regulated Utilities, December 11, 2009, at p. 36. [Emphasis in original] "ERP" is defined as equity risk premium.

16 Decision 27084-D02-2023, Determination of the Cost-of-Capital Parameters in 2024 and Beyond, at para. 115 (October 9, 2023)

Similarly, in its review of the Company's 2017 – 2021 Filing, the City of Edmonton hired Grant Thornton LLP ("Grant Thornton") to conduct its review. In their report, Grant Thornton stated:

> "[i]n our view it is best to estimate the cost of capital using more than one methodology, as the return determined by any model or test will not perfectly capture all of the variables that might be considered in determining a fair return."[17]

In the U.S., the Pennsylvania Public Utilities Commission for example has stated:

> Based on the record, we agree with the ALJs that it is appropriate to consider the CAPM results to account for economic changes such as those occurring currently, in addition to the DCF results, to determine Columbia's ROE.[18]

In summary, it is necessary to consider multiple models in determining the ROE; one should not assume the many factors investors weigh in determining market prices may be distilled to the few variables and strict relationships assumed in any single model. Rather, the Utility Committee should recognize the limitations and modeling risks associated with focusing on a single approach, and base its ROE determinations on a thorough review of multiple methods. My estimate of the Company's cost of common equity therefore considers three well-established methods: The Constant Growth DCF model; the RPM; and the CAPM, including its "Empirical" form.

ii. *Business and Financial Risk*

The investor-required ROE reflects investors' assessment of the total investment risk of the subject firm. Total investment risk often is considered in the context of business risk and financial risk, both of which are discussed below.

Business risk reflects the uncertainty associated with owning the subject company's common stock, without the use of debt and/or preferred capital. Examples of the business risks generally faced by utilities include but are not limited to: supply risk; demand (or market) risk;

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[17] City of Edmonton, EPCOR Performance Based Regulation 2017-2021 Filing Review, Prepared by Grant Thornton LLP, at p. 127 (September 22, 2016); Grant Thornton ultimately relied exclusively on the results of the CAPM in their final recommendation.

[18] PA PUC v. Columbia Water Company, R-2023-3040258, pp. 107-108 (Order entered January 18, 2024).

competitive risk; operating risk; and regulatory risk, all of which have a direct bearing on earnings levels and volatility.

Financial risk, which is the additional risk that the subject company may not have adequate cash flows to meet its financial obligations, is created by the introduction of senior capital, i.e., debt and preferred stock, into the capital structure. Intuitively, as the degree of financial leverage increases, the risk of financial distress also increases. Even if two firms face the same business risks, the company with meaningfully higher levels of debt in its capital structure is likely to have greater financial risk and, therefore, higher costs of both debt and equity. As Brigham and Gapenski point out, "…the use of debt, or financial leverage, concentrates the firm's business risk on its stockholders."[19]

Because the capital structure affects the subject company's overall level of risk, it is an important consideration in establishing a fair rate of return: The higher the proportion of senior debt capital in the capital structure, the higher the financial risk that must be factored into the cost of common equity.

iii. ***Credit Ratings as Measures of Business and Financial Risk***

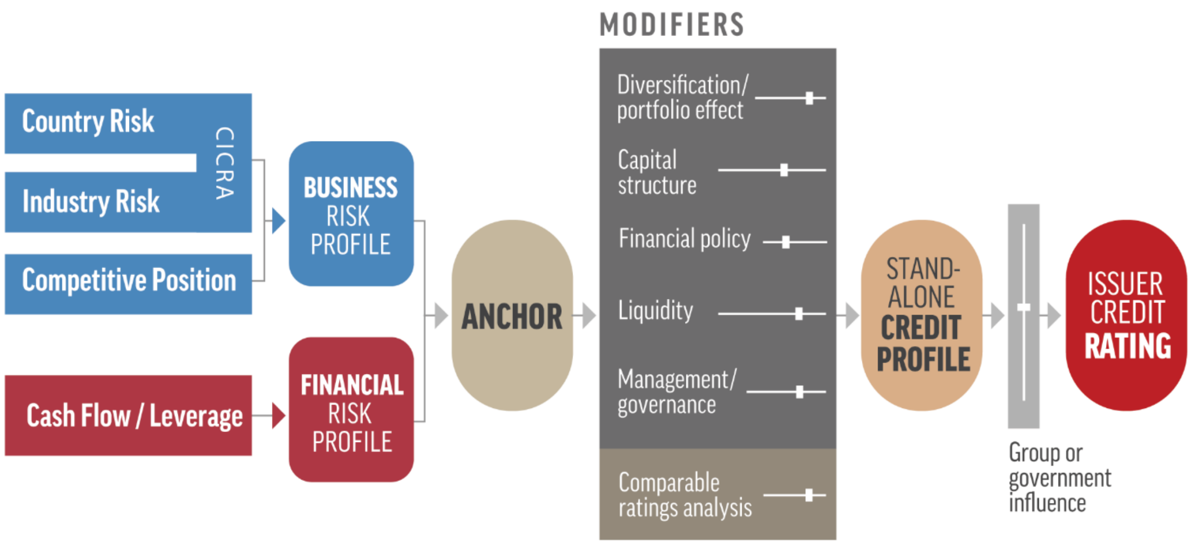
The principal relevance of business and financial risk is how they are reflected in the credit rating process. Standard & Poor's ("S&P") describes its overall process as follows:

> The corporate analytical methodology organizes the analytical process according to a common framework, and it divides the task into several factors so that Standard & Poor's considers all salient issues. First we analyze the company's business risk profile, then evaluate its financial risk profile, then combine those to determine an issuer's anchor. We then analyze six factors that could potentially modify our anchor conclusion.
>
> To determine that assessment for a corporate issuer's business risk profile, the criteria combine our assessments of industry risk, country risk and competitive position. Cash flow/leverage analysis determines a company's financial risk profile assessment. The analysis then combines the corporate issuer's business risk profile assessment and its financial risk profile assessment to determine its

[19] Eugene F. Brigham, Louis C. Gapenski, Financial Management, Theory and Practice, 1994, The Dryden Press, at 528.

> anchor. In general, the analysis weighs the business risk profile more heavily for investment-grade anchors, while the financial risk profile carries more weight for speculative-grade anchors.[20]

Chart 1: Standard & Poor's Corporate Criteria Framework[21]



S&P determines stand-alone credit profiles for an issuer, then takes into account the influence of the parent company before determining a final issuer credit rating. The key observation is that S&P considers a variety of business and financial risks, and applies a variety of analyses to assess those risks.

Although they reflect business and financial risk, in the final analysis credit ratings are opinions regarding the subject company's financial capacity to pay its financial obligations as they come due. As S&P notes:

> An S&P Global Ratings issuer credit rating is a forward-looking opinion about an obligor's overall creditworthiness. This opinion focuses on the obligor's capacity and willingness to meet its financial commitments as they come due.[22]

Credit ratings therefore speak to overall creditworthiness from the perspective of debtholders. The claims of equity holders, the subject of this Report, are subordinate to those of

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[20] Standard & Poor's Ratings Services, *Corporate Methodology*, November 19, 2013, at 4-5.
[21] *Ibid.*, at 5.
[22] https://www.standardandpoors.com/en_US/web/guest/article/-/view/sourceId/504352

debt holders. In short, the risks associated with common equity exceed the risks of owning bonds. The two have common considerations, but only to a point.

IV. PROXY GROUP SELECTION

I rely on the application of the cost of common equity models to both Canadian and U.S. utility proxy groups. The use of Canadian and U.S. utility proxy groups reflects the underlying financial principles of risk and return and that the economies of both countries are highly interdependent.

Canadian regulators frequently rely on proxy groups of both Canadian and U.S. utilities in determining the appropriate ROE. The AUC, for example, relied on both sets of proxy groups in Decision 20622-D01-2016,[23] Decision 22570-D01-2018,[24] and most recently in Decision 27084-D02-2023.[25] The OEB similarly relied on data from both Canadian and U.S. Utilities in EB-2009-0084.[26] Additionally, the British Columbia Utilities Commission ("BCUC") found US utility data to be acceptable "when Canadian data do not exist in significant quantity or quality".[27]

i. *Risk and Return*

Because EWS is not themselves a publicly traded entity and does not have publicly traded equity securities, it is necessary to develop groups of publicly traded, comparable companies to serve as their "proxy". In addition to the analytical necessity of doing so, the use of proxy companies is consistent with the *Northwestern*, *TransCanada*, *Hope*, and *Bluefield* comparable risk standards.

Even when proxy groups are carefully selected, it is common for analytical results to vary from company to company. Despite the care taken to ensure comparability, because no two companies are identical, market expectations regarding future risks and prospects will vary within

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23 Decision 20622-D01-2016, 2016 Generic Cost of Capital, PDF 72 (October 7, 2016)

24 Decision 22570-D01-2018, Determination of the Cost-of-Capital Parameters in 2024 and Beyond, para. 275 (August 2, 2018)

25 Proceeding 27084, Determination of the Cost-of Capital Parameters in 2024 and Beyond, Appendix B – Comparator Group of Utilities, November 10, 2022.

26 EB-2009-0084, Report of the Board on the Cost of Capital for Ontario's Regulated Utilities, December 11, 2009, at 21-23.

27 BCUC Return on Equity and Capital Structure Decision for Terasen Gas Inc., December 16, 2009, at 16.

the proxy group. It therefore is common for analytical results to reflect a seemingly wide range, even for a group of similarly situated companies. At issue is how to estimate the cost of common equity from within that range. That determination necessarily must consider the sort of quantitative and qualitative information discussed throughout this Report.

My analyses are based on two proxy groups, the first containing publicly traded U.S. water utilities, and the second containing publicly traded Canadian utility companies. The selection of a proxy group of water utilities reflects the fact that EWS is engaged exclusively in regulated water and wastewater activities. Therefore, a proxy group of water utilities is comparable in risk to EWS. Further, because there are no publicly traded Canadian water utilities,[28] I relied on a proxy group of publicly traded U.S. water utilities. The use of U.S. proxy companies is appropriate as all utilities, whether they operate in Canada or the U.S., must compete for capital on a global basis, and to do so, must be provided the opportunity to earn a fair and reasonable return. That said, there still may be factors that are pertinent to companies based in Canada as opposed to the U.S. which require consideration. While it is appropriate to consider both groups in determining the EWS ROE, I attribute more weight to the results based on the U.S. Water Utility Proxy Group, which directly considers the operational risks facing water utilities, as will be discussed in detail below.

To select the group of U.S. water proxy companies, I began with the companies listed in *Value Line Investment Survey's* ("*Value Line*")[29] Standard Edition as Water Utilities, and applied the following screening criteria:

(1) I excluded companies that do not consistently pay quarterly cash dividends;[30]

(2) I excluded companies that do not have positive projections of earnings per share ("EPS") growth;[31]

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[28] Algonquin Power & Utilities Corp's. regulated water operations accounts for 12.53% of total revenues and 9.83% of total assets for the company. See, Algonquin Power & Utilities Corp's. 2022 Annual Report at PDF 18, 77-79. No other member of the Canadian Utility proxy group reports revenues or earnings from regulated water operations.

[29] *Value Line* is a widely available and credible source for investment information for U.S. companies.

[30] Because utility investors consider dividends in their investment decisions, if a utility company either cut or suspended regular dividend payments, it could be a signal of unusual risk, which would not be representative of a traditional utility company.

[31] The projected EPS growth rate would logically need to be positive, as rational investors would not invest in a company which is expected to experience a contraction of earnings in perpetuity.

(3) I excluded companies that do not have *Value Line* and Bloomberg Professional Services ("Bloomberg") betas;[32]

(4) I excluded companies with less than 60.00% of total net operating income or assets derived from regulated water utility operations for the fiscal year 2022;[33] and

(5) I excluded companies that are currently known to be party to a merger or other significant transaction, as such transactions can temporarily skew market data.

That screening process produced the proxy group summarized in Table 3, below:

Table 3: U.S. Water Utility Proxy Group Screening Results

Company	Ticker
American States Water Company	AWR
American Water Works Co., Inc.	AWK
California Water Service Group	CWT
Essential Utilities, Inc.	WTRG
Middlesex Water Company	MSEX
SJW Group	SJW

To select the group of Canadian proxy companies, I began with all Canadian utilities identified by Yahoo! Finance,[34] and applied the following screening criteria:

(1) I excluded companies that do not consistently pay quarterly cash dividends;

(2) I excluded companies that do not have positive projections of EPS growth;

(3) I excluded companies with less than 60.00% of total net operating income or assets derived from regulated utility operations for the fiscal year 2022; and

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32 *Value Line*, as mentioned above, is widely available to individual investors. Bloomberg information is widely available to institutional investors.

33 In developing my proxy groups, my objective is to identify companies that, on balance are fundamentally risk comparable to EWS. To that end, I selected proxy companies with a significant portion of operating income derived from utility operations. Although comparability is important, it is also important that the proxy group is sufficiently large in number that the analytical results may be seen as representative of the returns required for utilities comparable to EWS. The threshold to eliminate companies with significant unregulated operations must balance the need to develop a group of companies that are fundamentally comparable to EWS with the need to develop a proxy group of sufficient size.

34 Yahoo! Finance Canada is a widely available and credible source for investment information. Please note that the list of initial companies produced by Yahoo! Finance Canada included regulated electric, natural gas, and water utilities in addition to renewable generators and independent power producers.

(4) I excluded companies that are currently known to be party to a merger or other significant transaction.

That screening process produced the proxy group summarized in Table 4, below:

Table 4: Canadian Utility Proxy Group Screening Results[35]

Company	Ticker
Algonquin Power & Utilities Corp.	AQN.TO
Canadian Utilities, Ltd.	CU.TO
Emera Inc.	EMA.TO
Fortis, Inc.	FTS.TO
Hydro One Limited	H.TO

As noted above, it is appropriate to afford primary weight to the results of the U.S. Water Utility Proxy Group, as those companies are more comparable in risk to EWS. In Proceeding 27084, the AUC excluded water utilities from its list of comparator companies relative to electric and natural gas utilities,[36] reflective of the importance of operational comparability.

When determining the comparability of one company to another company, it is important to consider if the potential proxy company has similar operations to EWS, which is a pure-play water and wastewater utility. Because the companies in the Canadian Utility Proxy Group are electric or natural gas distribution utilities, it is important to distinguish the different operational risks each industry faces to determine whether or not they are indeed comparable. For example, electric utilities transport a commodity through wires, while water and wastewater utilities transport a commodity through pipes in the ground. Further, water is mostly used for direct human consumption. Certain measures indicate that water utilities are riskier, while other measures indicate that water utilities are less risky. As demonstrated in the subsequent tables and charts, while electric, gas and water utilities have similar risks, they are not identical. As such, neither electric nor gas utility market data should directly be used as a measure of the investor required return for water utilities, like EWS, in a regulatory proceeding.

[35] ATCO Ltd., was excluded as its regulated operations consists solely of Canadian Utilities, Ltd., of which it is a majority shareholder.

[36] Proceeding 27084, Determination of the Cost-of Capital Parameters in 2024 and Beyond, Appendix A – Finalized Screening Criteria, November 10, 2022.

Table 5: Safety Rankings for the U.S.
Electric, Natural Gas and Water Utilities[37] as of December 2022[38]

	Mean	Median	Minimum	Maximum
Electric	1.85	2.00	1.00	3.00
Gas	2.22	2.00	1.00	3.00
Water	2.67	3.00	2.00	3.00

Table 6: Summary Statistics for the U.S.
Electric, Natural Gas and Water Utilities and the Canadian Electric Utilities – 2013 to 2022[39]

	Mean	Median	Minimum	Maximum
FFO/Debt[40]				
Can. Electric	13.15%	12.47%	9.61%	18.17%
U.S. Electric	18.30%	19.18%	12.48%	23.33%
Gas	19.86%	19.79%	13.86%	25.19%
Water	20.39%	22.45%	13.13%	26.51%

37 U.S. utilities reflect the companies that are contained within the *Value Line Standard Edition's* water, gas and electric utility universes.

38 Source: *Value Line*; *Value Line* also ranks stocks for Safety by analyzing the total risk of a stock compared to the approximately 1,700 stocks in the *Value Line* universe. Each of the stocks tracked in the *Value Line Investment Survey* is ranked in relationship to each other, from 1 (the highest rank) to 5 (the lowest rank). Safety is a quality rank, not a performance rank, and stocks ranked 1 and 2 are most suitable for conservative investors; those ranked 4 and 5 will be more volatile. Volatility means prices can move dramatically and often unpredictably, either down or up. The major influences on a stock's Safety rank are the company's financial strength, as measured by balance sheet and financial ratios, and the stability of its price over the past five years.

39 Sources: S&P Capital IQ; Bloomberg Professional Services.

40 Funds From Operations/Debt is a common metric used for assessing risk as it indicates the extent to which a firm generates the funds needed to cover its debts; higher percentages indicate lower risk.

	Mean	Median	Minimum	Maximum
CapEx/Net Plant[41]				
Can. Electric	9.13%	8.89%	7.29%	11.21%
U.S. Electric	10.13%	10.24%	9.67%	10.63%
Gas	11.32%	11.19%	10.33%	12.83%
Water	9.18%	9.71%	7.35%	10.14%
FCF/Interest (times)[42]				
Can. Electric	-0.42	-0.25	-1.84	0.21
U.S. Electric	-0.73	-0.48	-1.84	0.08
Gas	-1.23	-1.21	-2.68	0.36
Water	-0.92	-1.14	-2.60	1.00
FCF/EBITDA (times)[43]				
Can. Electric	-0.11	-0.07	-0.36	0.03
U.S. Electric	-0.13	-0.10	-0.33	0.01
Gas	-0.17	-0.15	-0.43	0.09
Water	-0.18	-0.21	-0.47	0.14
Free Cash Flow (millions)[44]				
Can. Electric	-178.40	-154.11	-613.67	48.34
U.S. Electric	-551.44	-500.96	-1,188.80	60.26
Gas	-90.19	-114.74	-209.01	82.16
Water	-81.95	-57.37	-296.62	67.81

[41] Capital Expenditures to Net Plant is a common metric used to as risk as it indicates how much money a firm invests each year relative to its current level of plant; higher percentages indicate higher risk.

[42] Free Cash Flow/Interest is a common metric used for assessing risk as it indicates the extent to which a firm generates the funds needed to cover its continuing obligations; higher measures indicate lower risk.

[43] Free Cash Flow/EBITDA is a common metric used for assessing risk as it indicates the extent to which a firm generates free cash relative to its operations; higher measures indicate lower risk.

[44] Free Cash Flow is a common metric used for assessing risk as it demonstrates whether a firm produces positive or negative cash flows and needs to raise additional funds; higher measures indicate lower risk.

Chart 2: Free Cash Flow/Operating Revenues for the U.S. Electric, Natural Gas and Water Utilities and the Canadian Electric Utilities– 2013 to 2022[45]

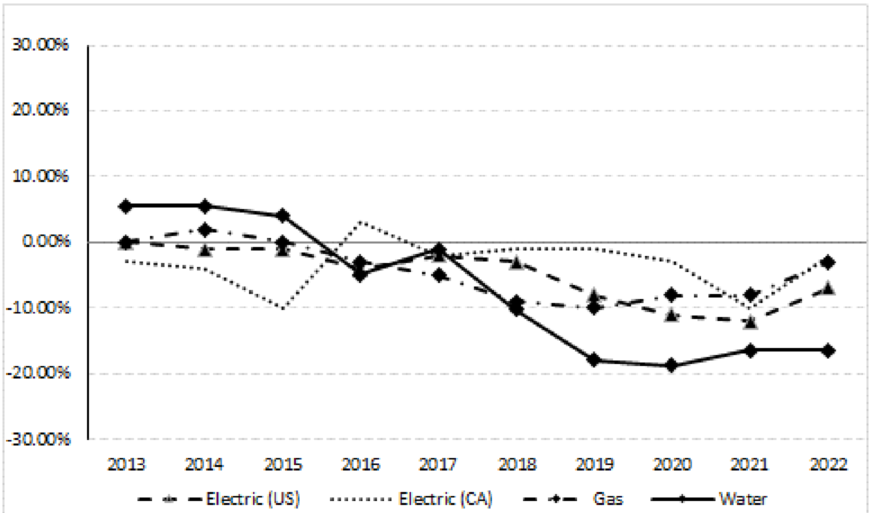
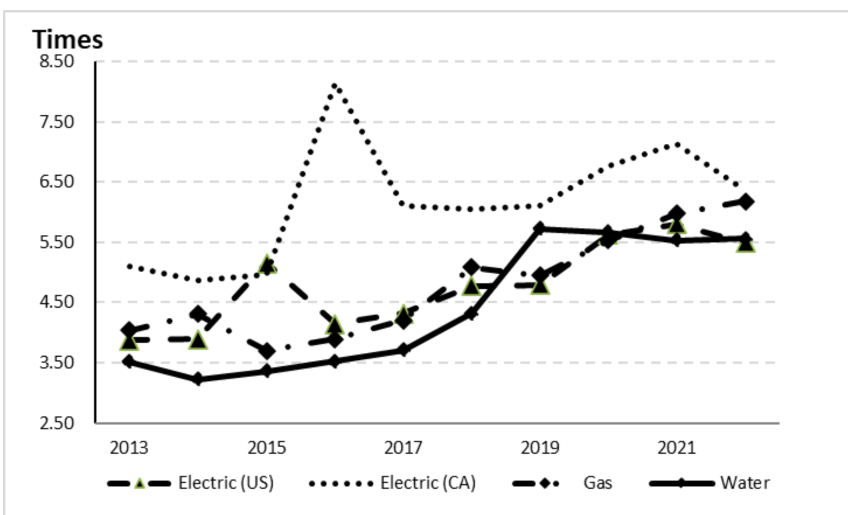


Chart 3: Total Debt/EBITDA for the U.S. Electric, Natural Gas and Water Utilities and the Canadian Electric Utilities– 2013 to 2022[46]



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45 Source: S&P Capital IQ; Free Cash Flow/Operating Revenue is a common metric used for assessing risk as it indicates the extent to which a firm generates free cash relative to its operations; higher measures indicate lower risk.

46 Source: S&P Capital IQ; Total Debt/EBITDA is a common metric used for assessing risk as it indicates the level of a firm's obligations compared to its operational earnings; higher measures indicate higher risk.

Chart 4: Funds from Operations/Total Debt for the U.S. Electric, Natural Gas and Water Utilities and the Canadian Electric Utilities– 2013 to 2022[47]

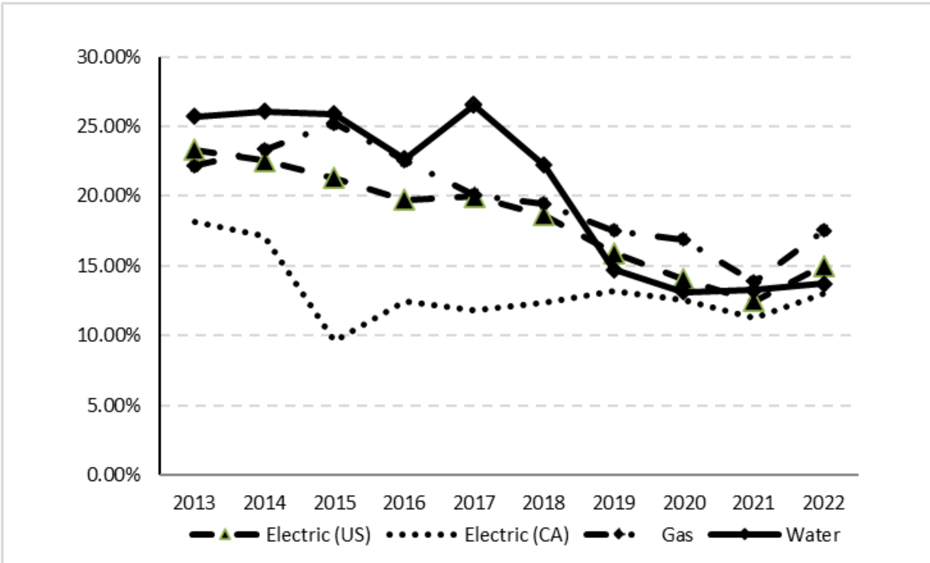
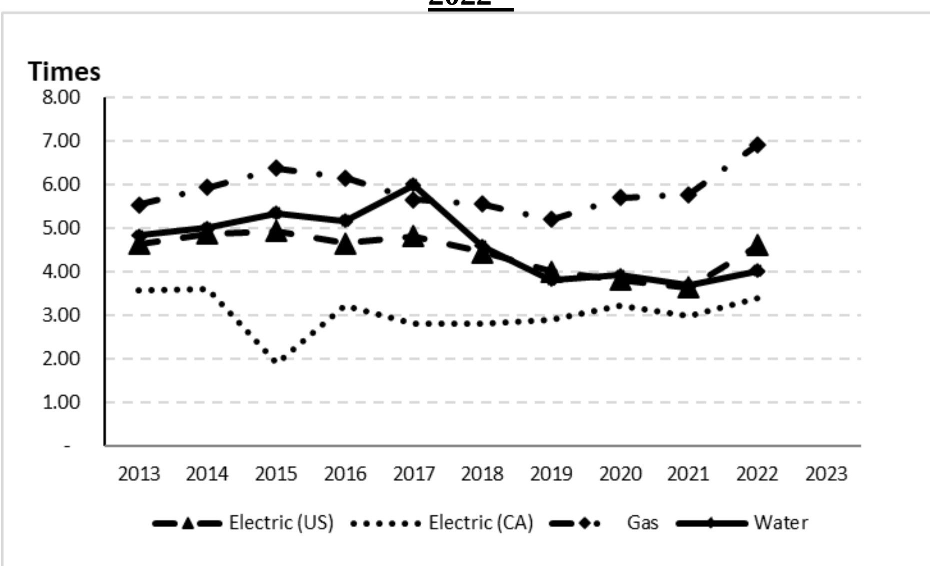


Chart 5: Funds from Operations/Interest Coverage for the U.S. Electric, Natural Gas and Water Utilities and the Canadian Electric Utilities– 2013 to 2022[48]



47 Source: S&P Capital IQ; Funds From Operations/Debt is a common metric used for assessing risk as it indicates the extent to which a firm generates the funds needed to cover its debts; higher percentages indicate lower risk.

48 Source: S&P Capital IQ; Funds From Operations /Interest is a common metric used for assessing risk as it indicates the extent to which a firm generates the funds needed to cover its continuing obligations; higher measures indicate lower risk.

Chart 6: Pre-Tax Interest Coverage for the U.S. Electric, Natural Gas and Water Utilities and the Canadian Electric Utilities– 2013 to 2022[49]

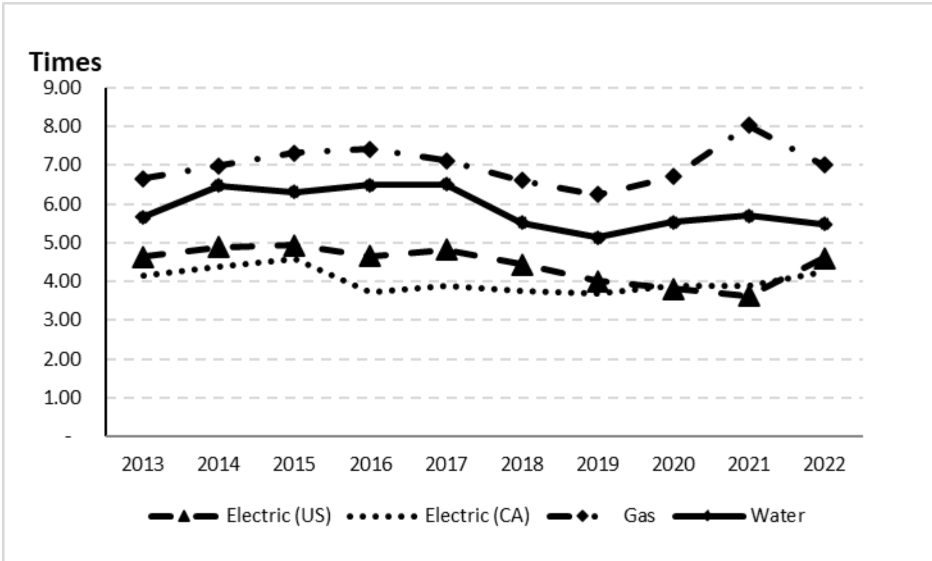
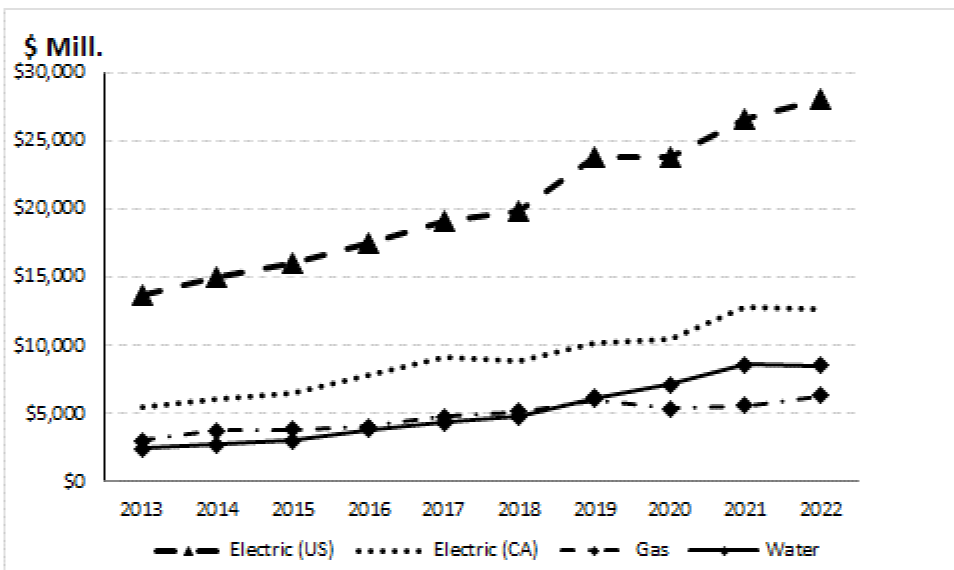


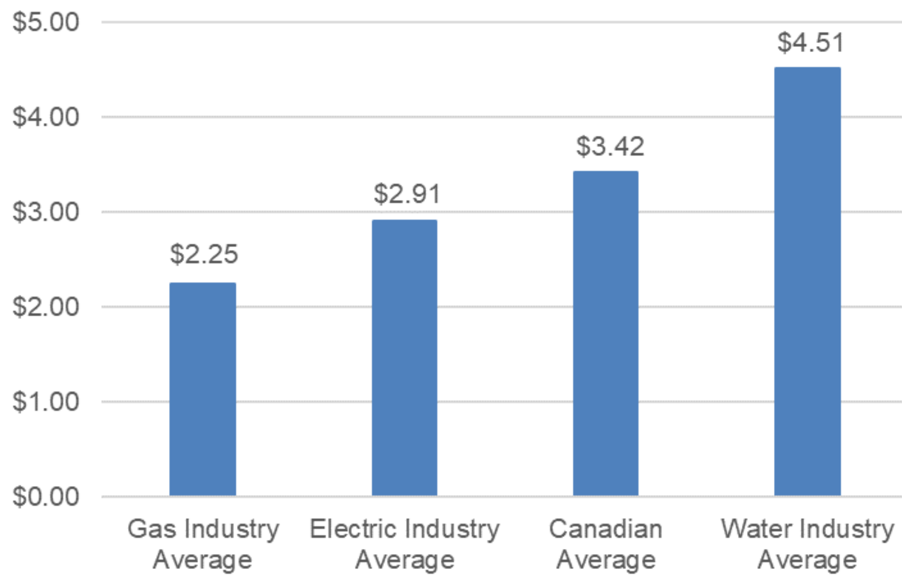
Chart 7: Market Capitalization for the U.S. Electric, Natural Gas and Water Utilities and the Canadian Electric Utilities– 2013 to 2022[50]



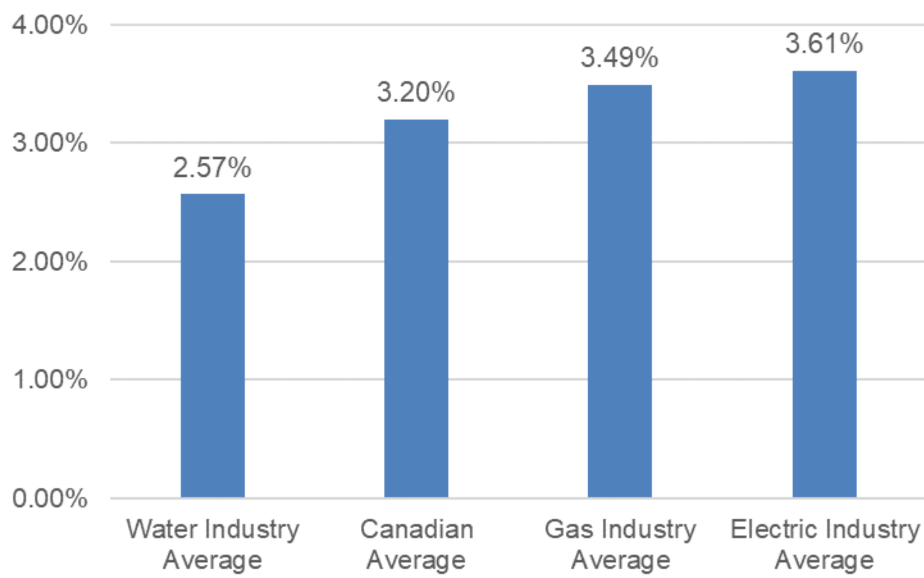
[49] Source: S&P Capital IQ; Pre-tax Interest Coverage is a common metric used for assessing risk as it indicates the extent to which a firm generates the funds needed to cover its continuing obligations; higher measures indicate lower risk.

[50] Source: S&P Capital IQ; Market Capitalization provides an indication of a firm's equity value; higher measures indicate lower risk.

<u>Chart 8: 2022 Capital Intensity for the U.S. Electric, Natural Gas and Water Utilities and the Canadian Electric Utilities</u>[51]



<u>Chart 9: 2022 Depreciation Rates for the U.S. Electric, Natural Gas and Water Utilities and the Canadian Electric Utilities</u>[52]



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[51] Source: S&P Capital IQ, Company SEC Form 10-Ks; Capital Intensity is a common measure used to assess risk as it represents how capital it takes to produce $1 of revenue; higher measures indicate higher risk.

[52] Source: S&P Capital IQ, Company SEC Form 10-Ks; Depreciation rates are one of the principal sources of internal cash flows for utilities, lower depreciation rates indicate lower cash flows.

In view of the above, the risks facing water utilities are not identical to those faced by gas and electric utilities. Given that, I conclude that primary weight should be placed on the results of the U.S. Water Utility Proxy Group when determining the ROE for EWS.

Further, given the above and the lack of publicly traded water utilities in Canada, and the extent to which the U.S. and Canadian economies are linked as discussed below, the use of U.S. publicly traded water utilities is appropriate.

ii. *Integration and Interdependence of the Canadian and U.S. Economies*

In addition to operational comparability, locational comparability should be considered because companies in a certain region or country may share similar risks to each other. Although there is significant interdependence between the U.S. and Canadian economies and markets (as discussed below), it may be useful to separate Canadian and U.S. utilities to gain insight into possible risk differentials for utilities in the two nations.

The Canadian and U.S. economies remain highly integrated and interdependent. The significant amount of Canadian investment in the U.S. is particularly important as the performance of Canadian investments in the U.S. is driven by U.S. capital market conditions. Not only are the Canadian and U.S. economies integrated and interdependent, their stock markets are intricately linked. David A. Bessler and Jian Yang studied the dynamic structure of nine major stock markets, including those of Canada and the U.S.[53] The authors found “the Canadian market follows the U.S. market in contemporaneous time, which is consistent with the common notion on the relationship between the two countries’ economies.”[54] As Bessler and Yang observed, “[t]he U.S. market is probably the only market that has a consistently strong impact on price movements in other major stock markets in the longer-run.”[55]

Looking to the Canadian and U.S. markets, both the S&P TSX Composite and the S&P 500 Index, and the Canada 30-year bond yield and the U.S. 30-year Treasury bond yields have moved in tandem (*see* Charts 10 and 11, respectively, below). In fact, since 2007, the correlation

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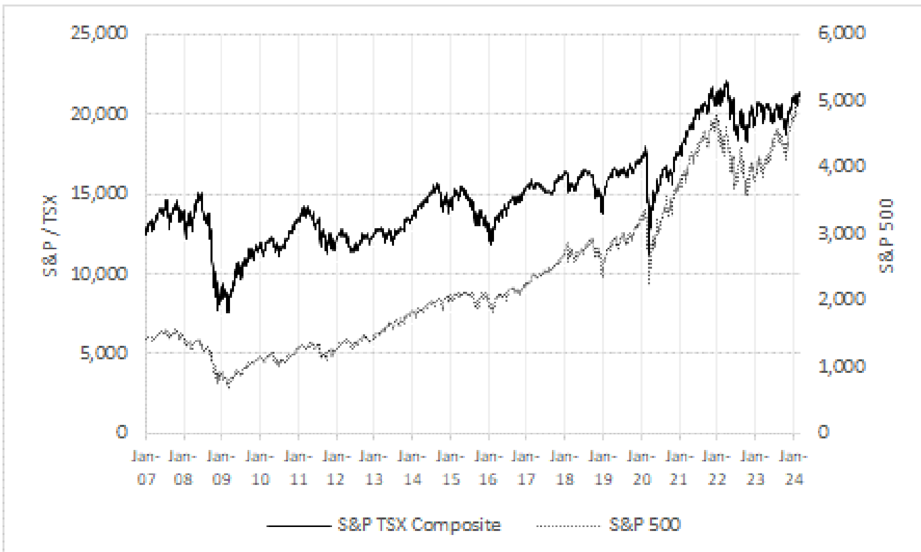
[53] David A. Bessler and Jian Yang, *The structure of interdependence in international stock markets*, Journal of International Money and Finance, 22 (2003), at 261-287.

[54] *Ibid*., at 277.

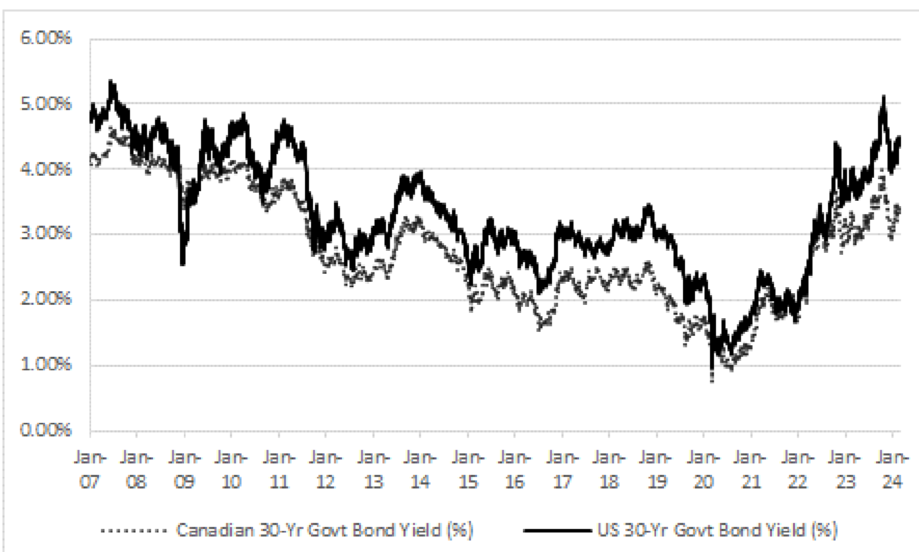
[55] *Ibid*., at 285.

between the equity and bond markets has been extremely high at approximately 95.71% and 95.52%, respectively. That degree of correlation is generally consistent with, although somewhat higher than, the relationship between the volatility of the respective Canadian and U.S. equity markets (correlation of 90.25% since 2017, *see* Chart 12, below). The data indicate that although they are not perfect substitutes, investors see the two capital markets as fundamentally related.

<u>Chart 10: Relative Performance (S&P/TSX Composite Index and S&P 500 Index)[56]</u>

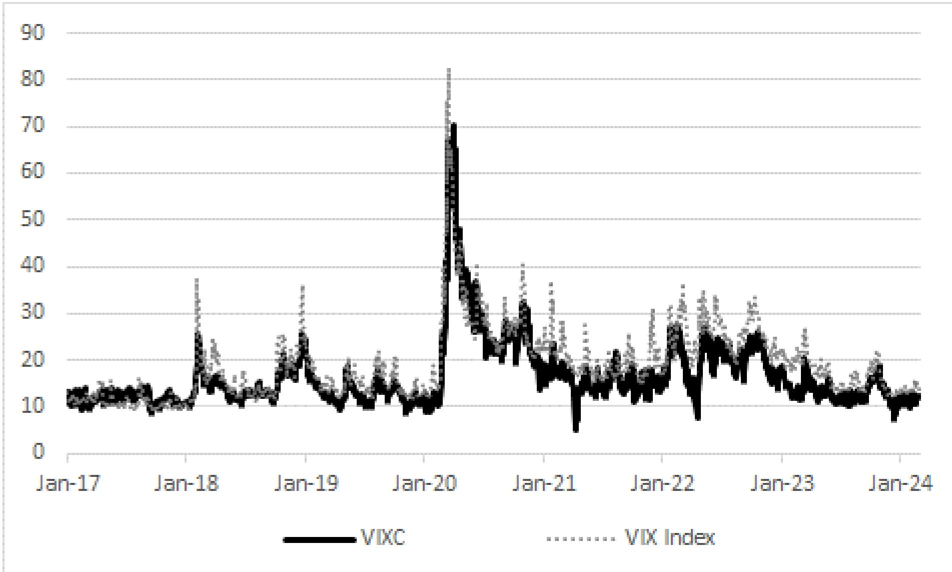


<u>Chart 11: Thirty-Year Canadian and U.S. Government Bond Yields[57]</u>



[56] Source: S&P Capital IQ.
[57] Source: Bloomberg Professional Service.

Chart 12: Relative Performance (VIXC/VIX) 2017-2024[58]



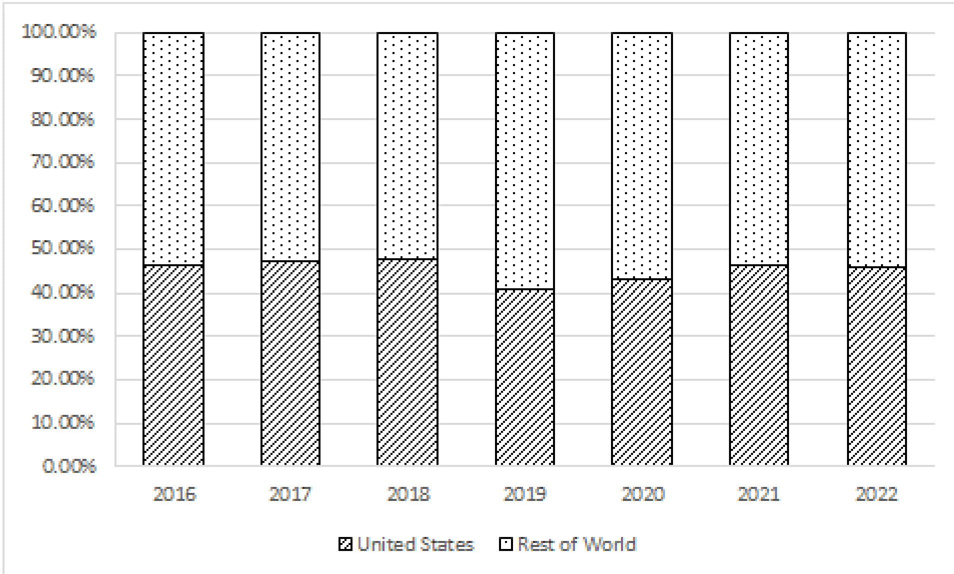
The capital market interdependence reflected in Charts 10 through 12 is reinforced given the foreign direct investment between Canada and the U.S., which is also highly linked. In *Canada and the United States: Trade, Investment, Integration and the Future*,[59] Blayne Haggart noted that investment flows between Canada and the U.S. have become greatly liberalized, with U.S. investors being the largest foreign investor in Canada.[60] As Chart 13 below indicates, U.S. direct investment in Canada for the seven years ended 2022 averaged slightly more than 45.37% of total foreign direct investment in Canada.

58 Source: S&P Capital IQ.

59 Blayne Haggart, *Canada and the United States: Trade, Investment, Integration and the Future*, Economics Division, Library of Parliament, Parliamentary Research Branch, April 2, 2001 (revised August 28, 2001) PRB 01-3E. Please note that the recent data discussed in this section continues to support Haggart's perspective.

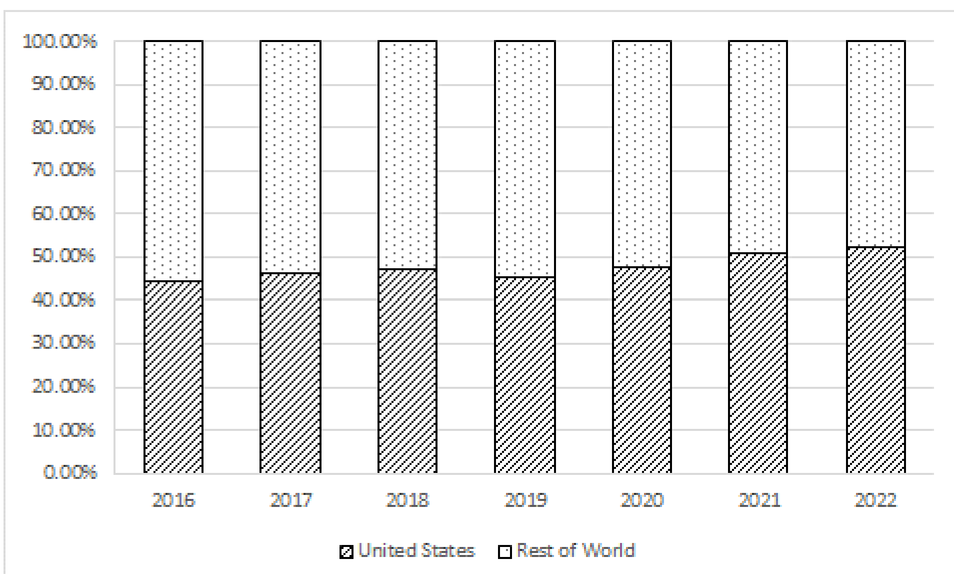
60 *Ibid.*, at 14.

Chart 13: Foreign Direct Investment in Canada (2016-2022)[61]



Likewise, Canadian direct investment in the U.S. constitutes a significant amount of total Canadian direct investment abroad, averaging approximately 47.76% for the seven years ended 2022.

Chart 14: Canadian Direct Investment Abroad (2016-2022)[62]



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61 Source: Statistics Canada.
62 Source: Statistics Canada.

Given the level of direct investment between Canada and the U.S., it is not surprising that their capital markets continue to move in tandem. As such, it would be impractical to not consider U.S. proxy companies as U.S. capital market data, which is subsumed by the market data of U.S. companies, is considered by Canadian investors. Likewise, to the extent that investors in the Canadian proxy group are based in the U.S., which is a natural conclusion given Chart 13, those investors would consider U.S. companies as alternative investment opportunities.

In view of the forgoing, the economies and capital markets of Canada and the U.S. remain highly integrated and interdependent. Because the cost of common equity represents an opportunity cost, Canadian utility investors also consider U.S. utility investments in their decisions. In my view, it therefore is reasonable to consider U.S. utility companies as relevant proxies for EWS.

The use of U.S. and Canadian utilities in an ROE analysis reflects the financial principles of risk and return and the fact that both economies are interdependent. As the subject utility in this report is engaged solely in providing regulated wastewater utility services, I believe it is imperative to place primary weight on the results of the U.S. Water Utility Proxy Group, as these companies are more comparable to EWS operationally.

V. COST OF COMMON EQUITY ANALYSES

As mentioned above, I will employ three cost of common equity models, the DCF, RPM, and CAPM, to the proxy groups identified above. As discussed in Section III, each method used to estimate the cost of common equity is subject to assumptions that become more, or less, applicable as market conditions change. The following sections discuss the methods used to estimate EWS's cost of common equity, how those methods were applied, and how their results should be considered.

i. ***Discounted Cash Flow Model***

The Theoretical Basis of the DCF Model

The theoretical basis of the DCF model is that the value of an investment is measured by the net present value of the cash flows derived from its ownership. As it relates to common stock, the market price equals the present value of cash flows associated with the ownership of that stock.

Under that construct, the cost of common equity is the discount rate that sets the stock's current market price equal to the present value of its expected cash flows:

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \cdots + \frac{D_\infty}{(1+k)^\infty} \quad \text{Equation [1]}$$

where P_0 represents the current stock price, $D_1 \ldots D_\infty$ represent expected future dividends, and k is the discount rate, or required ROE. Equation [1] is a standard present value calculation that can be simplified and rearranged into the familiar form:

$$k = \frac{D(1+g)}{P_0} + g \quad \text{Equation [2]}$$

Equation [2] often is referred to as the "constant growth DCF" model, in which the first term is the expected dividend yield and the second term is the expected long-term growth rate. The constant growth DCF model requires several assumptions, including:

(1) Earnings, book value, and dividends all grow at the same, constant rate in perpetuity;
(2) The dividend payout ratio remains constant in perpetuity;
(3) The price-to-earnings ("P/E") ratio remains constant in perpetuity;
(4) The discount rate is greater than the expected growth rate; and
(5) The estimated cost of common equity remains constant in perpetuity.

Because all assumptions are held constant in perpetuity, the market price at any point in the future is based on assumptions established in the present. Consequently, the holding period does not matter; the DCF result will be the same under any assumed horizon. The implication is that the model effectively assumes the market conditions in place when the stock is bought will remain in place in perpetuity.

Constant Growth DCF Model

Dividend Yield

I calculated the dividend yield by dividing each proxy group company's annualized dividend at February 29, 2024 by their 60-trading day average stock price ending February 29, 2024. It has been my practice to use an averaging period to avoid any biases that may arise from anomalous or transitory events. At the same time, the averaging period should be reasonably representative of expected capital market conditions over the long term. In my view, the use of the 60-trading day averaging period reasonably balances those concerns. As Morin notes:

> Average stock prices are appropriate during volatile market periods, when stock prices experience large random fluctuations. Visual inspection of a chart of daily closing prices over the last few weeks should reveal whether the current stock price…is an outlier.[63]

Because dividends are paid periodically (quarterly), as opposed to continuously (daily), an adjustment must be made to the dividend yield. This is often referred to as the discrete, or the Gordon Periodic, version of the DCF model.

DCF theory calls for the use of the full growth rate, or D_1, in calculating the dividend yield component of the model. Since the various proxy group companies increase their quarterly dividend at various times during the year, a reasonable assumption is to reflect one-half the annual dividend growth rate in the dividend yield component, or $D_{1/2}$. Because the dividend should be representative of the next 12-month period, my adjustment is a conservative approach that does not overstate the dividend yield. Therefore, the actual average dividend yields in Column 1 on pages 2 and 3 of Schedule 2 have been adjusted upward to reflect one-half the average projected growth rate shown in Column 6.

Growth Rates

Investors with more limited resources than institutional investors are likely to rely on widely available financial information services, such as *Value Line*, Zacks, Yahoo! Finance, and S&P Capital IQ. Investors realize that analysts have significant insight into the dynamics of the industries and individual companies they analyze, as well as companies' abilities to effectively manage the effects of changing laws and regulations, and ever-changing economic and market conditions. For these reasons, I used analysts' five-year forecasts of EPS growth in my DCF analysis.

Over the long run, there can be no growth in dividends per share ("DPS") without growth in EPS. Security analysts' earnings expectations have a more significant influence on market prices than dividend expectations. Thus, using projected earnings growth rates in a DCF analysis

[63] Morin, at 356.

provides a better match between investors' market price appreciation expectations and the growth rate component of the DCF.

Regarding the use of analysts' growth rate projections, there is considerable evidence they have significant influence on market prices.[64] As noted by Morin:

> Because of the dominance of institutional investors and their influence on individual investors, analysts' forecasts of long-run growth rates provide a sound basis for estimating required returns. Financial analysts exert a strong influence on the expectations of many investors who do not possess the resources to make their own forecasts, that is, they are a cause of g. [65]

The use of security analysts' EPS growth rate forecasts therefore provides the proper match between investors' expectations of market price appreciation, and the growth rate component of the DCF model.

The relationship between various growth rates and stock valuation metrics has been the subject of considerable academic research.[66] In a March 1990 speech before the Institute for Quantitative Research and Finance, Myron Gordon recognized the significance of analysts' EPS forecasts:

> We have seen that earnings and growth estimates by security analysts were found by Malkiel and Cragg to be superior to data obtained from financial statements for the explanation of variation in price among common stocks[…] estimates by security analysts available from sources such as IBES are far superior to the data available to Malkiel and Cragg.
>
> * * *
>
> Eq (7) is not as elegant as Eq (4), but it has a good deal more intuitive appeal. It says that investors buy earnings, but what they will pay for a dollar of earnings increases with the extent to which the earnings are reflected in the dividend or in appreciation through growth.[67]

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[64] Morin, at 371-380.

[65] Morin, at 371.

[66] *See*, for example, Harris, Robert, *Using Analysts' Growth Forecasts to Estimate Shareholder Required Rate of Return*, Financial Management, Spring 1986.

[67] Myron J. Gordon, *The Pricing of Common Stocks*, Presented before the Spring 1990 Seminar, March 27, 1990 of the Institute for Quantitative Research in Finance, Palm Beach Fl., at 12, 14.

Professor Gordon recognized that the total return is largely affected by the terminal price, which is mostly affected by earnings (for example, in the context of P/E multiples). Subsequent academic research clearly and consistently has indicated that measures of earnings and cash flow are strongly related to returns, and that analysts' forecasts are superior to other measures of growth in explaining stock prices.[68] For example, Vander Weide and Carleton state that, "[our] results…are consistent with the hypothesis that investors use analysts' forecasts, rather than historically oriented growth calculations, in making stock buy-and-sell decisions."[69]

Other research specifically notes the importance of analysts' growth estimates in determining the cost of common equity, and in the valuation of equity securities. Dr. Robert Harris noted that "a growing body of knowledge shows that analysts' earnings forecasts are indeed reflected in stock prices." Citing Cragg and Malkiel, Dr. Harris notes that those authors "found that the evaluations of companies that analysts make are the sorts of ones on which market valuation is based."[70] Similarly, Brigham, Shome and Vinson noted that "evidence in the current literature indicates that (i) analysts' forecasts are superior to forecasts based solely on time series data, and (ii) investors do rely on analysts' forecasts."[71]

To that point, the research of Vander Weide and Carleton demonstrates that whereas earnings growth projections have a statistically significant relationship to stock valuation levels, dividend growth projections do not. Those findings indicate investors form their investment decisions based on expectations of growth in earnings, not dividends. Consequently, earnings growth, not dividend growth, is the appropriate estimate in the constant growth DCF model.

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[68] See, for example, Christofi, Christofi, Lori and Moliver, *Evaluating Common Stocks Using Value Line's Projected Cash Flows and Implied Growth Rate*, Journal of Investing (Spring 1999); Harris and Marston, *Estimating Shareholder Risk Premia Using Analysts Growth Forecasts*, Financial Management, 21 (Summer 1992); and Vander Weide and Carleton, *Investor Growth Expectations: Analysts vs. History*, The Journal of Portfolio Management, Spring 1988.

[69] Vander Weide and Carleton, *Investor Growth Expectations: Analysts vs. History*, The Journal of Portfolio Management, Spring 1988, at 81.

[70] Robert S. Harris, *Using Analysts' Growth Forecasts to Estimate Shareholder Required Rate of Return*, Financial Management, Spring 1986, at 59.

[71] Eugene F. Brigham, Dilip K. Shome, and Steve R. Vinson, *The Risk Premium Approach to Measuring a Utility's Cost of Equity*, Financial Management, Spring 1985, at 36.

Studies performed by Cragg and Malkiel[72] demonstrate that analysts' forecasts are superior to historical growth rate extrapolations. Although some question the accuracy of analysts' projections, it does not matter well after the fact whether or not those forecasts were accurate. What matters is the forecasts reflect widely held expectations influencing investors at the time they make asset pricing decisions, i.e. the market prices investors are willing to pay.

Summary of DCF Results

In arriving at a conclusion for the constant growth DCF-indicated common equity cost rate for the two proxy groups, I relied on an average of the mean and the median results of the DCF. This approach considers all the individual proxy utilities' results from within their respective proxy groups, while mitigating the high and low outliers of those individual results. The constant growth DCF results are summarized in Table 7, below (*see also* Schedule 2).

Table 7: Constant Growth DCF Results

	Mean	**Median**	**Average of Mean and Median**
Canadian Utility Proxy Group	9.49%	8.98%	9.24%
U.S. Water Utility Proxy Group	9.89%	10.10%	10.00%

As shown on Table 7, the average result of the constant growth DCF model, as applied to the Canadian Utility Proxy Group results in mean and median cost rates of 9.49% and 8.98%, respectively. The DCF model as applied to the U.S. Water Utility Proxy Group, is 9.89%, while the median result is 10.10%. My indicated ROE using the DCF model is the average of the mean and median results, or 9.24% and 10.00% for the Canadian and U.S. Water Utility and Canadian Utility Proxy Groups, respectively.

[72] John G. Cragg, and Burton G. Malkiel, Expectations and the Structure of Share Prices (University of Chicago Press, 1982) Chapter 4.

ii. *Risk Premium Model*

Theoretical Basis of the Risk Premium Model

The RPM is based on the fundamental financial principle of risk and return; namely, that investors require greater returns for bearing greater risk. The RPM recognizes that common equity capital has greater investment risk than debt capital, as common equity shareholders are behind debt holders in any claim on a company's assets and earnings. As a result, investors require higher returns from common stocks than from bonds to compensate them for bearing the additional risk.

While it is possible to directly observe bond returns and yields, investors' required common equity returns cannot be directly determined or observed. According to RPM theory, one can estimate an equity risk premium ("ERP") over bonds (either historically or prospectively) and use that premium to derive an indicated ROE. The cost of common equity equals the expected cost rate for long-term debt capital, plus a risk premium over that cost rate, to compensate common shareholders for the added risk of being unsecured and last-in-line for any claim on the corporation's assets and earnings upon liquidation.

Total Market Approach Risk Premium Model

The total market approach RPM adds a prospective public utility bond yield to an average of: (1) an ERP that is derived from a beta-adjusted total market ERP, (2) an ERP based on the S&P Utilities Index/TSX Capped Utilities Index; and (3) an ERP based on authorized ROEs for U.S. utilities.

The first step in the total market approach RPM analysis is to determine the expected bond yield.[73] Because both ratemaking and the cost of capital, including the common equity cost rate, are prospective in nature, a prospective yield on similarly-rated long-term debt is essential. Because I am unaware of any publication that provides forecasted public utility bond yields, I relied on a consensus forecast of about 50 economists of the expected yield on Aaa-rated corporate bonds for the six calendar quarters ending with the second calendar quarter of 2025, and *Blue Chip Financial Forecast's ("Blue Chip")* long-term projections for 2025 to 2029, and 2030 to 2034.

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[73] For purposes of the total market approach RPM, I will be calculating the expected yield on A3-rated Canadian Utility bonds and A3-rated U.S. Utility bonds, consistent with the average bond rating of the Canadian and U.S. Water Utility Proxy Groups, respectively.

As shown on line 1, page 1 of Schedule 3, the average expected yield on Moody's Investor Service ("Moody's") Aaa-rated corporate bonds is 4.90%.

Because the 4.90% estimate represents an Aaa-rated U.S. corporate bond yield and not an A/A2-rated utility bond yield, I adjusted the expected Aaa-rated U.S. corporate bond yield to an equivalent A/A2-rated utility bond yield. The recent spread between Aaa-rated U.S. corporate bond yield and an A-rated Canadian utility bond yield is negative 0.22% and the recent spread between Aaa-rated corporate bond yields and A2-rated U.S. utility bond yields is 0.61%. Adding those spreads to the Aaa-rated U.S. corporate bond yield results in a Canadian A-rated utility bond yield of 4.68% and A-rated U.S. utility bond yield of 5.51%.

Since the average Moody's credit rating of the Canadian Utility Proxy Group is A3, I need to reflect the difference in risk between A2-rated Canadian utility bonds and A3-rated Canadian utility bonds. To reflect that risk, I must adjust the A2-rated Canadian utility bond yield to an A3-rated Canadian utility bond. The recent spread between BBB and A-rated Canadian utility bond yields is 0.51%. Taking one-third of that spread results in a prospective A3-rated Canadian public utility bond yield of 4.85%. Since the average credit rating of the U.S. Water Utility Proxy Group is also A3, a similar adjustment needs to be made to their 5.51% prospective A2-rated bond yield. The recent spread between Baa2- and A2-rated U.S. utility bond yields is 0.24%. Applying one-third of that spread results in a prospective A3-rated U.S. utility bond yield of 5.58%. The summary of each proxy group's indicated bond yield is summarized in Table 8, below:

Table 8: Summary of the Calculation of Each Proxy Group's Indicated Bond Yield[74]

	Canadian Utility	U.S. Water Utility
Prospective Yield on U.S. Aaa-Rated Corporate Bonds	4.90%	4.90%
Adjustment to Reflect Yield Spread Between Aaa-Rated Corporate Bonds and A/A2-Rated Public Utility Bonds	-0.22%	0.61%
Prospective Yield on A/A2-Rated Public Utility Bonds	4.68%	5.51%
Adjustment to Reflect Bond Rating Difference of the Utility Proxy Group	0.17%	0.08%
Prospective Bond Yield Applicable to the Utility Proxy Group	4.85%	5.59%

To develop the total market approach RPM estimate of the appropriate ROE, these prospective bond yields are then added to the average of three different ERPs: (1) the beta-derived ERP; (2) the utility-specific ERP; and (3) the authorized return ERP, which I now discuss, in turn.

Beta-Derived Equity Risk Premium

The components of the beta-derived RPM are: (1) an expected market ERP over corporate bonds, and (2) the beta. The derivation of the beta-derived ERP that I applied to the proxy goups are shown on lines 1 through 5, page 7 of Schedule 3. The total beta-derived ERP uses projected returns on the S&P TSX Composite and the S&P 500, and projected Canadian and U.S. corporate bond yields, to determine a market ERP. That market ERP is then adjusted by the betas of each proxy group to determine the prospective ERP applicable to the respective proxy groups.

Using data from Bloomberg, *Value Line*, and S&P Capital IQ, I calculated expected total returns for the S&P TSX Composite and the S&P 500 using expected dividend yields as a proxy for income returns and long-term growth estimates as a proxy for capital appreciation. The expected total returns for the S&P TSX Composite and the S&P 500 are 14.51% and 14.35%, respectively. Subtracting the prospective yields on Canadian and U.S. Aa/Aaa-rated corporate bonds of 4.63%[75] and 4.90% result in 9.88% and 9.45% projected ERPs, respectively.

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74 As shown on page 1 of Schedule 3.

75 Calculated as the forecasted U.S. Aaa-rated corporate bonds (4.90%) less the spread between U.S. Aaa-rated corporate bonds and Canadian Aa-rated corporate bonds (0.27%).

After calculating average market ERPs of 9.88% and 9.45%, I adjusted it by the betas of the proxy groups to account for the risk of the respective proxy groups. As discussed below, beta is a meaningful measure of prospective relative risk to the market as a whole, and is a logical way to allocate a company's, or proxy group's, share of the market's total ERP relative to corporate bond yields. As shown on pages 1 and 2 of Schedule 4, the averages of the mean and median beta for the Canadian Utility Proxy Group and the U.S. Water Utility Proxy Group are 0.70 and 0.80, respectively. Multiplying the betas by their respective market ERPs of 9.88% and 9.45%, respectively, result in a Canadian beta-adjusted ERP of 6.92% and a U.S. Water beta-adjusted ERP of 7.56%.

S&P/TSX Capped Utilities Index and S&P Utility Index Equity Risk Premium

As done for the S&P TSX Composite and the S&P 500, using dividend and EPS growth rate data from Bloomberg, *Value Line*, and S&P Capital IQ, I calculated projected total returns of the S&P/TSX Capped Utilities Index and the S&P Utility Index. Because the calculated S&P/TSX Capped Utilities Index projected total return exceeded the projected total return of the S&P TSX Composite Index, I chose to exclusively rely on the S&P Utility Index projected total return of 10.36%. Subtracting the prospective A/A2-rated Canadian/U.S. public utility bond yields of 4.68% and 5.51% results in equity risk premiums of 5.68% and 4.85%, respectively.

Bond Yield Plus Risk Premium Based on Authorized Returns for U.S. Water Utility Companies

The ERP based on authorized returns reflects the tendency of the ERP to change inversely with interest rates as discussed in the financial literature on the subject.[76] That is, as interest rates fall, the ERP increases; the converse also is true. A consequence of that relationship is that although the cost of common equity generally is a positive function of interest rates, the two do not move in lockstep. That finding is important, especially when interest rates have been volatile, reaching secular lows, then rebounding from them. The inverse relationship between ERPs and

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[76] *See*, *e.g.*, Robert S. Harris and Felicia C. Marston, *The Market Risk Premium: Expectational Estimates Using Analysts' Forecasts*, Journal of Applied Finance, Vol. 11, No. 1, 2001, at pages 11 to 12; Eugene F. Brigham, Dilip K. Shome, and Steve R. Vinson, *The Risk Premium Approach to Measuring a Utility's Cost of Equity*, Financial Management, Spring 1985, at pages 33 to 45.

interest rates has been acknowledged by the OEB,[77] the AUC,[78] and in previous reports presented before the Utility Committee.

Although my analyses rely on authorized returns to estimate the relationship between interest rates and the ERP, please note that I am not using U.S. authorized returns as a benchmark in isolation – I use them as a proxy for required market returns to estimate the relationship between the ERP and interest rates.

Used in that context, I believe authorized returns are a reasonable input. In my practical experience investors consider a broad range of data, including returns authorized in other jurisdictions, in establishing their return requirements.

As noted earlier, the practice of finance involves the efficient allocation of capital. Equity investors have many options available to them, and allocate their capital based on the expected risks and returns associated with those alternatives. The regulatory orders establishing the cost of common equity, in addition to regulation being the substitute for market competition, often discuss at length the issues surrounding the application and interpretation of market-based models. Because authorized ROEs reflect prevailing market conditions during each rate case and results of multiple market-based models, it is reasonable to use authorized returns to estimate the relationship between interest rates and the ERP. As Morin notes:

> [a]llowed risk premiums are presumably based on the results of market-based methodologies presented to regulators in rate hearings and on the actions of objectives unbiased investors in a competitive marketplace. [79]

With those points in mind, I defined the ERP as the difference between the authorized ROE from fully litigated cases[80] and the then-prevailing level of long-term A2-rated utility bond yields. I then gathered data for 2,069 U.S. electric and gas rate proceedings between January 1980 and

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77 Ontario Energy Board, EB-2009-0084, Report of the Board on the Cost of Capital for Ontario's Regulated Utilities, December 11, 2009, at p. 36-37. The derivation of the OEB's ROE formula explicitly recognizes the inverse relationship as it contains an ROE adjustment factor based on 0.5 times the change in the Long Canada Bond from the base period.

78 Decision 27084-D02-2023, Determination of the Cost-of-Capital Parameters in 2024 and Beyond, at para. 105 (October 9, 2023)

79 Morin, at 139.

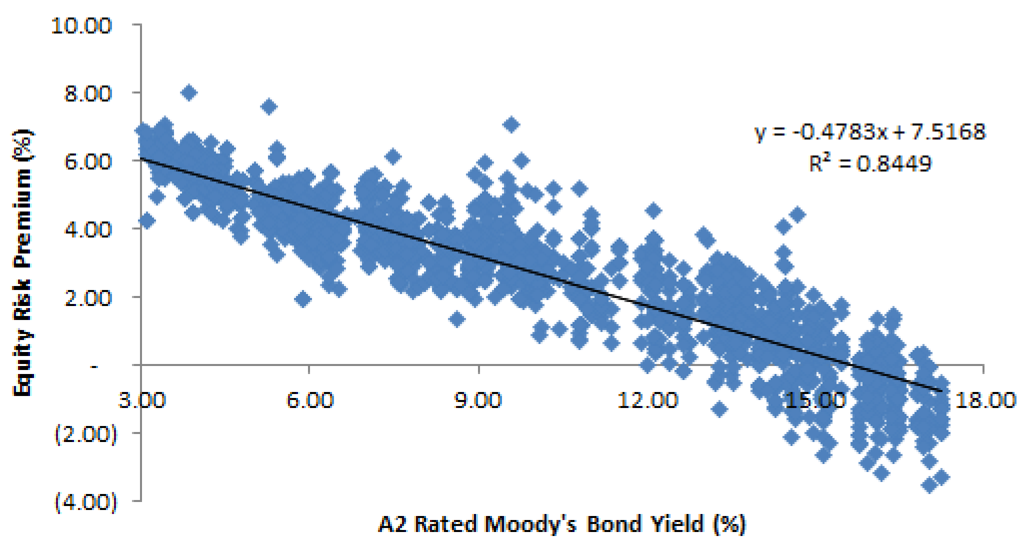
80 Please note I excluded returns associated with "Limited Issue Rate Riders", such as those resulting from incentive returns provided in Virginia, and "Settled" cases.

February 29, 2024, as reported by Regulatory Research Associates, as well as 56 U.S. water rate proceedings between July 2008 and February 29, 2024, also reported by Regulatory Research Associates.

Please note that a similar analysis could not be performed for Canadian returns because Regulatory Research Associates only reports U.S. authorized returns. However, given the integration of Canadian and U.S. markets,[81] I believe the relationship between interest rates and electric and natural gas industry ERPs using authorized ROEs can reasonably be applied using Canadian utility bond yields to develop an estimate of the Canadian specific cost of common equity.

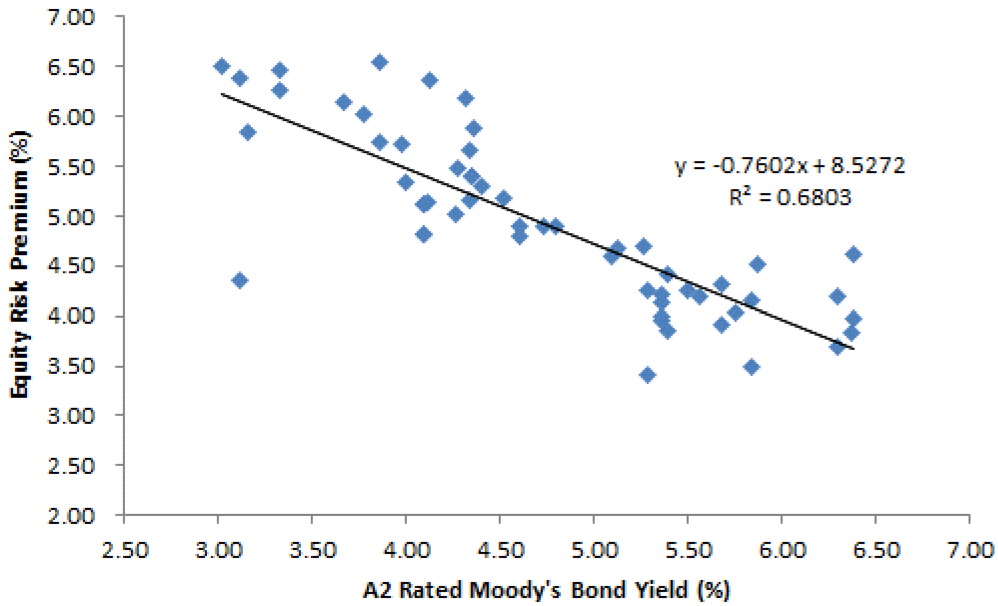
I modeled the relationship between interest rates and the ERP using regression analysis, in which the observed ERP is the dependent variable, and the average A-rated Public Utility bond is the independent variable. That is, the analysis considers the relationship between authorized returns and prevailing public utility bond yields at the time of the decision.

Chart 15: Equity Risk Premium Based on Authorized Returns for U.S. Electric and Gas Utilities



[81] As detailed in Section IV, above.

Chart 16: Equity Risk Premium Based on Authorized Returns for U.S. Water Utilities



As Charts 15 and 16 demonstrate, it is discernible that there is an inverse relationship between the yield on A2-rated public utility bonds and equity risk premiums. I used the regression results to estimate the ERP applicable to the projected yield on A2-rated Canadian public utility bond yields and A2-rated U.S. public utility bonds. Given an expected A2-rated Canadian public utility bond yield of 4.68%, it can be calculated that the indicated electric and gas ERP applicable to that bond yield is 5.28%. Given an A2-rated U.S. public utility bond of 5.51%, an indicated water ERP of 4.34% results.

The ERPs I applied were 5.96% (Canadian Utility Proxy Group) and 5.58% (U.S. Water Utility Proxy Group), which averaged the beta-adjusted equity risk premium, the utility-specific equity risk premium, and the authorized return ERPs as shown on Table 9, below:

Table 9: Summary of the Indicated Equity Risk Premium[82]

Equity Risk Premium	Canadian Utility Proxy Group	U.S. Water Utility Proxy Group
Beta-Adjusted Equity Risk Premium	6.92%	7.56%
Utility-Specific Equity Risk Premium	5.68%	4.85%
Authorized Return Equity Risk Premium	5.28%	4.34%
Average Risk Premium	5.96%	5.58%

Summary of RPM Results

As shown on line 7, page 1 of Schedule 3 and shown on Table 10, below, I calculated indicated common equity cost rates of 10.81% and 11.17% for the Canadian and U.S. Water Utility Groups, respectively, based on the total market approach.

Table 10: Summary of Indicated Cost Rate Using the Risk Premium Model[83]

	Canadian Utility Proxy Group	U.S. Water Utility Proxy Group
Prospective Utility Bond Applicable to the Utility Proxy Group	4.85%	5.59%
Prospective Equity Risk Premium	5.96%	5.58%
Indicated Cost of Common Equity	10.81%	11.17%

iii. ***Capital Asset Pricing Model***

The Theoretical Basis of the CAPM

CAPM theory defines risk as the co-variability of a security's returns with the market's returns as measured by beta (β). A beta of less than 1.0 indicates lower variability than the market as a whole, while a beta greater than 1.0 indicates greater variability than the market.

The CAPM assumes that all other risk (i.e., all non-market or unsystematic risk) can be eliminated through diversification. For example, consider two firms, X and Y, with expected returns, and the expected variation in returns noted in Chart 17, below. Although the two have the same expected return (12.50%), Firm X is far more variable (i.e., uncertain). As such, Firm Y would be considered the riskier investment.

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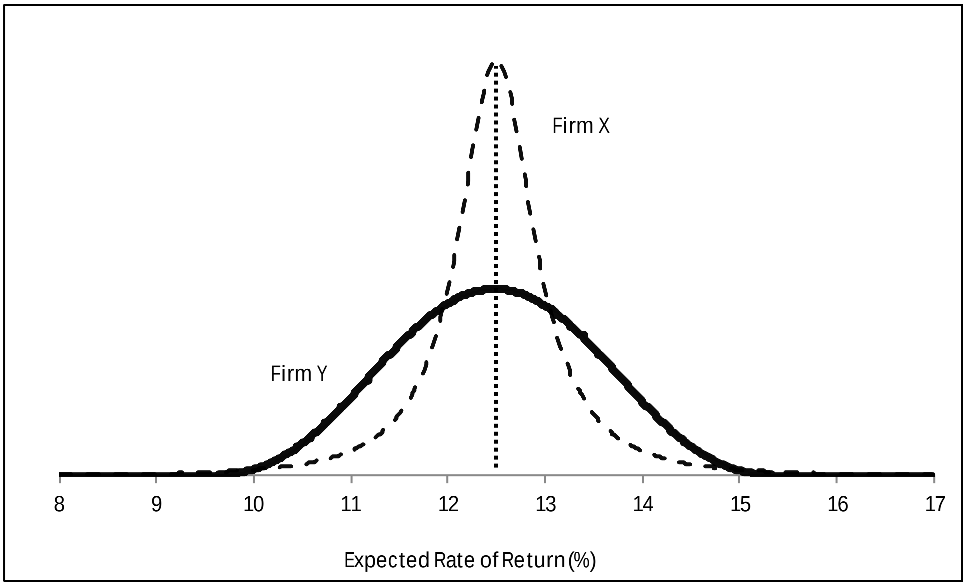
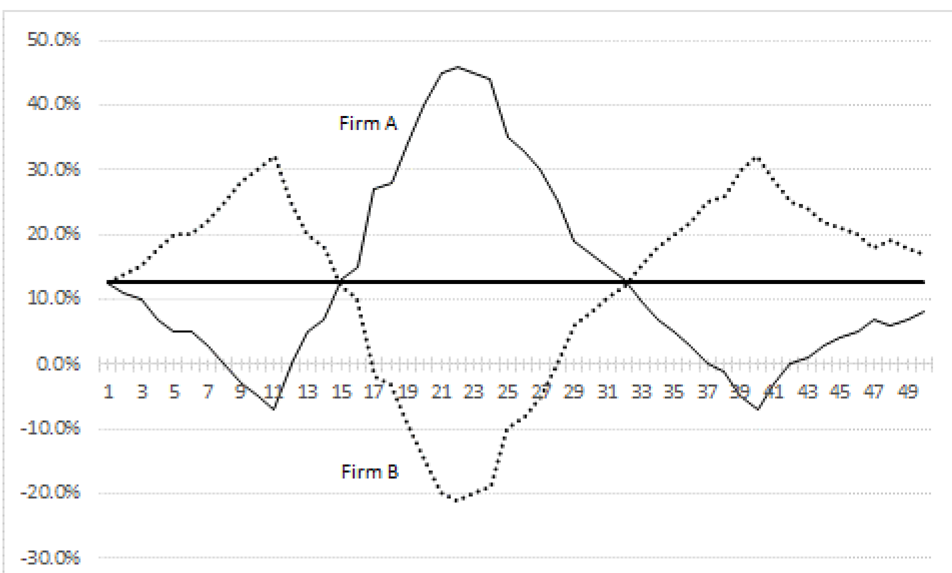
82 As shown on page 6 of Schedule 3.
83 As shown on page 1 of Schedule 3.

Chart 17: Expected Return and Risk



Now consider two other firms, Firm A and Firm B. Both have expected returns of 12.50%, and both are equally risky as measured by their volatility. But as Firm A's returns go up, Firm B's returns go down. That is, the returns are negatively correlated.

Chart 18: Relative Risk



If one were to combine Firms A and B into a portfolio, they would expect a 12.50% return with no uncertainty because their risk profiles counteract each other. That is, the risk can be diversified away. As long as two stocks are not perfectly correlated, the benefits of diversification can be achieved by combining them in a portfolio. The premise of the CAPM is because firms can be combined into a portfolio, the only risk that matters is the risk that remains after diversification, i.e., the "non-diversifiable" risk, which is the result of macroeconomic and other events that affect the returns on all assets.

The model is applied by adding a risk-free rate of return to a market risk premium, which is adjusted proportionately to reflect the systematic risk of the individual security relative to the total market, as measured by beta. The traditional CAPM model is expressed as:

$$R_s = R_f + \beta(R_m - R_f)$$

Where: R_s = Return rate on the common stock;

R_f = Risk-free rate of return;

R_m = Return rate on the market as a whole; and

β = Adjusted beta (volatility of the security relative to the market as a whole).

Numerous tests of the CAPM have measured the extent to which security returns and beta are related as predicted by the CAPM, confirming its validity. The empirical CAPM ("ECAPM") reflects the reality that while the results of these tests support the notion that beta is related to security returns, the empirical Security Market Line ("SML") described by the CAPM formula is not as steeply sloped as the predicted SML.[84] The ECAPM reflects this empirical reality. Fama and French clearly state regarding Figure 2, below, that "[t]he returns on the low beta portfolios are too high, and the returns on the high beta portfolios are too low."[85]

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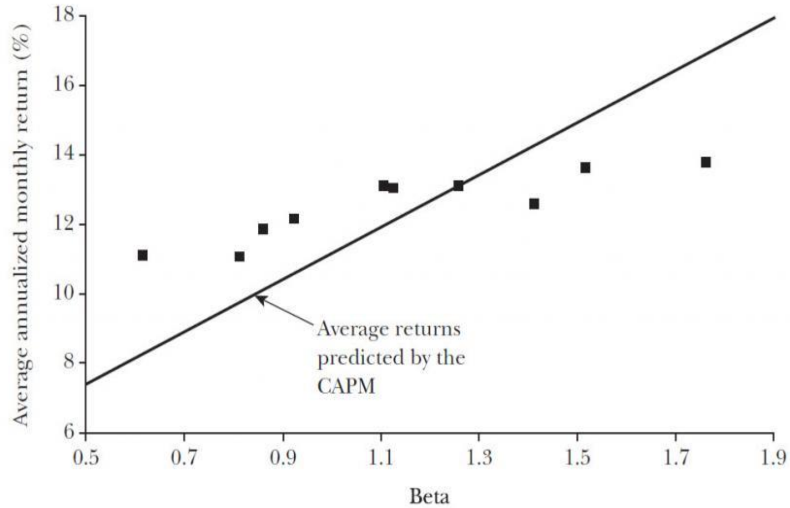
84 Morin, at 220-226.

85 Eugene F. Fama and Kenneth R. French, "The Capital Asset Pricing Model: Theory and Evidence", *Journal of Economic Perspectives*, Vol. 18, No. 3, Summer 2004 at 33 ("Fama & French").

Figure 2 http://pubs.aeaweb.org/doi/pdfplus/10.1257/0895330042162430

Average Annualized Monthly Return versus Beta for Value Weight Portfolios Formed on Prior Beta, 1928–2003



In addition, Morin observes that while the results of these tests support the notion that beta is related to security returns, the empirical SML described by the CAPM formula is not as steeply sloped as the predicted SML. Morin states:

> With few exceptions, the empirical studies agree that … low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted.[86]
>
> * * *
>
> Therefore, the empirical evidence suggests that the expected return on a security is related to its risk by the following approximation:
>
> $$K = R_F + x\,\beta(R_M - R_F) + (1\text{-}x)\;\beta(R_M - R_F)$$
>
> where x is a fraction to be determined empirically. The value of x that best explains the observed relationship [is] Return = 0.0829 + 0.0520 β is between 0.25 and 0.30. If x = 0.25, the equation becomes:
>
> $$K = R_F + 0.25(R_M - R_F) + 0.75\,\beta(R_M - R_F)^{87}$$

[86] Morin, at 207.
[87] Morin, at 221.

Fama and French provide similar support for the ECAPM when they state:

> The early tests firmly reject the Sharpe-Lintner version of the CAPM. There is a positive relation between beta and average return, but it is too 'flat.'… The regressions consistently find that the intercept is greater than the average risk-free rate… and the coefficient on beta is less than the average excess market return… This is true in the early tests… as well as in more recent cross-section regressions tests, like Fama and French (1992).[88]

Finally, Fama and French further note:

> Confirming earlier evidence, the relation between beta and average return for the ten portfolios is much flatter than the Sharpe-Linter CAPM predicts. The returns on low beta portfolios are too high, and the returns on the high beta portfolios are too low. For example, the predicted return on the portfolio with the lowest beta is 8.3 percent per year; the actual return as 11.1 percent. The predicted return on the portfolio with the highest beta is 16.8 percent per year; the actual is 13.7 percent.[89]

Research from Dianna R. Harrington also supports the use of the ECAPM. Harrington summarizes studies on the predicted results of the CAPM versus the actual returns in her text <u>Modern Portfolio Theory & the Capital Asset Pricing Model</u>:

> So far we have learned some very interesting things about the CAPM and reality. Some of the earliest work tested realized data (history) against data generated by simulated portfolios. Early studies by Douglas (1969) and Lintner (Douglas [1969]) showed discrepancies between what was expected on the basis of the CAPM and the actual relationships that were apparent in the capital markets. Theoretically, the minimal rate of return from the portfolios (the intercept) and the actual risk-free rate for the period should have been equal. They were not.
>
> * * *
>
> Another study, now more famous than Lintner's was done by Black, Jensen, and Scholes (1972). Lintner had used what is called a cross-sectional method (looking at a number of stock returns during one time period), whereas Black, Jensen, and Scholes used a time-series method (using returns for a number of stocks over several time

88 Fama & French, at 32.
89 Fama & French, at 33.

periods). To make their test, Black, Jensen, and Scholes assumed that what had happened in the past was a good proxy for the investor expectations (a frequent assumption in CAPM tests). Using historical data, they generated estimates using what we call the market model:

$$R_{jt} = \alpha_j + \beta_j (R_{mt}) + \varepsilon_j$$

Where:

R = total returns

β = the slope of the line (the incremental return for risk)

α = the intercept or a constant (expected to be 0 over time and across all firms)

ε = an error term (expected to be random, without information)

m = the market proxy

j = the firm or portfolio

t = the time period

Instead of using single stocks, they formed portfolios in an effort to wash out one source of error; because betas of single firms are quite unstable. On the basis of the CAPM, they expected to find

1. That the intercept was equal to the risk-free rate (their proxy was the Treasury bill rate)

2. That the capital market line had a positive slope and that riskier (higher beta) securities provided higher return

Instead they found

1. That the intercept was different from the risk-free rate

2. That high-risk securities earned less and low-risk securities earned more than predicted by the model

3. That the intercept seemed to depend on the beta of any asset: high-beta stocks had a different intercept than low-beta stocks

* * *

> Fama and MacBeth (1974) criticized the Black, Jensen, and Scholes study (hereafter called BJS). In a reformation of the study, they supported the first of the BJS findings. They found that the intercept exceeded the risk-free proxy, but did not find the evidence to support the other BJS conclusions.[90]

Harrington discusses Black's potential solution to this phenomenon:

> Black's replacement for the risk-free asset was a portfolio that had no covariability with the market portfolio. Because the relevant risk in the CAPM is systematic risk, a risk-free asset would be the one with no volatility relative to the market – that is, a portfolio with a beta of zero. All investor-perceived levels of risk could be obtained from various linear combinations of Black's zero-beta portfolio and the market portfolio… Since R_z (the rate of return of the zero-beta asset) and R_m are uncorrelated (as R_f and R_m were assumed to be in the simple CAPM), the investor can choose from various combinations of R_z and R_m. On segment R_mY, R_z, is sold short and proceeds are invested in R_m. On segment R_zR_m, portions of the zero-beta portfolio are purchased. At R_m, the investor is fully invested in the market portfolio. The equilibrium CAPM was rewritten by Black as follows:
>
> $$E\ (R_i) = (1 - \beta_i)\ E\ (R_z) + \beta_i E(R_m)$$
>
> Where:
>
> E indicates expected,
>
> $E\ (R_z)$ is less than $E(R_m)$, and
>
> R_z holdings over the whole market must be in equilibrium. That is, the number of short sellers and lenders of securities must be equal.
>
> Black's adaptation is intriguing. The result of using this model is a capital market line that has a less steep slope and a higher intercept than those of the simple CAPM. If Black's model is more correct in its description of investor behavior in the marketplace, then the use of the simple model would produce equity return predictions that would be too low for sticks with betas greater than one and too high for stocks with betas of less than one.[91]

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[90] Dianna R. Harrington, Modern Portfolio Theory & the Capital Asset Pricing Model – A User's Guide, Prentice-Hall, Inc. 1983, at 43-45.

[91] Dianna R. Harrington, Modern Portfolio Theory & the Capital Asset Pricing Model – A User's Guide, Prentice-Hall, Inc. 1983, at 30-31.

Some analysts argue that using adjusted betas addresses the empirical issues with the CAPM by increasing the expected returns for low beta stocks and decreasing the returns for high beta stocks. They conclude there is no need for the ECAPM approach. I disagree with that conclusion. The use of adjusted betas is not equivalent to the use of the ECAPM. As discussed above, betas are adjusted because of their general regression tendency to converge toward 1.00 over time, i.e., over successive calculations. As also noted earlier, numerous studies have determined that at any given point in time the SML described by the CAPM formula is not as steeply sloped as the predicted SML. To that point, Morin states that:

> Some critics of the ECAPM argue that the use of Value Line adjusted betas in the traditional CAPM amounts to using an ECAPM. This is incorrect. The use of adjusted betas in CAPM analysis is not equivalent to the ECAPM. Betas are adjusted because of the regression tendency of betas to converge toward 1.0 over time. We have seen that numerous empirical studies have determined that the SML, described by the CAPM formula *at any given moment* in time is not as steeply sloped as the predicted SML. The slope of the SML should not be confused with beta.
>
> * * *
>
> The ECAPM corrects for the for the fact that the CAPM under-predicts observed returns when beta is less than one and over-predicts observed returns when beta is greater than one… The two adjustments are not the same and there is no-double counting.[92]

Moreover, the slope of the SML should not be confused with beta. As Brigham and Gapenski state:

> The slope of the SML reflects the degree of risk aversion in the economy – the greater the average investor's aversion to risk, then (1) the steeper is the slope of the line, (2) the greater is the risk premium for any risky asset, and (3) the higher is the required rate of return on risky assets.[12]
>
> [12]Students sometimes confuse beta with the slope of the SML. This is a mistake. As we saw earlier in connection with Figure 6-8, and as is developed further in Appendix 6A, beta does represent the slope of a line, but *not* the Security Market Line. This confusion arises partly because the SML equation is generally written, in this

[92] Morin at 223-224.

> book and throughout the finance literature, as $k_i = R_F + b_i(k_M - R_F)$, and in this form b_i looks like the slope coefficient and $(k_M - R_F)$ the variable. It would perhaps be less confusing if the second term were written $(k_M - R_F)b_i$, but this is not generally done.[93]

Clearly, the justification from Morin, Fama, and French, and Harrington, along with their reviews of other academic research on the CAPM, validate the use of the ECAPM. In view of theory and practical research, I have applied both the traditional CAPM and the ECAPM to the companies in the proxy groups and averaged the results.

Risk-Free Rate of Return

I relied on two measures of the risk-free rate. The first measure is a projected 30-year Government of Canada bond yield, and the second measure is a projected 30-year Treasury bond yield. The Canadian projected risk-free rate of 3.21% is calculated using quarterly forecasts of the 30-year Government of Canada bonds from BMO Economics, CIBC Capital Markets, National Bank of Canada Financial Markets, RBC Capital Markets, Scotiabank Global Economics, and TD Economics from Q1 2024 through Q4 2025. The U.S. risk-free rate of 4.20% is based on the average of the *Blue Chip* consensus forecast of the expected yields on 30-year U.S. Treasury bonds for the six quarters ending with the second calendar quarter of 2025, and long-term projections for the years 2025 to 2029 and 2030 to 2034.

Yields on long-term Canadian government and U.S. Treasury bonds are considered default-free, and their terms are consistent with the long-term cost of capital to public utilities as measured by yields on A2-rated public utility bonds, the long duration of utility equities, the perpetual horizon assumed in the constant growth DCF model, and the long-term life of the jurisdictional rate base to which the allowed fair rate of return will be applied. In contrast, short-term Government bond yields are more volatile, do not match the duration or life of utility equity and assets, and are greatly influenced by Bank of Canada ("BoC") and Federal Reserve monetary policy.

93 Eugene F. Brigham and Louis C. Gapenski, Financial Management – Theory and Practice, 4th Ed. (The Dryden Press, 1985) at 201-204.

More specifically, the term of the risk-free rate used for cost of capital purposes should match the life (or duration) of the underlying investment (i.e., perpetuity). As noted by Morningstar:

> The traditional thinking regarding the time horizon of the chosen Treasury security is that it should match the time horizon of whatever is being valued. When valuing a business that is being treated as a going concern, the appropriate Treasury yield should be that of a long-term Treasury bond. Note that the horizon is a function of the investment, not the investor. If an investor plans to hold stock in a company for only five years, the yield on a five-year Treasury note would not be appropriate since the company will continue to exist beyond those five years.[94]

Morin also confirms this when he states:

> [b]ecause common stock is a long-term investment and because the cash flows to investors in the form of dividends last indefinitely, the yield on very long-term government bonds, namely, the yield on 30-year Treasury bonds, is the best measure of the risk-free rate for use in the CAPM (footnote omitted)… The expected common stock return is based on long-term cash flows, regardless of an individual's holding time period.[95]

Pratt and Grabowski recommend a similar approach to selecting the risk-free rate: "[i]n theory, when determining the risk-free rate and the matching ERP you should be matching the risk-free security and the ERP with the period in which the investment cash flows are expected."[96]

As a practical matter, equity securities represent a perpetual claim on cash flows; 30-year Treasury bonds are the longest-maturity securities available to approximate that perpetual claim. The average life of the Company's utility plant is approximately 35 years based on the composite depreciation rate of the components of their utility plant.[97] Thus, the use of a 30-year Canada bond yield is an appropriate risk-free rate as it reflects the life of the assets it finances.

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94 Morningstar, Inc., 2013 Ibbotson Stocks, Bonds, Bills and Inflation Valuation Yearbook, at 44.
95 Morin, at 169
96 Shannon Pratt and Roger Grabowski, Cost of Capital: Applications and Examples, 3rd Ed. (Hoboken, NJ: John Wiley & Sons, Inc., 2008), at 92. "ERP" is the Equity Risk Premium.
97 Composite depreciation rate for EWS is 2.86%; calculated as 1 / 2.86% = 34.97 years.

Beta Coefficients

Typically, I use both *Value Line* and Bloomberg published adjusted betas. However, *Value Line* provides beta for only two of the five Canadian proxy companies. For the companies not covered by *Value Line*, I calculated equivalent betas using the same parameters used by *Value Line* (i.e., five years of weekly return data and the New York Stock Exchange as the market index.)[98]

Betas are measured using an Ordinary Least Squares ("OLS") regression, in which the dependent variable is the return of the subject security, and the independent variable is the return on the market as measured by a given index (*Value Line*, for example, uses the New York Stock Exchange Index). Beta is represented by the slope term of the regression estimates. Intuitively, beta measures the change in the subject company's returns relative to the change in the market return.

The resulting beta is considered "raw" or unadjusted. Unadjusted betas are historical in nature, as they use historical market data. Blume studied the stability of beta over time and found that "[n]o economic variable including the beta coefficient is constant over time."[99] Consistent with that finding, Blume observed a tendency of raw betas to change gradually over time. Blume further stated:

> …there is obviously some tendency for the estimated values of the risk parameter [beta] to change gradually over time. This tendency is most pronounced in the lowest risk portfolios, for which the estimated risk in the second period is invariably higher than that estimated in the first period. There is some tendency for the high risk portfolios to have lower estimated risk coefficients in the second period than in those estimated in the first. Therefore, the estimated values of the risk coefficients in one period are biased assessments of the <u>future values</u>, and furthermore the values of the risk coefficients as measured by the estimates of β_1 tend to regress towards the means with this tendency stronger for the lower risk portfolios than the higher risk portfolios. (emphasis added)[100]

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98 Discussions with *Value Line* revealed that regardless of nationality of the stock, its returns are compared with the NYSE when their betas are calculated.

99 Marshal E. Blume, "On the Assessment of Risk", The Journal of Finance, Vol. XXVI, No. 1, March 1971.

100 *Ibid.*

Blume proposed a correction for this tendency, also known as "regression bias", which is inherent in the calculation of all betas. He stated:

> In so far as the rate of regression towards the mean is stationary over time, one can in principle correct for this tendency in forming one's assessments.
>
> * * *
>
> For individual securities as well as portfolios of two or more securities, the assessments adjusted for the historical rate of regression are more accurate than the unadjusted or naïve assessments. Thus, an improvement in the accuracy of one's assessments of risk can be obtained by adjusting for the historical rate of regression even though the rate of regression over time is not strictly stationary.[101]

Based on Blume's results, the typical adjustment is calculated based upon an approximate of the following formula:

$$\beta_{adjusted} = 0.35 + .67x\beta_{raw\ (unadjusted)}$$

This adjustment transforms the historical unadjusted beta into an expectational value, consistent with the expectational nature of the cost of capital.

As noted by Morin:

> Several authors have investigated the regression tendency of beta and generally reached similar conclusions [as Blume]. High-beta portfolios have tended to decline over time toward unity, while low-beta portfolios have tended to increase over time toward unity…He demonstrated that the Value Line adjustment procedure anticipated differences between past and future betas.[102]

Morin further notes:

> A comprehensive study of beta measurement methodology by Kryzanowski and Jalilvand (1983) concludes that raw unadjusted beta (OLS beta) is one of the poorest beta predictors, and is outperformed by the Blume-style Bayesian beta approach. Gombola and Kahl (1990) examine the time-series properties of utility betas

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101 *Ibid.*
102 Morin, at 81.

> and find strong support for the application of adjustment procedures such as the Value Line and Bloomberg procedures.
>
> ***
>
> Because of this observed regressive tendency, a company's raw unadjusted beta is not the appropriate measure of market risk to use. Current stock prices reflect expected risk, that is, expected beta, rather than historical risk or historical beta. Historical betas, whether raw or adjusted, are only surrogates for expected beta. The best of the two surrogates is adjusted beta.[103]

Morin also provides economic and statistical justification for using adjusted betas to estimate the cost of common equity for utilities. Relative to economic justification, he states:

> Adjusted betas compensate for the tendency of regulated utilities to be extra interest-sensitive relative to industrials.[(footnote omitted)] In the same way that bondholders get compensated for inflation through an inflation premium in the interest rate, utility shareholders receive compensation for inflation through an inflation premium in the allowed rate of return. Thus, utility company returns are sensitive to fluctuations in interest rates. Conventional betas do not capture this extra sensitivity to interest rates. This is because the market index typically used in estimating betas is a stock-only index, such as the S&P 500. A focus on stocks alone distorts the betas of regulated companies. The true risk of regulated utilities relative to other companies is understated because when interest rates change, the stocks of regulated companies react in the same way as bonds do. A nominal interest rate on the face value of a bond offers the same pattern of future cash flows as a nominal return applied on a book value rate base. Empirical studies of utility returns confirm that betas are higher when calculated in a way that captures interest rate sensitivity. *The use of adjusted betas compensates for the interest sensitivity of regulated companies.* (*italics added for emphasis)*[104]

Relative to statistical justification, Morin states:

> There is a statistical justification for the use of adjusted betas as well. High-estimated betas will tend to have positive error (overestimated) and low-estimated betas will tend to have negative error (underestimated). Therefore, it is necessary to squash the estimated betas in toward 1.00. One way to accomplish this is by

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103 Morin, at 81-82.
104 Morin, at 82.

> measuring the extent to which estimated betas tend to regress toward the mean over time. As a result of this beta drift, several commercial beta producers adjust their forecasted betas toward 1.00 in an effort to improve their forecasts. This adjustment, which is commonly performed by investment services such as Value Line, and Bloomberg, uses the formula:
>
> $$\beta_{adjusted} = 1.0 + a(\beta_{raw} - 1.0) \quad (4-3)$$
>
> where "a" is an estimate of the extent to which estimated betas regress toward the mean based on past data. Value Line and Bloomberg betas are adjusted for their long-term tendency to regress toward 1.0 by giving approximately 66% weight to the measured beta and approximately 34% weight to the prior value of 1.0 for each stock, that is, a = 0.66 in the above equation:
>
> $$\beta_{\text{adjusted}} = 1.0 + 0.66\,(\beta_{\text{raw}} - 1.0)$$
>
> $$= 0.33 + 0.66\,\beta_{\text{raw}} \quad (4\text{-}4)$$ [105]

Expected Market Risk Premiums for the Canadian and U.S. Markets

Given the cost of common equity is inherently forward-looking, it is important to ensure that the expected market return, and the associated MRP, likewise are prospective.

For the MRP, I use two measures using both Canadian and U.S. data. The first MRP is a regression analysis of historical monthly return data to calculate a projected MRP given a projected risk-free rate. The second MRP calculates a prospective market return using the DCF model then subtracts a projected risk-free rate to derive a projected MRP.

To derive the regression-based MRPs, I used historical monthly annualized returns of the large Canadian companies relative to long-term BoC bonds and monthly annualized returns of large U.S. companies relative to long-term Treasury bonds. I modelled the relationships between interest rates and the MRP using the observed monthly MRP as the dependant variable, and the monthly yield on the long-term government bond as the independent variable. I then used a linear OLS regression, in which the MRP is expressed as a function of the long-term government bond yield:

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[105] Morin, at 82-83.

$$RP = \alpha + \beta (R_f)$$

Given projected Canadian and U.S. long-term government bond yields of 3.21% and 4.20%, MRPs of 4.91% and 8.17% result.

To derive the projected MRPs, using data from Bloomberg, *Value Line,* and S&P Capital IQ, I calculated an expected total return[106] on the S&P TSX Composite and the S&P 500 by applying the constant-growth DCF model to the companies comprising each index. Using dividend yields as a proxy for income returns and long-term projected EPS growth rates as a proxy for capital appreciation, I calculated expected total returns on the Canadian and U.S. markets of 14.51% and 14.35%, respectively. Subtracting prospective Canadian and U.S. long-term government bond yields of 3.21% and 4.20% result in Canadian and U.S.-specific MRPs of 11.30% and 10.15%, respectively.

Averaging both measures of the MRP discussed above results in Canadian and U.S. MRPs of 8.11% and 9.16%, respectively.

Summary of CAPM Results

The indicated common equity cost rates for the proxy groups using the CAPM are shown on Tables 11 and 12, below:

Table 11: CAPM and ECAPM Results for the Canadian Utility Proxy Group[107]

	CAPM	ECAPM	Average
Mean	8.87%	9.48%	9.17%
Median	8.80%	9.43%	9.12%
Average	8.84%	9.46%	9.15%

Table 12: CAPM and ECAPM Results for the U.S. Water Utility Proxy Group[108]

	CAPM	ECAPM	Average
Mean	11.66%	12.09%	11.88%
Median	11.25%	11.78%	11.52%
Average	11.46%	11.94%	11.70%

106 Total returns to investors are comprised of both income returns (dividends) and capital appreciation.
107 *See*, Schedule 4, page 1.
108 *See*, Schedule 4, page 2.

iv. *Summary of Results of ROE Models Applied to the Proxy Groups*

The results of the application of the constant growth DCF model, the total market RPM, and the traditional and empirical CAPM to the U.S. Water Utility Proxy Group and Canadian Utility Proxy Group are summarized in Table 13, below.

Table 13: Summary of ROE Model Results

	Canadian Utility Proxy Group	U.S. Water Utility Proxy Group
Discounted Cash Flow Model	9.24%	10.00%
Risk Premium Model	10.81%	11.17%
Capital Asset Pricing Model	9.15%	11.70%

Based on the results of the ROE models applied to the U.S. and Canadian Utility Proxy Groups shown on Table 13, above, I recommend a range of ROEs between 10.00% and 11.70%, prior to the inclusion of a flotation cost adjustment.

VI. FLOTATION COST ADJUSTMENT

Flotation costs are part of capital costs, which are properly reflected on the balance sheet under “paid in capital” rather than current expenses on the income statement. Flotation costs are incurred over time, just as investments in rate base or debt issuance costs. As a result, the great majority of flotation costs are incurred prior to the test year, but remain part of the cost structure during the test year and beyond.

It is important to recognize flotation costs in the authorized return on equity because there is no other mechanism in the ratemaking paradigm through which such costs can be recovered. Because these costs are real and legitimate, recovery of these costs should be permitted. Moreover, models such as the RPM, DCF, and CAPM assume no transaction costs. Brigham and Daves confirm that point, providing the method used to calculate the flotation adjustment.[109] Morin also confirms the need for a flotation cost adjustment, even when no new issue is imminent.[110]

[109] Brigham, Eugene F. and Daves, Phillip R., Intermediate Financial Management, (Thomson-Southwestern, 2007), at 342.

[110] Morin, at 330-339.

In its review of the Company's 2017 – 2021 Filing, Grant Thornton noted that "[o]ther key elements in determining a fair return include the estimation of a risk free rate of return as well as estimate of the adjustment required for flotation cost and financial flexibility."[111]

Adding the 50-basis point flotation cost adjustment to the indicated range of ROEs attributable to the U.S. and Canadian Utility Proxy Groups of 10.00% to 11.70% results in a range of ROEs attributable to EWS of 10.50% to 12.20%. From this indicated range, I recommend an ROE of 10.80%. My recommendation also accounts for the fact that the Company is not requesting a continuation of its deferral account mechanism in its application.

VII. CAPITAL STRUCTURE AND COST OF LONG-TERM DEBT

The Company's requested capital structure, which approximates their actual capital structure, consists of 60.00% long-term debt at an embedded debt cost rate of 4.07% and 40.00% common equity is a reasonable capital structure for ratemaking purposes as it is in the lower end of the range of equity ratios maintained by the Canadian Utility and U.S. Water Utility Proxy Groups. The equity ratios of the Canadian Utility Proxy Group range from 32.23% to 45.0%, with an average of 38.32%,[112] and the equity ratios of the U.S. Water Utility Proxy Group range from 40.70% to 61.35%, with an average of 50.27%.[113]

The Company's requested 40.00% deemed equity ratio is consistent with their prior applications, which was not challenged by Grant Thornton in its 2016 review. As noted above regarding financial risk, the more leveraged a company is the higher the investor required ROE, as equity investors are last in line in the event of liquidation. If an equity ratio less than 40% is authorized, a corresponding increase in the ROE is warranted.

VIII. SUMMARY AND CONCLUSION

Based on the data and analyses discussed throughout this Report, I conclude that the ROE models applied to the U.S. and Canadian Utility Groups result in an ROE range of 10.00% to 11.70%.

[111] City of Edmonton, EPCOR Performance Based Regulation 2017-2021 Filing Review, Prepared by Grant Thornton LLP, at p. 127 (September 26, 2016)
[112] Page 1 of Schedule 5.
[113] Page 2 of Schedule 5.

Including the 50-basis point flotation cost adjustment, the adjusted range of ROEs applicable to EWS is 10.50% through 12.20%, and from that range, I recommend an ROE of 10.80%.

I also recommend that the deemed equity ratio applicable to EWS should remain at 40.00%. My ROE and deemed equity ratio recommendation takes into consideration market-based measures of investor expectations, and satisfies the comparable risk, capital attraction, and financial integrity standards that aligns with the Bylaws of the City of Edmonton, and which other regulatory jurisdictions in Canada and the U.S. are required by law to follow.

EPCOR Water Services Inc.
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Schedules to the Direct Testimony of Dylan W. D'Ascendis

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EPCOR Water Services Inc.
Recommended Capital Structure and Cost Rates
for Ratemaking Purposes

Type Of Capital	Ratios (1)	Cost Rate		Weighted Cost Rate
Long-Term Debt	60.00%	4.07%	(1)	2.44%
Common Equity	40.00%	10.80%	(2)	4.32%
Total	100.00%			6.76%

Notes:
(1) Company provided.
(2) From page 2 of this Schedule.

EPCOR Water Services Inc.
Brief Summary of Common Equity Cost Rate

Line No.	Principal Methods	Results based on Canadian Utility Proxy Group	Results based on U.S. Water Utility Proxy Group
1.	Discounted Cash Flow Model (DCF) (1)	9.24%	10.00%
2.	Risk Premium Model (RPM) (2)	10.81%	11.17%
3.	Capital Asset Pricing Model (CAPM) (3)	9.15%	11.70%
4.	Indicated Common Equity Cost Rate before Adjustment for Unique Risk	10.00% - 11.70%	
5,	Flotation Cost Adjustment	0.50%	
6.	Indicated Common Equity Cost Rate after Adjustment	10.50% - 12.20%	
7.	Recommended Common Equity Cost Rate	10.80%	

Notes:
(1) From page 1 of Schedule 2.
(2) From page 1 of Schedule 3.
(3) From page 1 of Schedule 4.

EPCOR Water Services Inc.
Summary of DCF Models for the
Proxy Groups

	Results based on Canadian Utility Proxy Group (1)	Results based on U.S. Water Utility Proxy Group (2)
DCF Result	9.24 %	10.00 %

Notes:
(1) From page 2 of this Schedule.
(2) From page 3 of this Schedule.

EPCOR Water Services Inc.
Indicated Common Equity Cost Rate Using the Discounted Cash Flow Model for the
Canadian Utility Proxy Group

Canadian Utility Proxy Group	[1] Average Dividend Yield (1)	[2] Value Line Projected Five Year Growth in EPS	[3] Zack's Five Year Projected Growth Rate in EPS	[4] Yahoo! Finance Projected Five Year Growth in EPS	[5] S&P Capital IQ Five Year Growth in EPS	[6] Average Projected Five Year Growth in EPS (2)	[7] Adjusted Dividend Yield (3)	[8] Indicated Common Equity Cost Rate (4)
Algonquin Power & Utilities Corporation	5.27 %	NA %	NA %	NMF %	NMF %	NA %	NA %	NA %
Canadian Utilities Ltd.	5.81	NA	NA	1.92	NMF	1.92	5.87	7.79
Emera Incorporated	5.87	10.50	NA	3.70	4.29	6.16	6.05	12.21
Fortis, Inc.	4.36	5.00	5.60	2.60	4.71	4.48	4.46	8.94
Hydro One Ltd.	3.00	NA	NA	5.75	6.11	5.93	3.09	9.02
							Average	9.49 %
							Median	8.98 %
							Average of Mean and Median	9.24 %

NA= Not Available
NMF=Not Meaningful Figure

Notes:

(1) Indicated dividend at 02/29/2024 divided by the average closing price of the last 60 trading days ending 02/29/2024 for each company.
(2) Average of columns 2 through 5 excluding negative growth rates.
(3) This reflects a growth rate component equal to one-half the conclusion of growth rate (from column 6) x column 1 to reflect the periodic payment of dividends (Gordon Model) as opposed to the continuous payment. Thus, for Canadian Utilities Ltd., 5.81% x (1+(1/2 x 1.92%)) = 5.87%.
(4) Column 6 + column 7.

Source of Information:

Value Line Investment Survey
www.zacks.com Downloaded on 02/29/2024
www.yahoo.com Downloaded on 02/29/2024
S&P Global Market Intelligence

EPCOR Water Services Inc.
Indicated Common Equity Cost Rate Using the Discounted Cash Flow Model for the
U.S. Water Utility Proxy Group

U.S. Water Utility Proxy Group	[1] Average Dividend Yield (1)	[2] Value Line Projected Five Year Growth in EPS	[3] Zack's Five Year Projected Growth Rate in EPS	[4] Yahoo! Finance Projected Five Year Growth in EPS	[5] S&P Capital IQ Five Year Growth in EPS	[6] Average Projected Five Year Growth in EPS (2)	[7] Adjusted Dividend Yield (3)	[8] Indicated Common Equity Cost Rate (4)
American States Water Company	2.21 %	6.50 %	6.30 %	4.40 %	14.00 %	7.80 %	2.30 %	10.10 %
American Water Works Company, Inc.	2.22	3.00	7.80	7.50	7.88	6.54	2.29	8.83
California Water Service Group	2.29	6.50	NA	10.80	8.00	8.43	2.39	10.82
Essential Utilities Inc.	3.37	7.50	5.60	5.20	6.10	6.10	3.47	9.57
Middlesex Water Company	2.14	5.00	NA	2.70	NA	3.85	2.18	6.03 (5)
SJW Group	2.55	8.00	7.50	7.50	7.00	7.50	2.65	10.15
							Average	9.89 %
							Median	10.10 %
	NA= Not Available						Average of Mean and Median	10.00 %

Notes:

(1) Indicated dividend at 02/29/2024 divided by the average closing price of the last 60 trading days ending 02/29/2024 for each company.
(2) Average of columns 2 through 5 excluding negative growth rates.
(3) This reflects a growth rate component equal to one-half the conclusion of growth rate (from column 6) x column 1 to reflect the periodic payment of dividends (Gordon Model) as opposed to the continuous payment. Thus, for American States Water Company, 2.21% x (1+(1/2 x 7.80%)) = 2.30%.
(4) Column 6 + column 7.
(5) Result omitted due to its result being more than two standard deviations away from the mean value.

Source of Information:

Value Line Investment Survey
www.zacks.com Downloaded on 02/29/2024
www.yahoo.com Downloaded on 02/29/2024
S&P Global Market Intelligence

EPCOR Water Services Inc.
Indicated Common Equity Cost Rate
Through Use of a Risk Premium Model
Using an Adjusted Total Market Approach

Line No.		Canadian Utility Proxy Group		U.S. Water Utility Proxy Group	
1.	Prospective Yield on U.S. Aaa Rated Corporate Bonds (1)	4.90	%	4.90	%
2.	Adjustment to Reflect Yield Spread Between Aaa Rated Corporate Bonds and A/A2 Rated Public Utility Bonds	(0.22)	(2)	0.61	(3)
3.	Adjusted Prospective Yield on A/A2 Rated Public Utility Bonds	4.68	%	5.51	%
4.	Adjustment to Reflect Bond Rating Difference of Proxy Group	0.17	(4)	0.08	(5)
5.	Adjusted Prospective Bond Yield	4.85	%	5.59	%
6.	Equity Risk Premium (6)	5.96		5.58	
7.	Risk Premium Derived Common Equity Cost Rate	10.81	%	11.17	%

Notes:
(1) Consensus forecast of Moody's Aaa Rated U.S. Corporate bonds from Blue Chip Financial Forecasts.
(2) The average yield spread of A rated Canadian Public Utility Bonds over Aaa rated U.S. corporate bonds of -0.22% from page 2 of this Schedule.
(3) The average yield spread of A2 rated U.S. Public Utility Bonds over Aaa rated U.S. corporate bonds of 0.61% from page 2 of this Schedule.
(4) Adjustment to reflect the A3 Moody's LT issuer rating of the Canadian Utility Proxy Group as shown on page 3 of this Schedule. The upward adjustment is derived by taking 1/3 of the spread between Canadian A and BBB Public Utility Bonds of 0.51% from page 2 of this Schedule.
(5) Adjustment to reflect the A3 Moody's LT issuer rating of the U.S. Water Utility Proxy Group as shown on page 4 of this Schedule. The upward adjustment is derived by taking 1/3 of the spread between U.S. A2 and Baa2 Public Utility Bonds of 0.24% from page 2 of this
(6) From page 6 of this Schedule.

EPCOR Water Services Inc.
Interest Rates and Bond Spreads for
Moody's Corporate and Public Utility Bonds

Selected Bond Yields

	[1] BBB Rated Canadian Public Utility Bond	[2] A Rated Canadian Public Utility Bond	[3] A Rated Canadian Corporate Bond	[4] AA Rated Canadian Corporate Bond	[5] Baa2 Rated U.S. Public Utility Bond	[6] A2 Rated U.S. Public Utility Bond	[7] Aaa Rated U.S. Corporate Bond
Feb-2024	5.27 %	4.75 %	4.77 %	4.72 %	5.79 %	5.56 %	5.03 %
Jan-2024	5.23	4.73	4.75	4.65	5.73	5.48	4.87
Dec-2023	5.02	4.51	4.53	4.45	5.68	5.42	4.74
Average	5.17 %	4.66 %	4.68 %	4.61 %	5.73 %	5.49 %	4.88 %

Selected Bond Spreads

Canadian A Rated Public Utility Bonds Over U.S. Aaa Rated Corporate Bonds:
(0.22) % (1)

U.S. A2 Rated Public Utility Bonds Over U.S. Aaa Rated Corporate Bonds:
0.61 % (2)

Canadian BBB Rated Public Utility Bonds Over Canadian A Rated Public Utility Bonds:
0.51 % (3)

U.S. Baa2 Rated Public Utility Bonds Over U.S. A2 Rated Public Utility Bonds:
0.24 % (4)

Canadian A Rated Corporate Bonds Over U.S. Aaa Rated Corporate Bonds:
(0.20) % (5)

Canadian AA Rated Corporate Bonds Over U.S. Aaa Rated Corporate Bonds:
(0.27) % (6)

Notes:
(1) Column [2] - Column [7].
(2) Column [6] - Column [7].
(3) Column [1] - Column [2].
(4) Column [5] - Column [6].
(5) Column [3] - Column [7].
(6) Column [4] - Column [7].

Source of Information:
Bloomberg Professional Service

EPCOR Water Services Inc.
Comparison of Long-Term Issuer Ratings for
Canadian Utility Proxy Group

	Moody's		Standard & Poor's	
	Long-Term Issuer Rating February 2024		Long-Term Issuer Rating February 2024	
Canadian Utility Proxy Group	Long-Term Issuer Rating (1)	Numerical Weighting (2)	Long-Term Issuer Rating (1)	Numerical Weighting (2)
Algonquin Power & Utilities Corporation	Baa1/Baa2	8.5	BBB	9.0
Canadian Utilities Ltd.	NR	- -	BBB+	8.0
Emera Incorporated	A3	7.0	BBB	9.0
Fortis, Inc.	A3	7.0	BBB+	8.0
Hydro One Ltd.	A3	7.0	A-	7.0
Average	A3	7.4	BBB+	8.2

Notes:
(1) Ratings are that of the average of each company's regulated operating subsidiaries.
(2) From page 5 of this Schedule.

Source Information: Moody's Investors Service
Standard & Poor's Global Utilities Rating Service

EPCOR Water Services Inc.
Comparison of Long-Term Issuer Ratings for
U.S. Water Utility Proxy Group

	Moody's		Standard & Poor's	
	Long-Term Issuer Rating February 2024		Long-Term Issuer Rating February 2024	
U.S. Water Utility Proxy Group	Long-Term Issuer Rating (1)	Numerical Weighting (2)	Long-Term Issuer Rating (1)	Numerical Weighting (2)
American States Water Company	A2	6.0	A+	5.0
American Water Works Company, Inc.	A3	7.0	A	6.0
California Water Service Group	NR	- -	A+	5.0
Essential Utilities Inc.	Baa1	8.0	A	6.0
Middlesex Water Company	NR	- -	A	6.0
SJW Group	NR	- -	A-	7.0
Average	A3	7.0	A	5.8

Notes:
(1) Ratings are that of the average of each company's regulated operating subsidiaries.
(2) From page 5 of this Schedule.

Source Information: Moody's Investors Service
Standard & Poor's Global Utilities Rating Service

Numerical Assignment for
Moody's and Standard & Poor's Bond Ratings

Moody's Bond Rating	Numerical Bond Weighting	Standard & Poor's Bond Rating
Aaa	1	AAA
Aa1	2	AA+
Aa2	3	AA
Aa3	4	AA-
A1	5	A+
A2	6	A
A3	7	A-
Baa1	8	BBB+
Baa2	9	BBB
Baa3	10	BBB-
Ba1	11	BB+
Ba2	12	BB
Ba3	13	BB-
B1	14	B+
B2	15	B
B3	16	B-

EPCOR Water Services Inc.
Judgment of Equity Risk Premium for the
Proxy Groups

Line No.		Canadian Utility Proxy Group	U.S. Water Utility Proxy Group
1.	Calculated equity risk premium based on the total market using the beta approach (1)	6.92 %	7.56 %
2.	Mean equity risk premium based on a study using the holding period returns of public utilities with A/A2 rated bonds (2)	5.68	4.85
3.	Predicted Equity Risk Premium Based on Regression Analysis of Past Fully-Litigated Gas and Electric Cases using Canadian Prospective A Rated Utility Bond (3)	5.28	NA
4.	Predicted Equity Risk Premium Based on Regression Analysis of Past Fully Litigated Water Cases using U.S. Prospective A2 Rated Utility Bond (4)	NA	4.34
5.	Average equity risk premium	5.96 %	5.58 %

Notes: (1) From page 7 of this Schedule.
(2) From page 8 of this Schedule.
(3) From page 9 of this Schedule.
(4) From page 10 of this Schedule.

EPCOR Water Services Inc.
Derivation of Equity Risk Premium Based on the Total Market Approach
Using the Beta for the
Proxy Groups

Line No.	Equity Risk Premium Measure	Canadian Utility Proxy Group	U.S. Water Utility Proxy Group
1.	Projected Total Return - TSX and S&P 500 (1)	14.51 %	14.35 %
2.	Consensus Forecast Aa/Aaa Corporate Bonds	4.63 % (2)	4.90 % (3)
3.	Equity Risk Premium Based on Bloomberg TSX and S&P 500 Companies	9.88 %	9.45 %
4.	Adjusted Beta (4)	0.70	0.80
5.	Forecasted Equity Risk Premium (5)	6.92 %	7.56 %

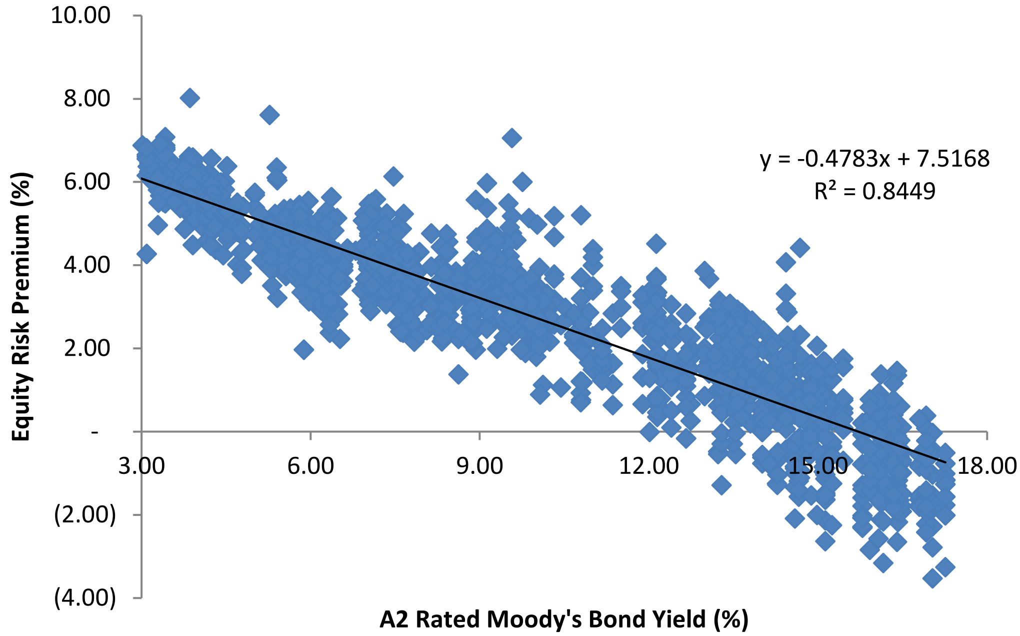
Notes:
(1) Source: Bloomberg Professional Service, Value Line, and S&P Global Market Inteligence.
(2) Calculated as the Prospective Yield on U.S. Aaa Rated Corporate Bonds from page 1 of this Schedule less the spread between U.S. Aaa Rated Corporate Bonds and Canadian Aa Rated Corporate Bonds from Page 2 of this Schedule.
(3) From line 1 of page 1 of this Schedule.
(4) Average of mean and median beta from Schedule 4, pages 1 and 2, respectively.
(5) Line 3 x Line 4.

EPCOR Water Services Inc.
Derivation of Mean Equity Risk Premium Based Studies
Using Holding Period Returns and
Projected Market Appreciation of the S&P Utility Index

Line No.		Results based on Canadian Inputs			Results based on U.S. Inputs	
1.	Projected Total Return on the S&P/TSX Capped Utilities Index and S&P Utilities Index (1)	10.36	%	(2)	10.36	%
2.	Expected A/A2 rated public utility bond yield (3)	4.68			5.51	
3.	Forecasted Equity Risk Premium	5.68	%		4.85	%

Notes:
(1) Source: Bloomberg Professional Service, Value Line, and S&P Global Market Inteligence.
(2) Used S&P Utilities Index because TSX Capped Utilities Index exceeded the required ROE for the TSX.
(3) Calculated on line 3 of page 1 of this Schedule.

EPCOR Water Services Inc.
Prediction of Equity Risk Premiums Relative to
Moody's A2 Rated Utility Bond Yields - Electric and Gas Utilities



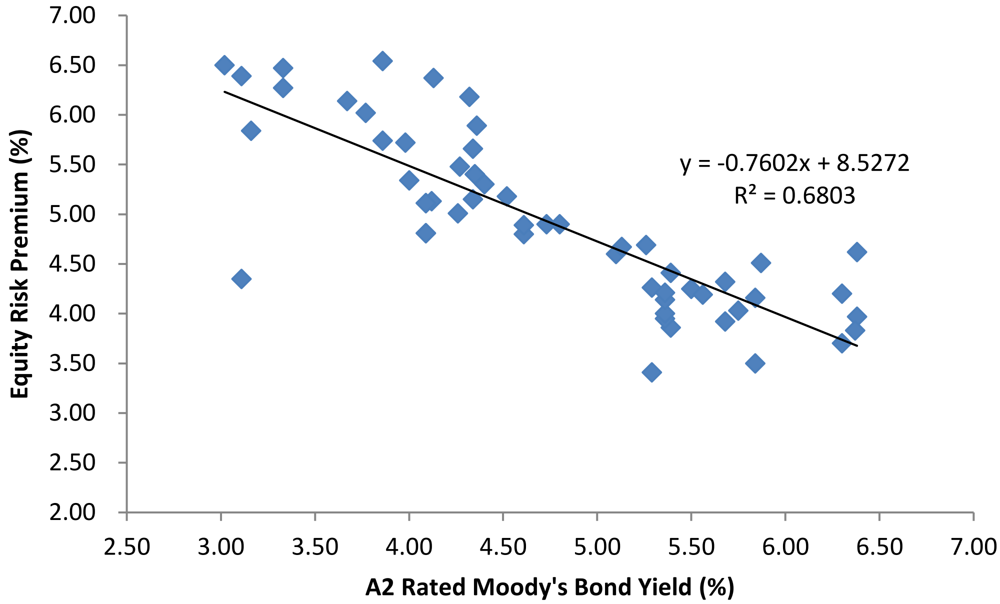
Constant	Slope	Canadian Prospective A Rated Utility Bond (1)	Canadian Prospective Equity Risk Premium
7.5168 %	-0.4783 %	4.68 %	5.28 %

Notes:

(1) From line 3 of page 1 of this Schedule.

Source of Information: Regulatory Research Associates.

EPCOR Water Services Inc.
Prediction of Equity Risk Premiums Relative to
Moody's A2 Rated Utility Bond Yields - Water Utilities



Constant	Slope	U.S. Prospective A2 Rated Utility Bond (1)	U.S. Prospective Equity Risk Premium
8.5272 %	-0.7602 %	5.51 %	4.34 %

Notes:
(1) From line 3 of page 1 of this Schedule.

Source of Information: Regulatory Research Associates.

EPCOR Water Services Inc.
Indicated Common Equity Cost Rate Through Use
of the Traditional Capital Asset Pricing Model (CAPM) and Empirical Capital Asset Pricing Model (ECAPM)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Canadian Utility Proxy Group	Value Line Adjusted Beta	Bloomberg Adjusted Beta	Average Beta	Market Risk Premium (1)	Risk-Free Rate (2)	Traditional CAPM Cost Rate	ECAPM Cost Rate	Indicated Common Equity Cost Rate (3)
Algonquin Power & Utilities Corporation	0.75	0.90	0.83	8.11 %	3.21 %	9.94 %	10.28 %	10.11 %
Canadian Utilities Ltd.	0.73	0.66	0.69	8.11	3.21	8.80	9.43	9.12
Emera Incorporated	0.75	0.68	0.71	8.11	3.21	8.97	9.55	9.26
Fortis, Inc.	0.70	0.59	0.65	8.11	3.21	8.48	9.19	8.83
Hydro One Ltd.	0.60	0.61	0.61	8.11	3.21	8.15	8.95	8.55
Mean			0.70			8.87 %	9.48 %	9.17 %
Median			0.69			8.80 %	9.43 %	9.12 %
Average of Mean and Median			0.70			8.84 %	9.46 %	9.15 %

Notes on page 3 of this Schedule.

EPCOR Water Services Inc.
Indicated Common Equity Cost Rate Through Use
of the Traditional Capital Asset Pricing Model (CAPM) and Empirical Capital Asset Pricing Model (ECAPM)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
U.S. Water Utility Proxy Group	Value Line Adjusted Beta	Bloomberg Adjusted Beta	Average Beta	Market Risk Premium (1)	Risk-Free Rate (2)	Traditional CAPM Cost Rate	ECAPM Cost Rate	Indicated Common Equity Cost Rate (3)
American States Water Company	0.70	0.74	0.72	9.16 %	4.20 %	10.79 %	11.44 %	11.12 %
American Water Works Company, Inc.	0.95	0.99	0.97	9.16	4.20	13.08	13.15	13.12
California Water Service Group	0.75	0.75	0.75	9.16	4.20	11.07	11.64	11.36
Essential Utilities Inc.	1.00	0.82	0.91	9.16	4.20	12.53	12.74	12.64
Middlesex Water Company	0.75	0.76	0.76	9.16	4.20	11.16	11.71	11.44
SJW Group	0.85	0.70	0.78	9.16	4.20	11.34	11.85	11.60
Mean			0.82			11.66 %	12.09 %	11.88 %
Median			0.77			11.25 %	11.78 %	11.52 %
Average of Mean and Median			0.80			11.46 %	11.94 %	11.70 %

Notes on page 3 of this Schedule.

EPCOR Water Services Inc.
Notes to Accompany the Application of the CAPM and ECAPM

Notes:

(1) The market risk premium (MRP) is derived as illustrated below:

	Canada		U.S.	
Measure 1: Application of a Regression Analysis to Historical Data (1926-2023)	4.91	%	8.17	%
Measure 2: Bloomberg, Value Line, and S&P Global Market Inteligence Projected MRP				
Total return on the Market based on the TSX (Canada) and S&P 500 (U.S.):	14.51	%	14.35	%
Projected Risk-Free Rate (see note 2):	3.21		4.20	
	11.30	%	10.15	%
Average MRP:	8.11	%	9.16	%

(2) For reasons explained in the Report, the appropriate risk-free rate for cost of capital purposes is the average forecast of 30 year Government of Canada Bonds and U.S. Treasury Bonds. The projection of the risk-free rate is illustrated below:

Canada

	BMO	CIBC	National Bank	RBC	Scotia	TD	Average	
2024Q1	3.30	3.40	3.40	3.35	3.40	3.20	3.34	%
2024Q2	3.25	3.40	3.30	3.25	3.30	3.15	3.28	
2024Q3	3.25	3.30	3.20	3.15	3.25	3.15	3.22	
2024Q4	3.20	3.25	3.05	3.05	3.35	3.15	3.18	
2025Q1	3.20	NA	3.10	2.90	3.45	3.15	3.16	
2025Q2	3.15	3.10	3.10	2.95	3.50	3.15	3.16	
2025Q3	3.15	NA	3.10	3.05	3.50	3.15	3.19	
2025Q4	3.10	3.05	3.10	3.10	3.50	3.15	3.17	
							3.21	%

U.S.

	U.S.	
First Quarter 2024	4.40	%
Second Quarter 2024	4.30	
Third Quarter 2024	4.20	
Fourth Quarter 2024	4.20	
First Quarter 2025	4.10	
Second Quarter 2025	4.10	
2025-2029	4.10	
2030-2034	4.20	
	4.20	%

(3) Average of Column 6 and Column 7.

Sources of Information:

BMO Rates Scenario, February 2024. Q1 2024 data uses the average of February and March forecast.
CIBC Capital Markets Economic Insights, February 2024. Q1 2024 data uses the average of February and March forecast.
National Bank of Canada Monthly Economic Monitor, February 2024. Only annual forecast available for 2025 which is applied to each quarter.
RBC Financial Markets Monthly, February 2024.
Scotiabank Forecast Tables, February 2024.
TD Economics Latest Forecast Tables January 2024.
Blue Chip Financial Forecasts December 1, 2023 and March 1, 2024.
Stocks, Bonds, Bills, and Inflation - 2023 SBBI Yearbook, Appendix A Tables, Kroll, Inc.
Bloomberg Professional Services, Value Line, and S&P Global Market Inteligence Projected MRP.

EPCOR Water Services Inc.
Capital Structures for Fiscal Year 2022
for the Canadian Utility Proxy Group

	2022	
Algonquin Power & Utilities Corporation		
Long-Term Debt	59.11	%
Preferred Stock	1.44	
Common Equity	39.44	
Total Capital	100.00	%
Canadian Utilities Ltd.		
Long-Term Debt	58.23	%
Preferred Stock	9.54	
Common Equity	32.23	
Total Capital	100.00	%
Emera Incorporated		
Long-Term Debt	58.91	%
Preferred Stock	5.11	
Common Equity	35.98	
Total Capital	100.00	%
Fortis, Inc.		
Long-Term Debt	57.79	%
Preferred Stock	3.26	
Common Equity	38.95	
Total Capital	100.00	%
Hydro One Ltd.		
Long-Term Debt	55.00	%
Preferred Stock	0.00	
Common Equity	45.00	
Total Capital	100.00	%
Average		
Long-Term Debt	57.81	%
Preferred Stock	3.87	
Common Equity	38.32	
Total Capital	100.00	%

Source of Information
Annual Forms 10-K

EPCOR Water Services Inc.
Capital Structures for Fiscal Year 2022
for the U.S. Water Utility Proxy Group

	2022	
American States Water Company		
Long-Term Debt	38.65	%
Preferred Stock	0.00	
Common Equity	61.35	
Total Capital	100.00	%
American Water Works Company, Inc.		
Long-Term Debt	59.29	%
Preferred Stock	0.02	
Common Equity	40.70	
Total Capital	100.00	%
California Water Service Group		
Long-Term Debt	44.39	%
Preferred Stock	0.00	
Common Equity	55.61	
Total Capital	100.00	%
Essential Utilities Inc.		
Long-Term Debt	54.99	%
Preferred Stock	0.00	
Common Equity	45.01	
Total Capital	100.00	%
Middlesex Water Company		
Long-Term Debt	43.33	%
Preferred Stock	0.29	
Common Equity	56.37	
Total Capital	100.00	%
SJW Group		
Long-Term Debt	57.39	%
Preferred Stock	0.00	
Common Equity	42.61	
Total Capital	100.00	%
Average		
Long-Term Debt	49.67	%
Preferred Stock	0.05	
Common Equity	50.27	
Total Capital	100.00	%

Source of Information
Annual Forms 10-K

Summary

Dylan is an experienced consultant and has been awarded the professional designations of Certified Rate of Return Analyst (CRRA) and Certified Valuation Analyst (CVA). Dylan joined ScottMadden in 2016 and is a leading expert witness with respect to cost of capital, capital structure, and valuation. He has served as a consultant for investor-owned and municipal utilities and authorities for 15 years. Dylan has testified as an expert witness on over 150 occasions regarding rate of return, cost of service, rate design, and valuation before more than 40 regulatory jurisdictions in the United States and Canada, an American Arbitration Association panel, and the Superior Court of Rhode Island. He also maintains the benchmark index against which the Hennessy Gas Utility Mutual Fund performance is measured. Dylan holds a B.A. in economic history from the University of Pennsylvania and an M.B.A. with concentrations in finance and international business from Rutgers University.

Areas of Specialization

- Expert Witness Testimony
- Rates and Regulation
- Return on Equity
- Valuation
- Utility Regulations
- Rate Case Planning, Management, and Support
- Utility Benchmarking

Recent Articles and Speeches

- “Decoupling, Risk Impacts, and the Cost of Capital.” Co-authored with Richard A. Michelfelder, Ph.D., Rutgers University and Pauline M. Ahern. The Electricity Journal. March 2020
- “Decoupling Impact and Public Utility Conservation Investment.” Co-authored with Richard A. Michelfelder, Ph.D., Rutgers University and Pauline M. Ahern. Energy Policy Journal. 130 (2019), 311-319
- “Establishing Alternative Proxy Groups.” Presentation before the Society of Utility and Regulatory Financial Analysts: 51st Financial Forum. April 4, 2019. New Orleans, LA
- “Past Is Prologue: Future Test Year.” Presentation before the National Association of Water Companies 2017 Southeast Water Infrastructure Summit. May 2, 2017. Savannah, GA
- “Comparative Evaluation of the Predictive Risk Premium Model™, the Discounted Cash Flow Model and the Capital Asset Pricing Model.” Co-authored with Richard A. Michelfelder, Ph.D., Rutgers University, Pauline M. Ahern, and Frank J. Hanley. The Electricity Journal. May 2013
- “Decoupling: Impact on the Risk and Cost of Common Equity of Public Utility Stocks.” Presentation before the Society of Utility and Regulatory Financial Analysts: 45th Financial Forum. April 17-18, 2013. Indianapolis, IN

Recent Assignments

- Provided expert testimony on the cost of capital for ratemaking purposes before numerous state utility regulatory agencies
- Maintains the benchmark index against which the Hennessy Gas Utility Mutual Fund performance is measured
- Sponsored valuation testimony for a large municipal water company in front of an American Arbitration Association Board to justify the reasonability of their lease payments to the city
- Co-authored a valuation report on behalf of a large investor-owned utility in response to a new state regulation which allowed the appraised value of acquired assets into rate base

Sponsor	Date	Case/Applicant	Docket No.	Subject
Regulatory Commission of Alaska				
Alaska Power Company	08/23	Alaska Power Company	Docket No. TA 909-2 / U-23-054	Capital Structure
ENSTAR Natural Gas Company	08/22	ENSTAR Natural Gas Company	Docket No. TA334-4	Rate of Return
Cook Inlet Natural Gas Storage Alaska, LLC	07/21	Cook Inlet Natural Gas Storage Alaska, LLC	Docket No. TA45-733	Capital Structure
Alaska Power Company	09/20	Alaska Power Company; Goat Lake Hydro, Inc.; BBL Hydro, Inc.	Tariff Nos. TA886-2; TA6-521; TA4-573	Capital Structure
Alaska Power Company	07/16	Alaska Power Company	Docket No. TA857-2	Rate of Return
Alberta Utilities Commission				
AltaLink, L.P., and EPCOR Distribution & Transmission, Inc.	02/23	AltaLink, L.P., and EPCOR Distribution & Transmission, Inc.	Proceeding ID. 27084	Determination of Cost-of-Capital Parameters
AltaLink, L.P., and EPCOR Distribution & Transmission, Inc.	01/20	AltaLink, L.P., and EPCOR Distribution & Transmission, Inc.	2021 Generic Cost of Capital, Proceeding ID. 24110	Rate of Return
Arizona Corporation Commission				
Foothills Water & Sewer, LLC	10/23	Foothills Water & Sewer, LLC	Docket No. WS-21182A-23-0292	Rate of Return and Fair Value Rate Base
Arizona Water Company	12/22	Arizona Water Company – Eastern Group	Docket No. W-01445A-22-0286	Rate of Return
EPCOR Water Arizona, Inc.	08/22	EPCOR Water Arizona, Inc.	Docket No. WS-01303A-22-0236	Rate of Return
EPCOR Water Arizona, Inc.	06/20	EPCOR Water Arizona, Inc.	Docket No. WS-01303A-20-0177	Rate of Return
Arizona Water Company	12/19	Arizona Water Company – Western Group	Docket No. W-01445A-19-0278	Rate of Return
Arizona Water Company	08/18	Arizona Water Company – Northern Group	Docket No. W-01445A-18-0164	Rate of Return
Arkansas Public Service Commission				
Summit Utilities Arkansas, Inc.	01/24	Summit Utilities Arkansas, Inc.	Docket No. 23-079-U	Rate of Return
Southwestern Electric Power Co.	07/21	Southwestern Electric Power Co.	Docket No. 21-070-U	Return on Equity
CenterPoint Energy Resources Corp.	05/21	CenterPoint Arkansas Gas	Docket No. 21-004-U	Return on Equity
California Public Utilities Commission				
San Gabriel Valley Water Company	05/23	San Gabriel Valley Water Company	Docket No. A23-05-001	Return on Equity
Colorado Public Utilities Commission				
Atmos Energy Corporation	08/22	Atmos Energy Corporation	Docket No. 22AL-0348G	Rate of Return
Summit Utilities, Inc.	04/18	Colorado Natural Gas Company	Docket No. 18AL-0305G	Rate of Return
Atmos Energy Corporation	06/17	Atmos Energy Corporation	Docket No. 17AL-0429G	Rate of Return
Commission of the Canada Energy Regulator				
Trans-Northern Pipelines Inc.	11/22	Trans-Northern Pipelines Inc.	Docket No. C-22197	Cost of Capital
Delaware Public Service Commission				
Artesian Water Company, Inc.	04/23	Artesian Water Company, Inc.	Docket No. 23-0601	Rate of Return
Delmarva Power & Light Co.	12/22	Delmarva Power & Light Co.	Docket No. 22-0897 (Electric)	Return on Equity
Delmarva Power & Light Co.	01/22	Delmarva Power & Light Co.	Docket No. 22-002 (Gas)	Return on Equity
Delmarva Power & Light Co.	11/20	Delmarva Power & Light Co.	Docket No. 20-0149 (Electric)	Return on Equity
Delmarva Power & Light Co.	10/20	Delmarva Power & Light Co.	Docket No. 20-0150 (Gas)	Return on Equity

Sponsor	Date	Case/Applicant	Docket No.	Subject
Tidewater Utilities, Inc.	11/13	Tidewater Utilities, Inc.	Docket No. 13-466	Capital Structure
Public Service Commission of the District of Columbia				
Washington Gas Light Company	04/22	Washington Gas Light Company	Formal Case No. 1169	Rate of Return
Washington Gas Light Company	09/20	Washington Gas Light Company	Formal Case No. 1162	Rate of Return
Federal Energy Regulatory Commission				
LS Power Grid California, LLC	10/20	LS Power Grid California, LLC	Docket No. ER21-195-000	Rate of Return
Florida Public Service Commission				
Tampa Electric Company	04/24	Tampa Electric Company	Docket No. 20240025-EI	Return on Equity
Peoples Gas System, Inc.	04/23	Peoples Gas System, Inc.	Docket No. 20230023-GU	Rate of Return
Tampa Electric Company	04/21	Tampa Electric Company	Docket No. 20210034-EI	Return on Equity
Peoples Gas System, Inc.	09/20	Peoples Gas System, Inc.	Docket No. 20200051-GU	Rate of Return
Utilities, Inc. of Florida	06/20	Utilities, Inc. of Florida	Docket No. 20200139-WS	Rate of Return
Hawaii Public Utilities Commission				
Launiupoko Irrigation Company, Inc.	12/20	Launiupoko Irrigation Company, Inc.	Docket No. 2020-0217 / Transferred to 2020-0089	Capital Structure
Lanai Water Company, Inc.	12/19	Lanai Water Company, Inc.	Docket No. 2019-0386	Cost of Service / Rate Design
Manele Water Resources, LLC	08/19	Manele Water Resources, LLC	Docket No. 2019-0311	Cost of Service / Rate Design
Kaupulehu Water Company	02/18	Kaupulehu Water Company	Docket No. 2016-0363	Rate of Return
Aqua Engineers, LLC	05/17	Puhi Sewer & Water Company	Docket No. 2017-0118	Cost of Service / Rate Design
Hawaii Resources, Inc.	09/16	Laie Water Company	Docket No. 2016-0229	Cost of Service / Rate Design
Illinois Commerce Commission				
Aqua Illinois, Inc.	01/24	Aqua Illinois, Inc.	Docket No. 24-0044	Rate of Return
Ameren Illinois Company d/b/a Ameren Illinois	01/23	Ameren Illinois Company d/b/a Ameren Illinois	Docket No. 23-0082 (Electric)	Return on Equity
Ameren Illinois Company d/b/a Ameren Illinois	01/23	Ameren Illinois Company d/b/a Ameren Illinois	Docket No. 23-0067 (Gas)	Return on Equity
Utility Services of Illinois, Inc.	02/21	Utility Services of Illinois, Inc.	Docket No. 21-0198	Rate of Return
Ameren Illinois Company d/b/a Ameren Illinois	07/20	Ameren Illinois Company d/b/a Ameren Illinois	Docket No. 20-0308	Return on Equity
Utility Services of Illinois, Inc.	11/17	Utility Services of Illinois, Inc.	Docket No. 17-1106	Cost of Service / Rate Design
Aqua Illinois, Inc.	04/17	Aqua Illinois, Inc.	Docket No. 17-0259	Rate of Return
Utility Services of Illinois, Inc.	04/15	Utility Services of Illinois, Inc.	Docket No. 14-0741	Rate of Return
Indiana Utility Regulatory Commission				
Aqua Indiana, Inc.	03/16	Aqua Indiana, Inc. Aboite Wastewater Division	Docket No. 44752	Rate of Return
Twin Lakes, Utilities, Inc.	08/13	Twin Lakes, Utilities, Inc.	Docket No. 44388	Rate of Return
Kansas Corporation Commission				
Atmos Energy Corporation	07/19	Atmos Energy Corporation	19-ATMG-525-RTS	Rate of Return
Kentucky Public Service Commission				
Bluegrass Water Utility Operating Company	02/23	Bluegrass Water Utility Operating Company	2022-00432	Return on Equity
Atmos Energy Corporation	07/22	Atmos Energy Corporation	2022-00222	PRP Rider Rate
Water Service Corporation of KY	06/22	Water Service Corporation of KY	2022-00147	Rate of Return

Sponsor	Date	Case/Applicant	Docket No.	Subject
Atmos Energy Corporation	07/21	Atmos Energy Corporation	2021-00304	PRP Rider Rate
Atmos Energy Corporation	06/21	Atmos Energy Corporation	2021-00214	Rate of Return
Duke Energy Kentucky, Inc.	06/21	Duke Energy Kentucky, Inc.	2021-00190	Return on Equity
Bluegrass Water Utility Operating Company	10/20	Bluegrass Water Utility Operating Company	2020-00290	Return on Equity
Louisiana Public Service Commission				
Utilities, Inc. of Louisiana	05/21	Utilities, Inc. of Louisiana	Docket No. U-36003	Rate of Return
Southwestern Electric Power Company	12/20	Southwestern Electric Power Company	Docket No. U-35441	Return on Equity
Atmos Energy Corporation	04/20	Atmos Energy Corporation	Docket No. U-35535	Rate of Return
Louisiana Water Service, Inc.	06/13	Louisiana Water Service, Inc.	Docket No. U-32848	Rate of Return
Maine Public Utilities Commission				
Northern Utilities, Inc. d/b/a Unitil	05/23	Northern Utilities, Inc. d/b/a Unitil	Docket No. 2023-00051	Return on Equity
Summit Natural Gas of Maine, Inc.	03/22	Summit Natural Gas of Maine, Inc.	Docket No. 2022-00025	Rate of Return
The Maine Water Company	09/21	The Maine Water Company	Docket No. 2021-00053	Rate of Return
Maryland Public Service Commission				
Washington Gas Light Company	05/23	Washington Gas Light Company	Case No. 9704	Rate of Return
FirstEnergy Service Company	03/23	Potomac Edison Company	Case No. 9695	Rate of Return
Washington Gas Light Company	08/20	Washington Gas Light Company	Case No. 9651	Rate of Return
FirstEnergy Corporation	08/18	Potomac Edison Company	Case No. 9490	Rate of Return
Massachusetts Department of Public Utilities				
Unitil Corporation	9/23	Fitchburg Gas & Electric Co. (Elec.)	D.P.U. 23-80	Rate of Return
Unitil Corporation	9/23	Fitchburg Gas & Electric Co. (Gas)	D.P.U. 23-81	Rate of Return
Unitil Corporation	12/19	Fitchburg Gas & Electric Co. (Elec.)	D.P.U. 19-130	Rate of Return
Unitil Corporation	12/19	Fitchburg Gas & Electric Co. (Gas)	D.P.U. 19-131	Rate of Return
Liberty Utilities	07/15	Liberty Utilities d/b/a New England Natural Gas Company	D.P.U. 15-75	Rate of Return
Minnesota Public Utilities Commission				
Northern States Power Company	11/01	Northern States Power Company	Docket No. G002/GR-21-678	Return on Equity
Northern States Power Company	10/21	Northern States Power Company	Docket No. E002/GR-21-630	Return on Equity
Northern States Power Company	11/20	Northern States Power Company	Docket No. E002/GR-20-723	Return on Equity
Mississippi Public Service Commission				
Great River Utility Operating Co.	07/22	Great River Utility Operating Co.	Docket No. 2022-UN-86	Rate of Return
Atmos Energy Corporation	03/19	Atmos Energy Corporation	Docket No. 2015-UN-049	Capital Structure
Atmos Energy Corporation	07/18	Atmos Energy Corporation	Docket No. 2015-UN-049	Capital Structure
Missouri Public Service Commission				
Confluence Rivers Utility Operating Company, Inc.	01/23	Confluence Rivers Utility Operating Company, Inc.	Case No. WR-2023-0006/SR-2023-0007	Rate of Return
Spire Missouri, Inc.	12/20	Spire Missouri, Inc.	Case No. GR-2021-0108	Return on Equity
Indian Hills Utility Operating Company, Inc.	10/17	Indian Hills Utility Operating Company, Inc.	Case No. SR-2017-0259	Rate of Return
Raccoon Creek Utility Operating Company, Inc.	09/16	Raccoon Creek Utility Operating Company, Inc.	Case No. SR-2016-0202	Rate of Return
Public Utilities Commission of Nevada				
Southwest Gas Corporation	09/23	Southwest Gas Corporation	Docket No. 23-09012	Return on Equity
Southwest Gas Corporation	09/21	Southwest Gas Corporation	Docket No. 21-09001	Return on Equity
Southwest Gas Corporation	08/20	Southwest Gas Corporation	Docket No. 20-02023	Return on Equity

Sponsor	Date	Case/Applicant	Docket No.	Subject
New Hampshire Public Utilities Commission				
Aquarion Water Company of New Hampshire, Inc.	12/20	Aquarion Water Company of New Hampshire, Inc.	Docket No. DW 20-184	Rate of Return
New Jersey Board of Public Utilities				
New Jersey Natural Gas Company	01/24	New Jersey Natural Gas Company	Docket No. GR24010071	Rate of Return
Middlesex Water Company	05/23	Middlesex Water Company	Docket No. WR23050292	Rate of Return
FirstEnergy Service Company	03/23	Jersey Central Power & Light Co.	Docket No. ER23030144	Rate of Return
Atlantic City Electric Company	02/23	Atlantic City Electric Company	Docket No. ER20120746	Return on Equity
Middlesex Water Company	05/21	Middlesex Water Company	Docket No. WR21050813	Rate of Return
Atlantic City Electric Company	12/20	Atlantic City Electric Company	Docket No. ER20120746	Return on Equity
FirstEnergy Service Company	02/20	Jersey Central Power & Light Co.	Docket No. ER20020146	Rate of Return
Aqua New Jersey, Inc.	12/18	Aqua New Jersey, Inc.	Docket No. WR18121351	Rate of Return
Middlesex Water Company	10/17	Middlesex Water Company	Docket No. WR17101049	Rate of Return
Middlesex Water Company	03/15	Middlesex Water Company	Docket No. WR15030391	Rate of Return
The Atlantic City Sewerage Company	10/14	The Atlantic City Sewerage Company	Docket No. WR14101263	Cost of Service / Rate Design
Middlesex Water Company	11/13	Middlesex Water Company	Docket No. WR1311059	Capital Structure
New Mexico Public Regulation Commission				
New Mexico Gas Company	09/23	New Mexico Gas Company	Case No. 23-00255-UT	Return on Equity
Southwestern Public Service Co.	11/22	Southwestern Public Service Co.	Case No. 22-00286-UT	Return on Equity
Southwestern Public Service Co.	01/21	Southwestern Public Service Co.	Case No. 20-00238-UT	Return on Equity
North Carolina Utilities Commission				
Carolina Water Service, Inc.	07/22	Carolina Water Service, Inc.	Docket No. W-354 Sub 400	Rate of Return
Aqua North Carolina, Inc.	06/22	Aqua North Carolina, Inc.	Docket No. W-218 Sub 573	Rate of Return
Carolina Water Service, Inc.	07/21	Carolina Water Service, Inc.	Docket No. W-354 Sub 384	Rate of Return
Piedmont Natural Gas Co., Inc.	03/21	Piedmont Natural Gas Co., Inc.	Docket No. G-9, Sub 781	Return on Equity
Duke Energy Carolinas, LLC	07/20	Duke Energy Carolinas, LLC	Docket No. E-7, Sub 1214	Return on Equity
Duke Energy Progress, LLC	07/20	Duke Energy Progress, LLC	Docket No. E-2, Sub 1219	Return on Equity
Aqua North Carolina, Inc.	12/19	Aqua North Carolina, Inc.	Docket No. W-218 Sub 526	Rate of Return
Carolina Water Service, Inc.	06/19	Carolina Water Service, Inc.	Docket No. W-354 Sub 364	Rate of Return
Carolina Water Service, Inc.	09/18	Carolina Water Service, Inc.	Docket No. W-354 Sub 360	Rate of Return
Aqua North Carolina, Inc.	07/18	Aqua North Carolina, Inc.	Docket No. W-218 Sub 497	Rate of Return
North Dakota Public Service Commission				
Northern States Power Company	09/21	Northern States Power Company	Case No. PU-21-381	Rate of Return
Northern States Power Company	11/20	Northern States Power Company	Case No. PU-20-441	Rate of Return
Public Utilities Commission of Ohio				
Aqua Ohio, Inc.	11/22	Aqua Ohio, Inc.	Case No. 22-1094-WW-AIR	Rate of Return
Duke Energy Ohio, Inc.	10/21	Duke Energy Ohio, Inc.	Case No. 21-887-EL-AIR	Return on Equity
Aqua Ohio, Inc.	07/21	Aqua Ohio, Inc.	Case No. 21-0595-WW-AIR	Rate of Return
Aqua Ohio, Inc.	05/16	Aqua Ohio, Inc.	Case No. 16-0907-WW-AIR	Rate of Return
Pennsylvania Public Utility Commission				
Columbia Water Company	05/23	Columbia Water Company	Docket No. R-2023-3040258	Rate of Return
Borough of Ambler	06/22	Borough of Ambler – Bureau of Water	Docket No. R-2022-3031704	Rate of Return
Citizens' Electric Company of Lewisburg	05/22	C&T Enterprises	Docket No. R-2022-3032369	Rate of Return
Valley Energy Company	05/22	C&T Enterprises	Docket No. R-2022-3032300	Rate of Return

Sponsor	Date	Case/Applicant	Docket No.	Subject
FirstEnergy	04/22	Pennsylvania Electric Company	Docket No. R-2024-3047068	Rate of Return
Community Utilities of Pennsylvania, Inc.	04/21	Community Utilities of Pennsylvania, Inc.	Docket No. R-2021-3025207	Rate of Return
Vicinity Energy Philadelphia, Inc.	04/21	Vicinity Energy Philadelphia, Inc.	Docket No. R-2021-3024060	Rate of Return
Delaware County Regional Water Control Authority	02/20	Delaware County Regional Water Control Authority	Docket No. A-2019-3015173	Valuation
Valley Energy, Inc.	07/19	C&T Enterprises	Docket No. R-2019-3008209	Rate of Return
Wellsboro Electric Company	07/19	C&T Enterprises	Docket No. R-2019-3008208	Rate of Return
Citizens' Electric Company of Lewisburg	07/19	C&T Enterprises	Docket No. R-2019-3008212	Rate of Return
Steelton Borough Authority	01/19	Steelton Borough Authority	Docket No. A-2019-3006880	Valuation
Mahoning Township, PA	08/18	Mahoning Township, PA	Docket No. A-2018-3003519	Valuation
SUEZ Water Pennsylvania Inc.	04/18	SUEZ Water Pennsylvania Inc.	Docket No. R-2018-000834	Rate of Return
Columbia Water Company	09/17	Columbia Water Company	Docket No. R-2017-2598203	Rate of Return
Veolia Energy Philadelphia, Inc.	06/17	Veolia Energy Philadelphia, Inc.	Docket No. R-2017-2593142	Rate of Return
Emporium Water Company	07/14	Emporium Water Company	Docket No. R-2014-2402324	Rate of Return
Columbia Water Company	07/13	Columbia Water Company	Docket No. R-2013-2360798	Rate of Return
Penn Estates Utilities, Inc.	12/11	Penn Estates, Utilities, Inc.	Docket No. R-2011-2255159	Capital Structure / Long-Term Debt Cost Rate
South Carolina Public Service Commission				
Blue Granite Water Co.	12/19	Blue Granite Water Company	Docket No. 2019-292-WS	Rate of Return
Carolina Water Service, Inc.	02/18	Carolina Water Service, Inc.	Docket No. 2017-292-WS	Rate of Return
Carolina Water Service, Inc.	06/15	Carolina Water Service, Inc.	Docket No. 2015-199-WS	Rate of Return
Carolina Water Service, Inc.	11/13	Carolina Water Service, Inc.	Docket No. 2013-275-WS	Rate of Return
United Utility Companies, Inc.	09/13	United Utility Companies, Inc.	Docket No. 2013-199-WS	Rate of Return
Utility Services of South Carolina, Inc.	09/13	Utility Services of South Carolina, Inc.	Docket No. 2013-201-WS	Rate of Return
Tega Cay Water Services, Inc.	11/12	Tega Cay Water Services, Inc.	Docket No. 2012-177-WS	Capital Structure
South Dakota Public Service Commission				
Northern States Power Company	06/22	Northern States Power Company	Docket No. EL22-017	Rate of Return
Tennessee Public Utility Commission				
Piedmont Natural Gas Company	07/20	Piedmont Natural Gas Company	Docket No. 20-00086	Return on Equity
Public Utility Commission of Texas				
Southwestern Public Service Co.	02/23	Southwestern Public Service Co.	Docket No. 54634	Return on Equity
CSWR – Texas Utility Operating Company, LLC	02/23	CSWR – Texas Utility Operating Company, LLC	Docket No. 54565	Rate of Return
Oncor Electric Delivery Co. LLC	05/22	Oncor Electric Delivery Co. LLC	Docket No. 53601	Return on Equity
Southwestern Public Service Co.	02/21	Southwestern Public Service Co.	Docket No. 51802	Return on Equity
Southwestern Electric Power Co.	10/20	Southwestern Electric Power Co.	Docket No. 51415	Rate of Return
Texas Railroad Commission				
Atmos Pipeline – Texas, a Division of Atmos Energy Corporation	05/23	Atmos Pipeline – Texas, a Division of Atmos Energy Corporation	Docket No. OS-23-00013758	Return on Equity
Virginia State Corporation Commission				
Aqua Virginia, Inc.	07/23	Aqua Virginia, Inc.	PUR-2023-00073	Rate of Return
Washington Gas Light Company	06/22	Washington Gas Light Company	PUR-2022-00054	Return on Equity
Virginia Natural Gas, Inc.	04/21	Virginia Natural Gas, Inc.	PUR-2020-00095	Return on Equity

Sponsor	Date	Case/Applicant	Docket No.	Subject
Massanutten Public Service Corporation	12/20	Massanutten Public Service Corporation	PUE-2020-00039	Return on Equity
Aqua Virginia, Inc.	07/20	Aqua Virginia, Inc.	PUR-2020-00106	Rate of Return
WGL Holdings, Inc.	07/18	Washington Gas Light Company	PUR-2018-00080	Rate of Return
Atmos Energy Corporation	05/18	Atmos Energy Corporation	PUR-2018-00014	Rate of Return
Aqua Virginia, Inc.	07/17	Aqua Virginia, Inc.	PUR-2017-00082	Rate of Return
Massanutten Public Service Corp.	08/14	Massanutten Public Service Corp.	PUE-2014-00035	Rate of Return / Rate Design
Public Service Commission of West Virginia				
FirstEnergy Service Company	05/23	Monongahela Power Company and The Potomac Edison Company	Case No. 23-0460-E-42T	Return on Equity
FirstEnergy Service Company	12/21	Monongahela Power Company and The Potomac Edison Company	Case No. 21-0857-E-CN (ELG)	Return on Equity
FirstEnergy Service Company	11/21	Monongahela Power Company and The Potomac Edison Company	Case No. 21-0813-E-P (Solar)	Return on Equity

Appendix E

EPCOR WATER SERVICES

Final 2020-2022 PBR Progress Reports

May 31, 2024

2020 PBR Progress Report

2017 – 2021 Performance Based Regulation

Water Services,

Wastewater Treatment Services,

and Drainage Services

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1 Executive Summary

This report provides an annual update to the City of Edmonton on the operational and financial results for the year ended December 31, 2020 for water services ("In-City Water"), wastewater treatment services ("Wastewater"), and sanitary and stormwater sewer services ("Drainage") provided within Edmonton by EPCOR Water Services Inc. ("EWSI"). The City of Edmonton City Council regulates In-City Water and Wastewater in accordance with the Performance Based Regulation ("PBR") Plan approved in the EPCOR Water Services and Wastewater Treatment Bylaw No. 17698 ("Bylaw 17698") and Drainage in accordance with the PBR Plan approved in EPCOR Drainage Services Bylaw No. 18100 ("Bylaw 18100").

1.1 Financial Performance

In-City Water, Wastewater and Drainage's financial performance for 2020 are summarized in Table 1.1 below[1]:

Table 1.1
Revenue and Return on Equity
($ millions)

		A	B	C	D
		2020		2017-2020*	
	Revenue and Return on Equity	PBR Forecast	Actual	PBR Forecast	Actual
1	**In-City Water**				
2	Revenue	214.2	203.4	808.1	774.6
3	Return on Equity	42.6	42.9	159.7	153.1
4	Rate of Return on Equity	10.18%	10.09%	10.18%	9.74%
5	**Wastewater**				
6	Revenue	112.6	105.4	410.1	391.4
7	Return on Equity	20.6	20.1	73.6	78.6
8	Rate of Return on Equity	10.18%	10.70%	10.18%	11.52%
9	**Drainage**				
10	Revenue	208.5	214.4	607.5	608.0
11	Return on Equity	19.1	30.3	76.7	90.0
12	Rate of Return on Equity	3.25%	4.96%	4.46%	5.03%

*2018-2020 for Drainage.

In 2020, In-City Water and Wastewater's revenues were significantly lower than forecast due to both low inflation, which affected rates adjustments and declines in commercial consumption as a result of the COVID-19 pandemic. Drainage revenues, which reflect scheduled rates from Bylaw 18100, were greater than forecast, with revenues from non-routine adjustments for SIRP and CORe more than offsetting declines in Sanitary Utility variable charge revenues.

[1] Consistent with the 2017-2021 PBR Application, all financial data in this report, including totals and sub-totals, are rounded to the nearest $0.1 million. This practice ensures continuity of data between tables and between years. However, the sum of the rounded detailed data in certain tables may not be equal to the related rounded total or sub-total.

In 2020, In-City Water achieved a 10.09% rate of return on equity (9.74% for 2017-2020), compared to its forecast rate of return of 10.175%. Operating expense reductions achieved by In-City Water ($10.1 million) were unable to fully offset reductions in revenue. The In-City Water mid-year rate base is $15.7 million (1.50%) higher than forecast, higher than forecast mid-year rate base also contributes to the lower rate of return on equity achieved in 2020.

In 2020, Wastewater achieved a 10.70% rate of return on equity (11.52% for 2017-2020), compared to its forecast rate of return of 10.175%. Lower than forecast operating expenses, combined with a lower than forecast rate base, more than offset reductions in revenue.

In 2020, Drainage achieved a 4.76% rate of return on equity (5.03% for 2018-2020), compared to its forecast rate of return of 3.25% (4.46% for 2018-2020). Lower than forecast operating expenses, lower interest expense due to one-time preferential financing from EUI and a lower than forecast rate base, more than offset reductions in revenue. As discussed in prior years' PBR Progress Reports, Drainage does not have a City of Edmonton-approved PBR forecast. Therefore, over the 2018-2021 period, Drainage's actual financial performance is compared to its 2018 EWSI budget, escalated at an appropriate inflation rate and adjusted for: (i) removal of one-time costs related to the transition of Drainage to EPCOR; and (ii) differences in basis of accounting between International Financial Reporting Standards (IFRS) and regulatory accounting.

Detailed analyses of In-City Water, Wastewater and Drainage's financial performance for 2020 and for the 2017-2020 period are provided in sections 2.3, 3.3, and 4.3, respectively.

1.2 Capital Expenditures

In-City Water, Wastewater and Drainage's capital expenditures for 2020 and updated forecasts the five-year term of the PBR Plan (the "2017-2021 PBR term") are summarized in Table 1.2 below:

Table 1.2
Capital Expenditures
($ millions)

		A	B	C	D	E	F
Capital Expenditures		2020		2017-2020[1]		2017-2021	
		PBR Forecast [2]	Actual	PBR Forecast [2]	Actual	PBR Forecast [2]	Current Projection
1	In-City Water	108.5	125.8	411.2	433.3	515.3	576.6
2	Wastewater	47.7	39.2	213.3	187.7	235.4	248.3
3	Drainage	215.5	236.1	527.5	481.9	780.6	747.5

[1] Drainage Forecast and Actual results only include 2018-2020, 2018 is the first full year of Drainage operation following the transfer to EPCOR in September 2017.
[2] Amounts include capital expenditures approved through Non-Routine adjustments.

Over the course of the PBR term, changes to capital programs are required to address unforeseen needs for repairs or rehabilitation, changes in regulatory or operational requirements, customer demands, and other external factors. These changes are coordinated through EWSI's Project Management Office and are authorized by EWSI's Capital Project Steering Committee, EPCOR Utility Inc.'s (EUI) Financial

Review Council, or EPCOR's Board of Directors, depending on the amount of the expenditure. EWSI also presents information on its capital programs, as well as business cases supporting significant new capital projects (i.e. not already included in the approved PBR application), to the Utility Committee throughout the year. The 2017-2021 forecasts presented above represents the most recent forecasts and do not reconcile entirely with that forecasts contained in the PBR applications as they were completed at an earlier point in time.

- **In-City Water's** 2017-2021 projected capital expenditures of $576.6 million are $61.4 million (11.9%) greater than the PBR forecast. Significant projects contributing to this variance include the E.L. Smith Solar Farm Project and Battery Storage System ($26.0 million), which is funded through the Special Rate Adjustment for Environmental Initiatives; changes to the scope of the Water D&T Facility Expansion Project, which adds an additional $6.5 million to its cost; and an increase in developer driven projects such as the Network PD Transmission Mains Program, Water Main Cost Sharing Program, and Water Service Connection Program ($25.5 million).

- **Wastewater's** 2017-2021 projected capital expenditures of $248.3 million are $12.9 million (5.5%) greater than the PBR forecast. The Gold Bar Wastewater Treatment Plant's aging infrastructure poses challenges to capital planning. Since the plant cannot be shutdown for maintenance, it is often difficult to accurately assess asset condition and the scope of rehabilitation needed before commencing work on a project. During preliminary engineering in 2017 and 2018, EWSI identified significant needs for repairs to critical infrastructure, such as sludge lines replacements, clarifier chain replacements, and structural rehab that had not been anticipated in the PBR forecast. EWSI reviewed design options and employed value engineering to reprioritize reliability and life cycle replacements. These efforts have ensured that changes to projections of the total cost of the 2017-2021 capital expenditures program have resulted in only a slight increase from the PBR forecast.

- **Drainage's** 2018-2021 projected capital expenditures of $747.5 million are $33.1 million (4.4%) less than capital expenditures included in the City Long Term Plan and approved Non-Routine Adjustments. This decrease reflects substantial shifts of projected costs between programs as Drainage continues to refine and reprioritize its overall capital expenditures program to address asset condition, mitigate the risk of failure, and maintain required service levels. These decreases are partially offset by higher capital expenditures on the Non-Routine Adjustment for CORe and $32.8 million in additional capital expenditure for a real estate consolidation initiative (a combined water and drainage facility – also referenced in water's capital expenditure section above).

Detailed explanations for differences between capital expenditures in PBR forecast and EWSI's current projections are provided in Sections 2.4, 3.4 and 4.4.

1.3 Operational Performance

In-City Water's and Wastewater's operational performance is measured by the results of indices prescribed in Schedule 3 of Bylaw 17698 with each index consisting of one or more performance measures. Commencing in 2020, Drainage's operational performance is measured using PBR performance indices approved by City Council on February 19, 2020 as amendments to Bylaw 18100.

Drainage's new PBR metrics program is patterned after the Water and Wastewater PBR metrics and meets the requirements of the Letter of Intent developed for the transition of Drainage Services from the City to EPCOR

Operational performance under each index is measured independently on a point basis with 100 base points available if the standards for all performance measure indices are achieved. Bonus points are available for performance above standards and financial penalties are applied if EWSI does not meet the 100 base point standard.

In 2020, In-City Water exceeded the performance standards for all five of its performance measure indices, Wastewater exceeded the performance standards for all four of its performance measure indices, and Drainage exceeded the performance standards for three of its four performance measure indices. Detailed discussions of the performance measures making up each of the indices and operational performance highlights are provided in Section 2.5 for In-City Water, Section 3.5 for Wastewater, and Section 4.5 for Drainage. .

Table 1.3-1
2020 Performance Measures and Standards

		A	B	C	D	E	F
Performance Index		**In-City Water**		**Wastewater**		**Drainage**	
		Standard	**Actual Score**	**Standard**	**Actual Score**	**Standard**	**Actual Score**
1	Water Quality Index(1)	25.0	25.0	55.0	60.5	N/A	N/A
2	Customer Service Index	20.0	21.5	15.0	16.5	20.0	21.4
3	System Reliability and Optimization Index	25.0	28.5	15.0	16.5	35.0	33.5
4	Environmental Index(1)	15.0	16.5	N/A	N/A	30.0	33.0
5	Safety Index	15.0	16.5	15.0	16.5	15.0	16.5
6	**Aggregate Points Earned**	**100.0**	**108.0**	**100.0**	**110.0**	**100.0**	**104.4**

[1] Water Quality and Environmental are combined into one index for Wastewater's and Drainage's operational performance

1.4 Rates and Bill Comparisons

In 2020, the average monthly bill for In-City Water customers, based on 2020 average monthly consumption per residential customer of 14.7 m^3, was **$39.90,** an increase of 5.5% from 2019. This increase consists of the 1.7% inflation adjustment discussed in Section 2.3.1; Special Rate Adjustments for Environmental Initiatives (0.3%), Accelerated Programs (0.5%) and Rebasing (0.7%); and Non-Routine Adjustment approved in 2019 for the Lead Mitigation Strategy (1.1%), Leduc County Annexation (0.7%), and LRT related Water Infrastructure Relocations (0.4%).

The average residential customer's wastewater treatment bill in 2020, also based on monthly consumption of 14.7 m^3, was **$19.30**, an increase of 6.1% from 2019. This increase includes the 1.7% inflation adjustment, and the Special Rate Adjustment for rebasing of 4.4% needed to support Wastewater's 2017-2021 capital programs.

The average residential customer's drainage bill in 2020, again based on monthly consumption of 14.7 m^3, was **$37.95**, an increase of 6.4% from 2019. This increase consists of the annual 3.0% increase set in Bylaw 18100, and Non-Routine Adjustments approved in 2019 for the Corrosion and Odour Reduction Strategy (1.6%), the Stormwater Integrated Resource Plan (1.5%), and LRT related Drainage Infrastructure Relocations (0.4%).

EWSI undertakes annual bill comparison surveys with various cities and local communities. Section 2.6 shows that EWSI's residential water rates are competitive with most of the cities and communities included in the comparison, with only Vancouver having significantly lower water rates. Drainage and Wastewater bills are more difficult to compare because of variations in the nature and extent of wastewater treatment, the inclusion of certain services in property taxes, and geographic and climatic factors which influence the level of investment in and approach to flood mitigation. Section 3.6 shows that Edmonton's combined Drainage and Wastewater Treatment bills are competitive with those of other cities and communities with similar geographic and climatic conditions. Commercial bill comparisons for both water and wastewater show similar results to residential water and wastewater bills.

1.5 Non-Routine Adjustments

Non-Routine Adjustments for In-City Water and Wastewater are defined in Bylaw 17698, and for Drainage in Bylaw 18100, as "items which are unusual, significant in size or nature, and beyond the scope of control of EWSI". Bylaws 17698 and 18100 allow EWSI to request adjustments to In-City Water, Wastewater and Drainage rates for Non-Routine Adjustments from the City Manager or City Council, depending on financial impact.

In 2019, EWSI received approval to increase In-City Water and Drainage rates for the following projects that qualified as Non-Routine Adjustments outlined in Bylaw 17698, Schedule 3, Section 5.0 for Water and Wastewater, or in Bylaw 18100, Schedule 3 Section 4.1 for Drainage. These non-routine adjustments were included in Drainage rates commencing January 1, 2020, January 1, 2021, and January 1, 2022, and In-City Water rates commencing April 1, 2020 and will be escalating by inflation less the productivity factor in April 1, 2021.

- **Lead Mitigation Strategy (In-City Water)** – On March 22, 2019, EWSI presented a new lead mitigation strategy to the Utility Committee. This strategy is designed to meet new Health Canada Guidelines that reduce the maximum concentration of lead in drinking water at the tap from 10 parts per billion to 5 parts per billion. On July 16, 2019, EWSI received approval to apply the Non-Routine Adjustments to In-City water rates commencing April 1, 2020 to recover the costs of implementing this strategy. The additional cost to an average residential In-City Water customer was $0.40 per month commencing April 1, 2020 (or a total of $10.91 over the 2017-2021 PBR term).

- **Leduc County Annexation (In-City Water)** – On November 27 2018, the Government of Alberta approved the City of Edmonton's annexation of 8,260 hectares from Leduc County. As part of the annexation, EWSI will acquire the existing water infrastructure within or required to service the annexed area, including a reservoir, pump house and booster station, as well as transmission mains and a small distribution system, at a cost of $9.5 million which is comprised of $7.8 million for the Discovery Park reservoir and the remainder for a pipeline and booster station. On November 7, 2019, EWSI received approval to apply the Non-Routine Adjustments to In-City Water rates commencing April 1, 2020 to recover the costs related to the annexation. The additional cost to the average residential In-City Water customer was $0.26 per month commencing April 1, 2020 (or a total of $7.09 over the 2017-2021 PBR term).

- **LRT Relocations (In-City Water and Drainage)** – EWSI has identified work needed to accommodate water main, hydrant and sewer relocations for the West Valley Line and Metro Line Northwest Phase I LRT projects. On November 7, 2019, (Drainage) and December 23, 2019 (In-City Water) EWSI received approvals to apply the Non-Routine Adjustments to water rates for In-City Water customers commencing April 1, 2020 and to Sanitary Utility and Storm Water Utility rates for Drainage customers commencing January 1, 2020. The additional cost to the average residential In-City Water customer is $0.17 per month commencing April 1, 2020 ($4.64 over the 2017-2021 PBR term). The average monthly bill increase for residential Drainage customers is $0.14 per month commencing January 1, 2020, an additional $0.37 per month commencing in January 1, 2021, and an additional $0.31 per month commencing on January 1, 2022 (or a total of $10.26 over the 2018-2021 PBR term).

- **Stormwater Integrated Resource Plan (Drainage)** – On May 10, 2019, EWSI presented its Stormwater Integrated Resource Plan (SIRP) alternatives to the Utility Committee. The plan includes a mix of capital and operational program investments to mitigate flood risks across the City using a mix of grey and green infrastructure components installed within the public right-of-way or within City or EPCOR owned parcels. The SIRP approach allows for a lower overall capital investment than seen with traditional engineering approaches through the inclusion of operational programs that support the overall community in responding to flooding events. On December 2, 2019, EWSI received approval to apply the Non-Routine Adjustments to Storm Water Utility rates commencing January 1, 2020. The additional cost to the average residential Drainage customer is $0.51 per month commencing January 1, 2020, an additional $0.15 per month commencing January 1, 2021, and an additional $0.03 commencing January 1, 2022 (or a total of $16.11 over the 2018-2021 PBR term).

- **Corrosion and Odour Reduction Strategy (Drainage)** – On June 28 2019, EWSI presented its Corrosion and Odour Reduction Strategy to the Utility Committee. The Corrosion and Odour Reduction Strategy was developed using similar principles and approaches to EWSI's SIRP to determine an optimized mix of operational and capital solutions to reduce corrosion and odour. The strategy expands the previous plan by focusing on preventing the formation of hydrogen sulphide gas, which will reduce community odour impacts and lengthen the life of sewer network assets. Areas of focus within the strategy include: prevent the formation of hydrogen sulphide gas in the sewer system, control the release of air from the sewer system, and adapt the system using real-time monitoring technologies and improved inspection data. On December 2, 2019, EWSI received approval to apply the Non-Routine Adjustments to Sanitary Utility rates commencing January 1, 2020. The additional cost to the average Residential Drainage customer is $0.53 per month commencing January 1, 2020, an additional $0.42 per month commencing January 1, 2021, and an additional $0.06 per month commencing January 1, 2022 (or a total of $20.79 over the 2018-2021 PBR term).

Table 1.5 summarizes the average residential customer monthly bill impact for all Non-Routine Adjustments that have been approved for EWSI's In-City Water and Drainage customers over the 2017-2021 PBR term. These Non-Routine Adjustments include the five Non-Routine Adjustments detailed above, plus the negative Non-Routine Adjustment approved in 2018, passing on reductions in corporate shared service cost allocations resulting from the transfer of Drainage Services assets to EPCOR to In-City Water and Wastewater customers. These Non-Routine Adjustments expire on March 31, 2022 at the end of the current PBR term.

Table 1.5
Monthly Residential Bill Impacts
Water and Drainage Approved Non-Routine Adjustments
(2017-2021 PBR Term)
($/month)

		A	B	C
	Non-Routine Adjustment	**2020**	**2021**	**2022* (Jan to Mar)**
1	Corporate Cost Reduction (Drainage Transfer)	(1.04)	(1.05)	(1.05)
2	Lead Mitigation Strategy	0.40	0.41	0.41
3	Leduc County Annexation	0.26	0.26	0.26
4	LRT Relocations	0.31	0.68	0.99
5	Corrosion and Odour Reduction Strategy	0.53	0.95	1.01
6	Stormwater Integrated Resource Plan	0.51	0.66	0.69
7	**Total Monthly Bill Impact**	**0.97**	**1.91**	**2.31**

* EWSI's current bylaws expire on March 31, 2022. New bylaws with updated rates would be in effect for the remainder of 2022.

2 In-City Water Services

2.1 Accomplishments and Challenges

In 2020, In-City water had significant accomplishments, including:

- Completion of Water's long term Integrated Resource Plan (IRP). The IRP encompasses: customer growth; changes to provincial regulatory frameworks; technology; asset management; and health, safety and environmental considerations. The IRP provides a roadmap for enabling EWSI's Water Treatment Plants and Distribution and Transmission operations to meet Edmonton's and surrounding community's future growth demands, while continuing to deliver safe and reliable drinking water;

- On August 27, 2020, EWSI received Decision 25770-D01-2020 from the AUC which will allow EWSI to construct and operate a 4MW battery energy storage system to increase the operational performance of the E.L. Smith Solar Farm by balancing supply and demand of electricity and serving as a backup power supply for the E.L. Smith Water Treatment Plant. This was followed by approval from Edmonton City Council for rezoning of the EPCOR-owned land for the Solar Farm project on October 19, 2020.

- Initial implementation of enhanced Lead Mitigation Program to reduce lead levels at the tap, including the addition of orthophosphate at the water treatment plants, as well as accelerated replacement of lead service lines (LSLs) from the water main to the meter inside the customer's home

- Execution of the Real Estate Consolidation Project. This project's overall objective is to leverage the natural operational synergies that exist between Water and Drainage to reduce the overall cost to customers through cost reduction and cost avoidance, while maintaining the service quality level that EWSI currently delivers, both during the transition to the single service center and in the long term. An important driver of cost minimization is synergies between Drainage Services and Water Services, some of which are only possible through consolidation. Cost reduction will be attainable by not having to fill vacancies created through attrition with consolidation. Cost avoidance anticipated with consolidation include improved and coordinated scheduling and planning of activities to reduce multiple trips to execute work. Additional operational benefits to be achieved over time include improved communications between engineering and field construction with staff being located in the same service centre.

- Between 2017 and 2020, EWSI completed a number of notable capital projects at both the water treatment plants and in the distribution and transmission system which have benefited EWSI's customers through improvements in overall safety and reliability of the water supply, safety improvements for EWSI's employees, improved environmental performance and expansion of the system in response to growing customer demands and City of Edmonton requests. These projects include:

- Significant upgrades at the Rossdale water treatment plant designed to improve the overall condition and increasing operational reliability and redundancy. These included upgrades to clarifiers, stilling basins, filter underdrains and air scour systems within the plant.

- Completion of the E. L. Smith Bypass Main Upgrade Project planned for 2021 to address the serious consequences of a failure of the ring main at E. L. Smith.

- Upgrades of various E. L. Smith and Rossdale chemical systems on a prioritized basis, including sodium bisulphite, sodium hypochlorite, ammonia and fluoride systems.

- Structural, mechanical and electrical upgrades and replacements to end-of-life and deteriorated structural components at Kaskitayo Reservoir.

- Replacement of 70 km of water mains during 2017-2021 through its various water main replacement programs to ensure reliability of the system is maintained. As a result of continued water main replacements, EWSI saw the lowest level of water main breaks since 1960 over the 2017-2021 period.

- Implementation of the Critical Pipeline Inspection program, inspecting critical transmission mains to more efficiently target weak points in the transmission system and further increase the reliability of the system.

- Expansion of the water distribution and transmission system as a result of the significant growth of the city of Edmonton over 2017-2021. This included adding 172 km of water mains by the end of 2020. EWSI has also continued its work with the City to relocate several water mains to accommodate City of Edmonton construction projects such as LRT expansions.

- Completion of the transfer of regional transmission pipelines and booster stations, including the Discovery Park Reservoir and the Southwest Pipeline and Booster Station at the end of 2020. The transfer of the of the Parkland Pipeline and Booster Station is planned for the 3rd quarter of 2021.

2.2 Customers and Consumption

In-City Water provides services to three customer classes: residential; multi-residential; and commercial (see Appendix A). These classes are unchanged from the previous PBR term and are described in detail in Appendix A. Customer counts, total annual consumption and monthly consumption per customer are shown in Table 2.2 below:

Table 2.2
Customers, Consumption and Consumption per Customer

		A	B	C	D
	Customers and Consumption	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	**Customers**				
2	Residential	271,195	272,538	263,704	266,550
3	Multi-Residential	3,883	3,779	3,814	3,769
4	Commercial	20,018	19,846	19,636	19,720
5	**Total**	**295,096**	**296,163**	**287,154**	**290,039**
6	**Consumption per Customer** (m^3 per month)				
7	Residential	13.9	14.7	14.3	14.4
8	Multi-Residential	408.6	407.9	408.6	396.5
9	Commercial	118.7	89.9	121.1	108.1
10	**Annual Consumption** (ML)				
11	Residential	45,350.5	48,105.2	180,756.6	184,018.2
12	Multi-Residential	19,039.3	18,498.4	74,813.4	71,732.6
13	Commercial	28,524.5	21,407.1	114,127.1	102,304.9
14	**Total**	**92,914.3**	**88,010.6**	**369,697.0**	**358,055.7**

The factors contributing to actual to forecast differences for 2020 and for 2017-2020 differ by customer class, as explained below:

- **Residential.** Customer counts in 2020 are 0.5% greater than forecast, primarily because of higher than expected actual customer counts at the beginning of the 2017-2021 PBR term. In 2020, consumption per customer was 5.6% higher than forecast, primarily attributable to changes in consumption patterns as a result of the COVID-19 pandemic (more time spent at home). Over the 2017-2020 period actual consumption per customer is slightly higher then the PBR forecast, confirming the robust residential forecasting methodology developed for the 2017-2021 PBR forecast. The combined effect of these factors is that total residential consumption for 2020 is 5.6% higher than forecast (0.7% greater for 2017-2020).

- **Multi-Residential.** Customer counts are 2.7% less than forecasts, continuing trends seen in 2018 and 2019. Consumption per customer, although still less than forecast, strengthened significantly in 2020, largely due to the COVID-19 pandemic. Lower than forecast customer counts, combined with lower than forecast consumption per customer, meant that total multi-residential consumption was 2.8% less than forecast in 2020 (4.1% lower for 2017-2020).

- **Commercial.** The commercial class was significantly impacted by the COVID-19 pandemic in 2020. Total consumption in the commercial customer class was 25.0% lower than forecast (8.4% lower in 2019), while customer counts were 0.9% lower than forecast. Largely attributable to public health guidance and restrictions put in place throughout the pandemic (closed facilities, capacity/occupancy limits, travel restrictions, employees working from home, etc.) nearly all industries experienced a decrease in consumption in 2020. Over the 2017-2020 period total commercial consumption is 10.4% lower than forecast.

2.3 Financial Performance

In-City Water's net income is derived from the provision of water services within Edmonton's boundaries. Besides these services, EWSI provides water services to surrounding communities under bulk water supply agreements with regional water service commissions ("RWCG" or "Regional Customers"), and fire protection services to the City of Edmonton under a service agreement ("Fire Protection").

EWSI's water system is fully integrated, with services jointly provided to In-City Water, Regional Customers and Fire Protection. Therefore, in sections 2.3.1 to 2.3.7, operating costs, depreciation, rate base and capital expenditures are presented and analyzed on a total system basis. In-City Water's share of these expenses, as well as its returns on rate base, are calculated in accordance with a cost of service model developed jointly by EWSI, the regional water service commissions and the City of Edmonton, and are shown as separate line items on each applicable table. In-City Water's total revenue and revenue requirements are summarized in Table 2.3 below:

Table 2.3
In-City Water Revenue Requirements
($ millions)

		A	B	C	D
	Summary of Revenue Requirements	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	In-City Water Rate Revenue(1)	209.1	198.7	788.1	753.2
2	In-City Water Revenue Requirement				
3	Operating expenses	110.4	100.3	425.1	395.8
4	Other revenue	(5.1)	(4.6)	(20.0)	(21.4)
5	Depreciation and amortization	29.6	30.8	110.7	112.1
6	Return on rate base financed by debt	30.4	29.4	114.7	113.5
7	Return on rate base financed by equity	42.6	42.9	159.7	153.1
8	In-City Water Revenue Requirement*	207.9	198.7	790.2	753.2
9	**Return on Rate Base Financed by Equity**	**10.18%**	**10.09%**	**10.18%**	**9.74%**

[1] In the PBR forecast, rebasing and other special rate adjustments have been smoothed over the PBR term. Therefore, although forecast revenue is equal to the revenue requirement over the 2017-2021 PBR term, in any year within the PBR term, forecast revenue may be greater or less than the revenue requirement.

2.3.1 Revenue

In-City Water's rate revenues include fixed monthly services charges which vary by meter size and consumption charges applied to each cubic meter of water consumed. Besides rate revenue, In-City Water revenues also include other revenue derived from temporary services, connection fees, water permits, late payment charges and other incidental services. Table 2.3.1-1 below provides a comparison of 2020 In-City Water revenues to the PBR forecast:

Table 2.3.1-1
In-City Water Revenue
($ millions)

		A	B	C	D
In-City Water Revenue		**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Fixed Monthly Service Charges				
2	Residential	25.5	24.4	95.1	88.9
3	Multi-Residential	1.6	1.5	5.9	5.5
4	Commercial	4.7	4.4	17.5	16.3
5	Fixed Monthly Service Charges	31.7	30.4	118.4	110.7
6	Consumption Charges				
7	Residential	104.5	107.0	395.6	390.7
8	Multi-Residential	33.0	31.4	123.4	116.7
9	Commercial	39.8	29.9	150.7	135.2
10	Consumption Charges	177.3	168.4	669.6	642.5
11	In-City Water Rate Revenue	209.1	198.7	788.1	753.2
12	Other Revenue	5.1	4.6	20.0	21.4
13	**Total In-City Water Revenue**	**214.2**	**203.4**	**808.1**	**774.6**

In-City rate revenues were $10.3 million less than forecast in 2020, and $34.8 million less than forecast over the 2017-2020 PBR period. This difference is attributable to the following factors:

- Lower than forecast inflation resulted in a $5.4 million decrease in 2020 ($16.4 million for 2017-2020). The PBR plan limits Water and Wastewater's annual routine rate adjustments to inflation less an efficiency factor (see Appendix A.1). As shown in Table 2.3.1-2, actual PBR inflation adjustments for 2020 and 2017-2020 are significantly less than forecast. The effect of lower than forecast inflation from 2016 to 2020 will continue to impact revenues throughout the remainder of the 2017-2021 PBR term.

Table 2.3.1-2
2020 PBR Inflation Adjustment

		A	B	C	D
PBR Inflation Adjustment to In-City Water and Wastewater Rates		**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Forecast Inflation				
2	CPI	2.20%	1.80%	9.09%	8.24%
3	Labour	2.40%	2.10%	9.95%	6.87%
4	Weighted Inflation (65% CPI, 35% Labour)	2.27%	1.91%	9.39%	7.76%
5	Less: Efficiency Factor	-0.25%	-0.25%	-1.00%	-1.00%
6	Forecast Inflation	2.02%	1.66%	8.39%	6.76%
7	Actual to Forecast Inflation Adjustment	-	0.08%	-	-1.64%
8	**PBR Inflation**	**2.02%**	**1.74%**	**8.33%**	**4.96%**

- Lower than forecast consumption (see Section 2.2) resulted in a $4.5 million decrease in 2020 revenues ($13.8 million for 2017-2020). These decreases were partially offset by slight increases in customer counts which resulted in a $0.1 million increase in revenue in 2020 ($1.0 million for 2017-2020); and

- Non-Routine Adjustments to water rates decreased revenues by $0.5 million in 2020 ($5.6 million for 2017-2020). This includes a negative Non-Routine Adjustments which fulfills EPCOR's commitment to the City to flow the benefits of any reductions in corporate shared service cost allocations resulting from the transfer of Drainage Services assets to EPCOR to In-City Water and Wastewater customers, and is partially offset positive by Non-Routine Adjustments for the Lead Mitigation Strategy, Leduc County Annexation, and Water LRT Relocations, which were approved in 2019.

Besides rate revenues, In-City Water earned $4.6 million in other revenue in 2020, $0.5 million lower than forecast ($1.3 million greater for 2017-2020). This decrease includes $0.3 million in lower late payment penalties largely attributable to the 90 day utility bill deferral program which was implemented to help customers during the early stages of the COVID-19 pandemic.

2.3.2 Operating Expenses by Function

Table 2.3.2 below provides a comparison of EWSI's total water system operating expenses for 2020 to the PBR forecast.

Table 2.3.2
Water Operating Expenses by Function
($ millions)

		A	B	C	D
		2020		**2017-2020**	
	Function and Sub-function	**PBR Forecast**	**Actual**	**PBR Forecast**	**Actual**
1	Power, Other Utilities and Chemicals				
2	Power and Other Utilities	14.7	11.2	55.1	43.1
3	Chemicals	7.6	10.3	29.5	38.3
4	Power, Other Utilities and Chemicals	22.3	21.5	84.6	81.4
5	Water Operations				
6	Water Treatment Plants	20.0	21.4	77.6	76.8
7	Water Distribution and Transmission	26.1	21.0	101.4	99.9
8	Operational Support Services	7.7	5.9	30.0	26.7
9	Quality Assurance and Environment	6.7	6.3	25.2	25.2
10	Capitalized Overhead Costs	(7.6)	(8.3)	(29.3)	(31.2)
11	Water Operations	53.0	46.3	204.9	197.4
12	Billing, Meters and Customer Service				
13	Billing and Collections	8.7	9.3	33.0	32.8
14	Meter Reading, Repairs and Maintenance	2.8	2.6	11.9	8.7
15	Customer Service	0.8	0.3	3.2	2.1
16	Billing, Meters and Customer Service	12.4	12.2	48.1	43.6
17	EWSI Shared Services				
18	EWSI Shared Services	10.4	10.6	40.3	38.4
19	Incentive and Other Compensation	3.3	4.8	12.9	13.8
20	EWSI Shared Services	13.7	15.4	53.3	52.3
21	Corporate Shared Services	15.9	12.1	61.8	49.1
22	Franchise Fees and Property Taxes				
23	Franchise Fees	16.3	15.5	62.1	59.3
24	Property Taxes	0.5	0.4	1.8	1.1
25	Franchise Fees and Property Taxes	16.8	15.9	63.9	60.4
26	**Total Operating Expenses by Function**	**134.1**	**123.3**	**516.4**	**484.2**
27	In-City Water Share - %	82.3%	81.3%	82.3%	81.7%
28	**In-City Water Share - $**	**110.4**	**100.3**	**425.1**	**395.8**

Overall, total operating expenses for 2020 were $10.8 million lower than the PBR forecast, and $32.2 million lower over the 2017-2020 PBR period. Key factors contributing to this difference include:

- **Power and Other Utilities** – $3.5 million less than forecast in 2020 ($12.0 million less for 2017-2020) due to lower than forecast power prices ($1.6 million in 2020 and $6.3 million for 2017-2020) and $1.9 million in savings associated with the green power premium ($5.7 million for 2017-2020) that was included in the PBR forecast. The PBR forecast included annual renewable (green power) power purchases of $1.9 million annually, starting in 2018. Rather than purchasing locally produced renewable energy, EWSI plans to construct a solar farm on land adjacent to the E.L. Smith water treatment plant. In the 2022-2026 PBR Application revenue collected through the Green Power Special Rate Adjustment has been treated as a contribution toward the E.L. Smith Solar Farm Project, which will decrease EWSI's revenue requirement and customer bills in the 2022-2026 PBR term.
- **Chemicals** – $2.7 million greater than forecast in 2020 ($8.8 million greater than forecast for 2017-2020). In 2020, higher than average precipitation (surface run off) resulted in unusually high colour in the river over the summer months requiring the use of more chemicals (alum, carbon, and caustic soda) in the water treatment process. Higher than forecast costs for the 2017-2020 PBR period are also attributable to unexpected changes in river water quality, including early spring run offs and high colour in the fall.
- **Water Treatment Plants** – $1.4 million greater than forecast in 2020 ($0.8 million less than forecast for 2017-2020). Higher than forecast costs in 2020 are attributable to several factors, including: higher salary costs of $1.6 million attributable to an increase in head count ($3.5 million higher than forecast 2017-2020); higher staff costs of $0.6 million for facility operations transferring from Supply Chain Management to Water Treatment Plants in 2020; and higher contractor costs of $0.6 million related to snow removal and chemical room cleaning ($0.5 million higher than forecast 2017-2020). Higher labour costs are partially offset by a higher than forecast proportion of internal labour working on capital projects, which increased capital recoveries by $1.1 million ($3.6 million higher for 2017-2020), and reductions in fringe benefit costs, primarily due to lower pension contribution rates, which provided savings of $0.4 million ($1.8 million lower than forecast 2017-2020). The remainder of the actual to forecast difference consists of numerous small items, none of which are individually significant.
- **Water Distribution and Transmission** – $5.1 million lower than forecast in 2020 ($1.5 million lower for 2017-2020). Lower than forecast costs in 2020 are attributable to several factors, including: a change in accounting treatment resulting in capitalization of valve and service replacement work which was previously expensed, which reduced operating expenses by $3.3 million; reductions in fringe benefit costs of $0.9 million, primarily due to lower pension contribution rates ($3.4 million for 2017-2020); lower staff costs of $0.6 million ($0.3 million less for 2017-202) due to vacancies; and an increase in the recovery of fleet costs attributable to an increase in capital work of $0.5 million in 2020 ($1.2 million for 2017-2020). The 2017-2020 variance also includes higher than forecast costs attributable to seasonal freeze-thaw cycles in 2017 and 2018 combined with a colder than average winter in 2019 which resulted in higher than normal volumes of emergency repairs (main breaks and frozen services) over the 2017 to 2019 period. Higher emergency repairs resulted in increased overtime costs of $2.1 million, higher contractor costs of $3.5 million, and additional material costs of $1.7 million. The remainder of the actual to forecast difference consists of numerous small items, none of which are individually significant.

- **Operational Support Services** – $1.8 million less than forecast in 2020 ($3.3 million less for 2017-2020). The 2017-2020 variance in this function is primarily attributable to lower staff costs of $1.1 million related to vacant positions within the Project and Asset Management functions, $0.8 million for the Knowledge Management function which transferred to Corporate Shared Service in 2019, and $0.6 million for facility operations transferring from Supply Chain Management to Water Treatment Plants in 2020, combined with lower than forecast legal costs of $0.7 million, as less external legal support was required.
- **Billing, Meters, and Customer Service** – $0.2 million less than forecast in 2020 ($4.5 million less for 2017-2020). Meter reading process improvements provided savings in staff costs of $1.1 million ($3.7 million less for 2017-2020). Other cost savings included $0.2 million in lower billing and customer service charges from EPCOR Energy Alberta ($1.0 million less for 2017-2020), and $0.4 million for lower Drainage Counter service fees ($0.4 million less for 2017-2020). This is offset by a higher bad debt expense of $0.8 million ($0.8 million higher for 2017-2020), largely attributable to the COVID-19 pandemic, and higher lease costs of $0.7 million related to end of lease obligations at the Montrose facility ($0.3 million higher for 2017-2020). The remainder of the actual to forecast difference consists of numerous small items, none of which are individually significant.
- **EWSI Shared Services** – $1.6 million higher than forecast in 2020 ($1.0 million less than forecast for 2017-2020). Higher than forecast costs in this category reflect a $0.2 million increase in business unit allocations ($1.9 less for 2017-2020) and higher than forecast incentive compensation of $1.4 million ($0.9 higher for 2017-2020).
- **Corporate Shared Services** – $3.8 million less than forecast in 2020 ($12.6 million less than forecast for 2017-2020). These differences reflect both the reduction in corporate shared services cost allocations resulting from the transfer of Drainage from the City of Edmonton to EPCOR, which are fully offset by the non-routine adjustment to rates described in Section 2.1.1, as well as cost savings in EUI's corporate functions**.**
- **Franchise Fees and Property Taxes** – $0.9 million less than forecast in 2020 ($3.5 million less than forecast for 2017-2020). Lower than forecast revenue resulted in a $0.9 million reduction in franchise fees in 2020 ($2.8 million for 2017-2020). The 2017-2020 variance includes lower than forecast property taxes relate to the deferral of the Distribution and Transmission facility which had been expected to increase Water Services property taxes by $0.2 million annually commencing in 2017. A new shared facility for Water Distribution and Transmission and Drainage was purchased in 2020.

Variances in other operating expense functions and sub-functions are not significant, either individually or in aggregate.

In 2020, In-City Water's share of operating expenses was $100.3 million (81.3%), compared to $110.4 million (82.3%) in the PBR forecast. This result reflects both lower total operating expenses for EWSI's total water system and a 1.0% decrease in In-City Water's share of operating expenses determined through the cost of service model.

2.3.3 Operating Expenses by Cost Category

Table 2.3.3 below shows operating expenses by cost category for Water Operations, Billing Meters and Customer Service, and EWSI Shared Services, where cost categories differ from the sub-functions in Section 2.3.2.

Table 2.3.3
Water Operating Expenses by Cost Category
($ millions)

		A	B	C	D
	Cost Category	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Water Operations				
2	Staff Costs and Employee Benefits	43.1	38.8	167.3	159.1
3	Contractors and Consultants	8.2	7.7	30.7	33.5
4	Vehicles	1.6	0.3	6.1	3.9
5	Materials and Supplies	3.2	3.8	12.5	14.8
6	Other	4.5	4.1	17.6	17.3
6	Capitalized Overhead Costs	(7.6)	(8.3)	(29.3)	(31.2)
7	Water Operations	53.0	46.3	204.9	197.4
8	Billing, Meters and Customer Service				
9	CUS Charges	8.7	9.3	33.0	32.8
10	Staff Costs and Employee Benefits	7.1	5.9	27.5	23.8
11	Contractors and Consultants	0.5	0.0	2.1	1.2
12	Vehicles	0.3	0.2	1.2	0.8
13	Other	0.6	1.3	2.2	2.7
14	Meter Reading Services (Recoveries)	(4.9)	(4.6)	(17.9)	(17.7)
15	Billing, Meters and Customer Service	12.4	12.2	48.1	43.6
16	EWSI Shared Services				
17	EWSI Shared Services Allocation	10.5	10.3	40.6	38.4
18	Staff Costs and Employee Benefits	3.3	4.7	13.0	13.9
19	Contractors and Consultants	0.2	0.2	0.8	0.6
20	Other	(0.3)	0.2	(1.1)	(0.6)
21	EWSI Shared Services	13.7	15.4	53.3	52.3

The information presented in this table supports the explanations of differences between 2020 actual and forecast expenses provided in Section 2.3.2. Accordingly, no additional explanations are considered necessary.

2.3.4 Depreciation and Amortization

EWSI total system depreciation expense and amortization of contributed assets for 2020 are shown in Table 2.3.4 below:

Table 2.3.4
Water Depreciation and Amortization
($ millions)

		A	B	C	D
	Depreciation and Amortization	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Gross depreciation expense	47.5	50.7	179.6	184.9
2	Amortization of contributions	(10.0)	(11.5)	(39.4)	(42.7)
3	**Depreciation, net**	**37.5**	**39.2**	**140.2**	**142.2**
4	In-City Water Share - %	79.1%	78.6%	78.9%	78.9%
5	**In-City Water Share - $**	**29.6**	**30.8**	**110.7**	**112.1**

Depreciation expense and amortization of contributions are both higher than forecast reflecting higher than forecast levels of developer-funded assets, explained in Section 2.3.5 below. These impacts are offsetting, so actual depreciation expense, net of amortization, is within $1.7 million of forecast. This increase in depreciation expense is driven by higher than forecast capital expenditures as discussed in Section 2.4.1.

In-City Water's share of 2020 depreciation expense is 0.4% lower than forecast, 1.0% of this difference is attributable to higher than forecast assets additions for fire protection related assets (hydrants). The offsetting 0.6% difference is consistent with actual to forecast differences in the base and max day peaking factors used to allocate depreciation expense between In-City customer classes versus that charged to the RWCG.

2.3.5 Rate Base

In 2020, EWSI's total water system rate base, shown in Table 2.3.5 below, was $34.9 million more than forecast, with the higher than forecast gross rate base partially offset by higher than forecast contributions.

Table 2.3.5
Water Mid-Year Rate Base
($ millions)

		A	B
	Components of Mid-Year Rate Base	**2020**	
		PBR Forecast	**Actual**
1	Plant in Service		
2	Balance, beginning of year	2,439.3	2,545.4
3	Additions - EPCOR-funded	94.4	119.2
4	Additions - Developer-funded	7.3	33.8
5	Retirements and adjustments	-	(10.4)
6	Balance, end of year	2,541.0	2,688.0
7	Mid-Year Plant in service	2,490.2	2,616.7
8	Accumulated Depreciation		
9	Balance, beginning of year	650.9	633.8
10	Depreciation expense	47.5	50.8
11	Retirements and adjustments	-	(10.2)
12	Balance, end of year	698.4	674.4

		A	B
	Components of Mid-Year Rate Base	2020	
		PBR Forecast	Actual
13	Mid-Year Accumulated Depreciation	674.7	654.1
14	Other Rate Base Items		
15	Working Capital	23.4	22.5
16	Materials and Supplies	2.9	4.0
17	**Gross Mid-Year Rate Base**	**1,841.8**	**1,989.1**
19	Contributions		
20	Balance, beginning of year	693.9	795.9
21	Contributions in aid of construction	7.3	33.8
23	Balance, end of year	701.2	829.7
24	Mid-Year Contributions	697.6	812.8
25	Accumulated Amortization		
26	Balance, beginning of year	178.0	180.1
27	Amortization of contributions	10.0	11.5
28	Balance, end of year	188.0	191.6
29	Mid-Year Accumulated Amortization	183.0	185.8
30	**Mid-Year Contributions**	**514.6**	**627.0**
31	**Net Mid-Year Rate Base**	**1,327.2**	**1,362.1**

The gross rate base reflects significantly higher than forecast levels of developer-funded assets over the 2016 to 2020 period. Developers are responsible for construction of distribution infrastructure in new subdivisions. When these assets are placed into service, ownership of the assets is transferred to EWSI, where the assets, together with offsetting contributions in aid of construction, are added to the rate base.

In 2020, the net mid-year rate base is $34.9 million or 2.6% more than forecast. This increase in rate base is driven by higher than forecast capital expenditures as discussed in section 2.4.1.

2.3.6 Return on Rate Base

In 2020, In-City Water's return on equity was $0.3 million (0.6%) more than forecast and $6.6 million (4.1%) less for 2017-2020. In 2020, this increase was attributable to EWSI's actions to control operating costs combined with a change in accounting treatment resulting in additional capitalization of expenses, which largely offsets a significant decline in revenue.

Table 2.3.6-1
Return on In-City Water Share of Mid-Year Rate Base
($ millions)

		A	B	C	D
Return on Rate Base		**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Net Mid-Year Rate Base	1,327.2	1,362.1		
2	In-City Water Share - %	78.9%	78.1%		
3	In-City Water Share - $	1,047.6	1,063.3		
4	Deemed Capital Structure				
5	Debt (%)	60.00%	60.00%		
6	Equity (%)	40.00%	40.00%		
7	Cost of Capital				
8	Cost of Debt	4.84%	4.60%	4.87%	4.81%
9	Cost of Equity	10.18%	10.09%	10.18%	9.73%
10	Weighted Average Cost of Capital (WACC)	6.97%	6.80%	6.99%	6.78%
11	Return on Mid-Year Rate Base				
12	Return on Rate Base Financed by Debt	30.4	29.4	114.7	113.5
13	Return on Rate Base Financed by Equity	42.6	42.9	159.7	153.1
14	**Total Return on In-City Water Rate Base**	**73.0**	**72.3**	**274.4**	**266.6**

In-City Water's share of the total system net mid-year rate base is 0.8% less than forecast. This reflects a 1.5% decrease attributable to higher than forecast asset additions for fire protection related assets (hydrants) offset by a 0.7% increase related to the change in In-City Water's demands on water system relative to that of Regional Customers. The In-City Water net mid-year rate base is within 1.5% of the forecast amount.

Return on rate base is calculated separately for the debt-financed and equity-financed portions of In-City Water's net rate base. The rate of return on debt is equal to the embedded cost of debt for EWSI's total water system, as calculated in Table 2.3.6-2 below:

Table 2.3.6-2
Interest Expense and Cost of Debt
($ millions)

		A	B	C	D
Interest Expense and Cost of Debt		**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Interest expense				
2	Interest on short-term debt	0.9	0.2	3.9	3.9
3	Interest on City of Edmonton debentures	0.4	0.4	2.6	2.6
4	Interest on intercompany debentures	36.5	35.8	136.7	133.9
5	Total interest expense	37.9	36.4	143.1	140.3
6	Mid-year debt and other long-term liabilities				
7	Mid-Year Short-term debt	32.7	10.6		
8	Mid-Year Long-term debt	747.9	777.9		
9	Mid-Year Other Long-term liabilities	1.8	2.3		
10	Total mid-year debt and other long-term liabilities	782.4	790.7		
11	**Embedded Cost of Debt**	**4.84%**	**4.60%**	**4.87%**	**4.81%**

The embedded cost of debt is lower than forecast in 2020. Although, EWSI issued more long term debt than forecast, which is more expensive that short term debt, due to favorable economic conditions EWSI was able to issue the long term debt at lower than forecast rates over the 2017 to 2020 period.

2.3.7 Transactions with Affiliates

In-City Water derives a significant proportion of its revenue and expenses from transactions with affiliates, including the City of Edmonton, EUI and its subsidiaries, and other EWSI business units. Table 2.3.7 provides a summary of In-City Water's 2020 actual and forecast transactions with affiliates.

Table 2.3.7
Transactions with Affiliates
($ millions)

		A	B	C	D
		2020		**2017-2020**	
	Affiliate and Service	**PBR Forecast**	**Actual**	**PBR Forecast**	**Actual**
1	**Revenues from the provision of services to the City of Edmonton**				
2	Public Fire Protection	12.2	12.0	46.2	45.9
3	Water sales	3.4	2.2	13.0	12.4
4	Other	0.2	-	0.9	0.1
5	Total	15.8	14.2	60.2	58.4
6	**Services provided by (recovered from):**				
7	**City of Edmonton**				
8	Franchise Fees	16.3	15.5	62.1	59.3
9	Property Taxes	0.5	0.4	1.8	1.1
10	Interest on City of Edmonton Debentures	0.4	0.4	2.6	2.6
11	Mobile equipment services	2.0	2.3	7.6	9.1
12	Other services	1.4	0.2	5.4	2.3
13	Meter Reading Recoveries	-	-	-	(1.4)
14	Total	20.6	18.9	79.4	72.9
15	**EPCOR Utilities Inc.**				
16	Corporate Shared Service Costs	15.9	12.1	61.8	49.1
17	Interest on Intercompany Debentures	36.5	35.8	136.7	133.9
18	Interest on Short-term debt	0.9	0.2	3.9	3.9
19	Other Services	-	0.6	-	0.9
20	Total	53.4	48.1	202.4	187.8
21	**EPCOR Distribution and Transmission Inc.**				
22	Meter Reading Recoveries	-	-	-	(0.5)
23	Other services	0.1	-	0.5	0.0
24	Total	0.1	-	0.5	(0.5)
25	**EPCOR Technologies Inc.**				
26	Hydrovac Charges and Space Rentals	0.9	1.2	3.6	6.0
27	Other Services (Recoveries)	-	(0.1)	-	(0.2)
28	Total	0.9	1.2	3.6	5.8
29	**EPCOR Energy Alberta LP**				
30	Customer Billing and Collection Services	8.7	9.3	33.0	32.8
31	Meter Data Management	-	0.3	-	0.8
32	Trouble Call Support Services	-	0.6	-	
33	Total	8.7	10.1	33.0	33.6
34	**EPCOR Power Development**				
35	Other Services (Recoveries)	-	(0.2)	-	(0.6)

		A	B	C	D
	Affiliate and Service	2020		2017-2020	
		PBR Forecast	Actual	PBR Forecast	Actual
36	**EPCOR Commercial Services**				
37	Commercial Services Rent Recoveries	-	-	-	(0.7)
38	**Other EWSI Business Units**				
39	EWSI Shared Services Allocation	10.5	10.3	40.6	38.4
40	Water Sales to Wastewater	(0.4)	(0.4)	(1.5)	(1.7)
41	Meter Reading Recoveries from Wastewater	(2.5)	(2.4)	(9.0)	(9.3)
42	Meter Reading Recoveries from Drainage Services	(2.5)	(2.4)	(9.0)	(7.7)
43	Customer Service Fees from Drainage Services	-	-	-	0.9
44	Other Services provided to Drainage Services	-	(0.3)	-	(0.5)
45	Meter Reading Recoveries from Other EWSI Business Units	-	-	-	(0.1)
46	Quality Assurance Lab Testing and Other Services from Other EWSI Business Units	-	-	-	0.2
47	Drainage Services Rent (Recoveries)	-	(0.2)	-	(0.2)
48	Total	5.2	4.5	21.1	20.0
49	**Expenditures on capital projects arising from services provided by:**				
50	City of Edmonton	3.2	0.5	12.5	3.0
51	EPCOR Technologies Inc.	4.1	5.7	15.7	18.6
52	EPCOR Utilities Inc.	-	2.3	-	5.1
53	EPCOR Drainage Services	-	2.6	-	9.1
54	EPCOR Distribution and Transmission Inc.	0.1	0.2	0.5	1.2
55	Other EPCOR Business Units	-	-	-	0.2
56	Total	7.3	11.3	28.7	37.1

2.4 Capital Programs

2.4.1 Capital Expenditures

Table 2.4.1 compares approved capital expenditures from the PBR forecast to actual capital expenditures for 2020 for each project with approved or forecast capital expenditures in excess of $5.0 million over the 2017-2021 PBR term, as well as for each project category. Table 2.4.1 also provides a comparison of total 2017-2021 approved capital expenditures to EWSI's current capital forecast.

Table 2.4.1
Capital Expenditures
($ millions)

		A	B	C	D	E	F	G	H	I	
		2020			**2017-2020**			**2017-2021**			
		PBR Forecast*	**Actual**	**Difference**	**PBR Forecast***	**Actual**	**Difference**	**PBR Forecast***	**Current Projection**	**Difference**	
1	**Regulatory**										
2	Water Services Replacement/Refurbishment	2.1	4.7	2.6	8.0	10.7	2.7	10.2	15.5	5.3	1
3	Accelerated Lead Service Replacement (NRA)	2.8	2.5	(0.3)	3.6	2.5	(1.1)	5.9	6.0	0.1	
4	Phosphoric Injection for Lead Control (NRA)	-	1.0	1.0	9.8	2.3	(7.5)	9.8	8.7	(1.1)	
5	Projects < $5 Million	0.3	0.1	(0.2)	1.2	1.7	0.5	1.5	2.0	0.5	
6	**Subtotal**	**5.2**	**8.3**	**3.1**	**22.6**	**17.2**	**(5.5)**	**27.4**	**32.2**	**4.8**	
7	**Growth/Customer Requirements**										
8	Network PD Transmission Mains	2.3	1.3	(0.9)	10.4	18.9	8.6	14.4	26.7	12.3	2
9	Distribution System Modifications	1.0	2.2	1.2	5.0	5.8	0.8	6.0	14.4	8.3	3
10	Water Main Cost Sharing Program	0.5	2.0	1.6	2.2	6.2	4.0	3.0	7.6	4.6	4
11	Water Services Connections	5.1	4.6	(0.5)	18.2	21.9	3.7	23.6	27.2	3.7	5
12	New Water Distribution Mains	1.8	1.6	(0.2)	7.0	8.5	1.5	8.8	10.8	1.9	
13	LRT Relocates (NRA)	6.0	8.5	2.5	18.9	21.9	3.0	24.9	25.6	0.7	
14	Discovery Park Reservoir & CRSWSC Pipe Line (NRA)	0.4	9.2	8.8	9.2	9.5	0.3	9.2	9.7	0.4	
15	PD Construction Coordination	3.5	2.6	(1.0)	11.8	10.4	(1.4)	15.4	13.3	(2.1)	
16	New Meter Purchase/Installation	3.0	2.1	(0.9)	10.1	8.9	(1.1)	13.2	11.2	(2.0)	6
17	Projects < $5 Million	0.2	0.0	(0.2)	2.3	6.5	4.1	2.6	8.9	6.3	7
18	**Subtotal**	23.8	34.0	10.2	95.1	118.5	23.4	121.2	155.4	34.1	
19	**Health, Safety & Environment**										
20	Solar Power Systems (including BESS) Project (net)	-	(3.0)	(3.0)	-	1.4	1.4	-	26.0	26.0	8
21	E.L. Smith - Deep Bed Filtration	10.3	0.0	(10.3)	11.6	0.4	(11.3)	22.3	0.4	(22.0)	9
22	Projects < $5 Million	0.8	0.7	(0.1)	3.1	3.0	(0.1)	4.3	3.3	(1.0)	
23	**Subtotal**	**11.1**	**(2.3)**	**(13.4)**	**14.7**	**4.7**	**(10.0)**	**26.6**	**29.6**	**3.0**	
24	**Reliability & Life Cycle Improvements**										
25	Obsolete Valve Replacement Program	0.8	4.4	3.5	3.3	9.1	5.8	4.1	13.4	9.3	10
26	Structural Rehab Program - E.L. Smith	0.5	1.6	1.1	1.5	3.1	1.5	2.0	10.1	8.1	9
27	Obsolete Hydrants Replacement Program	0.9	2.6	1.7	3.5	7.8	4.3	4.4	10.4	6.0	11
28	Chemfeed Upgrades – E.L Smith	0.5	2.5	2.0	3.6	6.8	3.2	4.0	8.9	4.9	12
29	Chemfeed Upgrades - Rossdale	0.5	1.8	1.4	3.3	7.8	4.5	4.0	8.4	4.4	13
30	Rossdale Filter Underdrain Upgrades	1.2	0.1	(1.2)	4.7	8.1	3.4	4.7	8.1	3.4	14
31	E.L. Smith - Bypass (Ring) Main	5.2	5.6	0.4	7.0	6.2	(0.8)	7.0	10.4	3.4	15
32	HVAC Upgrades – E.L Smith	0.6	0.0	(0.6)	2.8	4.9	2.1	3.4	5.0	1.6	
33	Mechanical Upgrades – E.L Smith	0.7	1.1	0.4	4.1	5.8	1.7	4.9	6.4	1.5	
34	Network Valve Chamber Refurbishment	1.1	2.1	1.0	4.4	5.7	1.3	5.6	7.0	1.4	
35	Rossdale Clarifier C1-2 Upgrade	-	-	-	4.3	5.5	1.1	4.3	5.5	1.1	
36	Vehicle & Fleet Additions	2.2	3.7	1.6	10.1	9.6	(0.5)	11.8	12.1	0.3	

		A	B	C	D	E	F	G	H	I	
		2020			2017-2020			2017-2021			
		PBR Forecast*	Actual	Difference	PBR Forecast*	Actual	Difference	PBR Forecast*	Current Projection	Difference	
37	Water Meter Change Out Program	6.9	2.0	(4.9)	19.0	10.9	(8.1)	25.6	12.8	(12.8)	16
38	Water Main Proactive Renewal	3.7	3.8	0.1	14.2	15.0	0.8	18.0	15.1	(2.9)	17
39	Electrical Upgrades - Reservoirs	0.8	0.2	(0.6)	4.1	2.4	(1.7)	5.3	2.6	(2.7)	18
40	Water Main Reactive Renewal	12.2	11.4	(0.8)	41.1	45.9	4.8	54.7	52.0	(2.6)	19
41	Transmission Mains Replacement/Refurbish	2.8	1.9	(0.8)	10.4	10.5	0.1	13.3	11.7	(1.6)	
42	Cell/Pumphouse Roof Replacement	-	0.1	0.1	4.9	1.6	(3.3)	6.3	5.0	(1.3)	
43	SCADA System Upgrade Program	0.7	0.9	0.1	5.0	3.7	(1.3)	5.7	4.6	(1.1)	
44	Electrical Upgrades - Rossdale	1.2	0.4	(0.8)	3.7	3.6	(0.2)	5.2	4.3	(0.9)	
45	Projects < $5 Million	13.9	11.0	(2.9)	56.6	57.4	0.9	68.0	75.3	7.3	20
46	**Subtotal**	**56.3**	**57.1**	**0.9**	**211.6**	**231.2**	**19.5**	**262.4**	**289.0**	**26.6**	
47	**Performance Efficiency & Improvement**										
48	Water D&T Facility Expansion	-	12.7	12.7	16.0	12.7	(3.3)	16.0	22.5	6.5	21
49	Water Main Cathodic Protection	4.3	4.6	0.3	16.6	14.6	(2.1)	21.0	18.1	(2.9)	22
50	Projects < $5 Million	0.7	2.8	2.1	6.8	5.9	(1.0)	7.1	6.4	(0.7)	
51	**Subtotal**	**5.0**	**20.1**	**15.1**	**39.4**	**33.1**	**(6.3)**	**44.1**	**47.0**	**2.8**	
52	**Accelerated**										
53	Accelerated Water Main Renewal	10.6	11.2	0.6	41.0	41.7	0.7	51.9	41.4	(10.5)	23
54	Accelerated Fire Protection	3.9	1.1	(2.7)	13.3	8.6	(4.7)	15.9	9.8	(6.1)	24
55	**Subtotal**	**14.5**	**12.4**	**(2.1)**	**54.4**	**50.4**	**(4.0)**	**67.8**	**51.2**	**(16.6)**	
56	**Capital Expenditures before contributions**										
57	**Contributions**										
58	Water Services Connections	(5.1)	(2.7)	2.3	(18.2)	(13.6)	4.6	(23.6)	(17.2)	6.4	5
59	Private Development Contributions	(0.5)	(0.1)	0.3	(1.5)	(0.9)	0.5	(1.9)	(1.2)	0.7	
60	New Water Distribution Mains	(1.8)	(1.0)	0.8	(7.0)	(7.2)	(0.2)	(8.8)	(9.3)	(0.5)	
61	**Subtotal**	**(7.3)**	**(3.9)**	**3.5**	**(26.6)**	**(21.7)**	**5.0**	**(34.3)**	**(27.7)**	**6.6**	
62	**Capital Expenditures**	**108.5**	**125.8**	**17.3**	**411.2**	**433.3**	**22.1**	**515.3**	**576.6**	**61.4**	

* Amounts include capital expenditures approved through Non-Routine adjustments.

Explanations for differences between PBR forecast capital expenditures for 2017 to 2021 and EWSI's current projection in excess of $2.0 million on individual projects with total costs in excess of $5.0 million, as well as for project categories in aggregate include:

1. **Water Services Replacement/Refurbishment** – $5.3 million (52%) greater than forecast. This program includes relocation of water service lines that do not meet current servicing standards, reactive replacements of service box and components, and customer-initiated lead service replacements (EPCOR portion of water service lines only). The increased expenditure in the 2017-2021 PBR term is primarily due to a high than expected number services qualifying for replacements combined with the increased capitalization of replacement costs that were previously expensed.
2. **Network PD Transmission Mains** – $12.3 million (85%) greater than forecast. This program represents the reimbursement of the costs incurred by private developers to extend the transmission network (450 mm and larger in diameter) to new subdivisions. Since developers determine both the timing of projects and the areas to be developed, expenditures on this program have proven difficult to forecast. Significant additions to this program include transmission main projects for Ellerslie Road Arterial Twinning Project, 28th Avenue SW/Whitemud Creek Crossing, the Horse Hills Creek/Meridian Street Crossing, 199th Street from 23rd Avenue to 35th Avenue, and Aurum Road 9th Street to 17th Street.
3. **Distribution System Modifications** – $8.3 million (139%) greater than forecast. This program includes relocating or modifying existing water mains and appurtenances to eliminate conflicts arising from COE projects, primarily related to road or sidewalk widening. The increase in program expenditures primarily relates to the combination of the COE's Yellowhead Trail Freeway Conversion project ($4.5 million), the 50th Street Overpass project ($1.8 million), and a large number of additional neighborhood renewals and transportation projects, which were unforeseen in prior years.
4. **Water Main Cost Sharing**– $4.6 million (151%) greater than forecast. This program provides private developers with a partial rebate for the construction of water mains 300 to 400 mm in diameter. Similar to Network PD Transmission Mains, the costs of this program are driven by developer activity. The increase in the costs of this program result from higher than forecast developer activity during the PBR term.
5. **Water Services Connections (net of contributions)** – $10.0 million (100%) greater than forecast. This program provides for the construction of new water services for infill developments and redevelopments. Contributions from private developers were forecast to recover 100% of the construction costs for new water service connections. EWSI found that after accounting for all program costs, its service application rates provide for recovery of less than 75% of the total program costs. Currently, EWSI's costs for completing service connections are recovered through a fee schedule outside the Bylaw and does not reflect EWSI's full cost for these activities. In the 2022-2026 PBR Application EWSI has updated the charge to a cost of service basis for each service connection, which will ensure EWSI achieves 100% recovery in the 2022-2026 PBR term.
6. **New Meter Purchase/Installation** – $2.0 million (15%) less than forecast. The purpose of this program is to comply with the Bylaw, which requires that all water consumed by customers must be metered. The decreased program costs relate primarily to lower activity during the COVID-19 pandemic period, during which home visits have been minimized.
7. **Growth and Customer Requirements < $5.0 million** – $6.3 million (247%) greater than forecast. The projected increase in this category results primarily from the unbudgeted Laurel Booster Station

project needed to address development in a high elevation area ($1.7 million), additional costs to acquire water mains from the Capital Region Northeast Water Service Commission following city expansion ($2.7 million), unbudgeted capital expenditures related to the acquisition of land necessary to construct a future reservoir to supply future water customers between 41 Avenue Southwest and the Edmonton International Airport ($1.6 million), which are partially offset by capital expenditure reductions in other growth projects.

8. **E.L. Smith Solar Farm and Battery Storage (net of contributions)** – $26.0 million (new projects). As noted in Section 2.3.2, instead of purchasing locally produced renewable power at an annual cost of $1.9 million, EWSI plans to construct a solar farm at E.L. Smith. The solar farm is expected to include a battery energy storage system that would be almost entirely grant-funded. The solar farm will include approximately 45,000 solar panels located on 51 acres of land to the southwest of the water treatment plant, and is expected to generate 21,500 MWh of renewable electricity in its first year of operations.
9. **Deep Bed Filtration Conversion – E.L Smith** – $22.0 million (99%) less than forecast and **Structural Rehabilitation Program – E.L Smith** – $8.1 million (400%) greater than forecast. During engineering inspections in 2018, EWSI identified immediate needs for structural rehabilitation of the E.L. Smith Stage 1 and Stage 2 filter plenums (12 filters in total). Accordingly, the conversion to deep bed has been postponed to the 2032-2036 PBR term so that the required structural rehabilitation and upgrades can be completed first.
10. **Obsolete Valve Replacement Program** – $9.3 million (225%) greater than forecast. Higher than expected rates of deterioration, requiring adjustments to valve replacement schedules, combined with the increased capitalization of replacement costs that were previously expensed are attributable for the increase in project costs. Although the projected cost of this program has increased substantially, improving overall valve operability in the system reduces isolation time, lessens the potential for property damage and mitigates customer impacts during emergency main break response.
11. **Obsolete Hydrant Replacement Program** – $6.0 million (136%) greater than forecast. Similar to the obsolete valve replacement program, higher than expected rates of deterioration have led to increased backlog, requiring adjustments to hydrant replacement schedules. EWSI has adjusted its hydrant replacement schedule to clear backlogs and ensure fire protection service levels are maintained.
12. **Chemfeed Upgrades – E.L Smith** – $4.9 million (122%) greater than forecast. Higher than estimated costs for a significant fluoride room upgrade to replace end-of-life equipment, and unanticipated upgrades to the sodium hypochlorite room, including new generation cells, are the primary factors contributing to the increase in the costs of this program.
13. **Chemfeed Upgrades – Rossdale** – $4.4 million (109%) greater than forecast. EWSI identified significant health, safety and environmental needs, requiring extensive upgrades to the sodium bisulphite room, which accounts for the majority of the program overage during the current PBR term.
14. **Filter Underdrain Upgrades – Rossdale** – $3.4 million (72%) greater than forecast. Both the scope and cost of this project have increased following an inspection of the filter underdrain system that identified unforeseen needs for upgrades to air scour systems, combined with an unexpected increase in the price of steel.

15. **Bypass Main (Ring Main) – E.L Smith** – $3.4 million (48%) greater than forecast. The scope of this project includes the construction of a new bypass primary feeder to help ensure redundancy and uninterrupted service to North and West Edmonton. In 2019, a historical resource impact assessment confirmed the presence of cultural materials within the proposed construction area, requiring archaeological mitigation, and increasing total project costs. Further design also identified the requirement for additional manual isolation valves to improve operational flexibility and isolation redundancy.
16. **Water Meter Change out Program** – $12.8 million (50%) less than forecast. The decrease in the projected cost of this program results from an improvement in the expected lives of the batteries used in the meters. As a result, fewer meters are expected to require replacement during the current PBR term.
17. **Water Main Proactive Renewal** – $2.9 million (16%) less than forecast. This project is very closely tied to Reactive Renewal and includes replacements or upgrades of water mains in older areas where water mains do not conform to current design standards for water quality, fire protection, and system reliability.
18. **Electrical Upgrades Program – Reservoirs** – $2.6 million (49%) less than forecast due to the deferral of lower priority electrical upgrades to a future PBR terms.
19. **Water Main Reactive Renewal** – $2.6 million (5%) less than forecast. Actual-to-forecast variances for this program generally correlate with the number of main breaks occurring, which is dependent upon weather conditions. Although the unit cost of construction for water main replacements has increased due to changes in the City's road restoration standards, increased traffic accommodation requirements, and an increase in transmission mains that qualify for replacement, the ongoing decrease in cast iron water main breaks has resulted in a decrease in the total length of candidates to be replaced, which more than offsets the increase in renewal costs per linear foot.
20. **Reliability and Life Cycle Improvements < $5.0 million** – $7.3 million (11%) greater than forecast. The projected increase in this category result primarily from the combination of the increased scope of the Rossdale stilling basin upgrade project ($3.0 million); accelerated roof and structural upgrades to Rossdale Reservoir Cell #1 ($4.2 million), and unbudgeted CRNWSC and NW transmission main inspection costs ($3.7 million). These increases were offset by the deferral of lower priority Rossdale roof replacements ($2.0 million), E. L. Smith electrical upgrades ($2.5 million) and a significant portion of the E.L. Smith High Level Pump #5 upgrades to the next PBR term ($3.7 million). The remaining increase was related mainly to other annual water treatment plant programs required to rehabilitate or replace on a life-cycle basis. Within each of these programs, the most critical work was prioritized for completion within the current PBR term and deferrable projects were rescheduled for future terms.
21. **Water D&T Facility Expansion** – $6.5 million (41%) greater than forecast. Completion of the D&T Facility was originally planned for 2017. This project has been re-scoped following the transfer of Drainage to EPCOR and the completion of an EPCOR-wide real estate review. The review concluded that a consolidated solution for Water and Drainage would provide long-term synergies and operational efficiencies that would outweigh the additional capital costs. In August 2020, EWSI finalized the purchase of a developed property on Aurum Road in North East Edmonton, which is ideally suited to EWSI long term needs. Site renovations will be required before large scale moves can occur in late 2021 and are included within the projected capital expenditure overage for this

project. The costs for the project have been allocated 40% to Water Services and 60% to Drainage Services based on estimated headcount.

22. **Water Main Cathodic Protection** – $2.9 million (14%) less than forecast. The reduction in the costs of the program result from adoption of more efficient anode installation processes combined with delays attributable to the ongoing COVID-19 pandemic.

23. **Accelerated Water Main Renewal** – $10.5 million (20%) less than forecast. The expenditures within this program are largely dependent upon the City paving program plans and the water main break frequency. The reduction in the forecasted program is primarily due to the reprioritization of other more critical lifecycle and reliability programs.

24. **Accelerated Fire Protection** – $6.1 million (38%) less than forecast. EWSI expects that expenditures over the remainder of the 2017-2021 PBR term will be less than approved amounts, due to a smaller number of potential sub-projects meeting the Accelerated Fire Protection Program criteria. EWSI has allocated a portion of the additional funding towards the Infill funding program that was introduced in 2019. This is a trail program that offsets the costs of infrastructure upgrades in infill areas and was developed in conjunction with IDEA and the COE. Additionally, funding has also been directed to critical work which has been identified in areas such as Distribution System Modifications (for City-driven relocates) and Transmission Main inspection work where capital expenditures are expected to exceed levels in the PBR forecast.

2.4.2 Construction Work in Progress

In-City Water's rate base consists of plant in service. If a capital project is not completed (i.e. not placed into service) in the year, the capital expenditures on that project remain in Construction Work in Progress and are excluded from the rate base. In 2020, as shown on Table 2.4.2, the balance in Construction Work in Progress was $15.4 million greater than forecast, of which $6.7 million relates to the new Water D&T and Drainage shared facility, and $6.2 million for the E.L. Smith Bypass Main project.

Table 2.4.2
Construction Work in Progress
($ millions)

		A	B	C	D
		2020		2017-2020	
	Construction Work in Progress	PBR Forecast	Actual	PBR Forecast	Actual
1	Balance, beginning of period	4.7	20.7	0.3	3.8
2	Capital Expenditures	101.5	125.8	377.8	433.2
3	Capital Additions	(94.4)	(119.2)	(366.3)	(409.8)
4	**Balance, end of period**	**11.8**	**27.2**	**11.8**	**27.2**

The PBR plan allows EWSI to capitalize the costs of financing certain projects remaining in Construction Work in Progress, using an allowance for funds utilized during construction (AFUDC). In 2020, AFUDC included in capital expenditures on eligible projects amounted to $1.4 million, compared to the PBR forecast amount of $0.7 million.

2.5 Operational Performance

2.5.1 Water Quality Index

The Water Quality index is calculated as the percentage of water quality test results that meet EWSI's internal water standards. Water quality standards are established by both the federal and provincial governments and are incorporated into EWSI's Approval to Operate from Alberta Environment and Parks (AEP). In some cases, EWSI sets even stricter limits for critical parameters that are identified in EWSI Quality Standards, to provide early warnings of potential water quality problems; so that corrective actions can be taken before external standards are not met.

Table 2.5.1
Water Quality Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Water Quality Index	The percentage of the total number of water quality tests taken in the period that do not yield suspect results	> 99.7%	99.8%	1.001
			Average Index	1.001
			Index Standard Points	25.0
			Total Actual Points	25.0
			Maximum Available Points Including Bonus Points	25.5
			Total Points Earned	**25.0**

2020 Highlights

- **Water Quality Index:** EWSI met all Health Canada Drinking Water Quality Guidelines and Alberta Environment and Parks' water quality testing requirements in 2020. During the year, EWSI collected 59,271 samples of treated drinking water, of those samples only 147 (0.25%) did not meet EWSI internal water quality standards.

  The majority of variances from EWSI internal water quality standards in 2020 were related to temporary increases in turbidity and/or decreases in chlorine concentrations in samples collected from the distribution system. Customer water quality inquiries were also related to increased turbidity and/or decreased chlorine.

2021 Areas for Improvement

- **Water Quality Index:** Increases in turbidity and/or decreases in chlorine concentrations, can be partly explained by changing water consumption patterns resulting from the COVID-19 pandemic. In response to changing consumption patterns EWSI developed a communication strategy to encourage large facility owners to flush their building's plumbing system when experiencing low occupancy. Additionally, EWSI conducted an analysis of the distribution system looking for areas of low consumption (increased stagnation) where increases in turbidity and/or decreases in chlorine concentrations were more likely to occur. Based on this distribution system assessment, additional flushing activities were completed in areas where potential stagnation was identified. Both of these programs will also continue in 2021.

2.5.2 Customer Service Index

The customer service index is a composite measure of the customers' perception of satisfaction with EWSI service, the aesthetic quality of water and speed of response to customer issues.

Table 2.5.2
Customer Service Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Post Service Audit Factor	The percentage of the customers responding as "completely" or "very satisfied" in the level of service received from the EWSI Emergency group.	> 74.9%	74.2%	0.990
Home Sniffing Factor	The percentage result of customer satisfaction for the home sniffing survey.	> 94.4%	95.1%	1.008
Response Time Factor	The average number of minutes needed to confirm a water main break from the time a call is received at EWSI's dispatch office.	< 25	17.8	1.290
Planned Construction Impact Factor	The percentage of the total planned construction events where EWSI complies with required construction notification procedures.	> 95.8%	97.3%	1.015
			Average Index	1.076
			Index Standard Points	20.0
			Total Actual Points	21.5
			Maximum Available Points Including Bonus Points	23.0
			Total Points Earned	**21.5**

2020 Highlights

- **Post Service Audit (PSA) Factor**: In 2020, EWSI continued to focus on enhancing the customer experience and continued to see improvement to the PSA compared to prior years. Water worked with Drainage Services and EPCOR Distribution & Transmission to establish common call handling processes for utility related emergencies.
- **Home Sniffing Factor**: The Home Sniffing program is designed to measure the impact of spring run-off in the river and the effectiveness of water treatment during this period, particularly in terms of mitigating run-off related odours at the tap. Spring runoff started in mid-April and its intensity and duration posed some of the greatest challenges the Edmonton water treatment plants have experienced in recent years. Despite these challenges, production was maintained, and taste and odour concerns were managed effectively. Through information collected from 300 home sniffers, data trends were analyzed which provided useful feedback for plant operators during spring runoff.

  Following the three-month customer home sniffing monitoring period, the 2020 customer satisfaction factor was 95.1%, which exceeded the target of 94.4%.
- **Response Time Factor:** EWSI continued to exceed the Response Time Factor through efficient dispatching of crews. Crews are typically assigned to a quadrant and stay within that quadrant allowing efficient dispatching to main breaks.

- **Planned Construction Impact Factor:** A number of newly hired inspectors and coordinators were trained in 2020 on the steps required to meet targets for the Planned Construction Impact Factor. This included formal workshops and informal training sessions through job shadowing. Additional improvements included development of further refined construction coordination plans and enhancements to IT infrastructure for field resources to improve field-to-office communication and give better visibility on construction timelines.

2021 Areas for Improvement

- **Post Service Audit (PSA) Factor**: In 2021, EWSI will continue to focus growing the customer service culture through first call resolution, procedure reviews, and continuing to build customer service skills.
- **Home Sniffing Factor**: A major improvement in 2020 was having next-day home sniffing results available daily, including weekends. This increased response frequency will continue in 2021.

  In 2021, extra emphasis will be placed on home sniffing recruitment to ensure that the home sniffers' distribution represents all areas of the City. Further, measures are required to reduce multiple entries and to encourage home sniffers to submit their results on the day the sniff test is completed, and EWSI will be encouraging participants to stay involved throughout the full monitoring period.
- **Planned Construction Impact Factor:** In 202,1 there will be an increased focus on managing construction projects that are completed with internal Water D&T crews. Additionally, customer notification letters will be revised to include more useful information for customers, and level 3 process maps for all construction coordination activities will be developed to help firm up existing processes that are used to complete these construction projects.

2.5.3 System Reliability and Optimization Index

The System Reliability Index is a measure of the confidence that customers can place in the reliability of the waterworks system.

Table 2.5.3
System Reliability and Optimization Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Water Main Break Factor	The number of water main breaks that occurred in the reporting period.	< 419	201	1.520
Water Main Break Repair Duration Factor	The percentage of water main breaks repaired and confirmed by EWSI within 24 hours from the time that the flow of water is shut off, excluding main breaks on arterial or collector roads.	> 93.7%	98.2%	1.048
Water Loss Factor	The Infrastructure Leakage Index, a performance indicator quantifying how well a water distribution system is managed for the control of "real" water losses (i.e. leakage).	< 2.0	0.84	1.580

Index Component	PBR Performance Measure	Standard	Actual Score	Index
System Energy Efficiency Factor	The energy used at all water facilities in kWh divided by the average annual water production per residential customer account (ML/kWh/customer).	< 309	249	1.243
			Average index	1.348
			Index Standard Points	25.0
			Total Actual Points	33.7
			Maximum Available Points Including Bonus Points	28.5
			Total Points Earned	**28.5**

2020 Highlights

- **Water Main Break Factor:** EWSI experienced 201 water main breaks in 2020. This is 218 less than the PBR standard of 419. This result is attributable to fewer breaks during winter months as well as the effectiveness of past and on-going water main replacement programs.
- **Water Main Break Repair Duration Factor:** In 2020, 98.2% of main breaks were repaired within 24 hours. This exceeded the PBR standard of 93.7%. When water main break repairs approach 20 hours in duration EWSI provides additional communication to affected customers, and when required, provides temporary water supply support via water tanks, hose hook ups, or delivery of water jugs to affected customers.
- **Water Loss Factor (ILI):** In 2020, EWSI's Infrastructure Leak Index (ILI) of 0.84 exceeded the PBR standard.
- **System Energy Efficiency Factor:** The water distribution system energy efficiency performance decreased slightly in 2020, relative to 2019, due to the impact of the COVID-19 pandemic. The shift in both consumption and primary pressure zones from commercial and industrial areas to residential areas resulted in increased power consumption.

  Despite the decrease in performance, EWSI implemented several energy efficiency improvements and GHG reductions, including:

  - Completion of several building envelope energy efficiency enhancement projects; and
  - Implementation of reservoir temperature control during non-occupied periods resulted in an 11% reduction in gas consumption (with heating and cooling degree days taken into account).

2021 Areas for Improvement

- **Water Loss Factor (ILI):** EWSI will continue to explore continuous improvement options to quantify and validate inputs and to identify and minimize water loss opportunities.
- **System Energy Efficiency Factor:** In 2021, EWSI has several key energy efficiency initiatives planned which will include:
  - Update the Water Canada Climate Change Adaptation Plan;
  - Continue with implementation of the office and reservoir off-hour temperature control program; and

- Continue to improve the building envelope energy efficiency programs to reduce GHG emissions.

2.5.4 Environment Index

The environmental index measures the success of programs and policies designed to mitigate and report adverse environmental impacts.

Table 2.5.4
Environmental Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Water Conservation Factor	The actual 10 year rolling average monthly Edmonton residential consumption per household.	<17.2	15.1	1.139
Environment Incident Factor	The number of reportable and preventable environmental incidents.	<6	6	1.000
Solids Residual Management Factor	The average number of days that the Rossdale and E.L. Smith water treatment plants are operating in direct filtration mode.	> 120	167.8	1.398
			Average index	1.179
			Index Standard Points	15.0
			Total Actual Points	17.7
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

2020 Highlights

- **Water Conservation Factor:** As a result of people spending more time at home during the COVID-19 pandemic residential consumption per customer increased in 2020. Higher indoor residential consumption was partially offset by a reduction in seasonal consumption, as a result of higher than usual precipitation over the summer months. Despite the COVID-19 pandemic, the actual Water Conservation Factor was still well below the standard. This is attributable to historical and ongoing changes in water usage habits and technology improvements resulting in efficient appliances and toilets.

- **Environment Incident Management Factor:** There were a total of six reportable and preventable incidents in 2020. Several of the incidents were lab-based which correlated to sampling errors.

  Root causes were identified for each incident, many pertained to management system issues such as inadequate communication or procedures. Subsequently, corrective actions were identified, assigned, and completed in a timely manner.

- **Solids Residual Management Factor:** In 2020, the water treatment plants successfully operated in direct filtration despite more challenging raw water conditions (e.g. higher colour) than have been experienced in the past. Both water treatment plants operated an average of 168 days in direct filtration relative to the target of 120 days. As a result, total solids discharged to the North Saskatchewan River during the winter months (January, February, November and December) were reduced by 43.3% relative to baseline conventional treatment and total solids reduction was 5.6% for the year.

2021 Areas for Improvement

- **Water Conservation Factor:** The impacts of COVID-19 pandemic have continued into 2021 with higher than usual residential consumption per customer. The duration of the COVID-19 impacts is uncertain, but changes in consumption patterns are likely to continue into at least the early part of the summer. The past two years have experienced colder and wetter than average summers, a more typical summer could result in a large increase in residential consumption for outdoor purposes such as lawn watering.

  Apart from COVID-19, residential consumption per customer will continue to decline due to changes in technology and water conservation awareness. Renovations in older homes will see inefficient appliances and toilets replaced with more efficient ones and new homes will be built with high efficiency appliances and low flush toilets already in place.

- **Environment Incident Management Factor:** Ongoing focus for 2021 will be on reducing the number of reportable incidents by continuing to perform root causes analysis and timely implementation of corrective actions for significant environmental and public health incidents.

  EWSI will also be implementing new consolidated Health, Safety, and Environment incident reporting and management guideline. This guideline is intended to help address management system issues identified in 2020.

- **Solids Residual Management Factor:** EWSI will continue to optimize chemical dosing and other operating strategies for direct filtration, with the goal being to minimize solids discharged to the North Saskatchewan River.

2.5.5 Safety Index

The safety index is a measure of the success of programs and the application of policies that maximizes the safety of employees and the public.

Table 2.5.5
Safety Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Near Miss Reporting Factor	The number of near miss reports entered in the ERS system.	>550	724	1.316
Work Site Inspections and Observations Factor	Number of Work Site Inspections and observations completed per year.	>1,032	3,140	3.043
Lost Time Frequency Factor	The actual lost time frequency rate.	<0.57	0.00	2.000
All Injury Frequency Factor	The actual all injury frequency rate	< 1.54	0.59	2.630
			Average index	2.247
			Index Standard Points	15.0
			Total Actual Points	33.7
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

2020 Highlights

- **Near Miss Reporting Factor:** Near miss and hazard identification reporting continued to be an effective means to proactively identify hazards and implement corrective actions to mitigate potential harm to employees, contractors and members of the public.
- **Work Site Inspections / Observations Factor:** Work site inspections and observations continued to be a successful leading indicator that provided leadership and employees the opportunity to engage in field activities, proactively identify areas of improvement, and verify conformance to EWSI standards.
- **Lost Time Frequency Rate Factor:** In 2020, EWSI exceeded the lost time frequency rate factor by having no lost time events.
- **All Injury Frequency Rate Factor:** In 2020, EWSI had 3 recordable incidents (Medical Treatment). Two were related to musculoskeletal strains and one was due to an abrasion.

2021 Areas for Improvement

- **Near Miss Reporting Factor:** With consideration of the ongoing impact of the COVID-19 pandemic, there will be a heighted focus on the reporting of near miss and hazard identification events throughout 2021. This ensures employees keep their mind on task and continue with proactive reporting to mitigate hazards before an event occurs.
- **Work Site Inspections / Observations Factor:** With consideration of the ongoing COVID-19 pandemic, EWSI will monitor inspection and observation activities and look for opportunities to continue to conduct proactive field engagements.

- **Lost Time Frequency Rate & All Injury Frequency Rate Factors:** Water Canada has developed risk profiles specific for water treatment plants and water distribution and transmission operations. This will enable EWSI to identify top health and safety risks specific to work environments and implement mitigating factors where possible. The objective will be to ensure effective and meaningful controls are in place to reduce the potential for harm to employees, contractors, and the public.

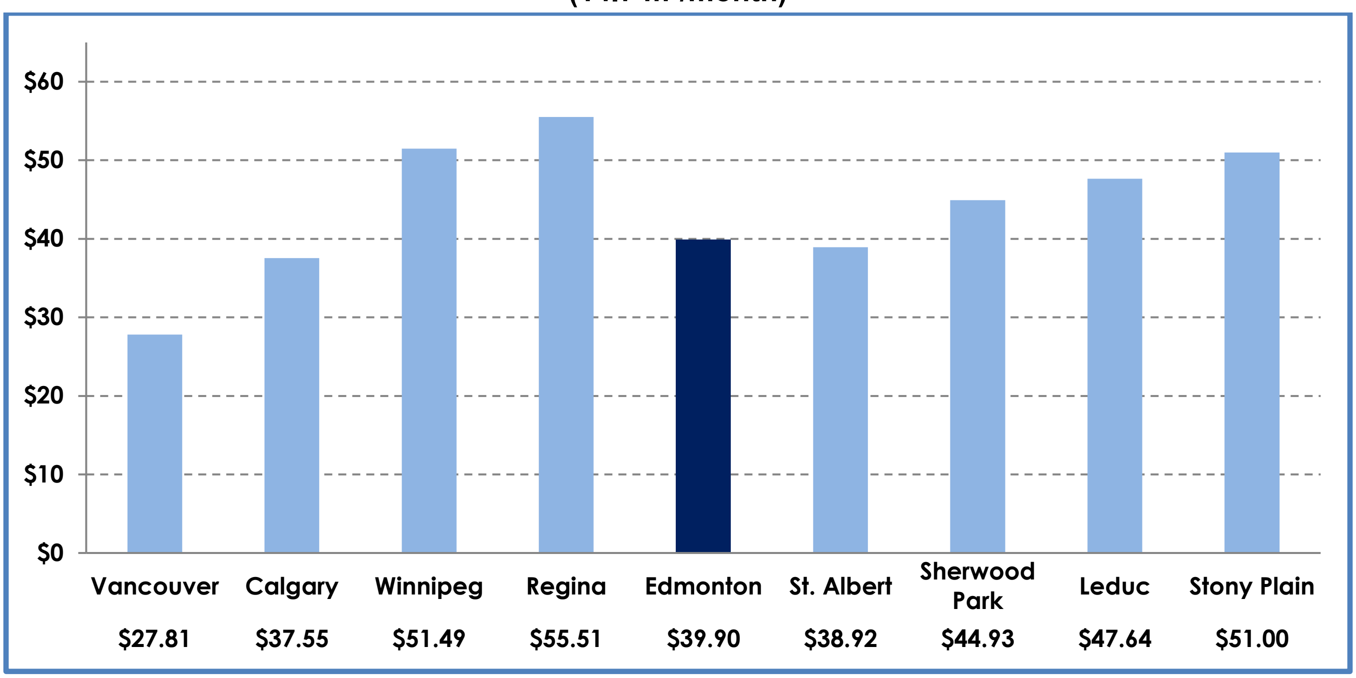
2.6 Rates and Bill Comparisons

Water bill comparisons for 2020 are based on the published water rates for Calgary, Vancouver, Winnipeg and Regina, as well as four local communities. These bill comparisons represent the total cost to the customer and include fixed charges, consumption charges and any other applicable surcharges.

2.6.1 Residential Water Bills

Figure 2.6.1 provides a comparison of residential household water bills for residential household consumption of 14.7 m^3 per month, the average residential customer consumption per month in Edmonton in 2020. Comparison of residential water bills shows that Edmonton's water bills are competitive with all of the cities and local communities surveyed, except for Vancouver. This result is not unexpected. Vancouver has an excellent raw water source and, therefore, has lower needs for water treatment than Edmonton which has a naturally highly variable water source in the North Saskatchewan River.

Figure 2.6.1
2020 Monthly Residential Water Bill Comparison
(14.7 m^3/month)



2.6.2 Commercial Water Bills

Table 2.6.2 provides a comparison of the water bills for commercial customer of various sizes. This table shows that water bills for EWSI's commercial customers are competitive with all of the other surrounding communities and other major cities in western Canada, except for Vancouver.

Table 2.6.2
Commercial Monthly Water Bill Comparison
($ per month)

		A	B	C	D
	Monthly Bill - $ per month	**Small**	**Medium**	**Large**	**Extra Large**
1	**Monthly Consumption** - m^3	**10**	**250**	**1,000**	**5,000**
2	Vancouver	21.63	336.72	1,370	6,703
3	Calgary	43.10	379.98	1,565	7,668
4	Regina	45.90	545.70	2,321	10,940
5	Winnipeg	42.73	497.97	1,976	9,572
6	**Edmonton**	**28.18**	**417.73**	**1,670**	**7,048**
7	St. Albert	30.68	450.68	1,763	8,763
8	Sherwood Park	32.26	677.86	2,695	13,455
9	Stony Plain	34.67	866.78	3,467	17,336
10	Leduc	40.20	668.21	2,772	13,111

3 Wastewater Treatment Services

3.1 Accomplishments and Challenges

In 2020, Wastewater's key accomplishments included:

- Completing an updated Edmonton Wastewater Treatment Integrated Resource Plan (the "IRP") following extensive public engagement from 2017 to 2019. The IRP documents the long term planning process for its wastewater treatment system considering: regulatory changes; technological advancements; changes in volume and characteristics of wastewater and stormwater flows; lifecycle replacement requirements for assets at Gold Bar WWTP and at the Clover Bar Biosolids Recovery Facility; climate change impacts; and EWSI's commitments to stakeholders. EWSI identifies the investments and operational activities that would be required under each of these scenarios, through evaluation of environmental and social impacts, operational, planning and infrastructure responses, risk assessment and management, financial analysis and community impacts. Each project proposed in the IRP is tested against the shared outcomes developed through public engagement processes. In some cases, shared outcomes can drive the pace of implementation of projects.

- Implementing cost controls and efficiency initiatives across all areas of Wastewater's operations, achieving savings in chemical costs from dosing optimization, in contractor costs following the dissolution of the Centre of Excellence, and in engineering costs by reducing the number of engineering studies. EWSI also found opportunities to utilize more internal personnel in certain capital maintenance and repair programs in place of contractors. These adjustments reduced operating expenses by increasing capitalization of internal labour costs and additional capitalized overheads. Finally, as noted above, corporate shared service cost allocations were reduced following the Drainage Services transfer.

- Making significant progress in identifying and rehabilitating deteriorating facilities and improving process performance and reliability at EWSI's wastewater treatment operations. Notwithstanding these successes, many operational and asset management challenges remain such as controlling odours, correcting deteriorating asset condition, and optimizing process performance, stability and reliability. EWSI plans to address these challenges in its capital and operating plans for the upcoming 2022-2024 PBR term.

- Under its One Water Planning approach, initiating the Sanitary Integrated Resource Plan (SanIRP). Under the Sanitary IRP, EWSI will continue to develop strategies to maximize the capture of wet weather flow and diversion to Gold Bar WWTP for enhanced primary treatment and to reduce loadings of bacteria and solids to the North Saskatchewan River. The development of SanIRP will incorporate many synergy opportunities with other EWSI initiatives including SIRP. One of SIRP's initiatives is to promote the wide spread installation of Low Impact Development (LID) features. Installation of LID will reduce stormwater flows to the storm and combined sewer networks, and decrease the combined sewer flow to Gold Bar WWTP and the environment. A city wide performance matrix called Green Hectares has been adopted to track the installation of LID in Edmonton.

3.2 Customers and Consumption

Wastewater's customer counts, consumption and consumption per customer are similar to those of In-City Water. Differences in customer counts, almost entirely within the commercial customer class, are attributable to "water-only" customers who are not tied into the City's drainage system, such as businesses in industrial parks that are served by septic systems, as well as seasonal water customers, such as commercial lawn watering services and golf courses. Table 3.2 below provides a comparison of 2020 and 2017-2020 forecast to actual customer counts and consumption per customer.

Table 3.2
Wastewater Treatment Customers, Consumption and Consumption per Customer

		A	B	C	D
	Customers and Consumption	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Customers				
2	Residential	271,073	272,428	263,585	266,445
3	Multi-Residential	3,883	3,779	3,814	3,769
4	Commercial	17,190	17,056	16,862	16,899
5	Total	**292,146**	**293,263**	**284,261**	**287,113**
6	Monthly Consumption per Customer				
7	Residential	13.9	14.7	14.3	14.4
8	Multi-Residential	408.8	407.1	408.8	396.4
9	Commercial	119.0	92.4	121.9	110.2
10	Annual Consumption - ML				
11	Residential	45,329.0	48,202.7	180,671.1	184,052.0
12	Multi-Residential	19,047.7	18,462.5	74,846.2	71,703.4
13	Commercial	24,537.3	18,920.9	98,624.0	89,404.9
14	Total	**88,914.0**	**85,586.0**	**354,141.3**	**345,160.3**

Actual to forecast differences in Wastewater's customer counts and consumption are attributable to the same factors discussed in Section 2.2.

3.3 Financial Performance

Wastewater's revenue requirements are summarized on Table 3.3 below.

Table 3.3
Wastewater Treatment Revenue Requirements
($ millions)

		A	B	C	D
	Summary of Revenue Requirements	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Wastewater Rate Revenue*	105.6	99.0	383.6	365.7
2	Wastewater Revenue Requirement				
3	Operating expenses	59.6	53.9	226.3	200.5
4	Other revenue	(7.1)	(6.4)	(26.5)	(25.7)
5	Depreciation and amortization	19.0	19.6	66.0	68.1
6	Return on rate base financed by debt	13.4	11.7	47.5	44.2
7	Return on rate base financed by equity	20.6	20.1	73.6	78.6
8	Wastewater Revenue Requirement*	105.6	99.0	386.9	365.7
9	**Return on Rate Base Financed by Equity**	**10.18%**	**10.70%**	**10.18%**	**11.52%**

* In the PBR forecast, rebasing and other special rate adjustments have been smoothed over the PBR term. Therefore, although forecast revenue is equal to the revenue requirement over the 2017-2021 PBR term, in any year within the PBR term, forecast revenue may be greater or less than the revenue requirement

Detailed explanations for forecast to actual variances for each of the elements of the revenue requirement are provided in sections 3.3.1 to 3.3.6.

3.3.1 Revenue

Wastewater's rate revenues include fixed monthly services charges applied on a per connection basis, and consumption charges applied to each cubic metre of consumption. Besides rate revenues, Wastewater also has a relatively small amount of other revenue, about 60% of which relates to overstrength surcharges that are subject to the same rate adjustment mechanism as Wastewater's rate revenue. Table 3.3.1 below provides a comparison of Wastewater's 2020 actual and forecast revenue.

Table 3.3.1
Wastewater Treatment Revenue
($ millions)

		A	B	C	D
	Wastewater Treatment Revenue	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Fixed Monthly Service Charges				
2	Residential	16.9	15.5	60.4	56.6
3	Multi-Residential	0.2	0.2	0.9	0.8
4	Commercial	1.1	1.0	3.9	3.6
5	Fixed Monthly Service Charges	18.3	16.7	65.1	61.0
6	Consumption Charges				
7	Residential	45.2	47.0	164.9	165.0
8	Multi-Residential	19.0	18.0	68.4	64.2
9	Commercial	23.1	17.3	85.2	75.5
10	Consumption Charges	87.3	82.3	318.4	304.7
11	Wastewater Rate Revenue	105.6	99.0	383.6	365.7
12	Other Revenue	7.1	6.4	26.5	25.7
13	**Total Wastewater Treatment Revenue**	**112.6**	**105.4**	**410.1**	**391.4**

Wastewater's revenues were $6.6 million less than forecast in 2020, and $17.9 million less than forecast over the 2017-2020 PBR period. This difference is attributable to three factors:

- Lower than forecast inflation resulted in $2.5 million less revenue in 2020 than forecast ($7.5 million lower than forecast for 2017-2020). Since rate increases are capped at inflation less the efficiency factor ("i-x"), lower than forecast inflation from 2016 to 2020 will continue to impact revenues throughout the remainder of the 2017-2021 PBR term;
- Lower than forecast consumption resulted in a $3.0 million decrease in 2020 ($8.0 million lower than forecast for 2017-2020). As with Water in 2020, commercial consumption was 22.9% lower than the PBR forecast primarily attributable to the COVID-19 pandemic. This is partially offset by higher than forecast residential consumption (6.3%); and
- The Non-Routine Adjustment related to the transfer of Drainage Services to EPCOR (see Section 1.5) has reduced revenues by $1.1 million in 2020 relative to the forecast ($3.0 million lower than forecast for 2017-2020).

3.3.2 Operating Expenses by Function

Wastewater's operating expenses are presented and analyzed on both functional and cost category bases. Actual and forecast operating expenses by function are shown in Table 3.3.2 below:

Table 3.3.2
Wastewater Treatment Operating Expenses by Function
($ millions)

		A	B	C	D
	Function and Sub-function	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Power, Other Utilities and Chemicals				
2	Power and Other Utilities	5.6	5.2	21.6	19.9
3	Chemicals	1.7	1.3	6.5	4.8
4	Power, Other Utilities and Chemicals	7.2	6.5	28.1	24.6
5	Wastewater Treatment				
6	Wastewater Treatment Plant	20.3	18.1	76.6	70.3
7	Operations Support Services	8.5	6.5	32.9	25.7
8	Capitalized Overhead	(2.5)	(2.5)	(9.6)	(11.7)
9	Wastewater Treatment	26.3	22.1	99.9	84.3
10	Billing, Meters and Customer Service				
11	Billing and collections	3.6	3.8	13.5	13.5
12	Meter reading	2.5	2.4	9.6	9.3
13	Regulatory Services	1.0	1.5	4.0	5.3
14	Billing, Meters and Customer Service	7.1	7.8	27.2	28.2
15	EWSI Shared Services				
16	EWSI Shared Services	3.5	3.8	13.7	13.4
17	Incentive and Other Compensation	1.2	1.4	4.6	3.2
18	EWSI Shared Services	4.7	5.3	18.3	16.6
19	Corporate Shared Services	5.2	4.1	20.0	16.0
20	Franchise Fees and Property Taxes				
21	Franchise Fees	7.9	7.7	29.4	28.5
22	Property Taxes	1.2	0.6	3.7	2.3
23	Franchise Fees and Property Taxes	9.2	8.3	33.1	30.9
24	**Total Operating Expenses by Function**	**59.7**	**54.0**	**226.5**	**200.7**

Overall, Wastewater's operating expenses for 2020 were $5.7 million less than forecast ($25.8 million less for 2017-2020). Key factors contributing to this difference include:

- **Power and Other Utilities** – $0.4 million less than forecast in 2020, ($1.7 million lower than forecast for 2017-2020), due to lower than forecast power prices.
- **Chemicals** – $0.4 million lower than forecast in 2020 ($1.7 million lower than forecast for 2017-2020), primarily attributable to two factors. First, the Ostara nutrient removal facility was offline more than expected, resulting in lower chemical usage over the 2017 to 2020 period. Second, process and dosing optimization enabled Wastewater to achieve significant reductions in alum usage over the 2017 to 2020 period. These savings are expected to continue to be realized on an ongoing basis.
- **Wastewater Treatment** – $4.2 million lower than forecast in 2020 ($15.6 million lower than forecast for 2017-2020). The variance is primarily attributable to adjustments to the capital program, where projects with a high component of contractor costs have been replaced by capital maintenance and repair projects completed by Wastewater personnel. These changes have led to capitalization of an additional $0.6 million of internal labour costs that would otherwise have been expensed ($5.8 million for 2017-2020) and additional capitalized overheads of $0.1 million in 2020 ($2.0 million for 2017-2020). Besides these changes, the variance also reflects lower than forecast fringe benefits costs of $0.5 million in 2020 ($2.4 million lower than forecast for 2017-2020) related to lower pension

contributions, and $2.4 million in savings in contractor costs ($3.9 million lower than forecast for 2017-2020) resulting from dissolution of the Centre for Excellence, lower maintenance costs, and the completion of fewer engineering studies in 2020. The remainder of the variance results from numerous small items, none of which are individually significant.

- **EWSI Shared Services** – $0.5 million higher than forecast in 2020 ($1.7 million lower than forecast for 2017-2020). Higher than forecast costs in this category in 2020 reflects a $0.3 million increase in business unit allocations ($0.3 million lower than forecast for 2017-2020) and higher than forecast incentive compensation of $0.2 million ($0.6 million lower than forecast for 2017-2020). The 2017-2020 variance also includes $0.8 million of savings in long term disability premiums, the remainder of the variance results from numerous small items, none of which are individually significant.
- **Corporate Shared Services** – $1.0 million less than forecast in 2020 ($4.0 million less for 2017-2020). These differences reflect both the reduction in corporate cost allocations resulting from the transfer of Drainage from the City of Edmonton to EUI, as well as cost savings in corporate functions. As with In-City Water, the cost reductions arising from the transfer of Drainage Services have been returned to Wastewater customers through a Non-Routine Adjustment to 2018 wastewater rates which continues through to 2021.
- **Franchise Fees and Property Taxes** – $0.9 million less than forecast in 2020 ($2.2 million less for 2017-2020). Lower than forecast revenue resulted in a $0.3 million reduction in franchise fees in 2020 ($0.9 million lower than forecast for 2017-2020). Lower than forecast property taxes relate to the deferral of capital projects, including the Operations Center at Mid-point Entrance project, which had been forecast to increase property taxes starting in 2018.

3.3.3 Operating Expenses by Cost Category

Table 3.3.3 shows operating expenses by cost category for Wastewater Treatment Plant Operations, Billing Meters and Customer Service, and EWSI Shared Services, where cost categories differ from the sub-functions in Section 3.3.2.

Table 3.3.3
Wastewater Treatment Operating Costs by Cost Category
($ millions)

		A	B	C	D
	Cost Category	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Wastewater Treatment Plant Operations				
2	Staff Costs and Employee Benefits	18.2	16.6	70.6	60.1
3	Contractors and Consultants	5.0	2.4	17.2	12.6
4	Materials and Supplies	2.1	1.9	8.1	8.5
5	Other	1.0	1.2	4.0	3.0
6	Wastewater Treatment Plant Operations Expenses	26.3	22.1	99.9	84.3
7	Billing, Meters and Customer Service				
8	CUS Charges	3.6	3.8	13.5	13.5
9	Contractors and Consultants	3.5	3.9	13.7	14.7
10	Billings, Meters and Customer Services Expenses	7.1	7.8	27.2	28.2
11	EWSI Shared Services				

		A	B	C	D
		2020		2017-2020	
Cost Category		PBR Forecast	Actual	PBR Forecast	Actual
12	EWSI Shared Services Allocation	3.3	3.2	12.7	11.5
13	Staff Costs and Employee Benefits	1.3	1.8	5.1	4.6
14	Other	0.1	0.3	0.5	0.5
15	EWSI Shared Services Expenses	4.7	5.3	18.3	16.6

The information presented in this table supports the explanations of differences between 2020 actual and forecast expenses provided in Section 3.3.2. Accordingly, no additional explanations are considered necessary.

3.3.4 Depreciation and Amortization

Wastewater's depreciation expense and amortization of contributed assets for 2020 are shown in Tables 3.3.4 below:

Table 3.3.4
Wastewater Treatment Depreciation and Amortization
($ millions)

		A	B	C	D
		2020		2017-2020	
Depreciation and Amortization		PBR Forecast	Actual	PBR Forecast	Actual
1	Gross depreciation expense	19.9	20.6	69.7	72.2
2	Amortization of contributions	(0.9)	(0.9)	(3.7)	(3.7)
3	**Depreciation, net**	**19.0**	**19.6**	**66.0**	**68.5**

Wastewater's 2020 depreciation expense was $0.7 million greater than forecast ($2.1 million greater for 2017-2020), even though plant in service was $63.9 million (9%) less than forecast at December 31, 2020 (Table 3.3.5, line 6. This difference results from adjustments to Wastewater's capital program where asset replacement projects were replaced with capital maintenance and repair projects, which have higher effective depreciation rates than asset replacements. In the PBR forecast, depreciation expense was calculated as if all asset additions related to new assets, rather than repair or to overhauls of existing assets. EWSI expects that the effect of higher than forecast depreciation rates will continue through the remainder of the 2017-2021 PBR term.

3.3.5 Rate Base

Wastewater's 2020 mid-year rate base, shown in Table 3.3.5 below, was $35.4 million less than forecast, reflecting lower than forecast capital additions over the 2016 to 2020 period resulting from project deferrals and other adjustments to the capital program described in Section 3.4.1.

Table 3.3.5
Wastewater Treatment Mid-Year Rate Base
($ millions)

		A	B
		2020	
	Components of Mid-Year Rate Base, net of Contributions	**PBR Forecast**	**Actual**
1	Plant in Service		
2	Balance, beginning of year	686.6	631.7
3	Capital additions	59.2	52.4
4	Retirements and adjustments	-	(2.1)
5	Balance, end of year	745.8	681.9
6	Mid-Year Plant in service	716.2	656.8
7	Accumulated Depreciation		
8	Balance, beginning of year	186.1	163.0
9	Depreciation expense	19.9	20.6
10	Retirements and adjustments	-	(2.1)
11	Balance, end of year	206.0	181.4
12	Mid-Year Accumulated Depreciation	196.1	172.2
13	Other Rate Base Items		
14	Working Capital	6.6	6.4
15	Materials and Supplies	1.6	1.9
16	**Gross Mid-Year Rate Base**	**528.3**	**492.9**
17	Contributions		
18	Balance, beginning of year	41.0	41.0
19	Contributions in aid of construction	-	-
20	Balance, end of year	41.0	41.0
21	Mid-Year Contributions	41.0	41.0
22	Accumulated Amortization		
23	Balance, beginning of year	18.4	18.4
24	Amortization of contributions	0.9	0.9
25	Balance, end of year	19.3	19.3
26	Mid-Year Accumulated Amortization	18.9	18.9
27	**Mid-Year Contributions**	**22.1**	**22.1**
28	**Mid-Year Rate Base**	**506.2**	**470.8**

Unlike In-City Water, where contributions relate primarily to developer-funded assets, contributions included in Wastewater's rate base offset the cost of non-utility assets included in Wastewater's plant in service. This treatment ensures that the capital costs associated with these assets are not borne by utility rate payers. The cost of operating these assets, as well as any related revenues are also excluded from Wastewater's financial results.

3.3.6 Return on Rate Base

In 2020, Wastewater's return on equity was $0.5 million lower than forecast and $5.0 million greater for 2017-2020. Although, Wastewater achieved a lower than forecast net income, lower than forecast rate base resulted in a Wastewater earning a return on equity of 10.70% in 2020 (11.52% for 2017-2020). EWSI expects that operating cost savings (see section 3.3.2), and lower than forecast rate base will continue to offset any reductions in revenue and drive higher than forecast returns on equity for the remainder of the 2017-2021 PBR term.

Table 3.3.6-1
Wastewater Treatment Return on Rate Base
($ millions)

	Return on Rate Base	2020 PBR Forecast	2020 Actual	2017-2020 PBR Forecast	2017-2020 Actual
1	Mid-year Rate Base	506.2	470.8		
2	Deemed Capital Structure				
3	Debt (%)	60.00%	60.00%		
4	Equity (%)	40.00%	40.00%		
5	Cost of Capital				
6	Cost of Debt	4.41%	4.14%	4.37%	4.32%
7	Cost of Equity	10.18%	10.70%	10.18%	11.52%
8	Weighted Average Cost of Capital (WACC)	6.72%	6.76%	6.69%	7.20%
9	Return on Mid-Year Rate Base				
10	Return on Rate Base Financed by Debt	13.4	11.7	47.5	44.2
11	Return on Rate Base Financed by Equity	20.6	20.1	73.6	78.6
12	**Return on Mid-year Rate Base**	**34.0**	**31.8**	**121.1**	**122.8**

Wastewater's weighted average cost of debt calculation are shown in Table 3.3.6-2 below. The lower than forecast embedded cost of debt is a result of both reduced issuances of new long-term debt in response to lower than forecast capital expenditures, and favorable economic conditions which allowed EWSI to issue the long term debt at lower than forecast rates over the 2017 to 2020 period.

Table 3.3.6-2
Wastewater Treatment Interest Expense and Cost of Debt
($ millions)

		A	B	C	D
	Interest Expense and Cost of Debt	2020 PBR Forecast	2020 Actual	2017-2020 PBR Forecast	2017-2020 Actual
1	Interest Expense				
2	Interest on short-term debt	1.0	0.3	3.7	3.6
3	Interest on City of Edmonton debentures	2.5	-	11.8	6.2
4	Interest on intercompany debentures	10.2	11.6	33.3	35.3
5	Total Interest expense	13.7	12.0	48.8	45.0
6	Mid-year debt and other long-term liabilities				
7	Mid-Year Short-term debt	274.6	272.1		
8	Mid-Year Long-term debt	35.2	16.9		
9	Mid-Year Other Long-term liabilities	0.5	0.3		
10	Total Mid-year debt and other long-term liabilities	310.2	289.4		
11	**Embedded cost of Debt**	**4.41%**	**4.14%**	**4.37%**	**4.31%**

3.3.7 Transactions with Affiliates

Wastewater derives a significant proportion of its revenue and expenses from transactions with affiliates, including the City of Edmonton, EUI, and its subsidiaries, and other EPCOR Water Services Inc. business units. Table 3.3.7 summarizes Wastewater's transactions with affiliates.

Table 3.3.7
Wastewater Treatment Transactions with Affiliates
($ millions)

		A	B	C	D
	Affiliate and Service	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	**Revenues from the provision of services to the City of Edmonton**				
2	Wastewater Treatment Services	1.1	0.9	4.1	4.5
3	Other Services	0.2	-	0.9	0.3
4	Total	1.3	0.9	5.1	4.8
5	**Services provided by (recovered from):**				
6	**City of Edmonton**				
7	Franchise Fees	7.9	7.7	29.4	28.5
8	Property Taxes	1.2	0.6	3.7	2.3
9	Interest on Long Term Debt	2.5	-	11.8	6.2
10	Regulatory Services	1.0	-	4.0	0.7
11	Biosolids Contractor Service	-	0.5	-	5.1
12	Other Services	0.2	0.2	0.7	0.8
13	Total	12.9	9.0	49.6	43.6
14	**EPCOR Utilities Inc.**				
15	Corporate Shared Service Costs	5.2	4.1	20.0	16.0
16	Interest on Intercompany Loans	10.2	11.6	33.3	35.3
17	Interest on Short-term debt	1.0	0.3	3.7	3.6
18	Other Services	-	0.2	-	0.3
19	Total	16.3	16.3	57.0	54.9
20	**EPCOR Distribution and Transmission Inc.**				
21	Maintenance and other services	0.1	-	0.2	0.2
22	**EPCOR Technologies Inc.**				
23	Hydrovac Charges	-	-	-	0.3
24	**EPCOR Energy Alberta LP**				
25	Billing and Collection Services	3.2	3.1	12.2	11.7
26	**Other EWSI Business Units**				
27	EWSI Shared Services Allocation	3.3	3.2	12.7	11.5
28	Meter reading services from In-City Water	2.5	2.4	9.6	9.3
29	Water purchases from In-City Water	0.4	0.4	1.5	1.7
30	Regulatory services from Drainage Services	3.2	1.5	12.2	4.7
31	Project engineering recoveries from Drainage	-	-	-	(1.2)
32	Laboratory services recoveries from Drainage	-	(0.3)	-	(1.1)
33	Total	9.4	7.2	36.0	25.0
34	**Expenditures on capital projects arising from services provided by:**				
35	City of Edmonton	-	0.1	-	0.1
36	EPCOR Technologies Inc.	-	0.1	-	0.3
37	EPCOR Utilities Inc.	-	0.0	-	0.3
38	Total	-	0.2	-	0.7

3.4 Capital Programs

3.4.1 Capital Expenditures

Table 3.4.1 compares approved capital expenditures from the PBR forecast to actual capital expenditures for 2020 for each project with approved capital expenditures in excess of $5.0 million over the 2017-2021 PBR term, as well as for each project category. Table 3.4.1 also provides a comparison of total 2017-2021 approved capital expenditures to EWSI's current capital forecast.

Table 3.4.1
Wastewater Treatment Capital Expenditures
($ millions)

		A	B	C	A	B	C	D	E	F	
		2020			**2017 to 2020**			**2017 to 2021**			
		PBR Forecast	**Actual**	**Difference**	**PBR Forecast**	**Actual**	**Difference**	**PBR Forecast**	**Current Projection**	**Difference**	
1	**Reliability and Life Cycle Improvements**										
2	Build Pipe Racks	-	7.3	7.3	-	9.4	9.4	-	10.8	10.8	1
3	Replace 2.5km of Sludge Line	-	0.7	0.7	-	7.8	7.8	-	7.8	7.8	2
4	Clarifier Chain Replacement	0.6	0.9	0.2	3.4	8.0	4.6	4.1	9.4	5.3	3
5	Sludge Line Upgrades	-	0.1	0.1	3.4	8.0	4.7	3.4	8.0	4.7	4
6	Mechanical Rehab Program	2.7	2.9	0.3	13.9	18.2	4.2	15.6	20.1	4.5	5
7	Structural Rehab Secondaries 1-8	3.5	4.3	0.8	13.9	17.8	3.8	17.6	21.4	3.8	6
8	Structural Rehab Program	1.6	1.4	(0.2)	6.1	7.0	1.0	7.7	11.5	3.8	7
9	Digester 3 Upgrades	-	2.7	2.7	11.3	14.1	2.8	11.3	14.4	3.1	8
10	Distribution Chamber Reconstruction	-	0.0	0.0	3.8	6.8	3.0	3.8	6.8	3.0	9
11	Electrical Rehab Program	1.7	1.7	0.1	5.4	6.8	1.4	7.2	8.9	1.8	
12	Operations Center at Mid-Point Entrance	2.0	0.4	(1.6)	19.4	1.5	(17.9)	19.4	7.5	(11.9)	10
13	Digester 4 Upgrades	6.6	0.1	(6.5)	12.0	1.4	(10.6)	12.0	1.4	(10.6)	11
14	Headworks and Primary Aeration System Upgrades	-	0.1	0.1	6.7	1.4	(5.3)	6.7	1.4	(5.3)	12
15	Utility Hot Water System Rehabilitation	1.0	2.1	1.1	12.9	8.8	(4.0)	13.9	9.0	(4.9)	13
16	Buildings and Site Rehab	1.2	1.7	0.5	11.6	5.7	(5.8)	12.8	8.0	(4.7)	14
17	Square 1 Gas Room Replacement	11.0	0.8	(10.1)	12.0	1.3	(10.7)	15.6	10.9	(4.7)	15
18	Site Ventilation Rehabilitation	9.0	4.2	(4.7)	29.7	18.4	(11.3)	31.5	29.9	(1.6)	
19	Projects < $5 million	3.2	2.5	(0.7)	19.3	19.3	(0.0)	21.2	27.3	6.2	16
20	**Subtotal**	44.0	34.0	(10.0)	184.7	161.7	(23.0)	203.4	214.5	11.1	
21	**Performance Efficiency and Improvement**										
22	Plant Improvements*	1.8	1.2	(0.6)	8.7	8.8	0.0	10.6	10.3	(0.2)	
23	Projects < $5 million	1.3	1.2	(0.0)	6.0	4.5	(1.5)	7.0	5.5	(1.5)	
24	**Subtotal**	3.1	2.4	(0.7)	14.7	13.3	(1.4)	17.6	15.8	(1.8)	
25	**Growth/Customer Requirements**										
26	Hydrovac Sanitary Grit Treatment Facility	-	0.1	0.1	8.4	7.3	(1.1)	8.4	7.6	(0.8)	
27	Projects < $5 million	-	0.9	0.9	1.5	2.0	0.4	1.5	2.1	0.6	
28	**Subtotal**	-	1.0	1.0	9.9	9.3	(0.6)	9.9	9.7	(0.3)	
29	**Health, Safety and Environment**										
30	Projects < $5 million	0.6	0.4	(0.1)	3.9	2.1	(1.8)	4.5	5.5	1.0	
31	**Regulatory**										
32	Projects < $5 million	-	1.3	1.3	-	1.3	1.3	-	2.8	2.8	17
33	**Capital Expenditures, net of Contributions**	**47.7**	**39.2**	**(8.5)**	**213.3**	**187.7**	**(25.6)**	**235.4**	**248.3**	**12.9**	

* Plant Improvements project is a consolidation of the individual plant improvements ($2.9M), control system upgrades ($1.0M), control system operational improvements program ($2.6M), and instrumentation upgrades ($4.1M) projects approved in the 2017 to 2021 PBR.

Explanations for differences between PBR forecast capital expenditures for 2017 to 2021 and EWSI's current projection in excess of $2.0 million include:

1. **Build Pipe Racks** – $10.8 million (new project). This project provides for construction of an above-ground pipe rack network to allow the relocation of biogas piping, natural gas, glycol heating lines and electrical circuits out of underground tunnels at the Gold Bar WWTP. Moving these utilities above ground will reduce tunnel ventilation upgrade costs, enable future expansion of process piping, facilitate compliance with building and fire codes, and provide a safer working environment.
2. **Replace 2.5 km of Sludge lines** – $7.8 million (new project). This project provides for replacement of a 2.5 km section of the sludge line between the Clover Bar lagoons and the North Saskatchewan River. Upon inspection this section of the sludge line was found to be in such poor condition that repairs and/or rehabilitation was not financially viable and full replacement was required.
3. **Clarifier Chain Replacement** – $5.3 million (132%) greater than forecast. The costs of this project have increased significantly following the premature failure of stainless steel clarifier chains due to unexpected localized corrosion. These chains are being replaced with plastic loop chains, which have a better performance record at Gold Bar WWTP. These particular chains required earlier than scheduled rehabilitation given the criticality of continuously running the primary and secondary clarifiers, which is crucial to meeting regulatory requirements for final effluent quality from the Gold Bar WWTP
4. **Sludge Line Upgrades** – $4.7 million (138%) greater than forecast. The PBR forecast only included the costs of cleaning and inspecting the sludge lines between Gold Bar WWTP and the Clover Bar Lagoons. Inspections on older sections showed that the sludge lines were in poor condition and required significant additional capital expenditure under this project for rehabilitation/replacement to ensure that these pipelines could continue to operate with minimal risk of leakage.
5. **Mechanical Rehabilitation Program** – $4.5 million (29%) greater than forecast, reflecting expenditures on emergency repairs. The most significant repairs included repair of a leaking glycol heating line and mechanical rehabilitation of the secondary clarifiers, which were originally expected to last beyond the current PBR term.
6. **Structural Rehab Secondaries 1-8** – $3.8 million (22%) greater than forecast. The purpose of this program is to complete the structural rehabilitation of the secondary clarifiers and bioreactors at the rate of one clarifier and bioreactor rehabilitation per year. The increase in program spending is primarily due to updated cost estimates and a better understanding of the current condition of the clarifiers for the rehabilitation work performed to date.
7. **Structural Rehabilitation Program** – $3.8 million (50%) greater than forecast, primarily attributable to the costs of addressing greater than expected concrete deterioration at the Gold Bar Diversion Structure caused by long-term H_2S gas exposure. This increase has been partially offset by deferral of lower priority structural rehabilitation sub-projects.
8. **Digester 3 Upgrades** – $3.1 million (27%) greater than forecast. The increased project costs are primarily attributable to costs associated with addressing unanticipated structural integrity issues identified during construction, which resulted in increases to the project scope.
9. **Distribution Chamber Reconstruction** – $3.0 million (79%) greater than forecast. The increase in the forecast cost of this project results from higher than expected competitive bids from contractors,

as well as higher than expected costs to demolish the distribution chamber and to construct the lift station tie-ins.

10. **Operations Centre at Mid-Point Entrance** – $11.9 million (61%) less than forecast. The reduction in project spending is reflective of design and scope adjustments that incorporate the results of public consultation, which also resulted in Gold Bar's recent commitment to complete all future construction within the existing footprint of the Gold Bar WWTP. In place of the Mid-Point Entrance project, to provide a new upgraded control room and the hygiene facilities necessary for maintenance workers within the existing footprint of the Gold Bar WWTP, there will be a renovation of the existing Centre of Excellence Building to house new control and hygiene facilities (Mid-Point Entrance Project) and the Maintenance Hygiene Project
11. **Digester 4 Upgrades** – $10.6 million (88%) less than forecast. EWSI completed an overall assessment of the solids loading to the Gold Bar WWTP. The assessment determined that Digester 4 upgrades were not required in the short term to meet treatment requirements. As such, EWSI was able to defer this project to the 2022-2024 PBR term to allow for the structural issues in Digester 3 to be addressed, and allow for prioritization of other higher priority wastewater plant projects that were required during the 2017-2021 PBR term.
12. **Headworks and Primary Aeration System Upgrades** – $5.3 million (79%) less than forecast, reflecting a reduction in the scope of this project following EWSI's determination that restoring aeration in the main influent channels was not required. This was because solids deposition rates in the primary influent channels at the Gold Bar WWTP had decreased due to recent upgrades of Grit Tanks 4/5 and Screens 7/8, and currently observed solids accumulation rates in the channels did not present operations and maintenance problems.
13. **Utility Hot Water System Rehabilitation** – $ 4.9 million (35%) less than forecast. The decrease in project spending is primarily attributable to the deferral of certain non-critical upgrades to future PBR periods. This allows these upgrades to be better coordinated with other upgrades to the heating system.
14. **Buildings and Site Rehabilitation Program** – $4.7 million (37%) less than forecast. The scope of this project was reduced following an internal review, which concluded that certain sub-projects could be safely deferred, allowing resources to be focused on unanticipated, higher-priority projects.
15. **Square 1 Gas Room Replacement** – $4.7 million (30%) less than forecast, reflecting scope and design changes that are expected to more efficiently resolve the identified process safety risks, at a lower total cost.
16. **Reliability and Life Cycle Improvements < $5.0 million** – $6.2 million (29%) greater than forecast. The projected increase in this category results primarily from the purchase and installation of new onsite emergency back up power generation ($2.0 million); unanticipated preliminary scope and design costs associated with a new Dewatering Facility ($2.9 million); and increased electrical program spending due to a combination of unforeseen construction difficulties and the replacement of more electrical equipment than was initially estimated ($1.8 million).
17. **Regulatory < $5.0 million** – $2.8 million (100%) greater than forecast. The projected increase in this category results primarily from an Air Quality Monitoring Station project ($1.6 million), which includes the installation of an air quality monitoring station between the Gold Bar WWTP and communities to the south of the plant. The monitoring station was added to Gold Bar WWTP's Approval to Operate

effective July 1, 2019 following collaborative discussions with AEP on reducing air quality impacts of the wastewater treatment process.

3.4.2 Construction Work in Progress

Wastewater's rate base consists of plant in service. If a capital project has not been completed (i.e. not placed into service) during the year, the capital expenditures on that project remain in Construction Work in Progress and are excluded from the rate base. The 2020 year-end balance of Wastewater's Construction Work in Progress is $7.9 million greater than forecast, reflecting changes in the timing of project completion.

Table 3.4.2
Wastewater Treatment Construction Work in Progress
($ millions)

		A	B	C	D
	Construction Work in Progress	**2020**		**2017-2020**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Balance, beginning of period	24.3	33.8	19.2	22.6
2	Capital Expenditures	47.7	39.2	213.3	187.8
3	Capital Additions	(59.2)	(52.4)	(219.7)	(189.7)
4	**Balance, end of period**	**12.8**	**20.7**	**12.8**	**20.7**

The PBR plan allows EWSI to capitalize the costs of financing certain projects remaining in Construction Work in Progress, using AFUDC. In 2020, because of the higher average balance of Construction Work in Progress, AFUDC included in capital expenditures on eligible projects amounted to $1.7 million, compared to the PBR forecast amount of $1.3 million.

3.5 Operational Performance

3.5.1 Water Quality and Environmental Index

The Water Quality and Environmental index is a composite measure intended to assess EWSI's impact on the environment through the quality of the wastewater effluent returned back to the North Saskatchewan River and the effectiveness of environmental management programs.

Table 3.5.1
Water Quality and Environmental Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Water Quality Factor	The value of the Wastewater Effluent Limit Performance, which aggregates measures of the percentage of the discharge limit for five parameters in the Gold Bar wastewater treatment plant's final effluent.	< 28.0%	19.0%	1.476
Environmental Incident Factor	The actual number of environmental incidents that are both reportable and preventable	< 10	1	10.00
			Average Index	5.738
			Index Standard Points	55.0
			Total Actual Points	315.6
			Maximum Available Points Including Bonus Points	60.5
			Total Points Earned	**60.5**

2020 Highlights

- **Wastewater Effluent Limit Performance Index:** Maintenance efforts in previous years to repair and maintain chains and drive mechanisms resulted in increased availability of secondary clarifiers which in turn improved process operations. As a result, the 2020 WELPI was the lowest in the past five years.
- **Environment Incident Management:** In 2020, there were no reportable incidents related to treated wastewater effluent discharged to the North Saskatchewan River. However, there was one reportable environmental incident. The incident was a result of not meeting the daily average oxidation-reduction potential in the EPT scrubber for one day, which is a requirement under the EWSI's Wastewater Treatment Plant Approval to Operate. Enhanced monitoring and alarming, procedural updates, and training were added to existing processes to prevent reoccurrence of this issue.

2021 Areas for Improvement

- **Wastewater Effluent Limit Performance Index:** In 2021, there will be an increased focus on the use of "winter mode" for the secondary treatment process which involves increased aeration in the bioreactors. There will also be a continued focus on limiting unplanned downtime to maximize treatment levels.
- **Environment Incident Management:** Continued efforts to manage odour-related incidents with planned installation of an air quality monitoring station south of the Gold Bar plant in 2021. This will be in addition to the existing two air quality stations currently near the plant and the onsite monitoring system installed in 2020.

3.5.2 Customer Service Index

Wastewater's customer service index for the 2017-2021 PBR term includes three equally weighted odour metrics. These metrics recognize that Wastewater's customer interactions typically relate to odour concerns from customers located close to the Gold Bar Wastewater Treatment Plant.

Table 3.5.2
Customer Service Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
H_2S – 1 Hour Exceedance Factor	The number of hourly exceedances of the 1 hour limit averaged between Gold Bar and Beverly air quality monitoring stations.	< 6	1	6.000
H_2S – 24 Hour Exceedance Factor	The number of hourly exceedances of the 24 hour limit averaged between Gold Bar and Beverly air quality monitoring stations.	< 2	0	2.000
Scrubber Uptime Factor	The percentage of time that the scrubbers are on line.	> 90%	99.4	1.104
			Average Index	3.035
			Index Standard Points	15.0
			Total Actual Points	45.5
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

2020 Highlights

- **H_2S – 1 and 24 Hour Exceedance Factor:** There was one 1-hour H_2S exceedance in 2020. Continued fence line H_2S monitoring and newly installed odour monitoring software allowed Gold Bar operations to identify elevated levels of H_2S and avoid potential exceedances. Two new carbon scrubbers at the grit and screenings buildings were also commissioned which reduced the amount of H_2S emitted from those operational areas.
- **Scrubber Uptime Factor:** Redundancy installed in the scrubber systems in 2018, helped to increase the scrubber uptime in 2020. Additional focus has been placed on planning preventative and corrective maintenance activities to limit scrubber downtime.

2021 Areas for Improvement

- **H_2S – 1 and 24 Hour Exceedance Factor:** Installation of a new air quality monitoring station south of the Gold Bar WWTP is planned for 2021.
- **Scrubber Uptime Factor:** The current preventative maintenance program will be continued to limit scrubber downtime. Construction of a new EPT scrubber with increased redundancy is planned to start in 2021.

3.5.3 System Reliability and Optimization Index

The system reliability and optimization index is a measure of the performance of the Gold Bar Wastewater Treatment Plant and the degree to which the wastewater treatment system is optimized to minimize its impact on the environment.

Table 3.5.3
System Reliability and Optimization Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Enhanced Primary Treatment Factor	The percentage of time that the enhanced primary treatment facility ran during wet weather events where the influent flow rate exceeded the EPT event threshold.	> 80.0%	100.0%	1.250
Biogas Utilization Factor	The percentage of biogas utilized, calculated as the volume of biogas produced less the volume flared divided by the volume produced.	> 60.0%	83.6%	1.393
Energy Efficiency Factor	The energy used in all wastewater facilities in kWh divided by the volume of wastewater effluent that either receives ultraviolet (UV) treatment or is membrane plant effluent.	< 514	489	1.051
			Average Index	1.231
			Index Standard Points	15.0
			Total Actual Points	18.5
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

2020 Highlights

- **Enhanced Primary Treatment (EPT) Factor:** The EPT clarifiers were proactively cleaned and inspected in 2020. This minimized downtime and maximized availability for primary treatment.
- **Biogas Utilization Factor:** In 2020, heating requirements were slightly higher and overall biogas production was slightly lower than planned. However, due to optimization of boiler and flare operation the plant was still able to utilize more and flare less biogas than in previous years.
- **Energy Efficiency Factor:** Energy consumption in 2020 was average, but slightly higher effluent flow volumes resulted in a lower Energy Efficiency Factor, as compared to previous years.

2021 Areas for Improvement

- **Enhanced Primary Treatment (EPT) Factor:** Planning for proactive replacement of assets nearing end-of-life to minimize unplanned downtime will continue in 2021.
- **Biogas Utilization Factor:** Operations will continue to concentrate on maximizing biogas utilization by running as many boilers on biogas as possible before relying on natural gas.
- **Energy Efficiency Factor:** During 2021, there will be a focus on optimization of secondary aeration blower operation and a decrease in the use of a lag blower when not operationally necessary.

3.5.4 Safety Index

EPCOR and EWSI are committed to a safe, healthy lifestyle and demonstrate this through care and concern for people. The safety index is a measure of the success of programs and the application of policies that maximizes the safety of employees and the public

Table 3.5.4
Safety Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Near Miss Reporting Factor	The number of near miss reports entered in the ERS system.	>220	199	0.905
Work Site Inspection Factor	Number of Work Site Inspections and observations completed per year.	>919	1,015	1.104
Lost Time Frequency Factor	The actual lost time frequency rate.	<0.75	0.00	2.000
All Injury Frequency Factor	The actual all injury frequency rate	<1.50	0.64	2.328
			Average Index	1.584
			Index Standard Points	15.0
			Total Actual Points	23.8
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

2020 Highlights

- **Near Miss Reporting Factor:** With consideration to the impact of COVID-19 pandemic, near miss reporting was slightly lower than past years. However, even with the slight decrease in reporting, near miss and hazard identification reporting continued to be an effective means to proactively identify hazards and implement corrective actions to mitigate potential harm to employees, contractors and members of the public.
- **Work Site Inspections / Observations Factor:** Work site inspections and observations continued to be a successful leading indicator that provided leadership and employees the opportunity to engage in field activities, proactively identify areas of improvement, and verify conformance to EWSI standards.
- **Lost Time Frequency Rate Factor:** In 2020, Gold Bar exceeded the lost time frequency rate factor by having no lost time events.
- **All Injury Frequency Rate Factor:** In 2020, Gold Bar recorded 1 recordable incident (Medical Treatment) when a worker suffered a burn to their wrist while performing calibration duties.

2021 Areas for Improvement

- **Near Miss Reporting Factor.** With consideration of the ongoing impact of the COVID-19 pandemic, there will be a heighted focus on the reporting of near miss and hazard identification events throughout 2021 to ensure employees keep their mind on task and continue with proactive reporting to mitigate hazards before an event occurs.

- **Work Site Inspections / Observations Factor.** With consideration of the ongoing COVID-19 pandemic, EWSI will monitor inspection and observation activities and look for opportunities to continue to conduct proactive field engagements.
- **Lost Time Frequency Rate & All Injury Frequency Rate Factors.** Water Canada has developed risk profiles specific for wastewater treatment plants. This will enable EWSI to identify top health and safety risks specific to work environments and to implement mitigating factors where possible. The objective will be to ensure effective and meaningful controls are in place to reduce the potential for harm to employees, contractors, and the public.

3.6 Rates and Bill Comparisons

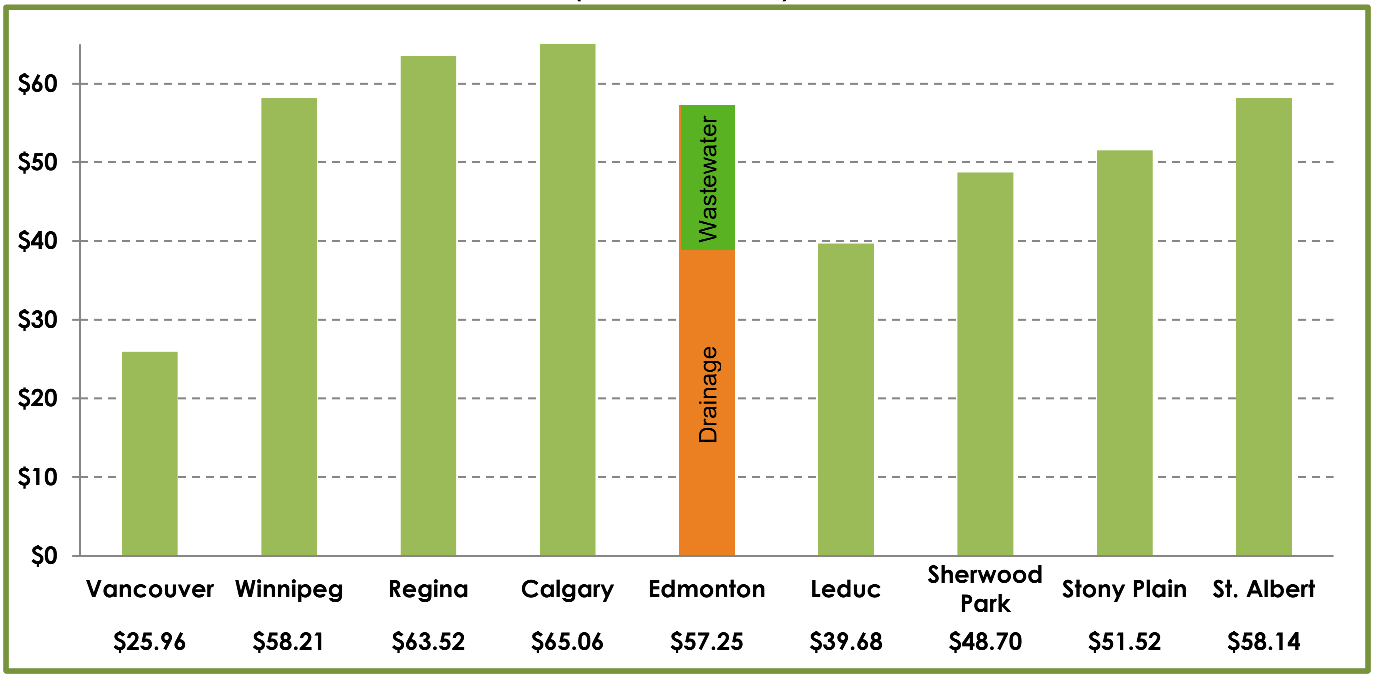
EWSI's wastewater (combined wastewater treatment, sanitary and stormwater) bill comparisons for 2020 are based on the published sanitary and stormwater rates for Calgary, Vancouver, Winnipeg and Regina, as well as four local communities. These bill comparisons represent the total cost to the customer and include fixed charges, consumption charges and any other applicable surcharges.

Unlike most cities, where wastewater treatment services and drainage services are combined, EWSI's Wastewater Treatment operations is only responsible for wastewater treatment and the operations and maintenance of sanitary, storm and combined sewer systems are provided through EPCOR Drainage Services. Accordingly, wastewater bill comparisons are based on the EWSI's combined wastewater treatment bill and its sanitary and stormwater bills.

3.6.1 Residential Wastewater Bills

Figure 3.6.1 provides a comparison of residential household wastewater bills for residential household consumption of 14.7 m^3 per month, the average residential customer consumption per month in Edmonton in 2020.

Figure 3.6.1
2020 Monthly Residential Wastewater Bill Comparison
(14.7 m^3/month)



Unlike water services which are relatively consistent among cities and communities, the nature and extent of wastewater treatment and drainage services vary significantly between cities and communities due to differences in wastewater treatment processes, the inclusion of certain services in property taxes, and geographic and climatic factors which affect the level of investment in and approach to flood mitigation and stormwater services. In particular, stormwater charges are often included as a component of taxes.

Edmonton's $57.25 average monthly bill from Figure 3.6.1 includes Wastewater charges of $19.30 and Drainage charges of $37.95 (inclusive of both sanitary and storm charges). While the total bill is higher than Vancouver, it is lower than Calgary and Regina, the two cities where drainage and wastewater treatment are most comparable to Edmonton. EWSI notes that cities across Canada are experiencing increased risk of flooding related to climate change and that substantial investments are needed to assess and address climate change-related flood mitigation.

Table 3.6.2
2020 Monthly Commercial Wastewater Bill Comparison
($ per month)

		A	B	C	D
	Monthly Bill - $ per month	**Small**	**Medium**	**Large**	**Extra Large**
1	**Monthly Consumption** - m^3	**10**	**250**	**1,000**	**5,000**
2	Vancouver	20.37	305.32	1,244	6,075
3	Calgary	60.72	474.61	1,768	8,666
4	Regina	55.00	497.20	2,062	9,795
5	Winnipeg	44.98	736.25	2,878	14,185
6	**Edmonton**	**47.77**	**563.77**	**2,303**	**11,490**
7	St. Albert	76.36	522.76	1,918	9,358
8	Sherwood Park	40.08	479.28	1,852	9,172
9	Stony Plain	64.84	734.44	2,831	13,991
10	Leduc	31.30	458.50	1,794	8,914

4 Drainage Services

4.1 Accomplishments and Challenges

In 2020, Drainage Services significant accomplishments included:

1) Achieving Operating Efficiencies

EPCOR's commitments to the City of Edmonton included the realization of a 1% savings per year in operating costs, or approximately $5.9 million of savings in 2022. Between 2018 and 2020, Drainage undertook key initiatives to ensure that it is able to achieve this level of savings, including:

- Building synergies across EWSI – Operational functions, including Private Development and Inspection Services, One Water Planning, Quality Assurance and Environment, Customer Analytics, Procurement, Inventory Management, and Operational Excellence have been combined with Water Services, providing efficiencies in the delivery of these functions across Water, Wastewater Treatment and Drainage;
- Reducing contractor and consultant costs – Drainage decreased the use of contractors and consultants and increased the use of internal resources to provide services that had previously been provided by contractors or consultants, such as inspections, engineering and design work, and environmental consultation and assessment;
- Reducing lost time incidents – Drainage has successfully implemented EPCOR's Health & Safety Management System within Drainage. Between 2018 and 2020, there were seven lost time incidents in Drainage, compared to 42 lost time incidents in the four years prior to the transfer. Not only did Drainage achieve a 79% reduction in total injuries, but incident severity was also reduced by 75%. Besides reducing the direct costs of medical leave for injured employees and overtime for replacement workers, WCB rebates have increased as a result of Drainage's improved safety;
- Optimizing shift scheduling – Drainage has identified and implemented three opportunities to reduce overtime through shift scheduling: adopting improved work schedules in System Control; establishing a dedicated trouble response crew; and improving scheduling during spring run-off;
- Strengthening financial controls over cost recoveries - Drainage has implemented EPCOR processes to ensure the completeness, accuracy and timeliness of collection of claims for third party damages, and recovery of the costs of service locates; and
- Increasing fleet fuel efficiency – Drainage has improved fleet fuel efficiency since the transfer by replacing older vehicles with newer more fuel-efficient vehicles and with the implementation of telematics which will also reduce vehicle maintenance costs. Telematics has been implemented very recently and we expect to realize additional efficiencies in future years from this implementation.

2) **Commencing work on SIRP**

Drainage commenced work on executing its comprehensive SIRP strategy in 2020. This twenty year strategy is based on a risk methodology aligned with the City of Edmonton's Climate Change Adaptation and Resilience Strategy. The SIRP strategy has been very well received and, through Drainage's efforts, Edmonton's rating from the Intact Centre on Climate Adaptation on its flood mitigation plans has increased from "C" to "B+"[2]. This rating is expected to improve as work is completed.

SIRP is also expected to provide major savings in capital costs. SIRP's estimated capital cost of $1.6 billion over twenty years provides direct savings of between $0.6 billion to $2.9 billion relative to the 2017 City Wide Flood Mitigation Plan, far surpassing EWSI's commitment to achieving a 10% capital cost saving on the City's 10-year plan.

3) **Commencing work on CORe**

Drainage also commenced work on CORe, its other major strategic initiative. Unlike previous odour mitigation plans that focused on the controlled release of hydrogen sulphide (H_2S) gas which is extremely odourous and corrosive, the CORe strategy focuses on preventing or minimizing the formation of H_2S gas, which will reduce community odour impacts and lengthen the life of sewer network assets. Work has begun on both the capital and operating components of this plan, and costs for continuing this work are included in the Drainage's 2022-2024 PBR Application.

4) **Implementing Capital Efficiency Initiatives**

Between 2018 and 2020, Drainage implemented capital cost efficiency initiatives, including:

- The use of internal engineering resources to reduce engineering and design costs for routine projects. Prior to the transfer to EPCOR, engineering and project management costs comprised 15% to 20% of the total capital project budgets in Drainage Services. By relying on its standard processes and GIS-based design tools, EWSI has achieved a reduction in engineering and project management costs to 5% of the cost of routine projects.
- The use of Master Service Agreements and improved procurement processes to reduce costs;
- Completion of Project Management Methodology Review and procurement process improvements to generate efficiencies;
- Reducing crew sizes, resulting in completing the same quantity of work with significantly fewer resources. While this change has been implemented recently without any layoffs and is still being refined, it is anticipated that it will result in significant labour cost reductions for work performed by internal resources; and
- Utilizing central dispatch of shared tandem trucks, rather than having one truck per crew. This reduces the amount of time that tandem trucks sit idle and significantly reduced the number of contract tandem trucks that have needed to be hired. While this change has been implemented

[2] https://www.intactcentreclimateadaptation.ca/wp-content/uploads/2021/02/16-Cities-Flood-Preparedness.pdf

recently and is still being refined, an immediate reduction in the overall cost of tandem trucks was observed initially after implementing this change.

These initiatives, as well as other smaller initiatives to improve capital project management, are expected to result in more significant capital cost savings over time as these initiatives are fully implemented across Drainage Services. These initiatives on their own are expected to contribute significantly to achieving the 10% capital cost savings commitment. When combined with SIRP savings that are approximately triple the promised savings, the total capital efficiencies are far in excess of the level committed to prior to the transition.

Other accomplishments are detailed in Drainages' 2020 Operating Plan review in section 5.2.

4.2 Customers and Consumption

Drainage provides sanitary services to the same customers served by Wastewater Treatment, while Drainage storm customer's charges are based on land size and other factors. Therefore, actual customer counts, consumption per customer and total consumption are the same as those of Wastewater Treatment and actual to forecast differences in Drainage's customer counts and consumption are attributable to the same factors.

4.3 Financial Performance

As explained in Appendix A.2, the drainage rates set out in Bylaw 18100 reflect EWSI's commitment to limit average annual rate increases to 3% over the period from January 1, 2018 to March 31, 2022. Therefore, there is no City of Edmonton-approved PBR forecast to serve as the basis of comparison for financial performance. Instead, as in 2018 and 2019, Drainage's 2018 EPCOR drainage budget, adjusted to incorporate annual revenue increases of 3% and annual operating expense increases of 2%, serves as a proxy for a PBR forecast, providing a basis for assessing actual financial performance.

Drainage's revenue requirements are summarized on Table 4.3 below. Explanations of forecast to actual variances are provided in sections 4.3.1 to 4.3.6.

Table 4.3
Drainage Revenue Requirements
($ millions)

		A	B	C	D
	Summary of Revenue Requirements	**2020**		**2018-2020**	
		Budget	**Actual**	**Budget**	**Actual**
1	Drainage Rate Revenue				
2	Sanitary utility revenue	133.2	131.0	388.0	376.5
3	Stormwater utility revenue	66.6	75.4	194.0	204.7
4	Drainage Rate Revenue	199.8	206.3	582.0	581.3
5	Drainage Revenue Requirement				
6	Operating expenses	121.0	124.8	350.1	352.2
7	Other revenue	(8.8)	(8.0)	(25.5)	(26.7)
8	Depreciation and amortization	35.3	36.2	98.3	100.9
9	Return on rate base financed by debt	33.1	23.1	82.4	64.9

		A	B	C	D
Summary of Revenue Requirements		**2020**		**2018-2020**	
		Budget	**Actual**	**Budget**	**Actual**
10	Return on rate base financed by equity	19.1	30.3	76.7	89.9
11	**Drainage Revenue Requirement**	**199.8**	**206.3**	**582.0**	**581.3**
12	**Return on Rate Base Financed by Equity**	**3.25%**	**4.95%**	**4.46%**	**5.03%**

4.3.1 Revenue

Drainage's rate revenues are derived from both sanitary utility and stormwater utility services. Sanitary utility revenues are comprised of variable monthly charges based on monthly metered water consumption and flat monthly service charges based on the meter size. Stormwater utility revenues are based on area, development intensity, and run-off coefficients based on the zoning of individual land parcels. Rates for both sanitary and stormwater utility services from January 1, 2018 to March 31, 2022 are prescribed in Bylaw 18100 and incorporate an average annual rate increase of 3%.

Table 4.3.1 below provides a comparison of 2020 and 2018-2020 Drainage revenues to the budget:

Table 4.3.1
Drainage Revenue
($ millions)

		A	B	C	D
Drainage Revenue		**2020**		**2018-2020**	
		Budget	**Actual**	**Budget**	**Actual**
1	Sanitary Utility				
2	Flat Monthly Service Charges				
3	Residential	37.6	33.9	109.7	97.3
4	Multi-Residential	0.5	2.3	1.6	6.5
5	Commercial (including large wholesale)	2.8	5.7	8.2	16.6
6	Flat Monthly Service Charges	41.0	41.9	119.5	120.4
7	Variable Monthly Charges				
8	Residential	48.0	50.9	139.9	139.5
9	Multi-Residential	18.8	19.4	54.8	54.0
10	Commercial	24.1	17.7	70.2	59.2
11	Large wholesale	1.3	1.1	3.7	3.4
12	Variable Monthly Charges	92.2	89.1	268.6	256.1
13	**Sanitary Utility Revenue**	**133.2**	**131.0**	**388.0**	**376.5**
14	Stormwater Utility				
15	Residential	35.1	40.4	102.3	110.3
16	Multi-Residential	3.4	4.3	10.0	11.7
17	Commercial	28.1	30.7	81.7	82.7
18	**Stormwater Utility Revenue**	**66.6**	**75.4**	**194.0**	**204.8**
19	**Drainage Rate Revenue**	**199.8**	**206.3**	**582.0**	**581.3**
20	Other Revenue	8.8	8.0	25.5	26.7
21	**Total Drainage Revenue**	**208.5**	**214.3**	**607.5**	**607.9**

In 2020, Drainage's rate revenues were $6.5 million greater than budget and $0.7 million less than budget for 2018-2020. Higher than budget revenues included $7.4 million in revenues related to non-routine adjustments, including $3.2 million for CORe, $3.2 million for SIRP and $0.8 million for LRT relocations. Without the NRAs, revenues would have been $0.8 million less than budget because of lower than forecast consumption. The COVID-19 pandemic shifted consumption from the commercial customer class to the residential and multi-residential customer classes. Even so, Drainage experienced an overall decrease in consumption because of business closures. Besides rate revenues, Drainage has Other Revenue derived from biosolids management services provided to the Alberta Capital Region Wastewater Commission, application and connection fees, wastewater transfer station services, late payment fees, miscellaneous fees pursuant to third party agreements, and other incidental services. The variance in these revenues is largely attributable to biosolids, where lower than planned activity and lower processed volumes resulting from the composter outage, resulted in lower than budget revenue.

4.3.2 Operating Expenses by Function

Table 4.3.2 below compares Drainage's 2020 actual operating expenses to its budget:

Table 4.3.2
Operating Expenses by Function
($ millions)

		A	B	C	D
	Function	**2020**		**2018-2020**	
		Budget	**Actual**	**Budget**	**Actual**
1	Drainage Operations				
2	Maintenance	31.3	31.0	89.4	82.2
3	Biosolids	17.0	15.6	49.7	49.5
4	Monitoring and Compliance	4.3	3.8	13.2	12.4
5	Other	0.5	0.6	3.2	3.8
6	Drainage Operations	53.1	51.0	155.4	148.0
7	Planning and Project Support				
8	Planning	10.4	6.0	32.9	23.1
9	Project Support	5.2	8.9	10.5	21.0
10	NRA – SIRP	-	2.6	-	2.6
11	NRA - CORe	-	0.5	-	0.5
12	Planning and Project Support	15.6	18.0	43.4	47.2
13	Billing and Meter Reading				
14	Meter Reading	6.7	6.8	19.1	19.5
15	CUS Charges	0.6	1.4	1.6	3.4
16	Billing and Meter Reading	7.3	8.2	20.8	22.9
17	Drainage Services Administration				
18	Drainage Shared Services	15.7	15.2	44.4	45.3
19	Incentive and Other Compensation	2.2	4.4	6.4	8.1
20	Drainage Services Administration	17.9	19.6	50.8	53.4
21	Corporate Shared Services	16.6	17.4	48.6	50.4
22	Franchise Fees and Property Taxes				
23	Franchise Fees	9.5	9.7	29.1	27.9
24	Property Taxes	1.1	0.9	2.1	2.6
25	Franchise Fees and Property Taxes	10.6	10.6	31.1	30.5
26	**Total Operating Expenses by Function**	**121.0**	**124.8**	**350.1**	**352.2**

Total operating expenses for 2020 were $3.8 million greater than budget ($2.1 million greater for 2018-2020). Key factors contributing to this difference include:

- **Biosolids -** $1.4 million less than budget ($0.2 million less for 2018-2020). This function includes the storage and management of biosolids generated by the Gold Bar and Alberta Capital Regional wastewater treatment plants. As in 2019, lower than budgeted expenses are primarily attributable to lower than planned activity and lower processed volumes resulting from the composter outage.

- **Monitoring and compliance** - $0.5 less than budget ($0.8 million less for 2018-2020). Lower than budget expenses reflect lower than anticipated contractor costs of $0.3 million ($0.4 million for 2018-2020), lower staff costs of $0.1 million ($0.3 million for 2018-2020) and capitalization of a higher portion of labour costs of $0.1 million ($0.1 million for 2018-2020).
- **Planning -** $4.4 million less than budget ($9.8 million less for 2018-2020). This function includes infrastructure, system and administration planning. Lower than budget expenses reflect lower than anticipated contractor costs of $2.3 million ($5.5 million for 2018-2020), capitalization of a higher than anticipated portion of staff costs of $0.3 million ($1.4 million for 2018-2020), savings of $0.5 million ($0.5 million for 2018-2020) related to the transfer of the customer services function to Water (now recovered through CUS charges), and lower staff costs net of vacancy factor of $1.3 million ($1.3 million for 2018-2020). The 2018-2020 variance also includes savings of $0.9 million related to the transfer of lot grading inspection services back to the City of Edmonton in 2018. The lot grading inspection cost savings were offset with a proportionate decrease in associated revenues.
- **Project Support -** $3.7 million greater than budget ($10.5 million greater for 2018-2020). This function includes surveying and engineering (conceptual, preliminary design or detailed design), project management, in-house construction, and emergency repairs. Higher than budgeted expenses include: $3.1 million of additional salary costs ($10.2 million for 2018-2020) related to design and construction work that had originally been budgeted as capital expenditures; and $0.6 million of higher than anticipated contractor costs ($1.8 million for 2018-2020), primarily related to project management. The 2018-2020 variance also includes $1.5 million of cost recoveries resulting from higher equipment utilization in operations in 2018.

  This category of costs illustrates the impact of the differences in accounting treatment between the City of Edmonton and EPCOR. Specifically, the PBR budget was prepared using City of Edmonton's Drainage's capitalization policies, which included capitalizing preliminary design costs (i.e. the costs incurred before there was a specific project). The actual results reflect EWSI capitalization policies, where most preliminary design costs are expensed, and where additional costs – capital overhead, higher salary burden, major inspections, abandonments, etc., are capitalized.
- **NRAs for SIRP and CORe -** $2.6 million for SIRP and $0.5 million for CORe. In 2020. EWSI commenced work on these programs following approval for NRAs on December 2, 2019. Additional information on these NRAs is provided in section 1.5.
- **Billing and Meter Reading -** $0.9 million greater than budget ($2.1 million greater for 2018-2020. Higher than budgeted expenses include metering and customer service support costs from EPCOR Energy Services, customer service costs transferred to Water (see Planning above), and unbudgeted call centre support costs from the City of Edmonton.
- **Corporate Shared Services** - $0.8 million greater than budget ($1.8 million greater for 2018-2020). Higher than budgeted expenses reflect growth in assets and revenue, which are key corporate cost allocators, and increases in corporate IT costs charged directly to Drainage.
- **Drainage Shared Services** - $0.5 million less than budget ($0.9 million more for 2018-2020). Lower than budgeted costs in 2020 and higher than budgeted costs for the 2018-2020 reflect organizational

changes in almost all administrative functions. These changes are primarily related to Drainage transition and integration.

- **Incentive and Other Compensation -** $2.2 million greater than budget ($1.7 million greater for 2018-2020). Higher than budgeted expenses include $0.7 million of incentive compensation ($0.3 million less for 2018-2020) and year-end payroll adjustments of $1.5 million related to long-term disability. The 2018-2020 variance also includes $0.5 million in adjustments to corporate benefits and a WCB refund of $0.1 million.
- **Franchise Fees and Property Taxes -** ($0.6 million less for 2018-2020). As with Water and Wastewater, lower than forecast franchise fees reflect lower than forecast revenues. This is partially offset by higher property taxes, which were not included in the budget as no accurate cost estimate was available at the time of budget preparation.

Variances in other operating expense functions and sub-functions are not significant, either individually or in aggregate.

4.3.3 Operating Expenses by Cost Category

Table 4.3.3 below shows operating expenses by cost category for Drainage Operations, Planning, Project Support Costs and Drainage Services Administration, where cost categories differ from the sub-functions in Section 4.3.2.

Table 4.3.3
Operating Expenses by Cost Category
($ millions)

		A	B	C	D
	Cost Category	**2020**		**2018-2020**	
		Budget	**Actual**	**Budget**	**Actual**
1	Drainage Operations				
2	Staff Costs and Employee Benefits	26.8	25.9	76.8	75.3
3	Contractors and Consultants	21.6	19.8	62.1	56.1
4	Materials and Supplies	0.2	-	0.6	0.3
5	Other	4.4	5.2	15.9	16.2
6	Drainage Operations	53.1	51.0	155.4	148.0
7	Planning and Project Support				
8	Staff Costs and Employee Benefits	10.5	13.9	29.0	39.2
9	Contractors and Consultants	4.5	3.2	15.1	10.4
10	Other	0.6	0.9	(0.7)	(2.4)
11	Planning and Project Support	15.6	18.0	43.4	47.2
12	Drainage Shared Services				
13	Staff Costs and Employee Benefits	12.2	14.2	34.2	35.9
14	Contractors and Consultants	5.2	4.1	14.8	12.6
15	Other	0.4	1.4	1.7	4.9
16	Drainage Shared Services	17.9	19.6	50.8	53.4

The information presented in this table supports the explanations of differences between 2020 actual and budget expenses provided in Section 4.3.2. Accordingly, no additional explanations are considered necessary.

4.3.4 Depreciation and Amortization

Drainage's depreciation expense and amortization of contributed assets for 2020 are shown in Table 4.3.4 below:

Table 4.3.4
Depreciation and Amortization
($ millions)

		A	B	C	D
Depreciation and Amortization		**2020**		**2018-2020**	
		Budget	**Actual**	**Budget**	**Actual**
1	Provision for depreciation	76.6	78.7	213.1	221.2
2	Amortization of contributions	(41.3)	(42.5)	(114.7)	(120.3)
3	**Depreciation, net**	**35.3**	**36.2**	**98.3**	**100.9**

Drainage's net depreciation expense is $0.9 million greater than budget ($2.6 million greater for 2018-2020). These differences reflect higher than budget asset additions resulting from the changes to Drainage's capital program discussed in Section 4.4. The 2018-2020 difference also includes a $1.5 million variance related to changes in depreciation rates in 2018. At the time the 2018 budget was prepared, Drainage had not completely finalized asset componentization and other adjustments needed for its regulated accounting. As a result, during 2018, Drainage found that actual depreciation rates, averaging 1.5%, were slightly higher than the average budget rate of 1.4%, resulting in higher-than-budgeted deprecation expense in 2018. The revised rates are reflected in the budget amounts for 2020 and future years.

4.3.5 Rate Base

Drainage's mid-year rate base, shown in Table 4.3.5 below, is $8.0 million less than forecast. This difference is almost entirely due to the changes in the capital program discussed in in Section 4.4.1. These changes have resulted in lower capital additions in 2018 and 2019, and much higher capital additions in 2020, due to reprioritization of capital projects to address urgent needs for emergency repairs and asset rehabilitation, consolidation of flood mitigation under SIRP and work on approved NRA programs (CORe and LRT Relocations).

Table 4.3.5
Mid-Year Rate Base
($ millions)

		A	B
Mid-Year Rate Base		**2020**	
		Budget	**Actual**
1	Plant in Service		
2	Balance, beginning of year	4,912.7	5,010.1
3	Additions - EPCOR-funded	144.1	211.9
4	Additions - Contributed	131.1	151.9
5	Retirements and adjustments	(12.8)	(7.1)
6	Balance, end of year	5,175.1	5,366.8
7	Mid-Year Plant in service	5,043.9	5,188.4
8	Accumulated Depreciation		
9	Balance, beginning of year	990.2	987.9

		A	B
Mid-Year Rate Base		2020	
		Budget	Actual
10	Depreciation expense	76.6	78.7
11	Retirements and adjustments	(12.8)	(7.0)
12	Balance, end of year	1,054.0	1,059.6
13	Mid-Year Accumulated Depreciation	1,022.1	1,023.8
14	Other Rate Base Items		
15	Working Capital	15.7	15.8
16	Materials and Supplies	1.5	1.5
17	Other Rate Base Items	17.2	17.3
18	**Gross Mid-Year Rate Base**	**4,039.0**	**4,182.0**
29	Contributions		
20	Balance, beginning of year	(3,142.9)	(3,289.2)
21	Contributions in aid of construction	(131.1)	(151.9)
22	Balance, end of year	(3,274.1)	(3,441.1)
23	Mid-Year Contributions	(3,208.5)	(3,365.2)
24	Accumulated Amortization		
25	Balance, beginning of year	(532.8)	(537.0)
26	Amortization of contributions	(41.3)	(42.5)
27	Balance, end of year	(574.1)	(579.6)
28	Mid-Year Accumulated Amortization	(553.5)	(558.3)
39	**Mid-Year Contributions**	**(2,655.1)**	**(2,806.9)**
30	**Net Mid-Year Rate Base**	**1,383.9**	**1,375.2**

Even with significant changes to the capital program, in 2020, the mid-year rate base is less than 1% less than budget. Contributed assets continue to affect both the gross rate base and mid-year contributions. As noted in prior years', the value of contributed assets is difficult to forecast since developers are responsible for construction of distribution infrastructure in new subdivisions and the pace of construction can vary significantly. As well, EWSI receives contribution funding from the Sanitary Servicing Strategy Fund (SSSF) to support drainage development throughout the City of Edmonton. The amount of SSSF funding also varies significantly in response to the level of developer activity on SSSF-eligible projects.

4.3.6 Return on Rate Base

In 2020, Drainage's total return on rate base is $0.8 million greater than budget ($4.2 million less for 2018-2020). Although the total return on the rate base is close to budget, debt returns are lower than budget and equity returns are higher. In 2019 and 2020, EUI provided one-time preferential financing to Drainage in the form of short term notes at rates of 2.31% and 1.75%, respectively. This debt, which will be rolled over to higher cost debt prior in 2021 and 2022, reduces the average cost of debt by 1.13% in 2020 and 0.61% over the 2018-2020 period. The low cost of debt has enabled Drainage to earn equity returns in 2020 in excess of its budgeted returns. Even so, since Drainage's rates of return on equity are much lower than the returns approved for Water and Wastewater Treatment, the 2022-2024 PBR application proposes to ramp-up Drainage's rate of return on equity to comparable rates over a five year period commending in 2022.

Table 4.3.6-1
Return on Mid-Year Rate Base
($ millions)

		A	B	C	D
	Return on Rate Base	**2020**		**2018-2020**	
		Budget	**Actual**	**Budget**	**Actual**
1	Net Mid-Year Rate Base	1,383.9	1,375.2		
2	Capital Structure				
3	Debt	57.50%	55.53%		
4	Equity	42.50%	44.47%		
5	Total	100.00%	100.00%		
6	Cost Rates				
7	Debt	4.16%	3.03%	3.91%	3.30%
8	Equity	3.25%	4.95%	4.46%	5.03%
9	Weighted Average Cost of Capital (WACC)	3.77%	3.88%	4.16%	4.13%
10	Return on Rate Base				
11	Debt	33.1	23.1	82.4	64.9
12	Equity	19.1	30.3	76.7	89.9
13	**Total Return on Drainage Rate Base**	**52.2**	**53.4**	**159.1**	**154.8**

Returns on rate base are calculated separately for the debt-financed and equity-financed portions of Drainage's net rate base. The rate of return on debt for 2020 and 2018-2020 reflects the "rollover" of City of Edmonton debentures into EUI notes with the same terms and conditions, as well as the preferential financing on short-term notes issued to EUI in 2019 and 2020. The calculation of the average cost of debt is shown in Table 4.3.6-2 below.

Table 4.3.6-2
Interest Expense and Cost of Debt
($ millions)

		A	B	C	D
	Interest Expense and Cost of Debt	**2020**		**2018-2020**	
		Budget	**Actual**	**Budget**	**Actual**
1	Interest expense				
2	Interest on short-term debt	1.3	1.5	5.2	3.6
3	Interest on City of Edmonton debentures	18.0	-	39.1	18.1
4	Interest on intercompany debentures	7.1	22.1	26.0	43.9
5	**Total interest expense**	**26.4**	**23.5**	**70.2**	**65.7**
6	Mid-year debt				
7	Mid-Year Short-term debt	34.6	47.2		
8	Mid-Year Long-term debt	599.3	731.0		
9	Total mid-year debt	633.9	778.2		
10	**Average Cost of Debt**	**4.16%**	**3.03%**	**3.91%**	**3.30%**

4.3.7 Transactions with Affiliates

Drainage derives a portion of its revenues and expenses from transactions with affiliates, including the City of Edmonton, EUI and its subsidiaries. Table 4.3.7 provides a summary of Drainage's 2020 and 2018-2020 transactions with affiliates.

Table 4.3.7
Transactions with Affiliates
($ millions)

		A	B	C	D
	Affiliate and Service	**2020**		**2018-2020**	
		Budget	**Actual**	**Budget**	**Actual**
1	**Revenues from the provision of services to the City of Edmonton**				
2	Utility Services	2.9	2.9	8.7	5.8
3	Other Revenue	0.9	0.1	2.7	3.5
4	Total	3.8	2.9	11.4	9.3
5	**Services provided by (recovered from):**				
6	**City of Edmonton**				
7	Franchise Fees	9.5	9.7	29.1	27.9
8	Property Taxes	1.1	0.9	2.1	2.6
9	Interest on City of Edmonton debentures	18.0	-	39.1	18.1
10	Other services	7.8	5.0	23.5	25.0
11	Total	36.4	15.6	93.7	73.6
12	**EPCOR Utilities Inc.**				
13	Corporate Shared Service Costs	16.9	17.7	49.5	51.3
14	Interest on short-term debt	7.1	22.1	26.0	43.9
15	Interest on intercompany debentures	1.3	1.5	5.2	3.7
16	Total	25.3	41.2	80.7	98.9
17	**Other Affiliates**				
18	EPCOR Energy Alberta LP	3.9	4.9	11.7	13.2
19	EPCOR Distribution and Transmission Inc.	0.9	-	2.7	0.9
20	EPCOR Technologies Inc.	-	-	-	(0.2)
21	EPCOR Commercial Services Inc.	-	-	-	0.7
22	Other EWSI Business Units	2.0	1.6	6.0	6.6
23	Total	6.8	6.6	20.4	21.1
24	**Expenditures (Contributions) on capital projects arising from services provided by:**				
25	City of Edmonton	(43.1)	(23.4)	(119.2)	(60.3)
26	EPCOR Technologies Inc.	-	5.2	-	12.6
27	EPCOR Utilities Inc.	2.3	1.3	5.2	4.2
28	EPCOR Energy Services	(2.2)	(2.7)	(7.6)	(8.1)
29	EPCOR Distribution and Transmission Inc.	-	0.0	-	0.4
30	EPCOR Water Services Inc.	0.2	0.3	0.6	0.7
31	Total	(42.9)	(19.2)	(121.1)	(50.4)

4.4 Capital Programs

4.4.1 Capital Expenditures

Drainage's forecast capital program is based on the 2018-2021 long term plan (LTP) included in Grant Thornton report CR_8300, an independent third party report assessing the transition of Drainage from the City of Edmonton to EPCOR. Drainage's 2020 capital expenditures program is summarized in Table 4.4.1 below. Table 4.4.1 provides a comparison of forecast to actual capital expenditures for 2020 and 2018 to 2020 for each program and for each project with capital expenditures in excess of $10.0 million over the 2018-2021 term, as well as a comparison of total forecast capital expenditures for 2018 to 2021 from the LTP, adjusted for approved Non-Routine Adjustments, to EWSI's current capital projection.

Please note that forecast capital expenditures also include capital expenditures approved for Non-routine Adjustments.

Table 4.4.1
Capital Expenditures and Contributions
($ millions)

		A	B	C	D	E	F	G	H	I	
		2020			**2018-2020**			**2018 - 2021**			
	Project Description	**Forecast**	**Actual**	**Difference**	**Forecast**	**Actual**	**Difference**	**LTP**	**Projection**	**Difference**	**Note**
1	**Capital Expenditures**										
2	Drainage Neighbourhood Renewal	43.8	36.6	(7.2)	124.1	87.2	(36.9)	175.8	123.0	(52.8)	1
3	Drainage System Expansion	20.4	24.9	4.6	57.3	67.8	10.5	84.2	93.1	8.9	2(a)
4	Drainage System Rehabilitation										
5	Groat Rd Trunk S OP-001639-01	-	13.2	13.2	-	34.5	34.5	-	34.5	34.5	3(a)
6	High Priority Replacement Program	13.7	18.6	4.9	40.0	53.0	13.0	54.2	70.6	16.5	3(b)
7	Projects under $15 million	16.5	34.1	17.6	48.0	84.2	36.1	65.0	115.4	50.3	3(c)
8	Drainage System Rehabilitation	30.2	65.9	35.7	88.1	171.7	83.6	119.2	220.5	101.3	
9	Environmental Quality Enhancement										
10	Kinnard OSS	-	2.3	2.3	-	2.5	2.5	-	12.7	12.7	
11	Projects under $15 million	33.7	14.7	(19.0)	74.7	26.1	(48.6)	100.8	33.1	(67.7)	
12	Environmental Quality Enhance	33.7	17.0	(16.7)	74.7	28.6	(46.1)	100.8	45.8	(55.0)	4
13	Flood Mitigation										
14	Tweddle Place OP-001334-01	9.1	5.4	(3.7)	29.6	14.5	(15.1)	29.6	20.5	(9.1)	5(b)
15	Malcolm Twed & Ed OP-001695-01	17.5	2.2	(15.3)	48.6	4.0	(44.7)	58.4	9.5	(48.9)	5(a)
16	Kenilworth Dry Pond	-	0.5	0.5	-	0.6	0.6	-	6.4	6.4	5(b)
17	Lauderdale West Dry Pond	-	-	-	-	-	-	-	0.8	0.8	5(b)
18	Projects under $15 million	40.8	25.5	(15.3)	108.7	43.3	(65.4)	159.5	71.7	(87.8)	5(b)
19	Flood Mitigation	67.5	33.7	(33.8)	186.9	62.4	(124.5)	247.5	108.9	(138.6)	
20	SSSF Projects										
21	SESS SW4 OP-001336-01	-	5.4	5.4	-	17.6	17.6	-	20.6	20.6	
22	NEST NC2 & NC3 OP-001795-01	-	5.8	5.8	-	23.6	23.6	-	32.6	32.6	
23	SESS SA10A CP-002993-01	-	15.4	15.4	-	28.6	28.6	-	38.5	38.5	
24	SW5	-	0.3	0.3	-	0.3	0.3	-	4.5	4.5	
25	Projects under $15 million	43.3	0.8	(42.5)	102.9	3.1	(99.8)	137.8	4.8	(133.0)	
26	SSSF Projects	43.3	27.8	(15.5)	102.9	73.2	(29.7)	137.8	101.0	(36.8)	6
27	NRA - LRT										
28	West Valley LRT	11.8	10.6	(1.2)	13.9	16.4	2.4	55.4	48.4	(7.1)	
29	Metro LRT	4.8	7.1	2.4	4.8	7.3	2.5	5.5	8.7	3.2	
30	NRA-LRT Projects	16.5	17.7	1.2	18.7	23.7	5.0	60.9	57.0	(3.8)	7
31	NRA - CORe										
32	151S/99A SanTrunk OP-001940-01	-	7.6	7.6	-	8.7	8.7	-	24.6	24.6	
33	Duggan Tunnel Replacement	1.0	0.8	(0.2)	2.1	0.8	(1.3)	10.4	5.2	(5.1)	
34	Mill Creek Combined	-	0.7	0.7	-	0.7	0.7	-	1.4	1.4	
35	Projects under $15 million	14.6	21.7	7.1	19.6	29.2	9.7	41.9	64.3	22.4	

	A	B	C	D	E	F	G	H	I	
	2020			2018-2020			2018 - 2021			
Project Description	**Forecast**	**Actual**	**Difference**	**Forecast**	**Actual**	**Difference**	**LTP**	**Projection**	**Difference**	**Note**
36 NRA - CORe	15.6	30.7	15.1	21.7	39.4	17.8	52.2	95.5	43.2	8
37 Real Estate	-	18.8	18.8	-	18.8	18.8		32.8	32.8	9
38 Total Capital Expenditures	**238.9**	**273.1**	**34.3**	**633.9**	**572.7**	**(61.2)**	**865.4**	**877.6**	**12.2**	
39 **Contributions**										
40 Drainage System Expansion	(12.2)	(4.0)	8.2	(43.9)	(16.3)	27.5	(60.1)	(21.6)	38.5	2(b)
41 Flood Mitigation										
42 Malcolm Twed & Ed OP-001695-01	-	(1.8)	(1.8)	-	(1.8)	(1.8)	-	(3.0)	(3.0)	
43 Projects under $15 million	-	(5.0)	(5.0)	-	(5.0)	(5.0)	-	(11.5)	(11.5)	
44 Flood Mitigation	-	(6.8)	(6.8)	-	(6.8)	(6.8)	-	(14.5)	(14.5)	5(c)
45 SSSF										
46 SESS SW4 OP-001336-01	-	(5.4)	(5.4)	-	(17.6)	(17.6)	-	(20.6)	(20.6)	
47 NEST NC2 & NC3 OP-001795-01	-	(5.8)	(5.8)	-	(23.6)	(23.6)	-	(32.6)	(32.6)	
48 SESS SA10A CP-002993-01	-	(15.4)	(15.4)	-	(28.7)	(28.7)	-	(38.5)	(38.5)	
49 SW5	-	(0.3)	(0.3)	-	(0.3)	(0.3)	-	(4.5)	(4.5)	
50 Projects under $15 million	(43.3)	0.7	44.0	(102.9)	2.6	105.5	(137.8)	2.3	140.1	
51 SSSF Projects	(43.3)	(26.2)	17.0	(102.9)	(67.7)	35.2	(137.8)	(94.0)	43.9	6
52 Total Contributions	**(55.4)**	**(37.0)**	**18.4**	**(146.8)**	**(90.8)**	**55.9**	**(197.9)**	**(130.1)**	**67.8**	
53 Capital Expenditures, Net	**215.5**	**236.1**	**20.6**	**527.5**	**481.9**	**(45.6)**	**780.6**	**747.5**	**(33.1)**	

Table 4.4.1 shows that despite the challenges posed by the COVID-19 pandemic, Drainage undertook an extensive capital program in 2020. Both actual and projected expenditures differ significantly from the LTP as Drainage (1) focused its resources on addressing critical needs for drainage system rehabilitation that had not been identified in the LTP; (2) re-evaluated flood mitigation projects in line with SIRP strategy; and (3) undertook capital projects to address needs identified in Non-Routine Adjustments approved for CORe and LRT relocations.

Explanations for significant differences between the LTP and Drainage's current projections for 2018 to 2021 are as follows:

1. **Drainage Neighbourhood Renewal** –2018-2021 - $52.8 million less than LTP. This category includes the costs of neighbourhood drainage asset renewals and is aligned with the timing of the City of Edmonton's Building Great Neighbourhoods program. The underspend compared to the LTP reflects a reduction in sewer upgrading costs based on reprioritization to more efficiently complete this work by including it into individual neighbourhood renewal projects where required or by using lower cost SIRP Strategy options such as capturing peak stormwater volumes at the source by using green infrastructure (LID and dry ponds) or by proactive relining of pipes and manholes to reduce inflow and infiltration.

2. **Drainage System Expansion, net of contributions** – 2018-2021 - $47.4 million greater than LTP.

   a. Capital expenditures –2018-2021- $8.9 million greater than LTP plan. Increases in 2018-2021 projected expenditures in this partially-contributed program are primarily due to higher service connection costs reflecting increases in non-standard connections and capitalization of the costs of private development construction project services provided by City of Edmonton staff.

   b. Contributions – 2018-2022 - $38.5 million less than LTP. These decreases are primarily attributable to the removal of contributions from local improvement fees following the Drainage transfer.

3. **Drainage System Rehabilitation Projects** – 2018-2020 - $101.3 million greater than LTP.

   a. **Groat Road Storm Trunk Rehabilitation** – 2018-2021 – $34.5 million greater than LTP. This project, completed in 2020, was originally planned to be complete prior to Drainage transfer but due to project complexity, design took longer than expected.

   b. **High Priority Replacement Program** – 2018-2021 - $16.5 million greater than LTP. The additional costs in this program result from asset inspections, which identified higher than anticipated volumes of assets meeting criteria for high priority replacement.

   c. **Drainage System Rehabilitation Projects < $15 Million** – 2018-2021 - $50.3 million greater than LTP. Increases in the costs of these projects are primarily due to the large number of emergency projects requiring immediate rehabilitation. This also reflects the increased need for rehabilitation of aging drainage infrastructure resulting in increased scope on the local sewer rehabilitation program to include catch basin leads and service connections as well as the new manhole catch basin program and proactive service relining project.

4. **Environmental Quality Enhancement** – 2018-2021 - $55 million less than LTP. This category includes projects that mitigate the impacts of the drainage system on the environment, including sewer overflows, river loading, and reuse of biosolids. Actual and projected expenditures in this category have been reduced significantly due to the cancellation of the River for Life, Mill Creek End of Pipe Facility and Enhanced Biosolids projects as part of the re-prioritization of environmental projects within the SIRP strategy. The SIRP strategy has incorporated these environmental quality objectives.

5. **Flood Mitigation, net of contributions** – 2018-2021 - $153.1 million less than LTP.

    a. **Malcolm Tweddle and Edith Rogers Dry Ponds** – 2018-2021 - $48.9 million less than LTP. Expenditures on this multi-year project have been deferred first due to delays in finalizing land agreement in 2019, then from weather-related pauses in construction in both 2019 and 2020 and delays on the City's LRT construction which impacted sewer installations

    b. **Other Flood Mitigation Projects** – $89.7 million less than LTP. This category includes development of drainage infrastructure and program improvements to decrease flood risks. As described in Section 1.5, Drainage has consolidated management of flood mitigation projects under SIRP. The projected underspend is consistent with 2018 and 2019 reporting and reflects re-evaluation of flood projects in line with the SIRP strategy combined with delays in land acquisition in accordance with the City of Edmonton’s new City consultative process.

    c. **Flood Mitigation Contributions** – 2018-2021 - $14.5 million greater than LTP. These contributions represent provincial and federal grant funding in respect of flood mitigation projects. Separate presentation of these contributions, rather than netting the grants against the related project reflects a change in the treatment of grant recoveries following the transfer of dry pond structure ownership to Drainage.

6. **Sanitary Servicing Strategy Fund (SSSF) Projects, net of contributions** - $7.0 million greater than LTP. The SSSF provides for developer financing of major sanitary trunk construction to service new development areas. Drainage works with the SSSF Management Committee to coordinate design, construction, schedules and budgets for various projects. While significantly less than the City LTP amounts, Drainage’s current projected expenditures, align with the SSSF Management Committee’s five year construction plan (2018-2022) to support orderly, cost-effective development. The major projects in this category fully funded through the SSSF. The unfunded amounts represent EWSI’s annual contributions to the SSSF.

7. **NRA-LRT Relocations** – 2018-2021 - $3.8 million less than NRA approval. Projected capital expenditures for these projects represent EWSI’s current estimates of capital required in the 2018-2021 PBR term for NRAs approved by City Council. Projected capital expenditures for 2018-2021 are less than the amount approved by City Council, primarily due to rescheduling to align with the latest City plans on the West Valley LRT.

8. **NRA-CORe** – 2018-2021 – $43.2 million greater than NRA approval. Actual and forecast costs for these programs represent EWSI's current estimates of capital required in the 2018-2021 PBR term for NRAs approved by City Council. Projected capital expenditures of $95.5 million are $43.3 million greater than the $52.2 approved by City Council for 2018-2021. This increase is primarily due to inclusion of the large trunk program in CORe which was previously included under Drainage System Rehabilitation. The rehabilitation of large sanitary trunks are needed to address corrosion and odour issues.

9. **Real Estate Consolidation Project** (new project) - 2018-2021 - $32.8 million. Following the transfer of Drainage to EPCOR, an EPCOR-wide real estate review was undertaken to identify and evaluate alternatives for consolidating Water Distribution and Transmission and Drainage's operations and maximize the contribution to the cost reduction and efficiency commitments made as part for the Drainage transfer. This project consolidates the many physical locations occupied by Water and Drainage and will provide operational cost-savings which are reflected in the 2022-2024 PBR. Projected expenditures are supported by a comprehensive business case submitted with Drainage's 2022-2024 PBR Application.

4.4.2 Construction Work in Progress

Drainage's rate base consists of plant in service. If a capital project is not completed (i.e. not placed into service) in the year, the capital expenditures on that project remain in Construction Work in Progress and are excluded from the rate base. Because of the long time frames required to complete large, complex projects, Drainage has larger balances of Construction Work in Progress than Water or Wastewater. Drainage's construction work in progress is summarized in Table 4.4.2 below:

Table 4.4.2
Construction Work in Progress
($ millions)

		A	B
	Construction Work in Progress	**2020**	
		Budget	**Actual**
1	Balance, beginning of year	66.2	46.9
2	Capital expenditures	236.1	237.5
3	Cancelled costs/Write-offs	-	(1.4)
4	Capital additions	(144.1)	(212.0)
5	**Balance, end of year**	**145.9**	**71.0**

The PBR allows Drainage to capitalize the costs of financing certain projects remaining in Construction Work in Progress, using an allowance for funds utilized during construction (AFUDC). In 2020, AFUDC included in capital expenditures on eligible projects amounted to $3.0 million ($2.1 million in 2019 and $1.7 million in 2018).

4.5 Operational Performance

On February 19, 2020, City Council approved amendments to Bylaw 18100. These amendments provide for the introduction of new PBR performance metrics, scoring and penalties beginning in 2020. The new proposed PBR metrics program is effective for the remainder of the PBR term (2020 and 2021), and is patterned after the water and wastewater PBR metrics and meets the requirements of the Letter of Intent developed for the transition of Drainage Services from the City to EPCOR.

4.5.1 Environmental Index

The environmental index measures the success of Drainage's programs and policies designed to mitigate and report adverse environmental impacts.

Index Component		PBR Performance Measure	Standard	Actual Score	Index
1	Stormwater Flow and Flow Monitoring	The percentage of storm drainage area monitored.	>63.0%	65.3%	1.037
2	Environment Incident Management	The actual number of reportable environmental incidents.	<50	34	1.471
3	Green Hectares	Number of hectares with runoff managed by green infrastructure.	>22.0	18.0	0.817
				Average Index	1.108
				Index Standard Points	30.0
				Total Actual Points	33.2
				Maximum Available Including Bonus Points	33.0
				Total Points Earned	**33.0**

2020 Highlights:

- **Stormwater Flow and Flow Monitoring**
  - Completed design of six new permanent outfall monitoring stations for construction in 2021
- **Environment Incident Management**
  - Achieved a 30% reduction in reportable incidents through organizational improvements, including assigning responsibility for investigating and identifying third party generators of spills and releases to Drainage's Monitoring and Compliance team.
  - Recovered over $39 thousand from customers following implementation of a new third party cost recovery process for spills and releases.

2021 Areas for Improvement

- **Green Hectares**
  - In 2020, Drainage developed new design and construction standards for Low Impact Development projects and completed LID and small storage projects on public property in four neighbourhoods and along Jasper Avenue. Achieving performance standards will require implementation of LIDs on private lands, as well as on public property. To this end, Drainage has developed a Master Servicing Agreement for LID design and is working with the City of Edmonton and local businesses to expedite LID facility design and construction in 2021. Drainage has also established a partnership with University of Alberta to construct LID facilities on University land.

4.5.2 Customer Service Index

The Customer Service Index is a composite measure of the customers' perception of satisfaction with EWSI service, the speed of response and quality service level to customer issues.

	Index Component	PBR Performance Measure	Standard	Actual Score	Index
1	Service Maintenance Calls	The percentage of service maintenance calls resolved within 24 hours.	>80.0%	97.2%	1.215
2	Emergency Dig Ups - Service Restored	The percentage emergency dig ups services resorted within 48 hours from time received from operations.	>98.0%	95.8%	0.978
3	Service Connections	The percentage of service connection meeting the 6 week target.	>85.0%	71.7%	0.844
4	Sewer Odour Hotspots	The percentage of the city area with odour hotspots.	<16.7%	13.5%	1.234
				Average Index	1.038
				Index Standard Points	20.0
				Total Actual Points	21.4
				Maximum Available Including Bonus Points	22.0
				Total Points Earned	**21.4**

2020 Highlights:

- **Service Maintenance Calls**
  - Despite the challenges of performing work in private residences during the COVID-19 pandemic, Drainage's achieved better than standard performance, primarily due to process improvements including enhanced customer screening, and training to ensure the continued safe delivery of services.
- **Sewer Odour Hotspots**
  - Air monitoring was completed at 56 sewer locations across the city. This effort has provided a comprehensive understanding of odour in the sewer system and has guided the development of the permanent monitoring plan.
  - Manhole sealing and sewer ventilation controls were successfully installed in key intersections of the Duggan and Steinhauer communities to limit sewer odour at historically high complaint locations.
  - Twelve access manholes were built in the communities of West Jasper Place, Strathcona and Brookside, allowing for the inspection and identification of odour sources in several deep trunks for the first time.

2021 Areas for Improvement

- **Service Maintenance Calls**
  - Additional technical training, customer service training, and specialized equipment will be provided to Service Maintenance crews, so that crews will be able to perform all required work during the initial call to the customer's property, reducing rework and customer inconvenience. .
- **Emergency Dig Ups – Service Restored**
  - Although the standard was not met, in 2020, the average restoration time for the 45 of 47 services restored within the 48 hour performance standard was 14 hours and the average restoration time for all 47 services was 21 hours.
  - Fro 2021, Drainage is continuing to work towards achieving performance targets. Average service reconnection time to April 30 is 11 hours.
- **Service Connections**
  - In 2020, Drainage completed new service installations at 228 locations with over 450 actual new services installed.
  - For 2021, Drainage will be implementing process improvements to meet or exceed service connection targets. These improvement will incorporate the review and updating customer application guidelines to address constructability, operational and safety issues, as well as concerns identified through forums with developer representative groups.
- **Sewer Odour Hotspots**
  - Drainage is continuing to implement its CORe strategy. In 2021, Drainage will install sixteen permanent air monitoring sites at locations across the city with a history of high public odour complaints. These sites will be integrated with SIRP Dashboard to allow planners and operators to see odour conditions in real time, both to pre-emptively manage odour issues in high impact areas, and that the evaluate the effectiveness of mitigation activities.
  - In 2021, the CORe program will also include: capital upgrades at six pump stations to decrease the generation of hydrogen sulfide from those facilities and reduce odour in their downstream communities; construction of o sewer modifications in Allendale to reduce the presence of odour in the community; and deep trunk inspections and cleaning.

4.5.3 Reliability and Optimization Index

The System Reliability Index is a measure of the confidence that customer can place in the reliability of the drainage sanitary and stormwater systems.

Index Component		PBR Performance Measure	Standard	Actual Score	Index
1	Blocked Sewers	The number of blocked sewers per 100km of sanitary/combined pipe.	<2.10	2.51	0.838
2	Sewer Renewal	The km of sewers renewed / relined.	>60.0	75.3	1.255
3	Infrastructure Condition Rating – Min Level	The percentage of all infrastructure (including non-linear) assessed at or above the minimum level of condition rating.	>90.0%	90.6%	1.007
4	Full Property Flood Proofing Inspections	The number of inspections completed.	>750	573	0.764
				Average Index	0.966
				Index Standard Points	35.0
				Total Actual Points	33.8
				Maximum Available Including Bonus Points	38.5
				Total Points Earned	**33.8**

2020 Highlights:

- **Sewer Renewal**
  - The total length of local sewers under 750 mm in diameter that were proactively renewed was well in excess of the performance target, allowing Drainage to start to reduce its maintenance backlog.
- **Infrastructure Condition Rating**
  - Better than standard performance reflects rehabilitation, replacement and new construction to improve overall system condition. The increase in the Drainage System Rehabilitation program and continued investment in higher value, critical assets, such as large trunks, is expected to contribute to overall ratings improvement in 2021.

2021 Areas for Improvement

- **Blocked Sewers**
  - The number of plugged mains increased significantly due to the “toilet paper shortage” in the early part of the pandemic and the resulting increase in prohibited waste (paper towel/ flushable wipes). In 2021, Drainage will undertake a customer education campaign targeted at preventing prohibited waste from entering the sewerage system and will also conduct a thorough review of the high pressure flushing program to identify improvement opportunities.
- **Full Property Flood Proofing Inspections**
  - Flood proofing inspections were suspended between March and the latter half of 2020 due to provincial pandemic restrictions. During the downtime, all technical staff successfully completed the advanced flood prevention training program offered by Fleming College and University of

Waterloo. After restrictions were eased, interior inspections could only be completed safely through the use of video calls.

- In 2021, Drainage will (1) hire three additional Flood Prevention Advisors, (2) develop and implement approaches for focused property level flood prevention efforts in high-risk basins, and (3) develop and implement a flood prevention inspection program for commercial customers.

4.5.4 Safety Index

The Safety Index is a measure of the success of programs and the application of policies that maximizes the safety of employees and the public.

	Index Component	PBR Performance Measure	Standard	Actual Score	Index
1	Near Miss Reporting Factor	The number of near miss reports entered in the ESS system.	>750	1,608	2.144
2	Work Site Inspection Factor	Number of Work Site Inspections and observations completed per year.	>1,300	1,461	1.124
3	Lost Time Frequency Rate	The actual lost time frequency rate.	<0.75	0.17	4.371
4	All Injury Frequency Rate	The actual all injury frequency rate	<4.00	2.23	1.793
				Average Index	2.358
				Index Standard Points	15.0
				Total Actual Points	33.4
				Maximum Available Including Bonus Points	16.5
				Total Points Earned	**16.5**

2020 Highlights:

- **Near Miss Reporting Factor**
  - Ongoing communication of importance of reporting near misses by management and leadership allowed Drainage to significantly exceed it performance targets. In 2021, Drainage will continue to report near misses in its monthly newsletter and will highlight near misses that resulted in improvements to workplace health and safety.
- **Work Site Inspections Factor**
  - Similar to near miss reporting, leadership provides on-going communication of the importance of completing inspections to Drainage personnel. Worksite inspection reports are reviewed by leadership on a monthly basis.
  - In 2021, Drainage will implement a new inspection module for all employees to facilitate conducting and reporting inspections in real time in the field.

- **Lost Time Frequency Rate**
  - Drainage used the Modified Work Program and developed an Injury Management Procedure document to assist frontline foremen and managers to allow injured employees to work in a modified capacity, rather than to be off work.
  - In 2021, Drainage will continue to investigate injuries to determine root causes and to develop corrective actions to prevent recurrences.
- **All Injury Frequency**
  - Similar to the Lost Time Frequency metric, in 2021, Drainage will continue to investigate injuries to determine root causes and to develop corrective actions to prevent recurrences.

4.6 Rates and Bill Comparisons

Unlike most cities, where wastewater treatment services and drainage services are combined, EWSI currently has separate bills for wastewater treatment services and for drainage services. Accordingly, in order to provide a better basis for comparison with other cities and communities, bill comparisons in Section 3.6 utilize EWSI's blended wastewater treatment and drainage bills.

5 2020 Annual Operating Plans

Water Services presented the 2020 Annual Operational plan to Utility Committee on February 14, 2020. The purpose of that document was to provide Edmonton City Council, Utility Committee and stakeholders a high level perspective of the major activities and initiatives that Water Services was undertaking. Unlike earlier plans, the 2020 Plan recognized the significant number of initiatives are were either underway or had been identified that were common to both the water and drainage business units. These initiatives were intended to drive synergies and efficiencies and to align the two businesses operationally. As a result, the plan was structured in three major sections: 1) Common Initiatives that are being pursued by Water Services and Drainage Services together, 2) Water Services' specific initiatives and 3) Drainage Services' specific initiatives.

In all three areas, initiatives planned for 2020 were organized within six strategic focus areas:

1. Customer Service
2. Public Health and the Environment
3. Employee and Public Safety
4. Employee Development
5. Operational Performance
6. Growth and Financial Performance

This PBR Progress Report provides an update on the 2020 Operational Plan. All initiatives have been described as either: 1) Completed, indicating that the activities are finished and the initiative is closed, 2) In-progress, indicating that work continues and the initiatives has been continued in the 2021 Operational Plan (as many initiatives are multi–year), or 3) On-going, indicating that the initiatives will never be formally completed as business requirements continue to change (e.g. operational improvement). A large number of initiatives planned for 2020 were delayed from the original timelines due to the impact of the COVID pandemic. This has resulted in many continuing in 2021 and are therefore designated as on-going in the charts below.

5.1 Water and Drainage Services – Common Initiatives

INITIATIVE	Year End Status
Customer Service	
Improve customer service The 2nd and 3rd phases of the project will be to do an assessment of the rest of EPCOR's customer facing groups and assessment of how EPCOR's website can be optimized for a customer perspective. In 2020, Water D&T will cross train and amalgamate existing water customer service groups. The other primary focus in 2020 is implementing EPCOR's new	**On-going** – In 2020, a new billing system was implemented. This entailed significant training of staff to ensure that new processes and procedures were well understood and customer service would not be impacted by the transition. The next phase of the project will be to do a comparison between how customer service is measured across EPCOR to current practice in EWSI and an assessment of how EPCOR's

INITIATIVE	Year End Status
billing system and ensuring staff are trained and able to provide a positive customer experience.	website can be further optimized from a customer perspective.
Review developer funding mechanisms to align approaches across all business units Capital investments required to support new development across the city are allocated between developers and ratepayers differently across EPCOR's various lines of business. EWSI is drafting a white paper to establish cost minimization, cost allocation and regulatory principles to be applied in its approach to funding water and drainage infrastructure required to support growth.	**In-progress** – EWSI continued to hold meetings with UDI to develop a principles based approach. The current focus is modelling the impact of applying common principles consistently across all three utilities. The final proposed approach will be presented to Utility Committee as per their request.
Public Health and the Environment	
Develop a Proactive Residuals Strategy – Develop a strategy for the continued reduction of residuals loading to the North Saskatchewan River. This strategy will revisit options for the potential diversion of water treatment plants residuals to sanitary sewer, landfill or other solids disposal and will explore opportunities to further reduce solids loading to the river and expanding water plants residual solids management to other seasons. EWSI will study the net environmental benefit of various options.	**In-progress** – In 2020, a Sustainable Return-On-Investment (SROI) study was completed with multiple stakeholders, including AEP, the CoE and the NSWA. The SROI study examined options for construction of facilities at the water treatment plant that would treat the residuals on site and divert to dewatered residuals to landfill for disposal. Based on a Triple Bottom (TBL) assessment, EWSI has concluded that the costs (financial, environmental and social) of on-site treatment strategies far outweigh the environmental benefits. The SROI study also revealed that information on the environmental impact of the discharges on the river was incomplete. EWSI's proposed residuals strategy for the next 10-year operating approval period is to conduct a more detailed evaluation of the residual discharges to fill in knowledge gaps.
Develop an integrated watershed management strategy for Edmonton - The objective of the IWM strategy is to manage total loadings to the NSR from all municipal discharges in Edmonton and to ensure drinking water security and source water protection for the Edmonton water supply in one unified watershed management program.	**In-progress –** In 2020, a joint Drainage and Water Canada committee and working group were established to explore, define and potentially implement opportunities in the development of an IWM. The committee produced a strategy document and detailed implementation plan at end of 2020. Activities in 2021 will focus on implementation of the plan.

INITIATIVE	Year End Status
Employee and Public Safety	
Develop and Implement Company-wide Assessments to review standard operating procedures for life saving rules, chemicals and high hazard activities.	**On-going** – the initial development has commenced with a focus on ensuring conformance to both EPCOR Standards and provincial legislative requirements. Future work will expand this foundation to the other rules. This initiative is being developed in conjunction with the competency program as described below. Additional modules will be develop over time.
Employee Development	
Develop and Implement Company-Wide Competency Based Training for All High Hazard Activities – Competency training will include fall protection, hazardous energy isolation, confined space and lifting devices.	**On-going** – initial work has commenced on the identified modules. This approach will establish early learnings that will inform the subsequent development of additional modules over time.
Increase awareness of employee growth opportunities through career fairs and other mechanisms - EPCOR intends to leverage relief postings for succession planning, cross functional skill development and knowledge development for in-scope positions. This gives staff the opportunity to take on new roles, demonstrate their ability, diversify their experience, and develop their career. Another objective is to identify immediate knowledge transfer needs and document practices for knowledge transfer.	**On-going –** "A Day in the Life Of" documents were created to give a realistic job preview as well as outline what type of knowledge, skills and education would be required to be successful in various those roles across the company. The Human Resources team will develop company-wide behaviours/competencies for front line workers and evaluate the results of the pilot program and rollout professional growth for individual contributors company wide.
Improve Employee Engagement and Build a Respectful, Inclusive, Collaborative, Safe and Healthy Work Culture – Water Services will deliver a bi-annual engagement survey and interpret the results and implement action plans to address top drivers and opportunities for engagement. We will pursue a variety of activities through the Diversity Council including increasing awareness of diversity and inclusion at EPCOR, incorporating diversity into hiring practices, supporting employee resource groups and working with *Careers: The Next Generation* to provide work opportunities for indigenous youth.	**On-going** – In 2020, the Diversity Council, in concert with leaders across our Business Units, continued to foster a variety of activities and initiatives to drive this focus such as increasing awareness of diversity and inclusion at EPCOR and supporting employee resource groups. A number of Employee Resource Groups (ERGs) were formed. These are grass roots groups formed by employees that share a common diversity characteristic.

INITIATIVE	Year End Status
Develop and Implement a Company-Wide Employee Rotation Program – To ensure a strong pool of talent now and into the future, this program will identify suitable candidates for job-to-job or project-to-project opportunities and support all aspects of the transition.	**On-going** – In 2019, all managers completed the Professional Growth Initiative assessment and associated development plans. To date, the focus has been on people leaders and building a solid foundation in order to support our frontline employees and individual contributors with their professional development. 2020 focused on continued work on the development plans and the completion of the PGI assessments for new staff. Formal employee rotation slowed due to the challenges related to the COVID pandemic.
Operational Performance	
Develop a Process Improvement Program to Support Productivity Increases – This initiative will develop standardized processes or continuous improvement programs to support productivity increases and service quality improvements. The program will encompass methods, techniques and tools and be used to design, control and analyze both business and operational processes. It is critical that any approach chosen involves the people aspect of the process and integrates processes and systems.	**On-going** – a team with six sigma credentials has been formed with the intent of that group both conducting process improvement projects themselves as well as developing educational materials to foster a process improvement orientation across the organization. Several process improvement projects have been identified and are under development with a particular focus on the opportunities resulting from the move to the Aurum facility. An educational program is in the final stages of development.
Develop Standardized Project Management Office/Capital Project Management Tools – This initiative will standardized the way project managers plan, execute and monitor their projects and programs. It involves creation of a project management methodology along with several processes, tools and templates	**On-going** – a cross organizational team has been formed to review project management processes across all business units of EPCOR. The group has identified common process and re-developed many of the supporting documents. More detailed process modelling is currently underway as part of the introduction of the process into the respective business units.
Develop and Implement Strategies for Realizing Synergies between Water and Drainage – EPCOR has committed to a minimum of 1% annual operational efficiency savings for 2018-2022 and capital cost efficiencies of 10% by 2022 for Drainage Services. The initial focus of this initiative has been on integrating Drainage into EPCOR processes. Recent activities have focused on cross functional teams meeting to identify and	**On-going** – several short term opportunities for synergies have been identified and implemented. Detailed analysis has been completed to address larger opportunities to move towards a more consolidated approach across water and drainage. Central to this assessment is the planned consolidation of the drainage and water D&T teams at the new Aurum site. A number of specific opportunities related to that move were identified in 2020 and

INITIATIVE	Year End Status
prioritize efficiency opportunities in the areas of planning, capital and operations.	they are currently under development. These initiatives will be rolled–out over the next 1-3 years
Growth and Financial Performance	
One Water – Develop an integrated planning and implementation approach to manage finite water resources encompassing all the master plans and IRPs for all EWSI owned assets – Water and Wastewater utilities around the world are enhancing their strategic planning by moving to a "One Water" approach to managing the entire Water cycle in their community. The One Water approach has been defined as a holistic approach to sustainable water management that breaks down the traditional silos within the water utility sector and encourages collaboration between water utilities and other sectors.	**In-progress** – The One Water initiative started in 2020 with the formation of the One Water Planning group within EWSI, with the following seven focus areas have been prioritized. It is expected that 2021 will continue to focus on the first six priority items, with the final priority around water reuse moving forward on an opportunistic basis should a development require this focus in 2021. i) Consumption Patterns ii) SanIRP/ SSSF/ Future Wastewater Plants Expansions – iii) Growth Strategies for City and Region iv) Integrated Watershed Management Systems v) Climate Change vi) Water/Sanitary and Stormwater Reuse in Industrial Areas The end objective of One Water is to align the long range planning initiatives across all of the water related business units within EWSI and ensure that decisions are based on data that is consistent and validated within each of the individual IRP plans
Prepare for the 2022-2026 Edmonton PBR – The strategy will be developed to align Drainage under the same PBR Framework as Water and Gold Bar. EPCOR is proposing to renew the Water PBR rates for another five year term for the period 2022-2026. To stagger the future renewal periods, EPCOR will file the Gold Bar and Drainage PBR applications for a three-year term 2022-2024.	**On-going** – The majority of the application development was completed in 2020, with only final review planned for 2021 prior to submission to the City of Edmonton Three separate applications have been developed, one each for water, wastewater and drainage along with business cases for the majority of the capital spending. Common appendices are also included to address issues and requirements that cross all three utilities. Activities in 2021 will be focused on first, answering information requests from City Administration, City Council and external parties in order to provide additional clarity and background information where required. The

INITIATIVE	Year End Status
	approval process then culminates in a public hearing where Water Canada will defend the prudency of the application and seek formal approval from City Council.

5.2 Water Services

INITIATIVE	Year End Status
Customer Service	
Improve Development Processes and Coordination with City of Edmonton and UDI/IDEA – Water Services will focus on better coordination with City Roadways, LRT, Development and Planning group for greenfield and infill development work as well as local industry associations (UDI, IDEA).	**On-going** – Initiatives to improve coordination with the City continue through 2020. Examples include Roadways, LRT planning and infill development. New requirements will evolve as both organization introduce new processes. EWSI worked with the City and IDEA to develop the Infill Cost Sharing Program which was successfully piloted in 2020. Based on that success, the program is proposed to be expanded in the 2022-2026 Water PBR application.
Improve Operational Coordination with the Regional Water Customer Group (RWCG) – This initiative will improve communication, planning and coordination of operational activities and unplanned events to ensure an effective and coordinated response to planned or unplanned events.	**On-going** – Information such as reservoir levels, pressure data and other important operational information is now shared between the parties. Additionally, EWSI now regularly attends the RWCG Steering Committee to provide updates on major operational initiatives (e.g. Lead program). Additional work will continue to ensure on-going co-ordination of outages, repairs and other operational activities.
Sustain the Gold Bar Stakeholder Consultation Plan – Water Services will **continue** provide the public with balanced and objective information to assist with understanding the problem, alternatives, opportunities and/or solutions and to solicit feedback on Gold Bar's long-term requirements at its site in the river valley.	**On-going** – The Gold Bar Stakeholder consultation plan was developed and executed through 2019 and provides the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions. Shared outcomes and design principles were developed in collaboration with stakeholders that will drive and inform activities at the site. The on-going aspects of that stakeholder engagement program will build upon the success of the work

INITIATIVE	Year End Status
	done in 2019. Due to COVID, there was limited stakeholder engagement in 2020.
Develop a social media strategy for water main breaks	**In-progress** – To further improve outage communication, Water D&T commenced the review the process for updating the outage map on epcor.com. The intent is to update the map to provide more real time information to customers. Water D&T and PGA will also evaluate additional means to notify customers of unplanned outages and updates. This work was delayed from the original schedule and will continue into 2021.
Public Health and the Environment	
Develop Climate Change Adaptation – River Flooding Resiliency Plan – Climate Change Strategy identified flooding as the highest risk. Conduct flood hazard analysis and develop a flood mitigation plan for Gold Bar and implement flood mitigation measures at the water treatment plants.	**In-progress** – A comprehensive climate change strategy has been completed in 2018. In 2020, the strategy continued to be operationalized through a number of initiatives and capital plans for the facilities. As part of the PBR applications, plans were developed to mitigate flood risks at the plants. This work will continue in 2021 with the review of all risks associated with climate change on the Edmonton water and wastewater system operations and determine the appropriate risk ranking. Additionally, an outward looking document will be developed that can be shared with key stakeholders such as the City of Edmonton Council and Administration, Alberta Environment and Parks, and others who are interested in the EWS Climate Change Adaption Plan. It will be critical to ensure that the risks and the plans align with the City of Edmonton Climate Change Adaptation Plan that was finalized in 2018 and with EPCOR's overall Climate Change strategy and Environmental and Social Government reporting initiative.
Develop Drinking Water Emergency Plan (Troubled Waters) – Water Services will finalize plans for addressing drinking water emergencies and have in place a clear framework and a documented Business Continuity Plan (BCP) that addresses water supply or water quality emergencies.	**Complete** – EWSI finalized the BCP in 2019. In 2020, the focus was on sharing results with regional customers.

INITIATIVE	Year End Status
Execute the Lead Mitigation Strategy in Edmonton and roll out to other communities – Water Services will develop a proactive means of reducing public health risks to customers from lead and to ensure compliance with the new guidelines for lead in drinking water.	**In-progress** – Design of the orthophosphate dosing systems at Rossdale and E.L. Smith WTPs continued in 2020. Construction will be complete and addition of orthophosphate will begin in mid to late 2022. AEP provided formal approval to add orthophosphate to the Edmonton water in early 2020 after receiving an environmental impact assessment from EPCOR. Broader communication plans and messaging related to the implementation of orthophosphate for our customers, specifically: residential; institutional, commercial, and industrial (ICI), as well as the Regional Water Customer Group (RWCG) will happen in mid-2021. A long-term monitoring program starting in 2021 will be developed to optimize and ensure the effectiveness of orthophosphate dosing across Edmonton. After initial delays due to the impact of COVID-19 in early 2020, the program for full LSL replacements (from “main to meter”) started in mid-2020 for high priority LSLs and those LSLs associated with water main renewal projects. The target is to complete 85 high priority and 45 water main renewals full LSLs replacements in 2020. The goals for 2021 is to complete another 100 high priority LSLs, and the overall object is to eliminate the high priority LSLs by end of 2024.
Confirm to ISO 14001 Across All Water Services Sites – Environmental Management Systems (EMS) are required at facilities and treatment systems across Water Services. Those facilities/systems with an Environmental Management Systems built to meet the old standard are required to transition and conform to the new ISO 14001:2015.	**Complete** – all Water Service facilities in Edmonton operate under a common Environmental Management system. Work progressed in 2020 focused on developing plans for implementing ISO14001 at EPCOR regional sites that were not registered and to begin the process of implementing management systems at these sites.
Complete E.L. Smith Solar Project and Smart Grid System – The E.L. Smith Solar Project is planned as a 12 MW solar farm that will provide renewable energy for water treatment plant operations. In conjunction, EWSI has received federal grant funding to build a Smart Grid	**On-going** – This project received final approval in October 2020 after considerable public and stakeholder consultation. Construction will commence in 2021.

INITIATIVE	Year End Status
System including a 4 MW battery energy storage system and micro-grid controls.	
Execute Green Energy Purchase Agreement – In addition to the E.L. Smith Solar project, another key component of Water Services' strategy to reduce its environmental footprint is to explore a competitive procurement for new renewable power from other Alberta sources for the remainder of the grid sourced electricity currently used by water operations.	**On-going** – In 2020, EPCOR Utilities Inc. signed an agreement with Renewable Energy Systems Canada ("RES") to develop and construct a new wind farm in southern Alberta. EPCOR will acquire the Renewable Electricity Certificates ("RECs") from the project for a 20 year term. The combination of this offtake agreement and the E.L. Smith Solar Farm will result in EPCOR Water utilizing 100% green electricity for all its operations within the City of Edmonton. Permitting activities are currently underway and the wind farm is expected to be constructed in summer 2022 with commercial operations commencing in Q4 2022.
Complete Edmonton Water System Renewal Approval	**Complete** – Edmonton water system approval renewed
Employee and Public Safety	
Move to Adopt ISO 45001 Across all Water Services Sites – Water Services has implemented and obtained registration to the OHSAS 18001 safety management system and is progressing to convert to the updated ISO 45001 safety management system to support continued safety performance improvement.	**On-going** – For its core Edmonton operations, Water Services has implemented and obtained registration to the OHSAS 18001 safety management system and is progressing to convert to the updated ISO 45001 safety management system to support continued safety performance improvement. EWC operations outside of Edmonton will be evaluated throughout 2021 to establish baseline requirements for conformance to the ISO 45001 standard.
Review Effectiveness of Safe Work Planning Across All Water Services Sites – Safe work planning includes implementing a field level hazard assessment that effectively identifies hazards and implements controls to prevent potential injury to employees, contractors and the public. Water Services will review safe work planning for all locations to strengthen hazard assessment and reinforce safety integration into routine and non-routine tasks.	**On-going** - EWSI continues to develop and implement company-wide assessments for six of the lifesaving rules and chemicals to effectively review existing procedures to ensure conformance to the EPCOR Standards and provincial legislative requirements
Employee Development	

<table>
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<tr><td colspan="2">All initiatives are detailed in the Common section above</td></tr>
<tr><td colspan="2">Operational Performance</td></tr>
<tr><td>Develop a Standardized Approach to Asset Management Across Water Services by Confirming to ISO 55000 – The Asset Management Framework will be expanded and adapted to allow greater consistency in how it is applied across business units of Water Services by aligning with the international standard for asset management ISO 55000.</td><td>On-going – The Asset Management Methods Office has expanded and adapted the current Asset Management Framework to allow greater consistency in how it is applied across various Business Units of Water Services by aligning with the international standard for asset management, ISO 55000 including creation of a Strategic Asset Management Plan that outlines how Asset Management is to be approached across the business. These asset management plans formed a central input into the development of the 2022-2024/26 PBR capital plans.</td></tr>
<tr><td>Optimize Meter Reading Function – Water Services will seek to optimize the meter reading function through an analysis of current routing as well as the implementation of meter reading technologies to determine if they are viable from a cost benefit perspective. Analysis of the costs and benefits of introducing Automated Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) technology will be completed.</td><td>On-going – In 2020, Water Services completed the analysis of the costs and benefits of introducing AMI technology and incorporated the results of that analysis into a business case as part of the submission for the 2022-2026 PBR. The proposed implementation of an AMI network in Edmonton would utilize the existing EDTI communications backbone in order to provide a more cost effective solution than a stand-alone installation. If approved within the PBR, the project will be implemented between 2022 and 2024. Planning and design work will commence in 2021.</td></tr>
<tr><td>Develop a Bio-solids Strategy – Since the 1970's, biosolids have been sent to the Clover Bar lagoons for additional processing and disposal, mostly through composting, landfilling and agricultural land application. Over time, the inventory of biosolids in the lagoons have increased as disposal has not met production, to where there is more than 6 years of inventory stored in the lagoons. Additionally, the City of Edmonton made a decision to close down composting operations, due to the integrity of the facility. An overall strategy is required to address these concerns.</td><td>In-progress – In late 2019, the development of a biosolids management program which builds upon past strategies was started. The objectives of the program were to continue to finds ways to beneficially dispose of biosolids, in a financially and environmentally sustainable manner, while reducing the inventory of biosolids in the Clover Bar lagoons. Work in this strategy continued in 2020 and included the development of the PBR business case for the development of a dewatering facility.</td></tr>
<tr><td colspan="2">Growth and Financial Performance</td></tr>
</table>

INITIATIVE	Year End Status
All initiatives are detailed in the Common section above	

5.2 Drainage Services

Initiatives and Objectives	Year End Status
Customer Service	
Build relationships with stakeholders to create trust and understanding – Drainage Services will continue to build stakeholder engagement plans that are aligned with the capital plans.	**On-going** – In 2020, Drainage Services continued to ensure that stakeholder engagement plans were developed for all major capital projects. This included defining when and how to engage with stakeholders to ensure the largest impact. Work will continue in 2021 to ensure this approach optimized as new capital projects commence.
Build systems, processes and training to provide consistently good service that feels seamless to the customer - continue to evaluate sources of customer escalations and implement remedial actions; reduce the number of escalations and reduce customer service connection time.	**On-going –** through 2020, Drainage continued to focus on providing improved levels of customer services, as is evidenced in the supporting metrics: • Customer escalations were reduced by 2.4% in 2020 compared to 2019. Note**:** The target in 2020 was a 0 % decrease from prior year. • Customer service connection completion time for 2020 averaged 2.4 weeks versus the target of 5 weeks.
Execute Corrosion and Odour Mitigation Strategy – The Corrosion and Odour Reduction (CORe) Strategy was developed using similar principles and approaches to SIRP program in order to determine an optimized mix of operational and capital solutions to reduce corrosion and odour. The CORe Strategy expands the previous plan by focusing on preventing the formation of H_2S gas, which will reduce community odour impacts and lengthen the life of sewer network assets. The current strategy also differs from previous plans by segregating the City into regions with consistent	**In-progress –** a detailed review of the work completed in 2020 is contained in the 2022-2024 Drainage PBR Application and Appendix I2

Initiatives and Objectives	Year End Status
odour issues, those with dynamic odour issues, and those with emerging odour issues. Different approaches are proposed for each region to ensure that causes of the odour are fully understood and to ensure that capital projects will provide sustainable relief.	
Complete Drainage LRT Relocations - In 2018, Drainage Services received notifications from the City of Edmonton requesting Drainage Services to start sewer facility relocation for several LRT projects. The notifications indicated that the Valley Line West (VLW) and the Metro Line Northwest (NW) Phase 1 are the City's next two LRT priorities. Since receiving the City's notifications, Drainage Services has been diligently working on the LRT Drainage Relocation Projects. Drainage Services has undertaken corresponding investigations, planning and design works for the VLW LRT project.	**In-progress –** a detailed review of the work completed in 2020 is contained in the 2022-2024 Drainage PBR Application
Public Health and Environment	
Minimize Environmental Impact of Our Operations – As an environmental steward in Edmonton, Drainage Services will minimize our environmental impact in all aspects of our operations. Drainage Services has been working with the City of Edmonton on the climate change initiative through the work on the Stormwater Integrated Resource Plan (SIRP). The purpose of this plan is to identify work that needs to be accomplished to reduce the impact of stormwater flow on Edmonton residents and businesses.	**On-going** – Drainage Services continues to work towards ensuring that all environmental work is aligned with considerations arising from the SIRP, and Corrosion and Odour Mitigation (CORe) Strategies. The goal remains to reduce flow to the river.
Execute the Stormwater Integrated Resource Plan (SIRP) - As part of the agreement to transfer Drainage Services to EPCOR, EPCOR committed to developing a complete stormwater strategy to reduce flooding risks within the City of Edmonton for urban and riverine flooding events. Drainage Services has created the Stormwater Integrated Resource Plan (SIRP) project to integrate environmental and social externalities;	**In-progress –** a detailed review of the work completed in 2020 is contained in the 2022-2024 Drainage PBR Application and Appendix I1

Initiatives and Objectives	Year End Status
operational, planning and infrastructure responses; risk assessment and management; financial analysis; and an open participatory process that incorporates continuous improvement.	
Develop a Strategy to Address Total Loadings in the North Saskatchewan River - Prior to the transition to EPCOR, Drainage Services had developed the Total Loading Plan (TLP) based on a number of strategies developed to reduce and mitigate impacts on the North Saskatchewan River (NSR) and in alignment with its commitment to continual improvement and environmental stewardship. The plan proposed a number of capital projects and other initiatives to reduce loading to the NSR and tributaries. In 2019, Drainage Services updated the TLP, taking a closer look at targets and objectives of main environmental strategies, such are Sewer Separation, Discharge Improvement Zone, Low Impact Development, Watershed Management, and Interconnection Strategy, with the intent of aligning them with asset management needs and the SIRP.	**In-progress** – this initiative has been incorporated into the Proactive Residuals Strategy defined above under the Common Water and Drainage section. The overall goal is to develop a strategy for the continued reduction of residuals loading to the North Saskatchewan River irrespective of the originating business unit.
Employee and Public Safety	

Reduce Tolerance towards safety related risks - Develop customized safe work plans for each unique work area. Implement a new Contractor Management Program, including a framework and guidelines for managing prime contractor accountabilities **Cultivate a culture of Safety Leadership –** Ensure that incidents are reported accurately within our Event Reporting System (ERS), investigations are completed in a timely manner, and learnings are shared with all employees **Encourage ownership of safety at all levels –** This initiative includes: focus on hazard recognition and near miss reporting; training of all people leaders to lead an incident investigation; developing an observation program to identify workplace hazards and recommend controls; rolling out driver report cards based on telematics; implementing workplace inspections across Drainage Services.	**On-going** - as noted above in the drainage metrics section, Drainage Services has made significant progress in improving safety overall. The introduction of new safety metrics in 2020 that align with those in Water and Wastewater Treatment allows direct comparability with the other business units. Drainage Services exceeded all metrics and a number by a significant margin. This performance was the culmination of a number of programs including: • Safe work plans have been developed for each unique work area. Work is underway to integrate these into a Safe Work Plan App for use in the field. • The Contractor Management Program, including guidelines for managing prime contractor accountabilities and serious incident response plans, were updated and communicated to managers as required. • Initiatives intended to develop a strong safety culture continued including training for compliance and conformance, revision of process, near miss and other reporting metrics as well as programs to increase general awareness among staff. • Training of people leaders to lead incident investigations began in 2019 and continued into 2020. This will form a common approach for incident investigation. • The installation of fleet telematics was completed in December 2019. Monthly driver report cards are now being produced used by managers to ensure adherence to vehicle safety expectations. • Targets for workplace observations and inspections by managers and foremen were developed and are included in the 2020 work plan. The total 2020 target of 1,300 inspections was exceeded with actual inspections at 1,461.

Initiatives and Objectives	Year End Status
Train Staff for Competency and Confidence – This initiative includes creating and implementing Hazard Registries for all high risk work; establishing competency based assessments for high risk tasks; and implementing “EPCOR Athletes” – a program to learn about body mechanics and how to incorporate healthy movement into everyday tasks for both field works and office workers.	**On-going** - The EPCOR Learning and Development team began the development of the formal Competency Assessment Project in 2019. The roll out of the program commenced in 2020.
Employee Development	
All initiatives are detailed in the Common section above	
Operational Excellence	
Develop and optimize end-to-end processes within Drainage – Key objectives include identifying projects that either define or optimize cross-functional processes; deploying telematics to assess vehicle utilization and optimize our fleet; develop a program management model building on the team delivery approach piloted in the control structure program; complete the field technology recommendation that ensures field staff have the platform and connectivity; build an information systems strategy that defines the systems of record and system integration strategy.	**In-progress** – A comprehensive process review/improvement program continued in 2020 in order to identify improvement opportunities from an “end to end” perspective. The program supports the identification, facilitation and realization of benefits of/from improvement opportunities across the Plan-Design-Build-Operate business cycle in Drainage. There is a particular focus on hand-offs between and within areas as this is when there is the greatest risk of miscommunication, poor transfer of responsibilities, or a breakdown in work continuity. Initial scoping of similar opportunities related specifically from Drainage Services’ move to the Aurum facility also commenced in 2020. These opportunities are related to the synergies that would result from co-locating water D&T and Drainage Services in a common facility.
Identify and manage emerging risks – This initiative includes implementing a knowledge transfer program to mitigate the risk of losing technical expertise as well as addressing findings from internal audits to mitigate operational risks.	**On-going** – Drainage continues to review and update operating procedures to ensure system knowledge is captured. The Operations and Maintenance internal audit was completed in November 2019 and the findings were addressed through 2020.
Growth and Financial Performance	

Initiatives and Objectives	Year End Status
Correct the revenue leakage that is occurring - In 2019, Drainage Services began an audit of the Stormwater Utility. Through the initial analysis, the stormwater team found multiple discrepancies in the billing system due to a number of factors including lack of auditing since system inception in 2003, lack of written standards, information system limitations and billing system limitations.	**In Progress –** work continued through 2020 to address the issues identified in the original audit. A number of areas were corrected while others have been postponed pending the transition to a new bylaw in 2022. A comprehensive analysis of City of Edmonton properties was completed – currently under discussion with City Administration.

Appendix A: PBR Plan 2017-2021

A.1 In-City Water and Wastewater

A.1.1 PBR Framework

EWSI's In-City Water and Wastewater rates for the 2017-2021 PBR term are regulated by Edmonton City Council in accordance with the PBR Plan approved in Bylaw 17698. This plan encompasses rates, performance measures, and return on equity. The relationships between these components are designed to ensure that capital and operating cost decisions provide a balance between operational performance, rates, and return on equity, while safeguarding system reliability and service quality, providing fair, stable, predictable rates to rate payers, and providing a basis for the future development of the water and wastewater treatments system.

- **PBR Rates.** Annual changes to In-City Water and Wastewater rates are limited to inflation, less an efficiency factor, plus Special Rate Adjustments and, in rare cases, Non-Routine Adjustments. The use of a formulaic approach for calculating and setting utility rates acts as a "price cap" providing ratepayers with stable and predictable rates. The efficiency factor, set at 0.25% for the 2017-2021 PBR term, requires EWSI to increase productivity and achieve efficiencies in excess of inflation if it is to meet it targeted return on equity.

- **Performance Measures.** EWSI's PBR framework includes performance measures for water and wastewater treatment system service quality as described in Schedule 3, Sections 3 and 4 of the Bylaw. EWSI faces financial penalties if it does not meet or exceed performance measure standards, providing assurance to customers that water and wastewater treatment system service quality will not be sacrificed to keep rates low or increase returns to EWSI. EWSI's performance measures are audited annually by an independent accounting firm.

- **Return on Equity.** The PBR plan incorporates a forecast rate of return on equity commensurate with consumption, cost and other risks that allows EWSI to finance its operational and capital programs, to provide its customers with high levels of service quality and reliability, and to provide "just and reasonable" returns to its shareholder. Achieving this return is dependent on EWSI achieving operating cost efficiencies, meeting or exceeding performance standards, and developing the utility infrastructure needed to provide service to its customers. For the 2017-2021 PBR term, returns on equity are based on a deemed capital structure of 60% debt and 40% equity and a 10.175% rate of return on equity.

A.1.2 Risks and Incentives

The PBR framework provides incentives for EWSI to improve operational performance while achieving cost savings through process improvements and other means. Under this framework, EWSI also assumes the risks associated with water consumption, operating costs, financing costs and capital costs, ensuring that customers are provided with stable and predictable rate increases. These risks and EWSI's strategies to mitigate them include:

- **Water Consumption Risk.** Under PBR, EWSI bears all of the risks associated with weather-related fluctuations in water consumption and water quality, as well as the longer-term risks associated with declining consumption per customer. EWSI seeks to mitigate consumption risk through the use of robust forecasting methodologies incorporating long term trends in water consumption.

- **Operating Cost Risk**. EWSI actively works to minimize fluctuations in input prices through long-term power contracts, chemical optimization processes, and continuous efforts to implement cost reduction strategies in all areas of its operations.

- **Interest Risk**. Fluctuations in short-term interest rates, long-term debt issue costs and in the level of capitalized interest have significant impacts on EWSI's net income and return on equity. EWSI mitigates interest risk through timing of long-term debt issuances and optimizing working capital.

- **Capital Cost Risk.** In-City Water and Wastewater's operations are capital intensive and it is often difficult to forecast required levels of capital replacements, both at the plants and in the water distribution and transmission network. EWSI seeks to minimize these risks through comprehensive capital project and asset management programs, ensuring that new projects or changes to existing projects are justified and that there is an appropriate level of management, senior management and executive oversight over capital spending.

A.1.3 Customer Classes and Rate Structure

A.1.3.1 In-City Water

In-City Water rates consist of fixed monthly service charges that vary with meter size and variable charges applied to each cubic metre of water consumed. Consumption charges differ for each of In-City Water's customer classes. These classes and their rate structures include:

- **Residential Customer Class.** Residential customers are charged based on an inclining rate structure with three consumption blocks. The inclining rate structure is intended to promote water conservation and provide incentives for residential customers to use water efficiently.

- **Multi-Residential Customer Class.** Multi-residential customers are charged based on a declining rate structure with three consumption blocks. EWSI has found that the cost of providing water to individual multi-residential customers declines as the size of the multi-residential building increases. As well, there is a wide range of consumption volumes for multi-residential customers. Accordingly, a declining rate structure best reflects the cost characteristics of this customer class.

- **Commercial Customer Class.** Similar to multi-residential customers, commercial customers are charged based on a declining rate structure, but with five consumption blocks to recognize the wide range of average consumption volumes within this customer class.

The 2017-2021 PBR Plan includes three Special Rate Adjustments for In-City Water:

- **Special Rate Adjustment for Rebasing**. The In-City Water revenue requirement was rebased at the beginning of the 2017-2021 PBR term. The resulting rebasing adjustment to rates includes the on-going benefits to rate-payers of efficiency gains realized in the 2012-2016 PBR term, the impacts of higher than forecast capital expenditures during the 2012-2016 PBR term; and increases in the capital expenditure programs for the 2017-2021 PBR term. Also included in the rebasing adjustments is the impact of EWSI's cost of service study which has resulted in redistribution of revenue requirements from the Residential and Multi-Residential customer classes to the Commercial customer class.

- **Special Rate Adjustment for Accelerated Programs.** These Special Rate Adjustments support the acceleration of the replacement of water mains as part of the City of Edmonton's neighbourhood renewal program and the upgrade of water mains to increase fire protection capacity in neighbourhoods experiencing increased densities as a result of infill development.
- **Special Rate Adjustments for Environmental Programs.** EWSI is undertaking two significant environmental initiatives during the 2017-2021 PBR term. The first initiative is an extensive River Monitoring Project to regularly monitor, evaluate and report on a number of water quality variables from several sampling sites in the river for 2018-2021. This program is forecast to have annual costs of $1.0 million starting in 2018. The second initiative, which aligns with the City's *"The Way We Green"* strategy, is a Green Power Initiative to replace approximately 10% of EWSI's total power volumes with energy from locally produced renewable sources starting in 2018. This initiative is forecast to cost $1.9 million annually commencing in 2018.

A.1.3.2 Wastewater Treatment

Wastewater treatment rates consist of fixed monthly service charges that are applied equally to each customer and variable charges applied to each cubic meter of water consumed. Wastewater has two customer classes:

- **Residential Customer Class.** Unlike In-City Water, there are no separate rates for multi-residential customers. Instead, customers who would be multi-residential water customers are subject to the same rates as residential wastewater customers. The common rate structure for residential and multi-residential customers recognizes that the costs of wastewater treatment are very similar for residential and multi-residential customers. Accordingly, charges to Residential customers are based on a flat rate structure with a single consumption block.

- **Commercial Customer Class.** Consumption charges for commercial customers are based on a declining rate structure with three consumption blocks to recognize that there are economies of scale in wastewater treatment for larger commercial customers. In addition, commercial customers are charged overstrength fees for prescribed materials that exceed the concentrations shown in Section 4 of Schedule 1 to Bylaw 17698.

The 2017-2021 PBR Plan includes a single special rate adjustment for rebasing. Similar to In-City Water, Wastewater's revenue requirement was rebased at the beginning of the 2017-2021 PBR term to reflect efficiency gains realized in the 2012-2016 PBR term, as well as the substantial increases in capital spending needed to deal with the challenges of the aging infrastructure at the Gold Bar Wastewater Treatment Plant.

A.2 Drainage

A.2.1 PBR Framework

EWSI's Drainage rates for the 2018-2022 PBR term are regulated by Edmonton City Council in accordance with the PBR Plan approved in the EPCOR Drainage Services Bylaw 18100. Similar to In-City Water and Wastewater, Drainage's 2018-2022 PBR plan encompasses rates and performance measures, but the mechanisms used to achieve a balance between rates and operational performance differ in important respects, as follows:

- **PBR Rates.** Bylaw 18100 prescribes drainage fees and charges for the period from January 1, 2018 to March 31, 2022. These fees and charges reflect EWSI's commitment to limit average annual rate increases to 3%. Besides these scheduled rate increases, Bylaw 18100 also includes a mechanism for non-routine adjustments to rates related to emergent City-directed needs.

- **Performance Measures.** Bylaw 18100 requires Drainage to measure operational performance for the period from January 1, 2018 to December 31, 2019 using performance measures for drainage system service quality modeled after previous City Drainage Services quality metrics. After that time, for the remainder of the 2018-2021 PBR term, Drainage's operational performance will be measured against new performance measures that will be developed Drainage and approved by the Utility Committee. Similar to Water and Wastewater, the new performance measures have a scoring system with financial penalties applied if Drainage does not meet or exceed performance standards. As with Water and Wastewater Treatment, the performance measures scorecard will be audited annually by an independent accounting firm.

A.2.2 Customer Classes and Rate Structure

Drainage has Residential, Multi-Residential and Commercial Customer classes, using the same customer definitions as Water. Drainage's rate revenues are derived from both Sanitary Utility and Stormwater Utility services.

- Drainage has a simple rate structure, with flat monthly service charges varying only by meter size regardless of customer class and the same monthly variable rate per cubic meter applicable to all customers, regardless of customer class, except the University of Alberta which has a unique rate, intended to recognize its lower servicing cost.

- Stormwater Utility revenues are based on the area of the customer's property, development intensity, and zoning, also with common rates regardless of customer class.

2021 PBR Progress Report

EPCOR

2017 – 2021 Performance Based Regulation

Water Services,

Wastewater Treatment Services,

and Drainage Services

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1 Executive Summary

This report provides an annual update to the City of Edmonton on the operational and financial results for the year ended December 31, 2021 for water services ("In-City Water"), wastewater treatment services ("Wastewater"), and sanitary and stormwater sewer services ("Drainage") provided within Edmonton by EPCOR Water Services Inc. ("EWSI"). The City of Edmonton City Council regulates In-City Water and Wastewater in accordance with the Performance Based Regulation ("PBR") Plan approved in the EPCOR Water Services and Wastewater Treatment Bylaw No. 17698 ("Bylaw 17698") and Drainage in accordance with the PBR Plan approved in EPCOR Drainage Services Bylaw No. 18100 ("Bylaw 18100").

1.1 Financial Performance

In-City Water, Wastewater and Drainage's financial performance for 2021 are summarized in Table 1.1 below[1]:

Table 1.1
Revenue and Return on Equity
($ millions)

		A	B	C	D
		2021		2017-2021*	
	Revenue and Return on Equity	PBR Forecast	Actual	PBR Forecast	Actual
1	**In-City Water**				
2	Revenue	217.4	206.9	1,005.4	960.2
3	Return on Equity	44.8	51.0	204.5	204.2
4	Rate of Return on Equity	10.18%	11.46%	10.18%	10.12%
5	**Wastewater**				
6	Revenue	112.8	107.3	496.3	473.0
7	Return on Equity	21.7	28.0	95.4	106.6
8	Rate of Return on Equity	10.18%	14.25%	10.18%	12.13%
9	**Drainage**				
10	Revenue	205.7	222.5	787.7	803.8
11	Return on Equity	15.9	34.3	93.5	124.2
12	Rate of Return on Equity	2.64%	5.42%	4.02%	5.13%

*2018-2021 for Drainage.

Two key factors impacted Water, Wastewater and Drainage's 2021 financial results. First, an unusually hot and dry summer resulted in the highest total water consumption in over 20 years. Second, the on-going effects of the COVID-19 pandemic continued to shift consumption from the

[1] Consistent with the 2017-2021 PBR Application, all financial data in this report, including totals and sub-totals, are rounded to the nearest $0.1 million. This practice ensures continuity of data between tables and between years. However, the sum of the rounded detailed data in certain tables may not be equal to the related rounded total or sub-total.

commercial customer class to the residential customer class, with many businesses remaining shuttered and many employees working from home.

In 2021, despite high consumption, In-City Water and Wastewater's revenues were significantly lower than forecast due to lower than PBR forecast inflation in prior years, which resulted in lower than forecast rates. Drainage revenues, which reflect scheduled rates from Bylaw 18100, were greater than forecast, due to both high consumption and revenues from non-routine adjustments for the Stormwater Integrated Resource Plan (SIRP), Corrosion and Odour Reduction (CORe) and LRT relocates.

In 2021, In-City Water achieved an 11.46% rate of return on equity (10.12% for 2017-2021), compared to its forecast rate of return of 10.175%. These results were achieved primarily through operating expense savings that offset lower than forecast revenues.

In 2021, Wastewater achieved a 14.25% rate of return on equity (12.13% for 2017-2021), compared to its forecast rate of return of 10.175%. Lower than forecast operating expenses, combined with a lower than forecast rate base, more than offset reductions in revenue.

In 2021, Drainage achieved a 5.42% rate of return on equity (5.13% for 2018-2021), compared to its forecast rate of return of 2.24% (3.92% for 2018-2021). Higher than forecast revenues, combined with lower than forecast interest expense due to one-time preferential financing from EUI and a lower than forecast rate base, more than offset higher than forecast operating expenses. As discussed in prior years' PBR Progress Reports, Drainage does not have a City of Edmonton-approved PBR forecast. Therefore, over the 2018-2021 period, Drainage's actual financial performance is compared to its 2018 EWSI budget, escalated at an appropriate inflation rate and adjusted for: (i) removal of one-time costs related to the transition of Drainage to EPCOR; and (ii) differences in basis of accounting between International Financial Reporting Standards (IFRS) and regulatory accounting.

These factors, combined with the cost savings realized in prior years, enabled EWSI to exceed its approved return on equity in 2021 and meet or exceed its 2017-2021 ROE.

Detailed analyses of In-City Water, Wastewater and Drainage's financial performance for 2021 and for the 2017-2021 period are provided in sections 2.2, 3.2, and 4.2, respectively.

1.2 Capital Expenditures

In-City Water, Wastewater and Drainage's capital expenditures for 2021 and the five-year term of the PBR Plan (the "2017-2021 PBR term") are summarized in Table 1.2 below:

Table 1.2
Capital Expenditures
($ millions)

		A	B	C	D
Capital Expenditures		**2021**		**2017-2021(1)**	
		PBR Forecast(2)	**Actual**	**PBR Forecast(2)**	**Actual**
1	In-City Water	104.0	132.7	515.3	565.9
2	Wastewater	22.1	45.1	235.4	232.9
3	Drainage	254.3	244.8	782.1	726.6

(1)Drainage Forecast and Actual results only include 2018-2021, 2018 is the first full year of Drainage operation following the transfer to EPCOR in September 2017.
(2) Amounts include capital expenditures approved through Non-Routine adjustments.

Over the course of the PBR term, changes to capital programs are required to address unforeseen needs for repairs or rehabilitation, changes in regulatory or operational requirements, customer demands, and other external factors. These changes are coordinated through EWSI's Project Management Office and are authorized by EWSI's Capital Project Steering Committee, EPCOR Utility Inc.'s (EUI) Financial Review Council, or EPCOR's Board of Directors, depending on the amount of the expenditure. EWSI also presents information on its capital programs, as well as business cases supporting significant new capital projects (i.e. not already included in the approved PBR application), to the Utility Committee throughout the year.

- **In-City Water's** 2017-2021 capital expenditures of $565.9 million are $50.8 million (10%) greater than the PBR forecast. Significant projects contributing to this variance include the E.L. Smith Solar Farm Project (now the kīsikāw pīsim Solar Farm) and Battery Storage System ($19.4 million), which is funded through the Special Rate Adjustment for Environmental Initiatives; changes to the scope of the Water D&T Facility Expansion Project, which sees the project rolled into the joint Water and Drainage Real Estate Consolidation Project, adds an additional $6.5 million to its cost; and an increase in developer-driven growth projects such as the Network PD Transmission Mains Program, Water Main Cost Sharing Program, and Water Service Connection Program ($20.6 million).

- **Wastewater's** 2017-2021 capital expenditures of $232.9 million are $2.6 million (1%) less than the PBR forecast. Since the entire plant cannot be shutdown for maintenance and inspection, it is often difficult to accurately assess asset condition and the scope of rehabilitation needed before commencing work on a project. During preliminary engineering in 2017 and 2018, EWSI identified significant needs for repairs to critical infrastructure, such as sludge lines replacements, clarifier chain replacements, and structural rehab that had not been anticipated in the PBR forecast. EWSI reviewed design options and employed value engineering to reprioritize reliability and life cycle replacements. These efforts have ensured that changes to projections of the total cost of the 2017-2021 capital expenditures program have resulted in only a slight decrease from the PBR forecast.

- **Drainage's** 2018-2021 capital expenditures of $726.6 million are $55.5 million (7%) less than capital expenditures included in the City Long Term Plan and approved Non-Routine Adjustments. This decrease reflects substantial shifts of projected costs between programs as Drainage continues to refine and reprioritize its overall capital expenditures program to address asset condition, mitigate the risk of failure, and maintain required service levels.

Detailed explanations for differences between capital expenditures in PBR forecast and EWSI's current projections are provided in Sections 2.3, 3.3 and 4.3.

1.3 Operational Performance

In-City Water's and Wastewater's operational performance is measured by the results of indices prescribed in Schedule 3 of Bylaw 17698 with each index consisting of one or more performance measures. Commencing in 2021, Drainage's operational performance is measured using PBR performance indices approved by City Council on February 19, 2021 as amendments to Bylaw 18100. Drainage's new PBR metrics program is patterned after the Water and Wastewater PBR metrics and meets the requirements of the Letter of Intent developed for the transition of Drainage Services from the City to EPCOR

Operational performance under each index is measured independently on a point basis with 100 base points available if the standards for all performance measure indices are achieved. Bonus points are available for performance above standards and financial penalties are applied if EWSI does not meet the 100 base point standard.

In 2021, In-City Water exceeded the performance standards for all five of its performance measure indices, Wastewater exceeded the performance standards for all four of its performance measure indices, and Drainage exceeded the performance standards for three of its four performance measure indices. Detailed discussions of the performance measures making up each of the indices and operational performance highlights are provided in Section 2.4 for In-City Water, Section 3.4 for Wastewater, and Section 4.4 for Drainage. .

Table 1.3-1
2021 Performance Measures and Standards

		A	B	C	D	E	F
	Performance Index	**In-City Water**		**Wastewater**		**Drainage**	
		Standard	**Actual Score**	**Standard**	**Actual Score**	**Standard**	**Actual Score**
1	Water Quality Index[(1)]	25.0	25.0	55.0	60.5	30.0	33.0
2	Customer Service Index	20.0	21.1	15.0	16.5	20.0	22.0
3	System Reliability and Optimization Index	25.0	28.5	15.0	16.5	35.0	30.4
4	Environmental Index[(1)]	15.0	16.5	-	-	-	-
5	Safety Index	15.0	16.5	15.0	16.5	15.0	16.5
6	**Aggregate Points Earned**	**100.0**	**107.6**	**100.0**	**110.0**	**100.0**	**101.9**

[1] Water Quality and Environmental are combined into one index for Wastewater's and Drainage's operational performance

1.4 Rates and Bill Comparisons

In 2021, the average monthly bill for In-City Water customers, based on 2021 average monthly consumption per residential customer of 15.1 m^3, was **$41.77,** an increase of $1.88 (4.7%) from 2020. This increase reflects two factors: first, a 2.3% increase in rates related to the inflation adjustment discussed in section 2.3.1 and Special Rate Adjustments for Environmental Initiatives, Accelerated Programs and Rebasing; and, second, a 2.4% increase related to an increase in consumption of 0.4 m3 per residential customer per month between 2020 and 2021.

The average residential customer's wastewater treatment bill in 2021, also based on monthly consumption of 15.1 m^3, was **$20.71**, an increase of 7.3% from 2020. This increase consists of a 2.1% increase due to higher consumption per customer and a 5.2% increase due to the inflation adjustment and the Special Rate Adjustment for rebasing needed to support Wastewater's 2017-2021 capital programs.

The average residential customer's drainage bill in 2021, again based on monthly consumption of 15.1 m^3, was **$40.46**, an increase of 6.6% from 2020. This increase consists of the annual 3.0% increase set in Bylaw 18100, and Non-Routine Adjustments approved in 2019 for the Corrosion and Odour Reduction Strategy (1.6%), the Stormwater Integrated Resource Plan (1.5%), and LRT related Drainage Infrastructure Relocations (0.4%).

EWSI undertakes annual bill comparison surveys with various cities and local communities. Section 2.5 shows that EWSI's residential water rates are competitive with most of the cities and communities included in the comparison, with only Vancouver having significantly lower water rates. Drainage and Wastewater bills are more difficult to compare because of variations in the nature and extent of wastewater treatment, the inclusion of certain services in property taxes, and geographic and climatic factors which influence the level of investment in and approach to flood mitigation. Section 3.6 shows that Edmonton's combined Drainage and Wastewater Treatment bills are competitive with those of other cities and communities with similar geographic and climatic conditions. Commercial bill comparisons for both water and wastewater show similar results to residential water and wastewater bills.

1.5 Non-Routine Adjustments

Non-Routine Adjustments for In-City Water and Wastewater are defined in Bylaw 17698, and for Drainage in Bylaw 18100, as "items which are unusual, significant in size or nature, and beyond the scope of control of EWSI". Bylaws 17698 and 18100 allow EWSI to request adjustments to In-City Water, Wastewater and Drainage rates for Non-Routine Adjustments from the City Manager or City Council, depending on financial impact.

In 2019, EWSI received approval to increase In-City Water and Drainage rates for the following projects that qualified as Non-Routine Adjustments outlined in Bylaw 17698, Schedule 3, Section 5.0 for Water and Wastewater, or in Bylaw 18100, Schedule 3, Section 4.1 for Drainage. These non-routine adjustments were included in Drainage rates commencing January 1, 2020, January

1, 2021, and January 1, 2022, and In-City Water rates commencing April 1, 2020 and escalated by inflation less the productivity factor on April 1, 2021.

- **Lead Mitigation Strategy (In-City Water)** – On March 22, 2019, EWSI presented a new lead mitigation strategy to the Utility Committee. This strategy is designed to meet new Health Canada Guidelines that reduce the maximum concentration of lead in drinking water at the tap from 10 parts per billion to 5 parts per billion. On July 16, 2019, EWSI received approval to apply the Non-Routine Adjustments to In-City water rates commencing April 1, 2021 to recover the costs of implementing this strategy. The additional cost to an average residential In-City Water customer was $0.41 per month commencing April 1, 2021 (or a total of $10.91 over the 2017-2021 PBR term).

- **Leduc County Annexation (In-City Water)** – On November 27 2018, the Government of Alberta approved the City of Edmonton's annexation of 8,260 hectares from Leduc County. As part of the annexation, EWSI acquired the existing water infrastructure within or required to service the annexed area, including a reservoir, pump house and booster station, as well as transmission mains and a small distribution system, at a cost of $9.5 million which is comprised of $7.8 million for the Discovery Park reservoir and the remainder for a pipeline and booster station. On November 7, 2019, EWSI received approval to apply the Non-Routine Adjustments to In-City Water rates commencing April 1, 2021 to recover the costs related to the annexation. The additional cost to the average residential In-City Water customer was $0.26 per month commencing April 1, 2021 (or a total of $7.09 over the 2017-2021 PBR term).

- **LRT Relocations (In-City Water and Drainage)** – EWSI has identified work needed to accommodate water main, hydrant and sewer relocations for the West Valley Line and Metro Line Northwest Phase I LRT projects. On November 7, 2019, (Drainage) and December 23, 2019 (In-City Water) EWSI received approvals to apply the Non-Routine Adjustments to water rates for In-City Water customers commencing April 1, 2020 and to Sanitary Utility and Storm Water Utility rates for Drainage customers commencing January 1, 2020. The additional cost to the average residential In-City Water customer was $0.17 per month commencing April 1, 2020 ($4.64 over the 2017-2021 PBR term). The average monthly bill increase for residential Drainage customers was $0.14 per month commencing January 1, 2020, an additional $0.37 per month commencing in January 1, 2021, and an additional $0.31 per month commencing on January 1, 2022 (or a total of $10.26 over the 2018-2021 PBR term).

- **Stormwater Integrated Resource Plan (Drainage)** – On May 10, 2019, EWSI presented its Stormwater Integrated Resource Plan (SIRP) alternatives to the Utility Committee. The plan includes a mix of capital and operational program investments to mitigate flood risks across the City using a mix of grey and green infrastructure components installed within the public right-of-way or within City or EPCOR owned parcels. The SIRP approach allows for a lower overall capital investment than seen with traditional engineering approaches through the inclusion of operational programs that support the overall community in responding to flooding events. On December 2, 2019, EWSI received approval to apply the Non-Routine Adjustments to Storm Water Utility rates commencing January 1, 2021. The additional cost to the average residential Drainage customer was $0.51 per month commencing January 1, 2020, an additional $0.15 per month commencing January 1, 2021, and an additional $0.03 commencing January 1, 2022 (or a total of $16.11 over the 2018-2021 PBR term).

- **Corrosion and Odour Reduction Strategy (Drainage)** – On June 28 2019, EWSI presented its Corrosion and Odour Reduction Strategy to the Utility Committee. The Corrosion and Odour Reduction Strategy was developed using similar principles and approaches to EWSI's SIRP to determine an optimized mix of operational and capital solutions to reduce corrosion and odour. The strategy expands the previous plan by focusing on preventing the formation of hydrogen sulphide gas, which will reduce community odour impacts and lengthen the life of sewer network assets. Areas of focus within the strategy include: prevent the formation of hydrogen sulphide gas in the sewer system, control the release of air from the sewer system, and adapt the system using real-time monitoring technologies and improved inspection data. On December 2, 2019, EWSI received approval to apply the Non-Routine Adjustments to Sanitary Utility rates commencing January 1, 2021. The additional cost to the average Residential Drainage customer was $0.53 per month commencing January 1, 2020, an additional $0.42 per month commencing January 1, 2021, and an additional $0.06 per month commencing January 1, 2022 (or a total of $20.79 over the 2018-2021 PBR term).

Table 1.5 summarizes the average residential customer monthly bill impact for all Non-Routine Adjustments that have been approved for EWSI's In-City Water and Drainage customers over the 2017-2021 PBR term. These Non-Routine Adjustments include the five Non-Routine Adjustments detailed above, plus the negative Non-Routine Adjustment approved in 2018, passing on reductions in corporate shared service cost allocations resulting from the transfer of Drainage Services assets to EPCOR to In-City Water and Wastewater customers. These Non-Routine Adjustments expire on March 31, 2022 at the end of the current PBR term.

Table 1.5
Monthly Residential Bill Impacts
Water and Drainage Approved Non-Routine Adjustments
(2017-2021 PBR Term)
($/month)

		A	B	C
	Non-Routine Adjustment	**2020**	**2021**	**2022* (Jan to Mar)**
1	Corporate Cost Reduction (Drainage Transfer)	(1.04)	(1.05)	(1.05)
2	Lead Mitigation Strategy	0.40	0.41	0.41
3	Leduc County Annexation	0.26	0.26	0.26
4	LRT Relocations	0.31	0.68	0.99
5	Corrosion and Odour Reduction Strategy	0.53	0.95	1.01
6	Stormwater Integrated Resource Plan	0.51	0.66	0.69
7	**Total Monthly Bill Impact**	**0.97**	**1.91**	**2.31**

* EWSI's Bylaw 17698 expired on March 31, 2022. New Bylaw 19626 with updated rates would be in effect for the remainder of 2022.

2 In-City Water Services

2.1 Customers and Consumption

In-City Water provides services to three customer classes: residential; multi-residential; and commercial (see Appendix A). These classes are unchanged from the previous PBR term and are described in detail in Appendix A. Customer counts, total annual consumption and monthly consumption per customer are shown in Table 2.1 below:

Table 2.1
Customers, Consumption and Consumption per Customer

		A	B	C	D
	Customers and Consumption	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	**Customers (average for 2017-2021)**				
2	Residential	276,347	277,950	266,232	268,830
3	Multi-Residential	3,929	3,805	3,837	3,776
4	Commercial	20,278	20,069	19,764	19,790
5	**Total**	300,555	301,825	289,834	292,396
6	**Consumption per Customer** (m^3 per month)				
7	Residential	13.7	15.1	14.2	14.5
8	Multi-Residential	408.6	421.1	408.6	401.5
9	Commercial	117.2	92.8	120.3	105.0
10	**Annual Consumption** (ML)				
11	Residential	45,459	50,305	226,216	234,323
12	Multi-Residential	19,268	19,229	94,081	90,962
13	Commercial	28,520	22,342	142,647	124,647
14	**Total**	93,247	91,876	462,944	449,932

The factors contributing to actual to forecast differences for 2021 and for 2017-2021 differ by customer class, as explained below:

- **Residential.** Customer counts in 2021 are 0.6% greater than forecast, primarily because of higher than forecast customer growth at the beginning of the 2017-2021 PBR term. Consumption per customer was higher than forecast, both in 2021 and overall over the 2017-2021 PBR term as the result of Edmontonians spending more time at home during the COVID-19 pandemic. The combined effect of these factors is that total residential consumption for 2021 is 10.7%% higher than forecast (3.6% greater for 2017-2021).

- **Multi-Residential.** Customer counts are 3.2% less than forecasts, continuing trends seen in 2018-2020. Consumption per customer exceeded the forecast in 2021, largely due to the COVID-19 pandemic. With lower customer counts and higher consumption per customer largely offsetting one another, the total multi-residential consumption was just 0.2% lower than forecast in 2021 (3.3% lower than forecast for 2017-2021).

- **Commercial.** The commercial class was significantly impacted by the COVID-19 pandemic in 2021. Total consumption in the commercial customer class was 21.7% lower than forecast (8.4% lower in 2019 and 25.0% lower in 2020), while customer counts were 1.0% lower than forecast. Largely attributable to public health guidance and restrictions put in place throughout the pandemic (closed facilities, capacity/occupancy limits, travel restrictions, employees working from home, etc.), nearly all industries experienced a decrease in consumption in 2021. Over the 2017-2021 period total commercial consumption is 12.6% lower than forecast.

2.2 Financial Performance

In-City Water's net income is derived from the provision of water services within Edmonton's boundaries. Besides these services, EWSI provides water services to surrounding communities under bulk water supply agreements with regional water service commissions ("RWCG" or "Regional Customers"), and fire protection services to the City of Edmonton under a service agreement ("Fire Protection").

EWSI's water system is fully integrated, with services jointly provided to In-City Water, Regional Customers and Fire Protection. Therefore, in sections 2.2.1 to 2.2.7, operating costs, depreciation, rate base and capital expenditures are presented and analyzed on a total system basis. In-City Water's share of these expenses, as well as its returns on rate base, are calculated in accordance with a cost of service model developed jointly by EWSI, the regional water service commissions and the City of Edmonton, and are shown as separate line items on each applicable table. In-City Water's total revenue and revenue requirements are summarized in Table 2.2 below:

Table 2.2
In-City Water Revenue Requirement
($ millions)

		A	B	C	D
		2021		**2017-2021**	
	Summary of Revenue Requirement	**PBR Forecast**	**Actual**	**PBR Forecast**	**Actual**
1	In-City Water Rate Revenue[(1)]	217.4	206.9	1,005.4	960.2
2	In-City Water Revenue Requirement				
3	Operating expenses	112.9	98.7	538.1	494.5
4	Other revenue	(5.2)	(4.9)	(25.3)	(26.2)
5	Depreciation and amortization	30.9	32.4	141.6	144.5
6	Return on rate base financed by debt	31.8	29.7	146.5	143.2
7	Return on rate base financed by equity	44.8	51.0	204.5	204.2
8	In-City Water Revenue Requirement	215.2	206.9	1,005.4	960.2
9	**Return on Rate Base Financed by Equity**	**10.18%**	**11.46%**	**10.18%**	**10.12%**

[1] In the PBR forecast, rebasing and other special rate adjustments have been smoothed over the PBR term. Therefore, although forecast revenue is equal to the revenue requirement over the 2017-2021 PBR term, in any year within the PBR term, forecast revenue may be greater or less than the revenue requirement.

2.2.1 Revenue

In-City Water's rate revenues include fixed monthly services charges which vary by meter size and consumption charges applied to each cubic meter of water consumed. Besides rate revenue, In-City Water revenues also include other revenue derived from temporary services, connection fees, water permits, late payment charges and other incidental services. Table 2.2.1-1 below provides a comparison of 2021 In-City Water revenues to the PBR forecast:

Table 2.2.1-1
In-City Water Revenue
($ millions)

		A	B	C	D
		2021		**2017-2021**	
	In-City Water Revenue	**PBR Forecast**	**Actual**	**PBR Forecast**	**Actual**
1	Fixed Monthly Service Charges				
2	Residential	26.6	25.3	121.6	114.2
3	Multi-Residential	1.6	1.6	7.5	7.1
4	Commercial	4.9	4.7	22.3	21.0
5	Fixed Monthly Service Charges	33.0	31.6	151.4	142.3
6	Consumption Charges				
7	Residential	108.5	111.7	504.0	502.4
8	Multi-Residential	34.6	32.4	158.0	149.1
9	Commercial	41.2	31.2	191.9	166.3
10	Consumption Charges	184.3	175.3	854.0	817.8
11	In-City Water Rate Revenue	217.4	206.9	1,005.4	960.2
12	Other Revenue	5.2	4.9	25.3	26.2
13	**Total In-City Water Revenue**	**222.6**	**211.8**	**1030.7**	**986.4**

In-City rate revenues were $10.5 million less than forecast in 2021, and $45.2 million less than forecast over the 2017-2021 PBR period. This difference is attributable to the following factors:

- Lower than forecast inflation meant that 2021 revenues were $6.9 million less than forecast ($23.4 million for 2017-2021). The PBR plan limits Water and Wastewater's annual routine rate adjustments to inflation less an efficiency factor (see Appendix A.1). As shown in Table 2.2.1-2, actual PBR inflation adjustments for 2021 and 2017-2021 were significantly less than forecast. The effect of lower than forecast inflation from 2017 to 2021 will continue to impact revenues throughout the remainder of the 2017-2021 PBR term.

Table 2.2.1-2
2021 PBR Inflation Adjustment

		A	B	C	D
PBR Inflation Adjustment to In-City Water and Wastewater Rates		**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Forecast Inflation				
2	CPI	2.20%	2.00%	11.49%	10.41%
3	Labour	2.40%	0.10%	12.59%	6.97%
4	Weighted Inflation (65% CPI, 35% Labour)	2.27%	1.34%	11.88%	9.21%
5	Less: Efficiency Factor	-0.25%	-0.25%	-1.24%	-1.24%
6	Forecast Inflation	2.02%	1.09%	10.64%	7.97%
7	Actual to Forecast Inflation Adjustment	-	-0.21%	0.00%	-1.85%
8	**PBR Inflation**	**2.02%**	**0.88%**	**10.52%**	**5.88%**

- In 2021, even though overall consumption was less than forecast, the shift in consumption from the commercial customer class to the residential class resulted in a $3.2 million increase in 2021 revenues for the residential class. Over the 2017-2021 PBR term, lower than forecast consumption resulted in a $36.2 million decrease in consumption revenue. Fixed monthly charges were affected by variances in customer counts, decreasing 2021 revenue by $1.4 million and decreasing 2017-2021 revenues by $9.1 million relative to the PBR forecast;
- Non-routine adjustments (see section 1.5) increased 2021 revenues by $0.4 million decreased 2017-2021 revenues by $5.2 million; and
- A $6.5 million revenue reduction due to reclassification of the Green Power SRA collected over the 2017-2021 PBR term from revenue to a contribution to the solar project. ($1.07 million - service charges, $5.46 million - consumption charges)

Besides rate revenues, In-City Water earned $4.9 million in other revenue in 2021, $0.3 million lower than forecast ($0.9 million greater for 2017-2021). This is comprised of a number of offsetting items, none of which are individually significant.

2.2.2 Operating Expenses by Function

Table 2.2.2 below provides a comparison of EWSI's total water system operating expenses for 2021 to the PBR forecast.

Table 2.2.2
Water Operating Expenses by Function
($ millions)

		A	B	C	D
	Function and Sub-function	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Power, Other Utilities and Chemicals				
2	Power and Other Utilities	15.0	11.4	70.1	54.5
3	Chemicals	7.7	5.3	37.2	43.6
4	Power, Other Utilities and Chemicals	22.7	16.7	107.3	98.1
5	Water Operations				
6	Water Treatment Plants	20.4	21.0	98.0	97.8
7	Water Distribution and Transmission	26.7	22.3	128.1	122.2
8	Operational Support Services	7.9	5.8	37.8	32.6
9	Quality Assurance and Environment	6.9	6.3	32.1	31.5
10	Capitalized Overhead Costs	(7.8)	(8.0)	(37.1)	(39.2)
11	Water Operations	54.0	47.4	258.9	244.9
12	Billing, Meters and Customer Service				
13	Billing and Collections	9.1	8.5	42.1	41.3
14	Meter Reading, Repairs and Maintenance	3.0	1.5	14.8	10.2
15	Customer Service	0.9	0.4	4.1	2.4
16	Billing, Meters and Customer Service	12.9	10.3	61.0	53.9
17	EWSI Shared Services				
18	EWSI Shared Services	10.6	10.9	50.9	49.3
19	Incentive and Other Compensation	3.4	4.2	16.3	18.1
20	EWSI Shared Services	14.0	15.1	67.3	67.4
21	Corporate Shared Services	16.2	13.5	78.0	62.6
22	Franchise Fees and Property Taxes				
23	Franchise Fees	16.9	16.6	79.0	75.8
24	Property Taxes	0.5	0.7	2.2	1.9
25	Franchise Fees and Property Taxes	17.4	17.3	81.2	77.7
26	**Total Operating Expenses by Function**	137.3	120.4	653.7	604.7
27	In-City Water Share - %	82.3%	81.9%	82.3%	81.8%
28	**In-City Water Share - $**	**112.9**	**98.7**	**538.1**	**494.5**

Overall, total operating expenses for 2021 were $16.9 million lower than the PBR forecast, and $49.0 million lower over the 2017-2021 PBR period. Key factors contributing to this difference include:

- **Power and Other Utilities** – $3.6 million less than forecast in 2021 ($15.6 million less for 2017-2021) due to lower than forecast power prices and distribution & transmission charges and savings associated with the green power premium that was included in the PBR forecast. The PBR forecast included annual renewable (green power) power purchases of $1.9 million annually, starting in 2018. Rather than purchasing locally produced renewable energy, EWSI has integrated a solar farm into the E.L. Smith water treatment plant. In the 2022-2026 PBR Application revenue collected through the Green Power Special Rate Adjustment has been treated as a contribution toward the kīsikāw pīsim Solar Farm Project, which will decrease EWSI's revenue requirement and customer bills in the 2022-2026 PBR term.
- **Chemicals** – $2.4 million less than forecast in 2021 ($6.4 million greater than forecast for 2017-2021). In 2021, lower than average precipitation (surface run off) resulted in below-

average colour in the river over the summer months requiring the use of less chemicals (alum, carbon, and caustic soda) in the water treatment process. On average over the 2017-2021 PBR period, average precipitation was above-average, resulting in the use of more chemicals.

- **Water Treatment Plants** – $0.6 million greater than forecast in 2021 ($0.2 million less than forecast for 2017-2021). Higher than forecast costs in 2021 are attributable to several factors, including: salary costs higher by $2.0 million and higher contractor costs of $0.6 million related to snow removal. Higher labour costs are partially offset by a higher than forecast proportion of internal labour working on capital projects, which increased capital recoveries by $1.0 million. The remainder of the actual to forecast difference consists of numerous small items, none of which are individually significant.
- **Water Distribution and Transmission** – $4.4 million lower than forecast in 2021 ($5.9 million lower for 2017-2021). Lower than forecast costs in 2021 are attributable to several factors, including: a change in accounting treatment resulting in capitalization of valve and service replacement work which was previously expensed, which reduced operating expenses by $3.5 million ($6.8 million for 2017-2021); and lower staff costs of $2.5 million ($1.0 million less for 2017-2021). The 2017-2021 variance also includes reductions in fringe benefit costs of $2.5 million and net fleet recoveries of $1.0 million due to an increase in capital work. The remainder of the actual to forecast difference consists of numerous small items, none of which are individually significant.
- **Operational Support Services** – $2.1 million less than forecast in 2021 ($5.2 million less for 2017-2021). Lower than forecast costs are attributable to lower contractor costs related to the River Monitoring Program due to COVID-19 restrictions (0.4 million lower than forecast for 2021), the transfer of the Knowledge management group to Shared Services and vacancies in the Project Management Office (total $0.4 million lower than forecast for 2021) and the transfer of custodians to the Water Treatment Plant Maintenance Group. The 2017-2021 variance in this function is primarily attributable to lower staff costs of $3.7 million related to vacant positions within the Project and Asset Management functions and the transfer of the Knowledge Management function to Corporate Shared Service in 2019; and lower than forecast legal costs of $0.7 million, as less external legal support was required.
- **Billing, Meters, and Customer Service** – $2.6 million less than forecast in 2021 ($7.1 million less for 2017-2021). Process improvements led to $1.9 million in operating savings, and $0.5 million for lower Drainage Counter service fees ($0.9 million less for 2017-2021). Over 2017-2021 this is offset by higher lease costs of $0.7 million related to end of lease obligations at the Montrose facility. The remainder of the actual to forecast difference consists of numerous small items, none of which are individually significant.
- **EWSI Shared Services** – $1.1 million higher than forecast in 2021 ($0.1 million higher than forecast for 2017-2021). Higher than forecast costs in this category reflect a $0.3 million increase in business unit allocations ($1.6 less for 2017-2021) and higher than forecast incentive compensation of $0.8 million ($1.8 higher for 2017-2021).
- **Corporate Shared Services** – $2.7 million less than forecast in 2021 ($15.4 million less than forecast for 2017-2021). These differences reflect both the reduction in corporate shared

services cost allocations resulting from the transfer of Drainage from the City of Edmonton to EPCOR, which are fully offset by the non-routine adjustment to rates described in Section 1.5, as well as cost savings in EUI's corporate functions**.**

- **Franchise Fees and Property Taxes** – $0.1 million less than forecast in 2021 ($3.5 million less than forecast for 2017-2021). Lower than forecast franchise fees are entirely attributable to lower than forecast revenues. Variations in property taxes result from differences in the timing of the purchase of a new D&T facility in 2021, rather than in 2017 as had been contemplated in the 2017-2021 PBR forecast.

Variances in other operating expense functions and sub-functions are not significant, either individually or in aggregate.

In 2021, In-City Water's share of operating expenses was $98.7 million (81.9%), compared to $112.9 million (82.3%) in the PBR forecast. This result reflects both lower total operating expenses for EWSI's total water system and a 1.0% decrease in In-City Water's share of operating expenses determined through the cost of service model.

2.2.3 Operating Expenses by Cost Category

Table 2.2.3 below shows operating expenses by cost category for Water Operations, Billing Meters and Customer Service, and EWSI Shared Services, where cost categories differ from the sub-functions in Section 2.2.2.

Table 2.2.3
Water Operating Expenses by Cost Category
($ millions)

		A	B	C	D
		2021		**2017-2021**	
	Cost Category	**PBR Forecast**	**Actual**	**PBR Forecast**	**Actual**
1	Water Operations				
2	Staff Costs and Employee Benefits	44.0	39.6	211.3	198.7
3	Contractors and Consultants	8.3	7.9	39.0	41.4
4	Vehicles	1.6	0.7	7.7	4.6
5	Materials and Supplies	3.3	3.7	15.8	18.5
6	Other	4.6	3.6	22.2	20.9
6	Capitalized Overhead Costs	(7.8)	(8.0)	(37.1)	(39.2)
7	Water Operations	54.0	47.4	258.9	244.9
8	Billing, Meters and Customer Service				
9	CUS Charges	9.1	8.5	42.1	41.3
10	Staff Costs and Employee Benefits	7.4	5.3	34.8	29.2
11	Contractors and Consultants	0.6	0.0	2.7	1.2
12	Vehicles	0.3	0.1	1.6	0.8
13	Other	0.6	0.9	2.8	3.6
14	Meter Reading Services (Recoveries)	(5.0)	(4.4)	(22.9)	(22.1)
15	Billing, Meters and Customer Service	12.9	10.3	61.0	53.9
16	EWSI Shared Services				
17	EWSI Shared Services Allocation	10.7	11.1	51.2	49.5
18	Staff Costs and Employee Benefits	3.4	3.8	16.4	17.7

		A	B	C	D
Cost Category		2021		2017-2021	
		PBR Forecast	Actual	PBR Forecast	Actual
19	Contractors and Consultants	0.2	0.2	1.0	0.8
20	Other	(0.3)	(0.0)	(1.4)	(0.7)
21	EWSI Shared Services	14.0	15.1	67.3	67.4

The information presented in this table supports the explanations of differences between 2021 actual and forecast expenses provided in Section 2.2.2. Accordingly, no additional explanations are considered necessary.

2.2.4 Depreciation and Amortization

EWSI total system depreciation expense and amortization of contributed assets for 2021 are shown in Table 2.2.4 below:

Table 2.2.4
Water Depreciation and Amortization
($ millions)

		A	B	C	D
Depreciation and Amortization		2021		2017-2021	
		PBR Forecast	Actual	PBR Forecast	Actual
1	Gross depreciation expense	49.2	53.4	228.8	238.8
2	Amortization of contributions	(10.1)	(12.0)	(49.5)	(54.7)
3	**Depreciation, net**	**39.1**	**41.3**	**179.4**	**183.5**
4	In-City Water Share - %	79.1%	78.4%	79.0%	78.8%
5	**In-City Water Share - $**	**30.9**	**32.4**	**141.6**	**144.5**

Depreciation expense and amortization of contributions in 2021 and for the 2017-2021 PBR term are higher due to both the adjustments to EPCOR's capital programs explained in section 2.3.1, as well as slightly higher than forecast depreciation and amortization rates related to differences in asset mix.

In-City Water's share of 2021 depreciation expense is 0.7% lower than forecast. Approximately 1.0% of this difference is attributable to higher than forecast asset additions for fire protection related assets (hydrants). The offsetting 0.3% difference is consistent with actual to forecast differences in the base and max day peaking factors used to allocate depreciation expense between the In-City and RWCG customer segments.

2.2.5 Rate Base

In 2021, EWSI's total water system rate base, shown in Table 2.2.5 below, was $38.2 million more than forecast, with the higher than forecast gross rate base partially offset by higher than forecast contributions.

Table 2.2.5
Water Mid-Year Rate Base
($ millions)

		A	B
	Components of Mid-Year Rate Base	**2021**	
		PBR Forecast	**Actual**
1	Plant in Service		
2	Balance, beginning of year	2,541.0	2,688.0
3	Additions - EPCOR-funded	109.5	96.8
4	Additions - Contributed	7.7	26.6
5	Retirements and adjustments	-	(11.6)
6	Balance, end of year	2,658.2	2,799.1
7	Mid-Year Plant in service	2,599.6	2,743.6
8	Accumulated Depreciation		
9	Balance, beginning of year	698.4	674.4
10	Depreciation expense	49.2	53.4
11	Retirements and adjustments	-	(11.6)
12	Balance, end of year	747.6	716.2
13	Mid-Year Accumulated Depreciation	723.0	695.3
14	Other Rate Base Items		
15	Working Capital	24.5	23.8
16	Materials and Supplies	2.9	4.5
17	**Gross Mid-Year Rate Base**	1,904.0	2,076.6
19	Contributions		
20	Balance, beginning of year	701.2	829.7
21	Contributions in aid of construction	7.7	26.6
22	Retirements and adjustments	-	1.5
23	Balance, end of year	708.9	857.8
24	Mid-Year Contributions	705.1	843.8
25	Accumulated Amortization		
26	Balance, beginning of year	188.0	191.6
27	Amortization of contributions	10.1	12.0
28	Retirements and adjustments	-	(0.2)
29	Balance, end of year	198.1	203.3
30	Mid-Year Accumulated Amortization	193.0	197.4
31	**Mid-Year Contributions**	512.0	646.3
32	**Net Mid-Year Rate Base**	1,392.0	1,430.2

The gross rate base reflects significantly higher than forecast levels of developer-funded assets over the 2016 to 2021 period. Developers are responsible for construction of distribution infrastructure in new subdivisions. When these assets are placed into service, ownership of the assets is transferred to EWSI, where the assets, together with offsetting contributions in aid of construction, are added to the rate base.

In 2021, the net mid-year rate base is $38.2 million or 2.8% greater than forecast. This increase in rate base is driven by higher than forecast capital expenditures as discussed in section 2.3.1.

2.2.6 Return on Rate Base

In 2021, In-City Water's return on rate base was $4.2 million (5.5%) greater than forecast and $3.6 million (1.0%) less for 2017-2021. Approximately $2.2 million of the 2021 difference results from revenue smoothing, where rate increases related to the Special Rate Adjustments for Rebasing are smoothed over the PBR term. The remainder of the 2021 increase is attributable to the hot and dry summer w, as well as the effects of COVID which shifted water consumption from the commercial customer class to the residential class, which has much higher rates than the commercial class.

Table 2.2.6-1
Return on In-City Water Share of Mid-Year Rate Base
($ millions)

		A	B	C	D
	Return on Rate Base	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Net Mid-Year Rate Base	1,392.0	1,430.2		
2	In-City Water Share - %	79.0%	77.8%		
3	In-City Water Share - $	1,099.6	1,113.1		
4	Deemed Capital Structure				
5	Debt (%)	60.00%	60.00%		
6	Equity (%)	40.00%	40.00%		
7	Cost of Capital				
8	Cost of Debt	4.82%	4.45%	4.86%	4.73%
9	Cost of Equity	10.18%	11.46%	10.18%	10.12%
10	Weighted Average Cost of Capital (WACC)	6.96%	7.25%	6.99%	6.89%
11	Return on Mid-Year Rate Base				
12	Return on Rate Base Financed by Debt	31.8	29.7	146.5	143.2
13	Return on Rate Base Financed by Equity	44.8	51.0	204.5	204.1
14	**Total Return on In-City Water Rate Base**	**76.5**	**80.7**	**351.0**	**347.4**

Although the net mid-year rate base is 2.8% greater than forecast, In-City Water's share of rates base is 1.2% less than forecast. The lower In-City share of rate base is attributable to higher than forecast asset additions for fire protection-related assets (hydrants), offset by an increase in In-City Water's demands on water system relative to that of Regional Customers.

Return on rate base is calculated separately for the debt-financed and equity-financed portions of In-City Water's net rate base. The rate of return on debt is equal to the embedded cost of debt for EWSI's total water system, as calculated in Table 2.2.6-2 below:

Table 2.2.6-2
Interest Expense and Cost of Debt
($ millions)

		A	B	C	D
	Interest Expense and Cost of Debt	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Interest expense				
2	Interest on short-term debt	1.0	1.0	4.8	4.9
3	Interest on City of Edmonton debentures	0.2	0.2	2.8	2.8
4	Interest on intercompany debentures	38.2	35.9	174.9	169.8
5	Total interest expense	39.4	37.1	182.5	177.4
6	Mid-year debt and other long-term liabilities				
7	Mid-Year Short-term debt	34.9	23.7		
8	Mid-Year Long-term debt	781.2	808.7		
9	Mid-Year Other Long-term liabilities	1.8	2.1		
10	Total mid-year debt and other long-term liabilities	817.9	834.5		
11	**Embedded Cost of Debt**	**4.82%**	**4.45%**	**4.86%**	**4.73%**

The embedded cost of debt is lower than forecast in 2021. Although, EWSI issued more long term debt than forecast, which is more expensive that short term debt, due to favorable economic conditions EWSI was able to issue the long term debt at lower than forecast rates over the 2017 to 2021 period.

2.2.7 Transactions with Affiliates

In-City Water derives a significant proportion of its revenue and expenses from transactions with affiliates, including the City of Edmonton, EUI and its subsidiaries, and other EWSI business units. Table 2.2.7 provides a summary of In-City Water's 2021 actual and forecast transactions with affiliates.

Table 2.2.7
Transactions with Affiliates
($ millions)

		A	B	C	D
	Affiliate and Service	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	**Revenues from the provision of services to the City of Edmonton**				
2	Public Fire Protection	12.6	12.4	58.8	58.3
3	Water sales	3.4	2.4	16.5	14.8
4	Other	0.2		1.1	0.1
5	Total	16.3	14.8	76.4	73.2
6	**Services provided by (recovered from):**				
7	**City of Edmonton**				
8	Franchise Fees	16.9	16.6	79.0	75.8

		A	B	C	D
	Affiliate and Service	2021		2017-2021	
		PBR Forecast	Actual	PBR Forecast	Actual
9	Property Taxes	0.5	0.7	2.2	1.9
10	Interest on City of Edmonton Debentures	0.2	0.2	2.8	2.8
11	Mobile equipment services	2.0	1.6	9.6	10.8
12	Other services	1.4	0.0	6.8	2.3
13	Meter Reading Recoveries			-	(1.4)
14	Total	21.0	19.2	100.5	92.1
15	**EPCOR Utilities Inc.**				
16	Corporate Shared Service Costs	16.2	13.5	78.0	62.6
17	Interest on Intercompany Debentures	38.2	35.9	174.9	169.8
18	Interest on Short-term debt	1.0	1.0	4.8	4.9
19	Other Services		0.4	-	1.3
20	Total	55.4	50.4	257.8	238.6
21	**EPCOR Distribution and Transmission Inc.**				
22	Meter Reading Recoveries	-	(0.0)	-	(0.6)
23	Other services	0.1	0.0	0.7	0.0
24	Total	0.1	(0.0)	0.7	(0.5)
25	**EPCOR Technologies Inc.**				
26	Hydrovac Charges and Space Rentals	0.9	1.0	4.5	7.0
27	Other Services (Recoveries)		(0.1)	-	(0.3)
28	Total	0.9	1.0	4.5	6.7
29	**EPCOR Energy Alberta LP**				
30	Customer Billing and Collection Services	9.1	8.5	42.1	41.3
31	Meter Data Management			-	0.8
32	Trouble Call Support Services		0.6	-	
33	Total	9.1	9.1	42.1	42.1
34	**EPCOR Power Development**				
35	Other Services (Recoveries)		(0.2)	-	(0.8)
36	**EPCOR Commercial Services**				
37	Commercial Services Rent Recoveries	-	0.0	-	(0.7)
38	**Other EWSI Business Units**				
39	EWSI Shared Services Allocation	10.7	11.1	51.2	49.5
40	Water Sales to Wastewater	(0.4)	(0.5)	(1.9)	(2.2)
41	Meter Reading Recoveries from Wastewater	(2.5)	(2.2)	(11.5)	(11.6)
42	Meter Reading Recoveries from Drainage Services	(2.5)	(2.2)	(11.5)	(9.9)
43	Customer Service Fees from Drainage Services				0.9
44	Other Services provided to Drainage Services		(0.3)		(0.8)
45	Meter Reading Recoveries from Other EWSI Business Units				(0.1)
46	Quality Assurance Lab Testing and Other Services from Other EWSI Business Units		0.0		0.2
47	Drainage Services Rent (Recoveries)		(0.3)		
48	Total	5.2	5.7	26.3	26.2
49	**Expenditures on capital projects arising from services provided by:**				
50	City of Edmonton	3.3	2.8	15.9	5.7
51	EPCOR Technologies Inc.	4.2	7.5	19.9	26.0
52	EPCOR Utilities Inc.		0.9	-	6.0
53	EPCOR Drainage Services		3.7	-	12.7
54	EPCOR Distribution and Transmission Inc.	0.1	0.3	0.6	1.5
55	Other EPCOR Business Units		0.1	-	0.3

		A	B	C	D
Affiliate and Service		2021		2017-2021	
		PBR Forecast	Actual	PBR Forecast	Actual
56	Total	7.5	15.1	36.3	52.2

2.3 Capital Programs

2.3.1 Capital Expenditures

Table 2.3.1 compares approved capital expenditures from the PBR forecast to actual capital expenditures for 2021 for each project with approved or forecast capital expenditures in excess of $5.0 million over the 2017-2021 PBR term, as well as for each project category. Table 2.3.1 also provides a comparison of total 2017-2021 approved capital expenditures to EWSI's current capital forecast.

Table 2.3.1
Capital Expenditures
($ millions)

		A	B	C	D	E	F	
		2021			2017-2021			
		PBR	Actual	Difference	PBR	Actual	Difference	
1	**Regulatory**							
2	Water Services Replacement and Refurbishment	2.1	4.6	2.5	10.2	15.3	5.2	1
3	Accelerated Lead Service Replacement Program (NRA)	2.3	3.8	1.5	5.9	6.3	0.3	
4	Phosphoric Injection for Lead Control (NRA)	-	3.9	3.9	9.8	6.2	(3.6)	2
5	Projects < $5M	0.3	0.3	(0.1)	1.5	1.9	0.5	
6	**Sub-total**	**4.7**	**12.6**	**7.9**	**27.4**	**29.7**	**2.4**	
7	**Growth/Customer Requirements**							
8	LRT Relocates (NRA)	6.0	7.8	1.8	24.9	29.7	4.8	3
9	Network PD Transmission Mains	4.0	7.2	3.1	14.4	26.1	11.7	4
10	Water Service Connections	5.4	6.2	0.9	23.6	28.1	4.5	5
11	WM Cost Sharing Program	0.9	0.4	(0.4)	3.0	6.6	3.6	6
12	Distribution System Modifications	1.0	3.8	2.7	6.0	9.6	3.5	7
13	Private Development Construction Coordination	3.6	2.7	(0.9)	15.4	13.1	(2.3)	8
14	New Meter Purchases and Installations	3.1	2.0	(1.1)	13.2	11.0	(2.2)	9
15	New Water Distribution Mains/DM	1.8	1.8	(0.0)	8.8	10.3	1.5	
16	Discovery Park Reservoir and Annexation Pipeline (NRA)	-	0.2	0.2	9.2	9.7	0.5	
17	Projects < $5M	0.2	2.0	1.8	2.6	8.5	5.9	10
18	**Sub-total**	**26.1**	**34.2**	**8.1**	**121.2**	**152.7**	**31.5**	
19	**Health, Safety and Environment**							
20	Solar Power Systems and Battery Energy Storage System	-	18.0	18.0	-	19.4	19.4	11
21	Stage 2 and 3 Filter Conversion to Deep Bed	10.7	-	(10.7)	22.3	0.4	(22.0)	12
22	Projects < $5M	1.2	0.2	(1.0)	4.3	3.2	(1.1)	

		A	B	C	D	E	F	
		2021			2017-2021			
		PBR	Actual	Difference	PBR	Actual	Difference	
23	**Sub-total**	**11.9**	**18.2**	**6.3**	**26.6**	**22.9**	**(3.7)**	
24	**Reliability and Life Cycle Improvements**							
25	Obsolete Valve Replacements	0.9	4.0	3.1	4.1	13.0	8.9	13
26	Chemfeed Upgrade Program - Rossdale	0.7	1.4	0.7	4.0	9.2	5.2	14
27	Chemfeed Upgrades Program - E.L. Smith	0.5	2.4	1.9	4.0	9.1	5.1	15
28	Obsolete Hydrant Replacements	0.9	1.3	0.4	4.4	9.1	4.7	16
29	E.L. Smith Bypass Main (Ring Main)	-	5.4	5.4	7.0	11.6	4.6	17
30	Water Main Reactive Renewal Program	13.5	13.0	(0.6)	54.7	58.9	4.2	18
31	Filter Underdrain Upgrades - Rossdale	-	0.0	0.0	4.7	8.1	3.4	19
32	Network Valve Chamber Refurbishment	1.2	2.2	1.0	5.6	7.9	2.3	20
33	E.L. Smith HVAC Upgrades Program	0.5	0.2	(0.3)	3.4	5.1	1.7	
34	Mechanical Reliability Program - E.L. Smith	0.8	0.5	(0.3)	4.9	6.3	1.4	
35	Rossale C1-2 Clarifier Upgrade	-	-	-	4.3	5.5	1.1	
36	Vehicle & Fleet Additions	1.7	2.4	0.7	11.8	11.9	0.1	
37	Water Meter Change Outs	6.6	1.2	(5.4)	25.6	12.1	(13.5)	21
38	Water Main Proactive Renewal Program	3.8	(0.0)	(3.8)	18.0	15.0	(3.0)	22
39	Reservoir Cell and Pumphouse Roof Replacement Program	1.5	2.0	0.6	6.3	3.6	(2.7)	23
40	Reservoir Electrical Upgrades Program	1.2	0.3	(0.9)	5.3	2.7	(2.6)	24
41	Plant Electrical Upgrades Program	1.5	0.3	(1.1)	5.2	3.9	(1.3)	
42	Transmission Mains Replacement/ Refurbishment	2.9	1.7	(1.2)	13.3	12.2	(1.1)	
43	SCADA System Upgrade Program	0.7	1.1	0.4	5.7	4.8	(0.9)	
44	Projects < $5M	11.9	24.0	12.1	70.0	87.2	17.2	12,25
45	**Sub-total**	**50.7**	**63.4**	**12.6**	**262.4**	**297.3**	**34.9**	
46	**Performance, Efficiency and Improvement**							
47	Water Main Cathodic Protection Program	4.4	4.2	(0.2)	21.0	18.8	(2.2)	26
48	Water D&T Facility	-	2.2	2.2	16.0	14.9	(1.1)	27
49	Projects < $5.0 million	0.3	0.3	(0.0)	7.1	3.4	(3.7)	28
50	**Sub-total**	**4.7**	**6.7**	**2.0**	**44.1**	**37.1**	**(7.0)**	
51	**Accelerated**							
52	Accelerated Fire Protection Program/DM	2.6	1.4	(1.3)	15.9	10.0	(5.9)	29
53	Accelerated WM Renewal Program	10.9	1.9	(8.9)	51.9	43.7	(8.2)	30
54	**Sub-total**	**13.5**	**3.3**	**(10.2)**	**67.8**	**53.7**	**(14.2)**	
55	**Capital Expenditures before Contributions**	**111.7**	**138.4**	**26.7**	**549.6**	**593.4**	**43.8**	
56	**Contributions**							
57	Water Services Connections Contribution	(5.4)	(3.7)	1.6	(23.6)	(17.3)	6.2	5
58	Private Development Contribution	(0.5)	(0.1)	0.4	(1.9)	(1.0)	0.9	
59	New Water Distribution Mains Contribution	(1.8)	(1.9)	(0.1)	(8.8)	(9.1)	(0.2)	

	A	B	C	D	E	F
	2021			2017-2021		
	PBR	Actual	Difference	PBR	Actual	Difference
60 Sub-total	(7.7)	(5.7)	2.0	(34.3)	(27.4)	6.9
Capital Expenditures	104.0	132.7	28.7	515.3	566.0	50.8

* Amounts include capital expenditures approved through Non-Routine adjustments (see Section 1.5).

Explanations for differences between PBR forecast capital expenditures for 2017 to 2021 in excess of $2.0 million on individual projects with total costs in excess of $5.0 million, as well as for project categories in aggregate include:

1. **Water Services Replacement/Refurbishment** – $5.2 million (51%) greater than forecast. This program includes relocation of water service lines that do not meet current servicing standards, reactive replacements of service box and components, and customer-initiated lead service replacements (EPCOR portion of water service lines only). The increased expenditure in the 2017-2021 PBR term is primarily due to a higher than expected number of services qualifying for replacements combined with the increased capitalization of replacement costs that were previously expensed.
2. **Phosphoric Injection for Lead Control -** $3.6 million less than forecast (see section 1.5) due to delays in project completion. This project is now expected to be completed in 2023.
3. **LRT Relocates** – $4.8 million (19%) greater than forecast (see section 1.5). Changes to track alignments, as well as the accelerated construction schedule for the West Valley Line LRT project resulted in increases to the projected costs of the required utility relocations.
4. **Network Private Development Transmission Mains** – $11.7 million (81%) greater than forecast. This program represents the reimbursement of the costs incurred by private developers to extend the transmission network (450 mm and larger in diameter) to new subdivisions. Since developers determine both the timing of projects and the areas to be developed, expenditures on this program have proven difficult to forecast. Significant additions to this program include transmission main projects for Fort Road (66 Street), 199 Street – 23 to 35 Avenue, and Maskekosikh Trail. EWSI continues to work with developers to identify their upcoming subdivision plans to better predict the program cost.
5. **Water Services Connections, before Contributions -** $4.5 million greater than forecast. This program provides for the construction of new water services for infill developments and redevelopments and for recovery of these costs from private developers. Although recovery is intended to fully cover EWSI's costs, only 62% of total program costs have been fully recovered over the 2017-2021 term. Actual program costs over the 2017-2021 term were $28.1 million, as opposed to the $23.6 million forecast. Meanwhile, recovery was $17.3 million, as opposed to the $23.6 million forecast. Thus, after accounting for all program costs, service application rates over the 2017-2021 PBR term provided for recovery of 62% of total program costs, resulting in $10.8 million in unrecovered costs to EWSI. EWSI has updated the service connection charges fee schedule in the 2022-2026 PBR Application, so that fees are based on the cost of service for each service connection. This change is intended to ensure that EWSI will fully recover water service connection costs from developers.
6. **Water Main Cost Sharing**– $3.6 million (119%) greater than forecast. This program provides private developers with a partial rebate for the construction of water mains 300 to 400 mm in diameter. Similar to Network Private Development Transmission Mains, the costs of this program are driven by developer activity. The increase in the costs of this program result from higher than forecast developer activity during the PBR term.
7. **Distribution System Modifications** – $3.5 million (59%) greater than forecast. This program includes relocating or modifying existing water mains and appurtenances to eliminate conflicts arising from City of Edmonton projects, primarily related to road or sidewalk widening. The increase in

program expenditures primarily relates to neighborhood renewals and transportation projects, which were unforeseen in prior years.

8. **Private Development Construction Coordination -** $2.3 million (15%) less than forecast due to efficiencies achieved in drawing reviews and inspections.
9. **New Meter Purchase/Installation** – $2.2 million (17%) less than forecast. The purpose of this program is to comply with the Bylaw, which requires that all water consumed by customers must be metered. The decreased program costs relate primarily to lower activity during the COVID-19 pandemic period, during which home visits have been minimized.
10. **Growth and Customer Requirements < $5.0 million** – $5.9 million (231%) greater than forecast. The increase in this category includes the unbudgeted Laurel Booster Station project needed to address development in a high elevation area ($1.7 million), as well as additional costs to acquire water mains from the Capital Region Northeast Water Service Commission following city expansion and annexation ($2.7 million). The remainder of the variance is attributable to higher than forecast capital expenditures in other growth projects.
11. **E.L. Smith Solar Farm (now the kīsikāw pīsim Solar Farm) and Battery Storage (net of contributions)** – $19.4 million (new projects). As noted in Section 2.3.2, instead of purchasing locally produced renewable power at an annual cost of $1.9 million, EWSI is constructing a solar farm at E.L. Smith, which is expected to generate 21,500 MWh of renewable electricity annually. The solar farm also includes a battery energy storage system that is largely grant-funded. The solar farm is expected to be fully commissioned in 2022.
12. **Deep Bed Filtration Conversion – E.L. Smith** – $22.0 million (99%) less than forecast and **Structural Rehabilitation Program – E.L. Smith** – $4.7 million (10%) greater than forecast. During engineering inspections in 2018, EWSI identified immediate needs for structural rehabilitation of the E.L. Smith Stage 1 and Stage 2 filter plenums (12 filters in total). Accordingly, the conversion to deep bed has been postponed to the 2032-2036 PBR term so that the required structural rehabilitation and upgrades can be completed first.
13. **Obsolete Valve Replacement**– $8.9 million (216%) greater than forecast. Higher than expected rates of deterioration, requiring adjustments to valve replacement schedules. Although the projected cost of this program has increased substantially, improving overall valve operability in the system reduces isolation time, lessens the potential for property damage and mitigates customer impacts during emergency main break response.
14. **Chemfeed Upgrades – Rossdale** – $5.2 million (129%) greater than forecast. EWSI identified significant health, safety and environmental needs, requiring extensive upgrades to the sodium bisulphite room, which accounts for the majority of the program overage during the current PBR term.
15. **Chemfeed Upgrades – E.L. Smith** –$5.1 million (127%) greater than forecast. Higher than estimated costs for a significant fluoride room upgrade to replace end-of-life equipment, and unanticipated upgrades to the sodium hypochlorite room, including new generation cells, are the primary factors contributing to the increase in the costs of this program.
16. **Obsolete Hydrant Replacement**– $4.7 million (107%) greater than forecast. Similar to the obsolete valve replacement program, higher than expected rates of deterioration have led to increased backlog, requiring adjustments to hydrant replacement schedules. EWSI has adjusted its hydrant replacement schedule to clear backlogs and ensure fire protection service levels are maintained.

17. **E.L. Smith Bypass Main (Ring Main)** – $4.6 million (65%) greater than forecast. The scope of this project includes the construction of a new bypass primary feeder to help ensure redundancy and uninterrupted service to North and West Edmonton. In 2019, a historical resource impact assessment confirmed the presence of cultural materials within the proposed construction area, requiring archaeological mitigation, and increasing total project costs. Further design also identified the requirement for additional manual isolation valves to improve operational flexibility and isolation redundancy.
18. **Water Main Reactive Renewal** – $4.2 million (8%) greater than forecast. Actual-to-forecast variances for this program generally correlate with the number of main breaks occurring, which is dependent upon weather conditions. Although the ongoing decrease in cast iron water main breaks has resulted in a decrease in the total length of candidates to be replaced, the unit cost of construction for water main replacements has increased due to changes in the City's road restoration standards, increased traffic accommodation requirements, and an increase in transmission mains (350 mm or larger) that qualify for replacement.
19. **Filter Underdrain Upgrades – Rossdale** – $3.4 million (72%) greater than forecast. Both the scope and cost of this project have increased following an inspection of the filter underdrain system that identified unforeseen needs for upgrades to air scour systems, combined with an unexpected increase in the price of steel.
20. **Network Value Chamber Refurbishment** – $2.3 million (41%) greater than forecast due to higher than anticipated number of critical valve replacements required during the 2017-2021 PBR term
21. **Water Meter Change Out**– $13.5 million (53%) less than forecast. The decrease in cost of this program is primarily due to the actual lives of the batteries used in the Automatic Meter Reading (AMR) devices exceeding their manufacturer-estimated lives of 12 years. Based on manufacturer's useful life, it was expected that the first significant replacement of first generation AMR devices would occur in 2019; however, due to the increase in useful life noted on the AMR batteries, the first significant year of replacement has been extended to coincide with the initiation of the AMI Deployment Project in 2023. As a result, fewer meters were replaced during the 2017-2021 term.
22. **Water Main Proactive Renewal** – $3.0 million (16%) less than forecast. This project is very closely tied to Reactive Renewal and includes replacements or upgrades of water mains in older areas where water mains do not conform to current design standards for water quality, fire protection, and system reliability.
23. **Reservoir Cell and Pumphouse Roof Replacement** – $2.7 million (43%) less than forecast. The decreased program expenditures primarily relates to changes in the scope of this program, which has resulted in reclassifying reservoir roof replacement projects to the Reservoir Structural Upgrades Project. This change allows for more efficient project delivery and improvements to project management and coordination. In addition to reclassifying, scope was further reduced on this program when Rossdale Cell 1 was pulled out as a standalone project.
24. **Reservoir Electrical Upgrades**– $2.6 million (49%) less than forecast due to reprioritization of other higher priority water plant projects during the 2017-2021 PBR term.
25. **Reliability and Life Cycle Improvements < $5.0 million** – $17.2 million (25%) greater than forecast. The increase in this category result primarily from the combination of the increased scope of the Rossdale stilling basin upgrade project ($3.0 million); accelerated roof and structural upgrades to

Rossdale Reservoir Cell #1 ($4.0 million) and unbudgeted filter upgrade work at E.L. Smith ($9.0 million). These increases were offset by the deferral of lower priority Rossdale roof replacements ($2.0 million) and E. L. Smith electrical upgrades and a significant portion of the E.L. Smith High Lift Pump #5 upgrades to the next PBR term ($6.7 million). The remaining increase was related mainly to other annual water treatment plant programs required to rehabilitate or replace on a life-cycle basis. Within each of these programs, the most critical work was prioritized for completion within the current PBR term and deferrable projects were rescheduled for future terms.

26. **Water Main Cathodic Protection** – $2.2 million (11%) less than forecast. The reduction in the costs of the program result from adoption of more efficient anode installation processes combined with delays attributable to the ongoing COVID-19 pandemic.

27. **Water D&T Facility Expansion (now Real Estate Consolidation Project)** – $1.1 million (10%) less than forecast. Completion of the D&T Facility was originally planned for 2017. This project has been re-scoped following the transfer of Drainage to EPCOR and the completion of an EPCOR-wide real estate review. The review concluded that a consolidated solution for Water and Drainage would provide long-term synergies and operational efficiencies that would outweigh the additional capital costs. In August 2021, EWSI finalized the purchase of a developed property on Aurum Road in North East Edmonton, which is ideally suited to EWSI long term needs. Site renovations will be required before large scale moves can occur in 2023 and are included within the projected capital expenditure overage for this project. The costs for the project have been allocated 40% to Water Services and 60% to Drainage Services based on estimated headcount. The project is now expected to be completed in 2023 and is forecasted to incur $18.0 million in capital expenditures during the 2022-2026 term.

28. **Performance Efficiency and Improvement Projects < $5 million** - $3.7 million (52%) less than forecast, primarily due to the $2.5 million in savings from the Hydraulic Debottlenecking Project capex which reduced flow restrictions in the UV effluent flume and increased the overall hydraulic capacity of the plant to an acceptable level. The remainder of the difference consists of smaller variances, none of which are individually significant.

29. **Accelerated Fire Protection** – $5.9 million (37%) less than forecast. The expenditures within this program are less than approved due to a smaller number of potential sub-projects meeting the Accelerated Fire Protection Program criteria. A portion of the funding was allocated to the Infill funding program which was developed in conjunction with IDEA and the City of Edmonton to help offset the costs of infrastructure upgrades in infill areas. In addition, funding was allocated to critical work identified in areas such as the Distribution System Modifications for City-driven relocates and Transmission Main work where expenditures exceeded PBR forecast.

30. **Accelerated Water Main Renewal** – $8.2 million (16%) less than forecast. The expenditures within this program are largely dependent upon the City paving program plans and the water main break frequency. Lower than forecast actual costs are primarily due to reprioritization of other more critical lifecycle and reliability programs.

2.3.2 Construction Work in Progress

In-City Water's rate base consists of plant in service. If a capital project is not completed (i.e. not placed into service) in the year, the capital expenditures on that project remain in Construction Work in Progress and are excluded from the rate base. In 2021, as shown on Table 2.3.2, the balance in Construction Work in Progress was $62.9 million greater than forecast.

Table 2.3.2
Construction Work in Progress
($ millions)

		A	B	C	D
	Construction Work in Progress	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Balance, beginning of period	11.8	27.2	0.3	3.8
2	Capital Expenditures	97.9	132.7	475.8	566.0
3	Capital Additions	(109.5)	(96.8)	(475.8)	(506.5)
4	**Balance, end of period**	0.2	63.1	0.2	63.1

The PBR plan allows EWSI to capitalize the costs of financing certain projects remaining in Construction Work in Progress, using an allowance for funds utilized during construction (AFUDC). In 2021, AFUDC included in capital expenditures on eligible projects amounted to $2.5 million, compared to the PBR forecast amount of $0.6 million.

2.4 Operational Performance

2.4.1 Water Quality Index

The Water Quality index is calculated as the percentage of water quality test results that meet EWSI's internal water standards. Water quality standards are established by both the federal and provincial governments and are incorporated into EWSI's Approval to Operate from Alberta Environment and Parks (AEP). In some cases, EWSI sets even stricter limits for critical parameters that are identified in EWSI Quality Standards, to provide early warnings of potential water quality problems; so that corrective actions can be taken before external standards are not met.

Table 2.4.1
Water Quality Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Water Quality Index	The percentage of the total number of water quality tests taken in the period that do not yield suspect results	≥ 99.7	99.7	1.000
			Average Index	1.000
			Index Standard Points	25.0
			Total Actual Points	25.0
			Maximum Available Points Including Bonus Points	25.5
			Total Points Earned	**25.0**

2021 Highlights

- **Water Quality Index:** During the year, EWSI collected and tested 60,644 samples of treated drinking water, of which only 159 (0.3%) did not meet EWSI internal water quality standards. EWSI met Health Canada's Drinking Water Quality Guidelines and Alberta Environment and Parks' water quality testing requirements in 2021 for all but 3 samples.

2022 Areas for Improvement

- **Water Quality Index:** Increases in turbidity and/or decreases in chlorine concentrations, can be partly explained by changing water consumption patterns resulting from the COVID-19 pandemic. In 2022, as part of EWSI's pandemic response to changing consumption patterns we continued to communicate to large facility owners, encouraging them to flush their building's plumbing systems when experiencing low occupancy.

2.4.2 Customer Service Index

The customer service index is a composite measure of the customers' perception of satisfaction with EWSI service, the aesthetic quality of water and speed of response to customer issues.

Table 2.4.2
Customer Service Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Post Service Audit Factor	The percentage of the customers responding as "completely" or "very satisfied" in the level of service received from the EWSI Emergency group.	≥ 74.9	72.2	0.963
Home Sniffing Factor	The percentage result of customer satisfaction for the home sniffing survey.	≥ 94.4	96.0	1.017
Response Time Factor	The average number of minutes needed to confirm a water main break from the time a call is received at EWSI's dispatch office.	≤ 25.0	19.4	1.225
Planned Construction Impact Factor	The percentage of the total planned construction events where EWSI complies	≥ 95.8	97.4	1.017

	with required construction notification procedures.			
			Average Index	1.056
			Index Standard Points	20.0
			Total Actual Points	21.1
			Maximum Available Points Including Bonus Points	23.0
			Total Points Earned	**21.1**

2021 Highlights

- **Post Service Audit (PSA) Factor**: In 2021, EWSI continued to focus on enhancing the customer experience. In addition to increased call reviews, EWSI held group sessions with the various teams that interact with customers to improve customer satisfaction. As a result of these efforts, the PSA showed improvement compared to previous years.
- **Home Sniffing Factor**: An especially mild spring runoff season during 2021 allowed taste and odour issues to be managed effectively so that a 96.0% customer satisfaction rating was achieved, well above the 94.4% target. Special care was exercised to ensure that the home sniffers' distribution represented all areas of the City, to encourage timely (same day) submission of observations, and to encourage participants to stay involved throughout the full monitoring period. A major improvement over previous years was having continuous, near real-time home sniffing results available as feedback to water plant operators.
- **Response Time Factor:** EWSI continued to exceed the Response Time Factor through efficient dispatching of crews. Crews are typically assigned to quadrants of the city which provide efficient dispatching of those crews to main breaks.
- **Planned Construction Impact Factor:** On-going training and improvements to construction coordination and communication plans resulted in performance exceeding the PBR standard.

2022 Areas for Improvement

- **Home Sniffing Factor**: Timeliness of data entry will be improved by imposing a two-day response cut-off so that only entries within that time-frame will be accepted. Any interruptions to automated data transmission will also be handled in a consistent manner, so that manual interventions are readily traceable.
- **Response Time Factor:** EWSI will continue to improve response time by implementing new procedures and identifying additional resources to respond to main breaks and to support shut down processes. A new Emergency Support Team has been identified that includes related employee positions that simultaneously respond to main breaks.
- **Planned Construction Impact Factor:** Training and construction processes will continue to be reviewed to minimize impacts of planned construction activities.

2.4.3 System Reliability and Optimization Index

The System Reliability Index is a measure of the confidence that customers can place in the reliability of the waterworks system.

Table 2.4.3
System Reliability and Optimization Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Water Main Break Factor	The number of water main breaks that occurred in the reporting period.	≤ 419	305	1.272
Water Main Break Repair Duration Factor	The percentage of water main breaks repaired and confirmed by EWSI within 24 hours from the time that the flow of water is shut off, excluding main breaks on arterial or collector roads.	≥ 93.7	95.8	1.022
Water Loss Factor	The Infrastructure Leakage Index, a performance indicator quantifying how well a water distribution system is managed for the control of “real” water losses (i.e. leakage).	≤ 2.00	0.90	1.550
System Energy Efficiency Factor	The energy used at all water facilities in kWh divided by the average annual water production per residential customer account (ML/kWh/customer).	≤ 309	245	1.263
			Average index	1.277
			Index Standard Points	25.0
			Total Actual Points	31.9
			Maximum Available Points Including Bonus Points	28.5
			Total Points Earned	**28.5**

2021 Highlights

- **Water Main Break Factor:** EWSI experienced 305 main breaks in 2021. Although this was an increase over the previous year, the result remains within the PBR standard, and was due to variations in weather and temperature.
- **Water Main Break Repair Duration Factor:** In 2021, 95.8% of main breaks were repaired within 24 hours which exceeded the PBR standard of 93.7%. When water main break repairs approached 20 hours in duration, additional communication was provided to impacted customers. In addition, EWSI provided temporary water supply via water tanks, hose hook ups, or delivery of water jugs to affected customers. When possible, additional crews were called in overnight to continue repairs to reduce impacts to customers.
- **Water Loss Factor (ILI):** EWSI’s Infrastructure Leakage Index (reported for 2020) of 0.90 exceeded the PBR standard of 2.00.
- **System Energy Efficiency Factor:** EWSI exceeded the energy efficiency target in 2021 and implemented several energy efficiency improvements and GHG reductions, including:

  - Completion of an energy audit to identify baseline and improvement opportunities for water treatment plant and reservoir operations.
  - On-going implementation of office and pump station off-hour temperature control programs.
  - On-going implementation of building envelope energy efficiency programs to reduce GHG emissions.

High temperatures late June and early July of 2021 also increased water consumption which in turn improved treatment process and water distribution efficiencies.

2022 Areas for Improvement

- **Water Main Break Factor:** Capital spending during 2022 will be allocated to projects for the prevention of high consequence main breaks through a new annual transmission main inspection program.
- **Water Main Break Repair Duration Factor:** EWSI continues to review its processes for mobilization of equipment and crews to ensure minimal impacts of organizational changes to repair timelines.
- **Water Loss Factor (ILI):** An ILI of 0.9 is considered extremely good for a water utility. Through continuous improvement, EWSI will continue to explore options to further quantify and validate inputs as well as to identify and minimize water loss.
- **System Energy Efficiency Factor:** In 2022, EWSI will continue with several key energy efficiency initiatives which will include:
  - Complete Energy Audit Phase I and II to draft a road map for GHG emission reductions for water treatment plant and reservoir operations.
  - Review major capital projects for GHG emission reductions related to the federal Low Emission Economy Grant. If approved, implementation would be planned to be completed in early 2025.
  - As an industrial leader in sustainable utilities of the future, EWSI will share knowledge of net zero emission reduction strategies and energy efficiency improvement experiences with other utilities in professional organizations.
  - Continue with current building envelope energy efficiency programs to reduce GHG emissions.

2.4.4 Environment Index

The environmental index measures the success of programs and policies designed to mitigate and report adverse environmental impacts.

Table 2.4.4
Environmental Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Water Conservation Factor	The actual 10 year rolling average monthly Edmonton residential consumption per household.	≤ 17.2	15.0	1.145
Environment Incident Factor	The number of reportable and preventable environmental incidents.	≤ 6	3	2.000
Solids Residual Management Factor	The average number of days that the Rossdale and E.L. Smith water treatment plants are operating in direct filtration mode.	≥ 120	131.0	1.092
			Average index	1.412
			Index Standard Points	15.0
			Total Actual Points	21.2
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

<u>2021 Highlights</u>

- **Water Conservation Factor:** Similar to much of 2020, the COVID-19 pandemic continued through 2021 and residential consumption per customer continued to remain elevated because of people spending more time at home. In addition to higher indoor residential consumption, seasonal or outdoor consumption was much higher than normal due to lower than usual precipitation and higher average temperatures over the summer months. Despite the COVID-19 pandemic, the actual Water Conservation Factor was still well below the standard. This is attributable to historical and ongoing changes in water usage habits and technology improvements resulting in efficient appliances and toilets.

- **Environment Incident Management Factor:** For 2021, there were four reportable environmental incidents pertaining to water distribution and transmission operations. Three related to bacteriological sample failures while the fourth related to a drainage wastewater release. A root cause investigation was carried out for each incident. Three events were determined to be preventable (two bacteriological samples resulting from equipment failure and the drainage wastewater release when a valve on a lift station was closed in error). These investigations provided information that resulted in improvements to maintenance and operating procedures.

- **Solids Residual Management Factor:** The water treatment plants successfully operated in direct filtration an average of 131 days in 2021, exceeding the target of 120 days. As a result, total solids discharged to the North Saskatchewan River during the winter months (January, February, November and December) were reduced by 52% relative to baseline conventional treatment.

2022 Areas for Improvement

- **Environment Incident Management Factor:** During 2022 there will be a continued focus on environmental and public health significant incident investigations that will be targeting root cause identification and tracking of corrective actions to completion.
- **Solids Residual Management Factor:** EWSI will continue to optimize chemical dosing and other operating strategies for direct filtration, with the goal being to minimize solids discharged to the North Saskatchewan River.

  In December 2021, EWSI submitted a proposed Wastestream Monitoring Program to Alberta Environment and Parks for review and approval. The proposed plan will build on previous assessment work, further quantifying residuals discharged to the river and their impacts, and will help inform future residual management strategies.

2.4.5 Safety Index

The safety index is a measure of the success of programs and the application of policies that maximize the safety of employees and the public.

Table 2.4.5
Safety Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Near Miss Reporting Factor	The number of near miss reports entered in the ERS system.	≥ 550	748	1.360
Work Site Inspections and Observations Factor	Number of Work Site Inspections and observations completed per year.	≥ 1032	3919	3.797
Lost Time Frequency Factor	The actual lost time frequency rate.	≤ 0.57	0.00	2.000
All Injury Frequency Factor	The actual all injury frequency rate	≤ 1.54	0.81	1.899
			Average index	2.264
			Index Standard Points	15.0
			Total Actual Points	34.0
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

2021 Highlights

- **Near Miss Reporting Factor:** Near miss and hazard identification reporting continued to be an effective means to proactively identify hazards and implement corrective actions to mitigate potential harm to employees, contractors and members of the public.
- **Work Site Inspections / Observations Factor:** Work site inspections and observations continued to be a successful leading indicator that provided leadership and employees the opportunity to

engage in field activities, proactively identify areas of improvement, and verify conformance to EWSI standards

- **Lost Time Frequency Rate Factor:** In 2021, EWSI exceeded the lost time frequency rate factor by having no lost time events.
- **All Injury Frequency Rate Factor:** In 2021, EWSI had 6 recordable incidents. Three were related to musculoskeletal strains. The remaining three were due to an insect bite, a crush injury and an electrical shock.

2022 Areas for Improvement

- **Near Miss Reporting Factor:** With consideration of the reintegration back into the workplace in 2022, there will be a continued focus on the reporting of near miss and hazard identification events. A Mind on Task initiative will drawn attention to the need to focus on mitigating hazards before an event occurs.
- **Work Site Inspections / Observations Factor:** With consideration of the reintegration back into the workplace in 2022, EWSI will continue to monitor inspection and observation activities and support proactive field engagements.
- **Lost Time Frequency Rate Factor/All Injury Frequency Rate Factor.** EWSI will continue to review investigation information for causal themes. This will assist in the identification of future direction for communications and activities related to addressing root causes.

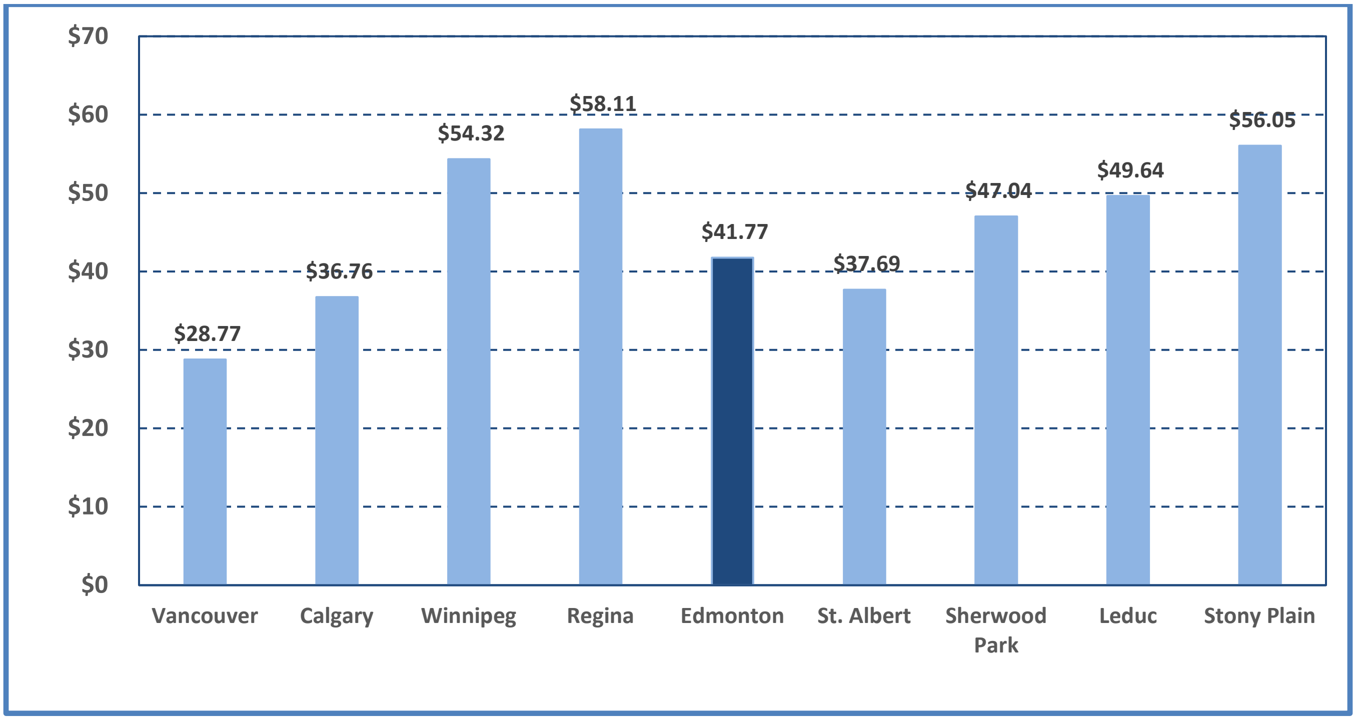
2.5 Rates and Bill Comparisons

Water bill comparisons for 2021 are based on the published water rates for Calgary, Vancouver, Winnipeg and Regina, as well as four local communities. These bill comparisons represent the total cost to the customer and include fixed charges, consumption charges and any other applicable surcharges.

2.5.1 Residential Water Bills

Figure 2.5.1 provides a comparison of residential household water bills for residential household consumption of 15.1 m^3 per month, the average residential customer consumption per month in Edmonton in 2021. Comparison of residential water bills shows that Edmonton's water bills are competitive with all of the cities and local communities surveyed. Vancouver continues to have the lowest rates due to its excellent raw water source and, therefore, lower needs for water treatment than Edmonton which has a naturally highly variable water source in the North Saskatchewan River.

Figure 2.5.1
2021 Monthly Residential Water Bill Comparison
(15.1 m^3/month)



2.5.2 Commercial Water Bills

Table 2.5.2 provides a comparison of the water bills for commercial customer of various sizes. This table shows that water bills for EWSI's commercial customers are competitive with all of the other surrounding communities and other major cities in western Canada, except for Vancouver.

Table 2.5.2
Commercial Monthly Water Bill Comparison
($ per month)

		A	B	C	D
	Average Monthly Bill	**Small**	**Medium**	**Large**	**Extra Large**
1	Monthly Consumption - m3 per month	10	250	1,000	5,000
2	Vancouver	22.52	353.11	1,435	7,029
3	Calgary	28.76	378.78	1,558	7,647
4	Regina	47.40	561.90	2,390	11,266
5	Winnipeg	38.80	498.10	2,006	9,761
6	**Edmonton**	**24.97**	**428.33**	**1,711**	**7,223**
7	St. Albert	28.41	465.21	1,830	9,110
8	Sherwood Park	32.96	695.36	2,765	13,805
9	Stony Plain	37.12	928.03	3,712	18,561
10	Leduc	36.60	680.95	2,822	13,462

3 Wastewater Treatment Services

3.1 Customers and Consumption

Wastewater's customer counts, consumption and consumption per customer are similar to those of In-City Water. Differences in customer counts, almost entirely within the commercial customer class, are attributable to "water-only" customers who are not tied into the City's drainage system. Water-only customers include businesses in industrial parks that are served by septic systems, as well as seasonal water customers, such as commercial lawn watering services and golf courses. Table 3.1 below provides a comparison of 2021 and 2017-2021 forecast to actual customer counts and consumption per customer.

Table 3.1
Wastewater Treatment Customers, Consumption and Consumption per Customer

		A	B	C	D
	Customers and Consumption	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Customers				
2	Residential	276,223	277,598	266,113	268,676
3	Multi-Residential	3,929	3,801	3,837	3,775
4	Commercial	17,414	17,167	16,972	16,952
5	Total	297,566	298,566	286,922	289,403
6	Monthly Consumption per Customer				
7	Residential	13.7	15.0	14.2	14.5
8	Multi-Residential	408.8	417.3	408.8	400.6
9	Commercial	117.0	96.1	120.9	107.4
10	Annual Consumption - ML				
11	Residential	45,438	49,973	226,109	234,025
12	Multi-Residential	19,276	19,035	94,122	90,739
13	Commercial	24,459	19,798	123,083	109,203
14	Total	89,173	88,806	443,314	433,967

Actual to forecast differences in Wastewater's customer counts and consumption are attributable to the same factors discussed in Section 2.2.

3.2 Financial Performance

Wastewater's revenue requirements are summarized on Table 3.2 below.

Table 3.2
Wastewater Treatment Revenue Requirements
($ millions)

		A	B	C	D
		2021		**2017-2021**	
Summary of Revenue Requirements		**PBR Forecast**	**Actual**	**PBR Forecast**	**Actual**
1	Wastewater Rate Revenue*	112.8	107.3	496.3	473.0
2	Wastewater Revenue Requirement				
3	Operating expenses	60.4	56.6	286.8	257.1
4	Other revenue	(7.4)	(9.8)	(33.9)	(35.4)
5	Depreciation and amortization	20.0	20.6	86.1	88.7
6	Return on rate base financed by debt	14.5	11.6	62.0	56.1
7	Return on rate base financed by equity	21.7	28.0	95.4	106.6
8	Wastewater Revenue Requirement*	109.4	107.3	496.3	473.0
9	**Return on Rate Base Financed by Equity**	**10.18%**	**14.25%**	**10.18%**	**12.13%**

* In the PBR forecast, rebasing and other special rate adjustments have been smoothed over the PBR term. Therefore, although forecast revenue is equal to the revenue requirement over the 2017-2021 PBR term, in any year within the PBR term, forecast revenue may be greater or less than the revenue requirement

Detailed explanations for forecast to actual variances for each of the elements of the revenue requirement are provided in sections 3.2.1 to 3.2.6.

3.2.1 Revenue

Wastewater's rate revenues include fixed monthly services charges applied on a per connection basis, and consumption charges applied to each cubic metre of consumption. Besides rate revenues, Wastewater's other revenue consists primarily of over-strength surcharges that are subject to the same rate adjustment mechanism as Wastewater's rate revenue. The remaining other revenue is derived from a variety of sources, including provision of services to the Alberta Capital Region Wastewater Commission and other suburban customers, sale of nutrients derived from Ostara, late payment charges, and various other services. Table 3.2.1 below provides a comparison of Wastewater's 2021 actual and forecast revenue.

Wastewater's rate revenues were $5.5 million less than forecast in 2021, and $23.3 million less than forecast over the 2017-2021 PBR period. This difference is primarily attributable to four factors:

- Lower than forecast inflation resulted in $4.0 million less revenue in 2021 than forecast ($11.1 million lower than forecast for 2017-2021);
- Lower than forecast consumption resulted in a $3.7 million decrease in 2021 ($17.5 million lower than forecast for 2017-2021); and
- A Non-Routine Adjustment related to the transfer of Drainage Services to EPCOR (see Section 1.5) which reduced revenues by $1.2 million in 2021 relative to the forecast ($4.3 million lower than forecast for 2017-2021); partially offset by

- Higher than forecast over-strength surcharges increased other revenue by $1.4 million in 2021 ($1.6 million higher than forecast for 2017-2021). The remainder of the higher than forecast other revenue related to numerous items, none of which are individually significant.

Table 3.2.1
Wastewater Treatment Revenue
($ millions)

		A	B	C	D
	Wastewater Treatment Revenue	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Fixed Monthly Service Charges				
2	Residential	18.3	16.7	78.7	73.4
3	Multi-Residential	0.3	0.2	1.1	1.0
4	Commercial	1.2	1.0	5.0	4.6
5	Fixed Monthly Service Charges	19.7	18.0	84.9	79.0
6	Consumption Charges				
7	Residential	48.1	51.2	213.0	216.2
8	Multi-Residential	20.4	19.5	88.8	83.7
9	Commercial	24.5	18.5	109.7	94.0
10	Consumption Charges	93.0	89.3	411.4	393.9
11	Wastewater Rate Revenue	112.8	107.3	496.3	473.0
12	Other Revenue	7.4	9.8	33.9	35.4
13	**Total Wastewater Treatment Revenue**	**120.1**	**117.0**	**530.2**	**508.4**

3.2.2 Operating Expenses by Function

Wastewater's operating expenses are presented and analyzed on both functional and cost category bases. Actual and forecast operating expenses by function are shown in Table 3.2.2 below:

Table 3.2.2
Wastewater Treatment Operating Expenses by Function
($ millions)

		A	B	C	D
	Function and Sub-function	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Power, Other Utilities and Chemicals				
2	Power and Other Utilities	5.7	5.2	27.2	25.1
3	Chemicals	1.7	1.1	8.2	5.8
4	Power, Other Utilities and Chemicals	7.4	6.2	35.4	30.9
5	Wastewater Treatment				
6	Wastewater Treatment Plant	19.9	19.3	96.6	89.6
7	Operations Support Services	8.6	6.1	41.5	31.8
8	Capitalized Overhead	(2.5)	(2.8)	(12.2)	(14.4)
9	Wastewater Treatment	26.0	22.7	125.9	107.0
10	Billing, Meters and Customer Service				
11	Billing and collections	3.7	3.5	17.2	17.1
12	Meter reading	2.5	2.2	12.2	11.6
13	Regulatory Services	1.1	2.0	5.1	7.3
14	Billing, Meters and Customer Service	7.3	7.7	34.5	36.0
15	EWSI Shared Services				

		A	B	C	D
		2021		2017-2021	
Function and Sub-function		**PBR Forecast**	**Actual**	**PBR Forecast**	**Actual**
16	EWSI Shared Services	3.6	4.0	17.3	17.4
17	Incentive and Other Compensation	1.2	1.8	5.8	5.0
18	EWSI Shared Services	4.8	5.8	23.1	22.4
19	Corporate Shared Services	5.2	4.8	25.1	20.7
20	Franchise Fees and Property Taxes				
21	Franchise Fees	8.5	8.6	37.9	37.1
22	Property Taxes	1.3	0.6	4.9	3.0
23	Franchise Fees and Property Taxes	9.8	9.3	42.8	40.1
24	**Total Operating Expenses by Function**	**60.4**	**56.6**	**286.8**	**257.1**

Overall, Wastewater's operating expenses for 2021 were $3.8 million lower than forecast ($29.6 million lower for 2017-2021). Key factors contributing to this difference include:

- **Power and Other Utilities** – $0.5 million lower than forecast in 2021 ($2.1 million lower than forecast for 2017-2021) due to lower than forecast power prices related to new power agreements.
- **Chemicals** – $0.6 million lower than forecast in 2021 ($2.4 million lower than forecast for 2017-2021), due to two factors. First, the Ostara nutrient removal facility was offline more than expected, resulting in lower chemical usage over the 2017 to 2021 period. Second, process and dosing optimization enabled Wastewater to achieve significant reductions in alum usage over the 2017 to 2021 period.
- **Wastewater Treatment** – $3.3 million lower than forecast in 2021 ($18.9 million lower than forecast for 2017-2021). The variance is primarily attributable to adjustments to the capital program, where projects with a high component of contractor costs have been replaced by capital maintenance and repair projects completed by Wastewater personnel. These changes have led to capitalization of an additional $2.3 million of internal labour costs that would otherwise have been expensed ($8.1 million for 2017-2021) and additional capitalized overheads of $0.3 million in 2021 ($2.2 million for 2017-2021). Besides these changes, the variance also reflects lower than forecast fringe benefits costs of $0.4 million in 2021 ($2.8 million lower than forecast for 2017-2021) related to lower pension contributions, and $1.1 million in savings in contractor costs ($5.0 million lower than forecast for 2017-2021) resulting from dissolution of the Centre for Excellence, lower maintenance costs, and the completion of fewer engineering studies in 2021. The remainder of the variance results from numerous small items, none of which are individually significant.
- **Billing, Meters and Customer Service** - $0.4 million higher than forecast in 2021 ($1.5 million greater for 2017-2021) primarily due to higher than forecasted drainage compliance costs related to measurement of wastewater overstrength constituents. These increases, which amounted to $0.9 million in 2021 ($2.2 million for 2017-2021) were partially offset by lower than forecast billing and collections and meter reading costs.
- **EWSI Shared Services** – $1.0 million higher than forecast in 2021 ($0.7 million lower than forecast for 2017-2021). Higher than forecast costs in this category in 2021 reflect a $0.4 million increase in business unit allocations ($0.1 million higher than forecast for 2017-2021) and higher than forecast incentive compensation of $0.6 million (no variance from forecast for 2017-2021). The 2017-2021 variance also includes $0.8 million of savings in long term disability premiums.

- **Corporate Shared Services** – $0.4 million less than forecast in 2021 ($4.4 million less for 2017-2021). These differences reflect both the reduction in corporate cost allocations resulting from the transfer of Drainage from the City of Edmonton to EUI, as well as cost savings in corporate functions. As with In-City Water, the cost reductions arising from the transfer of Drainage Services have been returned to Wastewater customers through a Non-Routine Adjustment to 2018 to 2021 wastewater rates.
- **Franchise Fees and Property Taxes** – $0.5 million less than forecast in 2021 ($2.7 million less for 2017-2021). Franchise fees are calculated as 8% of eligible revenue less the municipal portion of property taxes. Although 2021 revenues were less than forecast, lower than forecast property taxes resulted in a lower than forecast reduction to 2021 and 2017-2021 franchise fees. Lower than forecast property taxes of $0.7 million in 2021 ($1.9 million less than forecast for 2017-2021) relate to the deferral of capital projects, including the Operations Center at Mid-point Entrance project, which had been forecast to increase property taxes starting in 2018.

3.2.3 Operating Expenses by Cost Category

Table 3.2.3 shows operating expenses by cost category for Wastewater Treatment Plant Operations, Billing Meters and Customer Service, and EWSI Shared Services, where cost categories differ from the sub-functions in Section 3.2.2.

Table 3.2.3
Wastewater Treatment Operating Costs by Cost Category
($ millions)

		A	B	C	D
	Cost Category	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Wastewater Treatment Plant Operations				
2	Staff Costs and Employee Benefits	18.5	15.8	89.2	75.9
3	Contractors and Consultants	4.3	2.7	21.4	15.3
4	Materials and Supplies	2.1	2.1	10.3	10.7
5	Other	1.1	2.1	5.0	5.1
6	Wastewater Treatment Plant Operations Expenses	26.0	22.7	125.9	107.0
7	Billing, Meters and Customer Service				
8	CUS Charges	3.7	3.5	17.2	17.1
9	Contractors and Consultants	3.6	4.2	17.3	18.9
10	Billings, Meters and Customer Services Expenses	7.3	7.7	34.5	36.0
11	EWSI Shared Services				
12	EWSI Shared Services Allocation	3.3	3.4	16.0	15.0
13	Staff Costs and Employee Benefits	1.3	2.1	6.5	6.7
14	Other	0.1	0.2	0.6	0.7
15	EWSI Shared Services Expenses	4.8	5.8	23.1	22.4

The information presented in this table supports the explanations of differences between 2021 actual and forecast expenses provided in Section 3.2.2. Accordingly, no additional explanations are considered necessary.

3.2.4 Depreciation and Amortization

Wastewater's depreciation expense and amortization of contributed assets for 2021 are shown in Tables 3.2.4 below:

Table 3.2.4
Wastewater Treatment Depreciation and Amortization
($ millions)

		A	B	C	D
	Depreciation and Amortization	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Gross depreciation expense	21.0	21.6	90.7	93.3
2	Amortization of contributions	(0.9)	(0.9)	(4.7)	(4.6)
3	**Depreciation, net**	**20.0**	**20.6**	**86.1**	**88.7**

Wastewater's 2021 depreciation expense was $0.6 million greater than forecast ($2.6 million greater for 2017-2021), even though plant in service was $77.4 million (10%) less than forecast at December 31, 2021 (Table 3.2.5, line 5). This difference results from adjustments to Wastewater's capital program where asset replacement projects were replaced with capital maintenance and repair projects with shorter expected useful lives and, therefore, higher effective depreciation.

3.2.5 Rate Base

Wastewater's 2021 mid-year rate base, shown in Table 3.2.5 below, was $43.7 million less than forecast, reflecting lower than forecast capital additions over the 2017 to 2021 period resulting from project deferrals and other adjustments to the capital program described in Section 3.3.1.

Table 3.2.5
Wastewater Treatment Mid-Year Rate Base
($ millions)

		A	B
		2021	
	Components of Mid-Year Rate Base, net of Contributions	**PBR Forecast**	**Actual**
1	Plant in Service		
2	Balance, beginning of year	745.8	681.9
3	Capital additions	34.9	24.7
4	Retirements and adjustments	-	(3.3)
5	Balance, end of year	780.7	703.3
6	Mid-Year Plant in service	763.3	692.6
7	Accumulated Depreciation		
8	Balance, beginning of year	206.0	181.4
9	Depreciation expense	21.0	21.5
10	Retirements and adjustments	-	(3.3)
11	Balance, end of year	227.0	199.6
12	Mid-Year Accumulated Depreciation	216.5	190.5
13	Other Rate Base Items		
14	Working Capital	7.0	7.5
15	Materials and Supplies	1.6	2.1
16	**Gross Mid-Year Rate Base**	555.3	511.6

		A	B
		2021	
	Components of Mid-Year Rate Base, net of Contributions	PBR Forecast	Actual
17	Contributions		
18	Balance, beginning of year	41.0	41.0
19	Contributions in aid of construction		-
20	Balance, end of year	41.0	41.0
21	Mid-Year Contributions	41.0	41.0
22	Accumulated Amortization		
23	Balance, beginning of year	19.3	19.3
24	Amortization of contributions	0.9	0.9
25	Balance, end of year	20.3	20.2
26	Mid-Year Accumulated Amortization	19.8	19.8
27	**Mid-Year Contributions**	21.2	21.2
28	**Mid-Year Rate Base**	**534.1**	**490.5**

Unlike In-City Water, where contributions relate primarily to developer-funded assets, contributions included in Wastewater's rate base offset the cost of non-utility assets included in Wastewater's plant in service. This treatment ensures that the capital costs associated with these assets are not borne by utility rate payers. The cost of operating these assets, as well as any related revenues are also excluded from Wastewater's financial results.

3.2.6 Return on Rate Base

In 2021, Wastewater's return on equity was $6.3 million greater than forecast ($11.2 million greater for 2017-2021) enabling Wastewater to achieve a return on equity of 14.25% in 2021 (12.13% for 2017-2021). Approximately $3.4 million of the 2021 difference results from revenue smoothing, where rate increases related to the Special Rate Adjustments for Rebasing are smoothed over the PBR term. The remainder of the difference results from cost savings (see section 3.2.2) and interest expense savings (see below) that exceeded lower than forecast revenues (see section 3.2.1). The lower than forecast rate base also contributed to the higher than forecast rate of return on equity; if the 2021 rate base had been at forecast levels, EWSI's 2021 return would have been 13.2%, rather than 14.25%.

Table 3.2.6-1
Wastewater Treatment Return on Rate Base
($ millions)

		2021		2017-2021	
	Return on Rate Base	PBR Forecast	Actual	PBR Forecast	Actual
1	Mid-year Rate Base	534.1	476.8		
2	Deemed Capital Structure				
3	Debt (%)	60.00%	60.00%		
4	Equity (%)	40.00%	40.00%		
5	Cost of Capital				
6	Cost of Debt	4.53%	4.04%	4.41%	4.25%
7	Cost of Equity	10.18%	14.25%	10.18%	12.13%
8	Weighted Average Cost of Capital (WACC)	6.79%	8.12%	6.72%	7.40%
9	Return on Mid-Year Rate Base				
10	Return on Rate Base Financed by Debt	14.5	11.9	62.0	56.1

11	Return on Rate Base Financed by Equity	21.7	28.0	95.4	106.6
12	**Return on Mid-year Rate Base**	**36.3**	**39.8**	**157.4**	**162.6**

Wastewater's weighted average cost of debt calculation are shown in Table 3.2.6-2 below. Lower than forecast cost of debt reflects lower than forecast interest rates on new debt issuances, attributable to the Bank of Canada's efforts to maintain low interest rates in response to COVID-19-related declines in economic activity in 2020 and 2021.

Table 3.2.6-2
Wastewater Treatment Interest Expense and Cost of Debt
($ millions)

		A	B	C	D
	Interest Expense and Cost of Debt	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Interest Expense				
2	Interest on short-term debt	1.0	0.2	4.6	3.8
3	Interest on City of Edmonton debentures	2.3	-	14.0	6.2
4	Interest on intercompany debentures	11.3	11.6	44.6	46.9
5	Total Interest expense	14.5	11.9	63.3	56.9
6	Mid-year debt and other long-term liabilities				
7	Mid-Year Short-term debt	35.1	14.1		
8	Mid-Year Long-term debt	284.0	279.0		
9	Mid-Year Other Long-term liabilities	0.5	0.4		
10	Total Mid-year debt and other long-term liabilities	319.6	293.5		
11	**Embedded cost of Debt**	**4.53%**	**4.04%**	**4.41%**	**4.25%**

3.2.7 Transactions with Affiliates

Wastewater derives a significant proportion of its revenue and expenses from transactions with affiliates, including the City of Edmonton, EUI, and its subsidiaries, and other EPCOR Water Services Inc. business units. Table 3.2.7 summarizes Wastewater's transactions with affiliates.

Table 3.2.7
Wastewater Treatment Transactions with Affiliates
($ millions)

		A	B	C	D
	Affiliate and Service	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	**Revenues from the provision of services to the City of Edmonton**				
2	Wastewater Treatment Services	1.1	0.8	5.2	5.3
3	Other Services	0.2	-	1.2	0.3
4	Total	1.3	0.8	6.4	5.6
5	**Services provided by (recovered from):**				
6	**City of Edmonton**				
7	Franchise Fees	8.5	8.6	37.9	37.1
8	Property Taxes	1.3	0.6	4.9	3.0
9	Interest on Long Term Debt	2.3	-	14.0	6.2
10	Regulatory Services	1.1	-	5.1	0.7

11	Biosolids Contractor Service		0.4	-	-
12	Other Services	0.2	0.1	0.9	0.9
13	Total	13.3	9.8	62.9	47.9
14	**EPCOR Utilities Inc.**				
15	Corporate Shared Service Costs	5.2	4.8	25.1	20.7
16	Interest on Intercompany Loans	11.3	11.6	44.6	46.9
17	Interest on Short-term debt	1.0	0.2	4.6	3.8
18	Other Services	-	0.1	-	-
19	Total	17.4	17.0	74.3	71.4
20	**EPCOR Distribution and Transmission Inc.**				
21	Maintenance and other services	0.1	(0.0)	0.1	0.1
22	**EPCOR Technologies Inc.**				
23	Hydrovac Charges	-	0.0	-	0.3
24	**EPCOR Energy Alberta LP**				
25	Billing and Collection Services	3.4	3.1	15.5	14.8
26	**Other EWSI Business Units**				
27	EWSI Shared Services Allocation	3.3	3.3	16.0	14.9
28	Meter reading services from In-City Water	2.5	2.2	12.2	11.6
29	Water purchases from In-City Water	0.4	0.4	1.9	2.1
30	Regulatory services from Drainage Services	3.4	2.0	15.5	6.7
31	Project engineering recoveries from Drainage	-		-	(1.2)
32	Laboratory services recoveries from Drainage	-	(0.3)	-	(1.3)
		-	(0.0)	-	-
33	Total	9.6	7.7	45.6	32.7
34	**Expenditures on capital projects arising from services provided by:**				
35	City of Edmonton	-	0.0	-	0.1
36	EPCOR Technologies Inc.	-	0.0	-	0.3
37	EPCOR Utilities Inc.	-	0.1	-	0.4
38	Total	-	0.1	-	0.8

3.3 Capital Programs

3.3.1 Capital Expenditures

Table 3.3.1 compares approved capital expenditures from the PBR forecast to actual capital expenditures for 2021 for each project with approved capital expenditures in excess of $5.0 million over the 2017-2021 PBR term, as well as for each project category. Table 3.3.1 also provides a comparison of total 2017-2021 approved capital expenditures to EWSI's current capital forecast.

Table 3.3.1
Wastewater Treatment Capital Expenditures
($ millions)

		A	B	C	D	E	F	
		2021			**2017 to 2021**			
		PBR Forecast	**Actual**	**Difference**	**PBR Forecast**	**Actual**	**Difference**	
	Reliability and Life Cycle Improvements							
1	Build Pipe Racks	-	1.0	1.0	-	10.3	10.3	1
2	Sludge Line Upgrades	-	0.0	0.0	3.4	8.1	4.7	2
3	Replace 2.5km of Sludge Line	-	0.0	0.0	-	7.8	7.8	2
4	Clarifier Chain Replacement	0.7	1.4	0.7	4.1	9.4	5.3	3
5	Mechanical Rehab Program	1.6	2.4	0.7	15.6	20.5	5.0	4
6	Structural Rehab Secondaries 1-8	3.6	3.3	(0.3)	17.6	21.1	3.5	5
7	Structural Rehab Pgm	1.6	3.9	2.3	7.7	10.9	3.3	6
8	Digester 3 Upgrades	-	0.3	0.3	11.3	14.4	3.1	7
9	Distribution Chamber Reconstruction	-	0.0	0.0	3.8	6.8	3.0	8
10	Operations Centre at Mid-Point Entrance	-	2.3	2.3	19.4	3.8	(15.6)	9
11	Digester 4 Upgrades	-	0.0	0.0	12.0	1.4	(10.6)	10
12	Square 1 Gas Room Replacement	3.6	4.5	1.0	15.6	5.8	(9.7)	11
13	Site HVAC Rehabilitation	1.8	6.6	4.9	31.5	25.0	(6.5)	12
14	Headworks & Primary Aeration Upgrades	-	0.0	0.0	6.7	1.4	(5.3)	13
15	Utility Hot Water System Rehabilitation	1.0	0.2	(0.8)	13.9	9.0	(4.8)	14
16	Buildings and Site Rehab	1.2	2.5	1.3	12.8	8.2	(4.6)	15
17	Electrical Rehab Program	1.8	1.3	(0.5)	7.2	8.1	0.9	16
18	Projects < $5 million	1.8	7.9	6.1	21.2	27.2	6.1	16
19	**Subtotal**	18.7	37.6	18.9	203.4	199.3	(4.1)	
	Performance Efficiency and Improvement							
20	Plant Improvements	0.6	2.8	2.2	2.9	8.5	5.6	17
21	Projects < $5 million	2.3	0.8	(1.5)	14.7	8.4	(6.3)	18
23	**Subtotal**	2.9	3.5	0.7	17.6	16.8	(0.8)	
	Growth/Customer Requirements							
24	Hydrovac Sanitary Grit Treatment Facility	-	0.3	0.3	8.4	7.7	(0.7)	
25	Projects < $5 million	-	0.1	0.1	1.5	2.1	0.5	
26	**Subtotal**	-	0.4	0.4	9.9	9.7	(0.2)	
	Health, Safety and Environment							
27	Projects < $5 million	0.6	2.1	1.5	4.5	4.2	(0.3)	
	Regulatory							
28	Projects < $5 million	-	1.5	1.5	-	2.8	2.8	19
29	**Capital Expenditures, net of Contributions**	**22.1**	**45.1**	**23.0**	**235.4**	**232.9**	**(2.6)**	

Explanations for differences between PBR forecast capital expenditures for 2017 to 2021 and EWSI's current projection in excess of $2.0 million include:

1. **Build Pipe Racks** – $10.3 million (new project) greater than the 2017-2021 PBR forecast. This project is required to construct the first portion of an above-ground pipe rack network at the Gold Bar WWTP needed to improve site safety by relocating natural gas and other utilities from the underground tunnels. This project is currently on hold until 2024-2025 and is forecasted to incur $9.1 million in capex during the 2022-2024 PBR term.
2. **Sludge Line Upgrades** and **Replace 2.5 km of Sludge lines** – $12.5 million (372%) greater than the 2017-2021 PBR forecast. EWSI needed to replace 2.5 km of sludge lines which were found to be in such poor condition that repairs and/or rehabilitation was not technically feasible at a total cost of $7.8 million. The remaining $4.7 million increase relates to the completion of other sludge line rehabilitation work following inspections that showed that these sludge lines required significant rehabilitation to minimize risk of leakage.
3. **Clarifier Chain Replacement** – $5.3 million (132%) greater than the 2017-2021 PBR forecast following identification of severe corrosion of the stainless steel chain within several primary and secondary clarifiers at the Gold Bar WWTP in 2017 and premature chain failures in late 2017 and early 2018.
4. **Mechanical Rehabilitation Program** – $5.0 million (32%) greater than the 2017-2021 PBR forecast, primarily due to advancing mechanical rehabilitation of the secondaries into the 2017-2021 PBR term. This work was completed in conjunction with the structural rehabilitation projects, allowing for additional efficiencies in delivery of the work.
5. **Structural Rehabilitation Secondaries 1-8** – $3.5 million (20%) greater than the 2017-2021 PBR forecast, primarily due to additional rehabilitation work on Secondaries 1 and 4, which could not be identified until the clarifiers could be shut down, cleaned and inspected.
6. **Structural Rehabilitation Program** – $3.3 million (43%) greater than the 2017-2021 PBR forecast due to the need to address severe concrete deterioration at the diversion structure caused by long-term H2S gas exposure. This increase has been partially offset by deferral of lower priority structural rehabilitation sub-projects to future PBR periods.
7. **Digester 3 Upgrades** – $3.1 million (27%) greater than the 2017-2021 PBR forecast, primarily due to the costs associated with addressing unanticipated structural integrity issues identified during construction.
8. **Distribution Chamber Reconstruction** – $3.0 million (79%) greater than the 2017-2021 PBR forecast, resulting in higher than expected competitive bids from contractors, as well as higher than expected costs to demolish the existing distribution chamber and to construct the lift station tie-ins.
9. **Operations Centre at Mid-Point Entrance** – $15.6 million (81%) less than the 2017-2021 PBR forecast, due to design and scope adjustments incorporating the results of public consultation and Gold Bar's commitment to complete all future construction within the existing footprint of the Gold Bar WWTP. The project is now expected to be completed in 2022 with a much reduced scope of renovations to the existing Centre of Excellence building, and is forecasted to incur $3.8 million in capex during the 2022-2024 PBR term.

10. **Digester 4 Upgrades** – $10.6 million (88%) less than the 2017-2021 PBR forecast. When structural issues were identified with Digester 3 in 2019, requiring Digester 3 to remain out of service, EWSI completed an overall assessment of the solids loading to the Gold Bar WWTP. This assessment determined that Digester 4 was not required in the short term to meet treatment requirements, allowing EWSI to defer this project to the 2022-2024 PBR term and focus on other higher priority wastewater plant projects. The $1.4 million in capex during the 2017-2021 PBR term reflects the cost associated with shutting down the digester, removal of sludge and cleaning of the digester interior, and a visual condition assessment.
11. **Square 1 Gas Room Replacement** – $9.7 million (63%) less than the 2017-2021 PBR forecast. This project was initially expected to include the construction of a new gas room as part of the overall upgrades to Digester Square 1. Instead of building a single larger new gas room, EWSI's revised engineering solution will relocate new gas mixing compressors to a separate enclosure. EWSI determined the revised solution would better minimize explosion risks by installing the new equipment within a single skid unit located outside the existing Square 1 Gas Room. The project is on-going and is forecasted to incur $7.3 million in capex during the 2022-2024 PBR term.
12. **Site HVAC Rehabilitation** – $6.5 million (21%) less than the 2017-2021 PBR forecast. This program includes various sub-projects that will address Gold Bar WWTP spaces that have insufficient ventilation, improve or replace deficient ventilation equipment, and/or upgrade existing ventilation systems. Included in this sub-project is the EPT Scrubber Upgrade intended to upgrade the current EPT Scrubber system at Gold Bar WWTP ($4.3 million). The EPT Scrubber project is on-going and is forecasted to incur $15.3 million in capex during the 2022-2024 PBR term.
13. **Headworks and Primary Aeration System Upgrades** – $5.3 million (79%) less than the 2017-2021 PBR forecast. This project was intended to resolve air supply capacity constraints associated with the blowers that supply air to the grit tanks, pre-treatment channel aeration systems and aeration equipment. Increased aeration to the channels is intended to reduce deposition of solids in these channels. As the project progressed through detailed design, it was determined that some elements of the original scope were not necessary to achieve the desired system performance. As a result, total project scope and costs were able to be reduced.
14. **Utility Hot Water System Rehabilitation** – $4.8 million (35%) less than the 2017-2021 PBR forecast. The decrease in project spending is primarily due to the deferral of certain non-critical upgrades to a future PBR period, allowing these upgrades to be better coordinated with upgrades to other key components within the heating system.
15. **Buildings and Site Rehabilitation Program** – $4.6 million (36%) less than the 2017-2021 PBR forecast. EWSI reduced the scope of this program following an internal review of the program in 2020, which concluded that certain non-critical sub-projects could be safely deferred to future PBR periods, allowing resources to be re-allocated to unanticipated, higher-priority projects.
16. **Reliability & Life Cycle Improvement Projects < $5 million** - $7.0 million greater than the 2017-2021 PBR forecast, due to:
    a. $2.0 million to purchase and install new on-site emergency back-up power generation;
    b. $3.1 million in unanticipated preliminary scope and design costs associated with a new Clover Bar Dewatering Facility, which were triggered by the shutdown of the City of Edmonton's composting facility;

c. $1.8 million in unanticipated capex for Digester 5 Structural Assessment and Rehabilitation project to complete cleaning, structural assessments and brick shoring;
d. $1.5 million in unanticipated capex for Digester Square 1 to complete the rehabilitation of various structural components;
e. $3.2 million reduction in capex due to the deferral of the Gas Compressor Replacement, Fermenter TPS Pumps and Blower 6 overhaul projects.
f. $1.7 million in capital expenditures on minor projects, none of which are individually significant.

17. **Plant Improvements** Program – $5.6 million (193%) greater than the 2017-2021 PBR forecast. Over the past several years, improvement projects have been delivered in several different programs including Plant Improvements, Instrumentation Upgrades, and Control System Upgrades. Significant portions of these three programs have been combined into the Plant Improvements program ($5.4 million).
18. **Performance Projects < $5.0 million** - $6.3 million less than forecast for 2017-2021. The decreased capital expenditures result primarily from the cancellation of the Channel Access Improvement project ($2.1 million) and a number of small variances on individual programs and projects (each less than $1.0 million).
19. **Regulatory Capital Projects < $5.0 million -** $2.8 million (100%) greater than forecast for 2017-2021 primarily due to the unbudgeted installation secure pedestrian access pathways and gates ($1.1 million) and the unbudgeted construction of an air quality monitoring station between the Gold Bar WWTP and communities to the south of the plant ($1.3 million) as required by EWSI's Alberta Environmental Protection and Enhancement Act approval to operate and reduce air quality impacts from the wastewater treatment process.

3.3.2 Construction Work in Progress

Wastewater's rate base consists of plant in service. If a capital project has not been completed (i.e. not placed into service) during the year, the capital expenditures on that project remain in Construction Work in Progress and are excluded from the rate base. The 2021 year-end balance of Wastewater's Construction Work in Progress was $41.1 million greater than forecast, almost entirely due to changes in the timing of project completion.

Table 3.3.2
Wastewater Treatment Construction Work in Progress
($ millions)

		A	B	C	D
	Construction Work in Progress	**2021**		**2017-2021**	
		PBR Forecast	**Actual**	**PBR Forecast**	**Actual**
1	Balance, beginning of period	12.8	20.7	19.2	22.6
2	Capital Expenditures	22.1	45.1	235.4	232.9
3	Capital Additions	(34.9)	(24.7)	(254.7)	(214.4)
4	**Balance, end of period**	**0.0**	**41.1**	**0.0**	**41.1**

The PBR plan allows EWSI to capitalize the costs of financing certain projects remaining in Construction Work in Progress, using AFUDC. In 2021, because of the higher average balance of Construction Work in Progress, AFUDC included in capital expenditures on eligible projects amounted to $1.7 million, compared to the PBR forecast amount of $0.4 million.

3.4 Operational Performance

3.4.1 Water Quality and Environmental Index

The Water Quality and Environmental index is a composite measure intended to assess EWSI's impact on the environment through the quality of the wastewater effluent returned back to the North Saskatchewan River and the effectiveness of environmental management programs.

Table 3.4.1
Water Quality and Environmental Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Water Quality Factor	The value of the Wastewater Effluent Limit Performance, which aggregates measures of the percentage of the discharge limit for five parameters in the Gold Bar wastewater treatment plant's final effluent.	≤ 28.0	18.2	1.535
Environmental Incident Factor	The actual number of environmental incidents that are both reportable and preventable	≤ 10	1	10.000
Average Index				5.768
Index Standard Points				55.0
Total Actual Points				317.2
Maximum Available Points Including Bonus Points				60.5
Total Points Earned				**60.5**

2021 Highlights

- **Wastewater Effluent Limit Performance Index:** The use of "winter mode" for the secondary treatment process by increasing aeration in the bioreactors also proved to be effective in controlling ammonia in winter. Lower than average wet weather flows in 2021 resulted in more consistent secondary treatment throughout the summer months. As a result, 2021 had the lowest WELPI in the past five years.
- **Environment Incident Management:** For 2021, there were three reportable environmental incidents pertaining to Gold Bar operations. Root cause investigations were carried out on three reportable events (water main break, missed fence line H_2S sample and unplanned power outage). One of these events were determined to be preventable after review (i.e., missed fence line H_2S sample). These investigations provided information that resulted in improvements to operating, maintenance and asset management practices.

2022 Areas for Improvement

- **Wastewater Effluent Limit Performance Index:** There will be a continued focus on limiting unplanned process downtime to maximize treatment levels. Installation of a full-scale inDENSE™

secondary system will start in 2022 to further improve the overall performance of the biological nutrient removal (BNR) process.

- **Environment Incident Management:** Efforts to manage odour-related incidents will be continued with planned commissioning of an air quality monitoring station south of the Gold Bar plant in 2022 as required by the approval to operate. EPCOR will also complete additional daily H2S fence line sampling refresher training for field staff.

3.4.2 Customer Service Index

Wastewater's customer service index for the 2017-2021 PBR term includes three equally weighted odour metrics. These metrics recognize that Wastewater's customer interactions typically relate to odour concerns from customers located close to the Gold Bar Wastewater Treatment Plant.

Table 3.4.2
Customer Service Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
H_2S – 1 Hour Exceedance Factor	The number of hourly exceedances of the 1 hour limit averaged between Gold Bar and Beverly air quality monitoring stations.	≤ 6	1	6.000
H_2S – 24 Hour Exceedance Factor	The number of hourly exceedances of the 24 hour limit averaged between Gold Bar and Beverly air quality monitoring stations.	≤ 2	0	2.000
Scrubber Uptime Factor	The percentage of time that the scrubbers are on line.	≥ 90.0	99.2	1.102
			Average Index	3.034
			Index Standard Points	15.0
			Total Actual Points	46.5
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

2021 Highlights

- **H_2S – 1 and 24 Hour Exceedance Factor:** There was one 1-hour H2S exceedance and no 24-hour exceedances in 2021. Continued routine fence line H2S monitoring and ad hoc H2S monitoring when scrubbers were offline for maintenance enabled Gold Bar operations to intervene prior to elevated levels of H2S and avoid additional potential exceedances.
- **Scrubber Uptime Factor:** Additional focus was placed on planning preventative and corrective maintenance activities to limit scrubber downtime. Chemical feed pumps and instrumentation were continuously monitored to ensure scrubber reliability and operations.

2022 Areas for Improvement

- **H_2S – 1 and 24 Hour Exceedance Factor:** Construction of a new air quality monitoring station south of the Gold Bar WWTP will be completed and operational by Q3 2022. Routine fence line H2S monitoring will continue as a supplement to the Gold Bar odour monitoring strategies. Design activities will also begin on projects to capture and treat odour from the diversion structure and primary clarifier areas of the plant.

- **Scrubber Uptime Factor:** The current preventative maintenance program will be continued to limit scrubber downtime. A program to increase scrubber performance and reliability by rehabilitation or scrubber media replacement will occur in 2022. Construction of an additional new EPT scrubber with increased redundancy is currently underway.

3.4.3 System Reliability and Optimization Index

The system reliability and optimization index is a measure of the performance of the Gold Bar Wastewater Treatment Plant and the degree to which the wastewater treatment system is optimized to minimize its impact on the environment.

Table 3.4.3
System Reliability and Optimization Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Enhanced Primary Treatment Factor	The percentage of time that the enhanced primary treatment facility ran during wet weather events where the influent flow rate exceeded the EPT event threshold.	≥ 80.0	100.0	1.250
Biogas Utilization Factor	The percentage of biogas utilized, calculated as the volume of biogas produced less the volume flared divided by the volume produced.	≥ 60.0	86.4	1.440
Energy Efficiency Factor	The energy used in all wastewater facilities in kWh divided by the volume of wastewater effluent that either receives ultraviolet (UV) treatment or is membrane plant effluent.	≤ 514	539	0.954
			Average Index	1.215
			Index Standard Points	15.0
			Total Actual Points	18.2
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

2021 Highlights

- **Enhanced Primary Treatment (EPT) Factor:** In addition to proactive replacement of assets nearing end-of-life, EPT clarifiers were proactively cleaned and inspected to minimize clarifier downtime and maximize availability for primary treatment.
- **Biogas Utilization Factor:** In 2021, heating requirements were slightly lower and overall biogas production was slightly higher than planned. Overall, the volume of Biogas utilized and flared in 2021 was comparable to 2020. However, higher biogas utilization score was still achieved due to lower natural gas consumption throughout 2021.
- **Energy Efficiency Factor:** Above average energy consumption and much lower effluent flow volumes resulted in a higher than target Energy Efficiency Factor.

2022 Areas for Improvement

- **Enhanced Primary Treatment (EPT) Factor:** Planning for proactive replacement of assets nearing end-of-life to minimize unplanned downtime and completion of preventative maintenance activities will continue in 2022.
- **Biogas Utilization Factor:** Operations will continue to focus on maximizing biogas utilization while minimizing natural gas whenever possible.
- **Energy Efficiency Factor:** During 2022, there will be a continued focus on optimization of secondary aeration blower operation to reduce power demand. In addition, design activities to improve blower performance will continue.

3.4.4 Safety Index

EUI and EWSI are committed to a safe, healthy lifestyle and demonstrate this through care and concern for people. The safety index is a measure of the success of programs and the application of policies that maximize the safety of employees and the public.

Table 3.4.4
Safety Index

Index Component	PBR Performance Measure	Standard	Actual Score	Index
Near Miss Reporting Factor	The number of near miss reports entered in the ERS system.	≥ 220	253	1.150
Work Site Inspection Factor	Number of Work Site Inspections and observations completed per year.	≥ 919	1353	1.472
Lost Time Frequency Factor	The actual lost time frequency rate.	≤ 0.75	0.00	2.000
All Injury Frequency Factor	The actual all injury frequency rate	≤ 1.50	0.64	2.339
			Average Index	1.740
			Index Standard Points	15.0
			Total Actual Points	26.1
			Maximum Available Points Including Bonus Points	16.5
			Total Points Earned	**16.5**

2021 Highlights

- **Near Miss Reporting Factor:** Near miss and hazard identification reporting continued to be an effective means to proactively identify hazards and implement corrective actions to mitigate potential harm to employees, contractors and members of the public.
- **Work Site Inspections / Observations Factor:** Work site inspections and observations continued to be a successful leading indicator that provided leadership and employees the opportunity to engage in field activities, proactively identify areas of improvement, and verify conformance to EWSI standards
- **Lost Time Frequency Rate Factor:** In 2021, Gold Bar exceeded the lost time frequency rate factor by having no lost time events.

- **All Injury Frequency Rate Factor:** In 2021, Gold bar had only 1 recordable incident when an employee slipped on stairs.

2022 Areas for Improvement

- **Near Miss Reporting Factor:** Gold Bar will continue with internal monthly promotion for Near Miss and Hazard Identifications reporting. The goal is to promote increased reporting and show employees the impact of site specific reporting and changes.
- **Work Site Inspections / Observations Factor:** With consideration of the reintegration back into the workplace in 2022, Gold Bar will continue to monitor inspection and observation activities and support proactive field engagements.
- **Lost Time Frequency Rate Factor/All Injury Frequency Rate Factor:** Gold Bar will continue to review investigation information for causal themes. This will assist in the identification of future direction for communications and activities related to addressing root causes.

3.5 Rates and Bill Comparisons

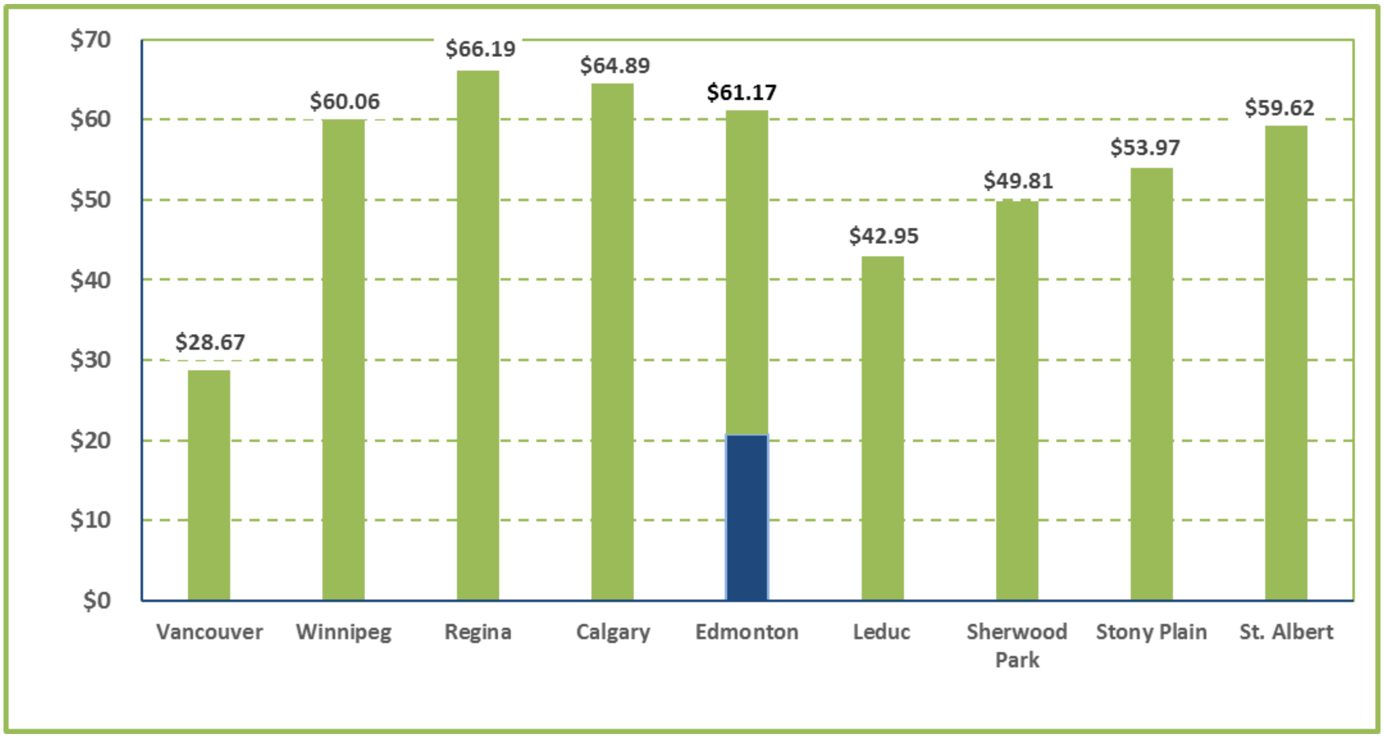
EWSI's wastewater (combined wastewater treatment, sanitary and stormwater) bill comparisons for 2021 are based on the published sanitary and stormwater rates for Calgary, Vancouver, Winnipeg and Regina, as well as four local communities. These bill comparisons represent the total cost to the customer and include fixed charges, consumption charges and any other applicable surcharges.

Unlike most cities, where wastewater treatment services and drainage services are combined, EWSI's Wastewater Treatment operations is only responsible for wastewater treatment and the operations and maintenance of sanitary, storm and combined sewer systems are provided through EPCOR Drainage Services. Accordingly, wastewater bill comparisons are based on the EWSI's combined wastewater treatment bill and its sanitary and stormwater bills.

3.5.1 Residential Wastewater Bills

Figure 3.6.1 provides a comparison of residential household wastewater bills for residential household consumption of 15.1 m^3 per month, the average residential customer consumption per month in Edmonton in 2021.

Figure 3.5.1
2021 Monthly Residential Wastewater Bill Comparison
(15.1 m^3/month)



Unlike water services which are relatively consistent among cities and communities, the nature and extent of wastewater treatment and drainage services vary significantly between cities and communities due to differences in wastewater treatment processes, the inclusion of certain services in property taxes, and geographic and climatic factors which affect the level of investment in and approach to flood mitigation and stormwater services. In particular, stormwater charges are often included as a component of taxes.

Edmonton's $61.17 average monthly bill from Figure 3.5.1 includes Wastewater charges of $20.71 (blue) and Drainage charges of $40.46 (green, including both sanitary and storm charges). While the total bill is higher than Vancouver, it is lower than Calgary and Regina, the two cities where drainage and wastewater treatment are most comparable to Edmonton. EWSI notes that cities across Canada are experiencing increased risk of flooding related to climate change and that substantial investments are needed to assess and address climate change-related flood mitigation.

3.5.2 Commercial Wastewater Bills

Table 3.5.2 provides a comparison of the drainage and wastewater treatment bills for commercial customer of various sizes. This table shows that drainage and wastewater treatment bills for EWSI's commercial customers are competitive with all of the other surrounding communities and other major cities in western Canada, except for Vancouver.

Table 3.5.2
2021 Monthly Commercial Wastewater Bill Comparison
($ per month)

		A	B	C	D
	Monthly Bill - $ per month	**Small**	**Medium**	**Large**	**Extra Large**
1	**Monthly Consumption - m3**	**10**	**250**	**1,000**	**5,000**
2	Vancouver	21.94	338.50	1,377	6,737
3	Calgary	61.09	482.97	1,801	8,833
4	Regina	56.70	511.20	2,120	10,069
5	Winnipeg	45.48	748.75	2,928	14,435
6	**Edmonton**	**41.60**	**594.92**	**2,430**	**12,117**
7	St. Albert	76.31	558.71	2,066	10,106
8	Sherwood Park	40.43	482.03	1,862	9,222
9	Stony Plain	73.87	756.94	2,921	14,441
10	Leduc	33.00	501.00	1,964	9,764

4 Drainage Services

4.1 Customers and Consumption

Drainage provides sanitary services to the same customers served by Wastewater Treatment, while Drainage storm customers' charges are determined based on parcel size and other factors. Therefore, actual customer counts, consumption per customer and total consumption are the same as those of Wastewater Treatment and actual to forecast differences in Drainage's customer counts and consumption are attributable to the same factors.

4.2 Financial Performance

As explained in Appendix A.2, the drainage rates set out in Bylaw 18100 reflect EWSI's commitment to limit average annual rate increases to 3% over the period from January 1, 2018 to March 31, 2022. Therefore, there is no City of Edmonton-approved PBR forecast to serve as the basis of comparison for financial performance. Instead, as in 2018 and 2019, Drainage's 2018 EPCOR drainage budget, adjusted to incorporate annual revenue increases of 3% and annual operating expense increases of 2%, serves as a proxy for a PBR forecast, providing a basis for assessing actual financial performance.

Drainage's revenue requirements are summarized on Table 4.2 below. Explanations of forecast to actual variances are provided in sections 4.2.1 to 4.2.6.

Table 4.2
Drainage Revenue Requirements
($ millions)

		A	B	C	D
Summary of Revenue Requirements		**2021**		**2018-2021**	
		Budget	**Actual**	**Budget**	**Actual**
1	Drainage Rate Revenue				
2	Sanitary utility revenue	137.2	141.3	525.2	517.8
3	Stormwater utility revenue	68.6	81.2	262.5	285.9
4	Drainage Rate Revenue	205.7	222.5	787.7	803.8
5	Drainage Revenue Requirement				
6	Operating expenses	123.4	132.6	473.5	484.9
7	Other revenue	(9.0)	(9.0)	(34.6)	(35.6)
8	Depreciation and amortization	39.8	38.0	137.2	138.9
9	Return on rate base financed by debt	38.1	26.6	120.5	91.5
10	Return on rate base financed by equity	13.5	34.3	91.1	124.2
11	**Drainage Revenue Requirement**	205.7	222.5	787.7	803.8
12	**Return on Rate Base Financed by Equity**	**2.24%**	**5.52%**	**3.92%**	**5.13%**

4.2.1 Revenue

Drainage's rate revenues are derived from both sanitary utility and stormwater utility services. Sanitary utility revenues are comprised of variable monthly charges based on monthly metered water consumption and flat monthly service charges based on the meter size. Stormwater utility revenues are based on parcel area, development intensity, and run-off coefficients based on the zoning of individual land parcels. Rates for both sanitary and stormwater utility services from January 1, 2018 to March 31, 2022 are prescribed in Bylaw 18100 and incorporate an average annual rate increase of 3%.

Table 4.2.1 below provides a comparison of 2021 and 2018-2021 Drainage revenues to the budget:

Table 4.2.1
Drainage Revenue
($ millions)

		A	B	C	D
	Drainage Revenue	**2021**		**2018-2021**	
		Budget	**Actual**	**Budget**	**Actual**
1	Sanitary Utility				
2	Flat Monthly Service Charges				
3	Residential	38.8	35.5	148.4	132.8
4	Multi-Residential	0.6	2.4	2.1	8.9
5	Commercial	2.9	5.9	11.0	22.5
6	Large Wholesale	0.0	0.0	0.1	0.1
7	Flat Monthly Service Charges	42.2	43.9	161.7	164.3
8	Variable Monthly Charges				
9	Residential	49.5	55.8	189.3	195.3
10	Multi-Residential	19.4	21.3	74.2	75.3
11	Commercial	24.8	19.2	95.0	78.4
12	Large wholesale	• 1.3	• 1.1	• 5.0	• 4.5
13	Variable Monthly Charges	94.9	97.4	363.5	353.6
14	**Sanitary Utility Revenue**	137.2	141.3	525.2	517.8
15	Stormwater Utility			-	-
16	Residential	36.2	43.0	138.4	153.3
17	Multi-Residential	3.5	4.7	13.5	16.4
18	Commercial	28.9	33.5	110.6	116.2
19	**Stormwater Utility Revenue**	**68.6**	**81.2**	**262.5**	**285.9**
20	**Drainage Rate Revenue**	**205.7**	**222.5**	**787.7**	**803.8**
21	Other Revenue	9.0	9.0	34.6	35.6
22	**Total Drainage Revenue**	**214.8**	**231.5**	**822.3**	**839.4**

In 2021, Drainage's rate revenues were $16.8 million greater than budget ($17.1 million greater for 2018-2021). Higher than budget revenues included $11.7 million in revenues related to non-routine adjustments, including $6.0 million for CORe, $4.2 million for SIRP and $1.5 million for LRT relocations. The remainder of the difference results from higher than forecast customer growth and higher consumption as explained in section 3.2. Besides rate revenues, Drainage has Other Revenue derived from biosolids management services provided to the Alberta Capital Region Wastewater Commission, application and connection fees, wastewater transfer station services, late payment fees, miscellaneous fees pursuant to third party agreements, and other incidental services.

4.2.2 Operating Expenses by Function

Table 4.2.2 below compares Drainage's 2021 actual operating expenses to its budget:

Table 4.2.2
Operating Expenses by Function
($ millions)

		A	B	C	D
Function		**2021**		**2018-2021**	
		Budget	**Actual**	**Budget**	**Actual**
1	Drainage Operations				
2	Maintenance	31.9	30.6	121.3	112.8
3	Biosolids	17.4	16.3	67.0	65.9
4	Monitoring and Compliance	4.4	3.8	17.6	16.3
5	Other	0.5	0.7	3.7	4.5
6	Drainage Operations	54.1	51.5	209.5	199.4
7	Planning and Project Support				
8	Planning	10.6	5.1	43.5	28.2
9	Project Support	5.3	9.7	15.8	30.7
10	NRA – SIRP	-	6.7	-	9.3
11	NRA - CORe	-	3.6	-	4.1
12	Planning and Project Support	15.9	25.0	59.3	72.2
13	Billing and Meter Reading				
14	Meter Reading	6.8	6.6	25.9	26.1
15	CUS Charges	0.6	(0.5)	2.3	2.9
16	Billing and Meter Reading	7.4	6.1	28.2	28.9
17	Drainage Services Administration				
18	Drainage Shared Services	16.0	14.8	60.4	60.1
19	Incentive and Other Compensation	2.2	3.8	8.6	11.8
20	Drainage Services Administration	18.2	18.6	69.0	71.9
21	Corporate Shared Services	16.9	20.0	65.6	70.3
22	Franchise Fees and Property Taxes				
23	Franchise Fees	9.7	10.2	38.8	38.1
24	Property Taxes	1.1	1.4	3.2	3.9
25	Franchise Fees and Property Taxes	10.8	11.5	41.9	42.0
26	**Total Operating Expenses by Function**	**123.4**	**132.6**	**473.5**	**484.9**

Total operating expenses for 2021 were $9.2 million greater than budget ($11.4 million greater for 2018-2021). Key factors contributing to this difference include:

- **Maintenance** - $1.3 million less than budget ($8.5 million less for 2018-2021). Lower than budgeted expenses are almost entirely attributable to higher than budgeted proportions of staff time charged to capital projects, most notably SIRP and CORe. The remainder of the variance is attributable to numerous minor items, none of which are individually significant.
- **Biosolids** - $1.1 million less than budget ($1.1 million less for 2018-2021). This function includes the storage and management of biosolids generated by the Gold Bar and Alberta Capital Regional wastewater treatment plants. As in prior years, lower than budgeted expenses reflect lower than planned activity and lower processed volumes.
- **Monitoring and compliance** - $0.6 less than budget ($1.3 million less for 2018-2021). Lower than budget expenses reflect lower than anticipated contractor costs of $0.5 million ($0.9 million for 2018-2021) and higher recoveries from Gold Bar of $0.6 million ($0.6 million greater for 2018-2021), offset by higher staff costs of $0.5 million ($0.2 million for 2018-2021).
- **Planning -** $5.5 million less than budget ($15.3 million less for 2018-2021). This function includes infrastructure, system and administration planning. Lower than budget expenses reflect lower than

anticipated consultant costs by completion of more planning analysis with in house resources of $2.1 million ($7.6 million for 2018-2021), capitalization of a higher than anticipated portion of staff costs of $0.7 million ($2.1 million for 2018-2021), and lower staff costs net of vacancy factor of $1.3 million ($2.6 million for 2018-2021). A savings of $0.5 million ($1.0 million for 2018-2021) related to the transfer of the customer services function to Water (now recovered through CUS charges) was also obtained by combining this function for water and drainage within the Water business. The remainder of the 2021 and 2018-2021 variances is primarily attributable to savings of $0.9 million related to the transfer of lot grading inspection services back to the City of Edmonton in 2018. The lot grading inspection cost savings were offset with a proportionate decrease in associated revenues.

- **Project Support -** $4.4 million greater than budget ($14.9 million greater for 2018-2021). This function includes surveying and engineering (conceptual, preliminary design or detailed design), project management, in-house construction, and emergency repairs. Higher than budgeted expenses include: $2.5 million of additional salary costs ($16.2 million for 2018-2021) related to design and construction work that had originally been budgeted as capital expenditures and $2.0 million of fleet costs ($2.0 million for 2018-2021. The 2018-2021 variance also includes $1.5 million of cost resulting from higher equipment utilization in operations and $1.8 million of higher than anticipated contractor costs, primarily related to project management.

  This category of costs illustrates the impact of the differences in accounting treatment between the City of Edmonton and EPCOR. Specifically, the PBR budget was prepared using City of Edmonton's Drainage's capitalization policies, which included capitalizing preliminary design costs (i.e. the costs incurred before there was a specific project). The actual results reflect EWSI capitalization policies, where most preliminary design costs are expensed, and where additional costs – capital overhead, higher salary burden, major inspections, abandonments, etc., are capitalized.

- **NRAs for SIRP and CORe -** $6.7 million for SIRP ($9.3 million for 2018-2021) SIRP and $3.6 million for CORe ($4.1 million for 2018-2018). EWSI commenced work on these programs following approval for NRAs on December 2, 2019. Additional information on these NRAs is provided in section 1.5.

- **Billing and Meter Reading -** $1.3 million less than budget ($0.7 million greater for 2018-2021. The favourable variance in 2021 is primarily attributable adjustments to the bad debt provision related to the 90 day deferral program. Over the 2018-2021 period, this adjustment was offset by higher than budgeted expenses for metering and customer service support costs provided by EPCOR Energy Services, as well as unbudgeted call centre support costs from the City of Edmonton.

- **Drainage Shared Services** - $1.2 million less than budget ($0.3 million less for 2018-2021). Lower than budgeted costs both for 2021 and for 2018-2021 reflect organizational changes in almost all administrative functions. These changes are primarily related to Drainage transition and integration.

- **Incentive and Other Compensation** - $1.6 million greater than budget ($3.2 million greater for 2018-2021). Higher than budget expenses in 2021 are due to incentive compensation ($1.3 million for 2018-2021. The 2018-2021 variance also includes $0.5 million in adjustments to corporate benefits and a $1.5 million adjustment to long-term disability.

- **Corporate Shared Services** - $3.1 million greater than budget ($4.7 million greater for 2018-2021). Higher than budgeted expenses reflect growth in assets and revenue, which are key corporate cost allocators, and increases in corporate IT costs charged directly to Drainage.

- **Franchise Fees and Property Taxes -** $0.7 million greater than budget, ($0.1 million greater for 2018-2021). As with Water and Wastewater, higher than forecast franchise fees reflect higher than forecast revenues for 2021. These increases are partially offset by higher property taxes, which were not included in the budget as no accurate cost estimate was available at the time of budget preparation.

Variances in other operating expense functions and sub-functions are not significant, either individually or in aggregate.

4.2.3 Operating Expenses by Cost Category

Table 4.2.3 below shows operating expenses by cost category for Drainage Operations, Planning, Project Support Costs and Drainage Services Administration, where cost categories differ from the sub-functions in Section 4.2.2.

Table 4.2.3
Operating Expenses by Cost Category
($ millions)

		A	B	C	D
	Cost Category	**2021**		**2018-2021**	
		Budget	**Actual**	**Budget**	**Actual**
1	Drainage Operations				
2	Staff Costs and Employee Benefits	27.3	25.6	104.1	100.9
3	Contractors and Consultants	22.1	20.7	84.1	76.8
4	Materials and Supplies	0.2	0.0	0.9	0.3
5	Other	4.5	5.3	20.4	21.4
6	Drainage Operations	54.1	51.5	209.5	199.4
7	Planning and Project Support				
8	Staff Costs and Employee Benefits	10.7	17.8	39.7	56.9
9	Contractors and Consultants	4.6	6.0	19.7	16.4
10	Other	0.6	1.3	(0.1)	(1.1)
11	Planning and Project Support	15.9	25.0	59.3	72.2
12	Drainage Shared Services				
13	Staff Costs and Employee Benefits	12.5	14.6	46.7	50.4
14	Contractors and Consultants	5.3	4.9	20.2	17.5
15	Other	0.4	(0.9)	2.2	4.0
16	Drainage Shared Services	18.2	18.6	69.0	71.9

The information presented in this table supports the explanations of differences between 2021 actual and budget expenses provided in Section 4.2.2. Accordingly, no additional explanations are considered necessary.

4.2.4 Depreciation and Amortization

Drainage's depreciation expense and amortization of contributed assets for 2021 are shown in Table 4.2.4 below:

Table 4.2.4
Depreciation and Amortization
($ millions)

		A	B	C	D
Depreciation and Amortization		**2021**		**2018-2021**	
		Budget	**Actual**	**Budget**	**Actual**
1	Provision for depreciation	85.9	82.3	298.2	303.5
2	Amortization of contributions	(46.2)	(44.3)	(161.0)	(164.6)
3	**Depreciation, net**	**39.8**	**38.0**	**137.2**	**138.9**

Drainage's net depreciation expense was $1.8 million less than budget ($1.7 million greater for 2018-2021). These differences are primarily attributable to both changes in capital programs discussed in section 4.3, as well as changes to depreciation rates resulting from asset componentization and other adjustments needed for regulated accounting following the transfer of Drainage to EPCOR.

4.2.5 Rate Base

Drainage's mid-year rate base, shown in Table 4.2.5 below, is $45.2 million greater than forecast. This difference, reflected in higher balances of both plant in service and contributed assets, results from reprioritization of capital projects to address urgent needs for emergency repairs and asset rehabilitation, and work on approved NRA programs (SIRP, CORe and LRT Relocations). These changes are discussed in detail in Section 4.3.1.

Table 4.2.5
Mid-Year Rate Base
($ millions)

		A	B
Mid-Year Rate Base		**2021**	
		Budget	**Actual**
1	Plant in Service		
2	Balance, beginning of year	5,175.1	5,366.8
3	Additions - EPCOR-funded	175.9	186.9
4	Additions – Contributed	200.9	151.2
5	Retirements and adjustments	(15.2)	-
6	Balance, end of year	5,536.7	5,704.9
7	Mid-Year Plant in service	5,355.9	5,535.9
8	Accumulated Depreciation		
9	Balance, beginning of year	1,053.1	1,059.6
10	Depreciation expense	85.9	82.2
11	Retirements and adjustments	(15.2)	(29.4)
12	Balance, end of year	1,123.9	1,112.4
13	Mid-Year Accumulated Depreciation	1,088.5	1,086.0
14	Other Rate Base Items		
15	Working Capital	17.3	18.3
16	Materials and Supplies	1.5	1.1
17	Other Rate Base Items	18.7	19.5
18	**Gross Mid-Year Rate Base**	4,286.1	4,469.3
29	Contributions		
20	Balance, beginning of year	(3,274.1)	(3,441.1)
21	Contributions in aid of construction	(200.9)	(151.2)
22	Balance, end of year	(3,475.0)	(3,592.4)

	Mid-Year Rate Base	A	B
		2021	
		Budget	Actual
23	Mid-Year Contributions	(3,374.5)	(3,516.8)
24	Accumulated Amortization		
25	Balance, beginning of year	(574.2)	(579.6)
26	Amortization of contributions	(46.2)	(44.3)
27	Balance, end of year	(620.3)	(623.9)
28	Mid-Year Accumulated Amortization	(597.2)	(601.8)
39	**Mid-Year Contributions**	(2,777.3)	(2,915.0)
30	**Net Mid-Year Rate Base**	**1,508.8**	**1,554.3**

4.2.6 Return on Rate Base

In 2021, Drainage's total return on rate base is $9.2 million greater than budget ($4.1 million greater for 2018-2021). In 2019 and 2020, EUI provided one-time preferential financing to Drainage in the form of short term notes at rates between 0.75% and 2.31%. These notes, which will be rolled over to higher cost debt prior to April 1, 2022, reduce the average cost of debt by 1.32% in 2021 and 0.83% over the 2018-2021 period. The low cost of debt, together with significant increases in revenue related to NRAs for SIRP and CORe, have enabled Drainage to earn equity returns in 2021 in excess of its budgeted returns.

Table 4.2.6-1
Return on Mid-Year Rate Base
($ millions)

	Return on Rate Base	A	B	C	D
		2021		2018-2021	
		Budget	Actual	Budget	Actual
1	Net Mid-Year Rate Base	1508.8	1554.3		
2	Capital Structure				
3	Debt	60.00%	59.38%		
4	Equity	40.00%	40.62%		
5	Total	100.00%	100.00%		
6	Cost Rates				
7	Debt	4.20%	2.88%	4.00%	3.17%
8	Equity	2.24%	5.42%	3.92%	5.13%
9	Weighted Average Cost of Capital (WACC)	3.58%	3.66%	3.97%	4.06%
10	Return on Rate Base				
11	Debt	38.1	26.6	120.5	91.5
12	Equity	13.5	34.3	91.1	124.2
13	**Total Return on Drainage Rate Base**	**51.6**	**60.8**	211.6	215.7

Returns on rate base are calculated separately for the debt-financed and equity-financed portions of Drainage's net rate base. The rate of return on debt for 2021 and 2018-2021 reflects the "rollover" of City of Edmonton debentures into EUI notes with the same terms and conditions, as well as the preferential financing on short-term notes issued to EUI in 2019 and 2021. The calculation of the average cost of debt is shown in Table 4.2.6-2 below.

Table 4.2.6-2
Interest Expense and Cost of Debt
($ millions)

		A	B	C	D
	Interest Expense and Cost of Debt	**2021**		**2018-2021**	
		Budget	**Actual**	**Budget**	**Actual**
1	Interest expense				
2	Interest on short-term debt	1.9	3.1	7.1	6.9
3	Interest on City of Edmonton debentures	18.5	-	57.6	18.1
4	Interest on intercompany debentures	12.5	24.2	38.5	68.1
5	**Total interest expense**	**31.1**	**27.3**	**103.2**	**93.1**
6	Mid-year debt				
7	Mid-Year Short-term debt	43.8	28.2		
8	Mid-Year Long-term debt	739.3	919.9		
9	Total mid-year debt	783.2	948.1		
10	**Average Cost of Debt**	**4.20%**	**2.88%**	**4.00%**	**3.17%**

4.2.7 Transactions with Affiliates

Drainage derives a portion of its revenues and expenses from transactions with affiliates, including the City of Edmonton, EUI and its subsidiaries. Table 4.2.7 provides a summary of Drainage's 2021 and 2018-2021 transactions with affiliates.

Table 4.2.7
Transactions with Affiliates
($ millions)

		A	B	C	D
	Affiliate and Service	**2021**		**2018-2021**	
		Budget	**Actual**	**Budget**	**Actual**
1	**Revenues from the provision of services to the City of Edmonton**				
2	Utility Services	2.9	3.0	11.6	8.8
3	Other Revenue	0.9	0.0	3.6	3.5
4	Total	3.8	3.0	11.4	9.3
5	**Services provided by (recovered from):**				
6	**City of Edmonton**				
7	Franchise Fees	9.7	10.2	38.8	38.1
8	Property Taxes	1.1	1.2	3.2	3.7
9	Interest on City of Edmonton debentures	18.5	-	57.6	18.1
10	Other services	7.8	4.7	31.3	29.8
11	Total	37.1	16.1	130.9	89.7
12	**EPCOR Utilities Inc.**				
13	Corporate Shared Service Costs	17.2	20.3	66.8	71.5
14	Interest on short-term debt	12.5	24.2	38.5	68.1
15	Interest on intercompany debentures	1.9	3.0	7.1	6.7
16		-	0.6	-	-
17	Total	31.6	48.0	112.3	146.4
18	**Other Affiliates**				
19	EPCOR Energy Alberta LP	3.9	5.0	15.6	18.1
20	EPCOR Distribution and Transmission Inc.	0.9	(0.1)	3.6	0.8
21	EPCOR Technologies Inc.	-	0.5	-	0.3

	Affiliate and Service	A	B	C	D
		2021		2018-2021	
		Budget	Actual	Budget	Actual
22	EPCOR Commercial Services Inc.	-		-	0.7
23	Other EWSI Business Units	2.0	1.0	8.0	7.6
24	Total	6.8	6.4	27.2	27.5
25	**Expenditures (Contributions) on capital projects arising from services provided by:**				
26	City of Edmonton	(43.1)	(16.6)	(162.3)	(76.9)
27	EPCOR Technologies Inc.	-	5.3	-	17.9
28	EPCOR Utilities Inc.	2.3	1.1	7.4	5.3
29	EPCOR Energy Services	(2.2)	(3.4)	(9.8)	(11.5)
30	EPCOR Distribution and Transmission Inc.	-	0.1	-	0.5
31	EPCOR Water Services Inc.	0.2	0.2	0.8	0.9
32	Total	(42.9)	(13.3)	(163.9)	(63.7)

4.3 Capital Programs

4.3.1 Capital Expenditures

Drainage's forecast capital program is based on the 2018-2021 long term plan (LTP) included in Grant Thornton report CR_8300, an independent third party report assessing the transition of Drainage from the City of Edmonton to EPCOR. Drainage's 2021 capital expenditures program is summarized in Table 4.3.1 below. Table 4.3.1 provides a comparison of forecast to actual capital expenditures for 2021 and 2018 to 2021 for each program and for each project with capital expenditures in excess of $10.0 million over the 2018-2021 term, as well as a comparison of total forecast capital expenditures for 2018 to 2021 from the LTP, adjusted for approved Non-Routine Adjustments, to EWSI's current capital projection. Please note that forecast capital expenditures also include capital expenditures approved for Non-routine Adjustments.

Table 4.3.1
Capital Expenditures and Contributions
($ millions)

		A	B	C	G	H	I	
		2021			**2018 - 2021**			
	Project Description	**Forecast**	**Actual**	**Difference**	**LTP**	**Actual**	**Difference**	**Note**
1	**Capital Expenditures**							
2	Drainage Neighbourhood Renewal	51.8	29.1	(22.7)	175.8	116.2	(59.6)	1
3	Drainage System Expansion	26.9	23.4	(3.5)	84.2	91.1	6.9	2a
4	Drainage System Rehabilitation							
5	Groat Rd Trunk S OP-001639-01	-	0.1	0.1	-	34.6	34.6	3a
6	High Priority Replacement Program	14.1	21.2	7.1	54.2	74.2	20.1	3b
7	Projects under $15 million	17.0	45.4	28.4	65.0	129.5	64.5	3c
8	Drainage System Rehabilitation	31.1	66.7	35.6	119.2	238.4	119.2	
9	Environmental Quality Enhancement							
10	Kinnard OSS	-	7.8	7.8	-	10.3	10.3	
11	Projects under $15 million	26.1	6.7	(19.4)	100.8	32.8	(68.0)	
12	Environmental Quality Enhance	26.1	14.5	(11.6)	100.8	43.1	(57.7)	4
13	Flood Mitigation							
14	Tweddle Place OP-001334-01	0.0	4.3	4.3	29.6	18.8	(10.8)	5a
15	Malcolm Twed & Ed OP-001695-01	9.8	20.6	10.8	58.4	24.6	(33.8)	5a
16	Kenilworth Dry Pond	-	0.5	0.5	-	1.1	1.1	
17	Lauderdale West Dry Pond	-	0.0	0.0	-	0.0	0.0	
18	Projects under $15 million	50.8	22.9	(27.9)	159.5	66.2	(93.3)	5b
19	Flood Mitigation	60.6	48.3	(12.2)	247.5	110.7	(136.8)	
20	SSSF Projects							
21	SESS SW4 OP-001336-01	-	2.6	2.6	-	20.2	20.2	
22	NEST NC2 & NC3 OP-001795-01	-	9.9	9.9	-	33.5	33.5	
23	SESS SA10A CP-002993-01	-	7.8	7.8	-	36.5	36.5	
24	SW5	-	0.1	0.1	-	0.4	0.4	
25	Projects under $15 million	34.9	2.9	(32.0)	137.8	6.0	(131.8)	
26	SSSF Projects	34.9	23.3	(11.6)	137.8	96.6	(41.3)	6
27	NRA - LRT							
28	West Valley LRT	41.5	35.8	(5.7)	55.4	52.2	(3.2)	
29	Metro LRT	0.7	0.2	(0.5)	5.5	7.4	2.0	
30	NRA-LRT Projects	42.2	36.0	(6.2)	60.9	59.6	(1.2)	7
31	NRA - CORe							
32	151S/99A SanTrunk OP-001940-01	-	15.1	15.1	-	23.8	23.8	
33	Duggan Tunnel Replacement	8.3	0.4	(7.9)	10.4	1.2	(9.2)	
34	Mill Creek Combined	-	0.4	0.4	-	1.1	1.1	
35	Projects under $15 million	23.4	20.6	(2.9)	43.3	49.8	6.5	

		A	B	C	G	H	I	
		2021			**2018 - 2021**			
	Project Description	**Forecast**	**Actual**	**Difference**	**LTP**	**Actual**	**Difference**	**Note**
36	NRA - CORe	31.8	36.5	4.8	53.7	76.0	22.2	8
37	Real Estate	-	3.0	3.0	-	21.8	21.8	9
38	**Total Capital Expenditures**	305.4	280.9	(24.5)	980.0	853.6	(126.4)	
39	**Contributions**							
40	Drainage System Expansion	(16.2)	(5.6)	10.6	(60.1)	(22.0)	38.1	2b
41	Flood Mitigation							
42	Malcolm Twed & Ed OP-001695-01	-	(6.8)	(6.8)	-	(8.6)	(8.6)	
43	Projects under $15 million	-	(2.2)	(2.2)	-	(7.2)	(7.2)	
44	Flood Mitigation	-	(8.9)	(8.9)	-	(15.7)	(15.7)	5c
45	SSSF							
46	SESS SW4 OP-001336-01	-	(2.5)	(2.5)	-	(20.1)	(20.1)	
47	NEST NC2 & NC3 OP-001795-01	-	(9.7)	(9.7)	-	(33.4)	(33.4)	
48	SESS SA10A CP-002993-01	-	(7.8)	(7.8)	-	(36.5)	(36.5)	
49	SW5	-	(0.1)	(0.1)	-	(0.4)	(0.4)	
50	Projects under $15 million	(34.9)	(1.4)	33.6	(137.8)	1.2	139.0	
51	SSSF Projects	(34.9)	(21.5)	13.4	(137.8)	(89.2)	48.6	6
52	**Total Contributions**	**(51.2)**	**(36.1)**	**15.0**	(197.9)	(126.9)	71.0	
53	**Capital Expenditures, Net**	**254.3**	**244.8**	**(9.5)**	**782.1**	**726.6**	**(55.4)**	

Table 4.3.1 shows that despite the challenges posed by the COVID-19 pandemic, Drainage undertook an extensive capital program in 2021. Both actual and projected expenditures differ significantly from the LTP as Drainage (1) focused its resources on addressing critical needs for drainage system rehabilitation that had not been identified in the LTP; (2) re-evaluated flood mitigation projects in line with SIRP strategy; and (3) undertook capital projects to address needs identified in Non-Routine Adjustments approved for CORe and LRT relocations.

Explanations for significant differences between the LTP and Drainage's current projections for 2018 to 2021 are as follows:

1. **Drainage Neighbourhood Renewal** – 2018-2021 - $59.6 million less than LTP. This category includes the costs of neighbourhood drainage asset renewals and is aligned with the timing of the City of Edmonton's Building Great Neighbourhoods program. Lower than LTP spending reflects a reduction in sewer upgrading costs due to fewer locations requiring upgrades in the neighbourhoods that were the focus for construction by the City based on a risk of failure analysis and CCTV inspection of pipes with these locations. Lower cost SIRP strategy options including low impact development and inflow/infiltration reduction programs were also aligned with neighbourhood work at a lower cost than traditional full pipe replacement or relining.

2. **Drainage System Expansion, net of contributions** – 2018-2021 - $45.0 million greater than LTP.

    a. Capital expenditures –2018-2021- $6.9 million greater than LTP. Increases in 2018-2021 projected expenditures in this partially-contributed program are primarily due to higher service connection costs reflecting increases in non-standard connections and capitalization of the costs of private development construction project services provided by City of Edmonton staff.

    b. Contributions – 2018-2022 - $38.1 million less than LTP. These decreases are primarily attributable to the removal of contributions from local improvement fees following the Drainage transfer.

3. **Drainage System Rehabilitation Projects** – 2018-2021 - $119.2 million greater than LTP.

    a. **Groat Road Storm Trunk Rehabilitation** – 2018-2021 – $34.6 million greater than LTP. This project, completed in 2021, was originally planned to be complete prior to Drainage transfer but due to project complexity, design took longer than expected.

    b. **High Priority Replacement Program** – 2018-2021 - $20.1 million greater than LTP. The additional costs in this program result from asset inspections, which identified higher than anticipated volumes of assets meeting criteria for high priority replacement.

    c. **Drainage System Rehabilitation Projects < $15 Million** – 2018-2021 - $64.5 million greater than LTP. Increases in the costs of these projects are primarily due to the large number of emergency projects requiring immediate rehabilitation, including the void at 109th Street and 61st Avenue. This also reflects the increased need for rehabilitation of aging drainage infrastructure resulting in increased scope on the local sewer rehabilitation program to include catch basin leads and service connections as well as the new manhole catch basin program and proactive service relining project, as well as vehicle and fleet replacements that had been included in Drainage System Expansion in the LTP.

4. **Environmental Quality Enhancement** – 2018-2021 - $57.7 million less than LTP. This category includes projects that mitigate the impacts of the drainage system on the environment, including sewer overflows, river loading, and reuse of biosolids. Actual and projected expenditures in this category have been reduced significantly due to the incorporation and reassessment of the River for Life, Mill Creek End of Pipe Facility and Enhanced Biosolids projects as part of the re-prioritization of environmental projects within the SIRP strategy. The SIRP strategy has incorporated these environmental quality objectives.

5. **Flood Mitigation, net of contributions** – 2018-2021 - $152.5 million less than LTP.

    a. **Malcolm Tweddle and Edith Rogers Dry Ponds** – 2018-2021 - $44.6 million less than LTP. Expenditures on this multi-year project have been deferred first due to delays in finalizing land agreement in 2019, then from weather-related pauses in construction and delays on the City's LRT construction which impacted sewer installations.

    b. **Other Flood Mitigation Projects** – $92.2 million less than LTP. This category includes development of drainage infrastructure and program improvements to decrease flood risks. As described in Section 1.5, Drainage has consolidated management of flood mitigation projects under SIRP. The projected underspend is consistent with 2018, 2019 and 2020 reporting and reflects re-evaluation of flood projects in line with the SIRP strategy combined with delays in land acquisition in accordance with the City of Edmonton's new City consultative process.

    c. **Flood Mitigation Contributions** – 2018-2021 - $15.7 million greater than LTP. These contributions represent provincial and federal grant funding in respect of flood mitigation projects. Separate presentation of these contributions, rather than netting the grants against the related project reflects a change in the treatment of grant recoveries following the transfer of dry pond structure ownership to Drainage.

6. **Sanitary Servicing Strategy Fund (SSSF) Projects, net of contributions** - $7.3 million greater than LTP. The SSSF provides for developer financing of major sanitary trunk construction to service new development areas. Drainage works with the SSSF Management Committee to coordinate design, construction, schedules and budgets for various projects. While significantly less than the City LTP amounts, Drainage's current projected expenditures, align with the SSSF Management Committee's five year construction plan (2018-2022) to support orderly, cost-effective development. Drainage is currently reviewing the timing and requirement of future SSSF trunks with the SSSF committees considering changing sewerage generation patterns in the City and the new City Plan. The major projects in this category are fully funded through the SSSF. The unfunded amounts represent EWSI's annual contributions to the SSSF

7. **NRA-LRT Relocations** – 2018-2021 - $1.2 million less than NRA approval. Capital expenditures on these projects vary only slightly from the NRAs approved by City Council, primarily due to rescheduling to align with the latest City construction plans on the West Valley LRT.

8. **NRA-CORe** – 2018-2021 – $22.2 million greater than NRA approval. Higher than NRA-approved costs reflect the inclusion of the costs of the large trunk program previously planned under Drainage System Rehabilitation in the CORe program. Rehabilitation of large sanitary trunks are primarily driven by the requirement to address corrosion and odour issues.

9. **Real Estate Consolidation Project** (new project) - 2018-2021 - $21.8 million. Following the transfer of Drainage to EPCOR, an EPCOR-wide real estate review was undertaken to identify and evaluate alternatives for consolidating Water Distribution and Transmission and Drainage's operations and maximize the contribution to the cost reduction and efficiency commitments made as part for the Drainage transfer. This project, expected to be completed in 2022 at a total cost of approximately $33 million, consolidates the many physical locations occupied by Water and Drainage and will provide operational cost-savings reflected in the 2022-2024 PBR. Projected expenditures are supported by a comprehensive business case submitted with Drainage's 2022-2024 PBR Application.

4.3.2 Construction Work in Progress

Drainage's rate base consists of plant in service. If a capital project is not completed (i.e. not placed into service) in the year, the capital expenditures on that project remain in Construction Work in Progress and are excluded from the rate base. Because of the long time frames required to complete large, complex projects, Drainage has larger balances of Construction Work in Progress than Water or Wastewater. Drainage's construction work in progress is summarized in Table 4.3.2 below:

Table 4.3.2
Construction Work in Progress
($ millions)

		A	B	C	D
	Construction Work in Progress	**2021**		**2018-2021**	
		Budget	**Actual**	**Budget**	**Actual**
1	Balance, beginning of year	146.2	71.3	32.8	32.8
2	Capital expenditures	254.3	242.9	782.1	728.0
3	Cancelled costs, write-offs and adjustments	-	1.9	-	(2.4)
4	Capital additions	(175.9)	(186.9)	(590.3)	(629.2)
5	**Balance, end of year**	**224.6**	**129.2**	**224.6**	**129.2**

The PBR allows Drainage to capitalize the costs of financing certain projects remaining in Construction Work in Progress, using an allowance for funds utilized during construction (AFUDC). In 2021, AFUDC included in capital expenditures on eligible projects amounted to $3.9 million ($10.7 million for 2018-2021).

4.4 Operational Performance

On February 19, 2020, City Council approved amendments to Bylaw 18100. These amendments provide for the introduction of new PBR performance metrics, scoring and penalties beginning in 2020. The new proposed PBR metrics program is effective for the remainder of the PBR term (2020 and 2021), and is patterned after the water and wastewater PBR metrics and meets the requirements of the Letter of Intent developed for the transition of Drainage Services from the City to EPCOR.

4.4.1 Environmental Index

The environmental index measures the success of Drainage's programs and policies designed to mitigate and report adverse environmental impacts.

Table 4.4.1
Environmental Index

	Index Component	PBR Performance Measure	Standard	Actual Score	Index
1	Stormwater Flow and Flow Monitoring	The percentage of storm drainage area monitored.	≥ 63.0	65.3	1.037
2	Environment Incident Management	The actual number of reportable environmental incidents.	≤ 50	16	3.125
3	Green Hectares	Number of hectares with runoff managed by green infrastructure.	≥ 22.0	18.0	8.190
				Average Index	1.660
				Index Standard Points	30.0
				Total Actual Points	49.8
				Maximum Available Including Bonus Points	33.0
				Total Points Earned	**33.0**

2021 Highlights:

- **Stormwater Flow and Flow Monitoring:** Detailed design of 6 monitoring sites and tendering for construction was completed during 2021.
- **Environment Incident Management:** Reportable environmental incidents decreased from 34 in 2020 to 16 in 2021. This reduction was attributed to decreases in number and intensity of precipitation events in 2021, proactive pre-identification of environmental hazards and risks during project planning, and improved field management of internal releases that minimized escalation to reportable incidents.
- **Green Hectares:** Although the Green Hectares target was below target in 2021 due to shifting in timing to 2022 for some of the construction coordinated with other capital projects, progress to improve future performance was carried out. This included development of Low Impact Development (LID) design standards and practices in conjunction with City of Edmonton teams, standardized scopes of work, and processes to improve project consistency. Process improvement sessions were also held for work on road Right-of-Way projects which resulted in LID being successfully incorporated in several neighbourhood renewal projects. Outreach to the commercial sector also occurred to identify additional locations for LID installation beyond coordination with City roadwork construction.

2022 Areas for Improvement

- **Environment Incident Management:** In 2021, there were several significant third party environmental incidents at storm water management facilities. In 2022 response plans and information sheets are being drafted for storm water management facilities to streamline response and proactively identify response points (e.g. control structure gate details, potential boom locations, inlets and outlets and upstream and downstream isolation points).

- **Green Hectares:** In 2022, LID standards and process development will continue. An LID training program for contractors is also being developed. Development of a management of change process to evaluate and approve additional LID products and suppliers, including underground storage products to enhance the number of Green Hectares installed will continue. There will also be efforts to increase the number of installations on commercial and industrial privately owned properties. Finally, a targeted communications strategy including clear agreements around the operations and maintenance of the facilities is a goal of 2022.

4.4.2 Customer Service Index

The Customer Service Index is a composite measure of the customers' perception of satisfaction with EWSI service, the speed of response and quality service level to customer issues.

Table 4.4.2
Customer Service Index

Index Component		PBR Performance Measure	Standard	Actual Score	Index
1	Service Maintenance Calls	The percentage of service maintenance calls resolved within 24 hours.	≥ 80.0	95.7	1.197
2	Emergency Dig Ups - Service Restored	The percentage of emergency dig ups services restored within 48 hours from time received from operations.	≥ 98.0	88.9	0.907
3	Service Connections	The percentage of service connection meeting the 6 week target.	≥ 85.0	69.1	0.813
4	Sewer Odour Hotspots	The percentage of the city area with odour hotspots.	≥ 16.7	10.1	1.661
				Average Index	1.144
				Index Standard Points	20.0
				Total Actual Points	22.9
				Maximum Available Including Bonus Points	22.0
				Total Points Earned	**22.0**

2021 Highlights:

- **Service Maintenance Calls:** Despite the ongoing challenges associated with accessing customers homes during the pandemic, Drainage achieved better than standard performance. This was achieved primarily by altering shift schedules to align with call volume trends. Additionally, a standby schedule was introduced to better accommodate responses to sporadic weekend, evening calls.

- **Emergency Dig Ups – Service Restored:** The COVID pandemic adversely impacted Drainage construction in two main ways - decreased crew availability and adjustments to site-working conditions. As a result, 4 services of 44 resulted in average restoration time not meeting the PBR standard.

- **Service Connections:** The COVID pandemic adversely impacted Drainage construction in two main ways - decreased crew availability and adjustments to site-working conditions. This, in addition to a significant increase in number of services (477 in 2020 to 578 in 2021) resulted in 72 locations not meeting the 6-weeks target.

- **Sewer Odour Hotspots:** City-wide tracking of odours was accomplished through air monitoring at over 150 locations. This included assessment of odours emanating from every pump station in service. 16 long-term monitoring stations were installed and manhole and trunk inspections were completed on priority trunks to inform cleaning priorities. CORe monitoring planning was also integrated in the Sanitary Integrated Resource Plan monitoring to optimize construction costs through sharing of communication equipment.

2022 Areas for Improvement

- **Service Maintenance Calls:** Technical training focused on efficient work practices will continue to be reinforced during 2022. This will allow crews to provide all services during first response which in turn will reduce re-work and customer inconvenience. Additional equipment tailored to smaller scale jobs will also be introduced. This is expected to decrease response time and thereby increase the number responses during a standard shift.
- **Emergency Dig Ups – Service Restored and Service Connections:** Alternate systems and equipment for preparing trench construction are being investigated and implemented to reduce time required to complete work and restore services.
- **Sewer Odour Hotspots:** To ensure on-going prevention of odour and corrosion, CORe will continue to reassessing mitigation and odour control needs across the City.

4.4.3 Reliability and Optimization Index

The System Reliability Index is a measure of the confidence that customer can place in the reliability of the drainage sanitary and stormwater systems.

Table 4.4.3

Index Component		PBR Performance Measure	Standard	Actual Score	Index
1	Blocked Sewers	The number of blocked sewers per 100km of sanitary/combined pipe.	≤ 2.10	2.70	0.787
2	Sewer Renewal	The km of sewers renewed / relined.	≥ 60.0	47.3	0.788
3	Infrastructure Condition Rating – Min Level	The percentage of all infrastructure (including non-linear) assessed at or above the minimum level of condition rating.	≥ 90.0	90.4	1.004
4	Full Property Flood Proofing Inspections	The number of inspections completed.	≥ 750	669	0.892
				Average Index	0.868
				Index Standard Points	35.0
				Total Actual Points	30.4
				Maximum Available Including Bonus Points	38.5
				Total Points Earned	**30.4**

2021 Highlights:

- **Blocked Sewers:** There was an increase in blocked sewers resulting from inappropriate wastes (specifically flushable wipes) flushed into the system compared to previous years. This was attributed to the large number of people continuing to work from home in 2021. There was also an increase in construction related blocked sewers due to debris from road construction being introduced into the sewer system. The issue of proper debris management during the Road Renewal Projects has been raised with project managers and contractors.
- **Sewer Renewal:** Sewer renewal and relining are proactive maintenance activities. The PBR target of 60km of sewers renewed or relined was not met due to emergency rehabilitation work in other areas of the system to restore service to customers.
- **Infrastructure Condition Rating – Min Level:** The standard was met taking into account the quantity and conditions of assets assessed. Rehabilitation programs and ongoing investment in higher value critical assets this year, such as large trunk lines, can be expected to contribute favourably to future ratings as many of these are multi-year projects.
- **Full Property Flood Proofing Inspections:** Despite the challenges of entering individual properties brought about by the pandemic, the Flood Prevention Team completed 669 full flood prevention inspections at single home residential properties in 2021. Additionally, 700 multi-family property (i.e. condominium) inspections were completed. While these were not included in the performance measure for 2021, they identified the need to include this building form in future metrics. The SIRP strategy supports flood proofing inspections for all property types in Edmonton, with this performance measure focused on the single family home.

2022 Areas for Improvement

- **Blocked Sewers:** A flushing program review will continue during 2022. In addition, communication strategies related to ongoing sewer blockages by grease are planned for 2022
- **Sewer Renewal:** The focus on Drainage Services sewer infrastructure renewal will continue to proactively reduce future emergencies.
- **Infrastructure Condition Rating – Min Level:** Odour Control facilities will be added to the current inventory of infrastructure. Capital projects which include Large Trunk Line rehabilitation and risk-based local sewer rehabilitation of poor condition assets during 2022 can also be expected to improve system condition. Renewal records are also being updated to ensure the most current information is available for calculating ratings.
- **Full Property Flood Proofing Inspections:** The program continues to explore and implement optimization opportunities as knowledge of stormwater basins through SIRP continues to evolve. Areas of focus for 2022 will include additional outreach to properties within high risk flood basins, updated inspections and processes to align with industry best practices and re-engagement with previously inspected properties to measure and trend both engagement and completion of recommended flood prevention actions.

Proposed Change to the Full Flood Inspection Metric

When first introduced in 2020, the Full Flood Inspection metric was defined as full inspections where a report of recommended improvements was developed. Full inspections were further defined as excluding partial inspections such as backwater valve installation confirmation and exterior only check-ups. With the implementation of the inspection programs, it has been determined that a strict application of this definition does not work for multi-family or commercial premises. Specifically, we are unable to complete a full interior inspection for multi-family residential properties and commercial properties as some elements require a more complex assessment with the building operator and are beyond the expertise of the flood inspection team within EPCOR (elevator shafts, mechanical rooms, etc.).There is unclear ownership between the property management company and the individual owner on any recommendations for interior components, further complicating the completion of a full interior and exterior inspection report for these building types. As a result, EWSI is proposing to adjust the metric as follows:

Commencing for 2022 reporting, the Full Flood Inspection metric will be based on full single family residential inspections (i.e. comprised of both interior and exterior inspection components) and full multi-family residential inspections (i.e. comprised of only exterior inspection components) with the completion of the report of recommended improvements. The metric will continue to exclude backwater valve installation confirmation only appointments. The current performance standard of 750 inspections per year will remain.

4.4.4 Safety Index

The Safety Index is a measure of the success of programs and the application of policies that maximizes the safety of employees and the public.

Table 4.4.4
Safety Index

	Index Component	PBR Performance Measure	Standard	Actual Score	Index
1	Near Miss Reporting Factor	The number of near miss reports entered in the ESS system.	≥ 750	2304	3.072
2	Work Site Inspection Factor	Number of Work Site Inspections and observations completed per year.	≥ 1300	2149	1.653
3	Lost Time Frequency Rate	The actual lost time frequency rate.	≤ 0.75	0.35	2.170
4	All Injury Frequency Rate	The actual all injury frequency rate	≤ 4.00	3.11	1.286
				Average Index	2.045
				Index Standard Points	15.0
				Total Actual Points	30.7
				Maximum Available Including Bonus Points	16.5
				Total Points Earned	**16.5**

2021 Highlights:

- **Near Miss Reporting Factor:** Communications regarding the importance of near miss reporting has resulted in Drainage exceeding the performance target. Communication processes were also improved to facilitate sharing of learnings from reported near misses across all areas of the business.
- **Work Site Inspections Factor:** Similar to near miss reporting, there has been on-going communications of the importance of performing work site inspections and observations. Resulting reports were reviewed by leadership on a monthly basis. Real time visibility via a results dashboard also provided a means to track corrective action activities stemming from inspections and observations to allow for timely completion.
- **Lost Time Frequency Rate:** Drainage continued to use the Modified Work Program and Injury Management Procedure introduced in 2020 to allow injured employees to work in a modified capacity, rather than to be off work. Drainage also initiated a manhole project – aimed at reducing recurring injuries for specific work activities. This included the development of resources for employees, ergonomic assessments and implementation of better tools for the task.
- **All Injury Frequency:** Similar to the Lost Time Frequency metric, in 2021, Drainage continued to investigate injuries to determine root causes and to develop corrective actions to prevent recurrences.

2022 Areas for Improvement

- **Near Miss Reporting Factor:** In 2022, Drainage will be incorporating trend analysis of reported near misses to further reinforce the contribution of near miss reporting in reducing and / or eliminating workplace injuries.
- **Work Site Inspections Factor:** In 2022, Drainage will continue to implement the dashboard to ensure inspections and observations continue to be done as required. Trending analysis from near miss reporting will be used for focused inspections and observations to further drive injury elimination and reduction.
- **Lost Time Frequency Rate:** In 2022, Drainage will investigate an ergonomic assessment tool as well as exoskeleton technology to see if these applications can be implemented to eliminate or reduce specific ergonomic injuries related to specific manual tasks.
- **All Injury Frequency:** Similar to the Lost Time Frequency metric, in 2022, Drainage will continue to investigate injuries to determine root causes and to develop corrective actions to prevent recurrences. Drainage will also assess an alternative root cause analysis methodology to see if it will improve incident investigations and prevent reoccurrence.

4.5 Rates and Bill Comparisons

Unlike most cities, where wastewater treatment services and drainage services are combined, EWSI currently has separate bills for wastewater treatment services and for drainage services. Accordingly, in order to provide a better basis for comparison with other cities and communities, bill comparisons in Section 3.5 utilize EWSI's blended wastewater treatment and drainage bills.

5 2021 Annual Operating Plans

Water Services presented the 2021 Annual Operational plan to Utility Committee on February 5, 2021. The purpose of that document was to provide Edmonton City Council, Utility Committee and stakeholders a high level perspective of the major activities and initiatives that Water Services would undertake during 2021. As with the preceding year's plan, the 2021 Plan recognized that a significant number of initiatives were common to both the water and drainage business units. These initiatives were intended to drive synergies and efficiencies and to align the two businesses operationally. As a result, the plan was structured in three major sections: 1) Common Initiatives that are being pursued by Water Services and Drainage Services collaboratively, 2) Water Services' specific initiatives and 3) Drainage Services' specific initiatives. In all three areas, initiatives planned for 2021 were organized within six strategic focus areas:

1. Customer Service
2. Public Health and the Environment
3. Employee and Public Safety
4. Employee Development
5. Operational Performance
6. Growth and Financial Performance

The intent of this section of the PBR Progress Report is to provide an update of progress on the 2021 Operational Plan. All initiatives have been described as either: 1) Completed, indicating that the activities are finished and the initiative is closed, 2) In-progress, indicating that work continues and the initiatives has been continued in the 2022 Operational Plan (as many initiatives are multi–year), or 3) On-going, indicating that the initiatives will never be formally completed as business requirements continue to change (e.g. operational improvement). Some initiatives planned for 2021 were delayed from the original timelines due to the impact of the COVID pandemic. This has resulted in many continuing in 2022 and are therefore designated as on-going in the charts below.

5.1 Water and Drainage Services – Common Initiatives

Initiative	Year End Status
Customer Service	
Implement the Service Optimization Project The final stages of this multi-year project will review how customer service is measured in other EPCOR business units and include an assessment of how EPCOR's website can be further optimized from a customer perspective. Water D&T will also cross train and amalgamate existing water customer service groups. The other primary focus is optimizing the recently implemented billing system and ensuring staff	**Complete.** The PBR customer service metric review was completed and the final metric approved in the PBR application was aligned with other EPCOR business units (and the AUC approach) to ensure comparability. The customer service groups have been amalgamated and training was completed ensure all staff effectively utilized the new billing

Initiative	Year End Status
are trained and able to provide a positive customer experience.	system that was implemented in late 2020. Further enhancements are planned.
Review Developer Funding Mechanisms to Align Approaches Across all Business Units Capital investments required to support new development across the city are allocated between developers and ratepayers differently across EPCOR's various lines of business. EWSI is drafting a white paper to establish cost minimization, cost allocation and regulatory principles to be applied in its approach to funding water and drainage infrastructure required to support growth.	**In-progress** – EWSI postponed further development of this initiative during 2021 as it was not intended to be part of the PBR applications that occurred at that time. The initiative has now been included in current work with City Administration and developers as part of a larger discussion on the City's Growth Management plan. The final proposed approach will be presented to Utility Committee as per their request.
Public Health and the Environment	
Enhance the Climate Adaptation/River Flooding Resiliency Plan The Climate Change Adaptation action plan has identified 15 key risks for the Edmonton water treatment plants (WTP), water transmission and distribution systems and the Gold Bar Wastewater Treatment Plant (WWTP) that will be significantly affected by climate change. Initial risk mitigation strategies and specific actions were developed for each of these risks. River flooding was identified as the greatest of the sudden onset risks for the Edmonton facilities.	**In-progress** – A comprehensive climate change strategy was developed in 2018 and has served as the basis for initiatives since that time. In 2021, the strategy continued to be operationalized through a number of sub-projects. All of the risks on the water system associated with climate changes were reviewed and will continue to be on an annual basis. As part of the PBR applications, capital projects were approved to mitigate flood risks at the plants. Continuation of the SIRP strategy and its associated projects was also approved. The implementation of these projects will continue for several years beyond 2021. Stakeholder engagement is currently underway for some of these projects. The development of an outward looking document that can be shared with key stakeholders such as the City of Edmonton Council and Administration, Alberta Environment and Parks, and others was postponed to 2022.
Execute Green Energy Purchase Agreement In addition to the kīsikāw pīsim Solar Farm, another key component of Water Services' strategy to reduce its environmental footprint is to explore a competitive procurement for new renewable power from other Alberta sources for	**In-progress** – In 2020, EPCOR Utilities Inc. signed an agreement with Renewable Energy Systems Canada ("RES") to develop and construct a new wind farm in southern Alberta. EPCOR will acquire the Renewable Electricity Certificates ("RECs") from the project for a 20 year term. The combination of this offtake

Initiative	Year End Status
the remainder of the grid sourced electricity currently used by water operations.	agreement and the kīsikāw pīsim Solar Farm will result in EPCOR Water utilizing 100% green electricity for all its operations within the City of Edmonton. This initiative was included in the PBR applications as was approved as part of the overall application approval. The wind farm is expected to be operational in Q1 of 2022.
Improve Understanding of the Impact of Residuals Develop a strategy for the continued reduction of residuals loading to the North Saskatchewan River. This strategy will revisit options for the potential diversion of water treatment plants residuals to sanitary sewer, landfill or other solids disposal and will explore opportunities to further reduce solids loading to the river and expanding water plants residual solids management to other seasons. EWSI will study the net environmental benefit of various options.	**In-progress** – In 2020, a Sustainable Return-On-Investment (SROI) study was completed with multiple stakeholders, including AEP, the CoE and the NSWA. The SROI study examined options for construction of facilities at the water treatment plant that would treat the residuals on site and divert to dewatered residuals to landfill for disposal. Based on a Triple Bottom (TBL) assessment, EWSI has concluded that the costs (financial, environmental and social) of on-site treatment strategies far outweigh the environmental benefits. The SROI study also revealed that information on the environmental impact of the discharges on the river was incomplete. EWSI's has developed and proposed a residuals strategy to Alberta Environment and Parks in the 2021-2031 operating renewal application. The strategy is focused on developing more detailed evaluation of the residual discharges, which is planned for 2022 implementation and will inform future developments.
Develop an Integrated Watershed Management (IWM) Strategy for Edmonton - The objective of the IWM strategy is to manage total loadings to the NSR from all municipal discharges in Edmonton and to ensure drinking water security and source water protection for the Edmonton water supply in one unified watershed management program.	**In-progress –** In 2020, a joint Drainage and Water committee were established to explore, define and potentially implement opportunities in the development of an IWM, which were ultimately defined within a strategy document and detailed implementation plan. In 2021, portions of strategy commenced implementation including the SIRP Slow programs which are intended to enhance source control to deter the release of sediment to Edmonton's storm system from urban development and/or construction The strategy will be expanded in 2022 to include the broader watershed stakeholders including regional municipalities, counties and indigenous groups. This work is foundational to the planned

Initiative	Year End Status
	discussions with Alberta Environment and Parks on integrated watershed management in order to establish the strategic objectives and requirements for the 2025 renewal of the Edmonton wastewater system approval.
Employee and Public Safety	
Develop and Implement Company-wide Standard operating procedures for all High Hazard activities. EWSI will develop and implement company-wide assessments for six of the lifesaving rules as well as chemicals to review existing procedures to ensure conformance to the EPCOR Standards and provincial legislative requirements. This review will increase the layers of protection for our people and assets.	**On-going** – the initial development has commenced with a focus on ensuring conformance to both EPCOR Standards and provincial legislative requirements. Future work will expand this foundation to the other rules. This initiative is being developed in conjunction with the competency program described below. Additional modules will be develop over time.
Implement Contractor Management and Incident Management Response Procedures Contractors are required to adhere to the same safety standards as EPCOR employees. This initiative will review processes and procedures to advance that objective.	**On-going -** Standardized HSE evaluation criteria for contractor awards have been established. The next step in this implementation will be monitoring the effectiveness of those standards, which will be completed through 2022 and beyond. Additional contractor initiatives are underway including the implementation of a compliance tracking took to ensure EPCOR Owner's representatives are completing and overseeing the critical tasks.
Employee Development	
Improve Employee Engagement and Build a Respectful, Inclusive, Collaborative, Safe and Healthy Work Culture – EWSI will pursue a variety of activities through the Diversity Council including increasing awareness of diversity and inclusion at EPCOR, incorporating diversity into hiring practices, supporting employee resource groups and working with *Careers: The Next Generation* to provide work opportunities for indigenous youth.	**On-going** – The original Diversity Council, established in 2020, has continued to expand its mandate and is now the EPCOR Diversity, Equity & Inclusion (DEI) Council. That council has developed a framework and strategy with the primary goals of establishing: 1) a diverse workforce that is reflective of the differences among people in the communities we serve, 2) an inclusive workplace that respects, values and leverages different opinions, beliefs, lifestyles and experiences and 3) employees that feel valued, engaged and enabled to professionally and personally succeed. In addition, 6 employee

Initiative	Year End Status
	resource groups have been established. These are grassroots groups formed by employees who share a common diversity characteristic (e.g. gender, ethnicity or race, sexual orientation, disability, education, geography etc.) or consider themselves an ally of that diversity community.
Develop and Implement Company-Wide Competency Based Training for All High Hazard Activities – Competency training will include fall protection, hazardous energy isolation, confined space and lifting devices.	**On-going** – work has continued with a focus on Ground Disturbance and Hazardous Energy Isolation procedures. The intent is to address the areas sequentially in order to ensure subsequent modules reflect the learning gained in the initial development.
Develop Our Employees for the Future To ensure a strong pool of talent now and into the future, this program will identify suitable candidates for job-to-job or project-to-project opportunities and support all aspects of the transition.	**On-going** – In 2019, EPCOR initiated a Professional Growth Initiative assessment and associated development plans for people leaders at the higher stratums in the organization. The implementation of this program has continued through successively lower stratums and with some initial participants are now going being re-surveyed. Formal employee rotation slowed due to the challenges related to the COVID pandemic.
Operational Performance	
Implement a Standardized Process Improvement Methodology This initiative will develop standardized processes or continuous improvement programs to support productivity increases and service quality improvements. The program will encompass methods, techniques and tools and be used to design, control and analyze both business and operational processes. It is critical that any approach chosen involves the people aspect of the process and integrates processes and systems.	**On-going** – a team with six sigma credentialed employees has continued to develop the process improvement discipline and conduct process improvement projects. This has been supported by the development of a consistent set of tools to conduct process improvement initiatives as well as educational materials to foster a process improvement orientation across the organization. Several process improvement projects have been identified and are under development with a particular focus on the opportunities resulting from the move to the Aurum facility.
Implement the Organizational Project Management Office (OPM) Initiative – This initiative will standardized the way project managers plan, execute and monitor their projects and programs. It involves creation of a	**On-going** – a cross organizational team has been formed to review project management processes across all business units of EPCOR. The group has identified common process and re-developed many of the supporting documents. More detailed process modelling is currently

Initiative	Year End Status
project management methodology along with several processes, tools and templates	underway as part of the introduction of the process into the respective business units.
Develop and Implement Strategies for Realizing Synergies between Water and Drainage – The initial focus of this initiative has been on integrating Drainage into EPCOR processes. Recent activities have focused on cross functional teams meeting to identify and prioritize efficiency opportunities in the areas of planning, capital and operations.	**On-going** – several short term opportunities for synergies have been identified and implemented. Detailed analysis has been completed to address larger opportunities to move towards a more consolidated approach across water and drainage. Central to this assessment is the planned consolidation of the drainage and water D&T teams at the new Aurum site. A number of specific opportunities related to that move were identified in 2020 and they are currently under development. These initiatives will be rolled–out over the next 1-3 years
Growth and Financial Performance	
Contribute to the "Utility of the Future" Initiative The Utility of the Future is an ambitious path to modernize operations and reduce long term operating costs by leveraging technology and processes used and refined by leading water utilities around the world. This Corporate initiative will provide a roadmap and framework identifying potential opportunities to implement emerging technology solutions and processes in the existing utilities operated by EPCOR, and the prioritization of those opportunities based on the highest potential return on investment (ROI)	**In–Progress** – Over 2021, a combination of internal working groups and an external consultant developed the high level strategies and a plan for the 6 specific initiatives that will support the development of the Utility of the Future. Two of those initiatives, 1) situational awareness and adaptability and 2) procurement, partnership and alliances were identified as high priority and are currently under development with dedicated resources assigned to each.

Initiative	Year End Status
One Water – Continue the Alignment of the Integrated Resource Planning Activities Between Water and Drainage Water and Wastewater utilities around the world are enhancing their strategic planning by moving to a "One Water" approach to managing the entire Water cycle in their community. The One Water approach has been defined as a holistic approach to sustainable water management that breaks down the traditional silos within the water utility sector and encourages collaboration between water utilities and other sectors.	**In-progress** – The One Water initiative started in 2020 with the formation of the One Water Planning group within EWSI with a mandate to consolidate planning across all of the water cycle. 2021 saw continued focus in a number of high priority areas including: 1) Consumption Patterns – an assessment of overall consumption patterns completed and presented to Utility Committee in early 2022. This work will be used to inform City Design and Constructions standards in consultation with the development community – planned for fall, 2022. 2) Situational Awareness – development of situational awareness dashboard for both water and drainage operations was completed 3) SanIRP/ SSSF/ Future Wastewater Plants Expansions – under development with the plan to complete the first consolidated report by the end of 2022 4) Growth Strategies for City and Region - on-going as EWSI coordinates with City planning groups as they implement the City Plan.
Submit and Defend the 2022-2026 Water PBR and the 2022-2024 Drainage and Wastewater Treatment PBRs EPCOR is proposing to renew the Water PBR rates for another five year term for the period 2022-2026. To stagger the future renewal periods, EPCOR will file the Gold Bar and Drainage PBR applications for a three-year term 2022-2024.	**Completed** – The majority of the application development was completed in 2020, with final review completed in early 2021 prior to submission to the City of Edmonton. Three separate applications were developed, one each for water, wastewater and drainage along with business cases for the majority of the capital spending. Common appendices were included to address issues and requirements that cross all three utilities. Post submission activities focused on answering information requests from City Administration, City Council and external parties in order to provide additional clarity and background information where required. The approval process then culminated in a public meeting where the applications were reviewed and then ultimately approved by City Council on August 30.

5.2 Water Services

INITIATIVE	Year End Status
Customer Service	
Improve Development Processes and Coordination with City of Edmonton and UDI/IDEA – Water Services will focus on better coordination with City Roadways, LRT, Development and Planning group for greenfield and infill development work as well as local industry associations (UDI, IDEA).	**On-going** – Initiatives to improve coordination with the City continued through 2021. Examples include Roadways, LRT planning and infill development. New requirements will evolve as both organization introduce new processes. EWSI worked with the City and IDEA to develop the Infill Cost Sharing Program which was successfully piloted in 2020. Based on that success, this program was proposed to be expanded and received approval as part of the 2022-2026 Water PBR application.
Improve Operational Coordination with the Regional Water Customer Group (RWCG) – This initiative will improve communication, planning and coordination of operational activities and unplanned events to ensure an effective and coordinated response to planned or unplanned events.	**On-going** – Operational communication and planning with the RWCG members continued to improve over 2021, particularly around outages, repairs and other operational activities. This also includes sharing of information such as reservoir levels, pressure data and other important operational information. Additionally, EWSI attends all RWCG Steering Committee meetings to provide updates on major operational initiatives (e.g. Lead program) in addition to regular financial updates.
Develop a Strategy for Additional Communication Around Water Breaks and Outages	**In -progress** – To further improve outage communication, Water D&T commenced the review the process for updating the outage map on epcor.com. The intent is to update the map to provide more real time information to customers. Water D&T and PGA will also evaluate additional means to notify customers of unplanned outages and updates. This work was delayed from the original schedule and will continue into 2022
Public Health and the Environment	
Execute the Lead Mitigation Strategy in Edmonton and roll out to other communities – Water Services will develop a proactive means of reducing public health risks to customers from	**In-progress** – Design of the orthophosphate dosing systems at Rossdale and E.L. Smith has been completed and construction has commenced. The orthophosphate systems are on track to commence operations in early 2023

INITIATIVE	Year End Status
lead and to ensure compliance with the new guidelines for lead in drinking water.	(AEP provided formal approval to add orthophosphate to the Edmonton water in early 2020 after receiving an environmental impact assessment from EPCOR). Broader communication plans and messaging related to the implementation of orthophosphate for customers will commence mid-2022. A long-term monitoring program will be developed to optimize and ensure the effectiveness of orthophosphate dosing across Edmonton. After initial delays due to the impact of COVID-19 in early 2020, the program for full LSL replacements (from “main to meter”) started in mid-2020 for high priority LSLs and those LSLs associated with water main renewal projects. The program continued through 2021 with 144 high priority LSLs replaced (44% higher than planned). The overall object is to eliminate the high priority LSLs by end of 2024.
Complete kīsikāw pīsim Solar Farm and Smart Grid System – The kīsikāw pīsim Solar Farm is planned as a 13.6 MW solar farm that will provide renewable energy for water treatment plant operations. In conjunction with that project, EWSI has received federal grant funding to build a Smart Grid System including a 4 MW battery energy storage system and micro-grid controls.	**On-going** – This project received final approval in October 2020 after considerable public and stakeholder consultation. Construction commenced in 2021 with completion planned by year end 2022.
Execute Green Energy Purchase Agreement – In addition to the kīsikāw pīsim Solar Farm, another key component of Water Services’ strategy to reduce its environmental footprint is to explore a competitive procurement for new renewable power from other Alberta sources for the remainder of the grid sourced electricity currently used by water operations.	**On-going** – In 2020, EPCOR Utilities Inc. signed an agreement with Renewable Energy Systems Canada (“RES”) to develop and construct a new wind farm in southern Alberta. EPCOR will acquire the Renewable Electricity Certificates (“RECs”) from the project for a 20 year term. The combination of this offtake agreement and the kīsikāw pīsim Solar Farm will result in EPCOR Water utilizing 100% green electricity for all its operations within the City of Edmonton. Permitting activities are currently underway and the wind farm is expected to be constructed in summer 2022 with commercial operations commencing in Q1 2023
Confirm to ISO 14001 Across All Water Services Sites – Environmental Management	**Complete** – all Water Service facilities in Edmonton operate under a common

INITIATIVE	Year End Status
Systems (EMS) are required at facilities and treatment systems across Water Services. Those facilities/systems with an Environmental Management Systems built to meet the old standard are required to transition and conform to the new ISO 14001:2015.	Environmental Management system. Work in 2021 focused on developing plans for implementing ISO14001 at EPCOR's regional sites that were not registered and to begin the process of implementing management systems at these sites. Maintaining the same processes and management systems at regional sites facilitates staff transfers and backups in case of emergencies.
Employee and Public Safety	
Conform to ISO 45001 Standards Across all Water Services Sites – Water Services has implemented and obtained registration to the OHSAS 18001 safety management system and is progressing to convert to the updated ISO 45001 safety management system to support continued safety performance improvement.	**Completed** – For its core Edmonton operations, Water Services has obtained registration in the updated ISO 45001 safety management system in order to support continued safety performance improvement. The transition to ISO 45001 for non Edmonton sites is progressing and will continue into 2022.
Review Effectiveness of Safe Work Planning Across All Water Services Sites – Safe work planning includes implementing a field level hazard assessment that effectively identifies hazards and implements controls to prevent potential injury to employees, contractors and the public. Water Services will review safe work planning for all locations to strengthen hazard assessment and reinforce safety integration into routine and non-routine tasks.	**On-going** - EWSI continues to develop and implement company-wide assessments for six of the lifesaving rules and chemicals to effectively review existing procedures to ensure conformance to the EPCOR Standards and provincial legislative requirements
Employee Development	
All initiatives are detailed in the Common section above	
Operational Performance	
Conduct an Energy Audit Across All Areas	**In-Progress** – a review of energy utilization across all areas of water has commenced with the goal of reducing overall energy use through increased efficiency. This program will support the achievement of EPCOR's environmental goals as defined in the ESG report published in 2021.
Develop a Standardized Approach to Asset Management Across Water Services by Confirming to ISO 55000 – The Asset	**On-going** – The Asset Management Methods Office continued to develop with a focus on aligning the current Asset Management

INITIATIVE	Year End Status
Management Framework will be expanded and adapted to allow greater consistency in how it is applied across business units of Water Services by aligning with the international standard for asset management ISO 55000.	Framework with ISO 55000 standards to allow greater consistency in how it is applied across various Business Units of Water Services. The resulting asset management plans formed a central input into the development of the capital plans approved as part of the 2022-2024/26 PBR Applications.
Optimize Meter Reading Function Through Introduction of AMI Water Services will seek to optimize the meter reading function through an analysis of current routing as well as the implementation of meter reading technologies to determine if they are viable from a cost benefit perspective. Analysis of the costs and benefits of introducing Automated Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) technology will be completed.	**On-going** – In 2021, Water Services completed the analysis of the costs and benefits of introducing AMI technology and incorporated the results of that analysis into a business case as part of the submission for the 2022-2026 PBR. The proposed implementation of an AMI network in Edmonton would utilize the existing EDTI communications backbone in order to provide a more cost effective solution than a stand-alone installation. The project was approved as part of the overall PBR approval. Planning and design work commenced in in late 2021 and will continue with implementation over the next few years.
Develop and Implement a Bio-solids Strategy – Since the 1970's, biosolids have been sent to the Clover Bar lagoons for additional processing and disposal, mostly through composting, landfilling and agricultural land application. Over time, the inventory of biosolids in the lagoons have increased as disposal has not met production, to where there is more than 6 years of inventory stored in the lagoons. Additionally, the City of Edmonton made a decision to close down composting operations, due to the integrity of the facility. An overall strategy is required to address these concerns.	**In-progress** – In late 2019, the development of a biosolids management program was initiated. The objectives of the program were to continue to finds ways to beneficially dispose of biosolids, in a financially and environmentally sustainable manner, while reducing the inventory of biosolids in the Clover Bar lagoons. Work on this strategy continued to include the development of the business case for the development of a dewatering facility which was included in the PBR application. The implementation requirements for the dewatering facility and the overarching strategy continued to be refined during 2021 and will continue into the future. This will include a review of bio-solids generation forecasts, regulatory and market changes, assessment of emerging technologies and the quantification of environmental benefits.
Growth and Financial Performance	
All initiatives are detailed in the Common section above	

5.3 Drainage Services

Initiatives and Objectives	Year End Status
Customer Service	
Build Relationships with Stakeholders to Create Trust and Understanding – Drainage Services will continue to build stakeholder engagement plans that are aligned with the capital plans.	**On-going** – In 2021, Drainage Services continued to ensure that stakeholder engagement plans were developed for all major capital projects. This work included considering when and how to engage with stakeholders to ensure the largest impact. Stakeholder engagement has become an operationalized process and will be incorporated into new capital projects that commence over the coming years.
Build Systems, Processes and Training to Provide Consistently Good Service Continue to evaluate sources of customer escalations and implement remedial actions; reduce the number of escalations and reduce customer service connection time.	**On-going –** through 2021, Drainage continued to focus on improving levels of customer services. Unfortunately, as indicated in the customer service metrics (section 4.5.2), the impact of COVID on crews and site working conditions impacted customer service in a number of areas. As noted in that section, adjustments were made in crew assignments and other areas to address the situations as they arose. These and other efforts are continuing in 2022 in order to ensure customer service performance is aligned with levels defined within the PBR metrics.
Execute Corrosion and Odour Mitigation Strategy The Corrosion and Odour Reduction (CORe) Strategy was developed using similar principles and approaches to SIRP program in order to determine an optimized mix of operational and capital solutions to reduce corrosion and odour. The CORe Strategy expands the previous plan by focusing on preventing the formation of H_2S gas, which will reduce community odour impacts and lengthen the life of sewer network assets. The current strategy also differs from previous plans by segregating the City into regions with consistent odour issues, those with dynamic odour issues, and those with emerging odour issues. Different approaches are proposed for	**In-progress –** a review of the work completed in 2021 for the execution of the CORe program is contained in sections 4.3.1 of this report and a more detailed listing of planned projects and initiatives in the approved. the 2022-2024 Drainage PBR Application

Initiatives and Objectives	Year End Status
each region to ensure that causes of the odour are fully understood and to ensure that capital projects will provide sustainable relief.	
Execute the Stormwater Integrated Resource Plan (SIRP) As part of the agreement to transfer Drainage Services to EPCOR, EPCOR committed to developing a complete stormwater strategy to reduce flooding risks within the City of Edmonton for urban and riverine flooding events. Drainage Services has created the Stormwater Integrated Resource Plan (SIRP) project to integrate environmental and social externalities; operational, planning and infrastructure responses; risk assessment and management; financial analysis; and an open participatory process that incorporates continuous improvement.	**In-progress –** a review of the work completed in 2021 for the execution of the SIRP program is contained in section 4.3.1 of this report and a more detailed listing of planned projects and initiatives in the approved the 2022-2024 Drainage PBR Application
Complete Drainage LRT Relocations - In 2018, Drainage Services received notifications from the City of Edmonton requesting Drainage Services to start sewer facility relocation for several LRT projects. The notifications indicated that the Valley Line West (VLW) and the Metro Line Northwest (NW) Phase 1 are the City's next two LRT priorities. Since receiving the City's notifications, Drainage Services has been diligently working on the LRT Drainage Relocation Projects. Drainage Services has undertaken corresponding investigations, planning and design works for the VLW LRT project.	**In-progress –** a review of the work completed in 2021 for the execution of the LRT Relocates program is contained in section 4.4.1 of this report and a more detailed listing of planned projects and initiatives in the approved the 2022-2024 Drainage PBR Application
Public Health and Environment	
Optimize Impact of Our Operations on the Environment As an environmental steward in Edmonton, Drainage Services will minimize our environmental impact in all aspects of our operations. Drainage Services has been working with the City of Edmonton on the climate change initiative through the work on the SIRP. The purpose of this plan is to identify work that	**On-going** – Drainage Services continues to work towards ensuring that all environmental work is aligned with considerations arising from the SIRP, and Corrosion and Odour Mitigation (CORe) Strategies. The over-riding goal remains to reduce flow to the river.

<table>
<tr><th>Initiatives and Objectives</th><th>Year End Status</th></tr>
<tr><td>needs to be accomplished to reduce the impact of stormwater flow on Edmonton residents and businesses.</td><td></td></tr>
<tr><td colspan="2">Employee and Public Safety</td></tr>
<tr><td>Reduce Tolerance towards safety related risks - Develop customized safe work plans for each unique work area. Implement a new Contractor Management Program, including a framework and guidelines for managing prime contractor accountabilities

Cultivate a culture of Safety Leadership – Ensure that incidents are reported accurately within our Event Reporting System (ERS), investigations are completed in a timely manner, and learnings are shared with all employees.</td><td>On-going - as noted above in the drainage metrics section, Drainage Services exceeded all metrics and a number by a significant margin. This performance was the culmination of a number of programs including:
Safe work plans have been developed for each unique work area. Work is underway to integrate these into a Safe Work Plan App for use in the field.
The Contractor Management Program, including guidelines for managing prime contractor accountabilities and serious incident response plans, were updated and communicated to managers as required.
Initiatives intended to develop a strong safety culture continued including training for compliance and conformance, revision of process, near miss and other reporting metrics as well as programs to increase general awareness among staff.
Training of people leaders to lead incident investigations began in 2019 and has continued since that time. This will form a common approach for incident investigation</td></tr>
<tr><td>Train Staff for Competency and Confidence
This initiative includes creating and implementing Hazard Registries for all high risk work; establishing competency based assessments for high risk tasks; and implementing “EPCOR Athletes” – a program to learn about body mechanics and how to incorporate healthy movement into everyday tasks for both field works and office workers.</td><td>On-going - The EPCOR Learning and Development team began the development of the formal Competency Assessment Project in 2019. The roll out of the program commenced in 2020 and will continued for several years as additional modules are developed and implemented.</td></tr>
<tr><td colspan="2">Employee Development</td></tr>
<tr><td>Develop Great Leaders Who Embody EPCOR’s Values</td><td>On-going - Drainage created functional area business plans that outline two year objectives</td></tr>
</table>

Initiatives and Objectives	Year End Status
In order to make sound business decisions, leaders must understand their accountabilities and their specific role in delivering the Water Services and the Drainage Services Operational Plans.	that align with the goals and strategies of this higher level Operational Plan. The intent is to create a deeper understanding of the business plan and alignment across all work units by directly involving leaders in the development of their section's business and responsibilities. In order to further support this understanding, a focus has been placed on ensuring that 100% of people leaders have a Position Description that outlines their role and accountabilities.
Operational Excellence	
Develop and Optimize End-to-End Processes within Drainage Drainage Services will be reviewing all processes to determine opportunities for efficiency and optimization. Process improvement projects may utilize project management, reporting, metrics and change management to monitor success and ensure sustainment. This program supports the identification, facilitation and realization of benefits of/from improvement opportunities across the Plan-Design-Build-Operate business cycle in Drainage.	**In-progress** – In 2021, the focus of process optimization has been concentrated on 17 separate initiatives identified in the water/drainage synergy project. The majority of these are opportunities are specifically related to the co-locating of Drainage Services' and Water's distribution and transmissions functions in the new Aurum facility (planned for 2023) Effectively, these opportunities are related to the synergies that would result from combining/co-locating groups that do similar functions in a common facility.
Identify and Manage Emerging Risks – This initiative identifies business risk and formulates appropriate mitigation strategies. Is also includes implementing knowledge transfer to mitigate the risk of losing technical expertise as well as addressing findings from internal audits to mitigate operational risks.	**On-going** – Drainage continues to identify and manage risk across a number of areas within the business. Operating procedures continue to be developed and updated to ensure system knowledge is captured and operational risks are mitigated. Internal audits are utilized to identify areas of risk, including the Construction Services Audit that was completed in 2021. Drainage also completed a risk based assessment of capital programs that were approved in the PBR application and is now utilizing the same methodology in developing and Sanitary IRP program.
Growth and Financial Performance	
Correct the Revenue Leakage that is Occurring	**In Progress –** work continued through 2021 to address the issues identified in the original audit. A comprehensive analysis of City of

Initiatives and Objectives	Year End Status
In 2019, Drainage Services began an audit of the Stormwater Utility. Through the initial analysis, the stormwater team found multiple discrepancies in the billing system due to a number of factors including lack of auditing since system inception in 2003, lack of written standards, information system limitations and billing system limitations.	Edmonton properties was completed. As part of the drainage transfer review conducted by Grant Thornton for the City, the recommendation was made to include City properties in billing. This potential change will be further reviewed and included in Drainage's 2025-2029 PBR application.

6 Stormwater Integrated Resource Plan Update

6.1 Introduction

The SIRP program, presented to the City of Edmonton Utility Committee and approved by City Council in 2019, is a $1.6 billion system-wide integrated approach, which began in 2019 and expected to be completed over the next 20 to 30 years. The program will mitigate flood risk by reducing the health and safety, financial and social risks of flooding with lower overall capital investment than compared to traditional engineering approaches. This includes the incorporation of green infrastructure and operational programs that support building community resiliency and leveraging advanced technologies to better manage stormwater volumes during storm events. In addition, annual operating costs for SIRP include an average of $2.2 million per year for operational activities plus the backwater valve subsidies which are forecast to increase over a 20 year period from approximately $0.8 million per year to $1.76 million per year. The SIRP program can be classified into five investment themes described below:

- SLOW: We slow the entry of stormwater into the drainage network by absorbing it in green infrastructure such as Low Impact Development (LID) features and holding it in ponds, creating space in the collection system during storm events;
- MOVE: We move excess water away from areas at risk, quickly and efficiently;
- SECURE: We help secure individual properties in higher risk areas against sewer backups, inflow infiltration (I/I) and overland flooding and river flooding;
- PREDICT: We predict and manage the movement of stormwater through smart sensors and technologies that integrate into the collection system; and
- RESPOND: We respond through fast rollout of flood barriers, traffic diversions, and public communications to protect life, safety and property.

The largest investment theme of the SIRP strategy is the “SLOW” theme with an estimated investment of $470 million in dry ponds and $480 million in LID over the 20-year SIRP plan. The SLOW theme involves slowing the entry of stormwater into the drainage network by absorbing it in green infrastructure and holding it in ponds, creating space in the collection system during storm events. Green infrastructure includes both dry ponds and LID. Dry ponds are designed to capture the large intensity rainfall events and hold the water within the neighbourhood until after the storm event has ended and then slowly release the water into the adjacent trunk networks. LID installations are designed to capture the lower intensity stormwater volumes that occur around the periphery of the large storm and have the ability to capture, absorb, slow and filter stormwater before it flows into the sewer system, groundwater or surface waters. LID installations also provide water quality enhancement for the primary storm events that do occur throughout the year helping EPCOR to meet the environmental regulations surrounding discharges to the rivers and creeks in Edmonton.

Due to the topography of the urban environment there exists numerous low or sag locations throughout the city of Edmonton. The SIRP strategy prioritizes investment in low-lying sag locations because there is potential for water to pool in these areas during major storm events. The objective is to redirect stormwater to dry ponds and LID in order to reduce peak flows to the stormwater system via the MOVE investments. Under the SECURE theme, SIRP will rehabilitate the grey infrastructure in these sag locations to reduce inflow and infiltration and includes an enhanced building flood proofing program for the properties adjacent to these localized sag areas to further protect the property from damage. The SECURE theme also includes improvements to the existing outfalls and control gates to secure the pipe network and properties from river flooding during high water level events. The PREDICT theme includes adding monitoring and real time controls to transition the entire stormwater system (including both pipes and ponds) into a “smart” system. This will aid in improving response times to major storm events and will allow for real time management of flow volumes between adjacent stormwater retention locations. Finally, the RESPOND theme includes the development of emergency response stations located throughout the city. These stations will be outfitted with emergency response equipment such as portable flood barriers, pumps and hoses to allow for efficient deployment during a major flooding event.

In addition to the five themes, EPCOR continues to actively engage with the Federal government and Insurance industry including participation in the development of the National Adaptation Strategy as a member of the Disaster and Resiliency table. EPCOR also has presented the SIRP strategy at numerous industry organizations supporting the municipal and insurance sectors. In 2021, the SIRP strategy and the project team were recognized with Clean50 awards as leaders in Canada in approaches to flood mitigation. The Intact Center for Climate Adaptation also released their updated report ranking Cities across Canada on their flood mitigation efforts and in particular highlighted that the approach being taken in Edmonton can be considered a model approach for other communities to emulate. EPCOR is also working with the EMRB Stormwater collaborative on a project to extend the SIRP framework to the Edmonton Region. This initiative will be begin later in 2022.

6.2 Major Accomplishments

SIRP Theme Description	A **2021 Accomplishments**
SLOW - SIRP Dry Ponds Program EWSI identified 31 locations across the city where dry ponds should be considered to support flood mitigation in a community. The final siting, sizing and design will be part of a coordinated discussion between EWSI and the City and working closely with local communities. EWSI developed the dry pond schedule over the next 20 years assuming that typically there will be 6 active pond projects per year (2 in planning, 2 in design and 2 in construction). This timing aligns with the recently approved	All 31 proposed new dry ponds have been reviewed through the City of Edmonton Open Spaces Repurposing Phase 1 review procedure and initial assessments were completed to confirm that all can proceed to Phase 2 reviews. The Phase 2 reviews will occur as the individual locations move into the concept design phase and include additional consultation with the City and local community on pond configuration and considerations for amenities and construction impacts. In 2021, construction was substantially completed for the Malcolm Tweddle, Parkallen and Tawa dry ponds. Construction was initiated for the Steinhaurer dry pond. Concept design was completed for the Kennilworth dry pond and detail design was initiated.

SIRP Theme Description	A 2021 Accomplishments
Federal Government Disaster Mitigation and Adaptation Fund (DMAF) grant of $44 million supporting construction of 13 dry ponds over the next 10 years.	Lauderdale and Parkdale ponds are currently in the concept design phase and the Ottewell dry concept design will be initiated later in 2022.
SLOW - SIRP LID Program SIRP includes wide scale implementation of LID throughout the entire city to reduce the peak stormwater flows that are entering the storm pipe network and pooling at low areas on the city streets. LID has the ability to support the capture, detention and retention of large stormwater events. In 2020, EWSI added the Greened Hectare as a new PBR performance metric and target to measure its performance in implementing LID. An increase in LID through the City of Edmonton will also result in improved performance on the total loadings to the river and the combined sewer overflow reduction strategies.	LID Design standards were developed and approved through consultation with the City of Edmonton and the development community and added to the Design and Construction standards available for use by developers for both greenfield and infill development. The standards clarified both the below ground components and the vegetation requirements to reduce the cost of detailed design for the development community. The project team continues to evaluate additional types of LID to increase the variation in form factor for LID to support different urban form constraints. Of particular note is the development of a proposed green sidewalk design to allow for the use of the space below the sidewalks and a portion of the grassed area adjacent on the private side of the property to capture stormwater prior to reaching the street. In 2020 and 2021, LID was installed in 23 project locations, (with each location having one or multiple LIDs associated with it); and two small storage project locations for a total number of added Greened Hectares over the 2 years of 36. In 2022, it is expected that 45 GHa will be added across the City in 20-21 project locations including the 103 Avenue location immediately to the west of City Hall currently under construction. The LID construction to date has focused on sites managed by EPCOR and coordinated with City of Edmonton planned construction sites. This initial approach was to facilitate the development of the design standards to support broader implementation. For 2022 and beyond the focus is on increasing the LID on private customer sites with projects currently underway with the University of Alberta, Lafarge and the Shamrock curling club. Design has also been

SIRP Theme Description	A 2021 Accomplishments
	completed for a box planter design suitable for connection to residential, low rise multi family and small scale commercial downspouts to slow roof drainage flows. EPCOR will also be working with City Operations in 2022 to assess the potential cost and environmental benefits for small underground parking lot storage to be dual purposed for capture of snow melt during extreme storm events necessitating residential snow clearing.
MOVE - SIRP MOVE Program The move theme involves moving excess water away from areas at risk, quickly and efficiently through both stormwater tunnels, trunks, sewer separation and movement of water through overland drainage paths. The SIRP proposed investment in MOVE infrastructure is estimated at $300 million over 20 years. For the 2022 to 2024 PBR term, the infrastructure investments identified in the SIRP-MOVE theme are primarily aligned with the SIRP-SLOW initiatives and confirmation of overland flow paths in locations without a piped stormwater system.	With the COVID-19 restrictions limiting the ability to move forward with activities related to in home property specific enhanced flood proofing, the focus shifted to developing strategies to reduce the historical on-going flooding risks related to ditches and swales. Working closely with the City of Edmonton, EWSI identified historical surface flooding locations associated with ditches and swale flooding. Through this review a number of locations requiring regrading and culvert upgrades were identified, a number of these locations were upgraded in Mistatim and North east Edmonton leveraging Federal government stimulus funding obtained by IIS. The work in Mistatim reduced the typical annual complaints of overland flooding down to 2 from a historical 50 per year. A ditches and swales maintenance manual was developed with City Operations and new equipment requirements and maintenance schedules required for vegetation management in ditches was developed. A formal process was also developed to manage and track any new ditches and swales flooding concerns, as historically these were only addressed each season. EWSI completed a detailed review of the partially separated sewer areas to identify quick win reconfigurations to reduce stormwater entry into the combined system if there was an adjacent storm pipe, and identify locations where catch basins connected to sanitary pipes lead to increased flooding risk in

SIRP Theme Description	A 2021 Accomplishments
	neighbourhoods. The Kinnard storm trunk and storm trunks on 105ave in the downtown core were under construction in 2021 and continue into 2022. The storm trunk supporting the Kennilworth dry pond will begin construction in 2022.
SECURE - Outfall and Control Gates Program The SIRP strategy includes a $30 million investment in outfalls and control gates to be added to existing outfalls located within the river valley to provide additional protection to the residential homes located within these areas from river water backing up through the pipe network. EWSI is planning to install the proposed automatic controls and new outfalls over 12 years due to the higher damage risk exposure for river valley neighbourhoods. Some outfall control gates will be partially funded by Federal DMAF grant programs.	A standard outfall gate design has been selected with one alternative configuration developed. Typical designs for both retrofitting a gate within an existing manhole and/or installing a new gate in a new manhole are being developed. The methodology for confirmation of outfall suitability to have a gate added has been developed and approximately 30% of the outfalls have been assessed for outfall gate configuration. Construction to retrofit the outfalls with existing manual gates will occur in late 2022 for the Cloverdale neighbourhood. New installations for outfalls without existing gates will begin in 2023 and continue over the next ten years in alignment with the DMAF grant funding for this work. A DMAF2 grant application was also submitted in late 2021 for additional three outfall gates to protect the Gold Bar Wastewater treatment plant from high river flood events. The Federal government has not yet announced the successful communities who will receive DMAF2 funding.
SECURE - I&I reduction The SIRP strategy includes a $100 million investment in I&I reductions. I&I occurs when inflow flood waters enter the piped network either through openings in manhole lids or through cracks in the manhole frames and in the pipe network when the soils are fully saturated. Minor leaks on these pipes can induce a high volume of infiltration into the pipe network when the soils are fully saturated with water. SIRP	The topographical sag locations across the City of Edmonton were reviewed and all manholes and pipes requiring relining were identified and prioritized completion in the coming years. More than 1000 manholes have been relined in 2020 and 2021. Detailed I&I monitoring, smoke testing and modelling analysis was completed for the northwest areas contributing excess storm flows into the NEST sanitary trunk system. Detailed community outreach plans are in development for the neighbourhoods showing higher levels of infiltration after a major storm

SIRP Theme Description	A 2021 Accomplishments
includes implementation of increased maintenance and repair on drainage infrastructure that is at higher risk of exposure to flooding in numerous sag locations along the road network.	event. Direct inflow connections due to storm pipes connected to sanitary pipes were confirmed as not a contributing factor to the flooding risks in these locations. Additional analysis was completed on the sanitary system Inflow/infiltration levels within the Windermere, Riverview and Edgemont neighbourhoods are significantly lower than the current design standards, providing the opportunity to reassess the requirements for SSSF funded sanitary trunks in Southwest Edmonton. Once reviews are completed recommendations for SSSF trunks in these neighbourhoods will come to City Council Executive committee for approval of any changes to the SSSF plans.
SECURE - Enhanced Flood Proofing Program EWSI's analysis of the localized sag areas with higher flooding risk has identified that there are approximately 6,000 properties (including 2,500 in the river valley neighbourhoods) that have a higher flooding risk due to being adjacent to areas where the water in the road could pool at depths above the 1 meter depth during an extreme storm event. There are an additional 40,000 properties with a mid-high exposure risk where ponding in the road network could be between 0.35 and 1 meter depth during these extreme events. Under SIRP, $60 million will be invested over 20 years for the Enhanced Building and Flood Proofing Program to support correction of lot grading on public-owned portion of the parcel and repairs to public-owned portion of drainage service lines in conjunction with the property owner implementing these improvements on the privately-owned	EPCOR provided a detailed project update on the SIRP SECURE activities in the August 2021 Utility committee meeting. Since the approval of the SIRP strategy additional resources have been hired to support property owners through the flood inspection and backwater subsidy programs. The inspectors also completed the certified flood inspectors training program developed by the Intact Center on Climate Adaption and the standard report delivered after an inspection has been updated to match the certified program components for a full inspection. EPCOR also completed a public opinion survey of the backwater subsidy program, detailed results were also shared in the August 2021 report to Utility committee. In general there is a positive perception of the program with recommendations to improve the process and timelines for submission for the subsidy. EPCOR has also implemented an online booking tool to support customers in arranging for a flood inspection and have seen increased uptake in customers applying for an inspection as a result. In 2021, EPCOR also worked with Edmonton Public School Board and City of Edmonton Facilities group to provide detailed flood risk information for their

SIRP Theme Description	A 2021 Accomplishments
portion of the service line. EWSI will also continue to invest in the Backwater Valve Subsidy Program with a subsidy amount of $800 per property for backwater valve installation for eligible properties. This program has been supported by the utility since 2004 and is consistent with programs offered in other communities across Canada.	properties to support their internal capital programs. Additional flood risk awareness building was initiated in the Rossdale neighbourhood in alignment with the water treatment plant flood protection public consultation processes. Additional outreach to all property owners (commercial, institutional and residential) is planned as a priority over the next few years, aligned with City of Edmonton Climate Change adaptation and Resiliency efforts.
PREDICT EWSI will predict and manage the movement of stormwater through implementation of smart sensors into the collection system and a dashboard system to increase situational awareness of real time storm tracking and ability to respond to major storm events. EWSI estimates total investment in $70 million in monitoring and controls under SIRP over 20 years. The capital plan for SIRP includes the installation of permanent underpass warning systems at 20 locations identified as being at higher risk of flooding with depths where there is a higher risk to public safety.	The SIRP Dashboard project was implemented in 2021, bringing together a number of disparate monitoring systems used with the Drainage and Water business units. The dashboard provides access to real time sensor data and is integrated with EPCOR GIS systems and is available to all employees to view via the EPCOR intranet. A grant application was submitted to the Federal Government DMAF2 initiative in late 2021. The grant included proposals to convert the existing wet ponds throughout the City into a Smart pond system to allow for real time management of Stormwater pond water levels during a rainfall event. Underpass warning systems were implemented in conjunction with the City of Edmonton at Whitemud Drive/Gateway Boulevard, Whitemud Drive/106 & 111 Streets, and 63 Avenue/Gateway Boulevard. The remaining underpass locations for warning systems were confirmed and design is progressing for installation each year. The team has also been working with IIS to have these incorporated as any new underpasses are constructed. A detailed analysis of the geyser location at 30th avenue and Calgary trail was completed and the probable root cause of the geyser has been determined to allow for the implementation of mitigation measures through introduction of flow controls on the storm basin to the north and additional ventilation manholes on the storm basin to the east. Updated IDF curve analysis was completed based on an additional 5 years of rain gauge data in the

SIRP Theme Description	A 2021 Accomplishments
	Edmonton region. Consultation with the City and UDI to update the design standards based on this new information will occur in 2021. This information was also shared with EMRB Stormwater collaborative for use in the region.
RESPOND The respond theme will enable EWSI to effectively respond to flood events through fast rollout of flood barriers, traffic diversions, and public communications to protect life, safety and property. The SIRP strategy includes a $45 million investment over 10 years to modernize emergency response equipment to ensure effective response to flooding events at emergency response locations within the river valley and at other high risk locations. The SIRP RESPOND approach broadens the role of the traditional stormwater utility from one that focuses primarily on the management of the pipe moving stormwater, to one where the utility is an active participant in the response to the flooding event and proactively develops emergency response protocols in advance of the flooding events to support the Office of Emergency Management who leads the response efforts.	In 2021, EPCOR purchased two mobile flood response trailers equipped with Tiger Dam flood barriers and associated equipment to provide flood protection of critical Drainage infrastructure located within the River Valley. Due to the temporary and portable nature, these barriers can be deployed at multiple locations as required. EPCOR also purchased a sandbagging attachment for skid steer equipment, which allows for filling and deployment of sandbags on location when needed. In 2022 additional coordination is planned with City resources in the Office of Emergency Management, City Operations and the Climate Adaptation team to refresh the emergency response protocols for river valley flooding and identify locations and types of flood barriers suited for the different reaches of the river valley. EPCOR completed a flood risk assessment review of all 1300 City owned properties and provided this information back to the City Risk Management and Asset management teams to allow them to assess mitigation measures for these locations. Additional coordination will occur in 2021 to provide our expertise in mitigating these risks going forward. Similar analysis was completed for Water Services and EPCOR Electricity Distribution and Transmission (EDTI). Water Services was able to secure grant funding to implement flood protection measures at their facilities and purchased additional equipment to protect high risk electrical equipment. EDTI has also incorporated flood mitigation measures into their future capital planning. Analysis was currently completed for the Edmonton Public School Boards to inform their emergency

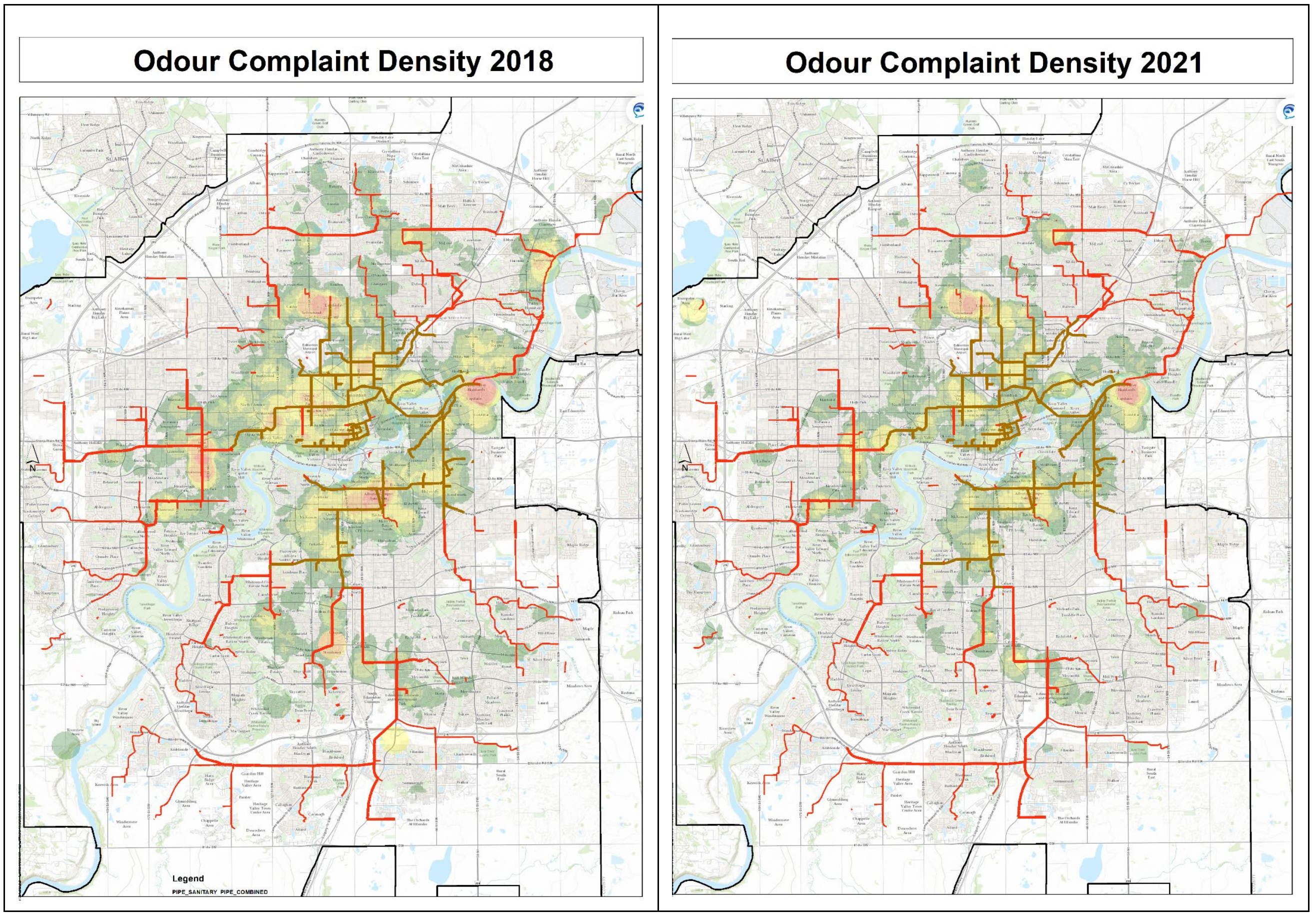
SIRP Theme Description	A 2021 Accomplishments
	response protocols and to allow for identification of opportunities to align the SIRP-SLOW and SIRP SECURE initiatives not only for property protection but to also identify opportunities to incorporate these initiatives into the curriculum at each school.

7 Corrosion and Odour Reduction Strategy Update

7.1 INTRODUCTION

Over the past decade, residents of Edmonton have reported over 10,000 instances of odours related to the sanitary and combined sewer network. To develop a robust strategy to address odour issues, EWSI has conducted public consultation, engaged with community members across the city, conducted advanced sewer air monitoring campaigns and expanded its sewer asset inspections. The assessment determined that odours are a precursor to the more serious corrosion and premature failure of sewer assets and this correlation was further confirmed over the last few years from a number of significant sewer trunk failures in locations with previous odour complaints. Figure 7.1 below is a heat map of odour locations across Edmonton comparing 2018 prior to the start of the CORe program and 2021.

Figure 7.1
Edmonton Odour Locations
2018 vs. 2021



EWSI implemented the Corrosion and Odour Reduction (CORe) Strategy that focuses on preventing the formation of hydrogen sulphide (H_2S) gas, which will reduce community odour impacts and lengthen the life of sewer network assets. The CORe Strategy includes roughly $200 million capital investment and $18 million in operating expenditures to address early action items over the period of 2019 to 2026. Implementation of CORe began in 2019.

EWSI's CORe Strategy includes the capital and operational program investments to focus on preventing the formation of H_2S gas by keeping the wastewater moving, adding chemical treatment, and expanding inspections and cleaning. Construction and rehabilitation of tunnels impacted by sewer gas corrosion is included in the capital program. Also included is the addition of improved access points for both inspection and cleaning purposes. Pump station enhancements through operational configuration changes including addition of chemical treatment to the system are also included to reduce wastewater stagnation time at the station.

Another focus for CORe is to enhance system understanding using real-time monitoring technologies and improved inspection data to better inform future capital and operational programs. Sewer trunks are 20 to 40 meters underground and some of these trunks constructed under previous City design standards do not have sufficient access points for inspection and cleaning. Approximately 80 km of trunk lines are currently beyond the reach of inspection technologies and do not allow inspections to identify whether

H_2S is forming and causing corrosion and odour issues, or whether the line contains sags or deposits of sediment/fat that require cleaning and may cause odour or operational issues in the future.

The CORe Strategy also recognizes that sewer gases will be venting out of the system as part of the normal process of moving wastewater through the system. Although it may be impractical to stop such venting in the system, venting locations can be controlled to reduce community impacts. Odour venting is managed by reducing air pressure in the sewer pipes, adding containment structures, and providing controlled release points.

EWSI's investments in CORe can be classified into four themes: PREVENT, OPTIMIZE, MONITOR and CONTROL. Details on the recent accomplishments within each of the themes is provided further below.

7.2 CORe MAJOR ACCOMPLISHMENTS 2021

CORe Theme Description	2021 Accomplishments
PREVENT – CORe Large Trunk Rehabilitation Program The CORe Large Trunk Rehabilitation Program focuses on the rehabilitation of large trunk sewers greater than or equal to 1,200 mm in diameter. EWSI has forecasted total program capital expenditures for this program during 2022-2024 PBR term at $79.0 million. This program includes two large discrete projects: the Mill Creek Combined Trunk Reach 49 and the 99 Avenue and 151 Street Trunk Sewer Rehabilitation Project at an estimated cost of $28 million and $30 million respectively during the 2022-2024 PBR term. The other large trunk rehabilitation projects within this program will address trunk repairs required with an imminent risk of failure and by prioritizing the projects based on risks. As EWSI continues to install access manholes as another component of the CORe strategy (through the CORe Access Manholes Program), it expects to identify additional trunk locations	Under CORe Large Trunk Rehabilitation Program, EPCOR Drainage seven large trunk rehabilitation projects were worked on in 2021: o 151 St / 99 Avenue Sanitary Trunk Rehabilitation. Stage 1 involves the construction of approximately 1,636 m of new 1800 mm in diameter bypass tunnel. 965m bypass tunnel was constructed in 2021. Stage 2 of the project is to rehabilitate the existing trunk. At the end of the project, both trunks will be put into service providing additional trunk capacity along this priority growth corridor. o Mill Creek Combined Trunk Reach 49 Replacement Consists of new combined trunk along 97 Street from 80 Avenue to 88 Avenue to replace the heavily corroded Trunk 49 located west of Mill Creek within the creek alignment. Odours will be reduced within the creek through the elimination of the drop structure and multiple manholes adjacent to the creek along this trunk. This reconfiguration will also increase the trunk line capacity available in Reach 41 immediately to the east of the creek to provide additional sewer capacity for the Bonnie Doon growth node east of Mill Creek. The detailed

CORe Theme Description	2021 Accomplishments
requiring immediate rehabilitation work at critical locations.	design of the project was completed in 2021. ○ Combined Trunk Area C-2 – Reach 94 The preliminary design was completed in 2021 for rehabilitation of this large combined trunk located immediately to the west of Commonwealth Stadium. ○ 151 South Large Trunk Rehabilitation The trunk inspection was completed in 2021 to determine rehabilitation scope requirements. Concept design began in 2022. ○ Large Trunk Sewer NEST - NL2 Trunk Rehabilitation Due to high sewer odours in this portion of the NEST system due to previous operational practices, this trunk requires structural rehabilitation within the next few years. In 2021, an access manhole was installed to facilitate inspection to confirm extent of liner required. Construction of the liner is planned for 2022/2023 ○ NEST NL1 Sanitary Chamber Rehabilitation The project scope was evaluated and confirmed based on inspection results in 2021. Rehabilitation is being coordinated with the NL2 work mentioned above. ○ 116 Street - SAN 11 Double Barrel Rehabilitation The design of 3 access manholes was completed and the construction of the access manholes began in 2021.
PREVENT - CORe Duggan Tunnel Project The $86 million CORe Duggan Tunnel Project is essential for addressing sewer corrosion and odour issues in the Steinhauer-Duggan area. The Steinhauer-Duggan sewer corridor is	The Duggan tunnel replacement project is continuing to progress as per the CORe strategy. Detailed design is complete with the design consultant completing the final components to issue the work for construction.

CORe Theme Description	2021 Accomplishments
an area that suffers from chronic, intense sewer odours and rapid asset corrosion. The area has accounted for one out of every ten sewer odour complaints received in the city of Edmonton over the past 20 years. The CORe Duggan Tunnel Project includes the construction of a new, shallower sewer trunk converting this portion of the sanitary network to a fully gravity system eliminating the need to operate the existing Duggan Pump Station.	The Contractor for the project was selected via a competitive bid process in early 2022 with the construction kick off meeting held in June 2022. Risk workshops to finalize the construction plan will occur in the coming months and construction is expected to commence in Q4 of 2022. EPCOR is also evaluating the potential to repurpose the old tunnel as an offline storm water storage tunnel to be used during major storms and reduce the ultimate size requirement for the Duggan dry pond proposed under the SIRP program. Final decision will be made after the new Duggan Sanitary tunnel is completed and the old tunnel can be fully inspected without sanitary sewage flowing to confirm the feasibility of this reconfiguration. If structurally feasible the use as a storm tunnel will avoid the write down of this asset for the utility.
PREVENT - CORe Access Manholes Program and Trunkline Cleaning Program The CORe Access Manhole Program is a critical component of the CORe Strategy under the PREVENT theme. The CORe Access Manhole Program is an annual program that initiates projects to construct access manholes in major trunk lines. There are approximately 170 km of sanitary and combined large trunk sewers (1,200 mm diameter and large) constructed over the past 100 years to varying standards and specifications. Approximately 80 km of the large trunk lines in the city of Edmonton have	Total number of access manholes installed since the start of the CORe program is 11. 5.3 km of sanitary and combined trunkline were inspected in 2021 using Multiple Senor Inspection (MSI) method or Closed-Circuit Television (CCTV) inspection method. Based on the inspection findings, 2.5 km of trunkline have been identified with excessive debris and these trunklines were cleaned in 2021. The trunkline inspection also revealed that 90m of the inspected trunkline has severe surface corrosion and over 3km has moderate surface corrosion Also 2021, 83 existing trunkline access manholes were inspected to confirm accessibility for future trunkline inspections and provide a quick overview scan for the city wide sanitary and combined trunk system since the majority of failures discovered were in near vicinity to drop structures and major changes in flow. This was to identify any trunklines with severe deterioration in the vicinity of the access location and to improve prioritization for

CORe Theme Description	2021 Accomplishments
insufficient access provisions for safe inspection and cleaning purposes. The scope of this program for the 2022-2024 PBR term is to construct a total of 24 additional access locations on major trunk lines. The forecast total program capital expenditures during 2022-2024 is estimated at $17.9 million.	future access manhole construction and cleaning efforts. Action plans including rehabilitation and operational activities have been developed to address these identified corrosion and defects based on the priority impact of failure of the trunk line segments. To improve the efficiency of the trunkline inspection and cleaning work, Master Service Agreements have been established for external trunk inspection and cleaning work in 2021.
OPTIMIZE The purpose for the OPTIMIZE theme is to reduce the stagnation time of sanitary sewage in the network and reduce the opportunity for H2S generation. Operationally there are opportunities to improve pump station and storage area operations to reduce storage times and inspection and cleaning can be employed to target blockages and sediment. By removing impediments to flow and keeping wastewater moving, sewer odours can be significantly reduced. During the 2022-2024 PBR term, the total capital expenditures for pump station improvements is estimated to be $2.7 million.	Three locations were the focus for optimization of pumping in 2021 o Duggan/Allendale Corridor Upgrades to PW 105 were completed to allow for reduction in duration for storage of sanitary sewage flows in the Duggan tunnel during dry weather flow conditions. Reductions in H2S concentrations were noted in the immediate vicinity of the station and in the downstream network multiple blocks away. • NEST\Clareview trunk System The NEST\Clareview trunk system was a primary focus in 2021 due to the conditions noted on the NL2 trunk. This included the addition of access manholes, cleaning of the trunks and optimization of the pumping at PW188 and reconfiguration of the trunk operation with the removal of the weir installed in the vicinity of PW174. H2S concentrations have reduced by 80% in the vicinity of the trunk to a point where they are below the concern threshold for H2S to cause significant future corrosion. • Big Lake Pump stations\Trunk system The Big Lake area, due to its location and neighbourhood configuration is serviced by three sanitary sewer lift stations and contains

CORe Theme Description	2021 Accomplishments
	longer than typical lengths of sewer forcemain which contribute to the risk of increased odours. The chemical feed systems for these pump stations was optimized to determine chemical dosing patterns along with pump set points to manage stagnant flow in the forcemains. This resulted in a reduction of overall odours by 30 to 50% from this system in the immediate vicinity and downstream in northwest Edmonton.
MONITOR The MONITOR theme is to improve EWSI's understanding on the H2S generation mechanism within the sewer system by using real-time monitoring technologies and improved inspection data. This theme is also coordinated with the SIRP PREDICT theme and involves using real-time monitoring technologies to improve wastewater management. Permanent odour monitoring locations will be installed to connect to the Drainage SCADA system. The total expenditure on EWSI's CORe Monitor Project will be \$0.3 million in the 2022-2024 PBR term.	CORe has greatly expanded the internal monitoring capacity to support H2S mitigation and management planning. A total of 80 H2S sewer air, 20 H2S ambient air, 12 H2S liquid and 60 air pressure monitors are now active or available in inventory and are being deployed with the support of additional personnel in the monitoring team. As of 2021, CORe monitoring has been completed at more than 300 sites across the city. Common sites include pump station wet wells, force main discharges, large drop structures and both small and large sewer trunks. The data provides hydrogen sulfide concentrations, pressure, humidity and air temperature values for the monitoring sites. This data has been used to develop and prioritize interventions, improve existing mitigation efforts and measure the overall success of the CORe program as a whole. In addition to the monitors moving in and out of different locations continuous long-term monitoring coverage across the city to track trends in odour and corrosion risk has also been installed. A total of 10 in-sewer locations and 10 above ground ambient locations have been in place continuously since 2020. Five permanent stations are presently being installed in 2022. An additional 15 are planned for 2023-2024 All monitoring data has been made accessible to the entire business unit through integration with the SIRP dashboard platforms

CORe Theme Description	2021 Accomplishments
CONTROL The purpose for the CONTROL theme is to control the release of air from the sewer system by reducing air pressure in the sewers, adding containment structures, and providing controlled release points in areas with lower community impact. The major capital component for this theme is to retrofit existing drop manholes with proper ventilation system structures that reduce the downstream air pressurization of a sewer and reduce the potential for sewer gases to exit the system at catchbasins and manholes Other containment work will include the installation of flaps, ventilation units, and sealing manholes. EWSI is forecasting capital expenditures under this theme to be $24 million during the 2022-2024 PBR term in the CORe Drop Structure Modification Program ($22 million) and in other containment projects ($2 million).	To date, eight drop structure modification projects have been completed in the Allendale / Strathcona communities with another five presently under design or in construction across the city. More than 30 one way flaps and 10 manholes seals have been installed to date under CORe. The installations have proven to be very effective at reducing odour nuisance. The team also completed a detailed review of the five existing odour control systems installed on the sewer trunks. This included a review of performance and maintenance challenges at each location. Based on the review, two of the locations are no longer functional as designed and alternative approaches to odour mitigation are being implemented.

Appendix A: PBR Plan 2017-2021

A.1 In-City Water and Wastewater

A.1.1 PBR Framework

EWSI's In-City Water and Wastewater rates for the 2017-2021 PBR term are regulated by Edmonton City Council in accordance with the PBR Plan approved in Bylaw 17698. This plan encompasses rates, performance measures, and return on equity. The relationships between these components are designed to ensure that capital and operating cost decisions provide a balance between operational performance, rates, and return on equity, while safeguarding system reliability and service quality, providing fair, stable, predictable rates to rate payers, and providing a basis for the future development of the water and wastewater treatments system.

- **PBR Rates.** Annual changes to In-City Water and Wastewater rates are limited to inflation, less an efficiency factor, plus Special Rate Adjustments and, in rare cases, Non-Routine Adjustments. The use of a formulaic approach for calculating and setting utility rates acts as a "price cap" providing ratepayers with stable and predictable rates. The efficiency factor, set at 0.25% for the 2017-2021 PBR term, requires EWSI to increase productivity and achieve efficiencies in excess of inflation if it is to meet it targeted return on equity.

- **Performance Measures.** EWSI's PBR framework includes performance measures for water and wastewater treatment system service quality as described in Schedule 3, Sections 3 and 4 of the Bylaw. EWSI faces financial penalties if it does not meet or exceed performance measure standards, providing assurance to customers that water and wastewater treatment system service quality will not be sacrificed to keep rates low or increase returns to EWSI. EWSI's performance measures are audited annually by an independent accounting firm.

- **Return on Equity.** The PBR plan incorporates a forecast rate of return on equity commensurate with consumption, cost and other risks that allows EWSI to finance its operational and capital programs, to provide its customers with high levels of service quality and reliability, and to provide "just and reasonable" returns to its shareholder. Achieving this return is dependent on EWSI achieving operating cost efficiencies, meeting or exceeding performance standards, and developing the utility infrastructure needed to provide service to its customers. For the 2017-2021 PBR term, returns on equity are based on a deemed capital structure of 60% debt and 40% equity and a 10.175% rate of return on equity.

A.1.2 Risks and Incentives

The PBR framework provides incentives for EWSI to improve operational performance while achieving cost savings through process improvements and other means. Under this framework, EWSI also assumes the risks associated with water consumption, operating costs, financing costs and capital costs, ensuring that customers are provided with stable and predictable rate increases. These risks and EWSI's strategies to mitigate them include:

- **Water Consumption Risk.** Under PBR, EWSI bears all of the risks associated with weather-related fluctuations in water consumption and water quality, as well as the longer-term risks associated with declining consumption per customer. EWSI seeks to mitigate consumption risk through the use of robust forecasting methodologies incorporating long term trends in water consumption.

- **Operating Cost Risk**. EWSI actively works to minimize fluctuations in input prices through long-term power contracts, chemical optimization processes, and continuous efforts to implement cost reduction strategies in all areas of its operations.

- **Interest Risk**. Fluctuations in short-term interest rates, long-term debt issue costs and in the level of capitalized interest have significant impacts on EWSI's net income and return on equity. EWSI mitigates interest risk through timing of long-term debt issuances and optimizing working capital.

- **Capital Cost Risk.** In-City Water and Wastewater's operations are capital intensive and it is often difficult to forecast required levels of capital replacements, both at the plants and in the water distribution and transmission network. EWSI seeks to minimize these risks through comprehensive capital project and asset management programs, ensuring that new projects or changes to existing projects are justified and that there is an appropriate level of management, senior management and executive oversight over capital spending.

A.1.3 Customer Classes and Rate Structure

A.1.3.1 In-City Water

In-City Water rates consist of fixed monthly service charges that vary with meter size and variable charges applied to each cubic metre of water consumed. Consumption charges differ for each of In-City Water's customer classes. These classes and their rate structures include:

- **Residential Customer Class.** Residential customers are charged based on an inclining rate structure with three consumption blocks. The inclining rate structure is intended to promote water conservation and provide incentives for residential customers to use water efficiently.

- **Multi-Residential Customer Class.** Multi-residential customers are charged based on a declining rate structure with three consumption blocks. EWSI has found that the cost of providing water to individual multi-residential customers declines as the size of the multi-residential building increases. As well, there is a wide range of consumption volumes for multi-residential customers. Accordingly, a declining rate structure best reflects the cost characteristics of this customer class.

- **Commercial Customer Class.** Similar to multi-residential customers, commercial customers are charged based on a declining rate structure, but with five consumption blocks to recognize the wide range of average consumption volumes within this customer class.

The 2017-2021 PBR Plan includes three Special Rate Adjustments for In-City Water:

- **Special Rate Adjustment for Rebasing**. The In-City Water revenue requirement was rebased at the beginning of the 2017-2021 PBR term. The resulting rebasing adjustment to rates includes the on-going benefits to rate-payers of efficiency gains realized in the 2012-2016 PBR term, the impacts of higher than forecast capital expenditures during the 2012-2016 PBR term; and increases in the capital expenditure programs for the 2017-2021 PBR term. Also included in the rebasing adjustments is the impact of EWSI's cost of service study which has resulted in redistribution of revenue requirements from the Residential and Multi-Residential customer classes to the Commercial customer class.

- **Special Rate Adjustment for Accelerated Programs.** These Special Rate Adjustments support the acceleration of the replacement of water mains as part of the City of Edmonton's neighbourhood renewal program and the upgrade of water mains to increase fire protection capacity in neighbourhoods experiencing increased densities as a result of infill development.
- **Special Rate Adjustments for Environmental Programs.** EWSI is undertaking two significant environmental initiatives during the 2017-2021 PBR term. The first initiative is an extensive River Monitoring Project to regularly monitor, evaluate and report on a number of water quality variables from several sampling sites in the river for 2018-2021. This program is forecast to have annual costs of $1.0 million starting in 2018. The second initiative, which aligns with the City's *"The Way We Green"* strategy, is a Green Power Initiative to replace approximately 10% of EWSI's total power volumes with energy from locally produced renewable sources starting in 2018. This initiative is forecast to cost $1.9 million annually commencing in 2018.

A.1.3.2 Wastewater Treatment

Wastewater treatment rates consist of fixed monthly service charges that are applied equally to each customer and variable charges applied to each cubic meter of water consumed. Wastewater has two customer classes:

- **Residential Customer Class.** Unlike In-City Water, there are no separate rates for multi-residential customers. Instead, customers who would be multi-residential water customers are subject to the same rates as residential wastewater customers. The common rate structure for residential and multi-residential customers recognizes that the costs of wastewater treatment are very similar for residential and multi-residential customers. Accordingly, charges to Residential customers are based on a flat rate structure with a single consumption block.

- **Commercial Customer Class.** Consumption charges for commercial customers are based on a declining rate structure with three consumption blocks to recognize that there are economies of scale in wastewater treatment for larger commercial customers. In addition, commercial customers are charged overstrength fees for prescribed materials that exceed the concentrations shown in Section 4 of Schedule 1 to Bylaw 17698.

The 2017-2021 PBR Plan includes a single special rate adjustment for rebasing. Similar to In-City Water, Wastewater's revenue requirement was rebased at the beginning of the 2017-2021 PBR term to reflect efficiency gains realized in the 2012-2016 PBR term, as well as the substantial increases in capital spending needed to deal with the challenges of the aging infrastructure at the Gold Bar Wastewater Treatment Plant.

A.2 Drainage

A.2.1 PBR Framework

EWSI's Drainage rates for the 2018-2022 PBR term are regulated by Edmonton City Council in accordance with the PBR Plan approved in the EPCOR Drainage Services Bylaw 18100. Similar to In-City Water and Wastewater, Drainage's 2018-2022 PBR plan encompasses rates and performance measures, but the mechanisms used to achieve a balance between rates and operational performance differ in important respects, as follows:

- **PBR Rates.** Bylaw 18100 prescribes drainage fees and charges for the period from January 1, 2018 to March 31, 2022. These fees and charges reflect EWSI's commitment to limit average annual rate increases to 3%. Besides these scheduled rate increases, Bylaw 18100 also includes a mechanism for non-routine adjustments to rates related to emergent City-directed needs.

- **Performance Measures.** Bylaw 18100 requires Drainage to measure operational performance for the period from January 1, 2018 to December 31, 2019 using performance measures for drainage system service quality modeled after previous City Drainage Services quality metrics. After that time, for the remainder of the 2018-2021 PBR term, Drainage's operational performance will be measured against new performance measures that will be developed Drainage and approved by the Utility Committee. Similar to Water and Wastewater, the new performance measures have a scoring system with financial penalties applied if Drainage does not meet or exceed performance standards. As with Water and Wastewater Treatment, the performance measures scorecard will be audited annually by an independent accounting firm.

A.2.2 Customer Classes and Rate Structure

Drainage has Residential, Multi-Residential and Commercial Customer classes, using the same customer definitions as Water. Drainage's rate revenues are derived from both Sanitary Utility and Stormwater Utility services.

- Drainage has a simple rate structure, with flat monthly service charges varying only by meter size regardless of customer class and the same monthly variable rate per cubic meter applicable to all customers, regardless of customer class, except the University of Alberta which has a unique rate, intended to recognize its lower servicing cost.

- Stormwater Utility revenues are based on the area of the customer's property, development intensity, and zoning, also with common rates regardless of customer class.

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EPCOR

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1 Executive Summary

This report provides the annual update to the City of Edmonton on the operational and financial results for the year ended December 31, 2022 for water and fire protection services ("In-City Water"), wastewater treatment services ("Wastewater"), and sanitary and stormwater utility services ("Drainage Services") provided within Edmonton by EPCOR Water Services Inc. ("EWSI"). Throughout this report, reference will be made to "EPCOR Water Services" and "EPCOR Drainage Services" as these were the EPCOR business units that existed in 2022. Since July 3, 2023, EPCOR Water Services and Drainage Services have been amalgamated into a single business unit, that will be responsible for the ongoing commitments for the PBR plans referenced in this report. Edmonton City Council regulates In-City Water in accordance with the 2022-2026 Performance Based Regulation ("PBR") Plans approved in EPCOR Water Services Bylaw No. 19626 ("Bylaw 19626") and Drainage and Wastewater Treatment services in accordance with the 2022-2024 PBR Plan approved in EPCOR Drainage Services Bylaw No. 19627 ("Bylaw 19627"). The key features of these plans, which encompass rates, performance measures, and return on equity are described in Appendix A.

1.1 Financial Performance

In-City Water, Wastewater and Drainage Services' financial performance[1] for 2022 are summarized in Table 1.1-1 below:

Table 1.1-1
Revenue and Return on Equity
($ millions)

		A	B
		2022	
		PBR Forecast	**Actual**
1	**In-City Water**		
2	Regulated revenue	220.1	223.1
3	Return on equity	42.0	43.0
4	Rate of return on equity	7.90%	8.36%
5	**Wastewater**		
6	Regulated revenue	122.1	124.2
7	Return on equity	21.7	25.1
8	Rate of return on equity	9.94%	12.44%

[1] Consistent with the 2022-2024/2026 PBR Applications, all financial data in this report, including totals and sub-totals, are rounded to the nearest $0.1 million to ensure continuity of data between tables and between years. However, the sum of the rounded financial data in certain tables may not be equal to the related rounded total or sub-total.

		A	B
		2022	
		PBR Forecast	Actual
9	**Drainage Services**		
10	Regulated revenue	236.4	238.6
11	Return on equity	43.8	41.8
12	Rate of return on equity	6.31%	6.18%

Table 1.1-1 shows that 2022 actual financial performance, as measured by return on equity for In-City Water and Drainage Services was close to target, while 2022 financial performance for Wastewater Treatment exceeded the PBR forecast. Higher than forecast revenues were attributable to higher than forecast customer growth and higher than forecast consumption prior to the introduction of the consumption deferral on April 1, 2022. Actual to forecast differences in return on equity in 2022 for each utility are as follows:

- **In-City Water** achieved an 8.36% rate of return on equity, slightly higher than the forecast rate of return of 7.90%, largely due to higher than forecast revenue resulting from higher customer growth and higher water consumption prior to the introduction of the consumption deferral.

- **Wastewater** achieved a 12.44% rate of return on equity, compared to the forecast rate of return of 9.94%, reflecting higher than forecast revenue, lower than forecast operating expenses and a lower than forecast rate base due to lower capital additions over the 2017 to 2021 period resulting from project deferrals and other adjustments to the capital program.

- **Drainage Services** achieved a 6.18% rate of return on equity, slightly lower than its PBR forecast rate of return of 6.31%, with higher than forecast operating expenses, partially offset by higher than forecast revenue as well as lower than forecast depreciation and rate base. Operating expenses were higher primarily due to higher than anticipated costs for trunk cleaning and inspections due to the amount of solids found within the trunk network and longer than anticipated use of leased facilities due to the delayed move to the new shared facility, resulting in higher costs than forecast. Revenue was higher due to higher customer growth.

Detailed analyses of In-City Water, Wastewater and Drainage Services' financial performance for 2022 are provided in Sections 2.1, 2.2, and 2.3, respectively, of this report.

1.2 Capital Expenditures

In-City Water, Wastewater and Drainage Services' capital expenditures for 2022 and for the PBR Term (the "2022-2026 Water PBR term" and "2022-2024 Wastewater and Drainage PBR term") are summarized in Table 1.2-1 below:

Table 1.2-1
Capital Expenditures
($ millions)

	A	B	C	D
	2022		2022-2024/2026	
Capital Expenditures	PBR Forecast	Actual	PBR Forecast	Current Projection
In-City Water	91.5	126.2	429.3	550.8
Wastewater	52.1	45.7	171.7	177.0
Drainage Services	226.7	239.1	754.3	776.8

Over the course of the PBR term, changes to capital programs are required to address unforeseen needs for repairs or rehabilitation, changes in regulatory or operational requirements, customer demands, and other external factors. These changes are coordinated through EWSI's Capital Governance and Review group and are authorized by EWSI's Capital Project Steering Committee, EPCOR Utility Inc.'s (EUI) Financial Review Council, or EPCOR's Board of Directors, depending on the amount of the expenditure. EWSI also presents information on its capital programs, as well as business cases supporting significant new capital projects (i.e., not already included in the approved PBR application), to the City of Edmonton's Utility Committee.

- **In-City Water's** 2022-2026 projected capital expenditures of $550.8 million are $121.4 million (28%) greater than the PBR forecast. Significant projects contributing to this variance include projects that were delayed and carried over from the 2017-2021 PBR term, including the kīsikāw pīsim Solar Farm and Battery Storage System, Phosphoric Injection for Lead Control, and the Water/Drainage Real Estate Consolidation Project ($46.3 million); a higher than anticipated volume of utility infrastructure relocate requests from the City of Edmonton related to the LRT expansion, Yellowhead Trail upgrades, and water distribution main relocates ($40.0 million); and an increase in developer-driven growth projects such as the Network Private Development Transmission Mains Program and Water Services Connections Program ($36.6 million).

- **Wastewater's** 2022-2024 projected capital expenditures of $177 million are $5.3 million (3%) slightly greater than the PBR forecast. This difference reflects considerable efforts to rebalance Wastewater's capital program in response to changing priorities to ensure that Wastewater continues to provide a high level of service to its customers while mitigating risks and maintaining performance standards.

- **Drainage Services'** 2022-2024 projected capital expenditures of $776.8 million are $22.5 million (3%) slightly greater than the PBR forecast. This difference reflects various shifts between programs as Drainage Services continues to refine and reprioritize its overall capital expenditures program to address asset condition, mitigate the risk of failure, and maintain required service levels, while staying as close as possible to the approved capital envelope.

Detailed explanations for differences between capital expenditures in PBR forecast and EWSI's current projections are provided in Sections 2.1.5, 2.2.5 and 2.3.5.

1.3 Operational Performance

In-City Water's operational performance is measured by the results of indices prescribed in Schedule 3, Section 3 of Bylaw 19626 with each index consisting of one or more performance measures. Wastewater treatment and Drainage Services' operational performance is measured by the results of indices prescribed in Schedule 3, Section 3 and Section 4 of Bylaw 19627.

Operational performance under each index is measured independently on a points basis with 100 base points available if the standards for all performance measure indices are achieved. Bonus points are available for performance above standards and financial penalties are applied if EWSI does not meet the 100 base point standard.

In 2022, In-City Water exceeded the performance standards for all five of its performance measure indices, Wastewater treatment exceeded the performance standards for three of its four performance measure indices, and Drainage Services exceeded the performance standards for all four of its performance measure indices. Actual operational performance for each of the indices are summarized in Table 1.3-1 and discussed in Section 3 of this report.

Table 1.3-1
2022 Performance Measures and Standards

		A	B	C	D	E	F
	Performance Index	**In-City Water**		**Wastewater**		**Drainage Services**	
		Standard	**Actual Score**	**Standard**	**Actual Score**	**Standard**	**Actual Score**
1	Water Quality Index[2]	30.00	30.00	45.00	49.50	-	-
2	Customer Service Index	15.00	17.25	15.00	16.50	20.00	22.00
3	System Reliability and Optimization Index	25.00	28.25	25.00	24.70	30.00	31.60
4	Environmental Index[2]	15.00	17.25	-	-	35.00	38.50
5	Safety Index	15.00	17.25	15.00	15.20	15.00	16.50
6	**Aggregate Points Earned**	**100.00**	**110.00**	**100.00**	**105.90**	**100.00**	**108.60**

1.4 Rates and Bill Comparisons

In 2022, the average residential customer's monthly bill for In-City Water services, based on an average monthly consumption of 14.0 m^3, was **$41.90**, an increase of $2.75 (7.0%) from 2021. This increase is largely due to the addition of a fixed monthly charge for public fire

[2] Water Quality and Environmental are combined into one index for Wastewater's and Drainage's operational performance

protection services of $2.54 (6.5%). Prior to 2022, the cost of public fire protection was recovered by the City of Edmonton through property taxes.

The average residential customer's monthly wastewater treatment and sanitary drainage services bill in 2022, also based on an average monthly consumption of 14.0 m^3, was **$51.63**, an increase of $5.05 (10.9%) from 2021. This increase includes a special rate adjustment of $2.94 related to the corrosion/odour mitigation program approved as a separate initiative by City Council. The remainder of the increase reflects other capital and operating revenue requirement changes approved in the PBR applications.

The average residential customer's monthly stormwater drainage services bill in 2022, was **$14.94**, an increase of $1.19 (8.6%) from 2021. The 2022 bill includes a special rate adjustment of $2.29 for climate-related flood mitigation program costs approved by City Council following extensive engagement and consultation with stakeholders and reflects other capital and operating revenue requirement changes approved in the PBR applications.

EWSI undertakes annual bill comparison surveys with various cities and local municipalities. EWSI's residential water bills are competitive with most cities and municipalities included in the comparison. Drainage and Wastewater treatment bills are more difficult to compare because of variations in the nature and extent of wastewater treatment, the inclusion of certain services in property taxes, and geographic and climatic factors that influence the level of investment and approach to flood mitigation. EWSI has been proactive in addressing the increased risk of flooding related to climate change and is making substantial investments through its Stormwater Integrated Resource Plan program to assess and mitigate these risks. EWSI's average wastewater treatment and drainage bills are comparable to cities that have started addressing risks related to climate change.

1.5 Consumption Deferral Account

For the 2022-2024/2026 PBR terms, City Council directed that EWSI establish *"a deferral account for water consumption for each of Water Services, Wastewater Treatment and Drainage Services that would be accumulated during the 2022-2026 and 2022-2024 PBR terms and included in customer rates in each of the next PBR terms through a special rate adjustment"*. The effect of the consumption deferral on 2022 Water Services, Wastewater Treatment and Drainages Services is summarized in Table 1.5-1 below. This table shows that actual consumption from the beginning of the 2022-2026 PBR term starting April 1, 2022 to December 31, 2022, was greater than forecast due to higher than forecast customer growth, a hot and dry summer resulting in increased consumption per customer, and commercial consumption recovering to pre-pandemic levels more rapidly than anticipated in the PBR forecast. The cumulative effect of these factors results in EWSI accumulating $19.7 million during 2022 in the consumption deferral account which will be refunded to customers in the next PBR term as outlined and approved in the PBR Bylaws.

Table 1.5-1
In-City Water
Consumption Deferral

		A	B	C	D
		Consumption (ML)		Consumption Deferral	
		Forecast	Actual	ML	$M
1	In-City Water	64,547	69,673	5,127	8.1
2	Wastewater Treatment	62,323	67,289	4,966	5.5
3	Drainage Services	62,319	67,277	4,958	6.1
4	**Total Deferral**				**19.7**

1.6 Non-Routine Adjustments

Non-routine adjustments are defined in Bylaw 19626 for In-City Water Services and in Bylaw 19627 for Stormwater Utility Services, Sanitary Utility Services and Wastewater Treatment Services, as items that are “by their nature unusual, significant in size or nature and beyond the scope of control of EWSI”. Bylaws 19626 and 19627 allow EWSI to request positive or negative non-routine adjustments to rates from either the City Manager or City Council, depending on the revenue requirement threshold specified in the respective Bylaws.

All non-routine adjustments applied for by EWSI during the 2022-2024 / 2022-2026 PBR terms are to be charged to the Adjustment Deferral Accounts. A two-step approach is then followed whereby EWSI would receive interim approval and funding for the proposed adjustment with a final true up of funding being completed based on actual costs.

During 2022, EWSI did not seek approval for any non-routine adjustments that met the criteria outlined in Schedule 3, Section 5.0 of Bylaws 19626 and 19627. EWSI may request approval in the future for expenditures that meet the non-routine adjustment criteria.

2 Financial Performance

2.1 In-City Water & Fire Protection

The City of Edmonton regulates water services and fire protection services provided by EWSI within the boundaries of the City of Edmonton ("In-City Water"). In addition to these services, EWSI provides water services to regional water customers pursuant to bulk water supply agreements with each regional water customer. Due to the fully integrated nature of EWSI's water system, operating expenses, capital expenditures, depreciation and amortization and rate base are presented and analyzed on a total system basis in Sections 2.1.3 to 2.1.10. In-City Water's share of the total system costs are calculated in accordance with a cost of service model developed jointly by EWSI, the Regional Water Customers Group (RWCG) and the City of Edmonton, shown as separate line items in each applicable table.

In-City Water's 2022 regulated revenues and revenue requirements are summarized in Table 2.1-1 below:

Table 2.1-1
In-City Water
Revenue and Revenue Requirements
($ millions)

		A	B
		2022	
	Description	**PBR Forecast**	**Actual**
1	Regulated revenue	220.1	223.1
2	Revenue requirement		
3	Operations and maintenance expenses	112.2	112.8
4	Less: revenue offsets	(6.3)	(4.2)
5	Depreciation and amortization	38.9	37.6
6	Return on rate base financed by debt	33.2	33.9
7	Return on rate base financed by equity	42.0	43.0
8	Revenue requirement	220.1	223.1
9	**Return on rate base financed by equity***	**7.90%**	**8.36%**

* In the PBR forecast, the special rate adjustment for rebasing is smoothed over the PBR term to mitigate "rate shock" at the beginning of the PBR term. Therefore, although EWSI's PBR forecast for the 2022-2026 PBR term is based on its awarded rate of return on 9.64%, PBR forecast rates of return for individual years of the PBR will differ from awarded ROE.

In 2022, EWSI achieved a rate of return on equity of 8.36%, slightly greater than its forecast rate of return of 7.90%. The factors contributing to forecast to actual differences are explained in Sections 2.1.1 to 2.1.9.

2.1.1 Customers and Consumption

In-City Water provides services to three customer classes:

1) **Residential**, defined as a service supplied to premises used primarily for domestic purposes, where no more than four separate dwelling units are metered by a single water meter and the service line to the premises is not greater than 50 millimeters in diameter;

2) **Multi-Residential**, defined as a service supplied to premises used primarily for domestic purposes; where more than four separate dwelling units are metered by a single water meter; and

3) **Commercial**, defined as a commercial, industrial and institutional customers within the City of Edmonton and all water customers not otherwise defined as Residential or Multi-Residential water service customers.

These classes are unchanged from the previous PBR term. Average monthly customer counts, total annual consumption and monthly consumption per customer are shown in Table 2.1.1-1 below:

Table 2.1.1-1
In-City Water
Customers, Consumption and Consumption per Customer

		A	B
	Customers and Consumption	**2022**	
		PBR Forecast	**Actual**
1	**Customers** (average active services per month)		
2	Residential	278,978	282,685
3	Multi-Residential	3,789	3,800
4	Commercial	19,920	20,151
5	**Total Customers**	**302,687**	**306,636**
6	**Annual Consumption** (ML)		
7	Residential	44,870	47,400
8	Multi-Residential	17,658	18,695
9	Commercial	21,541	24,581
10	**Total Annual Consumption**	**84,069**	**90,623**
11	**Consumption per Customer** (m^3 per month)		
12	Residential	13.4	14.0
13	Multi-Residential	388.4	410.0
14	Commercial	90.1	101.7

The factors contributing to the differences between actual and forecast for 2022 are explained below:

- **Customer growth**, while higher than forecast, is consistent with historic growth rates. EWSI's PBR forecast was prepared during mid-2020 and anticipated a reduction in migration into Edmonton due to the COVID-19 pandemic, resulting in lower anticipated customer growth. In reality, 2021 and 2022 residential customer growth rates remained at or near pre-pandemic levels, resulting in higher than expected customer counts at the beginning of the current PBR term.

- **Consumption**
    - **Residential** – 2,530 ML (5.6%) greater than forecast, with 596 ML due to higher customer growth and 1,934 ML due to higher per customer consumption. Higher per customer consumption reflected both weather-related variation due to unusually hot and dry weather, as well as the on-going COVID-19 impacts of more people working at home;
    - **Multi-Residential** – 1,037 ML (5.9%) greater than forecast, with 53 ML due to customer growth and 983 ML due to higher per customer consumption. In addition to weather-related variation, EWSI added several very large multi-residential customers in 2022. Because of the small number of customers in this class and the variation in the number of units per customer, the addition of large customers can have outsized effects on consumption per customer; and
    - **Commercial** – 3,040 ML (14.1%) greater than forecast, with 220 ML due to higher than forecast customer growth and 2,820 ML due to higher consumption per customer. Similar to the residential customer class, weather-related variation contributed to the increase in commercial consumption per customer.

2.1.2 Revenue

In-City Water rates consist of fixed monthly service charges that vary with meter size and variable charges per cubic meter of water consumed. For the 2022-2026 PBR term, City Council directed EWSI to make the following two significant adjustments:

1. Include *"recovery of the public fire protection revenue requirement through water rates over the 2022-2026 PBR term by adding a special rate adjustment for public fire protection services to In-City Water's fixed monthly charges"*. Similar to water fixed monthly service charges, fire protection charges vary by meter size, but also by customer class, because of different fire flow requirements for each customer class. In prior years, the fire protection revenue requirement was recovered through property taxes; and

2. Establish *"a deferral account for water consumption for each of Water Services, Wastewater Treatment and Drainage Services that would be accumulated during the 2022-2026 and 2022-2024 PBR terms and included in customer rates in each of the next PBR terms through a special rate adjustment"*.

The effect of the consumption deferral on 2022 In-City water is summarized in Table 2.1.2-1 below. This table shows that actual consumption from the beginning of the 2022-2026 PBR term starting April 1, 2022 to December 31, 2022 was 5,127 ML greater than forecast, resulting in a deferral of $8.1 million that will be refunded to customers in the next PBR term.

Table 2.1.2-1
In-City Water
Consumption Deferral

		A	B	C	D
		Consumption (ML)		**Consumption Deferral**	
		PBR Forecast	**Actual**	**ML**	**$M**
1	Residential	34,391	36,336	1,944	3.9
2	Multi-Residential	13,351	14,254	903	1.3
3	Commercial	16,805	19,084	2,279	3.0
4	**Total Consumption**	**64,547**	**69,673**	**5,127**	**8.1**

Table 2.1.2-2 below provides a comparison of 2022 In-City Water revenues to the PBR forecast.

Table 2.1.2-2
In-City Water
Revenue
($ millions)

		A	B
		2022	
	Description	**PBR Forecast**	**Actual**
1	In-City Water		
2	Fixed monthly service charges		
3	Residential	38.3	38.8
4	Multi-residential	2.4	2.4
5	Commercial	6.9	7.1
6	Fixed monthly service charges	47.5	48.3
7	Consumption charges billed to customers		
8	Residential	98.4	103.5
9	Multi-residential	29.5	30.8
10	Commercial	29.3	33.1
11	Consumption charges billed to customers	157.2	167.5
12	Less: Consumption deferral		
13	Residential	-	(3.9)
14	Multi-residential	-	(1.3)
15	Commercial	-	(3.0)
16	Consumption deferral		(8.1)
17	Consumption charges, net of deferral		
18	Residential	98.4	99.6
19	Multi-residential	29.5	29.6
20	Commercial	29.3	30.2
21	Consumption charges, net of deferral	157.2	159.3
22	**In-City Water revenue**	**204.7**	**207.7**

		A	B
		2022	
	Description	**PBR Forecast**	**Actual**
23	Fire Protection		
24	Public fire protection	12.6	12.8
25	Private fire protection	2.8	2.6
26	**Fire Protection revenue**	**15.4**	**15.4**
27	**Regulated Revenue**	**220.1**	**223.1**
28	Other revenue ("revenue offsets")	6.3	4.6
29	**In-City Revenue**	**226.3**	**227.7**

Actual In-City revenue for 2022 was within 0.7% of the PBR forecast. This difference was attributable to the following factors:

- **Fixed monthly service charges** - $0.8 million greater than forecast due to higher customer counts.

- **Consumption charges** - $2.1 million greater than forecast, due to higher than forecast consumption per customer during the first three months of 2022, prior to the introduction of the consumption deferral, and higher than forecast customer growth.

- **Fire protection charges** - Prior to the 2022-2026 PBR term, public fire protection charges were not billed directly to EWSI's customers. Instead, the cost of providing public fire protection, including dedicated reservoir capacity, oversizing of distribution mains to provide required fire flows and providing and maintaining fire hydrants, were charged directly to Edmonton Fire Rescue Services pursuant to a fire protection contract and were recovered through property taxes. As directed by City Council, effective April 1, 2022, EWSI charges customers directly for the costs of fire protection services. These charges vary by meter size and by customer class.

- **Other revenues** - $1.7 million lower than forecast. Other revenue ("revenue offsets") are derived from temporary services, connection fees, water permits, late payment charges and other incidental services, as well as a regulatory adjustment of $1.0 million per year related to an over-collection of charges for valve casings and service box replacements during the 2017-2021 PBR term. The regulatory adjustment refunds this over-collection to customers through an increase in forecast other revenue, reducing the forecast revenue requirement and, therefore, rates over the 2022-2026 PBR term. The remainder of the variance relates to numerous small items, none of which were significant.

2.1.3 Operating Expenses by Function

Table 2.1.3-1 below provides a comparison of EWSI's total water system operating expenses for 2022 to the PBR forecast.

Table 2.1.3-1
EWSI Total System
Operating Expenses by Function
($ millions)

		A	B
		2022	
	Function	**PBR Forecast**	**Actual**
1	Power, Other Utilities and Chemicals		
2	Power and Other Utilities	10.5	12.4
3	Chemicals	12.5	8.5
4	Power, Other Utilities and Chemicals	23.0	20.9
5	Water Operations		
6	Water Treatment Plants	24.0	21.5
7	Water Distribution and Transmission	22.9	22.7
8	Operational Support Services	12.7	12.3
9	Less: Capitalized Overhead Costs	(9.1)	(7.1)
10	Water Operations	50.5	49.4
11	Billing, Meters and Customer Service	11.6	10.5
12	EWSI Shared Services	14.4	17.6
13	Corporate Shared Services	13.6	13.7
14	Franchise Fees and Property Taxes	17.6	18.4
15	**Total Operating Expenses**	**130.7**	**130.5**
16	In-City Share - %	85.9%	86.4%
17	**In-City Share of Operating Expenses**	**112.2**	**112.8**

Overall, total operating expenses for 2022 were $0.2 million lower than forecast. Explanations for significant variances include:

- **Power and Other Utilities** – $1.9 million greater than forecast due to higher water consumption per customer due to higher seasonal temperatures and higher customer growth, resulting in higher than forecast power consumption to treat and distribute water. In addition, delayed energization of the kīsikāw pīsim solar farm because of delayed regulatory approval resulted in higher net purchase of power than forecast for 2022.

- **Chemicals** – $4.0 million lower than forecast, with favourable water quality providing $3.1 million of savings due to lower usage of alum, carbon and caustic soda, and delays in implementing the phosphoric injection for lead mitigation project due to COVID-19, which resulted in a $0.9 million reduction in phosphoric acid purchases.

- **Water Treatment Plants** – $2.5 million lower than forecast primarily due to lower salary and benefits costs of $1.0 million due to vacancies and $1.1 million lower contractor costs related to snow removal, lower general maintenance for the kīsikāw pīsim solar farm due to delayed energization and lower contractor spend on various miscellaneous activities.

- **Billing, Meters, and Customer Service** – $1.1 million lower than forecast primarily due to lower costs related to the move to the new Water/Drainage Shared Facility (Aurum facility).

- **EWSI Shared Services** – $3.2 million greater than forecast primarily due to higher salary and labour costs.

- **Franchise Fees and Property Taxes** – $0.8 million greater than forecast due to higher than forecast billed revenue. Franchise fees are calculated as 8% of eligible revenues less the municipal portion of property taxes. As noted in Section 2.1.2 above, water revenues were higher than forecast resulting in higher franchise fees paid to the City of Edmonton in 2022.

- In 2022, In-City Water's share of operating expenses were $112.8 million (86.4%), compared to $112.2 million (85.9%) in the PBR forecast. System wide costs are allocated between In-City customers and the RWCG using a cost of service model which was jointly developed by EWSI, RWCG and the City of Edmonton. The slight increase (0.5%) in In-City Water's share of operating expenses were primarily due to higher salary costs incurred by shared services groups providing support to the business unit because of wage inflation.

2.1.4 Operating Expenses by Cost Category

Table 2.1.4-1 below provides a breakdown of operating expenses by cost category for rows 10, 11 and 12 from Table 2.1.3-1.

Table 2.1.4-1
EWSI Total System
Operating Expenses by Cost Category
($ millions)

		A	B
		2022	
	Cost Category	**PBR Forecast**	**Actual**
1	Water Operations		
2	Staff costs and employee benefits	32.6	32.8
3	Contractors and consultants	8.6	8.0
4	Materials and supplies	3.7	3.8
5	Vehicles	0.4	0.9
6	Other	5.2	3.8
7	**Water Operations**	**50.5**	**49.4**
8	Billing, Meters and Customer Service		
9	Customer billing and collection services	8.2	8.8
10	Staff costs and employee benefits	6.4	5.4
11	Contractors and consultants	1.2	0.1
12	Vehicles	0.3	0.1
13	Other	1.2	0.8
14	Meter reading services (Recoveries)	(5.7)	(4.7)
15	**Billing, Meters and Customer Service**	**11.6**	**10.5**
16	EWSI Shared Services		
17	EWSI shared services allocation	10.5	12.5
18	Staff costs and employee benefits	3.6	4.9
19	Contractors and consultants	0.2	0.3
20	Other	0.2	(0.0)
21	EWSI Shared Services	**14.4**	**17.6**

2.1.5 Capital Expenditures by Major Project and Category

Table 2.1.5-1 compares PBR forecast to actual capital expenditures for 2022 by major category and by individual projects/programs in excess of $5.0 million. Table 2.1.5-1 also provides a comparison of the total 2022-2026 PBR forecast capital expenditures to EWSI's current forecast for the PBR term. Detailed variance explanations are provided below.

Table 2.1.5-1
EWSI Total System
Capital Expenditures
($ millions)

		A	B	C	D	E	F	
		Current Year			2022-2026			
	Major Category and Project	PBR Forecast	Actual	Variance	PBR Forecast	Projection	Variance	Note
1	**Health, Safety and Environment**							
2	kīsikāw pīsim Solar Farm and Battery Energy Storage System	1.0	16.8	(15.8)	1.0	20.4	(19.4)	1
3	Rossdale Ammonia Upgrades - Conversion to LAS	-	0.1	(0.1)	-	7.2	(7.2)	2
4	Projects < $5 million	2.4	1.3	1.1	10.4	7.3	3.1	
5	Subtotal	3.4	18.2	(14.8)	11.4	34.9	(23.5)	
6	**Regulatory**							
7	Water Services Replacement and Refurbishment Program	5.8	5.9	(0.1)	24.7	25.0	(0.3)	
8	Phosphoric Injection for Lead Control	-	9.7	(9.7)	-	10.8	(10.8)	3
9	Projects < $5 million	-	-	-	0.8	-	0.8	
10	Subtotal	5.8	15.6	(9.8)	25.5	35.8	(10.3)	
11	**Growth/Customer Requirements**							
12	Water Service Connections Program	5.4	6.6	(1.2)	28.4	40.9	(12.5)	4
13	Network Private Development Transmission Mains Program	4.6	23.6	(19.0)	15.0	39.9	(24.9)	5
14	QEII / 41 Avenue Crossing Project	-	-	-	14.1	13.4	0.7	
15	New Meter Purchases and Installations Program	2.6	1.9	0.8	13.9	13.5	0.3	
16	Customer Distribution Main Infrastructure Requests	2.1	3.2	(1.1)	11.2	12.2	(1.0)	
17	LRT Relocates Program	5.0	5.5	(0.5)	10.3	19.4	(9.2)	6
18	Private Development Construction Coordination Program	1.8	2.7	(0.9)	9.7	14.5	(4.7)	7
19	Winterburn Booster Station Project	0.6	-	0.6	7.2	-	7.2	8
20	Franchise Agreement Distribution Main Relocations	1.1	6.6	(5.4)	6.0	18.0	(12.0)	9
21	Yellowhead Trail Upgrades / Relocations Project	1.5	5.4	(3.9)	5.0	23.8	(18.8)	10
22	Projects < $5 million	1.5	0.8	0.7	4.2	5.0	(0.8)	
23	Subtotal	26.4	56.2	(29.8)	125.1	200.6	(75.6)	

		A	B	C	D	E	F	
		Current Year			2022-2026			
	Major Category and Project	PBR Forecast	Actual	Variance	PBR Forecast	Projection	Variance	Note
24	**Reliability and Life Cycle Improvements**							
25	Risk Based Distribution Main Renewals	5.5	3.4	2.1	29.0	19.2	9.7	11
26	Water Treatment Plants Flood Protection Project	5.9	3.5	2.3	22.9	55.5	(32.7)	12
27	Infill Fire Protection Program	3.9	1.2	2.8	20.2	15.5	4.7	13
28	EL Smith Stage 1 Filter Upgrades Project	3.5	3.0	0.5	13.5	16.1	(2.5)	14
29	Obsolete Valve Replacements Program	2.1	2.2	(0.1)	11.2	11.6	(0.4)	
30	Transmission Mains and Appurtenances	2.0	1.2	0.8	10.7	10.7	(0.0)	
31	Reservoir Structural Rehabilitation and Roof Replacement	2.1	0.0	2.0	9.6	11.2	(1.5)	
32	Vehicle and Fleet Additions Program	2.0	1.0	1.0	7.0	7.4	(0.4)	
33	Critical Pipeline Inspection Program	1.3	0.0	1.3	6.8	4.9	1.9	
34	Obsolete Hydrant Replacements Program	1.1	1.4	(0.2)	6.0	8.3	(2.3)	15
35	Water Meter Change Outs Program	-	0.8	(0.8)	5.8	8.3	(2.5)	16
36	EL Smith 5kV Upgrades and Electrical Room Expansion	5.0	0.1	4.9	5.0	7.8	(2.8)	17
37	EL Smith HLPH Expansion Project	-	0.3	(0.3)	5.0	1.9	3.1	18
38	Projects < $5 million	18.7	12.8	5.9	82.8	70.3	12.5	19
39	Subtotal	53.2	31.0	22.3	235.4	248.7	(13.2)	
40	**Performance Efficiency and Improvement**							
41	Water Main Cathodic Protection Program	2.9	2.4	0.5	15.1	15.1	(0.0)	
42	AMI Deployment Project	12.5	0.9	11.6	62.9	63.7	(0.9)	
43	Water D&T Facility	-	14.7	(14.7)	-	16.6	(16.6)	20
44	Projects < $5 million	1.0	0.4	0.7	5.1	4.5	0.6	
45	Subtotal	16.4	18.3	(1.9)	83.0	100.0	(16.9)	
46	**Capital Expenditures**	**105.2**	**139.3**	**(34.1)**	**480.4**	**619.9**	**(139.5)**	
47	**Contributions**							
48	Water Service Connections Contributions	(5.4)	(3.8)	(1.6)	(28.4)	(33.8)	5.4	4
49	Customer Infrastructure Requests Contributions	(2.1)	(3.2)	1.0	(11.2)	(12.2)	1.0	
50	Private Development Construction Coordination Contributions	(0.2)	(0.2)	(0.0)	(1.0)	(1.1)	0.1	
51	Solar Power Systems (including BESS) Contributions	(3.6)	(3.1)	(0.5)	(3.6)	(3.1)	(0.5)	
52	Water Treatment Plants Flood Protection Contributions	(2.3)	(2.9)	0.5	(6.7)	(18.9)	12.2	12
53	**Contributions**	**(13.7)**	**(13.1)**	(0.6)	**(51.0)**	**(69.1)**	**18.1**	
54	**Capital Expenditures, net of Contributions**	**91.5**	**126.2**	**(34.7)**	**429.3**	**550.8**	**(121.4)**	

Explanations for differences between PBR forecast capital expenditures and EWSI's current projection in excess of $2.0 million include:

1. **kīsikāw pīsim Solar Farm and Battery Energy Storage System** – $19.4 million greater than forecast. Longer than anticipated timeframes for regulatory and Bylaw approvals resulted in carryover of work from the 2017-2021 PBR term and delayed project completion. These delays meant that the solar farm was not fully commissioned until the end of 2022.

2. **Rossdale Ammonia Upgrades** – $7.2 million greater than forecast (new project). This project provides for the use of liquid ammonium sulphate ("LAS") in chloranimation. This upgrade was advanced to address safety considerations with aqueous ammonia which requires pressurized storage tanks as well as special handling and safety procedures.

3. **Phosphoric Injection for Lead Control** – $10.8 million greater than forecast (carry-over project). Although this project was scheduled for completion during the 2017-2021 PBR term, COVID-19 related delays required deferral of work and carry-over of work into the 2022-2026 PBR term.

4. **Water Services Connections Program** – $12.5 million greater than forecast. This program provides for the construction of new water services for infill developments and redevelopments and for recovery of these costs from private developers. Cost increases reflect requests from developers for larger and more complex service connections (primarily infills) than anticipated in the PBR forecast. These cost increases are partially offset by a $5.4 million increase in expected contributions.

5. **Network Private Development Transmission Mains Program** – $24.9 million greater than forecast. This program provides for the reimbursement of costs of transmission mains constructed by developers, ensuring that EWSI design standards are met and the expansion is properly sized for the development being constructed, for future development, and for fire protection. The increase in costs for this program relate to an increased length of transmission mains that were not anticipated in the PBR forecast, in particular three locations; a long length of transmission main in north-east Edmonton to initiate development in the Horsehills area adjacent to Manning Freeway, a transmission main in south Edmonton required due to the required shut down of a transmission main on Ellerslie Road to accommodate road and bridge reconstruction and still support growth in the region, and finally a transmission main in southeast Edmonton to support development of the new hospital and coordination of transmission construction with road construction across the pipeline corridor in the region. EWSI may request approval for the expenditures that meet the non-routine adjustment criteria in the near future. EWSI is also assessing the timing of the construction for the $13.4M QEII/ 41 Avenue Crossing project to mitigate these cost increases.

6. **LRT Relocates** – $9.2 million greater than forecast. The PBR forecast was approved before the final approval and funding for the Metro/Capital Line LRT was secured. The City's approved track alignments require EWSI to complete more infrastructure relocations than anticipated in the PBR forecast. EWSI may request approval for the expenditures that meet the non-routine adjustment criteria in the near future.

7. **Private Development Construction Coordination** – $4.7 million greater than forecast. Expenditures on this project are forecast to increase significantly due to increases in Network Private Development Transmission Mains projects described in note 4 above.

8. **Winterburn Booster Station Project** – $7.2 million lower than forecast. The acquisition of the Parkland Booster Station from the Capital Region Parkland Water Service Commission in 2021 allowed EWSI to enhance its resilience in the Edmonton West Secondary Zone at a lower overall cost instead of building a new booster station.

9. **Franchise Agreement Distribution Main Relocations** – $12.0 million greater than forecast. EWSI has experienced higher than forecast hydrant relocation work requests from the City. EWSI may request approval for the expenditures that meet the non-routine adjustment criteria in the near future.

10. **Yellowhead Freeway Conversion** – $18.8 million greater than forecast. EWSI received greater volume of utility relocation requests from the City than were anticipated in the PBR forecast. EWSI may request approval for the expenditures that meet the non-routine adjustment criteria in the near future.

11. **Risk Based Distribution Main Renewals** – $9.7 million lower than forecast. The scope of this program has been reduced in the current PBR to enable EWSI to address high priority reliability-driven projects, in particular Water Treatment Plants Flood Protection, which have been determined to be higher overall risk.

12. **Water Treatment Plants Flood Protection** – $32.7 million greater than forecast and **Water Treatment Plants Flood Protection Contributions** $12.2 million greater than forecast. The scope of this project increased mainly due to the following factors as planning and design work proceeded:

    a. The complexity of flood protection infrastructure needed for the two water treatment plants, following more detailed study and review, resulting in higher than forecast costs; and

    b. Comprehensive community consultation and close collaboration with Indigenous communities to ensure that the project is conducted with respect for cultural sensitivities, fully recognizing the archaeological, historical and cultural significance of the plant sites resulting in delayed implementation of the project than anticipated.

EWSI was able to secure additional grant funding of $12.2 million through the Federal Disaster Mitigation and Adaptation Fund (DMAF) and the Alberta Community Resilience Program (ACRP).

13. **Infill Fire Protection Program** – $4.7 million lower than forecast. During the 2017-2021 PBR term, EWSI worked closely with infill developers to develop criteria for funding infill fire protection, to develop forecasts of eligible projects and to forecast the funding required over the 2022-2026 PBR forecast. Based on 2022 actual results, the expected costs of this program over the 2022-2026 PBR term have been reduced to reflect lower than expected volume of investment required due to the success of the Infill Fire Protection Assessment program with Edmonton Fire Rescue services that determines the actual fire flows required based on the building structure being proposed versus being determined solely by land zoning.

14. **E.L. Smith Stage 1 Filter Upgrades Project** – $2.5 million greater than forecast. The increase is attributable to advancing the Filter 5 upgrade project in order to realize efficiencies by aligning this upgrade with similar projects undertaken at E.L. Smith during the 2022-2026 PBR term.

15. **Obsolete Hydrant Replacement** – $2.3 million greater than forecast. Higher than expected deficiencies have led to increased hydrant replacements. EWSI has also identified a particular model of hydrant that has seen increased failures that requires accelerated replacement due to lack of available components and to ensure fire protection service levels are maintained.

16. **Water Meter Change outs program** – $2.5 million greater than forecast. Scheduled replacements have been reassessed to align with the Advanced Metering Infrastructure (AMI) Deployment Project.

17. **E.L. Smith 5kV Upgrades and Electrical Room Expansion** – $2.8 million greater than forecast. Cost increases reflect additional complexities identified during the design phase of this project.

18. **E.L. Smith High Lift Pump House (HLPH) Expansion Project** – $3.1 million lower than forecast. Implementation of this project has been deferred to the next PBR term to enable EWSI to address high priority reliability-driven projects such as Water Treatment Plants Flood Protection.

19. **Reliability & Life Cycle Improvements < $5.0 million** – $12.5 million lower than forecast. Implementation of smaller low-priority projects have been deferred to enable EWSI to address high priority projects such as Water Treatment Plants Flood Protection and Rossdale Ammonia Upgrades.

20. **Water D&T Facility** – $16.6 million greater than forecast (carry-over project). This project was expected to be completed during the 2017-2021 PBR term. The project was delayed due to changes in scope and the need to address higher than expected construction bid costs. This project, now known as the Water/Drainage Shared Facility (Aurum facility) was completed in December 2022.

2.1.6 Construction Work in Progress

In-City Water's rate base consists of plant in service. If a capital project is not completed (i.e., not placed into service) during the year, the capital expenditures on that project remain in Construction Work in Progress and are excluded from the rate base. In 2022, as shown in Table 2.1.6-1, the balance in Construction Work in Progress was $36.8 million greater than forecast.

Table 2.1.6-1
EWSI Total System
Construction Work in Progress
($ millions)

		A	B
		2022	
	CWIP Continuity	**Forecast**	**Actual**
1	Construction work in progress, beginning of year	9.3	63.2
2	Capital expenditures		
3	Capital expenditures before contributions	105.2	170.0
4	Contributions received	(13.7)	(43.8)
5	Capital expenditures, net of contributions received	91.5	126.2
6	Capital additions		
7	Plant in service		
8	EPCOR-constructed assets	(108.7)	(158.3)
9	Developer-constructed assets	(32.2)	(26.7)
10	Total Capital Additions	(140.9)	(185.1)
11	Contributions		
12	Contributions recognized	19.1	17.1
13	Developer-constructed assets	32.2	26.7
14	Total contributed assets	51.3	43.8
15	Capital additions, net	(89.6)	(141.2)
16	**Construction work in progress, end of year**	**11.3**	**48.1**

The PBR plan allows EWSI to capitalize the costs of financing certain projects remaining in Construction Work in Progress, using an Allowance for Funds Utilized During Construction (AFUDC). In 2022, AFUDC included in capital expenditures on eligible projects amounted to $2.5 million, compared to the PBR forecast amount of $0.9 million. This difference was attributable to AFUDC on projects that were forecast to be completed in 2021, such as the Water D&T Facility and kīsikāw pīsim Solar Farm, as well as higher than forecast capital expenditure in 2022.

2.1.7 Depreciation and Amortization

EWSI's total system depreciation expense and amortization of contributed assets for 2022 are shown in Table 2.1.7-1 below:

Table 2.1.7-1
EWSI Total System
Depreciation and Amortization
($ millions)

		A	B
	Depreciation and Amortization	2022	
		PBR Forecast	Actual
1	Gross depreciation expense	58.9	57.0
2	Amortization of contributions	(13.1)	(12.7)
3	**Depreciation, net**	**45.8**	**44.3**
4	In-City Water share - %	85.0%	85.0%
5	**In-City Water share - $**	**38.9**	**37.6**

Depreciation expense and amortization of contributions in 2022 were slightly lower than forecast due to lower than forecast opening asset balances as shown in Table 2.1.8-1.

2.1.8 Rate Base

In 2022, EWSI's total water system rate base, shown in Table 2.1.8-1 below, was $58.3 million lower than forecast, largely due to lower opening asset balances related to delays in completing projects originally scheduled for completion during the 2017-2021 PBR term.

Table 2.1.8-1
EWSI Total System
Mid-Year Rate Base
($ millions)

		A	B
	Description	2022	
		PBR Forecast	Actual
1	Plant in service, beginning of year	2,911.2	2,798.9
2	Capital additions		
3	EPCOR-funded	89.6	141.2
4	Developer-funded	51.3	43.8
5	Capital additions	140.9	185.1
6	Retirements and adjustments	-	(4.8)
7	Plant in service, end of year	3,052.2	2,979.2
8	Accumulated depreciation, beginning of year	738.0	716.2
9	Gross provision	58.9	57.0
10	Retirements and adjustments	-	(4.8)
11	Accumulated depreciation, end of year	796.9	768.5
12	Mid-Year Net Property	2,214.3	2,146.7
13	Other Rate Base Items		
14	Materials and supplies	4.0	4.8

		A	B
	Description	**2022**	
		PBR Forecast	**Actual**
15	Working capital	15.4	(2.4)
16	**Gross Mid-Year Rate Base**	**2,233.6**	**2,149.2**
17	Contributions, beginning of year	880.8	857.8
18	Developer contributions		
19	Contributed assets	32.2	26.7
20	Contributions	19.1	17.1
21	Developer contributions	51.3	43.8
22	Retirements and adjustments	-	(0.0)
23	Contributions, end of year	932.2	901.6
24	Accumulated amortization, beginning of year	203.6	203.3
25	Gross provision	13.1	12.7
26	Retirements and adjustments	-	(0.2)
27	Accumulated amortization, end of year	216.7	215.8
28	**Mid-Year Net Contributions**	**696.4**	**670.2**
29	**Mid-Year Rate Base**	**1,537.3**	**1,479.0**
30	In-City Water share - %	86.5%	87.1%
31	In-City Water share - $	1,329.2	1,287.5

2.1.9 Return on Rate Base

In-City Water was initially awarded a Return on Equity (ROE) of 9.89% for the 2022-2026 PBR Term, which, pursuant to City Council direction, was reduced to 9.64% to reflect the reduction in business risk provided by the consumption deferral account. In the PBR forecast, the special rate adjustment for rebasing was smoothed over the PBR term to mitigate “rate shock” at the beginning of the PBR term. The special rate adjustment for rebasing accounts for the difference between EWSI’s revenue requirement forecast for the PBR term and the revenue that would be realized if annual rate increases were limited to inflation. Therefore, although EWSI’s 2022-2026 PBR term is based on its awarded rate of return on 9.64%, PBR forecast rates of return for individual years of the PBR will differ from awarded ROE, with a 7.90% ROE forecast for 2022 due to the phasing in of the rebasing adjustment.

In 2022, In-City Water’s return on rate base was $1.7 million greater than forecast. Approximately $0.7 million was attributable to higher cost of debt (see Table 2.1.9-1) and the remaining $1.0 million attributable to higher than forecast customer growth and variation in operations and maintenance expenses explained in Section 2.1.3.

Table 2.1.9-1
In-City Water
Return on Mid-Year Rate Base
($ millions)

		A	B
	Return on Rate Base	**2022**	
		PBR Forecast	**Actual**
1	In-City Water share - $	1,329.2	1,287.5
2	Deemed capital structure		
3	Debt (%)	60%	60%
4	Equity (%)	40%	40%
5	Cost of capital		
6	Cost of debt	4.17%	4.39%
7	Cost of equity	7.90%	8.36%
8	Return on Mid-Year Rate Base		
9	Return on Rate Base Financed by Debt	33.2	33.9
10	Return on Rate Base Financed by Equity	42.0	43.0
11	**Total Return on In-City Water Rate Base**	**75.2**	**76.9**

Return on rate base is calculated separately for the debt-financed and equity-financed portions of In-City Water's net rate base. The rate of return on debt is equal to the embedded cost of debt for EWSI's total water system, as calculated in Table 2.1.9-2 below:

Table 2.1.9-2
EWSI Water Services
Interest Expense and Cost of Debt
($ millions)

		A	B
	Interest Expense and Cost of Debt	**2022**	
		PBR Forecast	**Actual**
1	Interest expense		
2	Interest on short-term debt	0.8	1.6
3	Interest on long-term debt	37.4	37.3
4	Total interest expense	38.3	38.9
5	Mid-year debt		
6	Mid-year short-term debt	34.5	23.1
7	Mid-year long-term debt	883.4	863.4
8	Mid-year debt	918.0	886.5
9	**Average cost of debt**	**4.17%**	**4.39%**

The embedded cost of debt was higher in 2022 due to higher than forecast interest rates on new debt issues related to the Bank of Canada's rate hikes during 2022. Under the terms of the PBR Plan, EWSI bears interest rate risk and therefore, higher than forecast debt costs are not borne by ratepayers. EWSI expects interest rates to remain higher than forecast for the majority of the PBR term.

2.1.10 Transactions with Affiliates

In-City Water derives a portion of its revenue and expenses from transactions with affiliates, including the City of Edmonton, EUI and its subsidiaries, and other EWSI business units. Table 2.1.10-1 provides a summary of In-City Water's 2022 actual and forecast transactions with affiliates.

Table 2.1.10-1
EWSI Total System
Transactions with Affiliates
($ millions)

		A	B
		2022	
	Affiliate and Service	PBR Forecast	Actual
1	**Revenues from the provision of services to the City of Edmonton**		
2	Public fire protection	3.1	3.1
3	Water sales	3.5	3.6
4	Total	6.6	6.7
5	**Services provided by (recovered from):**		
6	**City of Edmonton**		
7	Franchise fees	16.8	17.6
8	Property taxes	0.8	0.7
9	Mobile equipment services	2.5	0.7
10	Other services	0.7	(0.0)
11	Total	20.8	19.1
12	**EPCOR Utilities Inc**.		
13	Corporate shared services	13.6	13.7
14	Interest on intercompany debentures	37.4	37.3
15	Interest on short-term debt	0.8	1.6
16	Other services	0.4	0.5
17	Total	52.2	53.1
18	**EPCOR Energy Alberta LP**		
19	Customer billing and collection services	8.2	8.8
20	Trouble call support services and other services	0.5	0.6
21	Total	8.7	9.5
22	**Other EPCOR Utilities Inc. subsidiaries**		
23	Hydrovac charges and space rentals from EPCOR Technologies Inc.	1.7	0.9
24	Other services (recoveries) from EPCOR Distribution and Transmission Inc.	0.0	(0.1)
25	Other recoveries from EPCOR Power Development	(0.2)	(0.3)
26	Total	1.5	0.5
27	**Other EWSI Business Units**		
28	Water shared services	10.5	12.5
29	Water sales to Wastewater Treatment	(0.5)	(0.4)
30	Meter reading services (recoveries) from Wastewater Treatment	(2.8)	(2.3)
31	Meter reading services (recoveries) from Drainage Services	(2.8)	(2.3)
32	Drainage Services rent (recoveries)	(0.4)	(0.3)
33	Drainage Services other services	(0.2)	(0.4)
34	Total	3.8	6.7
35	**Expenditures on capital projects arising from services provided by:**		
36	City of Edmonton	0.5	0.2
37	EPCOR Technologies Inc.	4.5	5.7
38	EPCOR Utilities Inc.	1.4	0.5
39	EPCOR Drainage Services	2.8	2.3
40	EPCOR Distribution and Transmission Inc.	0.2	0.8
41	Other EPCOR Business Units	0.1	0.1
42	Total	9.5	9.6

2.2 Wastewater Treatment

Wastewater's rate revenue and revenue requirements are summarized in Table 2.2-1 below.

Table 2.2-1
Wastewater Treatment Revenue Requirements
($ millions)

	A	B
	2022	
Description	**PBR Forecast**	**Actual**
1 Regulated revenue	122.1	124.2
2 Revenue requirement		
3 Operations and maintenance expenses	70.8	70.6
4 Less: revenue offsets	(5.9)	(7.2)
5 Depreciation and amortization	23.2	23.3
6 Return on rate base financed by debt	12.3	12.4
7 Return on rate base financed by equity	21.7	25.1
8 Revenue requirement	122.1	124.2
9 **Return on rate base financed by equity***	**9.94%**	**12.44%**

* In the PBR forecast, the special rate adjustment for rebasing is smoothed over the PBR term to mitigate "rate shock" at the beginning of the PBR term. Therefore, although EWSI's PBR forecast for the 2022-2024 PBR term is based on its awarded rate of return on 9.64%, PBR forecast rates of return for individual years of the PBR will differ from awarded ROE.

In 2022, EWSI achieved a greater than forecast rate of return on equity of 12.44%. The factors contributing to forecast to actual differences are explained in Sections 2.2.1 to 2.2.9.

2.2.1 Customers and Consumption

Wastewater's customer counts, consumption and consumption per customer are similar to those of In-City Water.

Wastewater has two customer classes:

- **Residential Customer Class.** Unlike In-City Water, there are no separate rates for multi-residential customers. Instead, multi-residential water customers are subject to the same rates as residential wastewater customers. The common rate structure for residential and multi-residential customers recognizes that the costs of wastewater treatment are similar for both residential and multi-residential customers. Accordingly, charges to residential customers are based on a flat rate structure with a single consumption block.

- **Commercial Customer Class.** Consumption charges for commercial customers are based on a declining rate structure with three consumption blocks to recognize the economies of scale in wastewater treatment for larger commercial customers. In addition, commercial customers are charged overstrength fees for prescribed materials that exceed the concentrations shown in Part III of Schedule 1 to Bylaw 19627.

Differences in customer counts, almost entirely within the commercial customer class, are attributable to "water-only" customers who are not tied into the City's drainage system. Water-only customers include businesses in industrial parks that are served by septic systems, as well as seasonal water customers, such as commercial lawn watering services and golf courses. Table 2.2.1-1 below provides a comparison of 2022 PBR forecast to actual customer counts and consumption per customer.

Table 2.2.1-1
Wastewater
Customers, Consumption and Consumption per Customer

		A	B
		2022	
	Customers and Consumption	**PBR Forecast**	**Actual**
1	Customers		
2	Residential	278,868	282,366
3	Multi-Residential	3,789	3,800
4	Commercial	17,069	17,283
5	Total	299,725	303,449
6	Annual Consumption - ML		
7	Residential	44,853	46,856
8	Multi-Residential	17,658	18,501
9	Commercial	18,819	22,087
10	Total	81,330	87,444
11	Monthly Consumption per Customer		
12	Residential	13.4	13.8
13	Multi-Residential	388.4	405.7
14	Commercial	91.9	106.5

Actual to forecast differences in Wastewater's customer counts and consumption are attributable to the same factors discussed in Section 2.1.

2.2.2 Revenue

Wastewater's rates include fixed monthly services charges applied on a per connection basis, and consumption charges applied to each cubic metre of consumption. Besides rate revenues, Wastewater's other revenue consists primarily of over-strength surcharges that are subject to the same rate adjustment mechanism as Wastewater's rate revenue. The remaining other revenue is derived from a variety of sources, including provision of services to the Alberta Capital Region Wastewater Commission and other suburban customers, sale of nutrients derived from Ostara, late payment charges, and various other services. The effect of the consumption deferral for wastewater is summarized in Table 2.2.2-1 and Table 2.2.2-2 below. Actual consumption from the beginning of the PBR term effective April 1, 2022 to December 31, 2022 was 4,966 ML greater than forecast, resulting in a deferral of $5.5 million, which will be refunded to customers in the next PBR term.

Table 2.2.2-1
Wastewater Treatment Consumption Deferral

		A	B	C	D
		Consumption (ML)		**Consumption Deferral**	
		PBR Forecast	**Actual**	**ML**	**$M**
1	Residential	34,378	35,865	1,487	1.8
2	Multi-Residential	13,351	14,086	735	0.9
3	Commercial	14,594	17,338	2,744	2.7
4	**Total Consumption**	**62,323**	**67,289**	**4,966**	**5.5**

Table 2.2.2-2 below provides a comparison of Wastewater's 2022 actual and forecast revenue.

Table 2.2.2-2
Wastewater Treatment Revenue
($ millions)

		A	B
		2022	
	Wastewater Treatment Revenue	**PBR Forecast**	**Actual**
1	Fixed Monthly Service Charges		
2	Residential	19.9	20.1
3	Multi-Residential	0.3	0.3
4	Commercial	1.2	1.2
5	Fixed Monthly Service Charges	21.4	21.6
6	Consumption Charges		
7	Residential	53.2	55.6
8	Multi-Residential	20.9	22.0
9	Commercial	21.2	24.0
10	Consumption Charges	95.4	101.6
11	Less: Consumption Deferral		
12	Residential	-	(1.8)
13	Multi-Residential	-	(0.9)
14	Commercial	-	(2.7)
15	Consumption Deferral	-	(5.5)
16	Consumption Revenue, net of deferrals		
17	Residential	53.2	53.8
18	Multi-Residential	20.9	21.1
19	Commercial	21.2	21.3
20	Consumption Revenue, net of Deferral	95.4	96.2
21	Overstrength surcharges	5.4	6.4
22	**Regulated Revenue (Line 5 + 20 + 21)**	**122.1**	**124.2**
23	Other revenue ("revenue offsets")	5.9	7.2
24	**Revenue**	**128.0**	**131.4**

Wastewater's revenues were $3.4 million greater than forecast in 2022. This difference was primarily due to the following factors:

- Higher than forecast consumption during the first three months of 2022, prior to the implementation of the consumption deferral;

- Higher than forecast overstrength surcharges due to higher surchargeable matter in the effluent from industrial customers; and

- Higher than forecast other revenue of $1.1 million reflecting increased volume of biosolids management and treatment of effluent for Alberta Capital Region Wastewater Commission (ACRWC). The remainder of the variance was related to numerous items, none of which were individually significant.

2.2.3 Operating Expenses by Function

Table 2.2.3-1 below provides a comparison of Wastewater Treatment operating expenses for 2022 to the PBR forecast.

Table 2.2.3-1
Wastewater Treatment Operating Expenses by Function
($ millions)

		A	B
		2022	
	Function	**PBR Forecast**	**Actual**
1	Power, Other Utilities and Chemicals		
2	Power and Other Utilities	5.8	4.9
3	Chemicals	1.5	1.4
4	Power, Other Utilities and Chemicals	7.2	6.3
5	Wastewater Treatment		
6	Wastewater Treatment Plant	32.4	31.2
7	Operations Support Services	6.2	5.6
8	Less: Capitalized Overhead Costs	(3.3)	(2.3)
9	Wastewater Treatment	35.4	34.5
10	Billing, Meters and Customer Service	7.9	7.6
11	EWSI Shared Services	5.0	6.4
12	Corporate Shared Services	5.2	5.2
13	Franchise Fees and Property Taxes	10.0	10.6
14	**Total Operating Expenses**	**70.8**	**70.6**

Overall, Wastewater's operating expenses for 2022 were $0.2 million lower than forecast. Key factors contributing to this difference include:

- **Power and Other Utilities** – $0.9 million lower than forecast in 2022 due to lower than forecast power consumption and credits received for the energy curtailment program.

- **Wastewater Treatment** – $1.1 million lower than forecast in 2022 primarily due to lower than forecast biosolids management costs; partially offset by lower capitalized overhead. The remainder of the variance results from numerous small items, none of which were individually significant.

- **Billing, Meters and Customer Service** - $0.3 million lower than forecast in 2022 primarily due to vacant meter reading positions and project delays related to the AMI project. These decreases, which amounted to $0.5 million, were partially offset by higher fees for customer service, billing and collections service provided by EPCOR Energy Alberta GP Inc. due to higher than forecast growth in residential services.

- **EWSI Shared Services** – $1.4 million greater than forecast primarily due to higher salary and labour costs.

- **Franchise Fees and Property Taxes** – $0.6 million higher than forecast in 2022. Franchise fees are calculated as 8% of eligible revenue less the municipal portion of property taxes. As noted in Section 2.2.2 above, Wastewater revenues were higher than forecast, resulting in higher franchise fees paid to the City of Edmonton in 2022.

2.2.4 Operating Expenses by Cost Category

Table 2.2.4-1 below provides a breakdown of operating expenses by cost category for rows 9, 10 and 11 from Table 2.2.3-1

Table 2.2.4-1
Wastewater Treatment Operating Costs by Cost Category
($ millions)

		A	B
		2022	
	Cost Category	**PBR Forecast**	**Actual**
1	Wastewater Treatment Plant Operations		
2	Staff costs and employee benefits	16.9	17.5
3	Contractors and consultants	14.3	12.3
4	Materials and supplies	2.1	3.7
5	Vehicles	0.1	0.3
6	Other	2.0	0.8
7	**Wastewater Treatment Plant Operations Expenses**	**35.4**	**34.5**
8	Billing, Meters and Customer Service		
9	Customer billing and collection services	3.4	3.7
10	Contractors and consultants	4.5	3.9
11	**Billings, Meters and Customer Services Expenses**	**7.9**	**7.6**
12	EWSI Shared Services		
13	EWSI shared services allocation	3.3	3.9
14	Staff costs and employee benefits	1.4	2.4
15	Other	0.3	0.1
16	**EWSI Shared Services**	**5.0**	**6.4**

2.2.5 Capital Expenditures by Major Project and Category

Table 2.2.5-1 compares approved capital expenditures from the PBR forecast to actual capital expenditures for 2022 for each project with approved or forecast capital expenditures in excess of $5.0 million over the 2022-2024 PBR term, as well as for each project category.

Table 2.2.5-1
Wastewater Treatment Capital Expenditures
($ millions)

		A	B	C	D	E	F	
		2022			2022-2024			
	Major Category and Project	PBR Forecast	Actual	Variance	PBR Forecast	Projection	Variance	Note
1	**Health, Safety and Environment**			-			-	
2	Maintenance Hygiene Improvements	-	3.1	(3.1)	-	6.2	(6.2)	1
3	Projects < $5 million	0.2	0.9	(0.7)	0.8	1.8	(1.0)	
4	Sub-total	0.2	4.0	(3.8)	0.8	8.0	(7.2)	
5	**Regulatory**							
6	Odour Control Improvements	0.8	0.1	0.7	5.6	7.4	(1.8)	
7	Projects < $5 million	-	0.4	(0.4)	-	0.5	(0.5)	
8	Sub-total	0.8	0.5	0.3	5.6	7.9	(2.4)	
9	**Growth/Customer Requirements**			-			-	
10	Projects < $5 million	2.8	2.2	0.6	5.5	5.2	0.3	
11	**Reliability and Life Cycle Improvements**			-			-	
12	Digester 4 Upgrades Project	4.0	1.0	3.0	13.4	18.6	(5.2)	2
13	Utility Rack West	-	0.0	(0.0)	-	9.5	(9.5)	3
14	Square 1 Biogas System Upgrade	-	3.6	(3.6)	-	12.0	(12.0)	4
15	Gold Bar Primary Effluent Channel Upgrades	3.3	0.4	2.9	17.0	4.4	12.5	5
16	Aux Control Room E-House (EB-1)	1.9	0.3	1.6	11.2	5.0	6.2	6
17	600v Electrical Building (EB-2)	1.5	0.3	1.2	11.8	1.9	10.0	7
18	Clover Bar Dewatering Facility	14.6	0.4	14.2	38.4	0.6	37.8	8
19	EPT Scrubber Upgrades	-	10.3	(10.3)	-	14.9	(14.9)	9
20	Expand Flare Capacity	1.1	0.1	1.0	8.0	2.7	5.3	10
21	Projects < $5 million	16.1	20.2	(4.2)	41.6	65.4	(23.8)	11
22	Sub-total	42.5	36.7	5.9	141.4	135.0	6.3	
23	**Performance Efficiency and Improvement**			-			-	
24	Secondary Aeration Blower Upgrades	0.8	0.5	0.3	8.0	9.7	(1.7)	
25	Laboratory Facility Consolidation	2.9	0.0	2.8	5.9	5.4	0.5	
26	Projects < $5 million	2.1	1.8	0.3	4.5	5.7	(1.2)	
27	Sub-total	5.8	2.3	3.5	18.4	20.8	(2.4)	
28	**Capital Expenditures**	**52.1**	**45.7**	**6.4**	**171.7**	**177.0**	**(5.3)**	

Explanations for differences between PBR forecast capital expenditures and Wastewater's current projection in excess of $2.0 million include:

1. **Maintenance Hygiene Improvements** – $6.2 million greater than the 2022-2024 PBR forecast (carry-over project). The Maintenance Hygiene Improvements project was originally planned to be completed by the end of 2021. However, following extensive stakeholder consultation in relation to the Gold Bar Integrated Resource Plan (IRP) and this project, significant scope adjustments were made to the project, resulting in project delay and cost increases related to supply chain. This additional cost is expected to be managed through prioritization of projects and programs approved for the 2022-2024 PBR and is offset by the deferral of the new dewatering facility.

2. **Digester 4 Upgrades Project** – $5.2 million greater than the 2022-2024 PBR forecast. The increase is primarily due to higher commodity prices and inflation. Work on the Digester 4 project was delayed due to leak issues that were experienced during completion of the Digester 3 Upgrades project, and the shutdown of Digester 5 due to structural concerns. Furthermore, completing Digester 3 before commencing Digester 4 provided better operational capacity and reliability with Digester 3 returning to service.

3. **Utility Rack West** – $9.5 million greater than the 2022-24 PBR forecast. This project was not included in the 2022-2024 PBR forecast. However, this project has been advanced to facilitate efficient delivery of The Aux Control Room Electrical Upgrade Project (EB-1) and the 600V Electrical Building Project (EB-2) by utilizing pipe racks to support the re-routing of electrical cables to the new electrical buildings.

4. **Square 1 Biogas System Upgrade** – $12.0 million greater than the 2022-24 PBR forecast. The project was partially deferred from the 2017-2021 PBR term to the 2022-2024 PBR term due to a revision in the engineering solution to relocate new gas mixing compressors to a separate enclosure. In addition, project is expected to cost more than previously forecast due to increased construction and process skid supply costs.

5. **Gold Bar Primary Effluent Channel Upgrades Project** – $12.5 million lower than the 2022-24 PBR forecast. Given the complexities and risks associated with the project, additional design and engineering work has been extended delaying project completion into the next PBR term. EWSI expects the project will go into service in 2026.

6. **Aux Control Room E-House (EB-1)** – $6.2 million lower than the 2022-24 PBR forecast. Through the design development process, the duration of this project has been extended to better plan for addressing the complexities of commissioning and transferring electrical loads to minimize operations disruptions. This has shifted some of the work for this project into the next PBR term.

7. **600v Electrical Building (EB-2)** – $10.0 million lower than the 2022-24 PBR forecast. Through the design development process, the duration of this project has been extended to

better plan for addressing the complexities of commissioning and transferring electrical loads to minimize operations disruptions. This has shifted some of the work for this project into the next PBR term.

8. **Clover Bar Biosolids Dewatering Facility** – $37.8 million lower than the 2022-24 PBR forecast. The Dewatering Facility project is currently deferred due to expected high costs and will be reassessed in the next PBR application. EWSI is reviewing a number of alternatives including the long-term viability of using a third-party mobile dewatering facility, which is currently being used temporarily while the current dewatering facility is shut down.

9. **Enhanced Primary Treatment (EPT) Scrubber Upgrades** – $14.9 million higher than the 2022-24 PBR forecast. The EPT Scrubber Upgrades project was originally part of the Site HVAC Rehabilitation project to be completed in 2021 at a total cost of $9.5M. During the design development of the project, the EPT Scrubber Upgrades project was identified and set up as a standalone project. The project was subsequently delayed and is scheduled for completion in 2023. The increased cost is primarily due to a combination of project scope and design refinements, and a general increase in costs related to market conditions.

10. **Expand Flare Capacity** – $5.3 million lower than the 2022-24 PBR forecast. Implementation of this project has been deferred to the next PBR to address other critical projects approved in the current PBR.

11. **Projects < $5 million** – Explanations for some of the larger projects making up the variance under this category include:

    a. Clover Bar Edmonton Waste Management (EWMC) Groundwater Transfer – This $3.1 million project was not included in the 2022-2024 PBR forecast. The project was initiated to support the City of Edmonton in addressing groundwater release management in response to regulatory requirements imposed on the City’s waste management operations. EWSI expects the project to be completed in 2025.

    b. Gold Bar Operation Center - $3.3 million higher than 2022-24 PBR forecast primarily due to project delays resulting from protracted stakeholder engagement requirements and scope changes.

    c. Gold Bar Loop 5 Rehab and Upgrade – This $3.1 million project was scheduled for the 2025-2027 PBR term. However, the project was advanced to meet operational heating requirements as the equipment is at the end of its useful life. The project will replace the remaining equipment on heating Loop 5. EWSI expects the commissioning of the system in 2023.

2.2.6 Construction Work in Progress

Wastewater's rate base consists of plant in service. If a capital project has not been completed (i.e., not placed into service) during the year, the capital expenditures on that project remain in Construction Work in Progress and are excluded from the rate base. The 2022 year-end balance of Wastewater's Construction Work in Progress, shown in Table 2.2.6-1 below, was $8.0 million greater than forecast, almost entirely due to changes in the timing of project completion.

Table 2.2.6-1
Wastewater Treatment Construction Work in Progress
($ millions)

		A	B
	Construction Work in Progress	**2022**	
		PBR Forecast	**Actual**
1	Balance, beginning of year	13.9	43.1
2	Capital expenditures	52.1	45.7
3	Capital additions	(21.1)	(35.8)
4	**Balance, end of year**	**45.0**	**53.0**

The PBR plan allows EWSI to capitalize the costs of financing certain projects remaining in Construction Work in Progress, using AFUDC. In 2022, because of the higher average balance of Construction Work in Progress, AFUDC included in capital expenditures on eligible projects amounted to $2.6 million, compared to the PBR forecast amount of $1.7 million.

2.2.7 Depreciation and Amortization

Wastewater's depreciation expense and amortization of contributed assets for 2022 are shown in Table 2.2.7-1 below:

Table 2.2.7-1
Wastewater Treatment Depreciation and Amortization
($ millions)

		A	B
	Depreciation and Amortization	**2022**	
		PBR Forecast	**Actual**
1	Gross depreciation expense	24.2	24.2
2	Amortization of contributions	(0.9)	(0.9)
3	**Depreciation, net**	**23.2**	**23.3**

Wastewater's 2022 depreciation expense was in line with forecast despite lower than forecast plant in service at the end of 2022, (see Table 2.2.8-1, line 5). This was primarily due to the completion of a higher number of capital maintenance and repair projects with shorter expected useful life, resulting in higher effective depreciation.

2.2.8 Rate Base

Wastewater's 2022 mid-year rate base, shown in Table 2.2.8-1 below, was $41.9 million lower than forecast, reflecting lower than forecast capital additions over the 2017 to 2021 period resulting from project deferrals and other adjustments to the capital program described in Section 2.2.5.

Table 2.2.8-1
Wastewater Treatment Mid-Year Rate Base
($ millions)

		A	B
	Components of Mid-Year Rate Base, net of Contributions	**2022**	
		PBR Forecast	**Actual**
1	Plant in Service		
2	Balance, beginning of year	785.5	738.1
3	Capital additions	21.1	35.8
4	Retirements and adjustments	-	(4.1)
5	Balance, end of year	806.6	769.9
6	Mid-Year Plant in service	796.1	754.0
7	Accumulated Depreciation		
8	Balance, beginning of year	218.3	212.9
9	Depreciation expense	24.2	24.2
10	Retirements and adjustments	-	(4.1)
11	Balance, end of year	242.4	233.0
12	Mid-Year Accumulated Depreciation	230.4	222.9
13	Other Rate Base Items		
14	Working Capital	(0.8)	(8.7)
15	Materials and Supplies	1.4	2.2
16	**Gross Mid-Year Rate Base**	566.3	524.5
17	Contributions		
18	Balance, beginning of year	41.0	41.0
19	Contributions in aid of construction	-	-
20	Balance, end of year	41.0	41.0
21	Mid-Year Contributions	41.0	41.0
22	Accumulated Amortization		
23	Balance, beginning of year	20.2	20.2
24	Amortization of contributions	0.9	0.9
25	Balance, end of year	21.2	21.2
26	Mid-Year Accumulated Amortization	31.1	31.1
27	**Mid-Year Contributions**	20.3	20.3
28	**Mid-Year Rate Base**	**546.1**	**504.2**

Unlike In-City Water, where contributions relate primarily to developer-funded assets, contributions included in Wastewater's rate base offset the cost of non-utility assets included in Wastewater's plant in service. This treatment ensures that the capital costs associated with these assets are not borne by utility ratepayers. The cost of operating these assets, as well as any related revenues are also excluded from Wastewater's financial results.

2.2.9 Return on Rate Base

In 2022, Wastewater's return on equity, shown in Table 2.2.9-1, was $3.4 million greater than forecast enabling Wastewater to achieve a return on equity of 12.44% in 2022. The increase in return on equity was primarily attributed to the increase in overstrength charges to industrial customers, and other revenue as noted in Section 2.2.2. The lower than forecast rate base also contributed to the higher rate of return on equity.

Table 2.2.9-1
Wastewater Treatment Return on Rate Base
($ millions)

		A	B
		2022	
	Return on Rate Base	**PBR Forecast**	**Actual**
1	Mid-year Rate Base	546.1	504.2
2	Deemed Capital Structure		
3	Debt (%)	60.00%	60.00%
4	Equity (%)	40.00%	40.00%
5	Cost of Capital		
6	Cost of Debt	3.75%	4.09%
7	Cost of Equity	9.94%	12.44%
8	Weighted Average Cost of Capital (WACC)	6.11%	7.43%
9	Return on Mid-Year Rate Base		
10	Return on Rate Base Financed by Debt	12.3	12.4
11	Return on Rate Base Financed by Equity	21.7	25.1
12	**Return on Mid-year Rate Base**	**34.0**	**37.4**

Wastewater's weighted average cost of debt is shown in Table 2.2.9-2 below. The embedded cost of debt was higher in 2022 due to higher than forecast interest rates on new debt issues related to the Bank of Canada's rate hikes during 2022. Under the PBR Plan, EWSI bears interest rate risk and therefore, higher than forecast debt costs are not borne by ratepayers. EWSI expects interest rates to remain higher than forecast for the majority of the PBR term.

Table 2.2.9-2
Wastewater Treatment Interest Expense and Cost of Debt
($ millions)

		A	B
		2022	
	Interest Expense and Cost of Debt	**PBR Forecast**	**Actual**
1	Interest Expense		
2	Interest on short-term debt	0.8	1.1
3	Interest on intercompany debentures	11.9	12.0
4	Total Interest expense	12.7	13.1
5	Mid-year debt and other long-term liabilities		
6	Mid-Year Short-term debt	35.1	12.1
7	Mid-Year Long-term debt	303.6	308.5
8	Total Mid-year debt and other long-term liabilities	338.7	320.5
9	**Embedded cost of Debt**	**3.75%**	**4.09%**

2.2.10 Transactions with Affiliates

Wastewater derives a portion of its revenue and expenses from affiliate transactions including the City of Edmonton, EUI, and its subsidiaries, and other EPCOR Water Services Inc. business units. Table 2.2.10-1 summarizes Wastewater's transactions with affiliates.

Table 2.2.10-1
Wastewater Treatment Transactions with Affiliates
($ millions)

		A	B
		2022	
	Affiliate and Service	**PBR Forecast**	**Actual**
1	**Revenues from the provision of services to the City of Edmonton**		
2	Wastewater Treatment Services	1.4	1.6
3	**Services provided by (recovered from):**		
4	**City of Edmonton**		
5	Franchise Fees	9.3	9.9
6	Property Taxes	0.7	0.7
7	Regulatory Services	0.2	-
8	Biosolids Contractor Service	0.4	0.6
9	Other Services	0.2	0.1
10	Total	10.8	11.3
11	**EPCOR Utilities Inc.**		
12	Corporate Shared Service Costs	5.2	5.2
13	Interest on Intercompany Loans	11.9	12.0
14	Interest on Short-term debt	0.8	1.1
15	Other Services	0.1	0.3
16	Total	18.0	6.6
17	**EPCOR Energy Alberta LP**		
18	Billing and Collection Services	3.0	3.0
19	**Other EWSI Business Units**		
20	EWSI Shared Services Allocation	3.3	3.9
21	Meter reading services from In-City Water	2.8	2.3
22	Water purchases from In-City Water	0.4	0.4
23	Regulatory services from Drainage Services	1.7	1.6
24	Laboratory services recoveries from Drainage Services	(0.4)	(0.3)
25	Total	7.9	7.9
26	**Expenditures on capital projects arising from services provided by:**		
27	City of Edmonton	0.0	0.1
28	EPCOR Technologies Inc.	0.1	0.2
29	EPCOR Utilities Inc.	0.1	0.2
30	Total	0.3	0.5

2.3 Drainage Services

Drainage Services provides sanitary utility and stormwater utility services within the boundaries of the City of Edmonton. These services are regulated by the City of Edmonton pursuant to the PBR Plan for 2022 to 2024 prescribed in Drainage Services and Wastewater Treatment Bylaw 19627. Drainage Services revenue and revenue requirements are summarized in Table 2.3-1 below.

Table 2.3-1
Drainage Services
Revenue and Revenue Requirement
($ millions)

		A	B
		2022	
		PBR Forecast	**Actual**
1	Regulated revenue		
2	Sanitary utility	143.6	144.7
3	Stormwater Utility	92.8	93.9
4	Regulated revenue	236.4	238.6
5	Revenue requirement		
6	Operating costs	122.4	127.7
7	Less: revenue offsets	(6.3)	(5.3)
8	Depreciation and amortization	42.0	39.7
9	Return on rate base financed by debt	34.5	34.7
10	Return on rate base financed by equity	43.8	41.8
11	Revenue requirement	236.4	238.6
12	**Rate of return on rate base financed by equity***	**6.31%**	**6.18%**

* In the PBR forecast, the special rate adjustment for rebasing is smoothed over the PBR term to mitigate "rate shock" at the beginning of the PBR term. Therefore, although EWSI's PBR forecast for the 2022-2024 PBR term is based on achieving a fair rate of return of 9.95% by 2026, PBR forecast rates of return for individual years of the PBR will differ from awarded ROE.

In 2022, EWSI achieved a rate of return on equity of 6.18%, slightly lower than its forecast rate of return of 6.31%. The factors contributing to differences between forecast and actual are explained in Sections 2.3.1 to 2.3.9.

2.3.1 Customers and Consumption

Drainage Services provides sanitary and stormwater utility services to the same customers served by Wastewater. Therefore, actual to forecast differences in Drainage Services' customer counts and consumption are attributable to the same factors discussed in section 2.2.1.

2.3.2 Revenue

Drainage Service's rate revenues are derived from both sanitary utility and stormwater utility services. Sanitary utility revenues are comprised of flat monthly service charges based on meter size and variable monthly charges based on monthly metered water consumption. Stormwater utility revenues are based on parcel area, development intensity, and run-off coefficients based on the zoning of individual land parcels.

For the 2022-2024 PBR term, City Council directed Drainage Services to establish *“a deferral account for water consumption for each of Water Services, Wastewater Treatment and Drainage Services that would be accumulated during the 2022-2026 and 2022-2024 PBR terms and included in customer rates in each of the next PBR terms through a special rate adjustment”*.

The effect of the consumption deferral for the sanitary utility is summarized in Table 2.3.2-1 below. This table shows that actual consumption from the beginning of the 2022-2024 PBR term starting April 1, 2022, to December 31, 2022, was 4,958 ML greater than forecast, resulting in a deferral of $6.1 million that will be refunded to customers in the next PBR term.

Table 2.3.2-1
Drainage Services
Sanitary Utility Consumption Deferral

		A	B	C	D
		Consumption (ML)		**Consumption Deferral**	
		PBR Forecast	**Actual**	**ML**	**$M**
1	Residential	34,378	35,865	1,487	1.9
2	Multi-residential	13,351	14,086	734	0.9
3	Commercial	14,590	17,327	2,736	3.3
4	**Total Consumption**	**62,319**	**67,277**	**4,958**	**6.1**

Table 2.3.2-2 below provides a comparison of Drainage Services 2022 revenues to the PBR forecast. In 2022, sanitary rate revenues were $1.1 million greater than forecast and stormwater utility rate revenues were $1.1 million greater than forecast. After adjusting for the consumption deferral, actual to forecast differences for both sanitary utility and stormwater utility rate revenue were attributable to higher than forecast customer growth. The variance in other revenue was comprised of numerous small differences in revenues derived from various sources such as biosolids management, compliance and monitoring, late payment charges, etc., none of which were individually significant.

Table 2.3.2-2
Drainage Services
Revenue
($ millions)

		A	B
		2022	
	Description	**PBR Forecast**	**Actual**
1	**Sanitary Utility**		
2	Flat monthly charges		
3	Residential	36.4	36.9
4	Multi-residential:	2.4	2.4
5	Commercial, including large wholesale	6.0	6.1
6	Flat monthly charges	44.8	45.4
7	Variable monthly charges billed		
8	Residential	55.0	57.5
9	Multi-residential	21.7	22.7
10	Commercial, including large wholesale	22.0	25.2
11	Variable monthly charges billed	98.7	105.5
12	Consumption deferral		
13	Residential	-	(1.9)
14	Multi-residential	-	(0.9)
15	Commercial, including large wholesale	-	(3.3)
16	Consumption deferral	-	(6.1)
17	Variable monthly charge revenue		
18	Residential	55.0	55.6
19	Multi-residential:	21.7	21.8
20	Commercial, including large wholesale	22.0	21.9
21	Variable monthly charge revenue	98.7	99.3
22	**Sanitary Utility regulated revenue**	**143.6**	**144.7**
23	**Stormwater Utility**		
24	Residential	49.2	49.5
25	Multi-residential	5.2	5.6
26	Commercial	38.4	38.8
27	**Stormwater Utility regulated revenue**	**92.8**	**93.9**
28	Drainage Services regulated revenue	236.4	238.6
29	Other revenue (“revenue offsets”)	6.3	5.3
30	**Drainage Services Revenue**	**242.7**	**243.9**

2.3.3 Operating Expenses by Function

Table 2.3.3-1 provides a comparison of Drainage Service's 2022 actual operating expenses to the PBR forecast:

Table 2.3.3-1
Drainage Services
Operating Expenses by Function
($ millions)

		A	B
		2022	
	Function	**PBR Forecast**	**Actual**
1	Drainage planning and operations		
2	Operations		
3	Pipeline maintenance	18.7	16.4
4	Flow control facilities	11.7	9.8
5	Monitoring and compliance	6.2	9.4
6	Stormwater Integrated Resource Plan	4.3	3.8
7	Corrosion and Odour Reduction	3.3	4.6
8	General maintenance and other	6.5	5.4
9	Operations	50.7	49.5
10	One Water planning and project support		
11	One Water planning	6.8	5.7
12	Project support	10.1	9.5
13	One Water planning and project support	16.9	15.2
14	Operational support services	0.4	4.2
15	Drainage planning and operations	68.0	69.0
16	Billing, meters and customer service	7.7	8.7
17	EWSI Shared Services	18.6	18.6
18	Corporate shared services	16.3	19.0
19	Franchise fees and property taxes	11.8	12.5
20	**Total operating expenses**	**122.4**	**127.7**

Total operating expenses for 2022 were $5.3 million greater than forecast. Key factors contributing to this variance include:

- **Pipeline maintenance, Flow control facilities, and Monitoring and compliance** - $1.0 million lower than forecast primarily due to a reorganization within Drainage Services resulting in the transfer of staff between Pipeline maintenance, Flow control facilities and Monitoring and compliance functions, resulting in variances within these functions without materially impacting the work completed in these functions. The remainder of the variance results from numerous small items such as lower spending on contractors, chemicals, and materials, none of which were individually significant.

- **General maintenance and other** - $1.1 million lower than forecast primarily due to lower biosolids management costs paid to Water Services, as a result of lower biosolids handling during the first three months of the year.

- **Stormwater Integrated Resource Plan (SIRP) -** $0.5 million lower than forecast primarily due to lower participation in the home backwater valve subsidy program than anticipated. Participation in the program was lower than anticipated as a higher proportion of homes inspected through the program already had backwater valves installed.

- **Corrosion and Odour Reduction (CORe) -** $1.3 million greater than forecast primarily due to higher than anticipated costs for trunk cleaning and inspections due to the amount of solids found within the trunk network once access to the network through new manholes was obtained. This was partially offset by lower chemicals and material costs due to a reassessment of pump station chemical treatment capital projects indicating that pumping optimization being more effective for some of the locations.

- **One Water planning -** $1.1 million lower than forecast due to higher transfers of staff costs and employee benefits into Operations for SIRP and CORe areas of $0.7 million and lower than anticipated contractor costs of $0.4 million, due to increasing the use of internal resources for strategic planning studies versus external consultants.

- **Project support -** $0.6 million lower than forecast primarily due to lower staff costs and employee benefits resulting from the timing of staff vacancies.

- **Operational support services** - $3.8 million greater than forecast primarily due to higher facility lease and utility costs incurred during the year because of the delayed move and consolidation of resources at EWSI's new Water/Drainage Shared Facility (Aurum facility), which was initially anticipated to be completed in 2021.

- **Billing, meters and customer services** - $1.0 million greater than forecast due to higher customer growth resulting in higher meter reading charges and fees for customer service, billing and collections service provided by EPCOR's billing arm (EPCOR Energy Alberta GP Inc.)

- **Corporate Shared Services** – $2.7 million greater than forecast primarily due to higher salary costs incurred by the Corporate groups providing support to the business unit as a result of wage inflation.

- **Franchise Fees and Property Taxes -** $0.7 million greater than forecast. Franchise fees are calculated as 8% of eligible revenue less the municipal portion of property taxes. As noted in Section 2.3.2 above, Drainage Services revenues were higher than forecast, resulting in higher franchise fees paid to the City of Edmonton in 2022.

2.3.4 Operating Expenses by Cost Category

Table 2.3.4-1 below provides a breakdown of operating expenses by cost category for rows 15, 16 and 17 from Table 2.3.3-1

Table 2.3.4-1
Drainage Services
Operating Expenses by Cost Category
($ millions)

		A	B
		2022	
	Cost Category	**PBR Forecast**	**Actual**
1	Drainage Services planning and operations		
2	Staff costs and employee benefits	48.6	45.4
3	Contractors and consultants	13.4	16.5
4	Materials and supplies	6.3	5.6
5	Vehicles	(5.7)	(4.5)
6	Other	3.5	5.4
7	EWSI shared services allocation	1.8	0.5
8	**Drainage Services planning and operations**	**68.0**	**69.0**
9	Billing, meters and customer service		
10	Customer billing and collection services	4.9	6.6
11	Meter services	2.8	2.1
12	**Billing, meters and customer service**	**7.7**	**8.7**
13	EWSI Shared Services		
14	Staff costs and employee benefits	9.0	10.8
15	Contractors and consultants	2.5	0.8
16	Materials and supplies	1.0	0.9
17	EWSI shared services allocation	1.7	1.3
18	Other	4.5	4.8
19	**EWSI Shared Services**	**18.6**	**18.6**

2.3.5 Capital Expenditures by Major Project and Category

Table 2.3.5-1 provides a comparison of forecast to actual capital expenditures for 2022 and PBR forecast to EWSI's current projection for each project or program with capital expenditures in excess of $10.0 million over the 2022-2024 term.

Table 2.3.5-1
Drainage Services
Capital Expenditures and Contributions
($ millions)

		A	B	C	D	E	F	
	Major Category and Projects	**2022**			**2022-2024**			
		PBR Forecast	**Actual**	**Variance**	**PBR Forecast**	**Projection**	**Variance**	
1	Drainage Neighbourhood Renewal Program	28.0	22.2	5.7	76.5	52.8	23.7	1
2	Drainage System Expansion							
3	Private Development Construction Coordination	4.0	4.6	(0.6)	11.6	13.6	(2.0)	
4	Service Connections Program	6.6	9.3	(2.7)	18.5	25.6	(7.0)	
5	Projects < $10 million	7.7	10.2	(2.6)	27.5	31.1	(3.6)	
6	Sub-total	18.3	24.1	(5.9)	57.6	70.3	(12.7)	2
7	Drainage System Rehabilitation							
8	Proactive Service Renewal	-	0.0	(0.0)	10.3	8.0	2.3	
9	Drill Drop Manholes Program	4.5	9.0	(4.5)	13.1	22.0	(8.9)	
10	Pump Station Rehabilitation Program	5.0	2.7	2.3	15.5	18.5	(3.0)	
11	Fleet & Vehicles Program	3.7	2.5	1.1	13.2	9.7	3.5	
12	Small Trunk Rehabilitation Program	0.1	2.0	(1.9)	18.8	16.0	2.8	
13	High Priority Replacement Program	17.0	24.0	(7.0)	52.1	57.8	(5.7)	
14	Outfall Rehabilitation	3.2	1.8	1.4	8.2	18.2	(10.0)	3
15	Local Sewer Rehabilitation	2.0	3.4	(1.5)	5.4	10.7	(5.4)	
16	Arterial Roadway	3.3	3.1	0.2	8.6	10.7	(2.0)	
17	Projects < $10 million	11.7	6.9	4.8	20.8	29.6	(8.8)	
18	Sub-total	50.5	55.6	(5.0)	166.0	201.3	(35.3)	
19	Flood Mitigation							
20	Dry Pond Program	13.8	18.2	(4.4)	46.3	25.4	20.9	4
21	Projects < $10 million	1.4	0.9	0.5	1.4	1.0	0.4	
22	Sub-total	15.2	19.1	(3.9)	47.7	26.4	21.3	
23	Real Estate	-	22.1	(22.1)	-	25.2	(25.2)	5

	Major Category and Projects	A	B	C	D	E	F	
		2022			**2022-2024**			
		PBR Forecast	**Actual**	**Variance**	**PBR Forecast**	**Projection**	**Variance**	
24	Stormwater Integrated Resource Plan							
25	Dry Pond Program	24.6	5.5	19.1	81.5	57.3	24.1	6
26	LID Program	7.8	10.9	(3.0)	53.1	55.0	(2.0)	
27	Proactive Manhole Relining Program	6.1	5.7	0.4	18.7	15.6	3.2	
28	Proactive Pipe Relining Program	7.5	2.9	4.6	22.9	19.8	3.1	
29	Projects < $10 million	21.9	14.0	7.9	57.2	40.3	16.8	7
30	Sub-total	67.9	38.9	29.1	233.3	188.1	45.3	
31	Sanitary Servicing Strategy Fund							
32	SW5	7.5	-	7.5	32.8	-	32.8	8
33	Projects < $10 million	5.4	7.9	(2.5)	5.8	11.7	(5.9)	
34	Sub-total	12.9	7.9	4.9	38.6	11.7	26.9	
35	Corrosion and Odour Reduction (CORe)							
36	Large Trunk Renewal Program	21.0	15.3	5.7	79.0	81.2	(2.2)	
37	CORe Duggan Tunnel Project	11.7	2.1	9.6	56.3	63.7	(7.4)	
38	CORe Drop Structure Modification Program	6.1	5.6	0.5	22.0	20.9	1.1	
39	CORe Access Manhole Program	6.2	7.2	(1.0)	17.9	22.4	(4.5)	
40	Projects < $10 million	1.8	3.6	(1.8)	5.3	7.0	(1.7)	
41	Sub-total	46.8	33.9	12.9	180.4	195.1	(14.7)	9
42	LRT Relocates Program	21.8	34.9	(13.1)	48.5	58.9	(10.3)	10
43	Developer and City-contributed	127.6	102.0	25.6	382.7	328.6	54.1	11
44	**Capital Expenditures**	**388.9**	**360.8**	**28.1**	**1,231.4**	**1,158.3**	**73.1**	
45	Contributions							
46	Drainage System Expansion							
47	Service Connections Program	(6.6)	(5.1)	(1.5)	(18.5)	(18.8)	0.2	
48	Private Development Construction Coordination Program	(0.3)	(0.3)	(0.0)	(0.3)	(1.0)	0.7	
49	Projects < $10 million	-	0.1	(0.1)	-	0.1	(0.1)	
50	Sub-total	(6.9)	(5.3)	(1.6)	(18.8)	(19.7)	0.9	
51	Flood Mitigation							
52	Dry Pond Program	(4.5)	(5.8)	1.3	(13.6)	(6.6)	(7.0)	4
53	Stormwater Integrated Resource Plan							
54	Dry Pond Program	(8.8)	(1.7)	(7.1)	(21.0)	(16.5)	(4.6)	6
55	Projects < $10 million	(3.1)	(0.5)	(2.6)	(6.7)	(1.8)	(4.9)	7
56	Sub-total	(11.9)	(2.2)	(9.7)	(27.8)	(18.3)	(9.5)	
57	Sanitary Servicing Strategy Fund							
58	SW5	(7.5)	-	(7.5)	(32.8)	-	(32.8)	8
59	Projects < $10 million	(3.9)	(6.4)	2.5	(1.3)	(8.3)	7.0	

		A	B	C	D	E	F	
	Major Category and Projects	**2022**			**2022-2024**			
		PBR Forecast	**Actual**	**Variance**	**PBR Forecast**	**Projection**	**Variance**	
60	Sub-total	(11.4)	(6.4)	(5.0)	(34.1)	(8.3)	(25.8)	
61	Developer and City-contributed	(127.6)	(102.0)	(25.6)	(382.7)	(328.6)	(54.1)	11
62	**Contributions**	(162.2)	(121.7)	(40.5)	(477.0)	(381.4)	(95.6)	
63	**Capital Expenditures, net of Contributions**	**226.7**	**239.1**	**(12.4)**	**754.3**	**776.8**	**(22.5)**	

In 2022, capital expenditures, net of contributions were $12.4 million greater than forecast. Since weather-related delays, scope and design changes, supply chain disruptions and other factors can affect capital expenditures in any single year of the PBR term, capital expenditures are more appropriately assessed over the entire 2022-2024 PBR term. Over the 2022-2024 PBR term, capital expenditures are currently projected to be $22.5 million higher than the PBR forecast. Explanations for projects and programs with projected costs that are $10.0 million greater or lower than the PBR forecast are provided below:

1. **Drainage neighbourhood renewal -** $23.7 million lower than PBR forecast due to the need to focus resources on emergency drainage system rehabilitation projects and the ability to defer some renewal work into the future.

2. **Drainage system expansion program** - $12.7 million greater than PBR forecast primarily due to a higher volume of service connection applications than forecast.

3. **Outfall rehabilitation -** $10.0 million greater than PBR forecast, as a result of new projects identified to manage the increased damage to outfalls during the 2021 spring river breakup season. This outcome reflects an updated risk ranking approach that prioritizes outfall remediation work, revised design requirements, and higher construction costs due to carryover of projects previously forecast to be completed in 2021.

4. **Dry pond program -** $20.9 million lower than forecast due to both lower than expected bids from contractors and efficiencies in project delivery for the Malcolm Tweddle dry pond. These savings are partially offset by a $7.0 million decrease in grants and contributions.

5. **Real estate (Water/Drainage Shared Facility)** - $25.2 million greater than forecast, as a result of construction delays driven by scope and design changes to address higher than expected construction bid costs.

6. **SIRP dry pond program -** $24.1 million lower than forecast. Longer-than-anticipated timeframes for land assembly involving the City of Edmonton, and school boards and public consultation are expected to push expenditures in dry ponds into future PBR terms. Lower capital spending in the 2022-2024 PBR term is partially offset by a $4.6 million decrease in contributions from grants.

7. **SIRP projects < $10 million** - $16.8 million lower than forecast, primarily due to design delays for the Outfall and Automatic Gates Program, which are projected to push expenditures into future PBR terms, as well as lower-than-anticipated public uptake on the Home Flooding program. Lower capital spending in the 2022-2024 PBR term is partially offset by a $4.9 million decrease in contributions from grants that align with the construction expenditure.

8. **Sanitary Servicing Strategy Fund (SSSF) - SW5 -** $32.8 million lower than forecast. This fully contributed project has been cancelled in response to updated capacity and demand forecasts showing that the existing infrastructure is sufficient to meet anticipated customer demand in southwest Edmonton.

9. **Corrosion and Odour Reduction (CORe) program -** $14.7 million greater than forecast primarily due to advancing the Duggan Tunnel project in the current PBR term, a new project to rehabilitate deteriorated trunk sections related to the NL2 Large Trunk in North Edmonton and unexpected poor ground conditions at Access Manhole Program locations requiring scope and construction methodology changes, resulting in cost increases.

10. **LRT Relocates Program** - $10.3 million greater than forecast. The PBR forecast was approved before the final approval and funding for the Metro/Capital Line LRT was secured. The City's approved track alignments require EWSI to complete more infrastructure relocations than anticipated in the PBR forecast.

11. **Developer and City contributed assets** - $54.1 million lower than forecast. These reflect drainage infrastructure completed by private developers and the City and transferred to EWSI on substantial completion of the development, the timing of which can vary due to individual development schedules. EWSI's current projections show a significant decrease in the value of these fully contributed assets than was anticipated in the 2022-2024 PBR forecast.

2.3.6 Construction Work in Progress

Drainage Services' rate base consists of plant in service. If a capital project is not completed (i.e., not placed into service) during the year, the capital expenditures on that project remain in Construction Work in Progress and are excluded from the rate base. Because of the long timeframes required to complete large, complex projects, Drainage Services has larger balances of Construction Work in Progress than Water or Wastewater. Drainage Services' 2022 construction work in progress is summarized in Table 2.3.6-1 below:

Table 2.3.6-1
Drainage Services
Construction Work in Progress
($ millions)

		A	B
		2022	
		PBR Forecast	Actual
1	Construction work in progress, beginning of year	68.0	127.3
2	Capital expenditures		
3	Capital expenditures before contributions	388.9	360.8
4	Contributions received	(162.2)	(121.7)
5	Sub-total	226.7	239.1
6	Capital additions		
7	Sanitary Utility	(150.1)	(159.2)
8	Stormwater Utility	(148.3)	(210.0)
9	Combined Sewer	(23.4)	(46.2)
10	SIRP	(82.9)	(43.1)
11	CORe	(27.3)	(17.9)
12	Sub-total	(432.0)	(476.4)
13	Contributions recognized		
14	Sanitary	87.1	123.8
15	Stormwater	86.7	146.0
16	Combined	7.7	(76.0)
17	SIRP	9.5	2.1
18	Sub-total	191.0	196.0
19	**Construction work in progress, end of year**	**53.6**	**85.9**

The 2022-2024 PBR Plan allows Drainage to capitalize the costs of financing certain projects remaining in Construction Work in Progress, using AFUDC. In 2022, AFUDC included in capital expenditures on eligible projects amounted to $8.2 million.

2.3.7 Depreciation and Amortization

Depreciation expense and amortization of contributions are shown in Table 2.3.7-1 below:

Table 2.3.7-1
Drainage Services
Depreciation and Amortization
($ millions)

		A	B
	Depreciation and Amortization	2022	
		PBR Forecast	Actual
1	Provision for depreciation	88.3	86.3
2	Amortization of contributions	(46.3)	(46.6)
3	**Depreciation, net of amortization of contributions**	**42.0**	**39.7**

Drainage's net depreciation expense was $2.3 million lower than the PBR forecast. This difference is consistent with lower than forecast opening balances of plant in service and contributions.

2.3.8 Rate Base

Drainage's mid-year rate base, shown in Table 2.3.8-1 below was $41.3 million lower than forecast due to lower opening balances of plant in service and contributions, largely due to the carry-over projects which remained under construction work in progress. The mid-year rate base has been allocated between the sanitary utility excluding CORe, CORe capital, the stormwater utility excluding SIRP and SIRP capital.

Table 2.3.8-1
Drainage Services
Mid-Year Rate Base
($ millions)

		A	B
		2022	
	Description	**PBR Forecast**	**Actual**
1	Plant in Service, beginning of year	5,752.7	5,637.4
2	Capital additions	432.0	476.4
3	Retirements and adjustments	(16.0)	(20.4)
4	Plant in Service, end of year	6,168.8	6,093.4
5	Accumulated depreciation, beginning of year	1,109.9	1,099.2
6	Gross Provision	88.9	86.6
7	Retirements and adjustments	(16.0)	(10.5)
8	Accumulated depreciation, end of year	1,182.8	1,175.2
9	Mid-Year Net Property	4,814.4	4,728.2
10	Other Rate Base Items		
11	Materials and Supplies	1.3	2.0
12	Working Capital	13.9	13.6
13	**Gross Mid-Year Rate Base**	4,829.6	4,743.8
14	Contributions, beginning of year	(3,625.6)	(3,592.3)
15	Additions	(191.0)	(196.0)
16	Contributions, end of years	(3,816.6)	(3,788.3)
17	Accumulated amortization, beginning of year	621.9	624.0
18	Gross Provision	46.3	46.7
19	Accumulated amortization, end of year	668.2	670.7
20	**Mid-Year Net Contributions**	(3,076.0)	(3,042.9)
21	Adjustment to SIRP Rate Base[3]	(20.3)	(8.8)
22	Mid-Year Rate Base	1,733.3	1,692.0
23	**Allocated to:**		
24	Sanitary Utility	798.2	777.1
25	Stormwater Utility	772.1	827.2
26	SIRP	60.9	26.5
27	CORe	102.1	61.2
28	**Mid-Year Rate Base**	**1,733.3**	**1,692.0**

[3] The costs of pre-SIRP flood mitigation plant in service were embedded in pre-2022 rates. Therefore, depreciation and returns on SIRP assets are only included in Drainage's rate base starting April 1, 2022, the date when the new PBR rates came into effect.

2.3.9 Return on Rate Base

Table 2.3.9-1 provides a comparison of Drainage's PBR forecast and actual returns on rate base for 2022. Returns are calculated separately for the debt-financed and equity-financed portions of Drainage's net rate base with returns on the debt-financed portion made at Drainage's average cost of debt and returns on the equity-financed portion made at the rates of return on equity awarded for the 2022-2024 PBR term.

Table 2.3.9-1
Drainage Services
Return on Mid-Year Rate Base
($ millions)

		A	B
		2022	
	Description	**PBR Forecast**	**Actual**
1	Drainage Services mid-year rate base	1,733.3	1,692.0
2	Deemed capital structure		
3	Debt	60.00%	60.00%
4	Equity	40.00%	40.00%
5	Cost rates		
6	Debt	3.32%	3.41%
7	Equity	6.31%	6.18%
8	Return on rate base		
9	Debt	34.5	34.7
10	Equity	43.8	41.8
11	**Total return on mid-year rate base**	**78.3**	**76.5**

Return on rate base is calculated separately for the debt-financed and equity-financed portions of Drainage Services net rate base. The rate of return on debt is equal to the embedded cost of debt for EWSI's total water system, as calculated in Table 2.1.9-2 below:

Table 2.3.9-2
Drainage Services
Interest Expense and Cost of Debt
($ millions)

		A	B
		2022	
		PBR Forecast	**Actual**
1	Interest expense		
2	Interest on long-term debt	35.4	35.1
3	Interest on short term debt	0.9	1.1
4	Interest expense	36.3	36.1
5	Mid-year debt		
6	Mid-year long-term debt	1,055.7	1,050.7
7	Mid-year short-term debt	36.9	7.8
8	Mid-year debt	1,092.6	1,058.5
9	**Embedded Cost of Debt**	**3.32%**	**3.41%**

Table 2.3.9-2 shows that the average cost of debt was slightly higher than forecast due to higher than forecast interest rates on new debt issues related to the Bank of Canada's rate hikes during 2022. Under the terms of the PBR Plan, EWSI bears interest rate risk and higher debt costs are not borne by ratepayers. EWSI expects interest rates to remain higher than forecast for the remainder of the PBR term.

Prior to 2022, Drainage Services earned a rate of return on equity that was significantly lower than a rate of return that would be considered fair for a utility requiring financing through external capital markets. In the 2022-2024 PBR Application, EWSI recognized that an immediate move to a fair rate of return would create financial hardship for many customers and proposed that the rate of return on equity for sanitary (excluding CORe) and stormwater (excluding SIRP) be reduced from the fair rate of return of 9.95% to 5.50% for 2022 and "ramped up" in a linear fashion by 1.1% per year to achieve a fair return of 9.95% by 2026. Because of their unique nature, SIRP and CORe were recognized as requiring a fair rate of return commencing in 2022 and were awarded a rate of return on equity of 9.95% for the entire 2022-2024 PBR term. In 2022, EWSI forecast a combined rate of return on equity of 6.31%. The actual rate of return on equity was slightly lower, primarily due to higher than forecast operating expenses, partially offset by lower than forecast depreciation and amortization.

2.3.10 Transactions with Affiliates

Drainage Services derives a portion of its revenue and expenses from transactions with affiliates, including the City of Edmonton, EUI and its subsidiaries. Table 2.3.10-1 provides a summary of Drainage Services' 2022 forecast and actual transactions with affiliates.

Table 2.3.10-1
Drainage Services
Transactions with Affiliates
($ millions)

		A	B
		2022	
	Affiliate and Service	PBR Forecast	Actual
1	**Revenues from the provision of services to the City of Edmonton**		
2	Utility Revenue	3.6	3.9
3	Other Services	0.1	0.0
4	Total	3.7	3.9
5	**Services provided by (recovered from):**		
6	**City of Edmonton**		
7	Franchise Fees	10.2	11.1
8	Property Taxes	1.6	1.4
9	Other Services	0.2	4.1
10	Total	12.0	16.6
11	**EPCOR Utilities Inc.**		
12	Corporate Shared Service Costs	16.3	19.0
13	Interest on Intercompany Loans	35.4	35.1
14	Interest on Short-term debt	0.9	1.1
15	Other services	3.9	3.7
16	Total	56.8	58.8
17	**Other Affiliate**		
18	EPCOR Technologies Inc.	(0.2)	3.1
19	EPCOR Commercial Services Inc.	0.3	(0.1)
20	EPCOR Water Services	1.7	1.7
21	EPCOR Distribution and Transmission Inc.	0.1	(0.1)
22	EPCOR Energy Services	4.2	4.9
23	Total	6.1	9.6
24	**Expenditures on capital projects arising from services provided by:**		
25	City of Edmonton	(18.6)	3.1
26	EPCOR Technologies Inc.	3.3	5.5
27	EPCOR Utilities Inc.	0.3	1.0
28	EPCOR Water Services	(2.1)	(2.3)
29	EPCOR Distribution and Transmission Inc.	-	0.1
30	Total	(17.1)	7.4

3 Operational Performance

3.1 Water Services

Table 3.1-1 summarizes the 2022 operational performance for Water Services:

Table 3.1-1
Water Services 2022 Operational Performance

Index and Performance Measure		Benchmark	Performance		Base Points	Points Earned	Maximum Bonus Points	Total Points Earned
			Target	Actual				
1.0	**Water Quality Index**	Non-suspect test results	99.7%	99.8%	**30.0**	**30.0**	**-**	**30.00**
2.0	**Customer Service Index**							
2.1	Post Service Audit Factor	% satisfied	75.0%	90.1%		4.5		
2.2	Home Sniffing Factor	% satisfaction	94.4%	92.9%		3.7		
2.3	Response Time Factor	min to confirm breaks	25	14.8		5.3		
2.4	Planned Construction Impact Factor	% compliance	95.8%	100.0%		3.9		
2.0	**Customer Service Index**				**15.0**	**17.4**	**2.25**	**17.25**
3.0	**System Reliability & Optimization Index**							
3.1	Water Main Break Factor	# of breaks	365	278		7.7		
3.2	Repair Duration Factor	% fixed within 24 hrs	95.4%	97.3%		6.4		
3.3	Water Loss Factor	leakage index (ILI)	1.23	0.87		8.1		
3.4	System Energy Efficiency Factor	kWh /ML treated	281.0	245.8		7.1		
3.0	**System Reliability & Optimization Index**				**25.0**	**29.3**	**3.25**	**28.25**
4.0	**Environmental Index**							
4.1	Water Conservation (Residential) Factor	m^3/month/household	16.8	14.8		5.7		
4.2	Environmental Incident Management Factor	# of incidents	5	2		12.5		
4.3	Solids Residual Management Factor	# days	120	150.8		6.3		
4.0	**Environmental Index**				**15.0**	**24.4**	**2.25**	**17.25**
5.0	**Safety Index**							
5.1	Near Miss Reporting Factor	# completed	550	837		5.7		
5.2	Work Site Inspections/Observations Factor	# conducted	1,032	3,492		12.7		
5.3	Lost Time Frequency Rate	frequency rate	0.40	0.21		7.3		
5.4	All Injury Frequency Rate	frequency rate	1.00	0.21		18.2		
5.0	**Safety Index**				**15.0**	**43.8**	**2.25**	**17.25**
	Aggregate Points Earned (sum of all the above indices)				**100.0**	**145.0**	**10.00**	**110.0**
	Points Required at Performance Standard							**100.0**
	Points Above / (Below) Performance Standard							**10.0**

Water Services quality is measured by the results of five indices shown in Table 3.1-1 above. Performance under each index is measured independently on a point basis with 100 base points available if the standards in all five areas are achieved. In total, up to 10 additional bonus points for performance above the standard are available. In 2022, Water Services exceeded performance standards for each index and earned maximum bonus points. Highlights and improvement opportunities for each index are provided below:

3.1.1 Water Quality Index

The water quality index measures the overall quality of water that is delivered to the customer and provides reassurance that water quality consistently meets or exceeds the federal and provincial water quality standards. This index consists of a single performance measure:

- **Water Quality Index Factor** (actual 99.8% vs target 99.7%), calculated as the percentage of water quality test results that meet EWSI's internal water standards. Both federal and provincial government water quality standards are incorporated into EWSI's Approval to Operate from Alberta Environment and Parks (AEP). In some cases, EWSI's internal water standards have stricter limits for critical parameters to provide early warnings of potential water quality problems.

  In 2022, EWSI collected and tested 58,066 treated drinking water samples, including randomly selected samples from plant reservoirs, field reservoirs and the distribution network, as well as specific testing to address water quality complaints and depressurization events. All water quality test results met Health Canada's Drinking Water Quality Guidelines and AEP water quality testing requirements and only 98 samples (0.17%) did not meet EWSI's internal water quality standards.

Areas for Improvement

- In 2023, EWSI plans to review its distribution water quality sampling practices and methodology to ensure sampling achieves AEP's monthly random sampling count and distributed location requirements.

3.1.2 Customer Service Index

The customer service index is a composite measure of the customers' perception of satisfaction with EWSI's service, the aesthetic quality of water and speed of response to customer issues. This index includes the following performance measures:

- **Post Service Audit Factor** (actual 90.1% vs target 75.0%), calculated as the percentage of customers responding "completely" or "very satisfied" with the level of service received from EWSI's Emergency group. In 2022, EWSI updated the post-service audit questionnaire to obtain greater feedback from customers regarding their experience with EWSI, so that EWSI can continue to improve customer experience.

- **Home Sniffing Factor** (actual 92.9% vs target 94.4%), calculated as the percentage of participants in the home sniffing survey responding “completely” or “very satisfied”. In 2022, home sniffing odour intensity trends were used to track customer satisfaction before, during, and after spring runoff, enabling water plant operators to make operational adjustments on a real time basis.

- **Response Time Factor** (actual 14.8 minutes vs target 25 minutes), calculated as the average number of minutes needed to confirm a water main break from the time a call is received at EWSI’s dispatch office. Implementation of an Emergency Support Team in early 2022 contributed to a reduction in response times to possible main breaks.

- **Planned Construction Impact Factor** (actual 100.0% vs target 95.8%), means the percentage of the total planned construction events where EWSI complies with required construction notification procedures. In 2022, on-going training and improvements to construction coordination and communication plans resulted in performance exceeding the PBR standard.

Areas for Improvement

- **Post Service Audit Factor:** In 2023, EWSI will continue to focus on improving customer experience by examining root causes derived from customers’ comments in the post service questionnaire.

- **Home Sniffing Factor:** In 2023, the Home Sniffing program will be rebranded as the Spring Home Analysis Runoff Program (SHARP) with updated guidelines for random selection of program participants, so that all areas of the city are adequately represented.

- **Response Time Factor:** Response times greater than 25 minutes will continue to be investigated to ensure continued success.

- **Planned Construction Impact Factor:** Training and construction processes will continue to be reviewed to minimize impacts of planned construction activities.

3.1.3 System Reliability and Optimization Index

The System Reliability Index is a measure of the confidence that customers can place in the reliability of the waterworks system. This index includes the following performance measures:

- **Water Main Break Factor** (actual 278 main breaks vs target 365), calculated as the number of water main breaks that occurred in the year. Main break rates continue to fluctuate with variations in weather and temperature, with the overall number of main breaks continuing to decline due to the replacement of cast iron mains with PVC mains.

- **Water Main Break Repair Duration Factor** (actual 97.3% vs target 95.4%), calculated as the percentage of water main breaks repaired within 24 hours from the time that the flow of water is shut off, excluding main breaks on arterial or collector roads. EWSI reviewed each main break that exceeded 24 hours to identify issues and find efficiencies for future repairs.

- **Water Loss Factor** (actual 0.87 vs target 1.23), measured using the Infrastructure Leakage Index ("ILI"), a industry-standard performance indicator quantifying how well a water distribution system is managed for the control of "real" water losses (i.e., leakage).

- **System Energy Efficiency Factor** (actual 245.8 kWh/ML of water treated vs target 281 kWh/ML), calculated as the energy used at all water facilities in kWh divided by the average annual water production per residential customer account (ML/kWh/customer).

  In 2022, EWSI exceeded the energy efficiency target by implementing several energy efficiency improvements including completion of an energy audit to identify improvement opportunities for water treatment plant and reservoir operations.

Areas for Improvement

- **Water Main Break Factor:** In 2023, EWSI will utilize AI software to identify and evaluate main break patterns, enabling further refinement of risk-based asset management programs.

- **Water Main Break Repair Duration Factor:** In 2023, EWSI plans to implement an online water outage map to provide more information directly to impacted customers. Planned improvements to the outage map includes providing additional information such as traffic impacts related to main breaks, unidirectional flushing and other interruptions. All processes for mobilization of resources to main break site will be reviewed to further reduce repair duration.

- **Water Loss Factor (ILI):** Although the ILI exceeded the PBR standard, EWSI continues to explore opportunities for identifying and minimizing water losses.

- **System Energy Efficiency Factor:** Planned energy efficiency improvements include:
  - Leveraging energy audit to identify climate change mitigation strategies and integrating recommendations into future capital project plans;

- Implementing an energy management dashboard to share near-real time solar farm generation and usage, energy efficiency indices, and other energy related data with stakeholders; and
- Completing the solar farm and battery system operation optimization plan.

3.1.4 Environment Index

The environmental index measures the success of programs and policies designed to mitigate and report adverse environmental impacts. This index includes the following performance measures:

- **Water Conservation Factor** (actual 14.8 m^3 vs target 16.8 m^3), calculated as the average monthly consumption per residential customer. In 2022, hybrid-working arrangements and hot, dry weather during late summer months continued to impact residential consumption per customer. Ongoing improvements in water usage habits and technology, including the use of more efficient appliances and toilets contributed to the Water Conservation Factor remaining better than the standard.

- **Environmental Incident Management Factor** (actual 2 vs target 5), calculated as the number of incidents reportable to municipal, provincial or federal regulators that are considered preventable. In 2022, there were two reportable release events. First, a small loss of refrigerant to the atmosphere from an aging building chiller unit at the Rossdale water treatment plant and, second, a release of approximately one thousand cubic meters of potable water from the Rosslyn reservoir to the stormwater management system and into the North Saskatchewan River due to a partially open value after a regular maintenance activity at the reservoir. Following this release, reservoir fill procedures were reviewed and additional controls were implemented.

- **Solids Residual Management Factor** (actual 150.8 vs target 120), calculated as the number of days that the water treatment plants operate in direct filtration mode. Direct filtration reduces the solids load of water returned to the North Saskatchewan River during water treatment. In 2022, solids discharged during winter months were reduced by 50% relative to baseline conventional treatment.

Areas for Improvement

- **Water Conservation Factor:** EWSI expects average monthly residential consumption to continue to decline due to changes in technology and water conservation awareness.

- **Environment Incident Management Factor:** Continued emphasis on improving operational controls and maintaining the environmental management systems to ISO

14001 standard with a focus on root cause analysis and implementing effective corrective action plans.

- **Solids Residual Management Factor:** In 2023, EWSI will implement its new Wastestream Monitoring Program which was approved by Alberta Environment and Protected Areas in December 2022. This program will build on previous assessment work for quantifying residuals discharged to the river and their impacts, helping to inform future residual management strategies.

3.1.5 Safety Index

The safety index is a measure of the success of programs and policies that maximize the safety of employees and the public. The performance measures comprising this index include:

- **Near Miss Reporting Factor** (actual 837 vs target 550), calculated as the number of near miss reports completed each year. In 2022, EWSI implemented a new Mind on Task initiative to encourage personnel to focus on identifying hazards before an event occurs in order to support a proactive approach to safety.

- **Work Site Inspections and Observations Factor** (actual 3,492 vs target 1,032), calculated as the number of Work Site Inspections and Observations completed each year. The higher number of inspections and observations completed reflects continued focus on proactive field engagement.

- **Lost Time Injury Frequency Factor** (actual 0.21 vs target 0.40), calculated as the frequency of disability injuries and illnesses and the **All Injury Frequency Factor** (actual 0.21 vs target 1.00), calculated as the frequency of disability injuries and medical aid injuries. These factors are key measures for assessing the effectiveness of safety programs. In 2022, strategies based on causal themes were identified to reinforce reducing and/or eliminating workplace injuries.

Areas for Improvement

- **Near Miss Reporting Factor**: Near miss and hazard identification reporting will continue to be a focus in 2023 to support EWSI's proactive approach to safety.

- **Work Site Inspections / Observations Factor**: In 2023, there will be a continued focus on inspections and observations to support a proactive approach to safety.

- **Lost Time Frequency Rate Factor and All Injury Frequency Rate Factor**: EWSI endeavours to eliminate workplace injuries and, to this end, will implement causal investigation methodology in 2023 to improve root cause identification and prevent re-occurrence of workplace injuries.

3.2 Wastewater Treatment Services

Table 3.2-1 summarizes Wastewater Treatment Services 2022 operational performance:

Table 3.2-1
Wastewater Treatment Services 2022 Operational Performance

A	B	C	D	E	F	G	H
		Performance					
Description	**Benchmark**	**Standard**	**Actual**	**Base Points**	**Points Earned**	**Maximum Bonus Points**	**Total Points Earned**
1.0 Water Quality & Environment Index							
1.1 Wastewater Quality Factor	WELP	26.0	16.7		35.1		
1.2 Environmental Incident Factor	# of incidents	5	3		37.5		
1.0 Water Quality & Environment Index				**45.0**	**72.6**	**4.5**	**49.5**
2.0 Customer Service Index							
2.1 H_2S - 1-hour Exceedance Factor	exceedance std	4	0.5		40.0		
2.2 H_2S - 24-hour Exceedance Factor	exceedance std	1	1		5.0		
2.3 Scrubber Uptime Factor	% on-line	96.0%	98.3%		5.1		
2.0 Customer Service Index				**15.0**	**50.1**	**1.5**	**16.5**
3.0 System Reliability and Optimization Index							
3.1 Enhanced Primary Treatment Factor	% in use	94.0%	100.0%		8.9		
3.2 Biosolids Inventory Reduction Factor	relative reduction	1.05	0.97		7.7		
3.3 Energy Efficiency Factor	kWh / ML treated	508	521		8.1		
3.0 System Reliability and Optimization Index				**25.0**	**24.7**	**2.5**	**24.7**
4.0 Safety Index							
4.1 Near Miss Reporting Factor	# completed	220	300		5.1		
4.2 Work Site Inspection/Observation Factor	# conducted	919	1,499		6.1		
4.3 Lost Time Frequency Rate	frequency rate	0.75	1.34		2.1		
4.4 All Injury Frequency Rate	frequency rate	1.00	2.02		1.9		
4.0 Safety Index				**15.0**	**15.2**	**1.5**	**15.2**
Aggregate Points Earned (sum of all the above indices)				**100.0**	**162.6**	**10.0**	**105.9**
Points Required at Performance Standard							**100.0**
Points Above / (Below) Performance Standard							**5.9**

Wastewater Treatment Services quality is measured by the results of four indices. As with Water Services, performance under each index is measured independently on a point basis with 100 base points available if the standards in all five areas are achieved. In total, up to 10 additional bonus points for performance above the standard are available. In 2022, Wastewater exceeded performance standards for three of the four indices, earning 5.9 bonus points. Highlights and opportunities for improvement for each index are provided below:

3.2.1 Wastewater Quality and Environmental Index

The Wastewater Quality and Environmental index measures the success of operational processes and procedures designed to manage the quality of effluent returned back the North Saskatchewan River and to manage adverse environmental impacts. The performance measures comprising this index include:

- **Wastewater Quality Factor** (actual 16.7 vs target 26.0), determined by the Wastewater Effluent Limit Performance (WELP) index is an aggregate measure of the percentage of the discharge limits for five parameters in the Gold Bar wastewater treatment plant's final effluent. In 2022, Wastewater achieved a record low WELP. Contributing factors included the use of "winter mode" to control ammonia in the bioreactors by increasing aeration and limiting process tanks out of service.

- **Environmental Incident Factor** (actual 3 vs target 5), calculated as the actual number of environmental incidents that are both reportable and preventable. The three reportable incidents in 2022 included one release of biosolids supernatant and two H_2S exceedances. EWSI conducted root cause investigations for each incident and implemented corrective actions.

Areas for Improvement

- **Wastewater Quality Factor**: In 2023, Wastewater will continue to optimize the use of the "winter operation mode" and limit process downtime. Installation of a secondary system will be implemented to further improve the overall performance of the biological nutrient removal (BNR) process.

- **Environmental Incident Factor**: In 2023, EWSI will utilize additional data from the new Gold Bar Park Road Air Quality Monitoring Station to better determine sources of odours and to improve the effectiveness of ongoing odour reduction projects.

3.2.2 Customer Service Index

Wastewater's customer service index includes three equally weighted odour related factors. These factors, recognize that Wastewater's customer interactions are primarily related to odour concerns from customers who live near to the Gold Bar Wastewater Treatment Plant. The performance measures comprising this index include:

- **H_2S – 1 Hour Exceedance Factor** (0.5 actual vs 4 target), measured as the number of exceedances of the 1-hour limit averaged between Gold Bar and Beverly air quality monitoring stations and **H_2S – 24 Hour Exceedance Factor** (1 actual vs 1 target), measured as the number of exceedances of the 24-hour limit averaged between Gold Bar and Beverly air quality monitoring stations. In 2022, there were two air quality events at the Strathcona Industrial Association (SIA) air quality monitoring station at Beverly, including one 1-hr H_2S exceedance and one 24-hour H_2S exceedance. Both events took place during the planned shutdown of a scrubber for maintenance. Although investigations were not conclusive, the Gold Bar Wastewater Treatment Plant may have contributed to these exceedances, which were deemed as non-preventable.

- **Scrubber Uptime Factor** (actual 98.3% vs target 96.0%), measured as the percentage of the time that the odour control systems at the Gold Bar Wastewater Treatment Plant are operating. In 2022, preventative and corrective maintenance activities limited scrubber downtime.

Areas for Improvement

- **H_2S – 1-hr and 24-hr Exceedance Factors**: In 2023, the newly commissioned EPCOR Air Quality Monitoring Station on Gold Bar Park Road will allow for intervention when high levels of H_2S are observed, reducing H_2S exceedances.

- **Scrubber Uptime Factor**: In 2023, construction of two additional odour scrubbers will provide additional redundancy for the EPT and West Scrubbers and tie in points for future redundancy of the Fermenter and East Scrubbers.

3.2.3 System Reliability and Optimization Index

The system reliability and optimization index is a measure of the performance of the Gold Bar Wastewater Treatment Plant. The performance measures comprising this index include:

- **Enhanced Primary Treatment (EPT) Factor** (actual 100% vs target 94.0%), calculated as the percentage of time that the EPT facility ran during wet weather events when the influent flow rate exceeded the EPT event threshold. Preventative maintenance, including inspection and cleaning of two of the four EPT clarifiers contributed to strong results in 2022.

- **Biosolids Inventory Reduction Factor** (actual 0.97 vs 1.05 target). This factor measures the reduction in the biosolids inventory at the Clover Bar Biosolids Recycling Facility and is calculated as the three-year average of the total dry tonnes of biosolids removed from the lagoons to the total dry tonnes of biosolids deposited in the lagoons. Performance in 2022 was lower than target due to a critical power failure at the dewatering facility and due to lower than expected solids content (Total Suspended Solids or “TSS”) of the biosolids deposits.

- **Energy Efficiency Factor** (actual 521 kWh/ML vs target 508 kWh/ML), calculated as the energy used in all wastewater facilities in kWh divided by the volume of wastewater effluent that either receives ultraviolet (UV) treatment or is membrane plant effluent. Lower than target energy efficiency reflected both increased energy consumption throughout 2022, as well as lower flow volumes.

Areas for Improvement

- **Enhanced Primary Treatment (EPT) Factor**: EWSI has scheduled inspection and cleaning of the remaining two clarifiers in 2023 and has commenced planning for proactive replacement of assets nearing end-of-life to minimize unplanned downtime.

- **Biosolids Inventory Reduction Factor**: Efforts will continue in 2023 to explore more non-agricultural re-use opportunities of biosolids, as well as development of additional on-site biosolids dewatering processes in response to the loss of production resulting from the dewatering facility shut down.

- **Energy Efficiency Factor**: In 2023, EWSI will continue to work on planning and design for upgraded secondary aeration blowers and the UV system. EWSI will also optimize the use of other equipment such as secondary aeration trimmer blowers.

3.2.4 Safety Index

The safety index is a measure of the success of programs and the application of policies that maximize the safety of employees and the public. The performance measures comprising this index include:

- **Near Miss Reporting Factor** (actual 300 vs target 220), calculated as the number of near miss reports completed each year. During 2022, there was a continued internal monthly promotion of near miss and hazard identification reporting to demonstrate to employees the impact of site-specific reporting.

- **Work Site Inspections / Observations Factor** (actual 1,499 vs target 919), calculated as the number of Work Site Inspections and Observations completed each year. Higher than target results reflect EWSI’s continued emphasis to monitor and measure inspections and observations to ensure employee engagement.

- **Lost Time Injury Frequency Rate Factor** (actual 1.34 vs target 0.75) calculated as the frequency of disability injuries and illnesses and **All Injury Frequency Rate Factor** (actual 2.02 vs target 1.00**)** calculated as the frequency of disability injuries and medical aid injuries. These factors are key measures for assessing the effectiveness of safety programs. In 2022, following lost time events, EWSI undertook root cause analysis to identify causal themes and provide a basis for developing strategies to reduce workplace injuries.

Areas for Improvement

- **Near Miss Reporting Factor**: In 2023, EWSI will continue to focus on near miss and hazard identification to promote reporting and demonstrate the benefit of site-specific reporting.

- **Near Miss Reporting Factor**: There will be a continued focus on inspection and observation completion to ensure engagement and proactive field presence.

- **Lost Time Frequency Rate Factor**: EWSI endeavours to eliminate workplace injuries and, to this end, will implement causal investigation methodology in 2023 to improve root cause identification and prevent re-occurrence of workplace injuries.

3.3 Drainage Services

Table 3.3-1 summarizes Drainage Services 2022 operational performance:

Table 3.3-1
Drainage Services 2022 Operational Performance

A	B	C	D	E	F	G	H
		Performance					Points with
Description	Benchmark	Standard	Actual	Base Points	Points Earned	Maximum Bonus Points	Maximum Bonus Points
1.0 Environmental Index							
1.1 Stormwater Flow and Flow Monitoring Factor	% area monitored	63.0	70.0		13.0		
1.2 Environmental Incident Management Factor	% reportable	50	14		41.7		
1.3 Green Hectares Factor	managed area	45.0	36.9		9.6		
1.0 Environmental Index				**35.0**	**64.2**	**3.5**	**38.5**
2.0 Customer Service Index							
2.1 Service Maintenance Calls Factor	% resolved in 24h	80.0	96.8		6.0		
2.2 Emergency Dig-Ups – Service Restored Factor	% restored in 48h	98.0	98.0		5.0		
2.3 Service Connections Factor	% within 6 weeks	85.0	80.4		4.7		
2.4 Sewer Odour Hotspots Factor	% city area	15.0	7.0		10.8		
2.0 Customer Service Index				**20.0**	**26.5**	**2.0**	**22.0**
3.0 System Reliability and Optimization Index							
3.1 Blocked Sewers Factor	# per 100 km	2.10	2.54		6.2		
3.2 Sewer Renewal Factor	km renewed	60.0	56.6		7.1		
3.3 Infrastructure Condition Rating Level Factor	% > minimum	90.0	90.1		7.5		
3.4 Full Property Flood Proofing Inspections	# inspections	750	1,077		10.8		
3.0 System Reliability and Optimization Index				**30.0**	**31.6**	**3.0**	**31.6**
4.0 Safety Index							
4.1 Near Miss Reporting Factor	# completed	750	1,721		8.6		
4.2 Work Site Inspection/Observation Factor	# conducted	1300	2,262		6.5		
4.3 Lost Time Frequency Rate	frequency rate	0.75	0.18		16.0		
4.4 All Injury Frequency Rate	frequency rate	4.00	1.23		12.2		
4.0 Safety Index				**15.0**	**43.4**	**1.5**	**16.5**
Aggregate Points Earned (sum of all the above indices)				**100.0**	**162.6**	**10.0**	**108.6**
Points Required at Performance Standard							**100.0**
Points Above / (Below) Performance Standard							**8.6**

Drainage Services service quality is measured by the results of four indices. Performance under each index is measured independently on a point basis with 100 base points available if the standards in all five areas are achieved. In total, up to 10 additional bonus points for performance above standard are available. In 2022, Drainage Services exceeded performance standards for each index, earning 8.6 bonus points. Highlights and opportunities for improvement for each index are provided below:

3.3.1 Environmental Index

The environmental index measures the success of Drainage Services programs and policies designed to mitigate and report adverse environmental impacts. The performance measures comprising this index include:

1. **Stormwater Flow Monitoring Factor** (actual 70.0% vs target 63.0%), defined as percentage of storm drainage area being monitored relative to all qualified hydrologically-effective drainage areas serviced by outfalls. In 2022, construction and activation of five new permanent outfall monitoring sites contributed to better than target performance.

2. **Environment Incident Management Factor** (actual 14 vs target 50), calculated as the number of incidents reportable to municipal, provincial or federal regulators that are considered preventable. The low number of reportable environment incidents in 2022 reflects proactive inspection and maintenance programs designed to minimize third party releases of prohibited or restricted waste.

3. **Green Hectares Factor** (actual 36.9 hectares vs target 45 hectares), measured by the area where the volume of green infrastructure managed runoff is spread evenly to a 15mm depth. While 2022 actual performance was lower than the PBR target, Drainage Services successfully implemented Low Impact Development (LID) at 82 locations in partnership with City of Edmonton, EPCOR construction sites and with a few commercial properties throughout the city.

Areas for Improvement

- **Stormwater Flow Monitoring Factor**: Nine additional permanent outfall monitoring sites are scheduled for construction and activation in 2023. Since projects can extend beyond a single year, some projects will be combined to improve design and construction efforts which in turn is expected to improve completion timelines.

- **Environment Incident Management Factor**: In 2023, EWSI will continue to provide educational programs for customers and other stakeholders on proper maintenance of private infrastructure so that risks are identified, and incidents minimized.

- **Green Hectares Factor**: In 2023, Drainage Services will continue to enhance the overarching LID Strategy that will guide planning and development of Green Hectare projects for construction on both public lands and for commercial and industrial sites to increase storage of stormwater and slow water moving into the system. Drainage Services will also continue efforts to increase awareness and education of LIDs and small storage facilities within EPCOR, the City of Edmonton, and the development industry which includes both commercial and industrial sites as well as new and retrofit development projects through the modernization of standards work.

3.3.2 Customer Service Index

The Customer Service Index measures the success of Drainage Services programs and policies pertaining to customer service. This index is comprised of the following performance measures:

- **Service Maintenance Calls Factor** (actual 96.8% vs target 80.0%), defined as the percentage of service maintenance sewer trouble calls resolved within 24 hours. In 2022, Drainage Services achieved higher than standard performance through implementation of shift changes that took into account call volumes, as well as from the introduction of smaller, easier to mobilize and operate equipment.

- **Emergency Dig-Ups with Service Restored Factor** (actual 98.0% vs target 98.0%), defined as the percentage of emergency dig-ups restored within 48 hours from the time the call is referred from Drainage Operations to Drainage Construction as an emergency dig-up. In 2022, Drainage Services implemented a new less costly and less invasive technology, enabling more timely repairs on some service connections than traditional open cut repairs.

- **Service Connections Factor** (actual 80.4% vs target 85.0%), calculated as the percentage of new installations of sanitary, storm, and common trench water service connection completed within a six-week timeframe. In 2022, Drainage Services investigated alternate work methods to ensure the safety and efficiency of service connection installations and established a working committee to improve work opportunities with the developer community.

- **Sewer Odour Hotspots Factor** (actual 7.0% vs target 15.0%), measured as the percentage of the city area with odour hotspots. In 2022, Drainage Services expanded monitoring and inspection of odour sources through the sewer system. Drainage Services also completed debris and sediment cleaning, constructed air recirculation chambers and completed the first odour control optimization pump station. Finally, Drainage Services installed a chemical dosage system at a pump station with the third highest point source of hydrogen sulfide, which completely eliminated odours from this one facility.

Areas for Improvement

- **Service Maintenance Calls Factor**: For 2023, Drainage Services will implement new initiatives to decrease time at customer locations and minimize repeat calls, including adding personnel and standardizing responses for first call resolution and issue assessment techniques.

- **Emergency Dig-Ups with Service Restored Factor**: For 2023, Drainage Services will explore opportunities, such as hydraulic shoring and directional drilling, to improve operational efficiencies and crew safety, as well as reducing the time required to complete work and restore service.

- **Service Connections Factor**: For 2023, Drainage Services will continue to implement hydraulic shoring to improve field efficiencies and reduce crew time.

- **Sewer Odour Hotspots Factor**: In 2023, Drainage Services will continue to monitor and inspect odour sources throughout the sewer system and will expand pump station odour control optimization.

3.3.3 Reliability and Optimization Index

The System Reliability Index measures the reliability of the sanitary and stormwater drainage systems. The performance measures comprising this index include:

- **Blocked Sewers Factor** (actual 2.54 vs target 2.10), calculated as the number of blocked sewers per 100 km of sanitary and combined sewer pipe. In 2022, Drainage Services experienced an increase in the number of blockages due to grease, rags and wipes. Each blockage was assessed to determine if a change to an existing flushing program or a new flushing program was warranted.

- **Sewer Renewal Factor** (actual 56.6 km vs target 60.0 km), measured as the km of sewers renewed / relined as part of the Neighbourhood Renewal Program, Local Sewer Rehabilitation Program, Arterial and Collector Roadway Renewal Coordination Program, SIRP Proactive Pipe Relining Program, Proactive Service Renewal Program and CORe Large Trunk Rehabilitation Program. Sewer renewal and relining are proactive maintenance activities. In 2022, the PBR target was not met due to increased focus on higher risk trunk line renewals which result in less length of sewer renewed for the cost required to complete the renewal.

- **Infrastructure Condition Rating Level Factor** (actual 90.1% vs target 90.0%), defined as the percentage of infrastructure at or above the minimum level of condition rating. In 2022, Drainage Services expanded infrastructure condition assessment to additional asset categories, including: storage pipes and tanks; gates and real-time control; permanent flow monitors; and SCADA components.

- **Full Property Flood Proofing Inspections Factor** (actual 1,077 vs target 750), calculated as the number of full flood proofing inspections completed that include an inspection report provided to the property owner. In 2022, Drainage Services updated the Full Property Flood Proofing Inspections metric to include multi-family property inspections, as well as single family inspections. Drainage Services also implemented a new inspection form to better align inspection elements with the home flood protection education program.

Areas for Improvement

- **Blocked Sewers Factor**: In 2023, Drainage Services will implement enhancements to plugged main reporting and investigative follow-up to better determine patterns of plugged mains. Drainage Services will also explore development of an operational and maintenance program for the small diameter sanitary and combined sewers that directly contribute up to 95% of blockages.

- **Sewer Renewal Factor**: For 2023, Drainage Services will continue to focus on higher risk sewer infrastructure renewal to proactively reduce future emergency repair and rehabilitation and will be assessing this measure for future PBR submission to ensure it reflects the focus on higher risk renewal of aging infrastructure

- **Infrastructure Condition Rating Level Factor**: For 2023, infrastructure assessment will be further expanded to include manholes, catch-basins and catch-basin leads. Drainage Services will also focus on proactive inspection of poor and very poor condition assets to ensure that the worst condition assets are rehabilitated and thereby improve the asset condition.

- **Full Property Flood Proofing Inspections Factor**: For 2023, EWSI will continue outreach to properties within high risk flood basins and will re-engage with previously inspected properties to assess and evaluate customer engagement and completion of recommended actions.

3.3.4 Safety Index

The safety index is a measure of the success of programs and the application of policies that maximize the safety of employees and the public. The performance measures comprising this index include:

- **Near Miss Reporting Factor** (actual 1,721 vs target 750), calculated as the number of near miss reports completed each year. During 2022, two actions contributed to higher than target performance. First, Drainage Services stressed the importance of near miss reporting to its workforce, encouraging prompt reporting. Second, Drainage Services analyzed trends of reported near misses to reinforce the contribution of near miss reporting in reducing workplace injuries.

- **Work Site Inspections / Observations Factor** (actual 2,262 vs target 1,300), calculated as the number of Work Site Inspections and Observations completed each year. In 2022, Drainage Services analyzed trends from near miss reporting to focus on inspections and observations to further drive injury elimination and reduction.

- **Lost Time Frequency Rate Factor** (actual 0.18 vs target 0.75) calculated as the frequency of disability injuries and illnesses an**d All Injury Frequency Rate Factor** (actual 1.23 vs target 4.00) calculated as the frequency of disability injuries and medical aid injuries. These factors are key measures for assessing the effectiveness of safety programs. In 2022, Drainage Services introduced a field-based ergonomics assessment process, which directly reduced the number of musculoskeletal injuries related to tasks involving manual handling.

Areas for Improvement

- **Near Miss Reporting Factor**: In 2023, Drainage Services will focus on identifying and mitigating hazards associated with everyday tasks to further reinforce the contribution of near miss reporting in reducing and/or eliminating workplace injuries.

- **Work Site Inspections / Observations Factor**: For 2023, trending analysis will be used to encourage completion of inspections & observations.

- **Lost Time Frequency and All Injury Frequency Rates**: For 2023, Drainage Services will focus on field ergonomic assessments on areas indicated by trend analysis and other areas targeted by management. Causal investigation methodology will also be implemented to improve root cause identification and to prevent re-occurrence of workplace injuries.

4 Rates and Bill Comparisons

Residential water and wastewater bill comparisons for 2022 are based on the published water, wastewater treatment, sanitary and stormwater rates for Calgary, Vancouver, Saskatoon, Winnipeg and Regina, as well as three surrounding municipalities (St. Albert, Sherwood Park and Leduc). These bill comparisons represent the total cost to the customer and include fixed charges, consumption charges and any other applicable surcharges based on readily available data from cities and municipalities.

Figure 4-1 provides a comparison of residential water bills with consumption of 14.0 m^3 per month, the average monthly water consumption for a residential customer in Edmonton in 2022. Edmonton is the only city in this comparison where fire protection charges are included in water rates. Therefore, Edmonton's average monthly residential bill of $41.90 which includes fire protection charge of $2.54 has been normalized to $39.36 for this comparison. Figure 4-1 shows that Edmonton's water bills are competitive with most of the cities and local communities surveyed. Vancouver and Calgary continue to have the lowest rates due to its excellent raw water source and, therefore, lower needs for water treatment than Edmonton, which has a naturally high variable water source in the North Saskatchewan River.

Figure 4-1
2022 Average Residential Water Bills
(14.0 m^3/month)

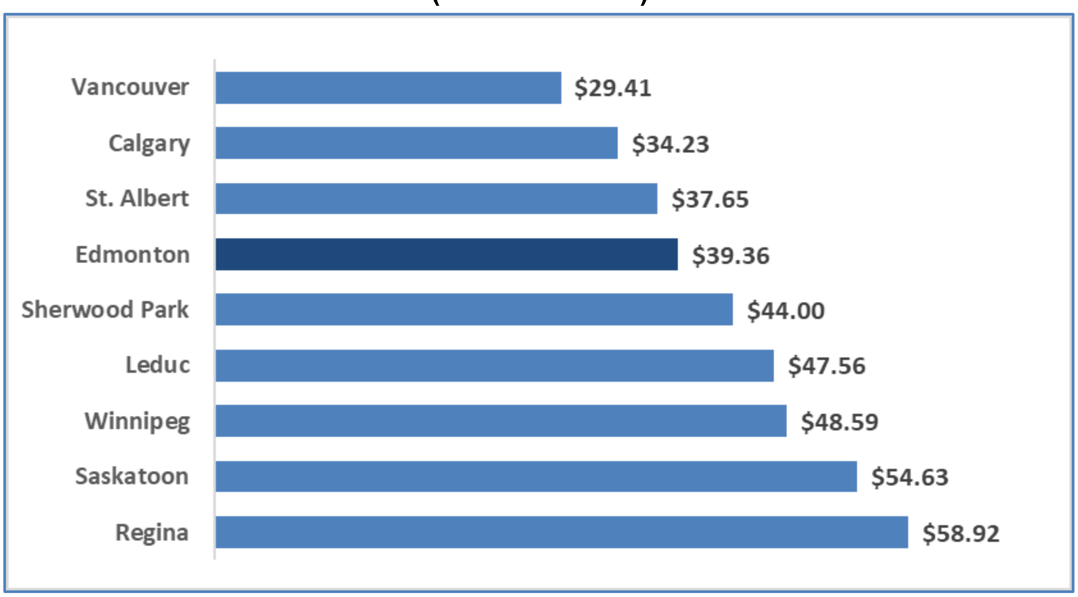


Figure 4-2 provides a comparison of average residential sanitary drainage and wastewater treatment bills with consumption of 14.0 m^3 per month, the average monthly water consumption for a residential customer in Edmonton in 2022. These bill comparisons represent the total cost to the customer and include fixed charges, consumption charges and any other applicable surcharges for wastewater treatment.

Although Edmonton's sanitary drainage and wastewater treatment bills appear higher relative to the comparison communities, the comparison does not reflect the impact of historical spending decisions by each community. For example, EWSI is expending significant resources on the CORe program to address corrosion issues and to remediate long-running odour issues in its sanitary sewers. In 2022, Edmonton residential bills included a special rate adjustment of $2.94 per month for the CORe program.

Figure 4.2
2022 Residential Sanitary Drainage and Wastewater Treatment Bills
(14.0 m^3/month)

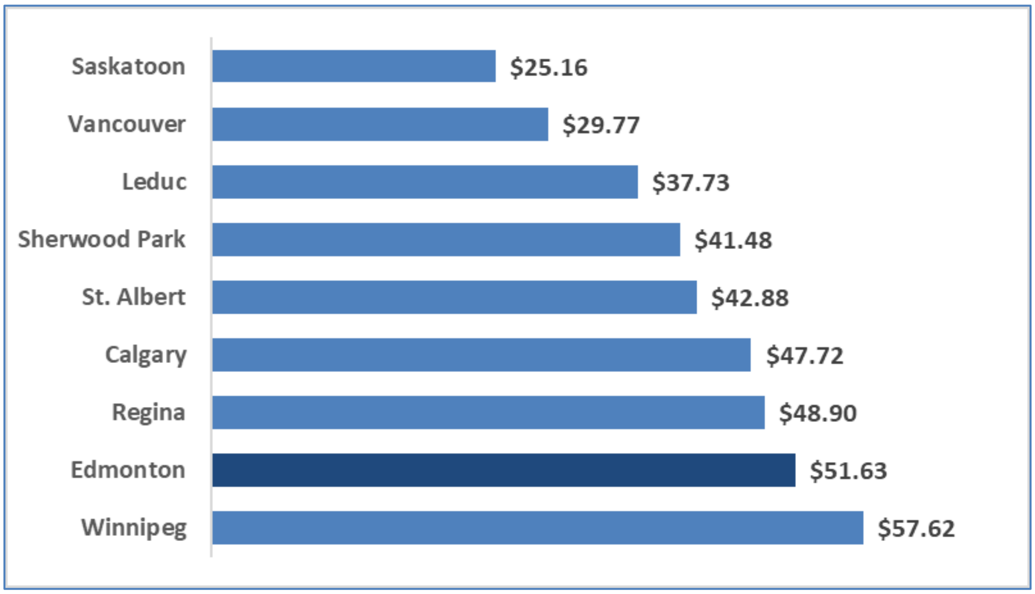
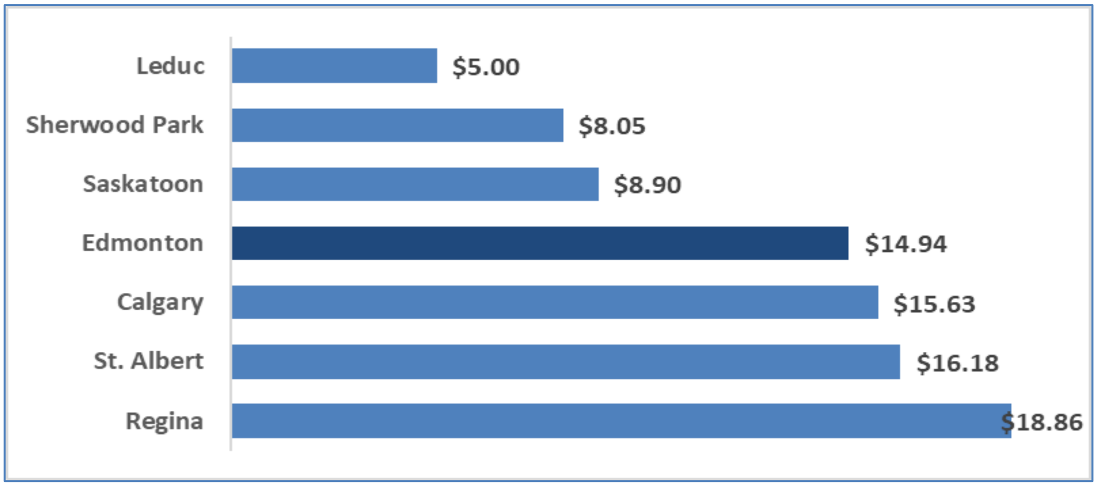


Figure 4-3 provides a comparison of average monthly residential stormwater bills for 2022. The nature and extent of stormwater drainage services varies among municipalities, due to geography and climatic conditions, with different cities facing different risks from storms, overland flooding and sea level. In addition, in some municipalities, flood mitigation and stormwater drainage charges are included in property taxes which makes this bill comparison challenging. Stormwater charges embedded in property taxes for Vancouver and Winnipeg were not readily accessible and therefore not reflected in the figure below. EWSI has been proactive in addressing the increased risk of flooding related to climate change and is making substantial investments through its SIRP program to assess and mitigate these risks. EWSI's 2022 average stormwater bills are comparable to cities that have started addressing risks related to climate change such as Calgary, St. Albert and Regina.

Figure 4-3
2022 Average Monthly Residential Stormwater Bills



Appendix A: PBR Framework

In 2021, Edmonton City Council approved EPCOR Water Services Bylaw 19626 and EPCOR Drainage Services and Wastewater Treatment Bylaw 19627. Bylaw 19626 provides for continuation of performance-based regulation ("PBR") for In-City Water Services for a five-year term from April 1, 2022 to March 31, 2027, while Bylaw 19627 provides for continuation of PBR for Wastewater Treatment and Drainage Services' Sanitary and Stormwater Utilities for a three-year term from April 1, 2022 to March 31, 2025.

A. Overview

The PBR framework encompass rates, performance measures, and return on equity. The relationships between these components are designed to ensure that capital and operating cost decisions provide a balance between operational performance, rates, and return on equity, while safeguarding system reliability and service quality, providing fair, stable, predictable rates to rate payers, and providing a basis for the future development of the water, wastewater treatment, and drainage systems. Several key changes were introduced for the 2022-2024/2026 PBR term, including:

1. **Introduction of a Consumption Deferral Account**: EWSI was directed to introduce a water consumption deferral account for each of Water, Wastewater Treatment and Drainage Services with the intent of capturing and accumulating variances related to consumption over the 2022-2024/2026 PBR terms and subsequently collecting or refunding the accumulated consumption variances through customer rates in future PBR terms. In the past, revenue risk related to consumption was borne by EWSI. The introduction of deferral account reduces EWSI's exposure to revenue risk resulting from volatile consumption patterns however, this risk and volatility is now borne by customers.
2. **Reduction in Return on Equity (ROE)**: Return on equity for Water and Wastewater Treatment was reduced from 10.175% to 9.89%, with a further 0.25% reduction to 9.64% to offset the reduction in risk associated with the introduction of a consumption deferral account. Return on equity for Drainage Services was reduced from 9.64% to 5.50% in 2022. Drainage Service ROE is approved to be "ramped up" by 1.1% per year to achieve a fair rate of return of 9.64% by 2026.
3. **Drainage Efficiency Factor**: Efficiency factor for Drainage Services was increased from 0.25% to 0.50% for the 2022-2024 PBR term.
4. **Introduction of Fire Protection Charge**: EWSI was directed to include recovery of the public fire protection revenue requirement through water rates over the 2022-2026 PBR term instead of the past practice of recovering fire protection revenue requirement through City's property taxes.

B. PBR Rates

Annual changes to In-City water, wastewater treatment and sanitary and stormwater utility rates consist of routine rate adjustments and, occasionally, non-routine adjustments.

I) Routine Rate Adjustments

Routine rate adjustments are limited to inflation, defined as a weighted inflation metric consisting of both CPI and labour components, less an efficiency factor, plus special rate adjustments approved by City Council as part of the 2022-2024/2026 PBR Applications. The use of a formulaic approach for calculating and setting utility rates act as a "price cap" providing ratepayers with stable and predictable rates. The efficiency factor for In-City water and wastewater treatment is set at 0.25%, while for sanitary and stormwater, the efficiency factor is at 0.50%. The efficiency factor incents EWSI to increase productivity and achieve efficiencies in excess of inflation in order to meet its targeted return on equity. The Special Rates Adjustments (SRA) approved for the 2022-2024/2026 PBR term, include:

1. **SRA for Re-basing** (In-City Water, Wastewater and Drainage Services): The SRA for re-basing accounts for the difference between EWSI's revenue requirement forecast for the 2022-2026 PBR term and the revenue that would be realized by limiting annual rate increases to PBR inflation. The resulting revenue requirement difference (shortfall or surplus) gets collected from or refunded to ratepayers over the current PBR term through a SRA for re-basing.
2. **SRA to Increase Monthly Service Connection Fees (**In-City Water): The SRA to increase monthly service connection fee adjusts EWSI's rate structure to generate higher portions of revenue from fixed service charges, with a corresponding decrease in variable rates in order to help minimize the impact of declining rate revenue due to declining consumption over the 2022-2026 PBR term.
3. **SRA for 90 Day Deferral Program basing** (In-City Water, Wastewater and Drainage Services): Alberta's Utility Payment Deferral Program Act was introduced in 2020 by the provincial government for electricity and gas utility customers in order to provide temporary financial relief to Albertans who were experiencing financial hardship due to COVID-19. City Council directed EWSI to implement a similar program to allow its customers to defer their water, wastewater treatment and drainage utility bill payments, without interest or penalty, for a 90-day period from March 18, 2020, to June 18, 2020. The program ended on June 18, 2020, and customers had one-year (June 18, 2021) to repay the entirety of their deferred payments. For the 2022-2024/2026 PBR Applications, EWSI received approval for a SRA to recover the forecasted bad debt expense, administration and carrying costs associated with the 90-day deferral program. The SRA was approved as a one-time increase to 2022 rates, which is removed from 2023 rates to ensure that the SRA does not generate any incremental revenue over the PBR term.

Furthermore, the approval included 2023 incremental bill adjustments to true up actual incurred costs.

4. **SRA for Public Fire Protection** (In-City Water): Prior to April 1, 2022, EWSI recovered the public fire protection revenue requirement through the Fire Hydrant Service Agreement with the City of Edmonton Fire Rescue Services Department, which was funded through the City's property tax levy. Edmonton City Council directed EWSI to include the recovery of the public fire protection revenue requirement through water rates over the 2022-2026 PBR term by way of a special rate adjustment that is added to fixed monthly service charges.
5. **SRA for SIRP and CORe** (Drainage Services): These special rates adjustments provide funding for two critical Drainage Services strategic initiatives:
   a) The SIRP strategy is a $1.6 billion system wide integrated approach, which is expected to be completed over the next 20 to 30 years to mitigate flood risk. The SIRP strategy includes investments to mitigate flood risks across the City of Edmonton by using a mix of grey (SIRP – MOVE trunks and tunnels) and green (SIRP – SLOW dry ponds and low impact developments (LID)) infrastructure installed in public right-of-way, City-owned land or EPCOR owned land. Implementation of the SIRP program began in 2019 and recovery of the SIRP program costs during the 2022-2024 PBR term is funded through a SRA to stormwater rates.
   b) The CORe strategy focuses on preventing the formation of hydrogen sulphide (H_2S) gas, which will help reduce community odour impacts and lengthen the life of sewer network assets. Implementation of the CORe program began in 2019 and is expected to be completed by 2026. Recovery of the CORe program costs during the 2022-2024 PBR term is funded through a SRA to sanitary rates.

II) Non-Routine Rate Adjustments (NRA)

The PBR framework facilitates rate adjustments for events or activities that are unusual, significant in size or nature and beyond the scope of control of EWSI. Non-routine adjustment criteria defined per Schedule 3 of Bylaw 19626 and Bylaw 19627 must be met in order for the NRA to be approved.

C. Performance Measures

Performance measures are an integral part of EWSI's PBR framework, which includes measures and targets for water service quality as described in Schedule 3, Section 3 of Bylaw 19626, and wastewater treatment and drainage service quality as described in Schedule 3, Sections 3 and 4 of Bylaw 19627. Annually, an independent auditor audits EWSI's performance against established measures and targets. These measures ensure the maintenance of a standard level of operational performance and ensures that EWSI does not compromise system reliability and service quality as it seeks to identify cost saving opportunities during the PBR term. EWSI faces financial penalties ranging from $400,000 up to $2,400,000 if it does not meet or exceed the performance standards established within the PBR, providing assurance to customers that water, wastewater treatment and drainage services system reliability and service quality is not sacrificed to keep rates low or to increase returns to EWSI.

D. Return on Equity

The PBR plan incorporates a forecast rate of return on equity commensurate with consumption, cost and other risks that allows EWSI to finance its operational and capital programs, to provide its customers with high levels of service quality and reliability, and to provide “just and reasonable” returns to its shareholder. Achieving this return is dependent on EWSI achieving operating cost efficiencies, meeting, or exceeding performance standards, and developing the utility infrastructure needed to provide service to its customers. For the current PBR term, return on equity is based on a deemed capital structure of 60% debt and 40% equity with awarded rates of return as follows:

- **Return on Equity for Water and Wastewater Treatment Services**: A return on equity of 9.64% was approved for Water and Wastewater Treatment services for the current PBR term.
- **Return on Equity for Drainage Services**: The return on equity approved for Drainage services during the 2022-2024 PBR term is lower than the fair rate of return of 9.64%. In order to moderate rate increases for Drainage services during the 2022-2024 PBR term, return on equity for Drainage services was reduced from 9.95% to 5.50% in 2022. Beginning in 2023, Drainage return on equity was approved to be “ramped up” by 1.1% per year to achieve a fair rate of return by 2026.

E. PBR Rate Structures

I) In-City Water

In-City Water customers are grouped into three customer classes: residential; multi-residential; and commercial. In-City customers pay a variable consumption charge as well as a fixed monthly service charge. The fixed charge recovers costs that are directly attributable to a customer such as costs of the water meter, customer service and billing whereas variable consumption charge captures all the costs of operations, maintenance, administration and capital investment associated with operating the water treatment, wastewater treatment, sanitary and stormwater drainage utilities.

1. **Residential Customer Class**: Residential customers are charged a monthly service connection fee that varies with the size of the service, plus a variable charge for water consumption. Residential water rates are based on an inclining block structure with three consumption blocks (0 to 10 m^3, 10.1 to 35 m^3 and >35 m^3). A higher consumption charge is applicable to residential customers who use larger volumes of water while consumption charge is lower for residential customers who use less water. The inclining block structure promotes water conservation and incents customers to be efficient with their water usage, either by using water-efficient appliances or behavioral change such as more efficient lawn watering practices.
2. **Multi-Residential Customer Class**: Multi-residential customers are charged a monthly service connection fee that varies with the size of the service, plus a variable charge for water consumption. Multi-residential water rates are based on a declining block structure with three consumption blocks (0 to 100 m^3, 100.1 to 1,000.0 m^3 and >1,000 m^3). Multi-residential customers have less seasonal variability in water consumption and make lower peak demands on the waterworks system than residential customers. At the same time, multi-residential customers do not use the same volume of water or have the same infrastructure requirements as commercial customers. As a result, they have a unique declining block rate structure.
3. **Commercial Customer Class**: Commercial water rates are based on a declining block structure with five consumption blocks (0 to 25 m^3, 25.1 to 100 m^3, 100.1 to 1,000.0 m^3, 1,000.1 to 5,000 m^3 and >5,000 m^3) resulting in a lower per cubic meter rate as the customer uses more water. Commercial and institutional customers tend to have stable consumption patterns, which remain stable throughout the day, and each day of the year. EWSI has set the size of the declining blocks for the commercial rate class based on the results of a statistical study of water usage by the type of customer within the commercial class. This allows EWSI to ensure that similar customers within the commercial class pay a similar water rate and helps promote equity within the commercial rate class.

II) Wastewater Treatment Rate Structure

Wastewater treatment customers are classified into the same category as water service customers (i.e., residential, multi-residential and commercial) and each class of water service customers also qualify as a wastewater treatment customer for that class.

1. **Residential and Multi-Residential Customer Class**: Wastewater treatment charges are based on a flat rate structure with a single wastewater treatment rate applied to each cubic meter of water consumed. Residential and multi-residential customers are charged a monthly service connection fee, plus a variable charge for wastewater treatment based on their water consumption.
2. **Commercial Customer Class**: Commercial customers are charged the same monthly connection fee as residential and multi-residential customers, but unlike consumption

charges for residential and multi-residential customers, the commercial customer class uses a declining rate structure with three consumption blocks. The first block is for customers consuming less than 10,000 m^3 of water per year (over 95% of commercial customers), the second is for customers consuming 10,000.1 to 100,000 m^3 of water consumption per year and the third block is for customers consuming over 100,000 m^3 per year.

3. **Overstrength Surcharges**: Wastewater treatment services provided to commercial customers include additional monitoring, sampling, and testing of wastewater potentially containing one or more constituents, such as oil and grease, phosphorus, and other compounds considered to be harmful to the environment. Customers who release wastewater into the sewer system that contains these compounds are billed overstrength surcharges for each kilogram of surchargeable matter per cubic metre of wastewater in excess of prescribed concentrations.

III) Drainage Services Rate Structure

Consistent with In-City Water and Wastewater, Drainage Service's sanitary and stormwater utility customers are assigned to residential, multi-residential and commercial customer classes. The customer definitions and other classification criteria are generally consistent among In-City Water, Wastewater and Drainage Services. Therefore, each class of water or wastewater treatment customer also qualifies as a sanitary or stormwater utility customer for that class.

1. **Sanitary Utility Rates**: Sanitary rates are designed to collect the costs associated with wastewater collection services. Sanitary rates consist of a flat monthly charge levied on each customer's premises that varies with the size of the premises' water meter and a variable monthly charge based on a rate per cubic metre of either metered water consumption for the premises, or, if a sewer meter has been installed, the sewer discharge for the premises. The sanitary utility rate design also includes a provision for EWSI, under the conditions of the Utility Credit Programs, to provide a utility credit to discount metered water volumes. In the 2022-2024 PBR plan, there is only one customer, the University of Alberta that receives a utility credit. This credit provides a 44% reduction to the sanitary utility variable rate to recognize that the University of Alberta is a large wholesale customer that owns and operates its own on-campus collection system.

2. **Stormwater Utility Rates**: Stormwater rates are designed to collect the costs associated with the management of stormwater runoff. The current stormwater rate design consists of a single rate applied to the product of:

    a. The area of the property in square metres and, for multiple units sharing a single building, the proportion of the building lot area attributable to each unit;

    b. The development intensity factor, which measures the portion of lot being used for its intended development. The development intensity factor is set at 1.0, except for those properties where owners demonstrate that they contribute significantly less stormwater runoff per property area to EWSI's land drainage system during rainfalls than other similarly-zone properties through the use of retention/detention ponds or other stormwater best practices. Applications for changes to the development intensity factor are made in accordance with the terms and conditions of the Utility Credit Programs; and

c. The runoff coefficient, which measures the permeability of the lot's surface (i.e., grass versus concrete), based on land zoning. The runoff coefficient ranges from 0.20 (e.g., agricultural zone AG) to 0.95 (e.g., commercial business zone CB2). As point of reference, a single-detached residential home (Zone RF1) has a runoff coefficient of 0.50. The runoff coefficients are included in Schedule 1 of the Drainage Services and Wastewater Treatment Bylaw.

EPCOR WATER SERVICES

Appendix F-1

Business Case

GOLD BAR WASTEWATER TREATEMENT PLANT ODOUR CONTROL IMPROVEMENTS PROJECT

May 31, 2024

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1.0 OVERVIEW

1. The Gold Bar Wastewater Treatment Plant (GBWWTP) is known to generate odours as a natural part of the overall wastewater conveyance and treatment from municipal, commercial, and industrial sources within Edmonton and surrounding areas. EWS has made a commitment to the regulator Alberta Environment and Protected Areas (AEPA) to continuously improve odour control at this facility and maintain quality of life in the surrounding areas by actively managing the odour sources within the GBWWTP. The total project cost is $21.3 million, with $7.7 million spent by 2024 as part of the current PBR and the remaining $13.6 million spent in the 2025-2027 PBR term.

2.0 BACKGROUND

2. The GBWWTP provides sanitary and combined wastewater treatment for Edmonton's residents, businesses, and some industrial customers. The primary objective of the facility is to treat and recover resources from the wastewater safely and reliably, while protecting the North Saskatchewan River (NSR) from contamination in compliance with environmental regulations enforced by AEPA.

3. The main contributor to odour generation at the GBWWTP is hydrogen sulfide (H_2S), which is produced by normal biological activity in wastewater (sewage). Extended travel times within the collection system can also contribute to increased H_2S generation. The combination of a large, geographically dispersed population and low flows in combined sewers during dry weather can also result in highly odorous wastewater on arrival at the plant.

4. EPCOR has committed to implement an odour monitoring and control strategy that aims to minimize the emission of odours from the site, while informing actions and potential improvements using continuous monitoring. EPCOR regularly engages with residents that live near the GBWWTP through an established Community Liaison Group (CLG), by hosting and attending neighbourhood events, and offering tours of the plant. In the past, many of these touchpoints included both formal and informal discussions around EPCOR's odour mitigation efforts. AEPA has also established air quality guidelines through the Alberta Ambient Air Quality Objectives (AAAQO), which identifies the H_2S 1-hour average release objective as 10 parts per billion (ppb) or 14 µg/m3. AEPA and EPCOR participate in regular discussions to review the ambient air quality near GBWWTP and the progress of the odour monitoring and control strategy.

5. Efforts to mitigate and reduce odours at the plant have been ongoing since the early 1970's, with a focus in the past 8 years to better understand and monitor the major sources of odour so that they can be prioritized for management. Over $35 million in capital has been spent on odour control improvements including adding new containment covers, installing additional foul air treatment capacity with three new carbon scrubbers and two new chemical scrubbers. Additionally, an ambient air quality monitoring station (AAQMS) has been installed outside of the fence line south of the facility to monitor the overall odour levels leaving the site and to improve the understanding of odour management needs.

6. Several assessment studies have also been undertaken to identify the top sources of odour as well as to develop improvement plans for containment and treatment. These assessments included modeling of odour and H2S emissions for both a base case and future case (after completing improvements). The most recent Odour Assessment and modelling results are shown in Table 2.0-1.

Table 2.0-1
Odour Assessment (Maximum 1-hour H_2S Concentrations in µg/m^3)

Sources Group Description	Base Case	Future Case
Diversion Structure	24.38	0.00
Exhaust Fans Combined	17.51	1.75
Primary Clarifiers Combined	9.31	3.55
Scrubbers Combined	1.09	0.57
Vents Combined	0.98	0.98
Bioreactors Combined	0.06	0.06
Secondary Clarifiers Combined	0.07	0.07
Boilers and Flares Combined	0.03	0.03

7. Table 2.0-1 shows that in the base case, the key contributors to odour exceedance of the AAAQO are the diversion structure, the exhaust fans, and primary clarifiers 5-8 (which are located outdoors). Impact from exhaust fans is being addressed by making changes to the ventilation of specific areas of the plant, while the other two sources are being addressed by this project.

8. The future case results presented in Table 2.0-1 demonstrate expected site odours after capture and treatment of the sources mentioned above. The model suggests that these capture and treatment improvements will bring the site into compliance with the AAAQO requirements for a 1-hour average H2S concentration.

3.0 JUSTIFICATION

9. EWS has committed to its stakeholders to minimize odour issues by actively managing sources within the GBWWTP. This effort is one of the shared outcomes identified through extensive public engagement and presented in the Gold Bar Integrated Resource Plan (GB IRP) submitted to Utility Committee in 2019. These odour control improvement projects are to manage and control emissions from the facility to minimize the impact on neighbouring communities and to comply with the AEPA regulatory requirements. Effectively controlling odours is crucial to meet regulatory standards and to safeguard EWS's reputation with the public and regulatory bodies. Failure to manage odours could potentially harm EWS's reputation and trust among stakeholders and customers.

4.0 PROJECT SCOPE

10. The project scope of work for this upcoming PBR will address the foul air generated at the Diversion Structure and Primary Clarifiers 5-8, which were identified as the most significant remaining sources of odour generation at the facility. The project will focus on providing odour capture at these two sources using the following means:

- Installation of fabric rollover covers to enclose the air headspace over Primary Clarifiers 5-8. A series of duct connections will allow for removal of the foul air from underneath the covers, which will be conveyed to one or more of the existing scrubbers. Figures 4.0-1 and 4.0-2 below show details for the covers and ductwork.

Figure 4.0-1
Primary Clarifiers 5-8 Proposed Covers

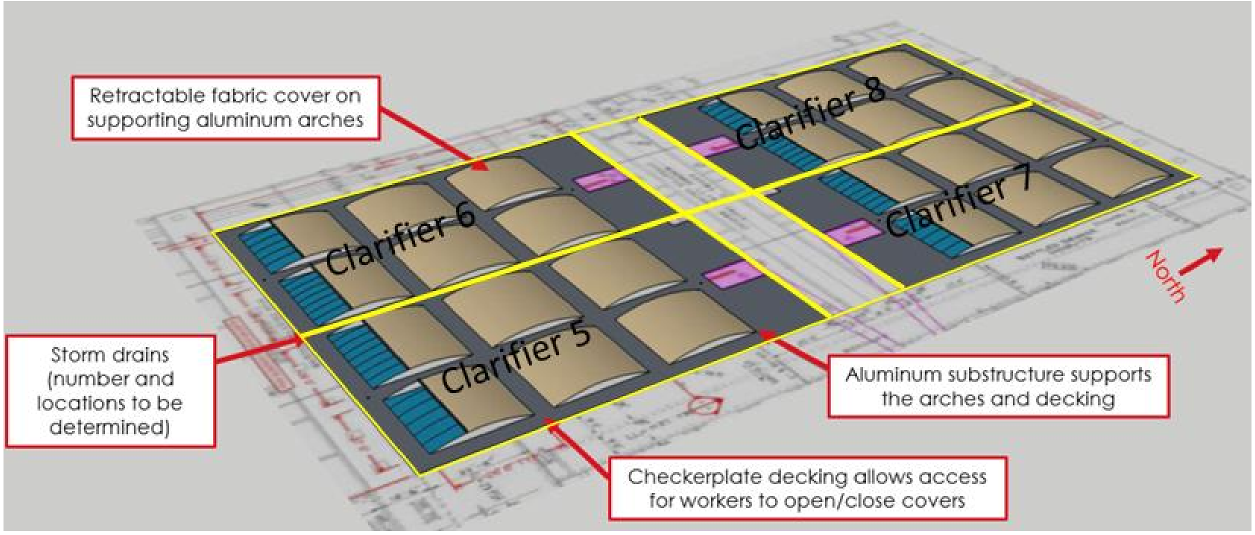
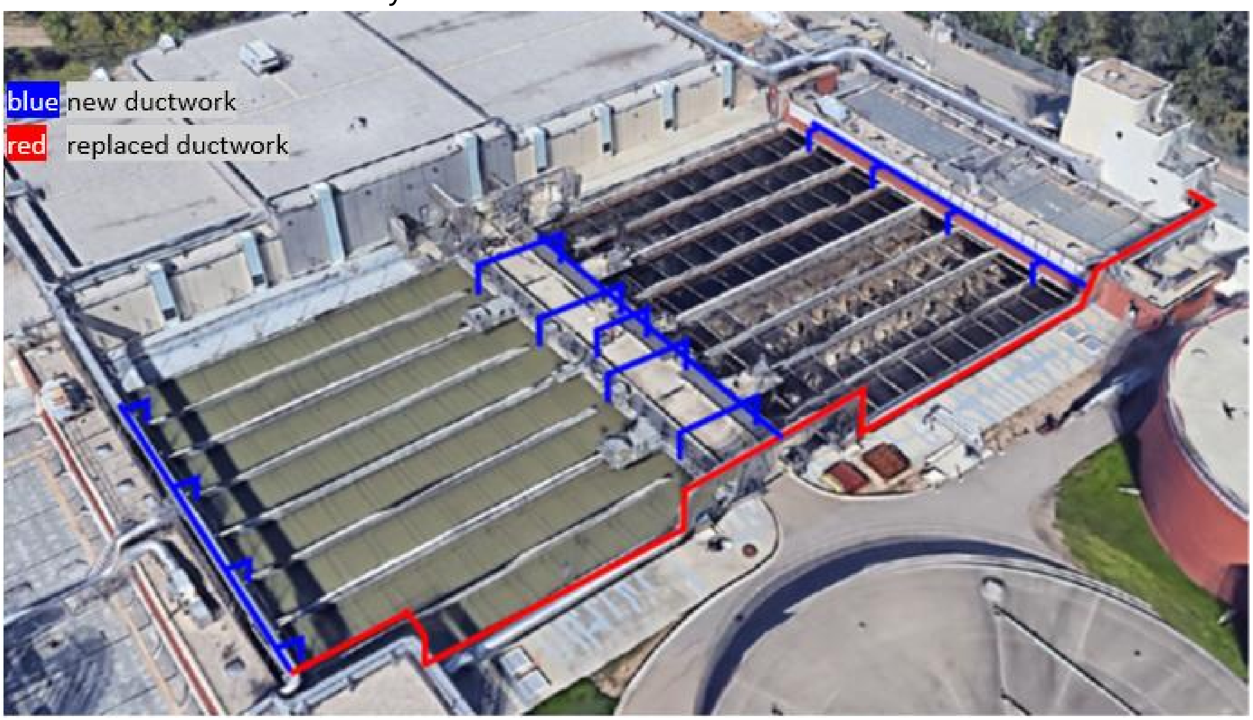
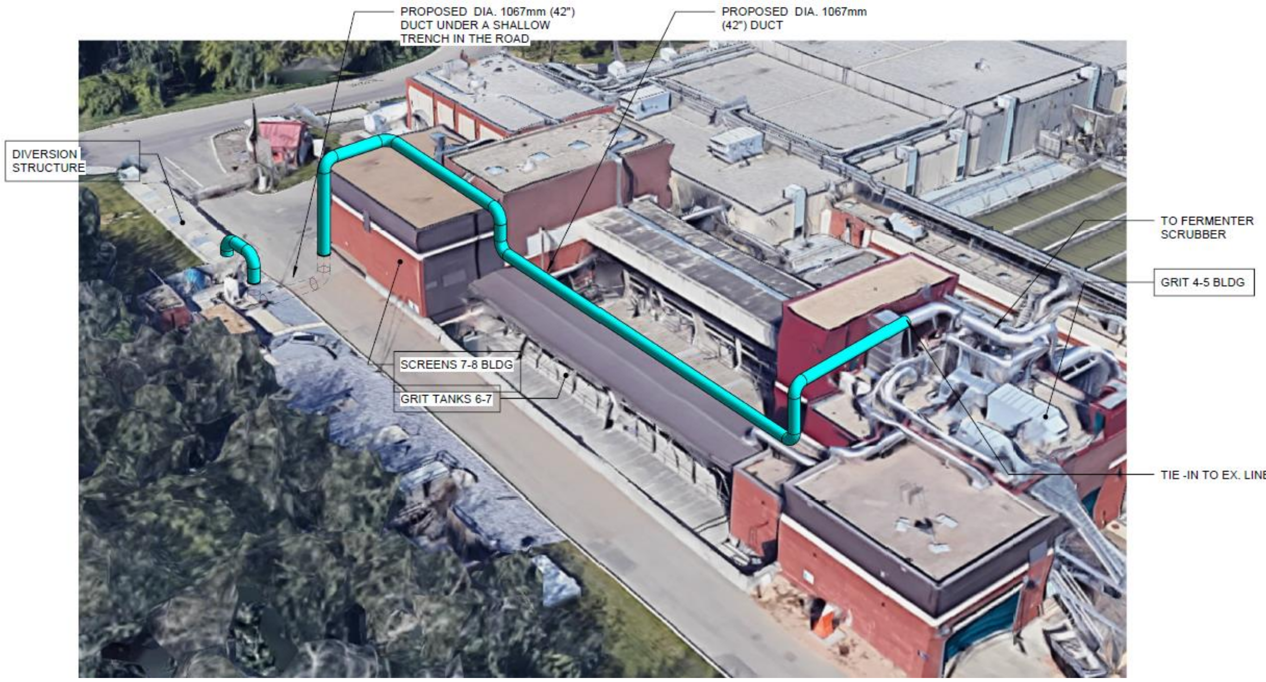


Figure 4.0-2
Primary Clarifiers 5-8 Tentative Duct Connections



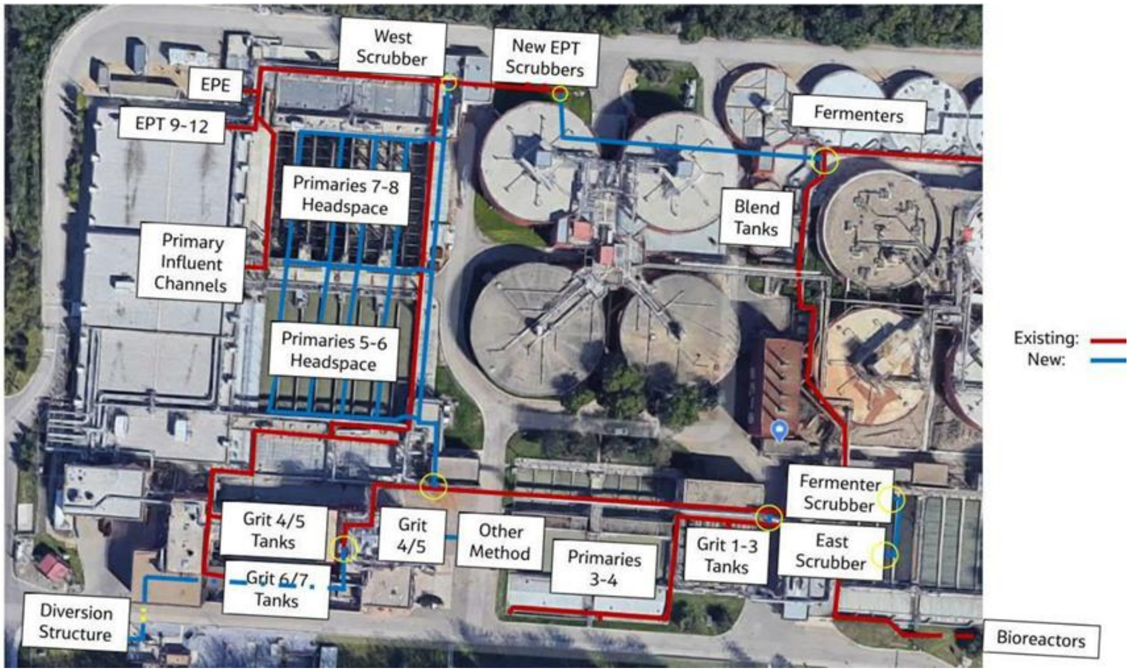
- Installation of ductwork to capture foul air from the Diversion Structure, which will be conveyed into the centralized duct network, where it will be treated by one or more of the existing scrubbers. Figure 4.0-3 below show the ductwork from the Diversion Structure.

Figure 4.0-3
Diversion Structure Tentative Duct Connections



11. As shown in Figure 4.0-4, the project scope also includes additional ducting for redundancy between scrubbers for maintenance purposes. This will ensure operational continuity by enabling loads from all odour sources to be re-routed to other scrubbers during maintenance. This will enhance the overall reliability and efficiency of the odour control system.

Figure 4.0-4
Overall Ductwork Concept



5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Nothing

12. The first alternative is to do nothing. EWS has made a commitment to the surrounding community and park users to manage odours by actively managing sources within the GBWWTP, and doing nothing would not meet this commitment. It would also lead to ongoing potential exceedance of the AEPA AAAQO for H_2S and is therefore not recommended.

5.2 Alternative 2 – Liquid Phase Chemical Dosing System

13. A second alternative, a liquid phase chemical dosing system, implemented at the headworks of the facility, has been trialed and proven unsuccessful. In addition, odorous compounds are already released in gas phase before flows enter the facility, so the treatment would have limited effectiveness. This alternative was rejected.

5.3 Alternative 3 – In-situ gas phase ionization treatment unit

14. A third alternative is to install an in-situ gas phase ionization treatment unit that collects air from the atmosphere, induces ionization, and injects the pressurized reactive air into the headspace of a channel. This sometimes can create positive pressure and makes it difficult to achieve a seal in the channel, resulting in escaping odour emissions. The complex nature of the diversion structure however makes it impossible to achieve appropriate contact of the foul air with the injected ionized air. This has been trialed and proven to be unsuccessful. This alternative was rejected.

5.4 Alternative 4 – Capture and treatment for Diversion Structure and Primary Clarifiers

15. Alternative four is to add modifications and duct work for the Diversion Structure and Primary Clarifiers and treat the foul air at the existing scrubbers. This is the current proposed solution as it utilizes existing infrastructure and established odour treatment methods proven successful at GBWWTP, making it the only feasible solution to meet the objective.

6.0 COST FORECAST

16. The project cost forecast is largely based on prior experience of executing similar projects on site. It is also assumed that consultants and contractors will be used to complete the scope. Projected costs for this project are shown in Table 6.0-1.

Table 6.0-1
Odour Control Improvement Project Capital Expenditure Forecast ($ millions)

	2024 and Prior	2025	2026	2027	Total
Total Capital Expenditures	7.7	10.2	3.4	-	21.3

7.0 KEY RISKS AND MITIGATION PLANS

17. Table 7.0-1 provides the key risks and mitigation plans associated with this project.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – Confined space entry and hazardous energy isolation are some of the associated risks.	EWS follows standard processes to reduce or eliminate these risks, including but not limited to: • Ensuring site specific safe work plans and procedures are developed that are compliant with regulatory requirements, at minimum.

	• Procuring qualified contractors with experience working in these conditions • Including safety systems and safety performance in evaluation criteria for the selection of contractors • Completing process hazard analysis, constructability reviews and risk assessments as part of the design and construction stages • Developing a hazard registry specific to the required tasks and implementing best practices like job-site hazard assessments and daily toolbox meetings to ensure workers are aware of these hazards. • Conducting regular site visits and formal, documented inspections during construction
2. Environmental Risks – Silica dust during construction, and removal and disposal of construction debris	EWS conducts Process Hazard Analysis to identify risks and implement appropriate mitigation measures for Environmental risks. Appropriate delineation of construction area, including necessary dust control and debris management measures will be employed to mitigate relevant risks.
3. Financial Risks – Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing. Further change orders or unknown conditions that cannot be seen until demolition is complete.	EWS manages financial risks by conducting preliminary design and allocation of contingency funds appropriate for the design level. The financial risks will become more evident as further design is completed. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.
4. Reputation Risks – Work conducted is in close proximity to Gold Bar residents. Additionally, external stakeholders (e.g. public, other asset owners) can be affected by some tasks that occur (e.g. excavation, equipment crossings).	External stakeholders and EPCOR Communications and Public Engagement will be consulted prior to starting these tasks. Community engagement will be conducted to address stakeholder concerns.

8.0 RESOURCES

18. This project will follow a design-bid-build delivery strategy, hiring consultants from existing master servicing agreements to support the design and stakeholder engagement efforts. Contractor will be hired from existing master service agreements. Internal resources will be used to support design, construction coordination, and commissioning efforts.

EPCOR WATER SERVICES

Appendix F-2

Business Case

CLOVER BAR EWMC GROUNDWATER TRANSFER PROJECT

May 31, 2024

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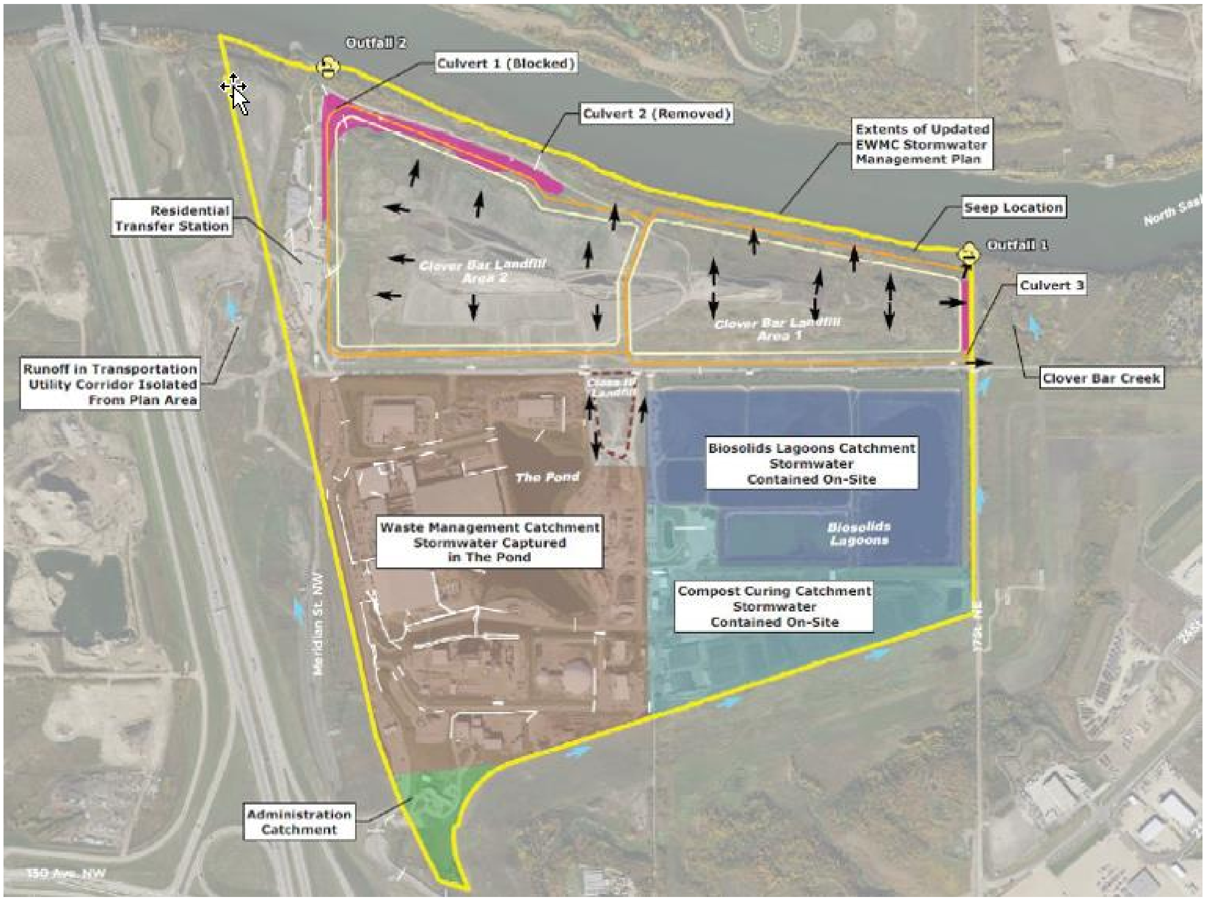
1.0 OVERVIEW

1. The City of Edmonton (COE) has an agreement with EPCOR to receive and treat groundwater and landfill leachate from the Edmonton Waste Management Center (EWMC) site as operationally feasible at the Gold Bar Wastewater Treatment Plant (GBWWTP) and Cloverbar Biosolids Resource Recovery Facility (CBBRRF). In order to have sufficient capacity and system redundancy to accommodate these groundwater flows, EWS will be constructing an approximately 2.5 km, 250 mm pipe segment from the CBBRRF to connect to a sanitary manhole located along the west riverbank of the North Saskatchewan River (NSR) immediately south of Hermitage Park. The project is preliminarily forecasted to have a total cost of $11.9 million, with $3.8 million spent during the current PBR, and $8.1 million during the 2025-2027 PBR term.

2.0 BACKGROUND

2. The EWMC is a COE owned waste processing facility used to manage and process the collection of waste such as garbage, food scraps, recycling, electronic waste, landfill gas and biosolids. The waste materials in the landfill causes contamination to occur when water from rainfall passes through the waste, creating leachate that carries pollutants like heavy metals and organic compounds. This leachate can then percolate into groundwater or run off the landfill surface. Historically, this groundwater was collected and discharged into the NSR through two COE private outfalls, built specifically for the landfill site, as shown in Figure 2.0-1. However, the impacted groundwater fails to meet the Water Quality Guidelines for Alberta Surface Waters. In order to maintain their approval to operate under the Environmental Protection and Enhancement Act (EPEA), the COE has been working with Alberta Environment and Protected Areas (AEPA) to find an alternative plan for managing the groundwater from the site.

Figure 2.0-1
Overview of EWMC



3. An agreement between the COE and EPCOR was implemented in 2017 as part of the Drainage transfer, that EWS will allow the transfer of impacted groundwater and leachate flows to the CBBRRF and GBWWTP for treatment, as operationally feasible. COE confirmed that the combined maximum flow is expected to be approximately 2.1 Megaliters Per Day (MLD), as stated in the EPCOR/EWMC Site Agreement. A detailed review of key water quality parameters was undertaken, and it was determined that no adverse impacts would be expected if controlled volumes of water from the EWMC groundwater system is discharged into the wastewater collection system and conveyed to GBWWTP for treatment.

4. There are currently three pipelines between CBBRRF and the GBWWTP used to convey flows between the two facilities. These flows primarily include digested sludge from GBWWTP to CBBRRF and supernatant return from CBBRRF to GBWWTP. Conveyance of these flows are critical to the wastewater treatment process and cannot be interrupted. Although the current infrastructure can manage the additional groundwater flow from the EWMC in the short term,

the system would lack redundancy and is insufficient to accommodate these streams back to GBWWTP on a continuous basis. Consequently, additional infrastructure is required to effectively manage the additional flow.

3.0 JUSTIFICATION

5. EWS' current conveyance infrastructure between CBBRRF and GBWWTP has sufficient capacity to handle typical bidirectional flows of digested sludge and supernatant, however it lacks sufficient redundancy to consistently accommodate additional EWMC flows of groundwater and leachate, especially during any substantial outage of the existing process.

6. Without adding piping capacity, it will be operationally challenging to convey the impacted groundwater flows from EWMC to the GBWWTP for treatment and will limit the ability to accommodate any future increases in system capacity to match increased flows between CBBRRF and GBWWTP. The volume of the groundwater flow is approximately similar to the supernatant flow and can double the required return flows from current state. Using existing conveyance infrastructure for the additional flows means that frequent operational interventions to manipulate pumps, valves and conveyance lines within challenging spaces would be required to manage the flows. If there were an outage of the conveyance system, flows would need to be either stopped and stored or temporarily redirected, which may result in regulatory violations.

7. As a result, this project is necessary to build capacity of the conveyance infrastructure to enable the transfer of groundwater to the wastewater collection system for treatment at the GBWWTP. The proposed pipeline segment provides assurance that there are separate, available conveyance paths for conveyance of sludge, supernatant, and impacted groundwater as well as required redundancy for inspections and maintenance activities.

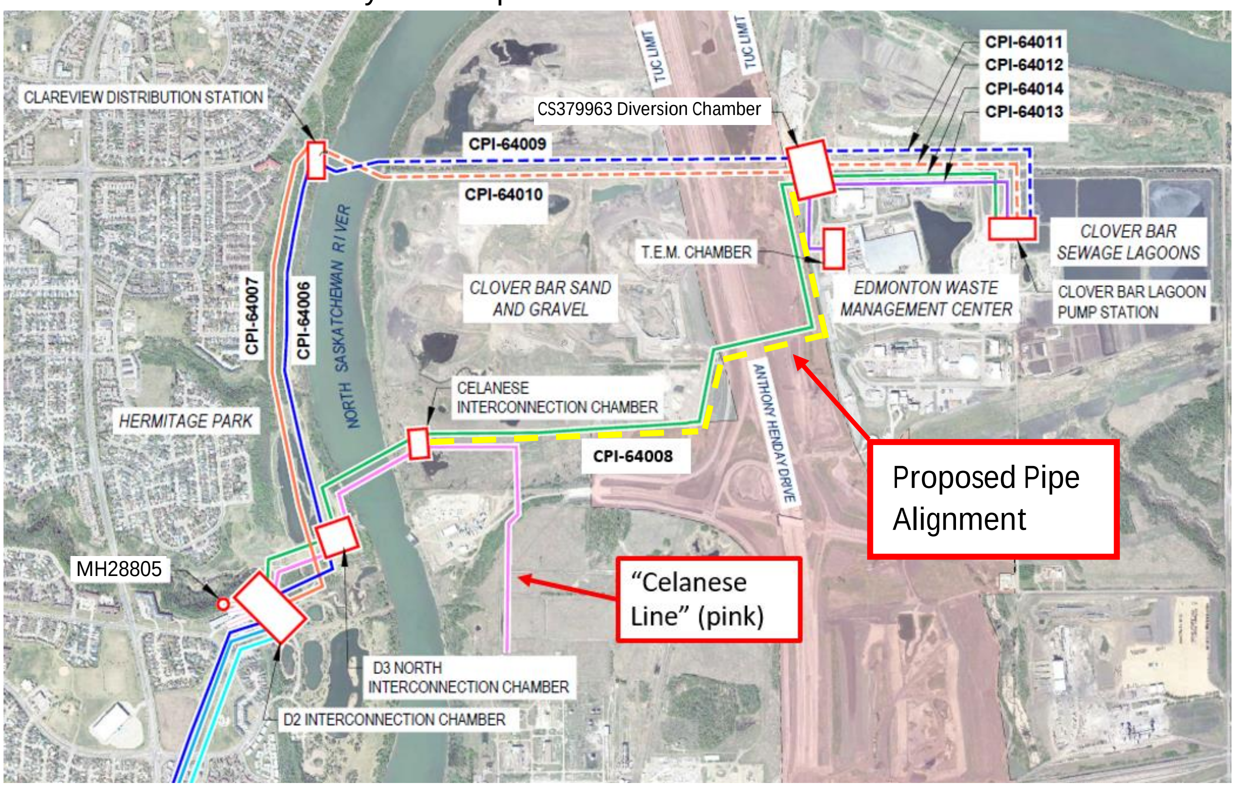
4.0 PROJECT SCOPE

8. The scope of this project is to construct a pipe to connect CBBRRF and the EWMC to the wastewater collection system in east Edmonton. The pipe will be constructed to connect the T.E.M Diversion Chamber and D2 Interconnection Chamber, as highlighted in yellow on Figure 4.0-1.

9. There is an opportunity to place back into service an existing pipe that extends from the old Celanese plant to Manhole D2 (shown in pink). This high density polyethylene (HDPE) piping was installed in 1997 in partnership with the COE to convey flows from the Celanese plant and

has not been in operation since the plant was decommissioned in 2007. This unused pipe is installed in the same right of way as the existing sludge line (shown in green). To reduce overall cost and construction scope, the plan is to repurpose this Celanese pipe, using the existing river crossing as the new flow path. This approach would then require the construction of approximately 2.5 km of pipe to the T.E.M Diversion Chamber. The Celanese pipe will be inspected in the fall 2024 to confirm condition and suitability for repurposing. Due to the age of the pipe and pipe material used in original construction it is unlikely that the pipe will not be suitable for this new use.

Figure 4.0-1
System Map between MH D2 and CBBRRF



5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Nothing

10. A do nothing approach would mean not adding any permanent modifications to the existing system. Temporary pumping and piping can be used by the COE to transfer groundwater from the EWMC to CBBRRF. Use of such temporary equipment and connections will increase operational cost and safety risk. Also, the existing conveyance system can handle the additional

flow for short durations but will not be able to maintain redundancy for the multiple streams of bidirectional flows. This will result in violation of the site agreement between EPCOR and the EWMC and potentially frequent violation of the COE's regulatory approval conditions.

5.2 Alternative 2 - Use Existing Conveyance Infrastructure

11. Using only the existing conveyance infrastructure would involve installing a permanent connection to the existing pipe to GBWWTP to allow the transfer of the groundwater flows. As mentioned above, existing conveyance is designed to accommodate two major streams of flow for digested sludge and supernatant and is not sufficiently redundant to allow an additional major return stream. Depending on the nature of the connection, the system will experience competing hydraulic demand and interruptions to regular flows. This will result in violation of the site agreement between EPCOR and the EWMC and potentially frequent violation of the COE's regulatory approval conditions.

5.3 Alternative 3 - Upsize Existing Conveyance Infrastructure

12. Existing conveyance infrastructure could be upgraded to allow additional capacity. This would involve upsizing one of the existing pipe routes from CBBRRF to the collection system at Manhole D2, to allow the transfer of the groundwater flows in addition to the supernatant flows. The scope of this approach would require upsizing multiple segments of piping but would still not achieve the desired redundancy for the flow streams and the system would be vulnerable during planned and unplanned outage. Depending on the nature of the connection, the system would still experience competing hydraulic demand and interruptions to regular flows. This will result in violation of the site agreement between EPCOR and the EWMC and potentially frequent violation of the COE's regulatory approval conditions.

5.4 Alternative 4 – Add New Pipe Segment

13. The addition of a new pipe segment would ensure the availability of the three pipes dedicated to transferring sludge from GBWWTP, and returning supernatant and groundwater to the GBWWTP, preventing any impact between the processes. It would also provide redundancy, facilitating inspections, cleaning and both planned and emergency rehabilitation activities. If feasible, repurposing the unused Celanese pipe river crossing would shorten the overall length,

offering the most direct route to the wastewater collection system and avoiding any new river crossings.

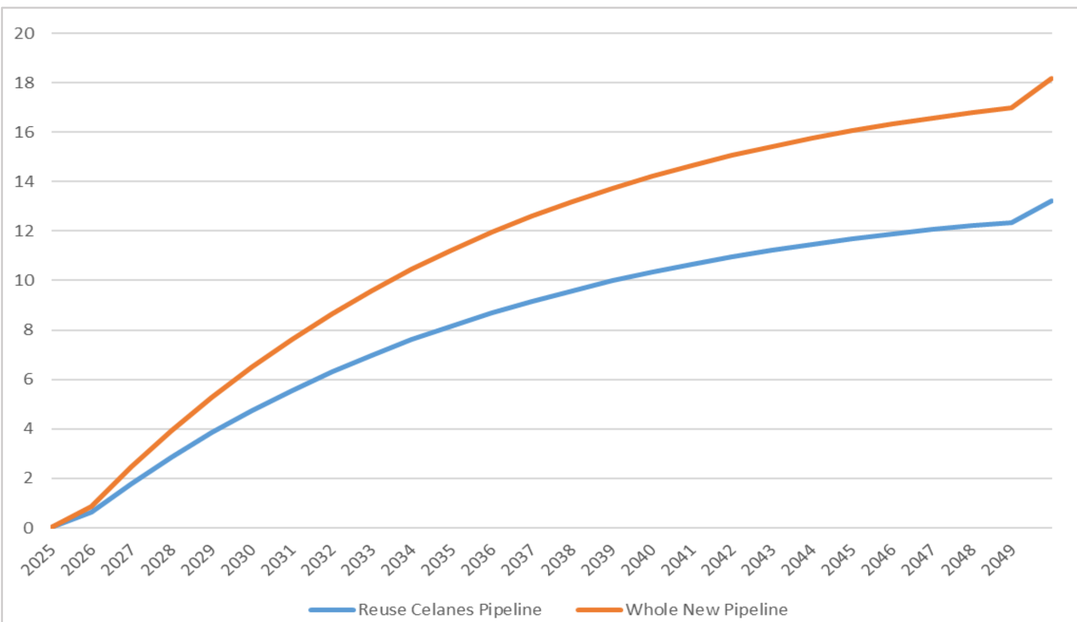
5.5 Net Present Value (NPV) Analysis

14. A 25-year NPV calculation was completed for all options with an acceptable risk level and is shown in Table 5.0-1. A chart displaying the cumulative revenue requirement is also provided in Figure 5.0-1.

Table 5.5-1
25-Year NPV Revenue Requirement Summary ($ millions)

25-Year Summary	NPV Revenue Requirement
Alternative 4.1 – Reuse Celanese Pipeline	13.2
Alternative 4.2 – Entirely New Pipeline	18.2

Figure 5.5-1
Cumulative Revenue Requirement by Year ($ millions)



6.0 COST FORECAST

15. EWS has forecast total program capital expenditures during the 2025-2027 PBR term at $8.1 million, with a total project cost of $11.9 million. The cost estimates shown in Table 6.0-1 are based on historical information such as past inspection costs, past design costs and past construction costs of similar open cut projects that occurred within the last few years.

Table 6.0-1
CB EWMC Groundwater Transfer Project Capital Expenditure Forecast ($ millions)

	2024 and Prior	2025	2026	2027	Total
Total Capital Expenditures	3.8	8.1	-	-	11.9

16. Geotechnical investigations will be required for the length of the pipe and will be completed by external resources.

17. The cost estimate also assumes that the Celanese pipe section and the associated river crossing can be repurposed as a conveyance asset for supernatant and groundwater return. This will be confirmed during an inspection planned for late 2024. If this repurposing is not feasible an additional river crossing would be required which would have a significant impact to the costs and timing for this project. This risk is unlikely based on the age and pipe material.

7.0 KEY RISKS AND MITIGATION PLANS

18. Table 7.0-1 summarizes the key risks and mitigation plans associated with this program.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – Confined space entry and ground disturbance are some of the associated risks.	EWS follows standard processes to reduce or eliminate these risks, including but not limited to: • Ensuring site specific safe work plans and procedures are developed that are compliant with regulatory requirements, at minimum • Procuring qualified contractors with experience working in these conditions • Including safety systems and safety performance in evaluation criteria for the selection of contractors • Completing process hazard analysis, constructability reviews and risk assessments as part of the design and construction stages • Developing a hazard registry specific to the required tasks, and implementing best practices like job-site hazard assessments and daily toolbox meetings to ensure workers are aware of these hazards • Conducting regular site visits and formal, documented inspections during construction
2. Environmental Risks – Associated risks include silica dust during construction, removal and disposal of construction debris, and impacts to groundwater quality.	EWS conducts Process Hazard Analysis to identify risks and implement appropriate mitigation measures for Environmental risks. Appropriate delineation of construction area, including necessary dust control, ventilation and debris management measures will be employed to mitigate relevant risks. Appropriate permits will be approved by AEPA. It is anticipated that the impacted groundwater quality will improve and conveyance requirements will diminish over time. However, based on water quality data, the required time for this to happen is expected to exceed the asset life for new conveyance infrastructure. Further modeling to project future water quality is recommended to be carried out during design. In addition, an operational plan on the future groundwater transfer will be developed and agreed upon between the COE and EPCOR during the design phase.

Risk	Mitigation Plan
3. Execution Risks – There are risks during design, procurement and construction that can affect scope and schedule. These include procurement delays, geotechnical variations, condition of existing infrastructure, complex design solutions for tying into connection points, buried anomalies discovered during construction, pipeline right of ways, crossing under roadways, potential river crossing etc. Also, if ground disturbance activities impact corridors outside of existing right of ways, then it could result in additional coordination and permitting requirements with associated time delays.	A plan will be developed during design for obtaining regulatory approvals and proximity agreements to better understand and minimize this risk. Additionally, the structural integrity of existing infrastructure and viable connection points will need to be verified during the design phase of the project and the proposed pipeline routing will need to be confirmed to limit potentially costly impacts during construction. Conducting geotechnical and integrity assessments early during the design and determining pipeline size and route early in the project, will mitigate these execution risks. The project currently has ample time allowance for planning, design, execution and stakeholder engagement to deal with potential unexpected delays within reason.
4. Financial Risks – Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	EWS manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.

8.0 RESOURCES

19. All activities related to project management, drafting, construction coordination and inspection, and as-built recording, will be undertaken internally by EWS. Construction and geotechnical assessments will be completed by external resources.

EPCOR WATER SERVICES

Appendix F-3

Business Case

DIGESTER IMPROVEMENTS PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. The Digester Improvements are intended to improve the solids digestion process at Gold Bar Wastewater Treatment Plant (GBWWTP), ensuring it can continue to handle wastewater solids loading safely and reliably. The project will initiate major rehabilitation and upgrades to Digester 6 during the 2025-2027 PBR term, along with replacement of systems and components that are end of life or have failed. The upgrades aim to reduce biogas-handling risks, restore digester capacity, improve digester performance, and align with the requirements of the GBWWTP. Preliminary estimate for the total project cost is at $20.7 million, with $14.0 million to be spent during the 2025-2027 PBR term and the remaining spend during the future PBR term.

2.0 BACKGROUND

2. The GBWWTP treats wastewater by removing contaminants using a series of treatment stages. The biologically active solid contaminants removed in each stage require additional treatment. Digesters are used to treat these biosolids and prepare them as source of nutrients for land application. GBWWTP has eight digesters that break down and stabilize the solids prior to them being pumped to the Clover Bar Biosolids Resource Recovery Facility. Biogas is generated during this digestion process, which contains primarily methane and carbon dioxide.

3. It is normal for digesters to gradually foul and lose treatment capacity with continued operation. Regular cleaning, rehabilitation, and upgrades are conducted for each digester to restore their operating capacity. Digesters 1 through 4 have previously been upgraded and Digester 6 is the next asset scheduled for upgrade work to restore its treatment capacity, while also enhancing safety, reliability, and efficiency of operation. Digesters 7 and 8 are currently scheduled for cleaning and rehabilitation following the upgrades to Digester 6.

4. One component of the Digester 6 upgrade will include the replacement of the current gas mixing system with a roof mounted mechanical (linear motion) mixing system. This retrofit has been successfully implemented previously in Digester 3, with implementation in Digester 4 currently underway. The mixing system greatly improves site and operational safety by removing the need to handle biogas for mixing and provides a system that can be more easily isolated during maintenance activities.

5. Additional upgrades to Digester 6 also include changing the design and mode of operation of the digester from conventional to a submerged roof design. This allows the digester to be filled

to the underside of the roof instead of needing headspace of 10-15% as required with conventional operation. An internal standpipe is installed to receive the overflow from the main vessel. Thus, the digester receives solids feed into the main vessel and is drawn from the bottom of the internal standpipe. This approach has proven successful in maximizing capacity and minimizing operational issues in in Digesters 1-3, with upgrades to Digester 4 currently underway.

3.0 JUSTIFICATION

6. Digester 6 is approaching end of life and is starting to exhibit subsystem failures. These include issues with biogas piping, internal concrete protection, external roof membrane, associated safety equipment, sludge piping, and other ancillary systems. The mixing system is obsolete and frequently plugs with debris, leading to inefficient and lower capacity treatment through the unit. In addition, the unit has very little usable capacity left due to fouling. Failure of the subsystem components could lead to sludge or biogas release to site, environment, and could lead to public safety risks if the release was high volume or long duration.

7. Through upgrades to Digester 6, mixing efficiency and capacity will be increased, and the associated gas compression and handling system will be decommissioned, resulting in improved safety for plant personnel.

8. The Gold Bar Integrated Resource Plan (GB IRP) identified the lack of ability to expand the footprint of the plant as a confining factor and as such, the existing footprint and processes must be used as effectively as possible to maintain treatment capacity. The rehabilitation of Digester 6 is therefore required to maximize available solids treatment capacity. Across the eight digesters, a capacity gain of 10% is equivalent to 80% of a new digester. Therefore, these upgrades provide the most cost-effective approach to the continued servicing of wastewater for Edmonton, within the GBWWTP footprint.

4.0 PROJECT SCOPE

9. The scope for this project includes design and construction for structural rehabilitation and mechanical and electrical upgrades. The proposed scope of work includes the following:

- Shut down, isolation and cleaning of the digester
- Partial demolition of existing obsolete piping, mixing system, and structural elements as required by design
- Installation of new exterior access ports

- Upgrades including foam control measures, internal overflow standpipe, modifications for the submerged roof, modifications to meet the latest digester gas code, and upgrade of other ancillary support systems such as process control and instrumentation
- Rehabilitation including replacement of gas mixers, gas proofing, gas collection and distribution piping, roofing membrane, associated sludge distribution and recirculation piping, biogas safety equipment
- Conversion to Linear Motion mixing system.
- Leakage control including high density polyethylene lining of the upper headspace area, and spray applied liner on the lower walls and floor cone of the digester.

10. Once the digester upgrades and conversion to the mechanical mixing are completed, the associated gas compression and handling systems, located outside of the digester, will be decommissioned.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Nothing

11. One alternative considered is to do nothing. Continuing to operate Digester 6 in its current state will lead to safety risks such as biogas release, and operability risks which would result in high costs to operate unreliable and inefficient equipment. In addition, doing nothing would lead to the eventual failure of the unit and inability to maintain current service level for wastewater treatment. This is not an acceptable outcome and was therefore rejected.

5.2 Alternative 2 – New Digester

12. A second alternative is to demolish Digester 6 and build a new digester in place. However, high level estimates indicate that the cost of replacement is expected to have a capital cost of more than $40 million and this is a much more costly alternative relative to the preferred alternative. In addition, this option results in the demolition of a large number of the reusable assets that can be returned to service after rehabilitation.

5.3 Alternative 3 – Cleaning Only

13. A third alternative is to clean Digester 6 to restore capacity back into the system and delay rehabilitation and upgrades until the next cleaning cycle in approximately 20 years. While

cleaning would be an effective way to restore capacity and defer the cost of capital improvements to the next PBR term, Digester 6 is at its end of life with several internal components in poor condition or that have become obsolete, and there is a risk that it would be unable to be put back into service safely once cleaning is completed. This has been experienced previously with other digesters that were of similar age, related to components like gasproofing, leakage protection, gas mixing system, pumps, heat exchangers etc. If Digester 6 were to remain out of service, it would prevent other digesters from undergoing regular cleanings as solids treatment capacity could not be maintained. For these reasons, this option has been excluded from further assessment.

5.4 Alternative 4 – Rehabilitate and Upgrade

14. A fourth alternative is to rehabilitate and upgrade Digester 6. Capacity improvements and rehabilitation will provide required levels of treatment and increase system reliability within the existing footprint, with minimal impact to the site and nearby residents. This is the preferred option.

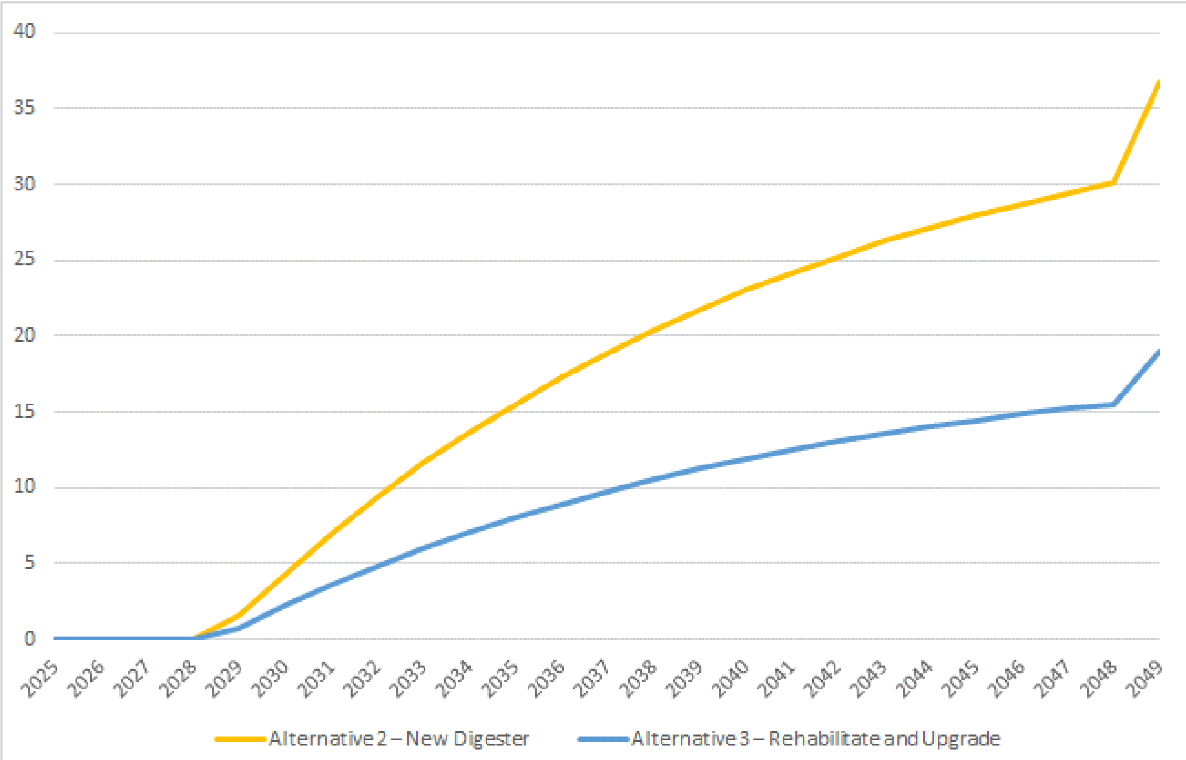
5.5 Net Present Value (NPV) Analysis

15. A 25-year NPV calculation was completed for all options with an acceptable risk level and is shown in Table 5.0-1. A chart displaying the cumulative revenue requirement is also provided in Figure 5.0-1.

Table 5.5-1
25-Year NPV Revenue Requirement Summary ($ millions)

25 Year Summary	NPV Revenue Requirement
Alternative 2 – New Digester	36.7
Alternative 3 – Rehabilitate and Upgrade	19.0

Figure 5.5-1
Cumulative Revenue Requirement by Year ($ millions)



6.0 COST FORECAST

16. The project cost forecast is based on the currently estimated cost for completing similar upgrades on Digester 4 and allowing for the known differences in the two systems. The project will apply learnings and efficiencies developed during the Digester 3 and Digester 4 upgrades. Project costs are shown in Table 6.0-1.

Table 6.0-1
Digester 6 Upgrades Project Capital Expenditure Forecast
($ millions)

	2024 and Prior	2025	2026	2027	2028 and Beyond	Total
Total Capital Expenditures	0.1	1.8	6.9	5.2	6.7	20.7

7.0 KEY RISKS AND MITIGATION PLANS

17. Table 7.0-1 provides key risks and mitigation plans associated with this project.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – Confined space entry, ground disturbance, hot-work, and hazardous energy isolation are some of the associated risks.	EWS follows standard processes to reduce or eliminate these risks, including but not limited to: • Ensuring site specific safe work plans and procedures are developed that are compliant with regulatory requirements, at minimum • Procuring qualified contractors with experience working in these conditions • Including safety systems and safety performance in evaluation criteria for the selection of contractors • Completing process hazard analysis, constructability reviews and risk assessments as part of the design and construction stages • Developing a hazard registry specific to the required tasks, and implementing best practices like job-site hazard assessments and daily toolbox meetings to ensure workers are aware of these hazards • Conducting regular site visits and formal, documented inspections during construction
2. Environmental Risks – Silica dust during construction, removal and disposal of construction debris, working within the river valley	EWS conducts Process Hazard Analysis to identify risks and implement appropriate mitigation measures for Environmental risks. Appropriate delineation of construction area, including necessary dust control, ventilation and debris management measures will be employed to mitigate relevant risks. Appropriate permits will be approved by AEPA.
3. Financial Risks – Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing. Further change orders or unknown conditions that cannot be seen until demolition is complete	EWS manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. The financial risks will become more evident as further design is completed. A competitive procurement strategy will also be implemented to ensure the best value is achieved. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods,

Risk	Mitigation Plan
	or design modifications can also help to mitigate price increases.
4. Quality Risks – this is the risk that construction is not performed to a sufficiently high standard, in which case for example, leaks could develop or the mixer may not function appropriately.	Examples of how quality risks are managed are: • Rigorous contractor selection process that considers experience, safety performance, and past performance on similar projects. • Comprehensive and clear technical specifications for the work and equipment/materials • Applying lessons learned from the Digester 3 and 4 Upgrades project • Inspection and testing plan to ensure only quality products and workmanship are accepted • Contractor, strong specs, using lessons learned from Digester 3 and 4 Upgrades.
5. Reputation Risks – Work conducted is in close proximity to Gold Bar residents. Additionally, external stakeholders (e.g. public, other asset owners) can be affected by some tasks that occur (e.g. excavation, equipment crossings).	External stakeholders and EWS's Communications and Public Engagement team will be consulted prior to starting these tasks. Community engagement will be conducted to address stakeholder concerns.

8.0 RESOURCES

18. This project is expected to hire external consultants to complete design and QA/QC during construction. An external contractor is expected to complete the construction work. Internal resources will be needed to support the project. Engineering will be done externally, while internal staff will provide reviews and feedback. Internal staff are also typically relied upon to prepare the assets for major work (e.g. shutdown, purging of gases, hazardous energy isolation). Contractors with specialized skills and previous experience will be utilized for construction and specific tasks. Supply Chain will be consulted to ensure the purchase orders and contracts are issued in accordance with company policy. A regulatory review will be conducted to ensure necessary approvals are in place for the work. This project is expected to be delivered using a traditional Design Bid Build method, which was used successfully for the previous four digester upgrades.

EPCOR WATER SERVICES

Appendix F-4

Business Case

ELECTRICAL BUILDINGS AND UTILITY RACK PROJECT

May 31, 2024

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1.0 OVERVIEW

1. The Electrical Building (EB) and Utility Rack projects will relocate and replace existing major 600V electrical distribution and control system interface equipment from existing high-risk locations to new dedicated EBs at the Gold Bar Wastewater Treatment Plant (GBWWTP). The series of projects will replace electrical equipment at or near end of expected life. In addition, the projects will rectify issues with electrical equipment located in areas classified as hazardous and/or corrosive, are exposed to moisture, and/or are in tunnels that are at risk of unexpected inundation from process upsets. This will address existing code-compliance deficiencies while also improving the reliability and longevity of the relocated replacement equipment. The planned phases of the total project spend is estimated at $71.8 million, with $41.6 million of the spend in the 2025-2027 PBR term. Of the costs outside this PBR term, approximately $15.6 million will be spent ahead of 2025, while the remaining $14.3 million will be spent in a future PBR term. Future phases of the project have not been planned or estimated yet.

2.0 BACKGROUND

2. In 2018, an electrical code compliance review of the GBWWTP identified numerous instances where major electrical distribution equipment is installed in locations that pose a risk to safety and plant operations. As an example, 600V motor control centers (MCCS) installed in areas which are classified as hazardous and/or corrosive, are exposed to moisture, and/or are in tunnels that are at risk of unexpected inundation from process upsets. It was also noted that electrical equipment installed in these locations have been prematurely failing due to corrosion or moisture, putting at risk both property and personnel.

3. In 2019, as part of developing the GBWWTP Integrated Resource Plan (IRP), an Electrical Long-Range Plan was completed. This was prepared to support EWS in planning major upgrades and expansions required in the GBWWTP's electrical distribution system to address capacity, asset lifecycle, code compliance, and technology modernization challenges that will be encountered through the year 2056. The IRP included recommendations for constructing a series of above ground EBs on site dedicated to housing the 600V electrical equipment.

4. Based on area classification, flood risk, corrosive locations, asset age, future plant development and space constraints, it is estimated that approximately 400 vertical MCC sections require replacement and relocation, representing a total combined demand load of ~7,500 kVA. Once ranked, the work was consolidated in the ELRP and prioritized to balance the spending and effort over future PBR periods.

- EB-1, EB-2, & Utility Rack Extension: Replacement and relocation of high-priority MCCs that are currently located in high-risk areas (hazardous, corrosive, tunnels), and/or are near end of expected life. These projects are currently in detailed design with construction planned during the 2025-2027 PBR term.
- EB-3: Replacement and relocation of high-priority MCCs that are currently located in medium risk areas (hazardous, corrosive, tunnels), and/or are near end of expected life. Construction of this project is expected in the 2028-2031 PBR term, but a siting review study is currently underway to determine most cost-effective location.
- EB-4, EB-5, & EB-6: Replacement and relocation of remaining high priority MCCs and others that are below grade and expected to be reaching end-of-life by this time. These projects are not included in the current scope and will be prioritized in future PBR terms based on capital availability and One Water Planning's risk-based analysis.

5. Cabling for the current electrical infrastructure is largely routed through trays in the underground tunnels. Many of these trays are overloaded and there is little space for routing additional trays. To minimize treatment interruptions, redundant cabling needs to be run from the new distribution equipment to the devices requiring power before the original cabling can be demolished and the existing utility rack needs to be extended to the new EB's 1 and 2.

6. These projects will relocate existing major 600V distribution equipment from high-risk areas, including hazardous locations, corrosive locations, and locations which are at increased risk of flooding due to process upsets, into new dedicated EBs. This will address existing code-compliance issues while also improving the reliability and longevity of the relocated replacement equipment. New substations will simplify and optimize the architecture of the plant's 600V distribution system and provide a location from which to supply future plant expansions.

3.0 JUSTIFICATION

7. The electrical equipment is not only housed in high-risk areas, much of it is also nearing their expected end of life. Failure of the electrical equipment in these areas would affect many of the primary treatment facilities, as they would lose power and capability, thus resulting in partially treated wastewater flowing into the North Saskatchewan River (NSR). These projects will reduce the risk of failure of the electrical equipment, resulting in operations that are more reliable. Failure of this equipment would result in significant disruption to the wastewater treatment process.

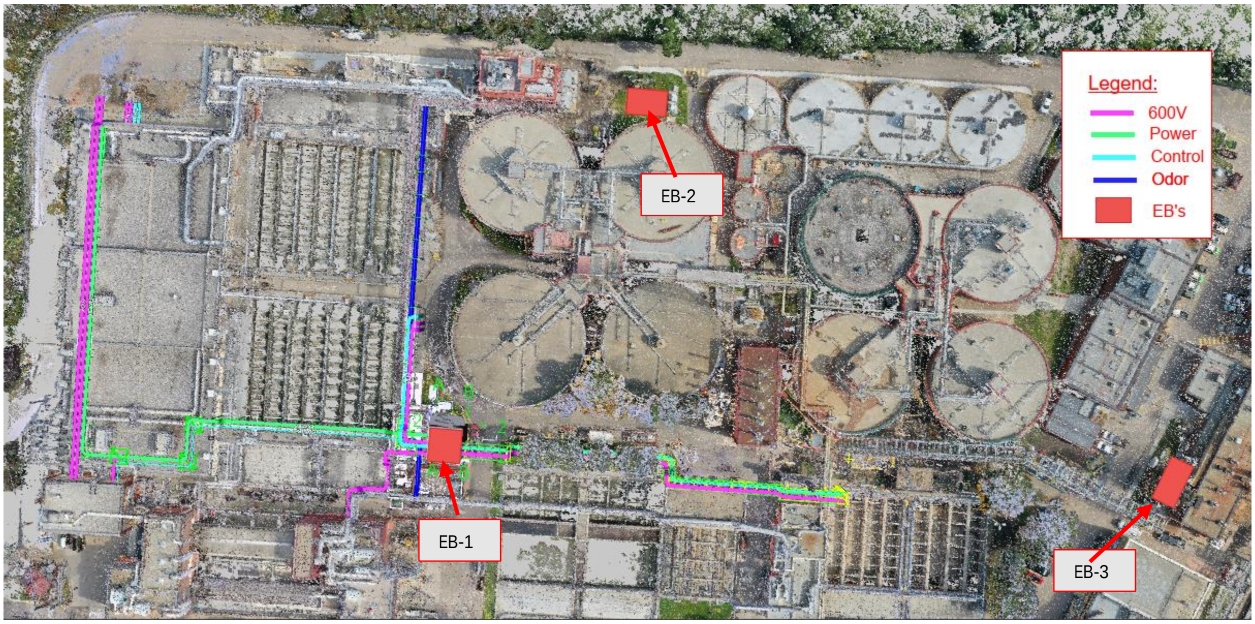
8. Additionally, the electrical equipment serving the central control room (including the Delta V plant control system), building heat boilers, secondary aeration Blowers 1 & 4, Maintenance Building, Administration Building, Operations Centre and numerous centrally located process equipment, utilizes a single radial feed topology, roughly 50% less reliable than the redundant dual feed secondary selective topology, which is plant standard. Failure of this equipment could result in a significant and lengthy disruption to the wastewater treatment process.

9. Extension of the utility rack greatly improves the constructability of the first two EBs and relieves trays that are overloaded beyond the cable thermal requirements per Canadian Electrical Code and the structural design of the support systems. Beyond this, the rack extension aids the plant's overall strategy of intensifying treatment processes while remaining in the existing footprint. Integrating a modular utility rack network would facilitate the relocation of many existing utilities, and any new utilities or assets as required.

4.0 PROJECT SCOPE

10. Projects EB-1, EB-2 and EB-3 will each provide a new two-story building to house new 600V switchgear, two new 13.8kV-600V transformers, and a floor dedicated to replacement 600V MCCs. Figure 4.0-1 below shows the general location for EB-1 and EB-2, as well as the existing utility rack (shown in yellow) and the conceptual extension to the west (shown in green). The location of EB-3 is not shown as it is yet to be confirmed.

Figure 4.0-1
Tentative Siting for EBs and Utility Rack



11. For Project EB-1, the building will be used to house replacement electrical equipment as follows:

- Tunnel B: Classified as Zone 2 (Hazardous) and Category 2 (Corrosive); flood risk; equipment near end-of-life (estimated 2026). Replacement of this equipment is high priority due to risk of accidental flooding, failure or explosion and associated consequences, including but not limited to injury or death and prolonged power interruption.
- Tunnel C: Classified as Category 2 (Corrosive); flood risk; some equipment near end-of-life (estimated end-of-life ranges from 2026 to 2043). Replacement of this equipment is considered a medium priority due to risk of accidental flooding or failure and associated consequences, including but not limited to prolonged power interruption.
- Auxiliary Control Room: Classified as Zone 2 (Hazardous) and Category 2 (Corrosive).
- Equipment near end-of-life. The 600V distribution equipment in this room currently sub-feeds numerous other facilities in the primary treatment areas of the plant. Replacement of this equipment is high priority due to risk of accidental flooding, failure or explosion and associated consequences, including but not limited to injury and prolonged power interruption. The arrangement of the auxiliary control room makes it challenging to declassify this area and the space is very congested with less-than-ideal working conditions.

- Future Projects: Transformer capacity and spare 600V breakers (or space for future breaker additions) in the new switchgear will be made available to accommodate future operational requirements.

12. For Project EB-2, the building will be used to house replacement electrical equipment as follows:

- Blend Tank Gallery: Classified as Zone 2 (Hazardous) and Category 2 (Corrosive); flood risk. The 600V distribution equipment in this room currently sub-feeds the electrical distribution equipment that services the fermenters and digester square #1. The design of this space, and various significant openings, make it infeasible to declassify. Replacement and relocation of this equipment is a high priority due to the high risk of an accident and prolonged power interruption due to the equipment location.
- Fermenter Gallery: Classified as Zone 2 (Hazardous) and Category 2 (Corrosive); flood risk. The design of this space, and various significant openings, make it infeasible to declassify. Replacement and relocation of this equipment is a high priority due to the high risk of an accident and prolonged power interruption due to the equipment location.
- Future Projects: Transformer capacity and spare 600V breakers (or space for future breaker additions) in the new switchgear will be made available to accommodate future operational requirements.

13. For Project EB-3, the building will be used to house replacement electrical equipment as follows:

- Operations Center: Process areas within this facility are classified as category 2 (Corrosive). The existing MCC at the Operations Center is installed in a process area, near process equipment, and is expected to reach end-of-life by the year 2041 (not accounting for potential early retirement due to corrosion). As such, it is considered a medium-to-low priority for replacement and relocation.
- Blower Building #1: This facility is classified as Category 2 (Corrosive) area. The identified MCCs are currently installed below ground (basement level) and have an expected end of life by the year 2030 (MCC-50521E) and the year 2043 (MCC-14106); however, they are installed in process areas that are at risk of flooding and premature failure due to corrosion. Blower Building #1 currently sub-feeds the Maintenance Building. As such, replacement and relocation of this equipment is considered a medium to high priority.
- Penthouse #2: This building is classified as Category 2 (Corrosive) area, located above ground. The MCC installed in this place has an expected end of life by the year 2040 (not

accounting for potential early retirement due to corrosion). The Area Classification Review [Stantec, 2018] recommends declassification of the building by the installation of a proper ventilation system; this is a feasible and low-cost alternative to replacement and relocation. Therefore, replacement and relocation of the equipment installed in this area has a low level of priority.

- Gallery 3 (Tunnel K): This underground space is classified as Category 2 (Corrosive) and has a risk of flooding. The MCC installed in this place has an expected end of life by the year 2037 (not accounting for potential early retirement due to corrosion). The design of these areas and various significant openings make it nonviable to declassify these spaces (from Category 2 to "normal'); additionally, even if the space were declassified, the equipment would still be at risk due to flooding, leaks, etc. Therefore, the replacement and relocation of the equipment installed in this area has a medium level of priority.
- Future Projects: Transformer capacity and spare 600V breakers (or space for future breakers) in the new EB-3 switchgear will be made available to accommodate supply of future known projects. Note that each of these projects are assumed to include dedicated electrical rooms, as required, to house electrical equipment and MCC's associated with the facility; therefore, EB-3 would only be used as the source for 600V supply feeders, i.e., no space allocated for future MCCs.

14. EB-3 is currently undergoing an early siting study, examining the most economical and constructible location, foundation configuration, topology etc., near or in, Blower Building #1. The project will validate the siting and design basis during this 2025-2027 PBR term and is currently planned for implementation during the following PBR.

15. For Project Utility Racks West, the EBs are the driver for expanding it immediately but, it is designed with the intention of relocating and allowing intensification of the following:

- Electrical and communications circuits and electrical conduits: Enable the construction of future EBs; for example, EB-1 and EB-2 will be constructed in the next four years and the 600V power cables have no designated available routing through this congested area of the plant. Future planned developments to the electrical distribution in this area will also benefit from the utility rack.
- Natural gas piping: Removal of natural gas piping from the tunnel systems will ensure compliance with safety standards and reduce ventilation requirements. The tunnels contain non-rated electrical equipment, which currently do not meet code requirements. Also, improved utility access in this part of the plant would minimize the need for temporary lines and connections in the future.

- Buried fiber network: The buried fiber network for the plant is mostly undocumented and can pose challenges with ground disturbance work on the west side of the Plant. Relocation can improve access to the network and avoid accidental interference in the future.
- Foul air ducting: Current strategy for odour control near the headworks of the plant includes covering primary clarifiers 5-8 and connecting ductwork from these new sources to the scrubbers currently being commissioned. There is limited available space on the ground for the new infrastructure and the positioning of new ductwork will need to be evaluated to understand if the proposed utility rack system must accommodate them.
- Glycol lines: Locating glycol heating on a utility rack could improve serviceability and maintainability.

16. EBs 4, 5, and 6 are future planned buildings identified in the ELRP and are out of scope for this 2025-2027 PBR period. They will be put forward as separate projects in future PBR periods.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do nothing

17. One alternative considered is to do nothing. Doing nothing will result in likely failure of the electrical equipment in the near future. Many of the primary treatment facilities would lose power in this situation resulting in partially treated wastewater flowing into the NSR, and replacement/repair of the failed gear could take months. This is not an acceptable outcome, so this option was rejected.

5.2 Alternative 2 – Gradual Implementation Approach

18. A second alternative is to take a more gradual approach to the implementation of the EBs. An extended timeline would help to distribute the costs over future PBR terms, thereby reducing the immediate financial burden on rate payers. While this would have a near term positive impact on rate payers, postponing necessary changes will lead to further degradation, increasing the risk of asset failure before the projects are implemented, resulting in the loss of the facility. As with Alternative 1, failure would cause the primary treatment facilities to lose power resulting in partially treated wastewater flowing into the NSR, and replacement/repair of the failed gear could take months. To reduce this risk, much of the end-of-life equipment would still require replacement in the PBR term and would need to be once again placed in an area that

would limit its lifespan. This limited lifespan would lead to premature risk of failure and higher capital costs in the long term.

5.3 Alternative 3 – Upgrade Electrical Switchgear in Place

19. A third alternative is to upgrade the electrical switchgear in place. In this option, temporary switchgear would be purchased and installed in a location close to the existing switchgear. Loads would be transferred to this temporary gear and then the existing gear would be demolished and replaced with new switchgear. Once the new switchgear was commissioned the loads would be transferred to the new switchgear and eventually the temporary gear would be disposed of. While this option does not result in the need for a new building, the new equipment would remain in their existing hazard-exposed locations which could result in shorter life spans due to these conditions. In addition, the utility rack would still be required to run the redundant cables.

5.4 Alternative 4 – New Buildings and Utility Rack

20. The fourth alternative, to construct new buildings and equip them with new switchgear, is considered the best option. Immediate capital costs are higher for this option due to the need for new buildings, however improved conditions in the buildings increases the lifespan of these assets and over the long term, leading to an overall reduction in capital cost. Given that about half of the existing equipment is end of life, there would be little early financial write offs associated with this alternative.

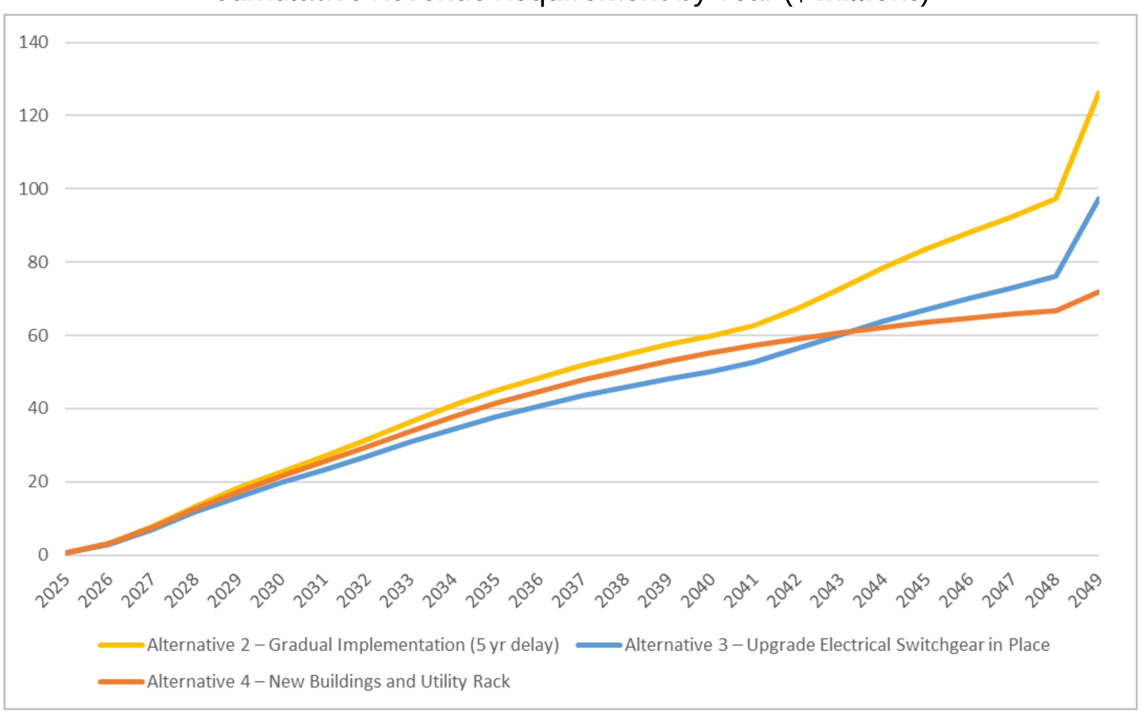
5.5 Net Present Value (NPV) Analysis

21. A NPV calculation was completed for all options with an acceptable risk level and is shown in Table 5.0-1. A chart displaying the cumulative revenue requirement is also provided in Figure 5.0-1.

Table 5.5-1
25-Year NPV Revenue Requirement Summary ($ millions)

25-Year Summary	NPV Revenue Requirement
Alternative 2 – Gradual Implementation (5-year delay)	
Capital Cost	125.8
Operating Cost	0.6
Total	126.4
Alternative 3 – Upgrade Electrical Switchgear in Place	
Capital Cost	95.8
Operating Cost	1.5
Total	97.3
Alternative 4 – New Buildings and Utility Rack	
Capital Cost	71.7
Operating Cost	0.3
Total	72.0

Figure 5.5-1
Cumulative Revenue Requirement by Year ($ millions)



6.0 COST FORECAST

22. The cost forecast is derived from the construction and engineering estimates from the ELRP. Projected costs are shown in Table 6.0-1.

Table 6.0-1
EBs and Utility Rack Projects Capital Expenditure Forecast ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	18.1	17.8	5.7	41.6

23. Table 6.0-2 provides the estimated capital expenditure for the EBs and Utility Rack projects by sub-project for the 2025-2027 PBR term.

Table 6.0-2
EBs and Utility Rack Projects Capital Expenditure Forecast by Project ($ millions)

Project	2023 and Prior	2024	2025	2026	2027	2028	2029 and Beyond	Total
1. Auxiliary Control Room Electrical Upgrades (EB-1)	1.3	3.1	10.9	7.2	0.00	0.00	0.00	22.5
2. 600v Electrical Bldg. (EB-2)	1.4	0.2	4.0	10.6	5.7	0.00	0.00	21.9
3. 600v Electrical Bldg. (EB-3)	0.1	0.0	0.0	0.0	0.0	0.6	14.1	14.7
4. Utility Rack West	0.9	8.6	3.1	0.00	0.00	0.00	0.00	12.6
5. Total Capital Expenditures	3.7	11.9	18.1	17.8	5.7	0.5	14.1	71.7

7.0 KEY RISKS AND MITIGATION PLANS

24. Table 7.0-1 provides the key risks and mitigation plans associated with these projects.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – Confined space entry, ground disturbance, hot-work, and hazardous energy isolation are some of the associated risks. Process safety risks can also arise during complex plant shutdowns.	EPCOR follows standard processes to reduce or eliminate these risks, including but not limited to: • Ensuring site specific safe work plans and procedures are developed that are compliant with regulatory requirements, at minimum • Procuring qualified contractors with experience working in these conditions • Including safety systems and safety performance in evaluation criteria for the selection of contractors • Completing process hazard analysis, constructability reviews and risk assessments as part of the design and construction stages

	• Developing a hazard registry specific to the required tasks, and implementing best practices like job-site hazard assessments and daily toolbox meetings to ensure workers are aware of these hazards • Conducting regular site visits and formal, documented inspections during construction To mitigate risks associated with working on high voltage switchgear, EWS employs hazardous energy isolation procedures to eliminate the risk of injury from conducting this type of work. Process shutdowns are planned using a planning process and multiple work packages are incorporated as needed. EWS also has Process Hazard Analysis procedures to identify specific mitigations required for each outage.
2. Environmental Risks – Associated risks include silica dust during construction, removal and disposal of construction debris, and working within the river valley	EPCOR conducts Process Hazard Analysis to identify risks and implement appropriate mitigation measures for Environmental risks. Appropriate delineation of construction area, including necessary dust control, ventilation and debris management measures will be employed to mitigate relevant risks. Appropriate permits will be approved by AEPA.
3. Financial Risks – Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing. While the impacts of the COVID-19 pandemic have eased, there still may be cost escalations and equipment procurement issues for specialty items.	EPCOR manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. The financial risks will become more evident as further design is completed. A competitive procurement strategy will also be implemented to ensure the best value is achieved. EWS may need to adjust procurement timing depending on market conditions. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.
4. Reputation Risks – Work conducted is in close proximity to Gold Bar residents.	Community engagement will be conducted to address stakeholder concerns.

8.0 RESOURCES

25. This project will be executed in a traditional design bid build delivery method. Design will be completed by a consulting engineering company selected from current Master Service

Agreement (MSA) holders. Construction will be completed by a contractor selected through a competitive process. Development and building permits will be required.

EPCOR WATER SERVICES

Appendix F-5

Business Case

UV DISINFECTION SYSTEM UPGRADES PROJECT

May 31, 2024

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1.0 OVERVIEW

1. The Ultraviolet (UV) Disinfection System Upgrades Project is focused on upgrading the UV disinfection system at the Gold Bar Wastewater Treatment Plant (GBWWTP) to a new UV system with low pressure high efficiency lamps. The current UV4000 disinfection system from Trojan Technologies is no longer manufactured and is extremely energy intensive compared to modern systems. The total spend of this project is currently estimated at $15.1 million, with $13.5 million spent over the 2025-2027 PBR term. About $0.2 million of this will be spent prior to the 2025-2027 PBR term, with the remaining $1.4 million to be spent in future PBR terms.

2.0 BACKGROUND

2. The GBWWTP currently has an UV4000 system in place to provide disinfection to the wastewater effluent, as required by EPCOR's approval to operate enforced by Alberta Environment and Protected Areas (AEPA). This system was originally supplied by Trojan Technologies in 1995 but is no longer manufactured.

3. The existing UV system has five flow channels. The first four channels of the system were installed in 1995, while the fifth channel was installed in 2006 and commissioned in 2011. Each of the initial four UV channels has 180 medium pressure lamps while the fifth channel has 176 lamps. Each channel can convey flows up to 140 million litres per day (MLD). Figures 2.0-1 and 2.0-2 show the flow schematic of the disinfection facility and the cross section of a channel.

Figure 2.0-1
Flow Schematic of the Disinfection System at GBWWTP

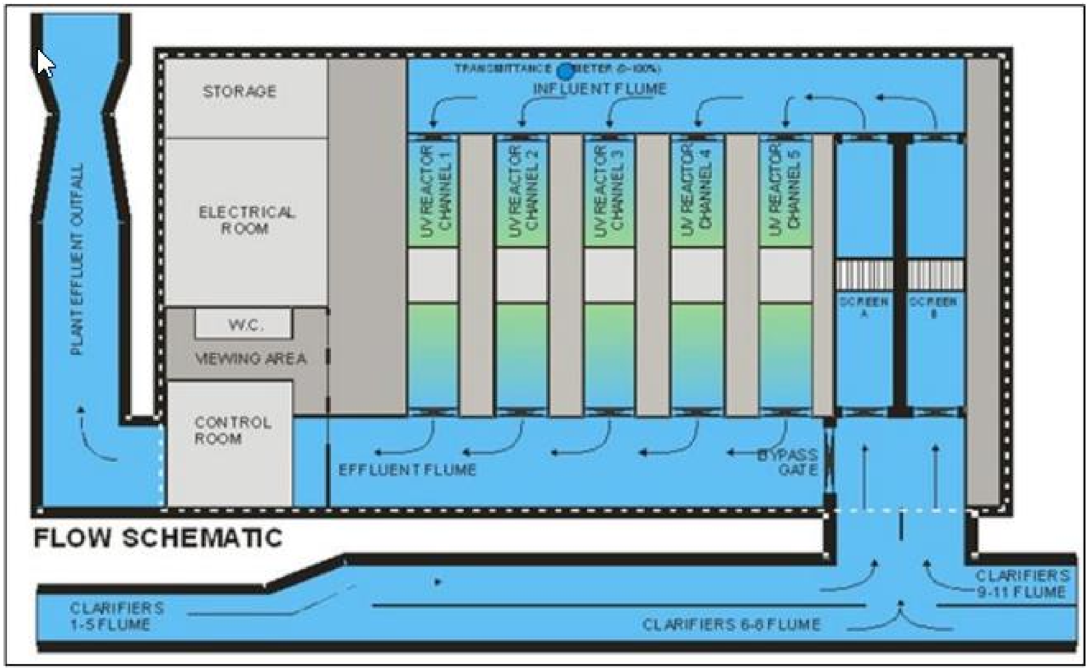
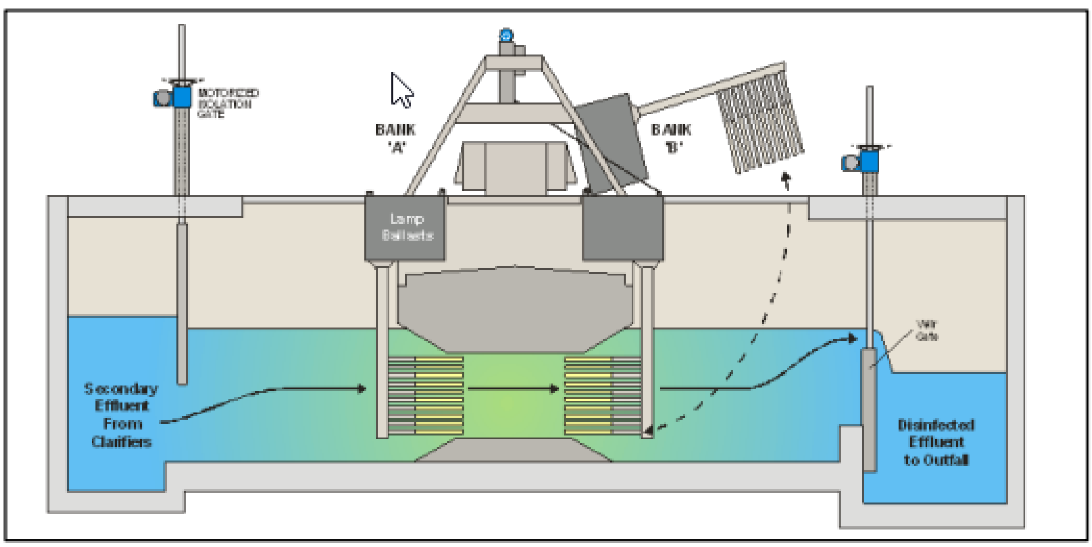


Figure 2.0-2
UV Channel Cross Section



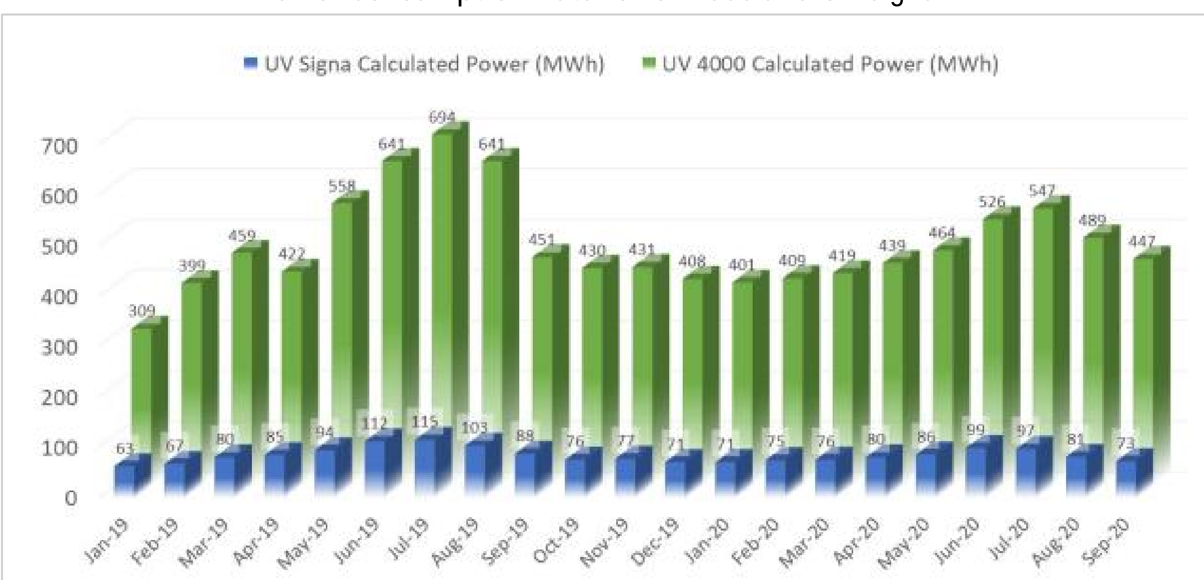
4. In 2017, EWS completed a scoping study to review current and future disinfection requirements and to assess upgrade options for disinfection. This study proposed upgrading to a new UV system equipped with low pressure lamps which have a much higher efficiency than the current system's medium pressure lamps. The proposed lamps also have a larger turndown range allowing for reduced power consumption during lower demand situations.

3.0 JUSTIFICATION

5. The UV4000 system that is currently in place has reached end of life and is no longer manufactured by the supplier. It is getting increasingly challenging to source parts and components to properly maintain this critical process system. Effluent disinfection is a mandatory part of the wastewater treatment process and ensures the protection of the aquatic habitat and recreational use of the NSR. It is impossible to operate the system for much longer in its current configuration and an upgrade must be completed soon.

6. Electricity is the largest energy source on site as well as the largest operating cost and greenhouse gas contributor. According to previous Energy Audits, the disinfection system accounts for more than 12% of the overall electricity consumption by the wastewater treatment operation, which is the third highest consumption by any process category. Thus, the UV system upgrades and UV control improvements have been identified as two of the most impactful Energy Conservation Measures for the wastewater treatment operation. Based on plant operating conditions between January 2019 and September 2020, an average annual savings of approximately $428,000 was estimated if the system is upgraded to a low-pressure UV system. The power consumption data for both the existing UV4000 system and the low-pressure UV system from Trojan Technologies (UV Signa™) is shown in Figure 3.0-1.

Figure 3.0-1
Power Consumption Data for UV4000 and UV Signa™



7. Upgrading the existing UV system to the proposed modern system also offers solutions to several challenges associated with the current control software.

- The current system does not have software logic that runs on the Distributed Control System (DCS) platform. GBWWTP is forced to accept Programmable Logic Controller (PLC) controls and use methods to interface the DCS with the PLC provided by Trojan. Additional hardware and resources are required for interfacing between the two systems.
- The software currently provided by Trojan Technologies does not allow access to the logic to see how it determines dosing rate and other key information and is very difficult to update.

4.0 PROJECT SCOPE

8. The scope of work will upgrade the existing UV system to a new UV system that is equipped with low pressure high efficiency lamps along with the associated control system. The design UV treatment of 60% and peak flow of 700 MLD for the proposed system were selected based on historical analysis of the existing data and the forecast maximum flow data to the year 2050.

9. All five channels are proposed to be upgraded, each equipped with four banks, one acting as a standby. Existing gates can be reused, although modifications within the channels, such as narrowing and benching at the bottom, may be required for retrofitting. Sufficient electrical capacity exists for equipment power. Additional concrete pads are required for new power distribution centers and retrofitting the proposed walkway at the bottom of the stairs. During construction, each channel can be completed individually to ensure plant operation, with isolation possible using existing inlet and outlet isolation valves.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Nothing

10. As the current UV4000 system is no longer manufactured by Trojan, it is getting increasingly challenging to source spare parts and supplies to maintain the system, which is of particular concern considering most of the components of the system have reached end of useful life. This alternative is not feasible.

5.2 Alternative 2 - Replace with a Similar Medium Pressure System

11. The current UV system, with medium pressure lamps, is not energy efficient. Electricity is the largest energy source on site as well as the largest operating cost and greenhouse gas contributor, which can all be reduced by upgrading to a more modern system. Also, maintaining the controls for the current UV system is challenging as the current system does not have software logic that runs on the DeltaV platform, making it difficult and costly to integrate and maintain. This alternative is thus not recommended.

5.3 Alternative 3 - Upgrade and Modernize to Low Pressure System

12. A new UV system with low pressure lamps will have a much higher efficiency than the current system's medium pressure lamps. The low-pressure lamps have a larger turndown range allowing for reduced power consumption when required. UV disinfection is best applied to secondary and tertiary effluents since the transmissivity of the water is better than primary effluents, thus requiring lower inputs of UV energy per unit volume of effluent. As a result, such a system would have much lower capital, operating, and maintenance costs than ozone and Peracetic Acid (PAA) disinfection. This is the recommended alternative.

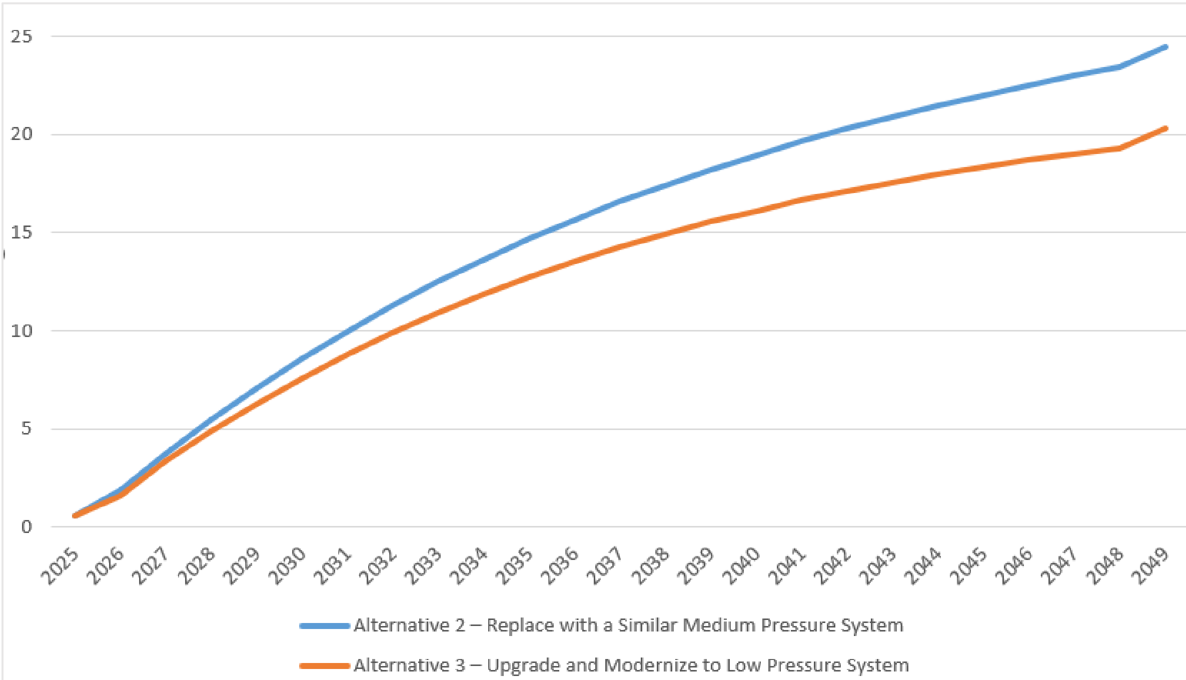
5.4 Net Present Value (NPV) Analysis

13. A 25-year NPV calculation was completed for all options with an acceptable risk level and is shown in Table 5.0-1. A chart displaying the cumulative revenue requirement is also provided in Figure 5.0-1.

Table 5.4-1
25-Year NPV Revenue Requirement Summary ($ millions)

25-Year Summary	NPV Revenue Requirement
Alternative 2 – Replace with a Similar Medium Pressure System	
Capital Cost	15.1
Operating Cost	8.6
Total	23.7
Alternative 3 – Upgrade and Modernize to Low Pressure System	
Capital Cost	16.2
Operating Cost	3.8
Total	20.0

Figure 5.4-1
Cumulative Revenue Requirement by Year ($ millions)



6.0 COST FORECAST

14. The cost forecast was developed based on the low pressure system. While capital costs are assumed to be similar between the medium pressure systems and low pressure systems, medium pressure systems have higher power consumption and increased operating costs and are therefore not recommended. Three UV suppliers were engaged to provide quotations and proposals with their low pressure technologies, which formed the basis of the cost estimation.

15. The estimated costs for the UV Disinfection System Upgrades Project for the 2025-2027 PBR term are provided in Table 6.0-1.

Table 6.0-1
UV Disinfection System Upgrades Project Capital Expenditure Forecast ($ millions)

	2024 and Prior	2025	2026	2027	2028 and Beyond	Total
Total Capital Expenditures	0.2	0.6	6.4	6.5	1.4	15.1

7.0 KEY RISKS AND MITIGATION PLANS

16. Table 7.0-1 outlines the risk and mitigation plans associated with this project.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – Confined space entry, ground disturbance, hot-work, and hazardous energy isolation are some of the associated risks.	EWS follows standard processes to reduce or eliminate these risks, including but not limited to: • Ensuring site specific safe work plans and procedures are developed that are compliant with regulatory requirements, at minimum • Procuring qualified contractors with experience working in these conditions • Including safety systems and safety performance in evaluation criteria for the selection of contractors • Completing process hazard analysis, constructability reviews and risk assessments as part of the design and construction stages • Developing a hazard registry specific to the required tasks, and implementing best practices like job-site hazard assessments and daily toolbox meetings to ensure workers are aware of these hazards • Conducting regular site visits and formal, documented inspections during construction
2. Environmental Risks – Silica dust during construction, removal and disposal of construction debris, working within the river valley	EWS conducts Process Hazard Analysis to identify risks and implement appropriate mitigation measures for Environmental risks. Appropriate delineation of construction area, including necessary dust control, ventilation and debris management measures will be employed to mitigate relevant risks. Appropriate permits will be approved by AEPA.
3. Financial Risks – Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing. Further change orders or unknown conditions that cannot be seen until demolition is complete	EWS manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. The financial risks will become more evident as further design is completed. A competitive procurement strategy will also be implemented to ensure the best value is achieved. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods,

	or design modifications can also help to mitigate price increases.
4. Quality Risks – this is the risk that construction is not performed to a sufficiently high standard, in which case for example, leaks could develop or the mixer may not function appropriately.	Examples of how quality risks are managed are: • Rigorous contractor selection process that considers experience, safety performance, and past performance on similar projects. • Comprehensive and clear technical specifications for the work and equipment/materials • Applying lessons learned from the Digester 3 and 4 Upgrades project • Inspection and testing plan to ensure only quality products and workmanship are accepted • Contractor, strong specs, using lessons learned from Digester 3 and 4 Upgrades.
5. Reputation Risks – Work conducted is in close proximity to Gold Bar residents.	Community engagement will be conducted to address stakeholder concerns.

8.0 RESOURCES

17. This project is expected to hire external consultants to complete design and QA/QC during construction. An external contractor is expected to complete the construction work. Internal resources will be needed to support the project.

EPCOR WATER SERVICES

Appendix F-6

Business Case

PRIMARY EFFLUENT (PE) CHANNEL UPGRADES PROJECT

May 31, 2024

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1.0 OVERVIEW

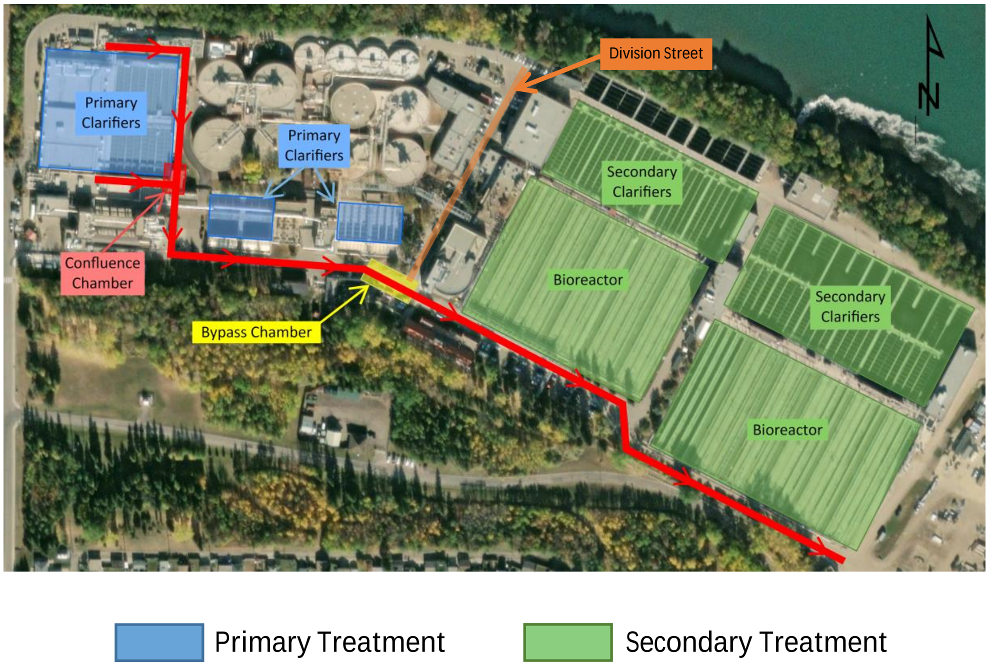
1. The Primary Effluent (PE) Channel Upgrades Project will continue the phased upgrade and rehabilitation work to the PE channel system at Gold Bar Wastewater Treatment Plant (GBWWTP). This work was initiated in 2019 and will span over several PBR terms. The scope of work for this project in the 2025-2027 PBR term includes completion of Phase 1 and initiation of Phase 2. The total forecasted spend for this project is expected to be $51.1 million, with $14.8 million to be spent during the 2025-2027 PBR term. About $7.6 million will be spent prior to the 2025-2027 PBR term, while the remaining $28.7 million is to be spent in future PBR terms.

2.0 BACKGROUND

2. GBWWTP consists of channels and chambers that convey wastewater from the entrance of the plant through treatment processes, then to the outfalls back into the North Saskatchewan River (NSR). Within the plant, PE channels move effluent from the primary clarifiers where primary treatment occurs to the Bioreactors for secondary treatment, as shown in Figure 2.0-1. The red line indicates the flow of the primary effluent, starting from the primary clarifiers shown in blue on the west side of the plant (west of Division Street). The flow moves along the south side of the plant through the Bypass Chamber to the Bioreactors shown in green on the east side of the plant (east of Division Street).

3. The Confluence Chamber and the Bypass Chamber shown in Figure 2.0-1, shown in red and yellow respectively, are key components of the conveyance infrastructure. The Confluence Chamber receives flow from Primary Clarifiers 5-12 and distributes flow into two downstream PE channels. This chamber marks the starting point of flow in the PE channel system and is a single point of failure without any readily available means of isolation. Flows leaving the Confluence Chamber then move to the Bypass Chamber, which is also a single point of failure for downstream process.

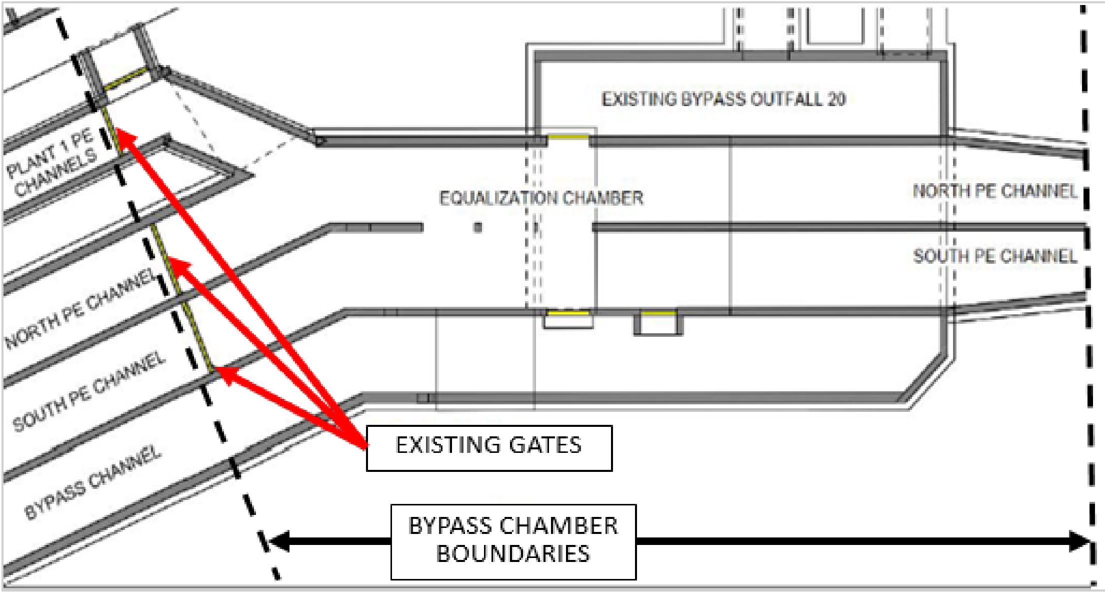
Figure 2.0-1
PE Channel Path



4. The central sections of these channels and chambers were constructed in the 1950's. In 2016, an inspection of the PE channels found them to be deteriorated and in need of rehabilitation. Because isolation of the inspected portions of the PE channels was not possible, the channel inspections were completed through available ports and openings with the channel running live with constant flows.

5. There are several channels that congregate at the Bypass Chamber. As shown in more detail in Figure 2.0-2, the North PE and South PE channels, as well as primary effluent from Clarifiers 1 to 4 (shown as Plant 1) connect with the Bypass Chamber and can be isolated using existing isolation gates in the current configuration. A fourth channel carries emergency plant bypass flows from the headworks area of the plant, which is then directed underneath the North and South PE channels to the NSR via Outfall 20. This emergency bypass path is used when incoming flows are higher than plant capacity during high flow events. However, once the flows enter the chamber, there is no means to isolate the North or the South streams leaving the chamber.

Figure 2.0-2
Current Configuration of the Bypass Chamber



6. Detailed early planning work identified the key drivers for this project to be the following:
   - Maintain current flow capacity in the PE channel system during any inspection and rehabilitation work.
   - Allow safe isolation and entry to the existing PE channels for inspection and rehabilitation work as needed.
   - Eliminate single point of failure locations (e.g., Confluence Chamber and Bypass Chamber).

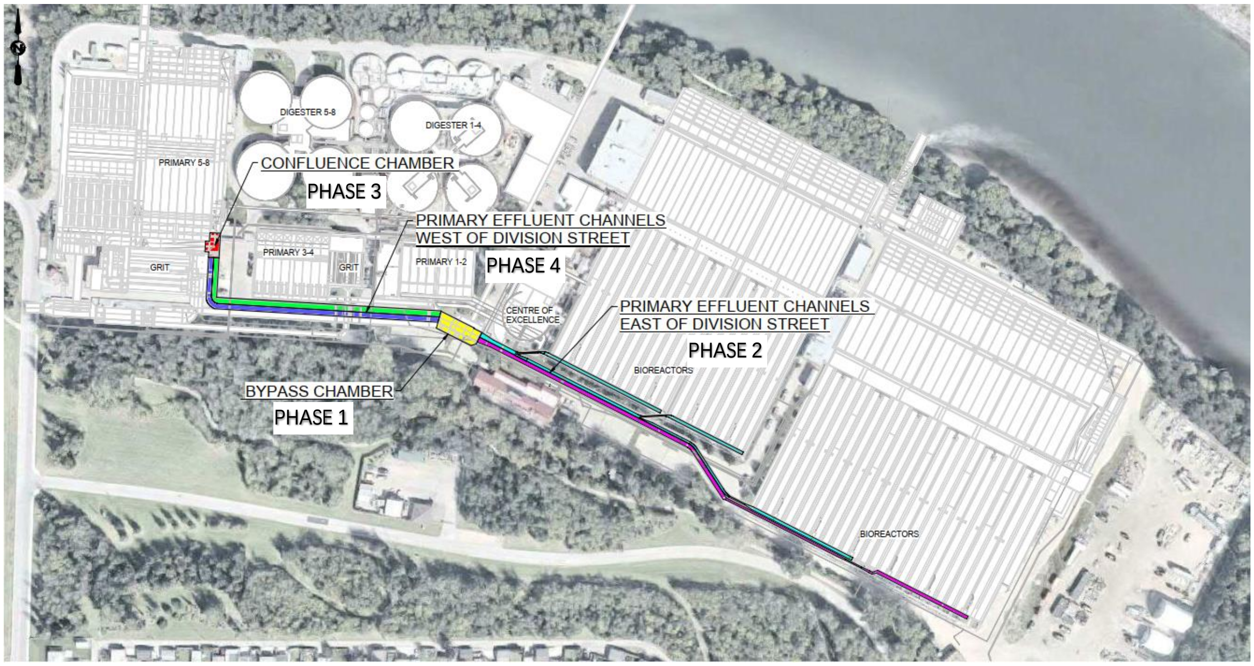
7. Early planning confirmed that the overall scope of work could not be delivered in a single PBR term. The rehabilitation work must be completed while maintaining full treatment process capacity, making it impossible to complete the work at once. Consequently, the project was separated into different phases.

8. Inspection of the Confluence Chamber found it to be in better condition than the Bypass Chamber, due primarily to the age and the configuration of the Bypass Chamber. Hence it was determined that the first phase of rehabilitating the PE channel system would be to upgrade the Bypass Chamber. This would eliminate this single point of failure and resolve issues with the most degraded part of the system.

9. Figure 2.0-3 shows the proposed phases of the PE Channel Upgrades. In the figure, the blue and green lines represent the PE channels upstream of the Bypass Chamber (Phase 4) and

the light blue and pink lines represent the PE channels downstream of the Bypass Chamber (Phase 2).

Figure 2.0-3
Phases of PE Channel Upgrades



10. The sequence of the project phases was determined based on understanding of current conditions of the infrastructure, outage requirements and operational considerations. For the upcoming PBR, the scope of the project includes completing Phase 1 upgrades and installing isolations and new channel sections to facilitate completion of Phase 2 rehabilitation.

3.0 JUSTIFICATION

11. To perform periodic inspections and required rehabilitation, it is necessary to stop flows into portions of the chambers and channel sections of the wastewater conveyance infrastructure. This is achieved by using a gate system located upstream of the relevant section. The Bypass Chamber and Confluence Chamber represent single points of failure in the PE channel system and are impossible to safely enter and rehabilitate. It is thus necessary to install gates within the chamber structures to manage flows. Other sections of the PE channel present similar issues and have never been isolated, inspected, or rehabilitated since construction. Failure of any part of this conveyance infrastructure would result in a failure to provide secondary and tertiary treatment to the city’s sewage. This could potentially result in large volume of undisinfected and

nutrient laden wastewater entering the NSR resulting in regulatory violation and potential environmental harm.

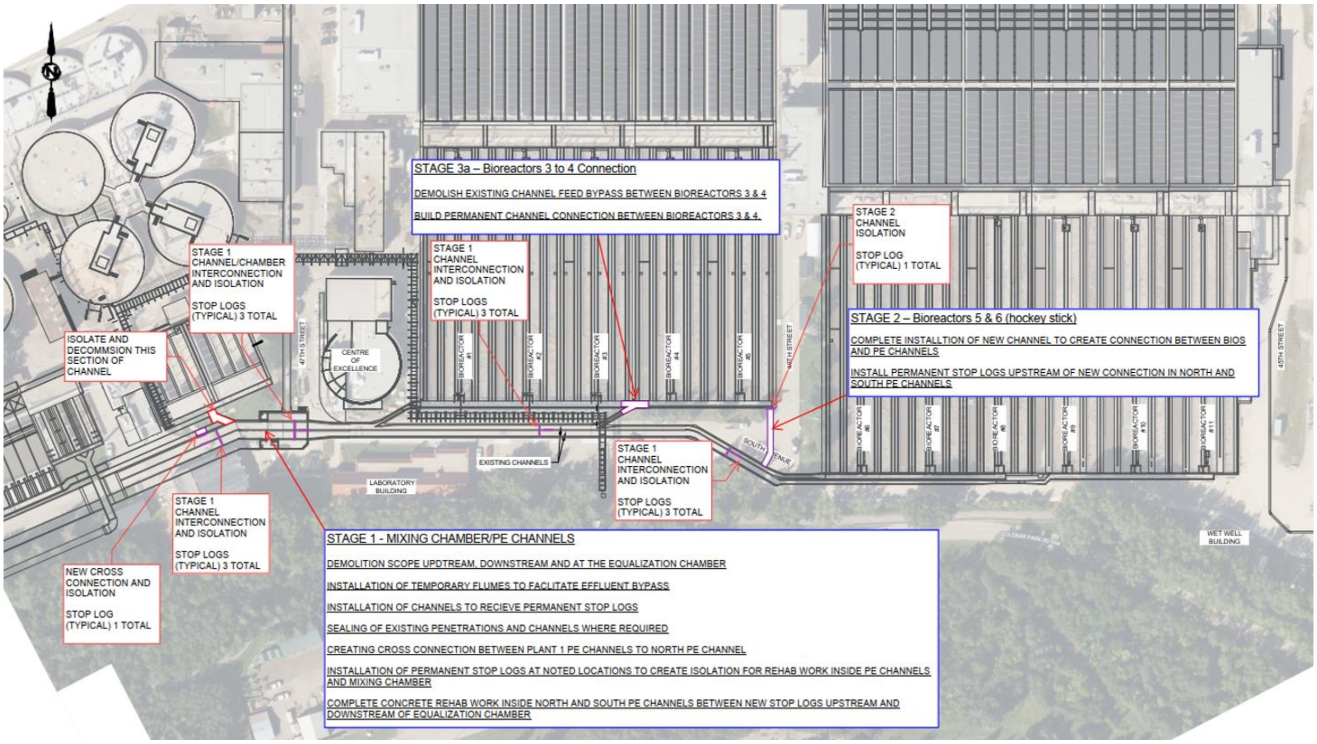
12. Creating the ability to isolate flows means that GBWWTP operations will be able to safely complete necessary upgrades and maintenance work to the rest of the PE channel system. The upgrade to the Bypass Chamber is part of a group of projects that will upgrade the entire PE channel system in future PBR periods. The channels downstream of the Bypass Chamber cannot be upgraded until the gate system in the chamber is installed, as there is no existing mechanism to safely alternate flows between the downstream PE channels.

4.0 PROJECT SCOPE

13. The scope for the PE Channel Upgrade project during the 2025-2027 PBR term will include upgrades to the Bypass Chamber (Phase 1) and adding new isolation and channel sections between Bioreactor trains, which will facilitate the future rehabilitation of the PE channels downstream of the Bypass Chamber (Phase 2). Detailed design, construction, and commissioning of this scope is currently planned to be completed during this period.

14. Work for following PBR terms is expected to include detailed design, construction, and commissioning of all remaining components of the system (Phases 2, 3 and 4). Figure 4.0-1 shows the proposed stages of work for Phases 1 and 2 during the 2025-2027 term.

Figure 4.0-1
Proposed PE Channel Upgrades during 2025-2027



15. The scope of work and construction sequencing is in the following main areas: Bypass Chamber (Phase 1), and North and South PE Channels between Bioreactors 1 to 6 (preparation of Phase 2).

16. The scope of work at the Bypass Chamber (Phase 1 of the overall project) includes demolition upstream, downstream and at the Bypass Chamber to allow access and facilitate upgrades, installation of temporary flumes to facilitate effluent bypass, installation of steel support channels to receive permanent stop logs, sealing of existing penetrations and channels where required, creating a cross connection between Plant 1 PE Channel to the North PE Channel, and installation of permanent stop logs as required to create isolation for rehab work inside the PE Channels and Bypass Chamber.

17. North and South Channel interconnection includes interconnecting PE Channels between Bioreactors 5 and 6 and between Bioreactors 3 and 4. Between Bioreactors 5 and 6, the scope includes installation of new channel to create connection between Bioreactors and the North PE Channel and installation of permanent stop logs upstream of the new connection in North and

South PE Channels. Between Bioreactors 3 and 4, the scope includes demolition of existing channel feed bypass and building a permanent channel connection between Bioreactors 3 and 4.

18. Finally, the project will complete concrete rehab work inside North and South PE Channels between new stop logs upstream and downstream of bypass chamber, cleanup roadways, and complete landscaping in all areas of construction.

19. The project will complete design and procurement through 2023 and 2024. Construction will follow through in 2024 and 2025 with the upgraded sections going into service by 2026.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 - Delay or Defer PE Channel Upgrades

20. The existing design of the PE Channels requires all flows to be stopped or diverted to access and maintain the infrastructure. As such, there has not been any rehabilitation or upgrades performed on the channels or chambers since they were constructed. As evidenced by inspection, the channels have degraded over time due to lack of maintenance. There is no protective coating at present on the concrete walls or columns within the channel to protect against water infiltration and corrosion-related deterioration. There is also no redundancy for the PE Channel to feed all Bioreactors. If there is a failure, leak or collapse in the PE Channel system, plant employees would not be able to inspect or resolve the issue without having to divert flows around the area of concern, which is impossible during an emergency given the magnitude of the flows. Also, such a failure would result in an extended outage of the secondary treatment process, causing environmental damage and violation of GBWWTP's approval to operate, triggering regulatory action. Delivering this project at a reasonable pace is thus critical for the continued operation of the facility and delaying or deferring this work poses an unacceptable level of risk to plant operations. This alternative was rejected.

5.2 Alternative 2 – Accelerate PE Channel Upgrades

21. This alternative involves delivering this project at an accelerated pace and completing the upgrades sooner than proposed in the current plan. Although the identified upgrades are critical in nature, it is impossible to accelerate the work due to outage requirements. There are novel components to the construction aspect of this project that involve keeping the conveyance infrastructure in operation while completing the upgrades. This method of construction is

needed to avoid large scale flow bypass, which was earlier deemed infeasible due to the scale of temporary pumping and piping required. The proposed scope and schedule will allow the validation of this method of construction and help with future planning for the remaining components of the project. It is possible to divert PE flows to the NSR through Outfall 30 avoiding the Bypass Chamber and downstream channels, allowing for the accelerated isolation and rehabilitation of those sections. However, this would eliminate secondary treatment and disinfection from the wastewater for the duration of construction, which would violate GBWWTP's approval to operate resulting in environmental impacts and regulatory action. Thus, this alternative was rejected.

5.3 Alternative 3 – New PE Channels

22. A third alternative would be to construct new channels to replace the existing PE Channels. However, early evaluations determined that this alternative is not applicable to all sections of the PE channel and had poor viability due to space and constructability constraints. A new channel was considered for the sections feeding the bioreactors but the channel would have to be built deeper than existing channels to allow process tie-in points, posing major constructability challenges and cost implications. This alternative would also involve greater disruption during construction compared to rehabilitation, to build additional conveyance capacity that is not needed nor will be in continuous use, which may result in faster degradation. In addition, building new channel infrastructure would require a much higher capital expenditure, directly impacting the rate payers. Rehabilitation offers a more sustainable and cost-effective solution by leveraging existing assets. Given the logistical challenges and higher costs associated with building new infrastructure, this alternative was excluded from further assessment.

5.4 Alternative 4 – Sequential Upgrade to the PE Channel System

23. Implementing the project as proposed includes installation of gate system on the upstream and downstream side of the Bypass Chamber, providing the ability to shut down various parts of the system and allow the subsequent phases of the project to proceed. Without upgrading the Bypass Chamber, no future channel rehabilitation is possible, which is not an acceptable scenario. This work was considered the most appropriate and immediate requirement and as such this scope was selected as Phase 1 of the project. Delivering the next phase of the project involves rehabilitating PE Channels east of the Diversion Street. This requires outage of the 11 Bioreactor trains that are supplied by these channels. Due to process demand, it is not

possible to allow outage of more than one or two trains at once. Thus, completing the necessary preparation, by incorporating required isolation and new channel sections, was deemed prudent for delivery within the upcoming construction scope. The sequential upgrade plan and proposed timeline allows for rehabilitation of the most critical parts of the PE Channel infrastructure, while providing necessary means to facilitate future work on the entire system. Validation of the construction approach will also allow for better planning and delivery of future phases of this project.

6.0 COST FORECAST

24. The project will be delivered using the Integrated Project Delivery (IPD) method. The project team includes members of the owner, designers, contractors, and sub-contractors. The cost forecast was updated using information provided by the IPD team during the project validation stage.

25. Table 6.0-1 provides the capital expenditure forecasts for the project by phase.

Table 6.0-1
PE Channel Upgrades Project Capital Expenditure Forecast by Project Phase ($ millions)

Project Phase	2024 and Prior	2025	2026	2027	2028 and After	Total
1. Phase 1 Upgrades and Phase 2 Preparation (Bypass Chamber and PE Channel interconnections between Bioreactors 1 to 6)	7.6	12.1	1.7	-	-	21.4
2. Future Phases 2-4 Upgrades (PE Channel sections east and west of division street and Confluence Chamber)	-	-	-	1.0	28.7	29.7
3. Total Capital Expenditures	7.6	12.1	1.7	1.0	28.7	51.1

7.0 KEY RISKS AND MITIGATION PLANS

26. It is anticipated that there will be risks during design, procurement, and construction that can affect the scope, cost, and schedule of this project. These include material delivery delays, fabrication delays, design changes to meet operating parameters, and construction delays.

27. Table 7.0-1 provides key risks and mitigation plans associated with this project.

Table 7.0-1
Key Risks and Mitigation Plans

Risks	Mitigation Plan
1. Health & safety risks – Confined space entry, ground disturbance, hot-work, and hazardous energy isolation are some of the associated risks. Additionally, removing the existing concrete and mechanical components, and installing an HDPE liner will be a large undertaking.	EWS follows standard processes to reduce or eliminate these risks, including but not limited to: • Ensuring site specific safe work plans and procedures are developed that are compliant with regulatory requirements, at minimum. • Procuring qualified contractors with experience working in these conditions • Including safety systems and safety performance in evaluation criteria for the selection of contractors • Completing process hazard analysis, constructability reviews and risk assessments as part of the design and construction stages • Developing a hazard registry specific to the required tasks and implementing best practices like job-site hazard assessments and daily toolbox meetings to ensure workers are aware of these hazards. • Conducting regular site visits and formal, documented inspections during construction
2. Environmental Risks – associated risks include: • Removal and disposal of construction debris (i.e. dispose construction waste to designated location). • Leakage of bypass pumps (i.e. provide secondary containment to mitigate potential environment release).	EWS conducts Process Hazard Analysis to identify risks and implement appropriate mitigation measures for Environmental risks. Appropriate delineation of construction area, including necessary dust control, ventilation and debris management measures will be employed to mitigate relevant risks.
3. Financial risks – Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing. Further change orders or unknown conditions that cannot be foreseen.	EWS manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. The financial risks will become more evident as further design is completed. A competitive procurement strategy will also be implemented to ensure the best value is achieved. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.

4. Reputation risks – Work conducted is near Gold Bar residents. Park and trail users may observe ongoing construction activities and express their concerns.	Community engagement will be conducted to address stakeholder concerns.
5. Construction risks – May anticipate ground disturbance, archaeological or paleontological finds.	Locate and mark utility lines prior to excavation (click Alberta one call).

8.0 RESOURCES

28. This project is being delivered using the IPD method. Procurement, negotiation, and formation of the IPD team was completed earlier in 2023. Subsequent project validation has been completed by the IPD team. Resources as required will be allocated by the IPD team throughout the life of the project.

EPCOR WATER SERVICES

Appendix F-7

Business Case

PLANT PIPE REHABILITATION AND UPGRADE PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. The Plant Pipe Rehabilitation and Upgrade Program is for replacement and upgrades to critical process and utility pipes at the Gold Bar Wastewater Treatment Plant (GBWWTP). During the 2025-2027 PBR term, this program will include projects to upgrade the potable water piping and repair deficiencies in sludge lines within the facility. The estimated capital cost is $9.2 million in the 2025-2027 PBR term.

2.0 BACKGROUND

2. The GBWWTP relies on a network of piping to carry out its processes effectively to treat wastewater before it is discharged back into the environment. These piping systems are essential for transporting both process streams and utilities throughout the facility.

3. The potable water piping network is comprised of approximately 3,000 m of piping of various materials including polyvinyl chloride (PVC), cast iron, asbestos-cement, and steel, ranging anywhere in age from less than 5 years to more than 50 years old. Potable water is used for process demands like cooling, straining, mechanical seals, hydrant use, and domestic and laboratory applications. The daily potable water consumption at the plant is more than 1,000 m^3/day. Sections of the existing network are undersized and vulnerable to overpressure and the aging cast iron and asbestos cement pipes are susceptible to leaks.

4. The secondary sludge pipes carry biologically active solid material called activated sludge and have been problematic for some time due to the corrosive nature of the process, with multiple leak events occurring over the last 10 years. The focus of the capital program includes the removal of epoxy lined carbon steel piping connecting the secondary process and replacement with stainless steel. These repairs and replacements have been prioritized to address the oldest and most problematic sections of piping first. Consequently, most of the sludge piping in eight out of eleven treatment trains have been upgraded to stainless steel. Continuing with this approach, the next area that requires upgrades is the return activated sludge (RAS) and waste activated sludge (WAS) piping in trains 9-11, which remain entirely carbon steel.

3.0 JUSTIFICATION

5. Piping infrastructure within the GBWWTP facility serves critical roles in maintaining operational efficiency. Issues with aging pipes, poor materials and/or pipe sizing make the network susceptible to leaks, failures and pressure spikes.

6. Water flow velocities and high pressures experienced in the potable water pipes in their current operating condition cause rapid changes in pressure, generating a pressure wave that travels through the network. This can result in pipe bursts, leaks, or damage to valves and fittings. The potable water pipe upgrades will reduce the likelihood of high velocities and pressure surges in the system that cause water main breaks. It will also enhance the overall reliability and redundancy of the system and decrease the likelihood of process interruptions.

7. Due to the deteriorated condition of the RAS and WAS piping, there have been ongoing issues with numerous leaks and failures. Figure 3.0-1 shows holes found in the existing piping infrastructure. Repairing these issues is challenging due to operational constraints. Isolations and outages are limited to a few hours due to treatment process demand, and any work exceeding 8 hours requires draining a Secondary Tank. This process can only occur between April and October to prevent freezing. Further, only one secondary train may be brought down for repair at a time while maintaining the capacities outlined in the operations plan. This leaves very little flexibility to coordinate emergency repairs. Additionally, the original carbon steel piping material is unsuitable for the purpose, as it is prematurely failing due to accelerated corrosion. Replacing the carbon steel with stainless steel will address ongoing failures and leaks, ensuring the piping system's resilience in the long term.

Figure 3.0-1
Holes in RAS/WAS Piping System

8. Replacements and upgrades of the existing piping network is essential to maintaining the reliability and integrity of the wastewater treatment system.

4.0 PROJECT SCOPE

9. The project scope includes upgrades to the potable water supply system, as well as replacements of the RAS/WAS piping system.

4.1 Potable Water Upgrades

10. The potable water network upgrade scope includes the following:

- Replacement of approximately 700 m of end of life unlined cast iron and asbestos cement piping.
- Proposed three additional hydrant locations to ensure full site coverage.
- Replacement of undersized pipes to ensure adequate flows (Mains will be upsized to meet plant demands and 100 L/s fire flow requirements, tunnel piping will be upsized to maintain target velocities below 1 m/s).

- Add approximately 350 m of looping to dead end runs to increase redundancy and reduce pressure surges.

11. The project scope for potable water upgrades is broken into three phases. Phases 1 will be executed in 2024, Phase 2 in 2025 and Phase 3 will be designed in 2026-27 and executed in the subsequent PBR.
    - o Phase 1: Installation of looped connection in the south-west part of the plant. This upgrade increases flow access on site and adds redundancy in case of an outage.
    - o Phase 2: Installation of pressure reducing valves (PRVs) and check valves on service lines into GBWWTP. This upgrade reduces the high pressures, reducing stress on pipes and bringing water pressure down to normal levels. This also brings the sites into compliance with the requirement for check valves on looped services.
    - o Phase 3: Further looping upgrades and additional hydrant installations. These upgrades bring the GBWWTP water network to its final state, adding hydrants where there are currently none and increasing flow at hydrants that are below capacity. This also has the effect of increasing the capacity of the water network for future on-site upgrades at GBWWTP.

4.2 RAS/WAS 9-11 Piping Upgrades

12. The RAS/WAS piping replacement scope includes the following:

- Demolish existing carbon steel piping transferring RAS from clarifiers 9, 10, and 11 to their respective bioreactors and replace the piping in stainless steel.
- Demolish existing carbon steel piping transferring WAS from the Secondaries 9-11 RAS header to the dissolved air floatation (DAF) header and replace in stainless steel.
- Redesign of the RAS and WAS systems for the Secondaries 9, 10, and 11 so that they don't operate on common headers, which makes isolation and maintenance extremely challenging.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Emergency Repairs to Address Failures

13. For both the potable water piping system and the RAS/WAS pipes at the GBWWTP, maintaining the status quo of only dealing with emergency failures is not recommended. The potable water distribution system is susceptible to pressure surges and contains sections of

piping over 50 years old that are prone to leaks. The likelihood of failures poses risks to plant operations, site safety, and the environment, as chlorinated water could potentially enter the North Saskatchewan River through on-site drains and impact aquatic habitat. Further, long-duration live repairs are infeasible under most circumstances for the secondary sludge pipes, greatly increasing the operational impacts from failures. The system can only be taken offline for less than 8 hours without downstream impacts on effluent quality. Given these challenges, maintaining the status quo could eventually lead to a catastrophic failure and is not a viable option for ensuring the reliability and safety of the wastewater treatment plant.

5.2 Alternative 2 – Spot Repairs/Minor Rehabilitation

14. This alternative involves rehabilitating sections of piping with repair and temporary patches, possibly through the removal of piping spools or cutting out sections for replacement with new piping. Once existing problem areas are addressed, a proactive approach may be adopted to identify and rehabilitate potential trouble spots before leaks occur, necessitating additional funds and outages for investigative work. Depending on the timeline for a full system replacement, multiple rehabilitation projects may be necessary to maintain the system's integrity. However, this approach does not guarantee a reduction in the likelihood of risks, as new leaks can still develop on old piping. Moreover, there's no guarantee that newly installed piping sections will be reusable once the system piping is eventually replaced, as the design, piping alignment, and pipe material may change. This is not an efficient use of capital funds, particularly if a replacement is slated within the next five years. This alternative is therefore not recommended.

5.3 Alternative 3 – Deferral

15. Deferring the upgrades and replacements outlined in the project scope to a future PBR term is not advisable due to existing vulnerabilities in the networks. These vulnerabilities include susceptibility to pressure surges and aging sections that are deteriorating to the point of experiencing leaks and failures. Given that some storm drains at GBWWTP flow directly to the North Saskatchewan River, a failure in the system could lead to the release of chlorinated water, harming the environment and violating EWS's approval to operate.

16. In addition, if potable water upgrades were deferred, it would be recommended to conduct extensive condition assessments of underground cast iron and asbestos cement piping to ensure that this piping is still in serviceable condition. Assessments are expected to be of

considerable cost on top of the associated upgrade cost. This alternative is thus not recommended.

5.4 Alternative 4 – Pipe Replacements and Upgrades

17. Replacements and upgrades to the potable water pipes and RAS/WAS pipes provides the best mitigation to reduce the likelihood of leaks, failures, and unexpected outages due to aging and pressure surges. This alternative involves executing Phases 1 and 2 of the potable network upgrades to install looped connection in the south-west part of the plant and installing PRVs and check valves on service lines into GBWWTP. For secondary trains 9, 10 and 11, this involves demolishing existing carbon steel piping carrying RAS and WAS and replacing with stainless steel, while redesigning to facilitate isolation and maintenance. This is the recommended alternative.

6.0 COST FORECAST

18. The forecasted capital expenditures for Plant Pipe Rehabilitation and Upgrades for the 2025-2027 PBR term are provided in Table 6.0-1.

Table 6.0-1
Pipe Rehabilitation and Upgrade Program Capital Expenditure Forecast 2025-2027 ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	5.3	2.1	1.8	9.2

19. Table 6.0-2 provides the estimated capital expenditure by sub-project for the 2025-2027 PBR term.

Table 6.0-2
Pipe Rehabilitation and Upgrade Program Capital Expenditure Forecast by Project ($ millions)

Project	2025	2026	2027	Total
1. Potable Water Upgrades	2.8	0.1	0.1	3.1
2. RAS/WAS 9-11 Piping Upgrades	2.5	2.0	1.7	6.3
3. Total Capital Expenditures	5.3	2.1	1.8	9.2

7.0 KEY RISKS AND MITIGATION PLANS

20. Piping replacement may involve activities such as excavation. These activities have been carried out in previous years, and lessons learned are incorporated so that each subsequent project can be done better and safer.

21. The key risks associated with this project and EWS's plans to mitigate these risks are summarized in Table 7.0-1.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – Confined space entry, ground disturbance, hot-work, and hazardous energy isolation are some of the associated risks.	EPCOR follows standard processes to reduce or eliminate these risks, including but not limited to: • Ensuring site specific safe work plans and procedures are developed that are compliant with regulatory requirements, at minimum. • Procuring qualified contractors with experience working in these conditions • Including safety systems and safety performance in evaluation criteria for the selection of contractors • Completing process hazard analysis, constructability reviews and risk assessments as part of the design and construction stages • Developing a hazard registry specific to the required tasks and implementing best practices like job-site hazard assessments and daily toolbox meetings to ensure workers are aware of these hazards. • Conducting regular site visits and formal, documented inspections during construction
2. Environmental Risks – Spills (to water or ground) are a risk. Landscaping, trees, and animals may also be affected by some activities related to this scope. Additionally, there is risk associated with silica dust during construction, removal, and disposal of construction debris, working within the river valley	EPCOR conducts Process Hazard Analysis to identify risks and implement appropriate mitigation measures for Environmental risks. Risks associated with spills are mitigated by using spill control measures and emergency response procedures. Risks to landscaping, tree, and animals are mitigated by consulting with environmental specialists during the execution of the work to ensure these risks are appropriately managed. Appropriate delineation of construction area, including necessary dust control, ventilation and debris management measures will be employed to mitigate relevant risks. Appropriate permits will be approved by AEPA.
3. Execution Risk – Pipe and pipeline replacement typically involves activities such as excavation.	These activities have been carried out in previous years, and lessons learned are incorporated so that each subsequent project can be done better and safer.

4. Government/Regulatory Risks - City and Provincial regulations apply to certain tasks of the program.	A regulatory review will be conducted prior to the work to ensure we are compliant with applicable regulations.
5. Financial Risks – Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	The activities in this program have been previously carried out, and a general understanding of the tasks and costs have been developed. Project costing is typically reviewed to ensure it aligns with assumptions and expectations. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.
6. Reputation Risk - External stakeholders (e.g. public, other asset owners) can be affected by some tasks that occur (e.g. excavation, equipment crossings).	These external stakeholders and EPCOR Communications and Public Engagement will be consulted prior to starting these tasks. Community engagement will be conducted to address stakeholder concerns.

8.0 RESOURCES

22. The project is expected to use both internal and external resources. Internal resources are typically relied upon to prepare the assets for major work. The delivery method for the project will be determined during development of design for the project. It is currently planned to engage with Water Distribution and Transmission to assist with scoping and design for the potable water components. It is expected that a competitive procurement strategy will be used among current Master Service Agreement holders to obtain a contractor for execution.

EPCOR WATER SERVICES

Appendix F-8

Business Case

SLUDGE AND SUPERNATANT PIPELINE REHABILITATION PROGRAM

May 31, 2024

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1.0 OVERVIEW

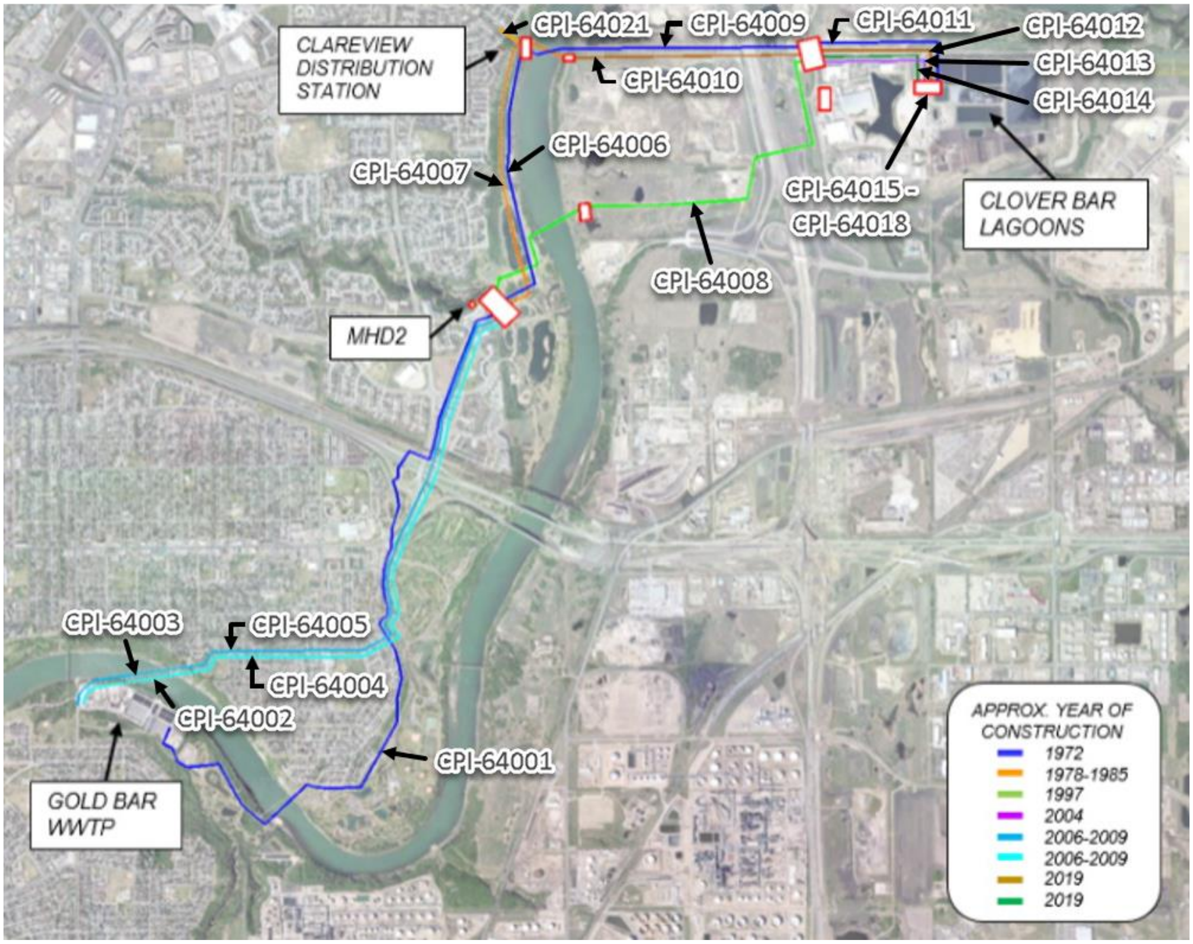
1. The Sludge and Supernatant Pipeline Rehabilitation Program is for major inspections, cleaning, repairs, rehabilitation, and upgrades for the pipeline assets and supporting infrastructure used to transfer sludge and supernatant between the Gold Bar Wastewater Treatment Plant (GBWWTP) and the Clover Bar Biosolids Resource Recovery Facility (CBBRRF). The estimated capital cost is $6.4 million in the 2025-2027 PBR term. An additional $7.3 million is estimated to be required in 2028 to complete the projects started in 2025-2027.

2.0 BACKGROUND

2. The GBWWTP produces digested sludge as a by-product of treating wastewater. The digested sludge is transferred by pipes to the CBBRRF where it is stored and dewatered prior to land application. Supernatant, a nutrient rich liquid waste stream separated from the digested sludge at the CBBRRF, is transferred by pipe from the facility back to the GBWWTP for further treatment. The pipe sections between GBWWTP and Hermitage Park area are used to transport digested sludge and the pipe sections within the CBBRRF site are dual purpose, transferring either digested sludge or supernatant. The dual-purpose pipe sections are designed to operate bi-directionally and have the capability to carry either waste stream depending on the process needs or pipeline availability.

3. The first sections of these pipes were built in 1972 and have expanded continually since then. There is 33.6 km of sludge and supernatant piping between GBWWTP and CBBRRF. The pipes are located primarily in or near the river valley and pass through several environmentally sensitive areas. The system has several major crossings including five river crossings and three crossings beneath each the Anthony Henday Freeway, and Yellowhead Freeway/CN Rail corridors. Figure 2.0-1 shows the layout of the piping system.

Figure 2.0-1
Sludge / Supernatant Pipe System Layout



4. The sludge and supernatant pipelines require regular cleaning, inspection, rehabilitation, and upgrades to extend the useful asset life and mitigate operational risks. In 2015, the GBWWTP developed a Sludge/Supernatant Pipeline Inspection Program. This program specified a phased approach for cleaning and inspection of the pipelines to assess their condition and identify any needed repairs, rehabilitation, or upgrades to ensure the integrity of the pipe.

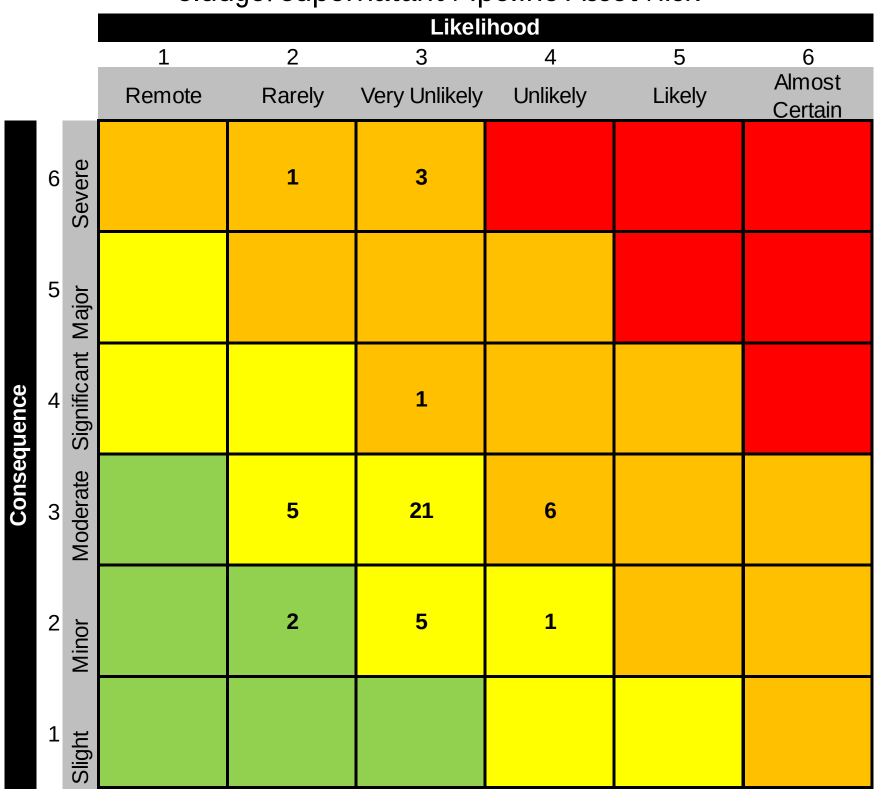
5. Since 2016, more than 10 km of pipe has been inspected including sections CPI-64001, CPI-64006, CPI-64009, CPI-64011, CPI-64007, CPI-64010, CPI-64012 and CPI-64008. CPI-64010 and CPI-64012 have been rehabilitated with 2.5 km of pipe replaced along their sections and spot repairs have been completed on CPI-64006.

6. In 2020, an overall Pipeline Master Plan was developed for the piping system. The plan considered the current and future overall layout, the number and size of pipes to meet volume

and redundancy requirements, material type, and monitoring options. An Asset Management Plan was also developed that focused on the needs and investments required for the sustainability of the existing pipeline assets to reduce the risk of failure.

7. The Asset Management Plan completed a condition assessment using both observed defects and deterioration models based on age and material type to produce a condition rating for each pipe. The sludge and supernatant pipeline system is comprised of 21 pipes, which were further segmented into a total of 45 segments based on either criticality or other attributes. The resulting condition ratings were used to develop the Likelihood of Failure (LOF) for each segment. Along with the LOF scores, Consequences of Failure (COF) were also completed across five consequence categories using the EPCOR Risk Matrix. The consequence categories include Health and Safety, Environment, Regulatory, Reputation, and Financial. A theoretical risk score was then calculated for each pipe and the results are shown on the matrix in Figure 2.0-2.

Figure 2.0-2
Sludge/Supernatant Pipeline Asset Risk



8. EWS expects that continued investment will be required to support cleaning, inspection, and rehabilitation of the pipeline assets. Inspections will be prioritized based on the risk

assessment, and replacement of segments will be identified through these inspections. Major segments that remain to be inspected include CPI-64002, CPI-64003, CPI-64004 and CPI-64005. Also, inspection and rehabilitation of pipeline supporting infrastructure including valve chambers will be conducted as part of this program.

3.0 JUSTIFICATION

9. The sludge and supernatant pipes require regular cleaning, inspection, rehabilitation, and upgrades to realize the desired flow capacity, expected asset life and mitigate operational risks. Without an investment in proactive rehabilitation, over time the system will become fouled and be at increased risk of failure. In addition, repairing or replacing failed piping is more costly and more disruptive to operations compared to proactive rehabilitation to maintain performance and extend service life.

10. The risk categories associated with these assets are the following:

- Health and Safety Risks – Failure of the pipes within chambers and restricted spaces can cause liquids and gases to be released, posing a safety risk to EWS staff, especially as they are pressurized pipes.
- Environmental Risks – Pipe failure could cause a spill of untreated waste to the local environment or to the river.
- Government/Regulatory Risks – A plant process upset, or regulatory non-compliance could result in fines or impact EPCOR's approval to operate.
- Reputation Risks – Disruption of service could impact EPCOR's reputation.
- Financial Risks – Emergency repairs of failed pipes can be considerably more costly than proactive renewal.

4.0 PROGRAM SCOPE

11. Approximately 18 km of pipe used for transferring sludge and supernatant will be cleaned, inspected, and prioritized for rehabilitation in the 2025-2027 PBR term as shown in Table 4.0-1. The program intends to rehabilitate the assets based on a small quantity of defects (e.g. 2-3 defects per segment).

Table 4.0-1
Pipe Inspection and Rehabilitation Priorities

GB Pipe Number	Size (mm)	Material	Length (km)	Asset # (Start)	Asset # (End)	Estimated Risk
64004	250	C.Steel	4.2	473637	474374	Medium-High
64005	250	C.Steel	4.2	473636	473403	Medium-High
64006	200	C.Steel	2.0	374268	376877	Medium-High
64008	250	C.Steel	3.5	376801	378786	High-Medium
64009	200	C.Steel	1.9	374869	375575	Medium-High
64010	200	C.Steel	1.9	374859	379989	Medium-High
64011	200	C.Steel	1.15	379971	375765	Medium-High
64015	200	C.Steel	Header	CB Biosolids Basins	-	Medium-Low
64016	200	C.Steel	Header	CB Biosolids Basins	-	Medium-Low
64017	200	C.Steel	Header	CB Biosolids Basins	-	Medium-Low
64018	300	C.Steel	-	CB Biosolids Basins	-	Medium-Low
64021	200	C.Steel	0.07	361843	-	Medium-High

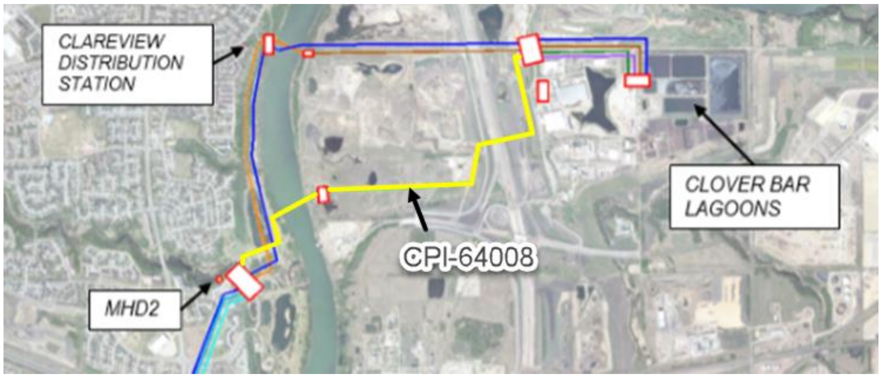
12. In addition to the scheduled inspections, pipeline segment CPI-64008 is currently being considered for rehabilitation during the 2025-2027 PBR term, based on its age, material, and usage.

4.1 CPI-64008 Rehabilitation

13. CPI-64008 is a 250 mm carbon steel pipe installed in 1997 to provide conveyance capacity between GBWWTP and CBBRRF. The pipe extends from Maintenance Hole D2, crosses under the North Saskatchewan River and Anthony Henday Drive, and ends at a diversion chamber adjacent to the Edmonton Waste Management Center. Its total length is approximately 3.5 km.

14. It is mostly used for sludge conveyance and is crucial for continued operation. The pipeline has not yet been inspected, but based on usage and past experience is anticipated to have up to 10 locations along its segment that may require rehabilitation and repair. The location of this pipe is shown in yellow in Figure 4.1-1.

Figure 4.1-1
CPI-64008 Location



5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Nothing

15. One alternative is to run the pipelines to failure; however, this creates operational and environmental risks that are unacceptable. Pumping digested sludge to the CBBRRF is critical to the safe operation of the GBWWTP, as there is no storage at the GBWWTP. There are also regulatory, reputational, environmental, and financial impacts associated with the spill and cleanup of a pipe rupture and release of supernatant or digested sludge to surrounding land or the North Saskatchewan River. This alternative does not mitigate any risk and therefore is not recommended.

5.2 Alternative 2 – Isolate and Remove from Service

16. This alternative is to isolate a pipeline segment and remove it from service and regular operations. If this is done when there is a potential for failure, it can mitigate some of the environmental or regulatory risks associated with spillage. However, taking a pipeline segment out of service can still result in issues with regular operations at GBWWTP, as there is no storage for digested sludge. While this alternative may be evaluated on a case-by-case basis, overall this alternative is not feasible and therefore not recommended.

5.3 Alternative 3 – Spot Repairs with Planned Rehabilitation and Replacement

17. Spot repairs and planned rehabilitation works are appropriate measures to manage any issues and defects detected during pipeline inspections. This alternative includes regular cleaning

and inspection of the pipeline segments to provide detailed condition information which can be used for prioritization of rehabilitation work. A full replacement will be required in some cases where the frequency and severity of the defects are more substantial and spot repairs are not practical or cost effective. This is the recommended alternative.

6.0 COST FORECAST

18. The forecasted capital expenditures for the 2025-2027 PBR term are provided in Table 6.0-1.

Table 6.0-1
Sludge and Supernatant Pipeline Rehabilitation Program Capital Expenditure Forecast
($ millions)

	2024 and Prior	2025	2026	2027	2028 and Beyond	Total
Total Capital Expenditures	0.1	1.4	3.3	1.7	7.3	13.8

7.0 KEY RISKS AND MITIGATION PLANS

19. Pipe replacement typically involves construction activities such as excavation. Past experiences in similar work have provided valuable lessons, which are now integrated into our approach to ensure that each subsequent project is executed more efficiently and safely.

20. Table 7.0-1 provides a summary of the key risk associated with executing this program and EWS's plans to mitigate these risks.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – Confined space entry, ground disturbance, hot-work, and hazardous energy isolation are some of the associated risks.	EWSS follows standard processes to reduce or eliminate these risks, including but not limited to: • Ensuring site specific safe work plans and procedures are developed that are compliant with regulatory requirements, at minimum. • Procuring qualified contractors with experience working in these conditions • Including safety systems and safety performance in evaluation criteria for the selection of contractors • Completing process hazard analysis, constructability reviews and risk assessments as part of the design and construction stages • Developing a hazard registry specific to the required tasks and implementing best practices like job-site

	hazard assessments and daily toolbox meetings to ensure workers are aware of these hazards. Conducting regular site visits and formal, documented inspections during construction
2. Environmental Risks – Spills (to water or ground) are a risk. Sludge and Supernatant pipelines run through the North Saskatchewan River valley and so any spills or unintended leaks will have high consequences and scrutiny. Landscaping, trees, and animals may also be affected by some activities related to this scope. Additionally, there are risks associated with silica dust during construction, removal, and disposal of construction debris, working within the river valley	EWS conducts Process Hazard Analysis to identify risks and implement appropriate mitigation measures for Environmental risks. Risks associated with spills are mitigated by using spill control measures and emergency response procedures. Risks to landscaping, tree, and animals are mitigated by consulting with environmental specialists during the execution of the work to ensure these risks are appropriately managed. If the existing alignment in Hermitage Park is to be reused, then tree removal, and management of trees become areas of consultation. Appropriate delineation of construction area, including necessary dust control, ventilation and debris management measures will be employed to mitigate relevant risks. Appropriate permits will be approved by AEPA.
3. Financial Risks – Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	The activities in this program have been previously carried out, and a general understanding of the tasks and costs have been developed. Project costing is typically reviewed to ensure it aligns with assumptions and expectations.
4. Government/Regulatory Risks - City and Provincial regulations apply to certain tasks of the program. It is expected that the following regulations and approvals will apply: • City of Edmonton River Valley Bylaw • Alberta Environment & Parks Approval to Operate • Alberta Transportation Ministerial Consent • Alberta Pipeline Act • City of Edmonton Parkland Access Permit	A regulatory review will be conducted prior to the work to ensure we are compliant with applicable regulations.
5. Reputation Risks - Work conducted is near Gold Bar residents. Additionally, external stakeholders (e.g. public, other asset owners) can be affected by some tasks that occur (e.g. excavation, equipment crossings).	External stakeholders and EPCOR Communications and Public Engagement will be consulted prior to starting these tasks. Community engagement will be conducted to address stakeholder concerns.

8.0 RESOURCES

21. The project is expected to use both internal and external staff. Internal staff are typically relied upon to prepare the assets for major work. Contractors will be utilized for specific tasks such as pipeline rehabilitation. Supply Chain will be consulted to ensure the purchase orders and contracts are issued in accordance with company policy. A regulatory review will be conducted to ensure necessary approvals are in place for the work. Agreements will depend on which areas

of the pipeline require rehab as it is anticipated that several crossing agreements may be required with other stakeholders that have assets nearby, as well as a parkland access permit.

EPCOR WATER SERVICES

Appendix F-9

Business Case

EXPAND FLARE CAPACITY PROJECT AT GOLD BAR WASTEWATER TREATMENT PLANT

May 31, 2024

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1.0 OVERVIEW

1. The Expand Flare Capacity Project is to construct a new building, new flares, and associated equipment. This will provide the Gold Bar Wastewater Treatment Plant (GBWWTP) with reliable and redundant biogas flaring capacity as the existing flares cannot safely process all potential biogas produced in the wastewater treatment process during needed maintenance activities. The total project spend is currently estimated at $11.2 million, with $7.7 million of the spend in the 2025-2027 PBR term.

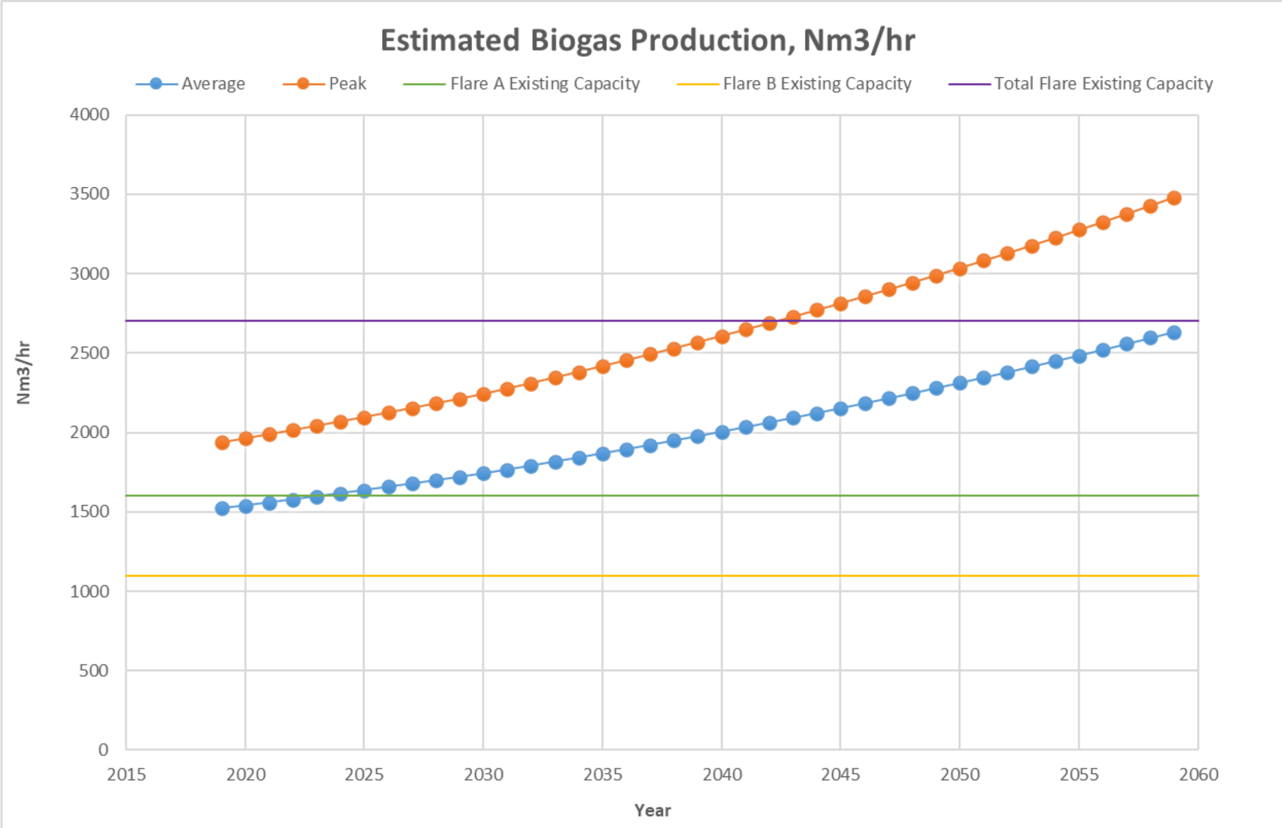
2.0 BACKGROUND

2. Biogas is a product of the wastewater treatment process and is a blend of methane, carbon dioxide, hydrogen sulfide, water vapour, and traces of other gases. The biogas is generated in anaerobic digesters and either utilized to provide heat and energy on site through boilers or flared. There is no biogas storage on site and the flares are primarily used to control biogas pressures and volumes within the anaerobic digester's headspace. For safety purposes and to minimize explosion risks, the emergency flaring system must always maintain sufficient capacity to permit the disposal of the entire biogas production volume.

3. Methane is a very potent greenhouse gas. One tonne of methane released into the atmosphere is equivalent to 28 tonnes of carbon dioxide, based on the Global Warming Potential (GWP) for 100-year time horizon (IPCC, 2014). Facilities that handle, process, or produce methane greatly reduce their climate change impact by flaring as opposed to venting methane. By flaring the methane, it is burned and converted into carbon dioxide which is a much weaker greenhouse gas. Combustion of biogas or biomethane, produced from fresh organic materials, does not increase the amount of carbon dioxide in the atmosphere, as the carbon is circulated in short cycles. This contrasts with carbon dioxide which is released during the combustion of fossil fuels after millions of years of storage underground.

4. The existing flares at GBWWTP were installed circa 2004-2008. The system is now approaching its design capacity and, due to its age has increasing operational, and maintenance needs. A study was completed in 2019 to review the capacity of the existing infrastructure as well as evaluate the future biogas projections and capacity requirements up to 2060. The results are shown in Figure 2.0-1. The red and blue dots are based on modelling and predicted data, whereas the capacities are based on actual measured data.

Figure 2.0-1
Estimated Hourly Biogas Production and Observed Capacities of Existing Flares



5. As shown in Figure 2.0-1, there is a lack of sustainable capacity to meet peak demands by individual flare units in the current installation. The capacity available is insufficient to accommodate shutdowns for maintenance or repairs and there is a risk of an uncontrolled release if there is a critical failure of any one of the flares. This risk can be managed for short durations by controlling biogas pressure and limiting biogas production upstream in the digesters, in case of a failure in the flare system. It is however recommended to install additional flaring assets in the near term to provide sufficient capacity for planned and unplanned shutdowns of portions of the flare system without risk of venting methane.

3.0 JUSTIFICATION

6. A failure in the biogas pressure control system, including the flares, could result in uncombusted biogas being released to the environment from the digesters. The digesters have pressure safety systems that would release the gas into the atmosphere instead of overpressuring the vessels, avoiding any explosion risk. Operating controls including solids feed to the digesters can also be adjusted to reduce biogas production pressure in such case. The release of biogas is a hazard to people, the environment, the wastewater treatment process, and is a prohibited practice (per Alberta Environment Approval 639-03-06 and Digester Gas Code CSA B149.6). As such, GBWWTP is required to have sufficient flaring capabilities within its direct control at all times. The system must be large enough to maintain sufficient flaring capacity, to completely prevent venting of biogas during any planned or unplanned shutdown of at least one flare unit.

7. The existing flares require regular preventive maintenance, which involves shutting them down for a period. The work typically involves disassembly, inspection, and replacement or reconditioning of parts (e.g. flame arrestors, thermal safety valves, thermocouples, burner nozzles). While one flare is being maintained, the plant is dependent on the remaining unit for full service. While this is possible for short periods of time, it can be only be done during lower demands and there is a major safety and environmental risk to the facility due to the lack of full redundancy.

4.0 PROJECT DESCRIPTION

8. The scope for the Expand Flare Capacity project includes construction of a new building to house the new flare and associated equipment. Due to existing site conditions and current code requirements on spacing and location, a new building is required for the new equipment to address minimum clearances from digesters, other flares, and other combustible gases. The facility will be built within a part of the space currently occupied by the abandoned Primary 1 and 2 clarifier structures. Structural modifications (e.g. micropiles) will be required within the clarifier structure to accommodate the new construction as the existing infrastructure was built in 1954 and is of unknown capacity.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Defer Upgrades

9. The first alternative is to defer the upgrade to the flare system to a later time and continue to use the existing equipment. However, there is not sufficient redundancy with the existing installation and any one of the existing flares is not capable of processing the plant's total biogas production on its own. There is a risk that a failure in the flare system could result in an un-combusted biogas release and in the worst case, a major safety incident.

5.2 Alternative 2 – Temporary Flare

10. The second alternative is to install a temporary flare to increase the plant's capacity to process biogas. This was originally considered during flare maintenance work, to temporarily install the spare capacity while a flare is taken out of service. This would involve a temporary tie-in to the biogas piping system, and a temporary control set-up to integrate the flare into the regular plant operations. This arrangement was not considered practical during the flare maintenance work, as it involves a great deal of coordination over a short period of time. The work steps required to implement this (including modifications to biogas piping, installation of temporary bypass piping, and bypassing automated safety system controls) are high risk. Other risks are introduced when trying to integrate a temporary system into the plant's control system for the biogas, which could detrimentally affect other areas of the operating plant. Any errors in that integration could result in a biogas release or explosion. This alternative was evaluated and confirmed to be high risk and therefore, this alternative was rejected.

5.3 Alternative 3 – Upgrade Existing Flares

11. Some consideration was also given to upgrading or modifying the existing flares in place to increase capacity. The candle stick flare is already the largest size available from the manufacturer (Varec Biogas). The enclosed burner flare is available in one size larger, and the existing nozzles could be bored out to slightly increase its capacity. However, this involves taking the flare out of service for an extended period and relying only on one flare to handle all of the biogas produced on-site. This presents the same challenges and risks experienced during maintenance work currently, but at a much greater scale and with a limited potential increase in

capacity. This option was rejected, as it does not provide sufficient additional capacity to warrant the risks involved with forgoing redundancy during construction and installation.

5.4 Alternative 4 – Build New Flares

12. The fourth alternative, to build a new flare facility, was considered the best option based on its ability to provide necessary redundancy and sustained capacity. In addition, there would not be any decrease in flare capacity during construction as the two existing flares could continue to operate, which presents the lowest risk during construction.

6.0 COST FORECAST

13. The cost forecast is based on conceptual design and engineering cost estimates. Table 6.0-1 shows the projected costs for this project.

Table 6.0-1
Expand Flare Capacity Project Capital Expenditure Forecast ($ millions)

	2024 and Prior	2025	2026	2027	Total
Total Capital Expenditures	3.4	6.2	1.6	-	11.2

7.0 KEY RISKS AND MITIGATION PLANS

14. Table 7.0-1 summarizes the key risks and mitigation plans associated with this project.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – Ground disturbance, hot-work, and hazardous energy isolation are some of the associated risks. Working near biogas piping presents health and safety risks to workers in the event of a release. The release of biogas to the environment is a concern during construction and commissioning. Working with other utilities (e.g. electricity, natural gas, water) also presents risks to the workers.	EPCOR follows standard processes to reduce or eliminate these risks, including but not limited to: • Ensuring site specific safe work plans and procedures are developed that are compliant with regulatory requirements, at minimum • Procuring qualified contractors with experience working in these conditions • Including safety systems and safety performance in evaluation criteria for the selection of contractors • Completing process hazard analysis, constructability reviews and risk assessments as part of the design and construction stages • Developing a hazard registry specific to the required tasks, and implementing best practices like job-site

	hazard assessments and daily toolbox meetings to ensure workers are aware of these hazards • Conducting regular site visits and formal, documented inspections during construction
2. Environmental & Regulatory Risks – Associated risks include release of biogas to atmosphere, silica dust during construction, and removal and disposal of construction debris.	EPCOR conducts Process Hazard Analysis to identify risks and implement appropriate mitigation measures for Environmental risks. Appropriate delineation of construction area, including necessary dust control, ventilation and debris management measures will be employed to mitigate relevant risks. Appropriate permits will be approved by AEPA. The release of biogas to the environment is mitigated through Process Hazard Analysis (PHA), recommendations, and emergency response procedures, prior to starting high risk activities. Additionally, City and Provincial regulations apply to certain tasks of the project (e.g. City of Edmonton River Valley Bylaw, Alberta Environment & Parks Approval to Operate). A regulatory review is conducted prior to the work to ensure we are compliant with applicable regulations.
3. Financial Risks – Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing. While the impacts of the COVID-19 pandemic have eased, there still may be cost escalations and equipment procurement issues for specialty items.	The activities in this program have been previously carried out, and a general understanding of the tasks and costs have been developed. Project costing is typically reviewed to ensure it aligns with assumptions and expectations. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.
4. Reputation Risks – Work conducted is in close proximity to Gold Bar residents. Additionally, external stakeholders (e.g. public, other asset owners) can be affected by some tasks that occur (e.g. excavation, equipment crossings).	External stakeholders and EPCOR Communications and Public Engagement will be consulted prior to starting these tasks. Community engagement will be conducted to address stakeholder concerns.

8.0 RESOURCES

15. Engineering will be done externally, while internal staff will provide reviews and feedback. Internal staff are also typically relied upon to prepare the assets for major work (e.g. shutdown, purging of gases, hazardous energy isolation). Contractors with specialized skills and previous experience will be utilized for construction and specific tasks. Supply Chain will be consulted to

ensure the purchase orders and contracts are issued in accordance with company policy. A regulatory review will be conducted to ensure necessary approvals are in place for the work. This project is expected to be delivered under a Construction Manager at Risk contract.

EPCOR WATER SERVICES

Appendix G-1

Business Case

ACCESS MAINTENANCE HOLE PROGRAM

May 31, 2024

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1.0 OVERVIEW

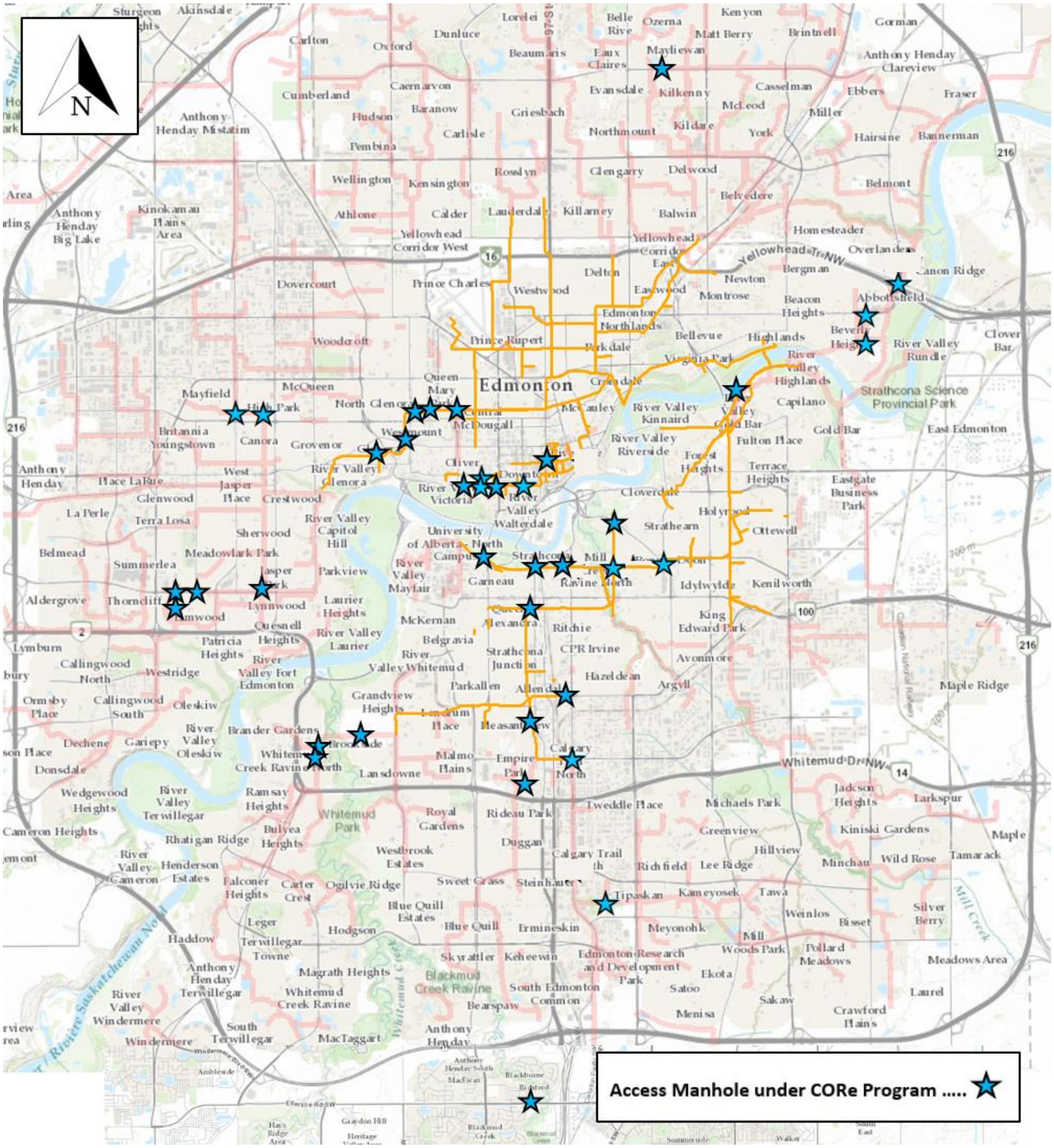
1. The Access Maintenance Hole Program is a critical component of EPCOR Water Services' (EWS) Corrosion and Odour Reduction Strategy (CORe). The program includes construction of access maintenance holes on major trunk lines where safe access for inspections and cleaning is required. The Access Maintenance Hole Program targets trunk lines with poor existing access availability, where odour causing sediment accumulations are expected and where there is a risk of moderate to severe deterioration of the sewer structure from hydrogen sulfide (H2S) corrosion. This program supports the large trunk inspection program by providing safe, reliable access to the trunks. EWS has forecasted the total program capital expenditure during the 2025-2027 PBR term at $21.7 million.

2.0 BACKGROUND

2. The CORe strategy was initiated in 2019 to understand, mitigate and prevent sewer odour issues across the city using a combination of capital and operational interventions. The CORe strategy focuses on preventing the formation of H_2S gas, reducing community odour impacts, and lengthening the life of sewer network assets. Under CORe, EWS segregates the city into regions with consistent odour issues, those with dynamic odour issues, and those with emerging odour issues. Different approaches have been proposed for each region to ensure that causes of the odour are fully understood and to ensure that capital projects will provide sustainable relief. The capital projects and operating activities in CORe can be classified into four themes of investment: PREVENT, OPTIMIZE, MONITOR and CONTROL.

3. The Access Maintenance Hole Program is a critical component of the CORe strategy under the PREVENT theme. This annual program constructs access maintenance holes on major trunk lines to mitigate health and safety risks, financial risks, environmental risks, and risks of customer service disruptions by providing safe access for inspections and cleaning. The program was initiated in 2019 as a key CORe deliverable. Since 2019, 28 access maintenance holes have been completed and a further 10 access maintenance hole projects have been initiated and are proceeding towards or undergoing construction with their completion occurring before the end 2024. Figure 2.0-1 below shows the completed and ongoing locations.

Figure 2.0-1
Access Maintenance Hole Locations



4. There are approximately 165 km of sanitary and combined large trunk sewers (1,200 mm diameter and larger) constructed over the past 100 years to varying standards and specifications.

5. As the Access Maintenance Hole Program supports the large trunk inspections, risk ranking of trunks is used as the main criteria in developing candidate locations for access maintenance hole construction, and therefore high priority is given to the candidates that provide access to the high-risk trunks.

6. In 2023, a condition assessment study of the entire large trunk sewer network was completed using both observed defects and deterioration models based on age, material type, and waste type and produced a condition rating for each pipe. The resulting condition ratings were used to develop the Likelihood of Failure (LOF) for each pipe. Along with the LOF scores, Consequences of Failure (COF) scores were also completed across all six consequence categories using the EPCOR Risk Management Standards and Risk Matrix. The six consequence categories include Health and Safety, Environment, Regulatory, Reputation, Service Interruption, and Financial. A theoretical risk score was then calculated for each pipe and the results are shown on the matrix in Figure 2.0-2.

Figure 2.0-2
Large Trunk Risk Matrix (#pipes(km))

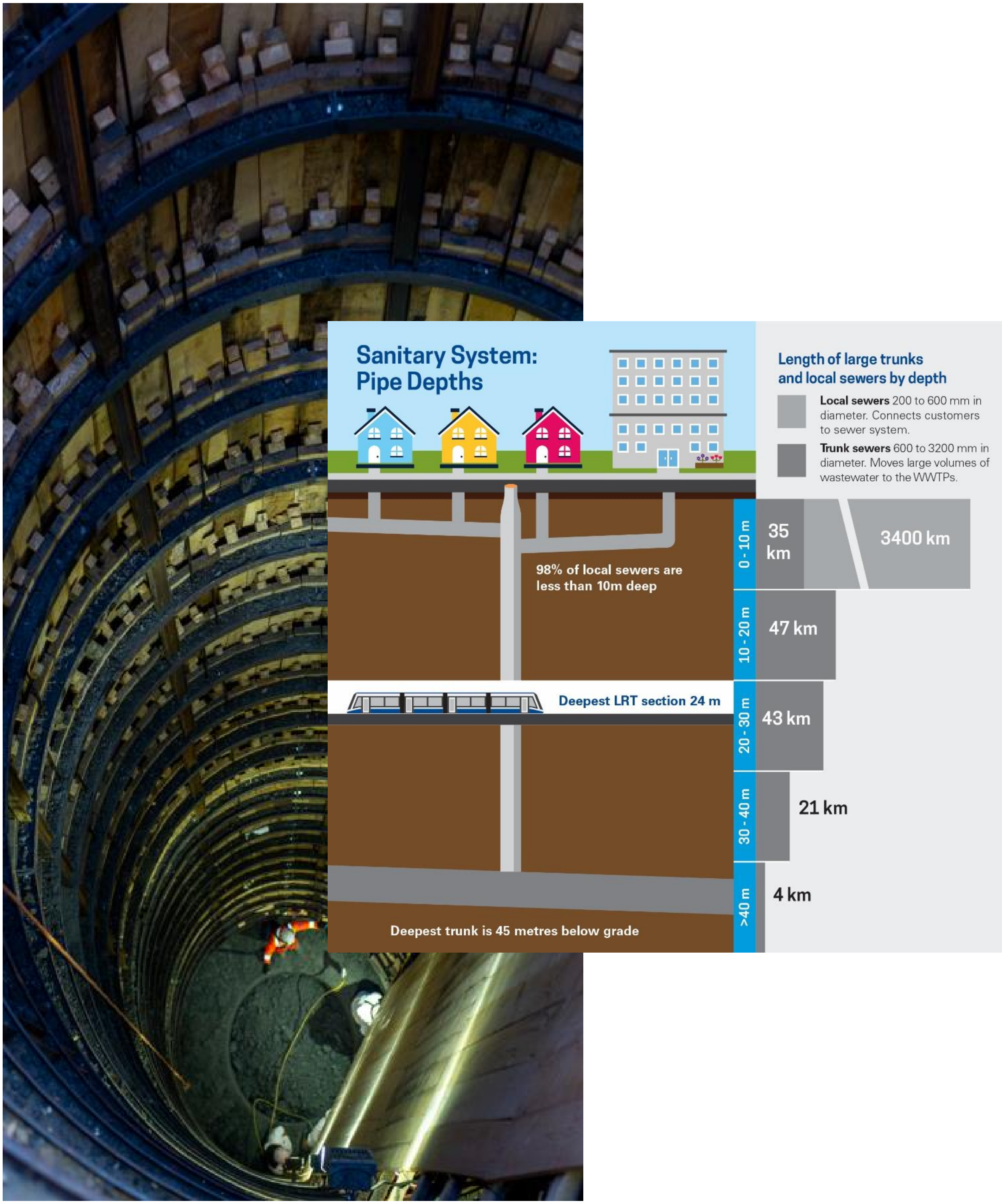
Consequence		Likelihood: 1 Remote	2 Rarely	3 Very Unlikely	4 Unlikely	5 Likely	6 Almost Certain
6	Severe						
5	Major	**12 (3.8 km)**	**53 (4.5 km)**	**285 (22.5 km)**	**146 (13.8 km)**	**24 (2.2 km)**	
4	Significant	**81 (6.8 km)**	**90 (6.5 km)**	**387 (26.6 km)**	**248 (24.9 km)**	**94 (10.3 km)**	
3	Moderate	**31 (3.0 km)**	**91 (7.9 km)**	**367 (21.1 km)**	**84 (5.9 km)**	**74 (4.7 km)**	
2	Minor						
1	Slight						

7. In addition, the program also takes CORe factors into consideration including measured H_2S concentration inside the trunk and public odour complaints in proximity to the asset. In

general, new access maintenance holes are given greater priority in areas where public odour complaints over the past 5 years exceeds a rate of 10 complaints/km^2 or where sewer H_2S concentration exceeds a 24 hour average of 2.5 parts per million.

8. Figure 2.0-3 shows a graphical image of typical access maintenance holes under construction for a large trunk Constructed as part of the CORe program, the maintenance hole pictured had a depth of 35m which is not unusual for trunks in the cities core areas.

Figure 2.0-3
Typical depths of access maintenance holes on large trunk sewers



9. The price of a constructing a new access maintenance hole is largely based on their required depth. For the large trunk system, sewer depths often exceed 15 meters below grade with some reaching as far down as 40 meters below grade. Many of the trunks with poor access provisions are the older, deeper trunks located closer to the city core. Since these older trunks are often also the highest risk trunks most of the current access maintenance hole candidates have typically had depth requirements exceeding 20 meters.

3.0 JUSTIFICATION

10. The Access Maintenance Hole Program is critical for managing several identified risk factors including health and safety, financial, and customer service disruptions. Without access to the sanitary system, the accumulation of odour causing sediments cannot be safely identified through inspection or remediated using cleaning technologies due to unsafe access. Safe access for inspections is critical to identify sources of H_2S, concrete corrosion, structural failures, and whether the line contains sags or deposits of sediment/fat that requires cleaning. To safely access the major trunk lines, technicians and robotic inspectors require maintenance holes that provide direct line of sight to the trunk, at distance intervals less than 500 m for the 1,200 mm to 1,800 mm trunk size and 800 m for larger than 1,800 mm. This allows for the safe navigation around major bends, weirs and drops. The Access Maintenance Hole Program is designed to provide those conditions at trunks with known odour issues across the city. The odours can impact quality of life for nearby residents and lead to reduced asset service life or unexpected asset failures by causing concrete corrosion. The premature aging of the sewer assets can result in customer service disruptions and require costly emergency repairs.

11. There are approximately 160 existing access maintenance holes in service on the 165 km of large trunk sewers. This indicates that on average, there is one access maintenance hole for every 1,000 m of large trunk. In addition, access maintenance holes are not consistently distributed along the large trunks, with some sections being properly provisioned and other sections having no suitable access at all.

12. The new access maintenance holes constructed to date under the CORe program have also been beneficial for trunk rehabilitation and emergency repair activities. The construction of two access maintenance holes in Empire Park not only allowed inspectors to identify structural failures in the connected trunk line prior to trunk line collapse but are also being used to support the on-going rehabilitation and repair activities. Two access maintenance holes recently completed in Brookside under the CORe program were used to support emergency repairs to the

Whitemud Creek trestle by providing safe access points to the trunk line immediately upstream of the trestle bridge.

4.0 PROGRAM SCOPE

13. The scope of the Access Maintenance Hole Program during the 2025 – 2027 PBR term includes construction of approximately 18 new access maintenance holes across the city, with roughly 6 scheduled per year. These access maintenance holes will be constructed along major large trunks with poor existing access that contributes to downstream sewer odour problems due to excessive sedimentation and debris accumulation. In addition to prioritizing locations on high risk trunks, candidate locations are chosen based on the following criteria:

- The trunk has been determined not to have sufficient access for inspections to be completed in a safe manner. According to the current design standards, maintenance hole spacing for large trunks should not exceed 500 m for 1,200 to 1,800 mm diameter trunks, and not exceed 800 m for trunks with diameters that exceed 1,800 mm. Spacing beyond these distances would be considered as insufficient access.
- The asset is a sanitary or combined trunk sewer of a diameter greater than 650 mm.
- Downstream H_2S concentrations exceed an average of 2 parts per million (ppm) over 24 hours or reach a peak concentration above 10 ppm at least once a day, or are suspected of reaching such concentrations if access is not available for monitoring.
- Sections of trunks with sharp bends, drill drop maintenance holes, or flat to negative slopes are given precedence as those specific features drastically increase access difficulty and are high risk areas for asset deterioration and odour nuisance.
- The location choice should consider access safety during construction, potential impacts to traffic and not conflict with nearby buried utilities.

14. The timing and location of candidates for access maintenance hole may change as understanding develops. Factors that alter candidate viability include surface access limitations, conflicting construction schedules (e.g. LRT, neighborhood renewal) and the presence of nearby buried utilities. The final selection strives to have maintenance holes placed in locations that are beneficial for both odour control and future rehabilitation needs to maximize the value of each maintenance hole.

15. Costs for each access maintenance hole project will vary depending on depth, geotechnical assessments, location, bypass, etc., and therefore the number that can be completed within the allocated budget will also vary.

5.0 ALTERNATIVES CONSIDERED

16. Current inspection and trunk cleaning technologies cannot effectively address the existing sewer system where long stretches of trunk sewer exist without proper access. Therefore, there are no viable "structural" alternatives for access maintenance holes.

5.1 Alternative 1 – Do Nothing

17. Doing nothing does not meet the CORe strategy objectives and is not an acceptable alternative because of the inherent risks inaccessibility pose to the existing system. The limited access conditions across the city prohibit safe inspection and cleaning activities and severely limits our understanding of the state of the sanitary and combined sewer network. Because of the limited access, proper planning to address sewer odour and corrosion issues is difficult especially in areas without easily identifiable point sources for odour, such as pump stations. For example, in communities such as Bonnie Doon, the limited access has made it difficult to identify all the sources of odour affecting the area. Providing reliable, safe, and regular access is a critical requirement for managing our existing system.

5.2 Alternative 2 – Decrease relative to the Proposed Plan

18. This alternative would reduce the number of access maintenance holes constructed under the program during the PBR term. While a decrease would reduce the impact to the rate payer in the short term, reduced investment would allow the limited access issues to remain while odours and corrosion continue to cause issues in the system. This could result in higher operational and maintenance costs, increased safety risks, as well as increased future rehabilitation costs for trunk sewers. Similar to the do-nothing option, this does not meet the strategy objectives and is not an acceptable alternative.

5.3 Alternative 3 – Increase relative to the Proposed Plan

19. This alternative would increase the number of access maintenance holes constructed under the program during the PBR term. Further accelerating investment in access maintenance holes would present resourcing and costing challenge that would be disproportionately larger than the resulting reduction in risk. The current rate of access maintenance hole construction is based on the capabilities of existing internal resources in EWS to engineer and execute the work.

To construct a larger number of access maintenance holes per year, external resources would need to be retained. Using external resources to construct access maintenance hole has typically increased the project costs by between 30 to 40%. Once sufficient access to the trunk is provided, inspections typically identify a need to clean and repair trunk sections. The recommended pace aligns with the operational and capital capacity to execute on the work identified once access to the trunk is made available.

6.0 COST FORECAST

20. Costs are estimated based on the reported costing for the most recently completed access maintenance hole projects from 2019 to 2023. The following assumptions were made to forecast the capital expenditures:

- Construction shaft depths are between 15 to 40 meters.
- Sufficient space is available for construction equipment.
- Access maintenance holes are designed and built using in house resources.
- The roads have moderate to heavy traffic requiring active traffic control provisions.
- Locations present on arterial or collector roads require coordination with the City of Edmonton for the duration of the road detour.
- The target trunk line requires only standard structural strengthening to support the access maintenance hole.
- Geotechnical investigations will be completed by external resources.

21. The scope of this program can be adjusted to remain within the budget targets, as some locations can be deferred to the next year.

Table 6.0-1
Access Maintenance Hole Program Capital Expenditure Forecast 2025-2027 ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	7.0	7.2	7.5	21.7

7.0 KEY RISKS AND MITIGATION PLANS

22. Table 7.0-1 provides key risks and mitigation plans associated with executing this program.

Table 7.0-1
Key Risk and Mitigation Plans for Access Maintenance Hole Program

Risk	Mitigation Plan
1. Health and Safety Risk - This project requires heavy construction activities that include, excavations, crane use, confined space entry and working in high traffic areas.	EWS's construction team will follow EPCORs best practices for ground disturbances and follow all safety procedures and plans. EWS will ensure that external contractors submit safety plans the meet or exceed EPCOR health, safety, and environment (HSE) requirements prior to commencing any work.
2. Risk of Customer Disruptions - During construction, the projects can have an impact on the neighborhood by causing disruptions to traffic, releasing sewer gasses, and making noise.	EWS will schedule activities to minimize all impacts and work may need to be adapted if unexpected conditions occur that can worsen impacts on neighbours and residents. EWS will ensure maintenance holes are designed to not act as egress points for odour, and the project must monitor upstream and downstream impacts
3. Financial Risk – Unknown geotechnical conditions, utility conflicts and poor trunk condition can increase the project cost. Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	EWS's design team will conduct desktop geotechnical studies during the design stage and commit to appropriate redesigns in advance when adverse geotechnical condition are anticipated. In the event of poor structural integrity of the trunk, additional project funding has been assigned to allow for moderate structural rehabilitation and support for the interface between the trunk and the new maintenance hole. The project will obtain information on all underground utilities during design stage and conduct hydrovac exposure to confirm utility locations EWS manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. The financial risks will become more evident as further design is completed and scope will be adjusted accordingly.

8.0 RESOURCES

4. All activities related to project management, inspections, assessment, design, and construction will be undertaken by internal EWS resources. External resources will be used for geotechnical assessments.

EPCOR WATER SERVICES

Appendix G-2

Business Case

DRY PONDS PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. Dry ponds are a critical element of EWS's Stormwater Integrated Resource Plan (SIRP) to mitigate flood risks across Edmonton. Using dry ponds, EWS is able to achieve flood mitigation objectives at a lower overall capital investment than seen with traditional engineering approaches. Dry ponds capture large volumes of stormwater within a neighbourhood during storm events and then release the stormwater slowly back into the existing piped storm trunk network after the storm event. This capture and release reduces the requirements for large sewer trunks to the river, and helps to prevent downstream flooding. For the 2025-2027 PBR term, the Dry Pond Program includes 11 active and planned dry pond projects at various stages of development at a forecast cost of $139.0 million. Of that total cost, $23.6 million is estimated to be covered by grant funding, resulting in net capital expenditures of $115.4 million.

2.0 BACKGROUND

2. The COE had been installing dry ponds throughout the city as part of the City-Wide Flood Mitigation capital program prior to the Drainage Utility transferring to EPCOR. The SIRP analysis, completed by EWS in 2018-19, reaffirmed that dry ponds are a recommended solution for the flooding risks in Edmonton and prioritized the ponds for future investment over the next 20 to 30 years. The SIRP Capital and Operational plan estimated $470 million in dry ponds would be implemented over that time period. Figure 2.0-1 provides examples of two completed dry ponds to provide context on the type of structures that are constructed as part of this program.

Figure 2.0-1
Dry Pond Examples

Parkallen

Steinhauer

3. EWS, together with the City of Edmonton (COE), successfully applied for federal grant funding for dry ponds under the federal Disaster Mitigation and Adaption Fund (DMAF) and in 2020 received a total of $43.6 million to complete 14 dry ponds. The 11 ponds covered within this business case are part of this DMAF funding. This funding applies to 40% of approved external costs, which will significantly reduce the cost to ratepayers over the next decade. As of early 2024, Parkallen, Steinhauer/Ermineskin and Parkdale have been completed.

4. As part of developing the SIRP strategy, EWS identified potential locations for future dry ponds and continues to work with City of Edmonton Open Spaces team to identify locations for safe storage of storm water during an extreme weather event. Each individual dry pond location typically requires three to four years to complete the conceptual design, detailed design, construction, and commissioning. While EWS manages each individual dry pond as a separate capital project, the individual projects are consolidated within this program in order to manage the overall program investment levels within the PBR term, manage project scheduling, and to optimize grant funding.

5. EWS worked with the COE Open Spaces team to review each of the proposed 14 dry pond locations funded under DMAF as required under the COE's Open Space Policy and in accordance with the Open Spaces Needs Justification and Assessment Reporting Procedure. The procedure includes a two phase review process with the COE and entities such as the school boards that use or own the open spaces. Phase one of the Open Spaces review process identifies any major constraints for the proposed development. Phase two of the Open Spaces review process identifies more specific recreational and joint use requirements to inform the detailed design of the dry pond. In 2020, phase one of the Open Spaces review process was completed for all potential dry pond locations identified in the SIRP strategy and the majority of the locations were confirmed to not have any major constraints. The phase two review process will occur for each dry pond once the conceptual design is completed in conjunction with the local community consultation activities that occur during this phase of the project.

3.0 JUSTIFICATION

6. The dry pond projects proposed within EWS's SIRP strategy are intended to mitigate and reduce flood risk in targeted high risk communities. Two aspects in particular drove the SIRP choice to include dry ponds as a major infrastructure upgrade. These aspects are:

i. the lower risk of sewer backups and basement flooding; and
ii. the reduction of ponding on the road after storm events.

7. Dry ponds, and additional storm pipe infrastructure, reduce the peak stormwater flows and reduce the volume of surface runoff entering the combined sewer system thereby lowering the risk of sewer backups and basement flooding. Dry ponds can remove large volumes of stormwater from the drainage system and reduce flooding risk within clusters of communities, in addition to providing benefits in other adjacent neighbourhoods.

8. Dry ponds mitigate a variety of risk categories:

- Health and Safety Risk – Basement flooding can put residents, contractors, and EPCOR employees at risk through contact with raw sewage and can affect the physical and mental health of the occupants. Surface flooding and street ponding increases risk of traffic accidents and injuries.
- Environmental Risks – Excessive combined flows could lead to floods and sewage spills, damaging and contaminating the natural environment. This can affect usage of facilities by the public, require substantial investment to restore the areas, and violate the Approval-to-Operate issued by Alberta Environment and Protected Areas (AEPA).
- Financial Risks – Surface flooding and basement backups from large storm events can be costly to manage and clean up and can lead to significant claims from customers.
- Service Disruption Risk – Surface ponding in localized sag areas during large storm events can cause water to access the sanitary pipes and/or foundation drains of properties without adequate flood proofing and enter the building, causing flooding and damage.

4.0 PROGRAM SCOPE

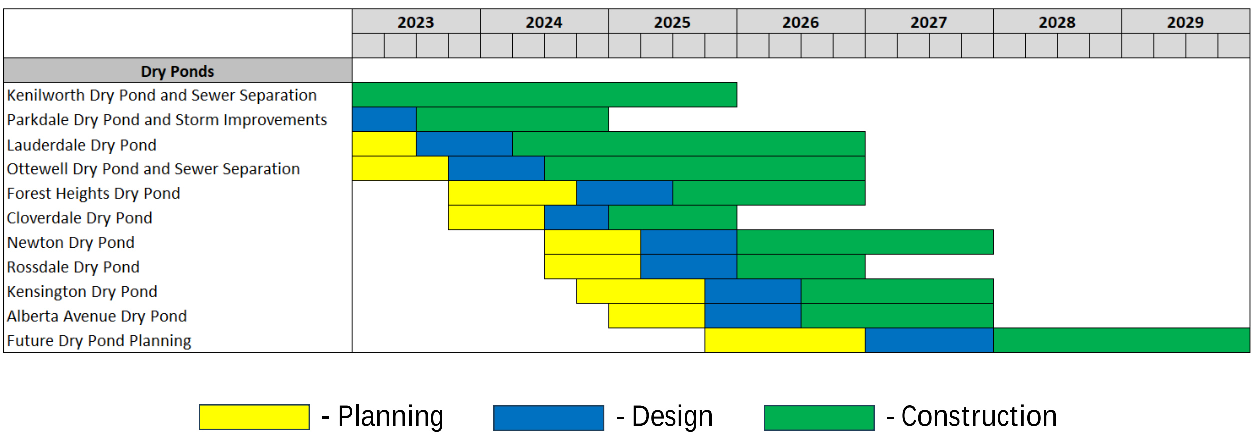
9. The dry pond locations have been prioritized and scheduled based on SIRP risk ranking and based on efficiencies in coordinating with other projects. Dry ponds located within higher flood risk areas are proposed to initiate earlier as they will have the greatest impact to reducing the flood risk throughout the city. For example, if EWS is able to work in coordination with a neighbourhood renewal project, project costs will be lower and the impact to the residents of the area will be reduced. This scheduling coordination plays an important role in delivery cost efficiency for the dry pond program. Typically, the infrastructure included within a dry pond project includes the dry pond, inlet and outlet structures, and neighbourhood storm piping to move the water to and from the pond.

10. Another important consideration for the scheduling of the program is managing the projects to meet overall annual program spending budget. Dry pond and storm separation projects have large capital expenditures, which can lead to years with significantly more capital

spend than others. To mitigate these variances, dry pond project timelines may be adjusted within the PBR period. For the 2025-2027 PBR term, EWS is planning to have a mix of dry pond projects at various stages of development in any one year to better manage project resources.

11. There are 11 known pond projects that will fall within the 2025-2027 PBR term. These projects will either be in planning, design, or construction, and by the start of the PBR term will have received approval or a Letter of Support from the COE as part of the Open Spaces phase two review process. In addition, there will be several projects that will initiate their phase two Open Spaces review and planning phase towards the end of the PBR term, however these locations have not yet been selected. Figure 4.0-1 shows the schedule for the 11 known ponds in the Dry Pond Program for the 2025-2027 PBR term.

Figure 4.0-1
Dry Pond Schedule (2023-2029)



12. As noted above, there are 11 scheduled dry pond projects that fall within the Dry Pond Program for the 2025-2027 PBR term.

12.1 *Kenilworth Dry Pond and Sewer Separation*
The Kenilworth Dry Pond will mitigate the high flood risk within the neighbourhood due to sewer surcharging and surface flooding. This project has completed the installation of separated sewers connecting to the existing system. The dry pond and underground storage at the school sites will commence in 2024, with neighbourhood piping to the west and south to be completed in 2024 and 2025.

12.2 *Lauderdale Dry Pond*
The Lauderdale neighbourhood is high risk due to sewer surcharging and surface flooding. Sewer separation construction will start in 2024 and will continue until 2026. Dry Pond construction is scheduled to commence in 2025 or 2026, depending on contractor schedules. This project has had many discussions with the COE regarding slopes and accessibility, and amenities.

12.3 *Ottewell Dry Pond and Sewer Separation*

The Ottewell neighbourhood is high risk due to sewer surcharging and surface flooding. Sewer separation construction will start in 2024 and will continue until 2026. Dry Pond construction is scheduled to commence in 2025. The project has been in contact with COE's Building Great Neighbourhood's (BGN) renewal since the initiation stage, and construction scheduling has been coordinated between the projects.

12.4 *Forest Heights Dry Pond*

The Forest Heights Dry Pond will work to mitigate the high flood risk due to sewer surcharging in the neighbourhood. The project land use justification report has been reviewed by the COE, and early design is progressing. Construction is projected to start mid-2025 and be complete by the end of 2026.

12.5 *Cloverdale Dry Pond*

The Cloverdale neighbourhood is high risk due to combined sewer surcharging and also surface flooding. The project will address some groundwater infiltration issues at the park space. The project land use justification report has been reviewed by the COE, and design is progressing. Construction is projected to be completed in 2025-2027 PBR period.

12.6 *Newton Dry Pond*

The Newton Dry Pond is planned to mitigate combined sewer surcharging and surface flooding in Newton and surrounding neighbourhoods. Newton is very high risk, and this project will reduce flooding risk in Newton and surrounding neighbourhoods by alleviating some of the capacity issues downstream. The project is currently in the concept validation stage. Construction of the project is expected to be completed by the end of 2027.

12.7 *Rossdale Dry Pond*

The Rossdale neighbourhood is high risk due to combined sewer surcharging, as well as riverine flooding. The dry pond project has been coordinating with both the COE's BGN and the River Crossing development projects. The project is currently undergoing concept validation review.

12.8 *Kensington Dry Pond*

This project will work to mitigate a high risk basin within the neighbourhood boundary, as well as high risk areas in the surrounding communities. This project could potentially reduce flooding on Yellowhead Trail by alleviating some of the capacity issues downstream within 107th Street Trunk. The project is currently in the concept validation stage.

12.9 *Alberta Avenue Dry Pond*

This project will work to mitigate a high risk basin within the neighbourhood boundary, as well as high risk areas in the surrounding communities. There is significant surface ponding in Alberta Avenue, in addition to widespread surcharging of the combined system. Targeted sewer separation and storage also work to mitigate these risks. This project will be coordinated with sewer separation projects in the neighbourhood.

12.10 *Future Dry Pond Planning*

EPCOR and the COE are currently evaluating alternative locations candidates for future dry pond projects and will start the concept validation review upon the selection of a future sites. The target communities will be examined to ensure that the flood risk reduction solutions are comprehensive and collaborative.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Nothing

13. Not implementing dry pond projects and related sewer separation would provide little to no flood mitigation for Edmonton high risk neighbourhoods. EWS would not be able to achieve the commitments set out in the SIRP strategy that was presented to City Council in 2019. Residents would see continued flooding during minor and major events. Additionally, there are financial risks associated with potentially not fully utilizing the DMAF grant funding if EWS is not able to complete the agreed scope of work prior to the timelines committed with the Federal Government.

14. EWS is regulated by AEPA and under approval to operate the collection system there is a commitment and requirement to reduce contaminant loading from collection system entering the river. Dry ponds and separated storm sewers reduce the volume of water going to combined sewer system, which will reduce the frequency of combined sewer overflow events as well as volume of combined sewer discharges resulting in overall contaminant loading reduction. Not proceeding with the ponds would require an assessment of additional measures at the outfall locations to meet the AEPA requirements. EWS chose to not proceed with this alternative given the above risks and its commitments to the COE, AEPA and its customers.

5.2 Alternative 2 – Delay Timing for Pond Investments

15. The overall capital investment during the 2025-2027 PBR term could be reduced by extending the timeframe to complete the high priority dry ponds. Under this alternative, EWS would still complete all of the proposed ponds within the 20-30 year period, however, some of the ponds would be shifted beyond the 2025-2027 PBR term. Under this alternative, dry ponds in the planning stage would not be initiated within the 2025-2027 PBR period and would be shifted to initiate in the 2028+ PBR at a higher level of investment that planned originally as part of the SIRP strategy. The risk with this approach is that ongoing flooding risks within high risk stormwater subbasins would continue, resulting in higher risk of property damage to residents. Additionally, there are financial risks associated with potentially not fully utilizing the DMAF grant funding if EWS is not able to complete the agreed scope of work prior to the agreed timelines

committed with the Federal Government. This alternative was rejected on the basis of this additional risk.

5.3 Alternative 3 – Grey Infrastructure

16. Without the ability to construct dry ponds throughout the existing urban area, the increased volumes of stormwater would require the construction of a significant network of stormwater trunks and new outfalls throughout the city. This alternative would require building wide-spread neighbourhood sewer separation, storm tunnels and outfalls. In some neighbourhoods, additional local pipe sewers would be installed to capture the peak storm volumes while limiting surface ponding of water. In the combined sewer areas, sewer separation would be completed. Additional outfalls would also be required. The COE had completed some preliminary estimates of implementing a grey infrastructure approach to manage storm volumes with cost estimates of up to $4.6 billion with an 80 year timeframe to construct due to the complexities of adding a new storm trunk tunnel network through the existing urban area. This alternative was not considered based on the much higher cost impact to ratepayers.

6.0 COST FORECAST

17. Cost estimates for active projects are based on detailed design construction estimates and/or tender prices. Cost estimates for pond projects where detailed design is not complete were developed based on historical costs from previously completed pond projects, an estimate for the area for each pond, and the following assumptions:

- No significant utility conflicts
- Standard construction methods and timelines will be applied
- Where sewer separation is required, a standard unit rate for the various lengths of sewers will be applied
- External consultants will be used during the extent of the project for design and construction support
- External contractors will be used for construction
- Consultant fees are based on previous projects, project complexity and construction costs
- Contingencies are based on project phase and complexity and range from 30-50%
- For projects where the dry pond location land is owned by Edmonton Public School Board, the estimated costs are based on previous pond acquisitions from this entity, as well as estimates from EPCOR's internal real estate group.

- Any land purchased for a dry pond will be owned by the COE with access rights provided to EWS
  for the dry pond operation and maintenance.

18. Table 6.0-1 provides the capital expenditure forecast for the Dry Pond Program for the 2025-2027 PBR term.

Table 6.0-1
Dry Pond Program Capital Expenditure Forecast 2025-2027 ($ millions)

	2025	2026	2027	Total
1. Total Capital Expenditures	43.6	66.6	28.8	139.0
2. Less: Grant Funding	11.5	11.3	0.8	23.6
3. Net Project Costs	32.1	55.3	28.0	115.4

19. Table 6.0-2 provides the capital expenditure forecast for the Dry Pond Program by pond project for the 2025-2027 PBR term. For each project, the source of the cost forecast is specified. Pond projects denoted with "(D)" indicate that costing estimates for the project are based on design construction estimates from consultants and project managers. Projects denoted with "(H)" indicate costing estimates that are using historical unit rates for dry ponds based on their conceptual size.

Table 6.0-2
Dry Pond Program Capital Expenditure Forecast by Project 2025-2027 ($ millions)

	2025	2026	2027	Total
POND PROJECTS				
1. Kenilworth Dry Pond and Sewer Separation (D)	8.2	-	-	8.2
2. Lauderdale Dry Pond (D)	11.9	20.5	-	32.4
3. Ottewell Dry Pond and Sewer Separation (D)	13.0	14.7	-	27.7
4. Forest Heights Dry Pond (H)	4.6	9.4	-	14.0
5. Cloverdale Dry Pond (H)	3.3	-	-	3.3
6. Newton Dry Pond (H)	0.6	6.0	17.5	24.1
7. Rossdale Dry Pond (H)	0.9	4.9	-	5.8
8. Kensington Dry Pond (H)	0.7	9.1	5.9	15.7
9. Alberta Avenue Dry Pond (H)	0.3	1.6	4.3	6.2
10. Future Dry Pond Planning (H)	0.1	0.5	1.1	1.7
11. Total Capital Expenditures	43.6	66.6	28.8	139.0
12. Less: Grant Funding	11.5	11.3	0.8	23.6
13. Net Project Costs	32.1	55.3	28.0	115.4

(D) – Cost forecasts are based on design construction estimates
(H) – Cost forecasts are based on historical costs

7.0 KEY RISKS AND MITIGATION PLANS

20. Table 7.0-1 provides a summary of key risks associated with executing the Dry Pond Program.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Execution Risk - Some dry pond project sites may have competing land requirements which may limit the development of a dry pond.	EWS has engaged with the COE as part of the Open Spaces Repurposing procedure. The initial review of the dry pond sites has been complete, with the majority of the sites not showing significant constraints. During project development and initiation, EWS drafts a land justification report which contains more detail than the initial review. Since dry ponds have the potential to change recreation amenities, neighbourhood greenspaces and trees, and have other community impacts, the justification report must be circulated across multiple departments and stakeholders for review prior to approval.
2. Execution Risk – There may be public resistance to the selected project sites	EWS will work engage with residents, community leagues, and users to ensure the need for the dry pond is understood. Coordination with the COE on construction phasing to be considered when necessary to maintain amenity access. EWS will identify additional or modified recreational amenities in the final design. EWS will undertake public consultation throughout the design process to get feedback and make changes to accommodate community needs. EWS will work with the COE to make the area appealing, inviting and part of the community open space inventory and aligned with the COE Breathe objectives for green spaces.
3. Financial Risk - Availability of DMAF funding. Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	EWS has put together a Grant Funding Committee to assist with development and delivery of grant funding. If projects are undertaken within proposed program timelines, then funding should be available. The committee also looks at additional grant funding opportunities from the Province as projects move into active construction phases. The activities in this program have been previously carried out, and a general understanding of the tasks and costs have been developed. Project costing is typically reviewed to ensure it aligns with assumptions and expectations. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.

8.0 RESOURCES

21. External consultants will be hired for each location for the extent of the project. They will assist with concept validation, preliminary and detailed design, as well as construction support. As an external cost, this should be applicable for DMAF reimbursement as DMAF funding is contingent on the use of external consultants and contractors. EWS will handle delivery of the project and will outsource construction services as per requirements of the grant funding. COE Open Spaces is a partner throughout the project, circulating project details for comments from various COE departments. EPCOR Communications and Public Engagement team will be working with the project from concept development stage until project completion and has been budgeted for as an operating cost.

EPCOR WATER SERVICES

Appendix G-3

Business Case

PRIVATE DEVELOPMENT CONSTRUCTION COORDINATION PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. The Private Development Construction Coordination Program is an annual program that includes costs to support the planning and development processes and facilitate the construction of new wastewater collection infrastructure by private developers. The costs in this program cover EPCOR Water Service's (EWS) and the City of Edmonton's (COE) costs for staff to review land development applications, technical reports, and design drawings, and EWS's cost to complete inspections and record as-built drawings. This program also covers the COE's costs to administer the Permanent Area Contribution (PAC) system and other drainage cost sharing levies. The COE's personnel costs are paid for by EWS under the terms of the Urban Form and Corporate Strategic Development Services Agreement (SLA), and a portion of those costs are subsequently capitalized by EWS. A total spend of $16.1 million, exclusive of recoveries from inspection fees, is expected over the 2025-2027 PBR term.

2.0 BACKGROUND

2. This is an annual program that supports land planning and development processes. Land development in Edmonton is driven by developers who utilize consultants and contractors to plan, design, and construct drainage infrastructure which is then turned over to EWS as contributed assets under the COE's Servicing Agreement process. This program is essential to the development of the drainage system in alignment with EPCOR's long-term plans and to support future urban development with consideration for the requirements of system operations and maintenance. As EWS will assume ownership of these assets upon completion, it is essential that EWS be involved throughout the planning, design, and construction process.

3. Throughout the development process, various applications, technical reports, design drawings, and other documents are submitted for review and acceptance from a wastewater utility perspective. EWS and the COE collaborate on these processes, as outlined in the Urban Form and Corporate Strategic Development Services Agreement. EWS performs inspections during and after construction, completes acceptance certification, and records as-built information. In addition, the COE administers development levies for the cost sharing of new infrastructure designed to provide additional capacity to support future development between benefiting landowners.

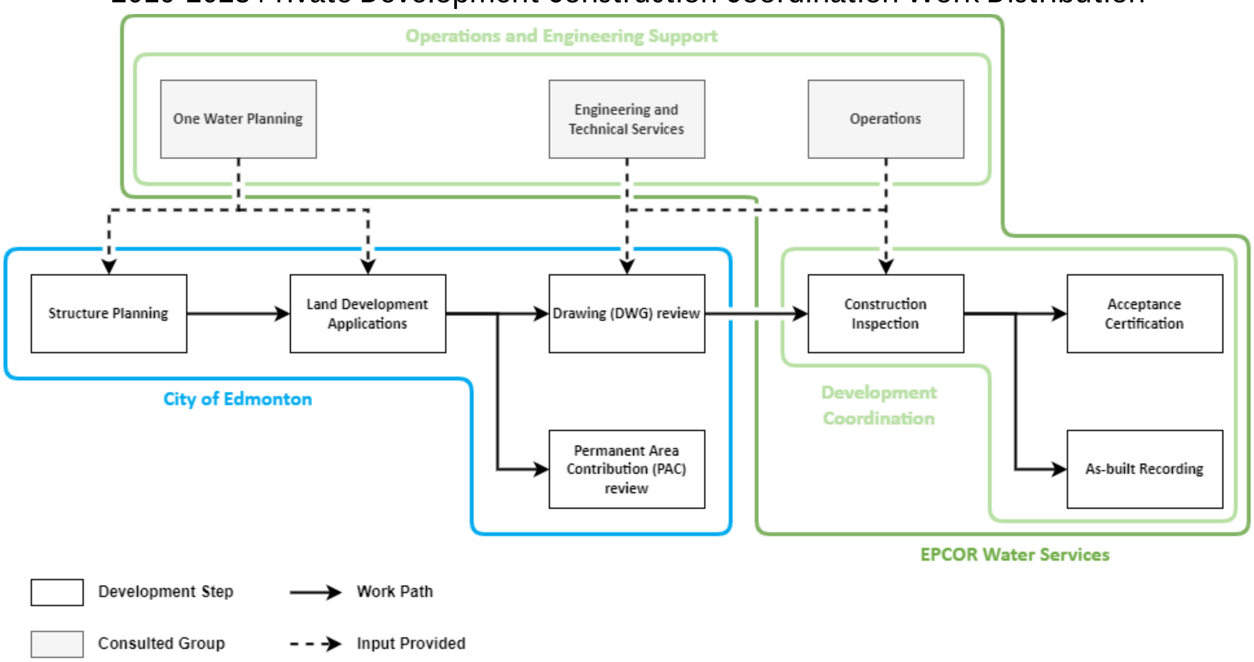
3.0 JUSTIFICATION

4. This program funds activities that are required to ensure that new developments are designed and built with infrastructure that is suitable to support future development objectives and that can be operated and maintained for its intended lifespan. It also ensures that infrastructure is recorded accurately in EWS's Geographic Information System (GIS). This program ultimately facilitates the growth of the drainage network and EWS's customer base.

4.0 PROJECT/PROGRAM SCOPE

5. The activities associated with this program are outlined in Figure 4.0-1. These activities are distributed between the COE and EWS. The COE completes Structure Planning, Land Development Application, and Engineering Drawing Review, with input from EWS teams as requested. COE also administers the Permanent Area Contribution program. EWS completes construction inspections and issues acceptance certifications as part of the integration of new drainage infrastructure into the EWS network as contributed assets.

Figure 4.0-1
2019-2023 Private Development Construction Coordination Work Distribution



6. This is an annual program beginning on January 1st and ending on December 31st each year.

5.0 ALTERNATIVES CONSIDERED

5.1. Alternative 1 – Do nothing

7. One alternative is to not complete any type of review, inspection, or recording activities for private development projects. This would mean relying entirely on the engineer who designs and certifies on behalf of the developer that the infrastructure is constructed in accordance with the standards. Without EPCOR's participation in the COE's planning and development processes, the quality, integrity, and reliability of privately constructed drainage infrastructure would be jeopardized, as well as compliance with regulations, standards, and environmental requirements. Operational and maintenance costs would increase due to improper planning, design, and installation of drainage infrastructure. In addition, the orderly sequential development of the drainage system could break down, making it difficult or inefficient to service future subdivisions. This would ultimately lead to negative impacts on EPCOR's finances, operation, and reputation.

5.2. Alternative 2 – Reduced Involvement

8. A second option is to reduce EWS's involvement in the development process. This would be achieved by reducing involvement during the structure planning, land development application, and engineering drawing review stages, relying on the COE to provide those services. Further reductions could be achieved by reducing the involvement during infrastructure construction and removing operational support from the inspection system. EWS's only involvement would be for certification inspection and the issuance of acceptance certificates. This increases the potential for longer term operational and maintenance concerns not being addressed early in the process, resulting in increased costs for either EWS or the development industry for rectification of impacts to customers. This option has been rejected.

5.3. Alternative 3 – Third-Party Reviewers

9. The option to rely on a third-party engineers is not considered viable in Edmonton due to the volume of submissions, our approval to operate, and the potential for issues with consistency if the hired firm were to change year over year. EWS would risk losing institutional knowledge and control over the quality of submissions and the infrastructure as it would be entirely dependent on the consulting firm. This option has been rejected.

6.0 COST FORECAST

10. This program has been in operation for six full calendar years, starting after Drainage Services was transferred from the COE to EPCOR in September 2017. The actual costs and recoveries for 2019 through 2023 are broken down as shown in Table 6.0-1.

Table 6.0-1
2019-2023 Private Development Construction Coordination Program Costs ($ millions)

Year	COE Activity Costs	EWS Costs (salaries, mileage, overhead, etc.)	Recoveries (Inspection Fees)	Total
1. 2019	$2.2	$1.6	($0.2)	$3.6
2. 2020	$2.1	$1.5	($0.3)	$3.3
3. 2021	$2.1	$1.9	($0.2)	$3.8
4. 2022	$2.3	$2.4	($0.3)	$4.4
5. 2023	$2.5	$2.0	($0.9)	$3.6

11. Program costs were determined using historical internal and external data. Internal EPCOR hours, shown as equivalent FTE values, are shown in Table 6.0-2. Program hours by job type were analyzed and applied to the PBR term. External costs related to Service Level Agreement transfers for services provided by the COE are estimated at $2.3 million per year. The historical COE FTE equivalents are shown in Table 6.0-2 and cost allocation information is presented in Table 6.0-3.

Table 6.0-2
2019-2023 Private Development Construction Coordination Resources (FTEs)

Activities (Year)		2019	2020	2021	2022	2023	5-year avg
Activities completed by EWS[1]							
1.	Program Coordination	0.5	1.0	1.3	1.8	1.8	1.3
2.	Field Construction Inspection	4.5	4.8	5.3	6.5	5.3	5.3
3.	Operational support for inspection activities	0.8	0.3	0.8	0.3	0.3	0.5
4.	Operational support for engineering review	0.8	0.8	1.3	1.3	1.0	1.0
5.	Land administration services	0.3	0.3	0.3	0.3	0.3	0.3
6.	Infill Water and Sewer Servicing support	0.5	0.3	0.3	0.5	0.3	0.4
7.	As-built recording	2.3	1.5	1.8	2.3	2.0	2.0
	EWS total	8.8	8.0	10.0	12.8	10.0	10.0
Activities completed by COE							
8.	Land development application (LDA) review	6.2	5.1	4.9	4.9	4.9	5.2
9.	Drawing (DWG) review	8.8	8.0	8.0	8.0	8.0	8.2
10.	Permanent Area Contribution (PAC)	3.8	4.4	4.4	4.4	4.4	4.3
	COE total	18.8	17.5	17.3	17.3	17.3	17.6
	Total effort	27.6	25.5	27.3	30.1	27.3	27.6

[1] An FTE is assumed to be 2000 hours/calendar year

Table 6.0-3
2019-2023 COE Service Level Agreement Transfer Allocations ($ millions)

Year	Allocation	1. Edmonton Service Center Public Services	2. Sanitary Servicing Strategy Fund Management	3. Land Development Applications (LDA)	4. Drawing Review (DWG)	5. Permanent Area Contribution (PAC)	6. Planning Administration	Total Allocation
2019	Program Portion	-	-	$0.7	$1.0	$0.5	-	$2.2 (61%)
	Other Capital Portion	-	$0.3	-	-	-	-	$0.3 (8%)
	Operating Portion	$0.1	-	$0.8	-	$0.1	$0.1	$1.1 (31%)
	Task Total	$0.1	$0.3	$1.5	$1.0	$0.6	$0.1	$3.6 (100%)
2020	Program Portion	-	-	$0.6	$1.0	$0.5	-	$2.1 (64%)
	Other Capital Portion	-	$0.3	-	-	-	-	$0.3 (9%)
	Operating Portion	$0.1	-	$0.6	-	$0.1	$0.1	$0.9 (27%)
	Task Total	$0.1	$0.3	$1.2	$1.0	$0.6	$0.1	$3.3 (100%)
2021	Program Portion	-	-	$0.6	$1.0	$0.5	-	$2.1 (64%)
	Other Capital Portion	-	$0.3	-	-	-	-	$0.3 (9%)
	Operating Portion	$0.1	-	$0.6	-	$0.1	$0.1	$0.9 (27%)
	Task Total	$0.1	$0.3	$1.2	$1.0	$0.6	$0.1	$3.3 (100%)
2022	Program Portion	-	-	$0.6	$1.2	$0.5	-	$2.3 (66%)
	Other Capital Portion	-	$0.2	-	-	-	-	$0.2 (6%)
	Operating Portion	$0.1	-	$0.7	-	$0.1	$0.1	$1.0 (28%)
	Task Total	$0.1	$0.2	$1.3	$1.2	$0.6	$0.1	$3.5 (100%)
2023	Program Portion	-	-	$0.6	$1.3	$0.6	-	$2.5 (68%)
	Other Capital Portion	-	$0.2	-	-	-	-	$0.2 (5%)
	Operating Portion	$0.1	-	$0.7	-	$0.2	$0.1	$1.0 (27%)
	Task Total	$0.1	$0.2	$1.3	$1.3	$0.8	$0.1	$3.7 (100%)

12. Program recoveries come solely from Inspection Fees paid by developers when they enter into servicing agreements with the COE. The amount of revenue is dependent on development activity levels, which is linked to market conditions and fluctuates each year. However, there is also potential for different types of growth and a certainty of development upon economic rebound. Edmonton has diversified as a city over the last 5 years, with expanding development within regions within the city boundary along with redevelopment in mature neighbourhoods.

13. Recoveries varied significantly over the 2019 to 2023 period with 2023 being an anomalous year. This was due to a delay in recovery remittance for the previous years and the

associated transfer of funds occurring in 2023. Recoveries have been estimated based on the level of development activity seen over the past five years and the corresponding program utilization, adjusted for the anticipated development activity within the PBR term. The pace of development remains uncertain, therefore an estimate of $312,000 was used.

14. Forecast capital expenditures and contributions for the 2025-2027 PBR term are shown in Table 6.0-4.

Table 6.0-4
Private Development Construction Coordination Program Capital Expenditure Forecast
($ millions)

	2025	2026	2027	Total
1. Total Capital Expenditures	5.2	5.4	5.5	16.1
2. Contributions (recoveries)	(0.3)	(0.3)	(0.3)	(0.9)
3. Total Project Costs	4.9	5.1	5.2	15.2

7.0 KEY RISKS AND MITIGATION PLANS

15. Key risks and mitigation plans associated with execution of this program are described in Table 7.0-1.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Execution Risks - A key execution risk is the possible lack of adequate staffing to handle workloads, particularly when complex situations or issues arise.	On a regular basis, EWS will carefully monitor resource and work levels and adjust as necessary.
2. Third Party Risks – the extensions of the drainage system are completed by third party contractors. There remains a risk of cross-connections between the sanitary and stormwater systems and of releases of detrimental substances to the environment.	EWS construction inspectors are on site on a regular basis to adequately assess the activities and associated risks and provide direction to mitigate the risks to the existing system and the environment. Contraventions result in immediate stoppage of work, and internal forces are used for remediation and risk control
3. Financial Risks - The number of submissions and construction projects is under the control of developers and consultants, who are under the influence of market conditions. Costs and revenues can fluctuate if market conditions vary.	The activities in this program have been previously carried out, and a general understanding of the tasks and costs have been developed. EWS will monitor costs and revenues each month as part of its regular capital management and governance processes with an effort to manage any anticipated cost increases.

8.0 RESOURCES

16. Internal EWS resources as well as COE resources will be used for the execution of this program.

EPCOR WATER SERVICES

Appendix G-4

Business Case

LOW IMPACT DEVELOPMENT PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. The Low Impact Development (LID) Program will construct and design LID installations throughout Edmonton on both public property and privately-owned commercial, industrial, and institutional properties in alignment with the Stormwater Integrated Resource Plan (SIRP) strategy. Implementation involves significant coordination with both the City of Edmonton (COE) and private owners of industrial and commercial property where LID installation will support the overall system. LID is a critical element of EWS's SIRP strategy to mitigate flood risks across the city. LID provides another strategy to achieve climate change adaptation and to maintain and improve the health of the local creeks and the North Saskatchewan River (NSR). The SIRP Capital and Operational plan estimated $480 million in LID would be implemented over the next 20 to 30 years.

2. The LID Program includes forecast capital expenditures of $51.3 million for the 2025-2027 PBR term.

2.0 BACKGROUND

3. LID installations and small storage are a part of the SLOW theme of the SIRP strategy. SIRP is a system wide integrated approach to mitigate flood risk by reducing the health, safety and social risk of flooding with lower overall capital investment than compared to traditional engineering approaches. SIRP recommended a five theme strategy for flood mitigation (SLOW, MOVE, SECURE, PREDICT and RESPOND) that included a mix of grey infrastructure (trunks and tunnels) and green infrastructure (dry ponds, low impact development). The SLOW theme refers to slowing the entry of stormwater into the sewer system, groundwater or surface waters by collecting it in small storage infrastructure and absorbing it in green infrastructure, such as LID, creating space in the collection system during storm events. LIDs incorporate vegetation, engineered soils and natural processes into the built environment to manage stormwater, mitigate the impacts of climate change and to maintain healthy and sustainable communities. Green infrastructure was first advanced as a component of stormwater management and flood risk mitigation over 25 years ago, and today it is applied in communities across North America.

4. In developing the SIRP strategy, EWS studied storm patterns in the Edmonton region. The decision to incorporate green infrastructure was driven by two main factors: the significant impact of ponding on roads after storms, and the fact that most storms in Edmonton are small, with intense events affecting smaller areas over a short duration. Edmonton's storms are often localized and intense, surrounded by less intense rainfall. LID is effective in capturing lower water

volumes in the storm's periphery, helping pipes and ponds handle the intense core of the storm. City-wide LID implementation can divert runoff from most rainfall-affected areas, reducing the impact on the collection system.

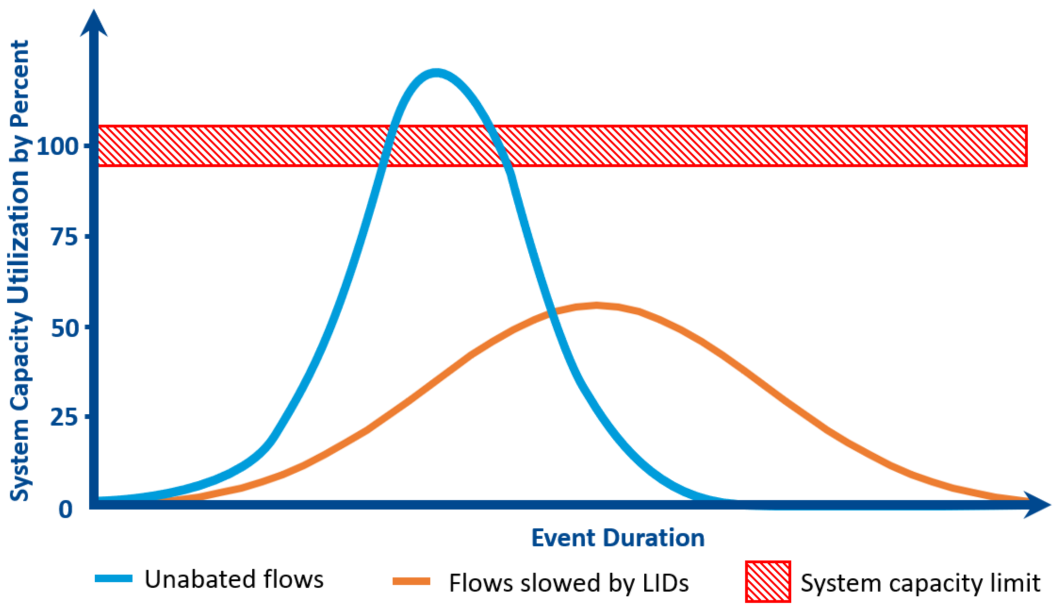
5. Green infrastructure installations have two primary functions for flood mitigation - retention and detention. Retention allows surface runoff to infiltrate into the specialized soils to be used by plants or to evaporate. Detention allows a delayed release of the remainder of stormwater runoff into the sewer system, thereby reducing peak stormwater flows and the demand on sewer infrastructure.

6. EWS developed the SIRP Risk Framework for a number of stormwater catchment areas within the city and identified approximately 1,392 sub-basins. These sub-basins were then risk ranked based on urban and riverine flooding hazard levels using four perspectives: social, financial, health and safety, and environmental. EWS is recommending investment in LID for each sub-basin based on previously completed engineering studies, additional data/information analysis and system wide assessment for hydraulic feasibility. EWS will continue to develop these strategies to overcome barriers to implementing LID, ensure cost effectiveness of implementation, and provide positive impacts to local communities. These efforts include partnering with the COE and private property owners.

3.0 JUSTIFICATION

7. Implementation of LID within SIRP sub-basins will reduce the flood risk levels of those areas as the LID reduces peak flows so that the system doesn't become as inundated during a rain event. This is conceptually illustrated in Figure 3.0-1. For both conventional system designs and those employing LIDs, the same volume of storm water is handled and conveyed by the storm water collection system. However, by slowing the storm water down using LIDs, the duration of the event in the collection system is increased given the system more time to handle the flows and greatly diminishing the peak flows experienced by the system.

Figure 3.0-1
Conceptual representation of capacity impacts from using LIDs



8. Beyond contributing to the SLOW theme of SIRP, LID implementation also aligns with the Integrated Watershed Management Strategy (IWMS) and supports the Wastewater Integrated Resource Plan (WW IRP). While LID installations are climate change adaptation measures, they also provide supplementary benefits. LID implementation has the ability to both improve water quality and reduce inflow and infiltration into the system. Water quality benefits come from green infrastructure's ability to manage surface runoff at the source, reducing the volume of water released. The engineered soil and vegetation promote natural processes to capture, absorb and filter the water. Water that isn't captured within the LID facility is filtered, removing solids and other contaminants from the runoff before it leaves the facility. In addition, LID can be more cost effective over its life span compared to conventional grey stormwater infrastructure such as sewer pipes, ditches, swales, and larger storm water management facilities.

9. LID meets multiple land development and stormwater management objectives and is becoming more common throughout North America as measures to adapt to climate change. Continued implementation of this program will help to meet the SIRP flood risk reduction targets, support EPCOR's commitment to climate change adaptation, and maintain and improve NSR health.

4.0 PROGRAM SCOPE

10. The scope of this program includes design and construction of LID installations throughout Edmonton, with a focus on COE-led projects. The COE-led LID projects will work in conjunction with the COE's ongoing projects and programs, such as Building Great Neighbourhoods (BGN) or the Urban Planning and Economy programs. These LID are typically installed within the Public Right of Way or installed with COE owned land holdings including open spaces and publicly accessible COE facilities. At any one time, there can be about 15 to 25 ongoing LID projects in progress, all at various stages. In addition to the COE-led LID projects, there will also be several EPCOR-led projects included in the program as well. These projects will focus on LID installations on both private and public parcels of land or areas with flooding concerns to provide additional stormwater storage from the property and surrounding areas including public roadway.

11. The scope of work will include the following:

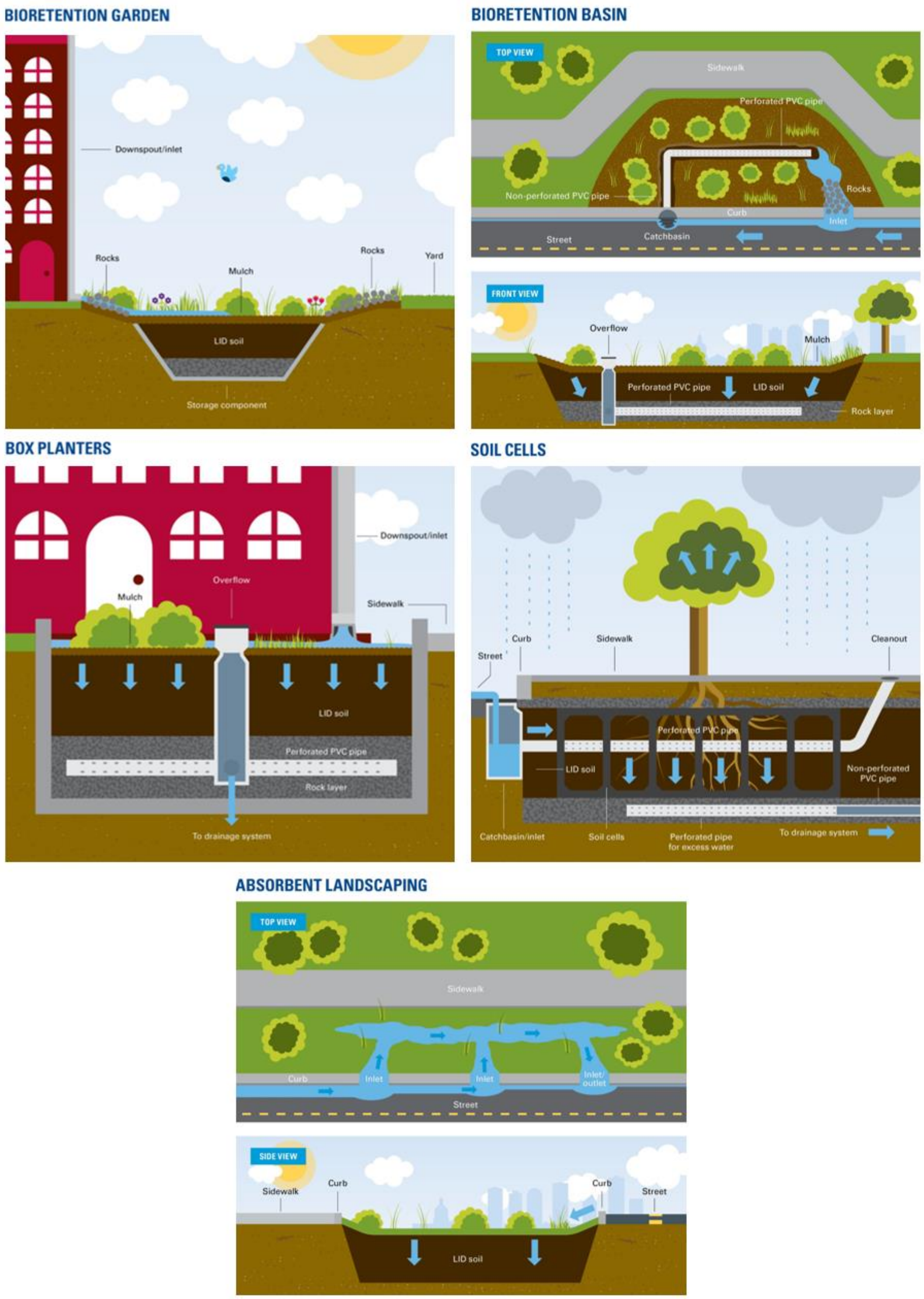
- Liaising and coordinating with COE departments and customers for LID development and inclusion within programs/properties.
- Developing concept designs including identification and delineation of potential LID locations, calculation of catchment areas and imperviousness, storage provided by LID, type of LID installation, cost-benefit analysis, and identifying general constraints (such as utilities and existing trees).
- Developing preliminary designs including preliminary layouts of each proposed LID feature, drawing packages, refinement of calculations such as storage capacity, runoff volume reduction, and peak flow attenuation and reduction, cost estimates for construction, and stakeholder engagement.
- Developing detailed designs including detailed grading plans, planting plans, profiles/cross sections, details, specifications, and refined calculations.
- Construction, construction management, inspection, and commissioning of LID.

12. As of now, specific sites for the 2025-2027 PBR term have not been determined. Outreach and communication efforts with the COE and other customers and partners will be ongoing to identify appropriate locations.

13. Within the scope of this program is the construction and addition of LID systems that provide storage, slow down storm flows, and overall reduce flood risk. These can include but are not limited to bioretention gardens, bioretention basins, box planters, soil cells, absorbent

landscaping, permeable pavement, soakaway pits, small scale storage, and green and blue roof conversions so long as storage benefits can be demonstrated and quantified. Some examples of LIDs are illustrated in Figure 4.0-1.

Figure 4.0-1
Examples of Some Types of LID Installations



14. LID designs on private parcels require to be approved by EWS prior to commencement of their construction. EWS funds the portion of storage that the LID provides in exceedance of the storm water management requirements of the site.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Nothing

15. Not implementing LID infrastructure would require implementing an approach similar to the COE's original Flood Mitigation Strategy. Grey infrastructure would collect and divert more runoff to the collection system, moving problems from one area to another as the overall system capacity would not improve. Adding more pipes without retaining volume at the source would not help with system capacity and would also bring faster and cause more environmental damage to natural watercourses such as creeks and the NSR.

16. EWS operates under the regulatory oversight of Alberta Environment and Protected Areas (AEPA), and as part of its approval to operate the collection system, there is a commitment and requirement to decrease solids loading from the system entering the river as part of our IWMS. Implementation of green infrastructure will help to mitigate and reduce these loadings through volume reduction by natural processes such as plant absorption and infiltration, along with the retention and treatment of runoff at its source, ensuring that EWS remains compliant with its total loading objectives. The additional capacity in established areas, particularly those with combined sewer service, aligns with COE infill targets and aids in minimizing both the frequency and volume of combined sewer overflow occurrences. Reaching EWS's SIRP and Total Loadings Plan targets would be unattainable with the do nothing alternative.

5.2 Alternative 2 - Installation of LID in Public Road Right of Way and Public Lands Only

17. Based on the COE land use report, "Roadways" only make up about 4% of the city's area, therefore it would be very difficult to meet SIRP targets using only Public Road Right of Way and Public Lands. LID construction within Public Road Right of Way without working in conjunction with the COE would be very disruptive to the public. The current program pairs LID construction with urban/neighbourhood renewals to minimize this disruption. To execute this program in conjunction with COE projects, EWS must rely heavily on the COE and must work within the scope and confines of their renewal projects.

5.3 Alternative 3 - Installation of LID on Private Properties Only

18. Based on the COE land use report, “Commercial” and “Industrial” properties make up 11% of the city’s area and are primarily impervious areas. Installation of LID facilities on Commercial/Industrial properties can be completed in some cases minimal disturbance to the public. However, it would be very difficult to meet the main SIRP objective of flood mitigation if funding was only allocated to Commercial/Industrial properties. The capital spend is therefore being limited to between $2.0 to $3.0 million per year, with additional support being proposed as a stormwater rebate program beginning in the 2025-2027 PBR term. This rebate would be an operating expense.

5.4 Alternative 4 - Installation of LID on Public and Private Properties

19. Installation of LID facilities in conjunction with a number of COE programs as well as through EPCOR-led projects in cooperation with private commercial/industrial/institutional customers allows EWS to more effectively and efficiently plan LID facilities moving forward. The increased options provide more flexibility to invest dollars into areas that offer more benefit to the storm and combined system. The increased flexibility also provides the greatest opportunity to meet environmental and SIRP targets. Where possible, the LID program will be coordinated with capital projects with surface works such as dry ponds and outfall rehabilitation. This is the recommended alternative. Its pace of installation addresses the identified needs to reduce the present flood risk and capacity constraints in the storm and combined sewer system.

6.0 COST FORECAST

20. The total forecasted expenditure for the 2025-2027 PBR term is $51.3 million. The number of sites completed will vary depending on the scope of the projects. Factors that may influence this include the size and number of LID facilities constructed for each project, catchment area, ease of installation, and LID type. The COE-led projects are assumed to be completed almost entirely externally for both design and construction, as typical projects coordinated with the COE are contractually managed by the COE. EPCOR-led projects will be completed with a mix of both internal and external resources for both design and construction.

21. Table 6.0-1 provides the forecast for the LID program for the 2025-2027 PBR term.

Table 6.0-1
LID Program Capital Expenditure Forecast 2025-2027 ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	17.6	16.6	17.1	51.3

22. Table 6.0-2 provides a breakdown of costs for the COE-led projects and the EPCOR-led projects.

Table 6.0-2
LID Program Capital Expenditure Forecast 2025-2027 Breakdown ($ millions)

	2025	2026	2027	Total
1. COE-Led Delivery	15.6	14.6	15.0	45.2
2. EPCOR-Led Delivery	2.0	2.0	2.1	6.1
3. Total	17.6	16.6	17.1	51.3

7.0 KEY RISKS AND MITIGATION PLANS

23. Table 7.0-1 summarizes the key risks and mitigation plans associated with this program.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Risk of Limited uptake by commercial/industrial property owners - As this is a relatively new program, there is a risk that none of the identified properties will agree to be part of the program. Although EPCOR is funding design and construction of the LID, there will always be some impact to the property that the site owner(s) will have to agree to.	• Developing a list of potential sites using streamlined tools such as FME • Developing key messaging around LID and agreements to better communicate EPCOR's needs • Reaching out to partners such as the COE's BIA resources and other programs such as the cornerstore program to help communicate about EPCOR's LID program and the benefits of LID • Education, networking and presentations to communicate about LID to a wider audience
2. Construction Risks - Risk of utility conflicts, bad soil conditions/high groundwater table, restoration requirements, lack of space, and conflicts with other construction projects.	• Started designing LID earlier in the project • Regular touchpoints/meetings with project teams • Hold lessons learned each year, and improve procedures and processes, such as getting survey earlier in the project and completing hydrovac in areas of utility congestion
3. Financial Risk - Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing. Further change orders or unknown conditions that cannot be seen until demolition is complete	• The activities in this program have been previously carried out, and a general understanding of the tasks and costs have been developed. Project costing is typically reviewed to ensure it aligns with assumptions and expectations. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency

	budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.

8.0 RESOURCES

24. For LID projects initiated and led by COE, the program will be run according to the Memorandum of Understanding between EPCOR and the COE. The COE's Project Development and Delivery Model will be used to manage and implement projects. EWS will work closely with the COE to manage scope and forecasts, in addition to monitoring forecasts and spending.

25. For LID projects initiated and led by EWS, a combination of internal and external resources will be used for both design and construction. Internal resources will be used to manage implementation, construction, and contract management, up to and including project close-out. The existing Master Service Agreements (MSA) can be leveraged for design and both drainage works and surface restoration.

EPCOR WATER SERVICES

Appendix G-5

Business Case

DRILL DROP MAINTENANCE HOLE RENEWAL PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. The Drill Drop Maintenance Hole (DDMH) Renewal Program is an annual program to systematically rehabilitate or replace failing DDMH which are small diameter shafts extending from the ground surface into the deep trunk sewer. These assets were built at time of the trunk line construction using corrugated metal pipes (CMP) or cast iron (CI) pipe that are highly susceptible to corrosion, and many are beyond their expected life. The scope includes inspections, risk assessment, prioritization, design, and construction of the DDMHs. During the 2025-2027 PBR term, this program is forecast to complete 18 DDMHs full replacements with a total capital spend of $29.8 million which contributes to reducing the overall risk of significant failure of these structures.

2.0 BACKGROUND

2. DDMHs were constructed as equipment or emergency access points during tunneling construction of deep trunk sewers. They are small diameter shafts extending from the ground surface into the trunk sewer and housed power cables, lighting, and ventilation systems during construction of the sewer. Many were left in place following completion of the trunk instead of being properly abandoned, and numerous DDMHs were subsequently utilized as receiving maintenance holes for local sewers. CMP and CI are prone to corrosion, and only have a typical lifespan of 30-40 years. Consequently, many of the DDMHs are beyond their expected life.

3. The Drill Drop Renewal Program was originally initiated in 2006 to address the risk of failure of these maintenance holes. Records indicate that approximately 300 DDMHs existed in the drainage system at that time. In December 2020, a comprehensive risk-based inspection plan was developed to get a baseline condition on the entire DDMH inventory. Closed Circuit Televising (CCTV) is required to determine condition of the assets, and since 2020, nearly all of the asset category has had a baseline inspection completed. Through rehabilitation, replacement, and abandonment work, the DDMH inventory has reduced from approximately 300 to 233 DDMHs.

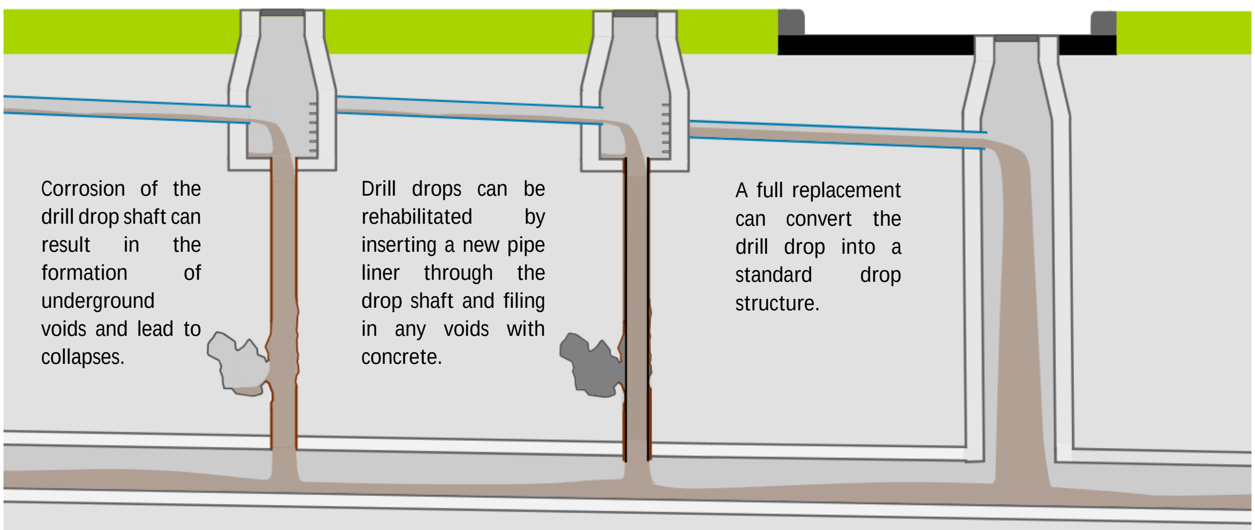
4. There are three methods used for DDMHs:

1) Full Replacement – This method must be used where the DDMH is in such poor condition and no viable rehabilitation option is available. Functionality can also be the driver for full replacement if there are a number of sewer connections present, and if there is a risk of back-ups or inability to remove an obstruction.

2) Rehabilitation (Relining) – This includes options such as slip lining or cured in place pipe and cannot be used where there are side connections to the trunk or if the DDMH is corroded away. This method reduces the hydraulic capacity of the DDMH.
3) Abandonment – If there are no connecting local sewers into the DDMH, and the location is not required for trunk access, the DDMH can be abandoned.

5. The method for each DDMH will be selected based on its structural integrity, connection type to the trunk, access points, and other engineering considerations. Figure 2.0-1 shows both the rehabilitation and full replacement options for DDMH.

Figure 2.0-1
DDMH Rehabilitation and Replacement



3.0 JUSTIFICATION

6. DDMH failures can lead to roadway subsidence or sinkhole formation, resulting in public safety and traffic impacts, flooding, environmental spills, and costly emergency repairs. A notable example of a failure was at a location on Allendale Road and Calgary Trail in August of 2018. Upon inspection, it was determined that from 16 m below ground to the trunk sewer, 7 m of the CMP maintenance hole was missing and a large void had formed. Where the DDMH previously connected to the trunk sewer, a hole remained and within several days, settlement of the road surface was seen in the wheel path of vehicles. The location is a very busy intersection and therefore a high safety risk to the public and also caused major traffic disruption in the area. As this DDMH is part of the combined system, the failure allowed for flow of untreated wastewater

to the soil in the surrounding area. The total cost of emergency repairs was $3.5 million, and the work took 16 months to complete.

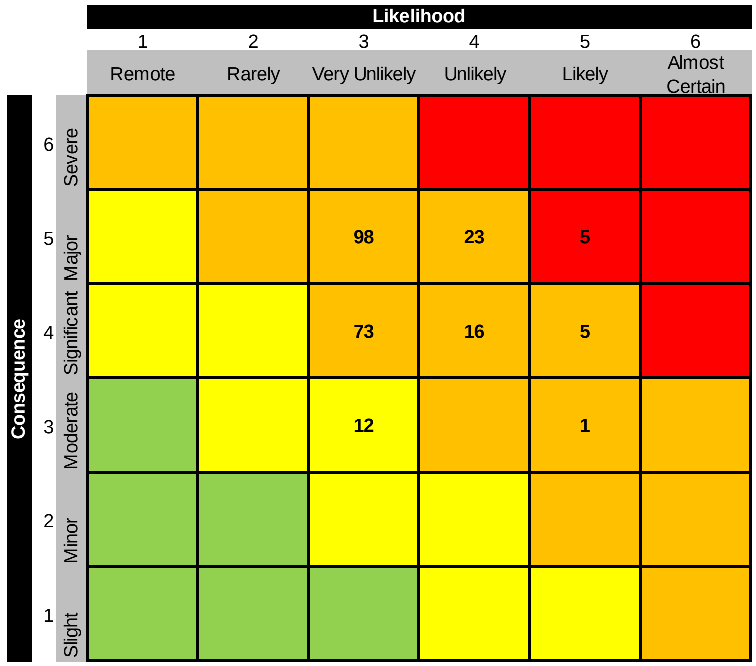
7. Another recent example is of the DDMH at Calgary Trail and Saskatchewan Drive on a combined trunk. While a large hole and visible void were initially discovered through proactive inspections, it escalated into an emergency project when the bottom of the existing DDMH collapsed, causing flow backups and the release of untreated wastewater into the surrounding soil. The response required multiple costly bypasses, clearing of debris from the collapse, and filling of several large voids. Given its location, the project was highly disruptive to traffic and the local community, negatively impacting the reputation of EPCOR Water Services (EWS). This project resulted in a nine month completion timeline at a total cost of $3.2 million.

8. By proactively replacing or abandoning DDMHs, EWS can continue to manage the risk appropriately to reduce risk exposure, especially as about 95% or 218 of these are approaching or past their design life. Selection of DDMHs for replacement will be based on those identified as requiring immediate replacement to prevent voids, collapses or sinkholes. DDMHs are prioritized based on risk assessments, number of inlets, functionality, depth of trunk, road classification/location, and synergy with other projects. The risk assessments consider age, waste type, proximity to environmentally sensitive areas, depth, roadway classification and customer impacts due to pipe and roadway failures.

9. During the current PBR term of 2022-2024, EWS undertook a proactive inspection program of all DDMH to determine asset condition. Due to these baseline inspections, current condition is known for a significant portion of the asset category, with the remaining location inspections estimated to be completed by mid-2024.

10. A risk assessment was completed for all the DDMH inventory based on age, material type, waste type, and inspection information, producing a condition rating for each DDMH. The resulting condition ratings were then used to develop the Likelihood of Failure (LOF) for each DDMH. Along with the LOF scores, Consequences of Failure (COF) were also completed across all six consequence categories using the EPCOR Risk Management Standards and Risk Matrix. The six consequence categories include Health and Safety, Environment, Regulatory, Reputation, Service Interruption, and Financial. The EPCOR Risk Matrix has been utilized to show the current results which are displayed in Figure 3.0-1 below. Any DDMHs remaining to be inspected are shown with their pre-inspection risk score.

Figure 3.0-1
DDMH EPCOR Risk Matrix Results



11. Of the 233 remaining DDMHs in service, 221 rank either High or Medium-High risk. There are currently 13 ongoing and planned projects that will be completed ahead of the 2025-2027 PBR period. The asset category therefore has the following remaining requirements:

1. As 4 of the 11 DDMHs in LOF 5 are currently in progress for replacement, the remaining 7 DDMHs will require replacement or abandonment as soon as possible. Operations will be continuously monitoring these locations until they are replaced.
2. 32 of the DDMHs in LOF 4 are backlogged waiting for replacement or abandonment and require continuous monitoring at various intervals until they are replaced.
3. Of the remaining 190 locations in LOF 4 and LOF 3, 85 will require scheduled monitoring until they deteriorate to the point of requiring replacement. This monitoring is an operational task and is out of scope of this program.

12. The approach to maintaining a Medium-High risk backlog is driven by the object to minimize the impacts on rate payers. By prioritizing and regularly monitoring the backlog locations, we are able to manage the risk until they can all be planned for rehabilitation, replacement, or abandonment.

4.0 PROGRAM SCOPE

13. The scope of renewal for DDMHs will include either rehabilitation, full replacement or abandonment. As the DDMHs in the highest risk categories will be targeted first, the initial focus will be on replacement or abandonment as these locations are in very poor condition. The capital program for the 2025-2027 PBR term includes inspections to confirm asset conditions, assessment and prioritization, design, and construction. The annual scope of work includes the following:

- Inspections of approximately 20 DDMHs to confirm asset condition
- Assessment and prioritization of DDMHs
- Design of 5-7 DDMHs going forward for replacement
- Geotechnical investigations
- Construction of 5-7 DDMH replacements
- Assets placed into service

5.0 ALTERNATIVES CONSIDERED

14. The alternative to the program is to leave the DDMHs and deal with them reactively instead of proactively. If this program is not continued and existing deterioration in the DDMHs remains unaddressed, failures are likely to occur potentially causing underground voids. This could lead to sinkholes in the middle of high traffic arterial roadways where many DDMHs are located which is a significant safety concern. Other considerations are environmental impacts from holes in sanitary or combined DDMHs which could cause soil contamination, interruption of service to residents and high costs of unplanned emergency repairs. To illustrate the cost effectiveness of a proactive approach, the Allendale emergency DDMH project cost a total of $3.5 million. In comparison, several recent proactive DDMH projects, one in Queen Mary Park and one in Strathcona, cost a total of $1.4 million and $1.6 million respectively. In general, proactive work is roughly 2-3 times more cost effective relative to a reactive response in the event of a failure. The advantage to this reactive alternative is that there may be lower impact to the rate payers in the immediate PBR term, however if more emergencies continue to occur, the costs in the long term will be increased.

6.0 COST FORECAST

15. EWS has forecast total program capital expenditures during the 2025-2027 period at $29.8 million. This reflects an increase in average annual spending on this program from $4.4

million per year to $8.9 million per year. This increase is required to address the known DDMH deficiencies found through the baseline inspections completed in the current PBR term. More investment is needed to address the DDMHs in the system before they become emergency projects because of the inherent risks of these DDMHs. These system failures present a high safety risk for EWS employees and the public.

16. The program cost estimates for the 2025-2027 PBR term shown in Table 6.0-1 are based on historical information such as past inspection costs, past design costs and past construction costs of similar DDMH projects that occurred within the last few years. Costs for each DDMH project will vary depending on the depth, geotechnical assessments, location, condition, etc. The costs were developed with the following assumptions:

- Approximately 20 DDMH inspections will be completed by internal resources over the PBR term to confirm current condition of the infrastructure ahead of design and construction
- 6 replacements will be required each year
- Replacements will be completed by internal resources
- Geotechnical investigations will be required for each location, and will be completed by external resources
- Replacements are assumed to cost approximately $1.5 million per location
- Project cost estimates are based on costs incurred for inspection, design, and construction of similar projects that occurred over the past several years

Table 6.0-1
DDMH Program Capital Expenditure Forecast ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	6.5	10.9	12.4	29.8

7.0 KEY RISKS AND MITIGATION PLANS

17. As these assets continue to deteriorate, the risk of failure will continue to increase. Failure can lead to subsidence or sink holes on arterial roadways, resulting in health and safety risks for the public, costly emergency repairs, service impacts, and/or sewage leakage and spills to the environment leading to incompliance and fines. The most effective measure to mitigate these risks is to continue with proactive replacement of deteriorating DDMHs. Execution risks, such as safety concerns for workers on a busy roadway site and traffic disruptions on high traffic roadways, can be mitigated by ensuring an experienced project manager is engaged to follow all proper safety procedures on site and to develop an optimal construction staging plan. Another

execution risk is cost escalations which can impact the overall budget. Cost escalations can arise due to various factors such as unforeseen ground conditions, fluctuations in material or labour costs, delays in permits or approvals, or unexpected design modifications. This risk can be mitigated through contingency planning, regular cost monitoring, and experienced project managers.

8.0 RESOURCES

18. All activities related to project management, design, drafting, construction coordination and inspection, and as-built recording, will be undertaken internally by EWS, eliminating the need for external consultants. Construction of DDMHs will also be completed by internal resources. Geotechnical assessments will be completed through external resources. Where possible, work will be coordinated with other projects or maintenance activities to minimize costs.

EPCOR WATER SERVICES

Appendix G-6

Business Case

FLEET – VEHICLES AND MOBILE EQUIPMENT PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. EPCOR Water Services (EWS) operates and maintains a fleet of vehicles and mobile equipment (light trucks, heavy trucks, offroad equipment and trailers) that are necessary to build, operate, maintain and repair EWS' wastewater collection system. This ongoing program consists of the lifecycle replacement of vehicles and equipment that have reached the end of their service lives and the purchase of vehicles and equipment to address growth. The availability and dependability of EWS' fleet is essential to ensuring that EWS' wastewater collection system is maintained in a reliable manner and its operations are carried out safely, efficiently, and effectively. EWS has forecast total program capital expenditures during the 2025-2027 PBR term of $26.8 million.

2.0 BACKGROUND

2. EWS uses fleet assets to build, operate, maintain, and repair the wastewater collection system across Edmonton. EWS currently employs a fleet of 345 units for projects and operations support for the wastewater collection system. These include the vehicle types described in Table 2.0-1.

Table 2.0-1
Description of Fleet Vehicle and Mobile Equipment Types

Fleet Type	Description, and examples of vehicles
1. Light Duty	Vehicles with a gross vehicle weight (GVW) that is roughly less than 9,000kg
2. Medium Duty	Vehicles with a GVW roughly between 9,000 kg and 15,000 kg
3. Heavy Duty	Vehicles with GVW that can exceed 15,000 kg
4. Equipment	Backhoes, forklifts, cranes, excavators, loaders, drills, etc.
5. Trailers	Cargo trailers, dump trailers, tilt trailers, tank trailers, office trailers, etc.
6. Vans	Enclosed unibody motor vehicles

3. EWS has completed a bottom-up cost/benefit assessment to estimate the number of fleet vehicles that will reach their end of life (EOL) during the upcoming PBR term. EOL estimates are based on historical fleet longevity data and can vary by vehicle type, asset usage and historical maintenance needs. Generally, EOL for most fleet assets is comparable to the asset's financial service life of 10 years. Based on the bottom-up fleet analysis, it is estimated that approximately 114 fleet assets will have reached EOL before the end of 2027 as is shown in Table 2.0-2.

Table 2.0-2
Fleet Vehicle and Mobile Equipment Counts, EOL Estimate

Fleet Type	Total Vehicle Count	Total Count of EOL assets by 2027
1. Light Duty	73	42
2. Medium Duty	51	10
3. Heavy Duty	39	15
4. Equipment	62	40
5. Trailer	100	6
6. Van	20	1
7. Total	345	114

4. Availability of fleet assets is another indicator guiding the determination of fleet investment needs. Availability quantifies the approximate likelihood that fleet assets are in good operational condition and available for use. The overall availability target set by Fleet Services is 89% which is in line with industry standards. As can be seen in Table 2.0-3, availability in 2023 was sufficient across most fleet asset categories except for heavy duty vehicles at 82%. The low availability for heavy duty vehicles is primarily because that specific fleet type cannot be easily supplemented with rentals. As a result, current fleet availability will not be a primary driver for new fleet investments in the 2025-2027 PBR term.

Table 2.0-3
2023 Fleet Availability by Vehicle and Mobile Equipment Type

Fleet Type	Availability
1. Light Duty	97.7%
2. Medium Duty	96.3%
3. Heavy Duty	82.1%
4. Equipment	94.2%
5. Trailer	97.4%
6. Van	96.2%
7. Total	94.2%

5. Across most fleet type classes, rentals are used in the short-term by EWS to maintain reliable fleet-wide availability and to manage short term disruption risks. Rentals can be taken on for periods as short as a day, or up to periods spanning several years. However, sustained, long-term use of rental fleet asset by EWS is not cost effective and over reliance can have a detrimental impact on customer rates. To determine the 2025-2027 PRB term fleet investment needs, EWS reviewed rental usage metrics and, when justified through growth, made recommendations to replace rented assets with owned fleet assets. As shown in table 2.0-4, EWS

has identified that there are currently 35 leased fleet assets in inventory that are currently being rented in perpetuity due to growth needs.

Table 2.0-4
Number of Perpetually Rented Vehicle and Mobile Equipment by Type

Fleet Type	Availability
1. Light Duty	17
2. Medium Duty	13
3. Heavy Duty	0
4. Equipment	2
5. Trailer	0
6. Van	3
7. Total	35

6. Replacement opportunities for the leased fleet pool has not been reviewed in previous PBR submissions. The backlog of 35 leased fleet assets recommended for replacement with owned assets is due to growth that has occurred since Drainage Services was first transferred to EPCOR in 2017. It is anticipated that the quantity of recommended replacements for leased assets will decrease in subsequent PBR filings as a result having addressed the current backlog.

3.0 JUSTIFICATION

7. As shown in the example provided in Figure 3.0-1, EWS fleet assets approaching EOL require additional repair and maintenance work, leading to higher operational costs and extended periods of down time. This downtime further impacts operational efficiency of work crews unless alternatives such as rental units are available. However, rentals can only be obtained for a limited number of non-specialized, customer-built units, as shown in Table 3.0-1, and can increase the operational burden of the fleet program.

Figure 3.0-1
Annual Operational Cost for Heavy Duty Truck Category by Age of Asset*

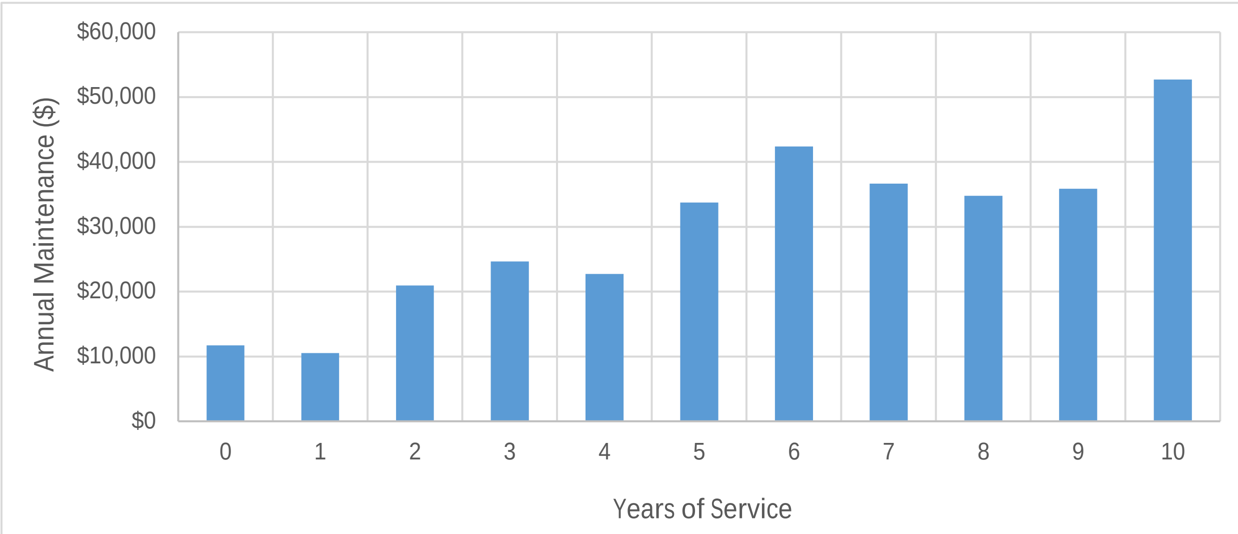


**Figure 3.0-1 is not adjusted for kilometers driven per year, which tends to decrease as fleet assets age and can affect annual maintenance costs.*

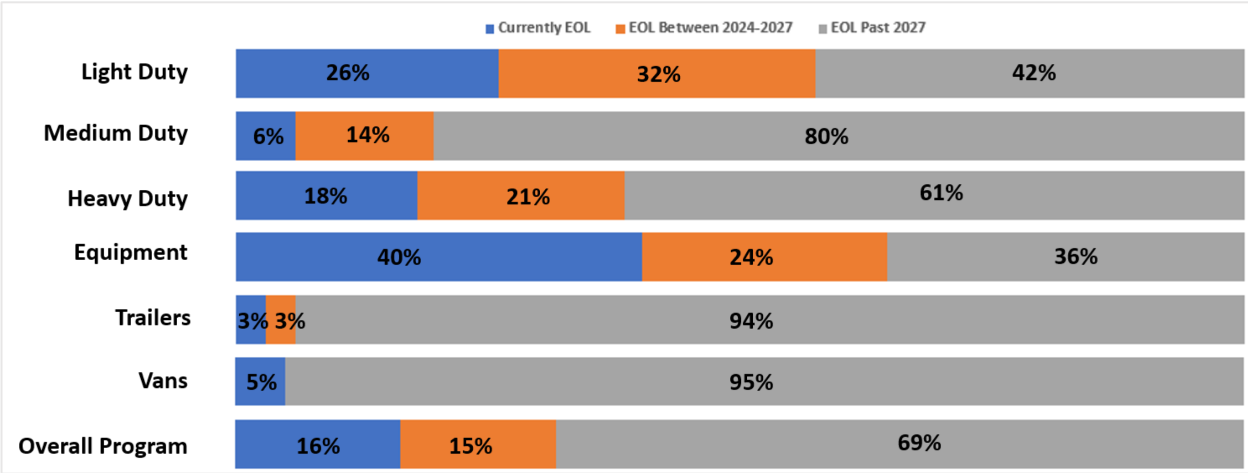
Table 3.0-1
Availability of Rentals for Replacements by Fleet Type

Fleet Type	Light Duty	Medium Duty	Heavy Duty	Equipment	Trailers	Vans
Rental Availability	Moderate	Poor	Very Poor	Poor	Very Poor	Poor

8. Fleet assets approaching EOL also begin to approach the limits of design tolerance levels and it is typical to experience an increased level of safety issues as the assets age out. As such, failure to replace fleet assets which have reached the EOL will result in increased operating costs, reductions in worker safety, and reductions in productivity.

9. As of 2024, 16% (~55 units) of the fleet assets have exceeded their useful operating life. By 2027, if no action is taken, 31% (~114 Units) of the fleet assets will have exceeded their useful operating life cycle as shown in Figure 3.0-2.

Figure 3.0-2
Fleet Future EOL Breakdown



4.0 PROGRAM SCOPE

10. EWS has forecast total program capital expenditures during the 2025-2027 PBR term of $26.8 million to purchase a total of 124 fleet assets.

11. A total of 35 leased fleet units will be replaced with owned units in the 2025-2027 PBR term as shown in Table 4.0-1. The 35 leased assets being replaced are based on an analysis of fleet growth requirements where it was determined that the purchase of the units is required in lieu of renting in perpetuity.

Table 4.0-1
Leased Fleet Program Replacements by Type for 2025-2027

Fleet Type	Forecasted Leased Unit Replacements
1. Light Duty	17
2. Medium Duty	13
3. Heavy Duty	0
4. Equipment	2
5. Trailer	0
6. Van	3
7. Total	35

12. The remaining capital expenditures for the program will go towards replacing owned fleet assets reaching their EOL. There are 89 EOL fleet assets that will be replaced from the pool of owned assets in the 2025-2027 PBR term as shown in Table 4.0-2.

Table 4.0-2
Owned Fleet Program Replacements by Type for 2025-2027

Fleet Type	Current Number of Owned Units	Forecasted EOL Unit Replacements
1. Light Duty	56	38
2. Medium Duty	38	5
3. Heavy Duty	39	11
4. Equipment	60	27
5. Trailer	100	6
6. Van	17	2
7. Total	310	89

13. By the end of 2027, the number of outstanding fleet assets at EOL will be reduced from 55 to 25. The majority of outstanding EOL fleet assets in 2027 will consist of equipment fleet category items. Within the equipment category, inspection and asset usage data indicates that there are several equipment types that can be anticipated to maintain a useful operational life that will extend into the subsequent PBR term with minimal impact to availability and program maintenance costs.

5.0 ALTERNATIVES CONSIDERED

5.1. Alternative 1 – Rent to offset new EOL based purchases

14. In this alternative, assets reaching their EOL would be replaced with leased equivalents.

15. This alternative was rejected because EWS cannot rent or lease many of the fleet assets it requires as they are not available in the marketplace. Many of EWS' fleet assets are custom built to ensure they are suitable and safe to perform the necessary work. For example, EWS requires storage provisions for specialized parts, tools, and instruments. EWS requires modifications and customizations to ensure contaminated materials are handled appropriately. EWS also requires modifications to ensure vehicles and equipment are reliable and suitable for use in severe winter conditions.

16. This alternative is also not expected to be cost effective over the long-term. Typical long-term cost implications from perpetual leasing are generally in the range of 30% to 40% in similar industries. Due to the specialized needs of the fleet assets for EWS, the cost impact from rentals may be even higher.

5.2. Alternative 2 – Continue to rent to offset growth based purchases

17. In this alternative, instead of replacing the 35 perpetually leased fleet vehicles with owned vehicles, EWS would instead continue to rent the vehicles in perpetuity.

18. Because the current rental pool is meant for short term use, generic purpose rentals without any specialized modifications are currently used. Their lack of specialized features can be accommodated in the short-term through the support of the existing owned fleet. However, if they were to be rented in perpetuity as a policy, arrangements with the rental supplier would be necessary to acquire rentals with significant and custom built modifications.

19. Even if such modified units could be acquired as rentals, this alternative was rejected because renting equivalent fleet assets indefinitely is not cost effective. An NPV analysis was completed comparing this alternative scenario verses the status quo. Based on this NPV analysis, this would result in a cost impact to customers that would be 29% greater than buying the equivalent vehicles outright.

5.3. Alternative 3 – Accelerated Investment

20. This alternative would increase program spending to purchase a larger number of fleet assets, increase fleet-wide availability, and decrease the number of outstanding EOL assets remaining by the end of 2027 to be lower than the anticipated 25 units currently expected.

21. This alternative was rejected because it not cost-effective. With the current rate of fleet acquisitions, fleet availability is expected to be acceptable. The purchase of additional units would be likely to introduce assets with low usage while still increasing total fleet maintenance needs. Additionally, further decreasing the number of outstanding EOL assets from 25 by 2027 is anticipated to have no or only marginal benefits since that allowance is serving as a buffer for assets that may be found to still be in satisfactory condition by 2027. Further reductions to the outstanding EOL pool has the potential to retire fleet assets prematurely.

5.4. Alternative 4 – Reduced Investment

22. This alternative represents a partial reduction in capital spend either by pushing more units past their effective operating period or by leveraging fleet needs with a higher proportion of rentals.

23. This alternative was rejected based on the anticipated increases in maintenance cost, impact to overall availability as vehicle downtimes increase with age, and the cost burden of providing additional support with rentals.

24. EWS will however continue to seek opportunities to reduce investment needs with minimal impacts to overall operability. If fleet assets are found to remain in good/fair condition even at their anticipated EOL, they will be retained. Further, EWS will be evaluating approaches to further consolidate rental pools in the light-duty vehicle category which could result in reduced investment needs within the 2025-2027 PBR term.

5.5. Alternative 5 – Capital Dominated Investment Profile

25. In this alternative, both growth and EOL needs are met through the purchase of owned fleet assets at a rate that leaves no more than 25 outstanding EOL assets in service by 2027. This is projected to require the purchase of 124 fleet assets across all fleet categories at a cost of $26.8 million. This is the preferred option based on the total reduction on risk and cost benefit to EWS and its customers.

6.0 COST FORECAST

26. The projected number of replacements over the 2025-2027 PBR term is 124 units. Capital costs for each fleet asset includes:

- Engineering Design – define specification of unit and draft drawings where applicable.
- Chassis – Procure vehicle chassis from chassis manufacturer.
- Upfitting – Fabricate upfitting on chassis.
- Prep-For Service – EPCOR brand decaling, GPS, training materials, pre-delivery inspections etc.

27. Table 6.0-1 provides the program costs for the 2025-2027 PBR term.

Table 6.0-1
Fleet – Vehicles and Mobile Equipment Program Capital Expenditure Forecast ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	8.9	7.0	10.9	26.8

28. Table 6.0-2 shows the breakdown of 2025-2027 PBR costs for leased replacements by fleet type.

Table 6.0-2
Leased Fleet Program Replacement Costs by Type for 2025-2027 ($ millions)

Fleet Type	Forecasted Leased Unit Replacements	Forecasted Cost
1. Light Duty	17	1.6
2. Medium Duty	13	2.4
3. Heavy Duty	0	0.0
4. Equipment	2	0.7
5. Trailer	0	0.0
6. Van	3	0.4
7. Total	35	5.3

29. Table 6.0-3 shows the breakdown of 2025-2027 PBR costs for owned replacements by fleet type.

Table 6.0-3
Owned Fleet Program Replacement Costs by Type for 2025-2027 ($ millions)

Fleet Type	Forecasted EOL Unit Replacements	Forecasted Cost
1. Light Duty	38	3.7
2. Medium Duty	5	0.9
3. Heavy Duty	11	5.4
4. Equipment	27	10.6
5. Trailer	6	0.5
6. Van	2	0.3
7. Total	89	21.5

7.0 KEY RISKS AND MITIGATION PLANS

30. EWS is subject to changing types and volumes of work, changing work practices or tools that can result in different vehicle requirements. These changes can result in more, less, or different types of vehicles and equipment being required. To mitigate this risk, EWS regularly reviews the EWS fleet to identify changing needs and potential synergies that can be addressed through the Fleet life-cycle replacements. These reviews can result in units being deferred, re-purposed, sold resulting in fleet reductions or their replacement being built to an updated configuration or specification to better accommodate new tools, work, or work practices.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety - Risk associated with worker injury while upfitting units.	Third party vendors are used to upfit the units at their facilities.
2. Financial - Risk associated with committing costs for chassis by ordering units prior to the year they are to be replaced.	This risk is offset by the earlier delivery of the chassis ordered allowing for upfitting to be completed prior to the specified deadline.
3. Supply Chain Disruptions - EWS continues to face longer than historical lead times, quotas, allocations and order cancellations of various fleet and equipment types and components.	EWS has ensured there is sufficient flexibility in Master Service Agreements to pursue alternative procurement options if service providers are not able to deliver on EWS' requirements. EWS has also ensured that Fleet Capital replacements are being considered sufficiently in advance to accommodate the longer lead times and mitigate the risk of units being run to failure.

8.0 RESOURCES

31. All activities related to project management will be undertaken by EPCOR Commercial Services. While procurement of fleet assets may be executed by leveraging existing master service agreements, large value/complex purchases will be procured through public tender to ensure competitive pricing. EPCOR primarily uses master service agreements for fleet acquisitions but can use non-competitive justifications and other procurement methodologies to navigate supply chain challenges.

EPCOR WATER SERVICES

Appendix G-7

Business Case

FLOW CONTROL FACILITIES REHABILITATION PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. The Flow Control Facilities (FCF) Rehabilitation Program is an annual program that focuses on the renewal of aging lift stations and real time control (RTC) assets on the wastewater collection system across the city. Maintaining an acceptable level of environmental protection and service requires ongoing rehabilitation efforts. Through this program, EPCOR Water Services (EWS) can systematically rehabilitate or replace deteriorated flow control facility assets to mitigate the risks of deterioration and failure. Total program capital expenditures for the 2025 – 2027 PBR term is forecasted at $20.3 million. Based on historical projects, the program will support the rehabilitation of approximately 8 sites including lift stations, RTCs, syphon structures or other flow control infrastructure.

2.0 BACKGROUND

2. Flow Control Facilities encompass a broad range of assets that interact with wastewater to directly impact how the wastewater is conveyed through the sewer system. Flow Control Facilities often include buildings, sub-structure components, mechanical systems, and electrical controls. Some examples of Flow Control Facilities include lift stations for moving wastewater up gradient, RTC stations for storage operations, and syphon buildings which provide access and heating, ventilation, and air conditioning (HVAC) for river crossing tunnels.

3. EWS owns and maintains 91 lift stations, 4 RTCs, 9 sewer control gate stations, 3 syphon tunnels and over 70 other Flow Control Facilities such as manual gates and weirs. As the system ages, it is important to assess the condition of Flow Control Facilities to avoid emergencies and prioritize renewal to deal with deterioration. This annual program allows EWS to rehabilitate or replace deteriorated facilities to mitigate the risks of failure and maintain an acceptable level of environmental protection and service. This program aligns with EPCOR's asset management objectives by identifying emerging risks and managing them appropriately, reducing risk exposure and reducing negative impacts on the environment.

4. Flow Control Facilities are being inspected to assess their physical condition and performance by Wastewater Collection teams. Deficiencies are cataloged and then assessed to help determine the needs for rehabilitation. Inspections have been completed for all lift stations, RTC's and gates, while inspections are on-going for syphons and weirs. Based on the inspections, a Likelihood of Failure (LOF) and Consequence of Failure (COF) rating is determined. The results are plotted on EWS's Risk Matrix to inform capital investment. The COF score is based on the

service population, business sectors served and relation/proximity to critical crossings or environmentally sensitive areas.

5. RTC's and lift stations have similar structures and mechanical systems. Their inspections include assessing the condition of the site and building, substructure, pipes, valves, gates, motors, and pumps, etc. Assets found to have the highest LOF scores have issues such as deteriorated site and building condition, concrete structure cracks, mechanical systems that are beyond their useful life, leaks, etc. as shown below in Figure 2.0-1 for lift stations and Figure 2.0-2 for RTC gates.

Figure 2.0-1
EPCOR Risk Matrix Results for Lift Stations

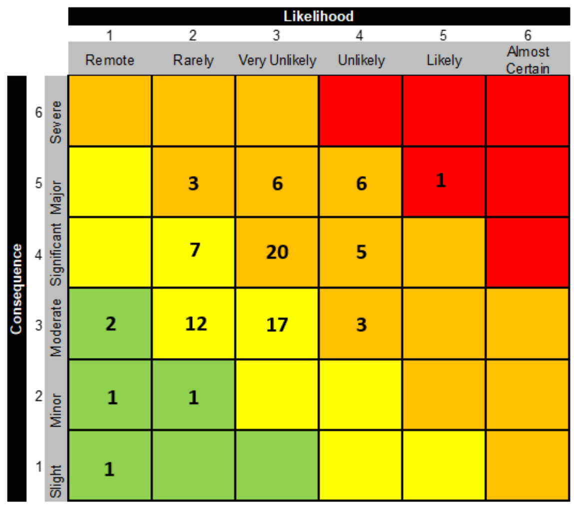
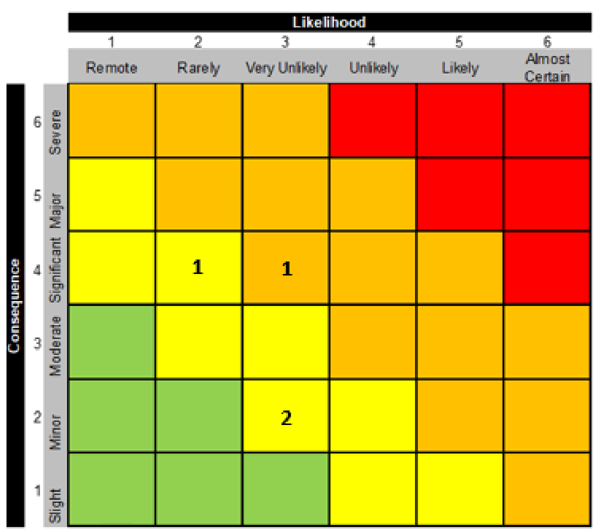


Figure 2.0-2
EPCOR Risk Matrix Results RTCs



6. As shown in Tables 2.0-1 and 2.0-2 a total of 16 lift stations have undergone rehabilitation or have rehabilitation that is soon to be completed including 8 out of the top 10 stations by risk. Remaining projects for the 2025-2027 PBR will be chosen from the remaining medium-high risk stations as shown in Table 2.0-3.

Table 2.0-1
Lift Stations Rehabilitated Completed in Previous PBR Period

Facility Name	LS #	Status
AMBLESIDE	203	Rehabilitation Completed
TWIN BROOKS	163	Rehabilitation Completed
DUNLUCE	130	Rehabilitation Completed
EMPIRE	157	Rehabilitation Completed
RIVERDALE	115	Rehabilitation Completed
DUGGAN	105	Rehabilitation Completed
WESTBROOK	102	Rehabilitation Completed
HAWRELAK	108	Rehabilitation Completed

Table 2.0-2
On-going Lift Stations Rehabilitation Projects

Facility Name	LS #	COF	LOF	Risk	Status
LAURIER HEIGHTS	111	5	5	High	Rehabilitation On-going
WALTERDALE	171	5	4	Medium-High	Rehabilitation On-going
CLOVERDALE	121	5	4	Medium-High	Rehabilitation On-going
INDUSTRIAL HEIGHTS	173	5	3	Medium-High	Rehabilitation On-going
ROYAL GARDEN	156	5	3	Medium-High	Rehabilitation On-going
RUNDLE HEIGHTS	116	4	4	Medium-High	Rehabilitation On-going
EASTGATE INDUSTRIAL	141	4	4	Medium-High	Rehabilitation On-going
NORTH EDMONTON	188	5	3	Medium-High	Rehabilitation On-going
BUENA VISTA	120	3	4	Medium-High	Rehabilitation On-going

Table 2.0-3
Candidate Locations for Rehabilitation in 2025-2027 or Future PBR Terms

Facility Name	LS #	COF	LOF	Risk	Status
QUESNELL HEIGHTS	212	5	4	Medium-High	Under Consideration
ELLERSLIE	168	5	4	Medium-High	Under evaluation for abandonment
YELLOWHEAD EAST	158	5	3	Medium-High	Under Consideration
WEDGEWOOD	155	3	4	Medium-High	Under Consideration
CASTLEDOWNS	119	4	3	Medium-High	Under Consideration
MISTATIM INDUSTRIAL	180	4	3	Medium-High	Under Consideration
BEAUMARIS	131	4	3	Medium-High	Under evaluation for abandonment
CHAMBERY	162	4	3	Medium-High	Under Consideration
GOLD BAR PARK	128	3	4	Medium-High	Under Consideration
HADDOW	187	4	3	Medium-High	Under Consideration
HERMITAGE	132	4	3	Medium-High	Under Consideration
DUNLUCE	159	4	3	Medium-High	Under Consideration
HAMPTONS SAN	195	4	3	Medium-High	Under Consideration
SOUTH EDMONTON	185	5	2	Medium-High	Under Consideration
CLOVER BAR	182	4	3	Medium-High	Under Consideration
HAWKS RIDGE	223	4	3	Medium-High	Under Consideration
GLASTONBURY	184	4	3	Medium-High	Under Consideration
FORT EDMONTON	221	4	3	Medium-High	Under Consideration
TRUMPETER	213	5	2	Medium-High	Under Consideration
WESTRIDGE	110	4	3	Medium-High	Under Consideration
GLENORA RV	113	4	3	Medium-High	Under Consideration
RUNDLE PARK	122	4	3	Medium-High	Under Consideration
BELVEDERE	135	4	3	Medium-High	Under Consideration
GLENORA	112	4	3	Medium-High	Under Consideration
HAMPTONS STORM	195	4	3	Medium-High	Under Consideration

7. The Wastewater Collections FCF team also identifies and tracks the backlog of outstanding mechanical and reliability issues identified through the operation of the FCF assets. The identified backlogs are classified across six reliability categories including, Electrical, External Mechanical (force main and valves), On-site Mechanical, SCADA/Controls, Site Safety and Structural. FCF provides a rough preliminary estimate of the approximate scale of costs for each deficiency noted to assist with understanding the approximate level of need, prior to any in depth

assessment. Currently, 178 backlogged issues have been logged and are being tracked across more than 70 FCF assets.

8. The backlog information supports planning prioritization and scope development by identifying and cataloguing known rehabilitations needs at FCF assets as shown in Table 2.0-4.

Table 2.0-4
FCF Backlog Tracking for 10 Stations out of 70 Inspected

		Preliminary Estimates of Approximate Scale of Cost					
Station	Items Backlogged	Electrical	External Mechanical	On-site Mechanical	SCADA / Controls	Site Safety	Structural
141	3		<$1M	<$1M		<$0.1M	
131	4			<$1M		<$1M	
203	9	<$0.5M		<$1M	<$0.1M	<$0.1M	<$0.1M
212	4	<$0.1M		<$0.5M		<$1M	
168	3		<$0.5M	<$0.5M		<$0.5M	
106	3	<$0.1M				<$1M	
175	3			<$1M		<$0.1M	
199	3	<$1M				<$0.1M	

9. Syphon tunnel inspections are on-going and include the surface structures, substructure sections, tunnels, electrical and HVAC systems. The inspections do not include the sewer pipes which are covered under pipe rehabilitation programs.

10. Inspections for manual/automatic gates and weirs focus specifically on the condition of the asset structure itself. At this time, there are four gates identified that require investment and rehabilitation as shown in Figure 2.0-5. Inspections are still on-going for weirs and priorities may change as new information is received.

Table 2.0-5
All Medium-High Risk Gates

Station #	Facility	LOF	COF	Risk
544	Elsinore Lake Gate	5	2	Medium-High
545	Valencia Lake Gate	5	2	Medium-High
551	Belle Rive Stage 5 Lake Gate	5	2	Medium-High
592	Schonsee Control Gate	5	2	Medium-High

11. There are several separate and smaller programs that implement improvements to lift stations. These include the Lift Station Enhancement Program, the Lift Station Mechanical

Upgrades Program, the Lift Station Electrical Upgrades Program, and the Facility Safety Improvements Program. These programs often implement minor improvements of less than $50,000 per project and are effective at reducing risk when it is driven by single item deficiencies. The FCF Rehabilitation program coordinates with each program to ensure resources are allocated effectively and to identify opportunities for synergies.

3.0 JUSTIFICATION

12. There are several risk categories associated with the deterioration and failure of FCFs:

- Health and Safety Risk – deteriorated or failed facilities pose a safety risk to the EWS staff who operate and maintain the stations. There is also a safety risk to the public if a facility fails and causes spilled sewage and basement backups.
- Environmental Risks – deteriorated or failed FCFs can lead to floods and sewage spills to the local environment and water bodies. This can result in violations of EWS's approval to operate and potential fines.
- Financial Risks – Emergency repairs to failed facilities are more costly than proactive rehabilitation or replacement. Failed assets can also lead to flooding which are costly to manage and clean up and can lead to claims from customers with flooded basements.
- Service Disruption Risk – A failed facility can lead to sewage backup or neighbourhood flooding, which could result in service issues and damage to customer properties.

13. There are several examples that demonstrate the consequences of failure of FCFs and the associated risks that have been addressed in previous PBR terms:

- Walterdale Lift Station: A failure of a gate caused untreated wastewater to be mixed with water from the North Saskatchewan River (NSR) resulting in discharge of untreated wastewater to the river.
- Beverly Raylo Lift Station: This station overflowed multiple times due to high discharge volumes, as well as due to consequences of its internal processes. The overflows spilled untreated wastewater flows to the surrounding environment and river.
- Manning Drive RTC Gate Failure: Corrosion of the gate mechanisms inhibited the operation facility and caused the upstream storage tunnel to become stagnant during dry weather conditions.

14. This proactive annual program allows EWS to rehabilitate, replace, upgrade, or abandon deteriorated infrastructure to mitigate the risks and consequences listed above.

4.0 PROJECT/PROGRAM SCOPE

15. The scope of this program is to evaluate the condition of FCFs, determine what is required to reduce risk, and implement the rehabilitation, replacement, or alternative solutions at those locations.

16. Based on historical experience, major rehabilitation upgrades include the site and building, the substructure, pipes, valves, mechanical (including HVAC), and the instrumentation and controls. The program can be expected to fully rehabilitate approximately 8 sites and complete partial rehabilitation at an additional 5-10 sites including lift stations, RTC gates, syphon structures and other flow control infrastructure over the 2025-2027 PBR term. The number of rehabilitation projects will be dependent on the size of each project, bid prices and scope of work.

17. Program priorities will be based on operational needs, outcomes of the site inspections, and asset risk evaluations. A high-level assessment of priority locations is on-going and is exploring alternative solutions such as adjustments to operational scope or facility abandonment. This review will also consider any unique characteristics of the site and assets that require accommodation. Following this high-level review, further study and concept development will continue for the highest risk assets in the program that are not yet being actioned. This work will include additional inspections if required, development of rehabilitation actions, and a constructability assessment. Once complete, the program will proceed with the implementation of the most effective actions to mitigate the identified risks.

5.0 ALTERNATIVES CONSIDERED

5.1. Alternative 1 – Do Nothing

18. One alternative to the FCFs Rehabilitation Program is to do nothing. If nothing is done, the assets will be at risk of eventual failure and the likelihood of failure will continue to increase as the assets age. This will continue to increase the risk of flooding to the surrounding environment and will increase the safety risk posed to the public and EWS staff. Although the do nothing alternative can provide cost savings and lower impact on the rate payer in the short term, delaying rehabilitation or other solutions will not resolve the problem and will ultimately move required work and higher expenditures to future years.

5.2. Alternative 2 – Replace, Abandon or Convert Facilities

19. There are alternatives to full rehabilitation or replacement that will be considered as part of the evaluation stage of this program to reduce the identified risks. Each facility is unique and will require a different approach based on the deterioration, risk ranking, age, and location. Alternatives to full rehabilitation that can be evaluated include abandonment or redirection of flows. Hydraulic assessments will be required to support the validity of these alternatives and it may require a project scope that necessitates its own project outside of the scope of this business case.

5.3. Alternative 3 – Accelerated Investment

20. A third alternative is to increase the level of spending for rehabilitation in this asset category. While acknowledging that not all assets in this asset category have been inspected at this time, the current recommended spending level is appropriate relative to the risk presently identified in the system. There are no high-risk assets that are not currently being targeted for rehabilitation. Further, out of the top 10 assets by risk, 7 are already within the scope of existing programs. Overall, system risk can be addressed more effectively by investing in the rehabilitation of other assets across EWS.

6.0 COST FORECAST

21. This program is forecast at $20.3 million for the 2025-2027 PBR term. Concept development has not yet occurred and so the program cost forecast is based on historical costs of inspection, planning, design, and construction of past rehabilitation projects. Each facility is unique with distinct characteristics making it difficult to provide accurate cost estimates for rehabilitation, upgrades or replacement prior to concept development and design. The cost estimates will be tracked and refined as the program progresses. Key assumptions in developing the cost forecast are as follows:

- All inspections will be completed internally.
- Concept development and design will be completed by external resources.
- External cost estimates are taken from historical contractor bid prices.
- All other costs are based on historical experience with similar projects.

22. Table 6.0-1 provides the capital expenditure forecast for this program for the 2025-2027 PBR term.

Table 6.0-1
FCF Rehabilitation Program Capital Expenditure Forecast ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	0.9	9.6	9.8	20.3

7.0 KEY RISKS AND MITIGATION PLANS

23. EWS has identified the key risks and mitigations associated with executing this program in Table 7.0-1.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health & Safety Risks - Risk of sanitary flooding in the neighborhood during construction, particularly during the summer.	EWS will develop a bypass plan as needed and contingency plan that will ensure minimal adverse impacts especially during rainy season.
2. Environmental Risks – Associated risks may include the removal and disposal of construction debris and working within environmentally sensitive areas such as the river valley.	EWS will identify risks during the planning process and ensure the appropriate mitigation measures for the identified risks are implemented during construction. This includes appropriate delineation of the construction area and executing debris management measures.
3. Execution Risks – Work is expected to occur in a variety of locations, therefore there may be project-specific risks associated with traffic disruptions, noise pollution, and bypass needs. Impacts to traffic is of high concern for work done on assets on or near high traffic roadways, and as most sites are located near residential areas, there are potential construction impacts to neighbourhood traffic and noise levels. Additionally, these sites are often built due to physical barriers that prevent typical gravity conveyance of wastewater. These barriers can make project by-pass needs difficult.	EWS will develop a construction plan to minimize disruptions. This includes coordinating construction work to minimize traffic disruptions and heavy equipment use during morning and evening rush hours. EWS will also identify bypass needs prior to project commencement to ensure work is completed during the best season and with sufficient supporting infrastructure to ensure the sewer network is not disrupted.
4. Financial Risks – Actual contactor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	EWS will include contractors early in the process, clearly identify scope requirements and evaluate options such as bundling multiple project scopes approach when efficiencies can be identified. EWS manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. The financial risks will become more evident as further design is completed and scope will be adjusted accordingly.

5. Unknown Asset Condition Risks – Because asset inspections for syphons and weirs are on-going it is possible that one or several assets are found whose condition and likelihood of failure is worse than anticipated. Several syphons have a high consequence of failure. The identification of any unexpected but significant issues affecting a large syphons condition or likelihood of failure can shift the asset to the high-risk category and necessitate more immediate rehabilitation.	EWS will prioritize the inspection of the remaining FCF assets with high and medium high consequences of failure regardless of their anticipated condition. By prioritizing the inspection of these assets early on this program can still ensure their rehabilitation through reprioritization of spending within the program.

8.0 OTHER RESOURCES

24. All activities related to project management, drafting, construction coordination and inspection, and as-built recording, will be undertaken internally by EWS. Design, construction, and geotechnical assessments will be completed by external resources. Where possible, work will be coordinated with other projects or maintenance activities to minimize costs.

EPCOR WATER SERVICES

Appendix G-8

Business Case

HIGH PRIORITY RENEWAL PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. The High Priority Renewal (HPR) Program focuses on emergency and high priority repairs and replacements within the wastewater collection system of assets such as service pipes, catch basins, mainlines, maintenance holes, outfalls, force mains and other small drainage assets where the total project cost is not expected to exceed $250,000. The HPR program also includes proactive service pipe relining to reduce future HPR needs. EPCOR Water Services (EWS) has forecast total program capital expenditures during the 2025-2027 PBR term at $72.2 million.

2.0 BACKGROUND

2. Deterioration of drainage infrastructure as it ages increases the risk of unexpected failures that can disrupt sewer service to homeowners and businesses and result in safety issues or environmental impacts. Typical failures can include collapses or structural failures of sewers, services, maintenance holes, catch basins, outfalls, and force mains. These failures require high priority and emergency replacements or repairs, and in the case of emergencies, immediate attention.

3. EWS owns and operates over 6,500 km of sanitary, storm, and combined sewers and over 446,000 services. More than half of the sewer pipes, as well as more than half of the services, are now over 45 years of age. Historically, within the HPR program, a substantial portion of both high priority and emergency replacement and repair work has occurred on assets between the ages of 50 to 70 years which now makes up approximately 30% of the in-service assets as shown in Figures 2.0-1 and 2.0-2.

Figure 2.0-1
Asset Age of Sewer Pipe by Length

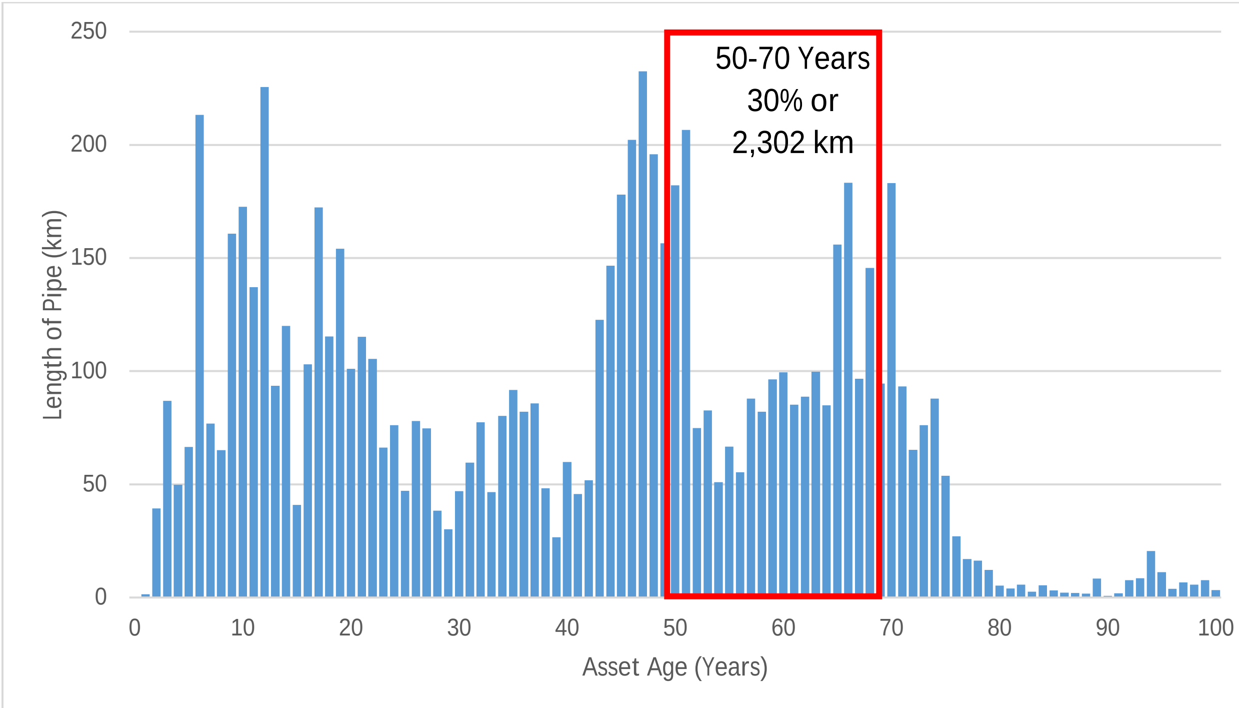
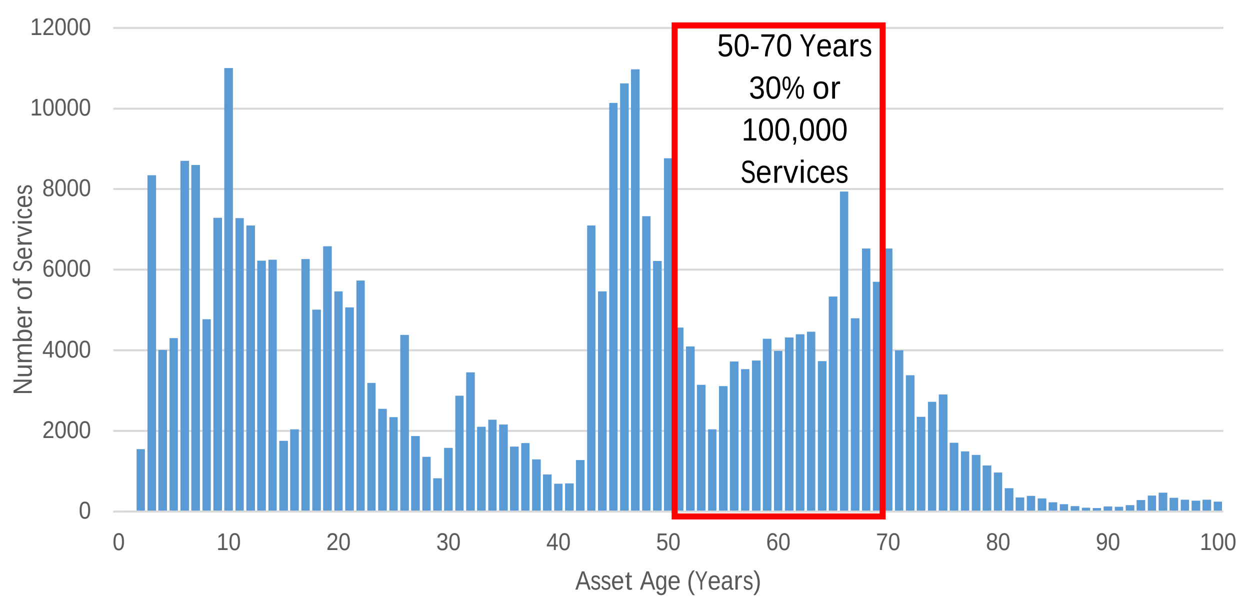


Figure 2.0-2
Number of Services by Asset Age



4. High priorities and emergencies are identified either through regular inspections or through customer calls to the EWS Control Center. EWS's construction crews may replace a pipe section or full length of mainline or service to rectify the situation or there may be a requirement for further assessment before proceeding with design and repair or replacement. Table 2.0-1 explains the difference between emergency and high priority renewal criteria.

Table 2.0-1
Emergency and High Priority Renewal Criteria

Priority	Definitions/Check List	Timeline for Renewal
1. Emergency	• Sanitary service is collapsed/broken on EPCOR side of the property line. • Service Maintenance/Operational crews were unable to release the service. • A Service Maintenance foreman has confirmed that the collapsed/broken pipe is on EPCOR side if it was not clear as per the initial crew visit.	24 Hours / Within a day
2. High Priority	• Sanitary service is in poor condition on EPCOR side of the property line. • There can be one factor or multiple factors contributing to the poor condition. • Service Maintenance/Operational crews were able to release the service. • A Service Maintenance foreman has confirmed the poor condition on EPCOR side if it was not clear as per the initial crew visit.	1 day to 365 days / Within a year

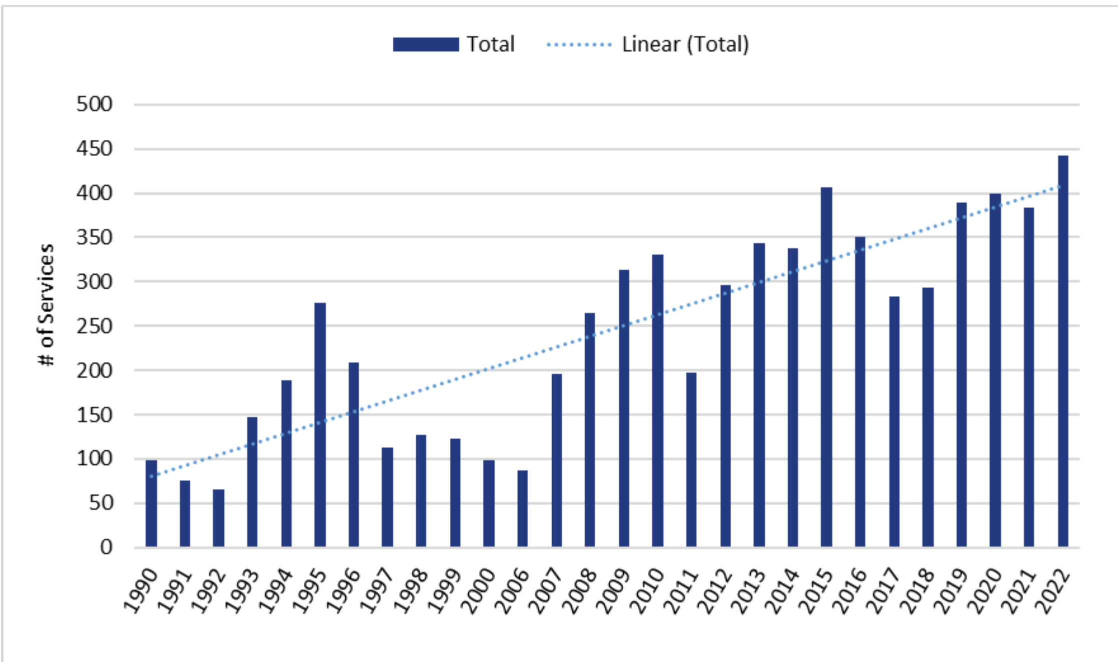
5. Historically, high priority and emergency work completed in the HPR program has been 69% services (around 400 locations per year), 22% catch basins and catch basin leads (around 100 locations per year), and 8% mainlines and maintenance holes (around 50 locations per year). While other infrastructure such as force mains and outfalls can fall under the scope of the HPR program, they typically comprise less than 1% of the program or less than 10 locations per year.

6. Mainlines, maintenance holes, catch basins and catch basin lead failures include failures to the barrel of the structure, the frame and covers, pipe collapse, and disconnections between the basin/barrel and the connecting pipes or leads. These failures can lead to street flooding, backups, environmental releases, or subsidence. As mentioned above, EWS responds to an average of 100 failures of catch basins annually and around 50 maintenance hole and mainline failures annually. Repairs can consist of shallow excavations, frame and barrel replacement, as well as catch basin lead repairs.

7. Services owned by EWS are defined as the service pipe from the lateral mainline to the property line. Services within private property from the property line to the home are owned and

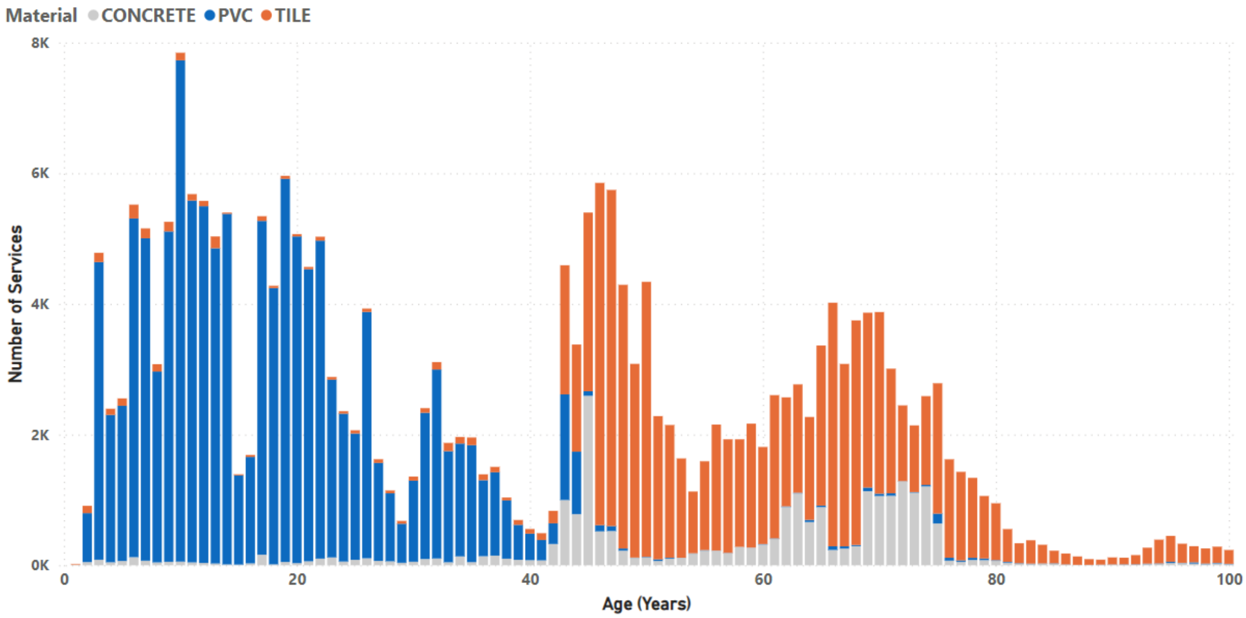
maintained by the owner. EWS maintains over 446,000 sanitary (60%) and storm (40%) services. Most services are over 40 years old with the median ages at 43 years for sanitary services and 47 years for storm services. Due to this aging infrastructure, EWS receives on average 2,300 annual calls related to service issues which result in a high frequency of reactive maintenance. Figure 2.0-3 below indicates that there has been a steadily rising trend of service replacements each year.

Figure 2.0-3
Historical Service Replacements Per Year



8. Service replacements are predominantly 1950's clay tile services, averaging a 65 year life span. Figure 2.0-4 shows that these failures correlate with the peak installation period that started around 1953 and continued to 1961. This peak will start to decline over the next few years before climbing once again to the highest quantity of clay tile installations that occurred between 1974 and 1978. At this time, industry transitioned to polyvinyl chloride (PVC) pipe which are inherently less prone to failures, offering increased reliability and durability compared to clay tile services.

Figure 2.0-4
Upcoming Wave of Services Expected to Experience Failure



9. This data highlights the likelihood of a significant increase in failures within the next 15 years. To effectively address this anticipated rise, proactive renewal of clay tile services before potential failures occur will be incorporated into the program. Proactive repairs will be carried out through relining, employing either a qualified external contractor, or utilizing in-house Blue Light Relining (BLR) technology.

10. BLR is a trenchless relining technology acquired by EPCOR during the current PBR that enhances the efficiency of our crews in completing service repairs. This technology enables EWS to add a proactive component that is not only cost-effective but also well-suited to support the anticipated surge in the volume of service replacements required.

11. With a large cohort of clay tile services approaching 50 years in age, it was anticipated that the number of service failures would begin to increase in proportion to the increasing number of aging assets. The Proactive Service Renewal Program was initiated as a standalone program in the 2022-2024 PBR with the goal of reducing the number of emergency and high priority renewals needed in the future. Proactive renewal provides a means to reduce the risk of failure for a service by reinforcing the existing pipe structure with a liner insert. Because the pipe has not yet failed, the cost of relining is between 20% to 50% lower than an emergency repair for an equivalent pipe and can be completed more promptly and with less overall resources. In the 2025-2027 PBR term, the Proactive Service Renewal program has been presented in combination

with the High Priority Repair Program as it was found that both programs need to coordinate and align project activities to avoid replication of effort, and to support the overall goal of reducing the occurrence of emergency repairs.

12. During proactive, high priority and emergency service renewals, EWS does not currently coordinate with the property owner to identify opportunities for simultaneous renewal to both the section of service owned by EPCOR and the section of service owned by the property owner. There may be several benefits of extending relining to encompass the privately owned asset, such as cost efficiency since deployment has already occurred, decreased risk of customer interruptions from a failure on their side of the asset, and reduced inflow and infiltration entering the sewer system through cracks and holes. With that in mind, EWS is reviewing the feasibility of extending service connection relining activities to also include the private portion which could be included in future PBR terms.

3.0 JUSTIFICATION

13. Due to an aging wastewater collection system, emergency and high priority work is inevitable. Emergencies arise that need to be dealt with in a timely fashion to maintain service for our customers. The HPR Program is essential to address unforeseen failures or urgent situations that may arise in the system. Aging infrastructure is susceptible to unexpected breakdowns, and emergencies such as pipe failures can disrupt service and pose environmental risks. A dedicated program allows EWS to promptly respond to these situations, ensuring timely repairs or replacements to maintain the system’s functionality and prevent prolonged service disruptions.

14. Additionally, given that a significant number of the high priority and emergency renewals that arise are related to services, it is beneficial to proactively reline services to mitigate the future burden of a surge of service failures. Risks associated with the growing number of services in poor condition include:

- Financial Risk – open cut emergency repairs are costly, and the number of high priority service replacements are increasing each year.
- Customer Service Disruptions – customer frustration and potential damage to customer properties will increase as more customers deal with service issues such as blockages and sewer back up, and the reputation of EPCOR will be impacted.

15. Proactive relining typically costs between $14,000 and $18,000 per service depending on service length, which is a significant costs savings over the reactive open cut costs of

approximately $38,000 per service. This approach is also less invasive for the customer as in many cases it avoids cutting into sidewalks and roads or impacting existing trees or landscaping. It also reduces the construction time by about half, further reducing the impact to the customer.

16. In addition, the benefit of proactively relining services with structural issues and ongoing maintenance needs is that it eliminates ongoing, repetitive operational maintenance costs, claims, and dissatisfied customers by reducing the number of disruptions and customer complaints associated with service backups and blockages. Relining technology is effective at preventing root intrusions and crack formation/propagation in services, and by prioritizing services on the EWS Root Maintenance Program, it is a solution that can provide a reduction in operational expenses in future PBR terms. With approximately 1,850 services on the Root Maintenance Program currently, the average cost to maintain these services is around $700,000 annually. This program will allow EWS to continue to provide a high level of service to customers by reducing the risk of service failures and minimizing disruptions.

4.0 PROGRAM SCOPE

17. The HPR Program scope will consist of both reactive and proactive renewal.

4.1. High Priority Repair – Reactive Renewal

18. Locations are initially investigated by the Wastewater Collection team. EWS then uses a risk-based approach to review the condition of the asset and prioritize the work. Each location is assessed and given a risk score utilizing a standardized assessment tool. This ensures an objective process is followed and that locations presenting higher risk are prioritized. Situations where an asset is completely blocked or collapsed are considered emergencies, and crews will respond immediately to mitigate damages to the customer.

19. The estimated scope of reactive work is approximately 650 locations per year over the PBR term. Actual work completed will depend on the number and type of high priority or emergency repairs required to restore or maintain service to customers. Based on previous years, it was found that of all work completed in the HPR program, 69% were services, 22% were catch basins and catch basin leads, 8% were mainlines and maintenance holes, with a small number of other repairs (i.e. outfalls, forcemains, etc). Large scale rehabilitations or replacements, generally greater than $250,000, are treated as separate standalone projects outside the scope of this program.

4.2. Proactive Service Renewals

20. As outlined earlier, a surge in required service renewals is anticipated over the next 15 years. This has led to EWS identifying an opportunity to address this challenge by incorporating proactive relining work into the program. Specifically, the focus is on relining services that have not yet reached the stage requiring high priority or emergency replacements. Currently, there are approximately 490 locations that have been identified as needing service replacement or renewal but do not meet the risk ranking criteria to be prioritized in the annual reactive HPR program. These locations are predicted to fail in the next 2-5 years. Most of these locations can be dealt with through a relining method.

21. In addition to the 490 locations identified above, there will also be targeted inspections for service renewals in areas with a history of frequent high priority service repairs or significant numbers of homes on the Root Maintenance Program. Inspections will be reviewed and assessed for condition and operational issues, and subsequently prioritized based on risk scores. The relining work will be undertaken either in-house using the BLR technology or using a qualified external contractor as necessary depending on in-house resource availability.

22. The estimated scope includes approximately 300 service renewals per year, or 900 total over the 2025-2027 PBR term, although the actual number will fluctuate as costs per service will vary depending on length, technology used, etc. The number of renewals completed will be balanced within the overall budget envelope.

5.0 ALTERNATIVES CONSIDERED

5.1. Alternative 1 – Delay Work

23. In this option EWS would decrease total resourcing for the HPR program and reduce the annual number of priority and proactive relining completed. This approach shifts a portion of the backlogged assets into the next PBR term. Given the approaching surge of aging assets, this approach was rejected as it presents the risk of causing a large jump in resourcing and program costs in the subsequent PBR term.

24. In addition, this alternative would continue to place increased demand for services on the Root Maintenance Program. Currently, services that are deemed to be candidates for maintenance are placed on a one or two-year cycle. Service crew’s auger roots by means of the private cleanout to ensure the service is not susceptible to infiltration. Maintaining the public

portion in this manner does pose a liability risk, but it also benefits the customers as their pipe also receives root removal at the same time. A disadvantage to this method is that the maintenance cycle does not actually fix the issue and ultimately runs the pipe to failure. This alternative also runs the risk of causing sewer back up in the home. This is not a viable option as EWS has an obligation to maintain service for its customers.

5.2. Alternative 2 – High Priority Repairs with No Proactive Service Relines

25. This alternative would continue to focus on the high priority and emergency repairs, without taking on any proactive relining of services. This would result in the anticipated surge of service failures in the coming years, consequently increasing the need for costly emergency open cut replacements. Open cut replacements involve excavation at an average cost of $38,000 per service. This approach commonly requires excavating and subsequently restoring portions of the public street and sidewalk, as well as private landscaping and driveways. In comparison, a proactive service reline costs between $14,000 and $18,000 depending on the service length and the reline technology used. This alternative is not recommended.

5.3. Alternative 3 – Increased Proactive Service Relines

26. This alternative involves increasing the number of services proactively relined each year. The advantage of increasing investment in proactive relining is that it is a cost-effective means to reduce future high priority and emergency replacements and can decrease the risk of service interruptions for a larger cohort of customers.

27. EWS has identified 490 services as candidates for proactive relining in the 2025-2027 PBR term. The current program scope has allocated $16.2 million for proactive relining in this period which will provide for the relining for approximately 900 services. This provides an allocation for an additional 410 relining locations to be completed which will be identified through the existing planned service inspections. Increasing the reline target to exceed 900 locations is possible by increasing the number of service inspections over the next 3 years. However, the current inspection levels represent an optimal use of current resources relative to present asset risks for the existing cohort of services. Further increasing the resourcing allocations for inspections is not anticipated to provide cost-effective reduction in total system risk relative to other rehabilitation and proactive renewal projects. Further increases in proactive relining was therefore rejected.

5.4. Alternative 4 – Proactive Reline of Public and Private Services

28. This alternative proposes to extend the relining process beyond the property line to include both the public side of the service as well as the private portion up to the home. However, this approach introduces complications and heightened liability concerns associated with working on private property. It also increases the demands on project management or external contractors to coordinate with customers. In addition, the additional costs per service would lead to fewer total relines being completed compared to when only the public side is addressed. While this option may be revisited in future PBR terms, it is not recommended at this time.

5.5. Alternative 5 – High Priority Repairs with Proactive Service Relines

29. This alternative includes continued focus on high priority repairs, while also taking the opportunity to proactively reline services before they reach a state where high priority or emergency replacements are required. This alternative is recommended as a cost effective and risk-based approach.

6.0 COST FORECAST

30. Project costs are estimated based on historic costs for both high priority repairs and proactive service relines. High priority and emergency work is estimated at approximately $38,000 per location, while proactive relines are estimated at an approximate average of $18,000 per location. The capital expenditures for the 2025-2027 PBR term are shown in Table 6.0-1 below.

Table 6.0-1
HPR Program Capital Expenditure Forecast ($ millions)

	2025	2026	2027	Total
1. Total Capital Expenditures	23.4	24.1	24.7	72.2

31. In addition to the table above, Table 6.0-2 provides the estimated capital expenditure by sub-program during the 2025-2027 PBR term, while Table 6.0-3 shows the further breakdown of the High Priority Repair Program by asset type.

Table 6.0-2
Program Cost Breakdown ($ millions)

Program	Capital Expenditure Forecast
1. High Priority Repairs – Reactive Renewals	55.9
2. Proactive Service Renewals	16.3
3. Total Capital Expenditures	72.2

Table 6.0-3
High Priority Repair Asset Cost Breakdown ($ millions)

High Priority Repair Asset Types	Capital Expenditure Forecast
1. Services	38.6
2. Catch Basins and Catch Basin Leads	12.3
3. Mainlines and Maintenace Holes	4.5
4. Other	0.5
5. Total Capital Expenditures	55.9

7.0 KEY RISKS AND MITIGATION PLANS

32. EWS has identified the key risks and mitigations associated with the execution of this program in Table 7.0-1 below.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Environmental Risks – Release of untreated sewage	EWS will train employees to contain potential releases and will hydrovac and dispose of contaminated soil in an approved landfill
2. Customer Service Disruptions	EWS will inform customers of the issue and upcoming work. Emergency utility locates are acquired and service is restored within 48 hours
3. Customer Property Damage	EWS would utilize the score based on EPCOR risk approach to ensure that jobs are prioritized appropriately. Allowing construction crews to complete repair prior to failure.
4. Health and Safety Risks – Sink Holes Disrupting Traffic	EWS will ensure the area is secured immediately and made safe for the public and traffic is diverted. Repairs are prioritized as emergency based on their impact to public safety and disruption to traffic
5. Health and Safety Risks – Reline material not properly cut-out at connections causing sewer backups	Ensure EPCOR hires reline contractors that are competent and have a track record of producing quality work.
6. Financial Risks – Damage to Public Property Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	EWS crews ensure utility locates are in place prior to excavation. EWS will ensure the job is planned to minimize damage to public property. The activities in this program have been previously carried out, and a general understanding of the tasks and costs have been developed. Project costing is typically reviewed to ensure it aligns with assumptions and expectations. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency

	budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.

8.0 RESOURCES

33. High Priority renewals are dealt with primarily utilizing in house construction resources. Most sewer replacements are completed with the open cut method with support from external service providers such as hydrovac, fillcrete and asphalt restoration. Proactive service relining will be completed using a combination of both internal and external resources. Internal staff within EWS will undertake project related activities including drafting, project management, construction coordination, as well post rehabilitation inspection.

EPCOR WATER SERVICES

Appendix G-9

Business Case

INFLOW AND INFILTRATION RELINING PROGRAM

May 31, 2024

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1.0 OVERVIEW

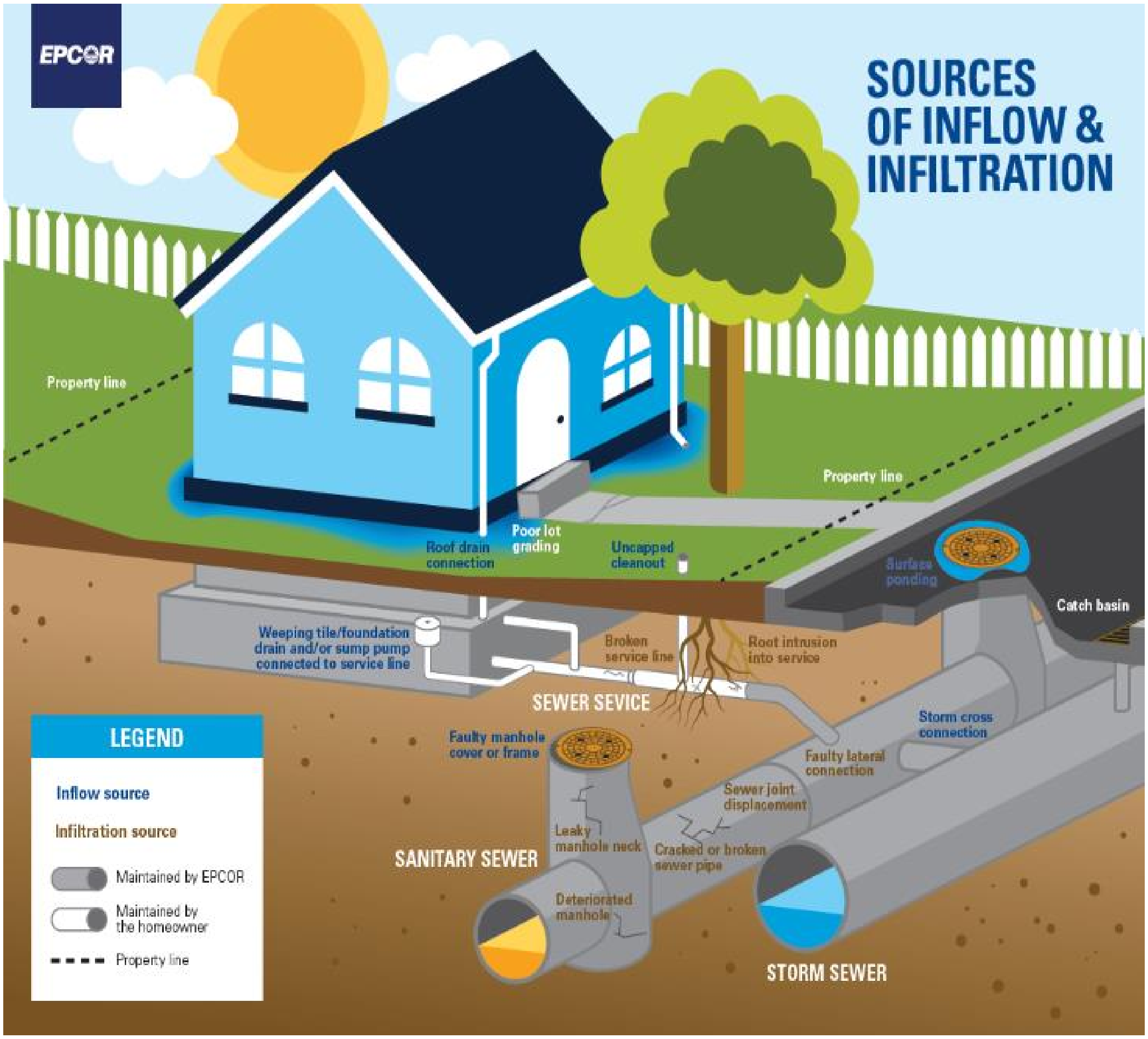
1. The Inflow and Infiltration (I/I) Relining Program consists of annual programs focused on reducing inflow and infiltration into the sanitary and combined sewer systems to decrease the risk of flooding due to sewer backups and to create capacity within the existing sewer network to accommodate the City of Edmonton's growth targets. The scope of this program includes the inspection, repair, and relining of manholes and sanitary and combined sewer pipes in areas, with high I/I such as local sags, and low-lying areas. EPCOR Water Services' (EWS) has forecast the total program capital expenditures during the 2025-2027 PBR term at $29.2 million.

2.0 BACKGROUND

2. EWS's Stormwater Integrated Resource Plan (SIRP) is a system wide integrated approach to mitigate flood risk by reducing the health, safety, and social risk of flooding with lower overall capital investment than compared to traditional engineering approaches. SIRP recommended a five-theme strategy for flood mitigation (SLOW, MOVE, SECURE, PREDICT and RESPOND) that included a mix of grey infrastructure (trunks and tunnels) and green infrastructure (dry ponds, low impact development). The SIRP I/I Relining Program is a critical component of the SIRP Strategy under the SECURE theme.

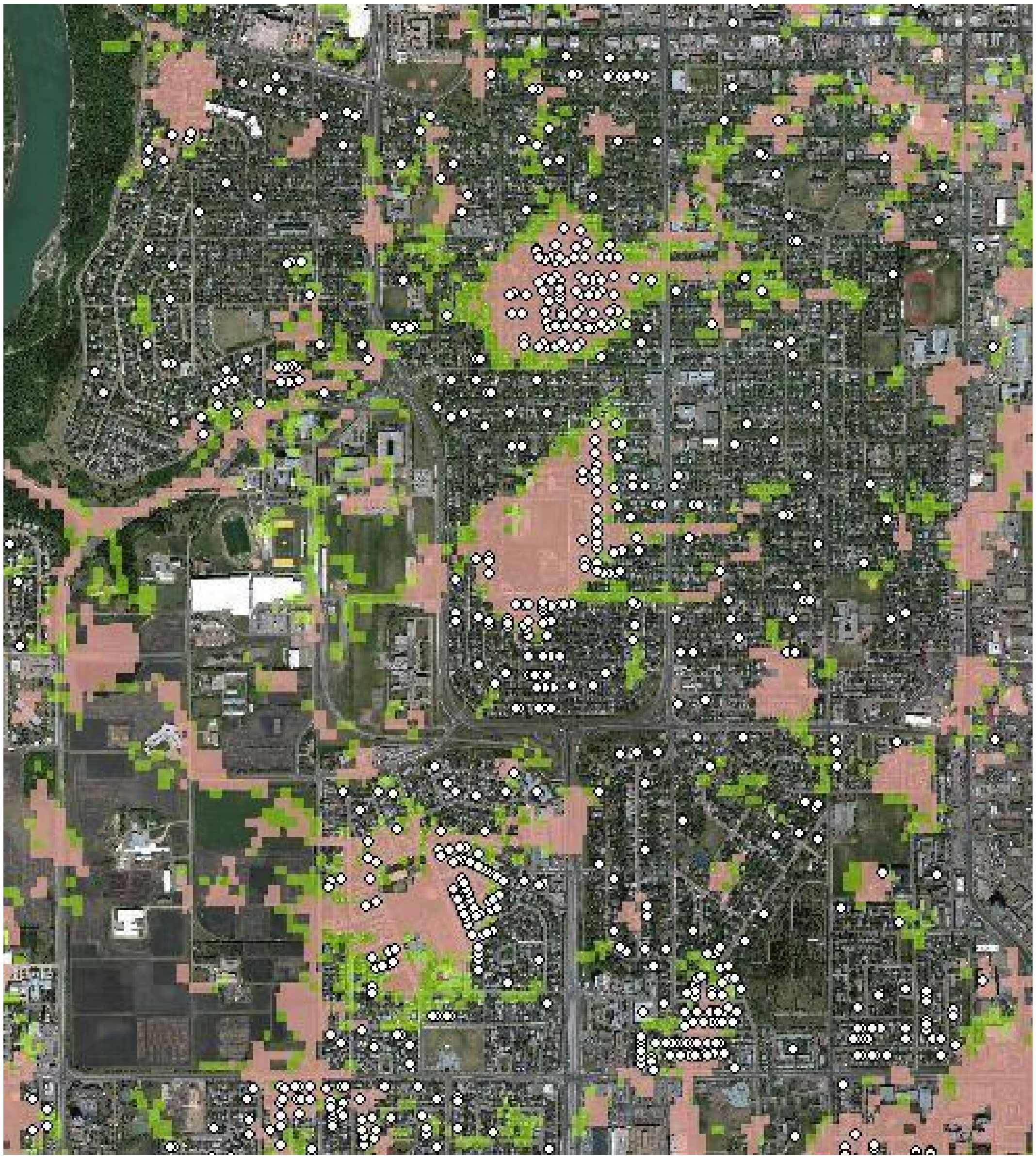
3. I/I reduces the capacity of the collection system by allowing stormwater and groundwater flows to enter into the sanitary and combined system through cracks or holes in the infrastructure, or by direct connections of roof or foundation drains. SIRP identified that there is an increased risk of basement flooding in areas where water ponding occurs on the road prior to draining through the piped stormwater network. These low-lying areas have a higher risk of I/I through cracks and open joints, increasing the risk for sewer backups during extreme rainfall events. This can lead to increases in health, safety, environmental and financial risks for EWS and its customers due to the potential for sewer backups, basement flooding, environmental contamination, costly emergency repairs, and service disruptions. The increased flood risk in localized sag areas is illustrated in Figure 2.0-1, depicting various paths through which stormwater can enter properties during flooding events. The longer the storm water pools on the road surface, the greater the risk of it accessing the sanitary pipes and/or foundation drains of properties lacking adequate flood proofing, potentially entering the buildings. The SIRP strategy therefore focuses on programs aimed at mitigating the risk of system overloading and water ponding in these localized sag areas during a storm event.

Figure 2.0-1
Typical Household Connections



4. The higher risk of ponding to properties was evident from the risk analysis of the stormwater sub basins where water was predicted to pond on the roads after a storm event. Historical basement flooding records for Edmonton confirmed this increased risk level as shown in Figure 2.0-2. This figure identifies customer calls to 311 to report flooding events from 2003 to 2016 represented by white dots. The pink and green areas represent the ponding areas identified by the insurance industry pluvial flood modelling using federal topographical maps under various storm intensities. The strong correlation between predicted ponding locations and historical basement flooding records suggests that I/I significantly contribute to basement flooding.

Figure 2.0-2
Comparison of Ponding Areas from Insurance Maps with 2003-2016 Basement Floods



Predicted Ponding Areas ○ Reported Flooding Events

5. In addition to supporting SIRP objectives, this program also supports EWS's Sanitary Integrated Resource Plan (SanIRP). SanIRP focuses on ensuring the high operational, environmental, and financial performance of the sanitary and combined sewer collection system in the long-term as the city transitions to growth through infill development. It is common for some stormwater to enter sanitary sewers through I/I, and in practice, nearly half of the capacity of a sanitary pipe is reserved for the additional flows introduced by a storm event. SanIRP

recommends the reduction of I/I to increase capacity of the system. Implementation of this program provides capacity for future growth in the existing sanitary and combined sewer collection system.

6. The I/I Relining program consists of Proactive Manhole Sealing and Proactive Pipe Relining, which are focused on securing individual properties in higher risk areas against flooding. Through this program, the volume of stormwater entering the sanitary and combined sewer networks will be reduced.

3.0 JUSTIFICATION

7. Relining work is critical to reducing I/I and minimizing the potential for sewer backups and basement flooding in low-lying areas during extreme rainfall events. Relining is an effective solution for reducing I/I by sealing cracks, fractures, and joints in the existing infrastructure through the addition of a new, impermeable lining, preventing I/I from entering the system.

8. Consequences of not completing this program include:

- Health and Safety Risks – Excessive I/I could pose a safety risk to the EWS staff who operate and maintain the drainage infrastructure. There is also a safety risk to the public if the area is flooded due to high I/I causing spilled sewage and basement backups.
- Environmental Risks – Excessive I/I could lead to floods and sewage spills to the local environment or water bodies and may cause damage or contamination to the natural environment and wildlife. This will affect the usage of these facilities by the public and require substantial investment to restore the affected areas. The release of untreated sewage into the environment also violates Drainage's Approval-to-Operate issued by Alberta Environment and Protected Areas.
- Financial Risks – High I/I can lead to flooding which is costly to manage and clean up and can lead to claims from customers with flooded basements impacting the level of service and expectation of customers.
- Reputational Risks – High I/I could lead to neighbourhood flooding especially for customers in localized sag areas.

9. In addition to mitigating the risks identified above, the program's focus on reducing I/I helps to regain pipe capacity for infill development, delaying the potential need for pipe upsizing and prolonging the life of existing infrastructure.

4.0 PROGRAM SCOPE

10. This program will focus on reducing I/I through the implementation of Proactive Manhole Sealing and Proactive Pipe Relining.

4.1. Proactive Manhole Sealing

11. Proactive Manhole Sealing will focus on reducing I/I by relining the top 1.5 meter portion of sanitary manholes as shown in Figure 4.0-1.

Figure 4.1-1: Typical Manhole Before and After Sealing

Before After

12. The majority of I/I is due to surface runoff entering a manhole around the manhole neck and cone area which is about 1.2 to 1.5 m below surface. This is the area that receives the most impact from traffic. Unless there is evidence of major cracks along the manhole barrel, relining the top portion of manholes is the most cost effective approach to minimize I/I from entering to sewer pipe through the manhole. In areas where the depth of ponding exceeds 0.30 meters, manhole covers will be partially sealed to further prevent water flowing directly into the manhole through the pick-holes. This will extend the life of manholes and reduce service disruptions due to manhole collapses.

13. EWS has identified more than 9,000 sanitary manholes that are located in ponding areas across the city. Since 2019, EWS has sealed and relined nearly 4,000 of these manholes. EWS is planning to continue to seal and reline the remaining 5,000 manholes based on ponding depth and priority of the SIRP risk ranking. SIRP risk ranking is developed based on a combination of risk level from four different consequence categories: Health and Safety, Environmental, Financial

and Social. Each storm sub-area is then placed into one of eight risk groups (A to H) and assigned a Risk Level of High, Medium High, Medium, Medium Low, and Low.

14. The scope of this program for the 2025-2027 PBR term includes:

- Inspection of manholes in sag areas
- Repair of severe structural defects of manholes prior to relining if needed
- Relining a total of 2,000 manholes located in sag areas within the selected neighbourhoods
- Sealing manhole covers for approximately 1,200 manholes to prevent wet weather inflows through the pickholes.
- Replacing manhole frames in manholes with identified maintenance issues in areas with critical ponding depths.

15. Selected manholes will first be inspected to confirm condition. After the field inspection and condition assessment, EWS will address manholes with severe structural defects prior to relining if required. Based on site inspections, EWS estimates that roughly 25% of manholes will require minor repair works and 5% will require major structural rehabilitation. As there are many products available in the market, the most suitable method for relining and sealing will be finalized at the procurement stage.

16. This program is based on EWS's 10-year plan to complete a total of 9,000 manholes in ponding areas by 2030. As of early 2024, approximately 4,000 of these manholes have been completed.

4.2. Proactive Pipe Relining

17. Proactive Pipe Relining work focuses on relining sanitary and combined sewer pipes in surface ponding areas to reduce I/I from entering through cracks and open joints. Since 2019, about 15 km of relining has been completed annually under this program.

18. Prolonged surface ponding over low-lying areas leads to a higher risk for I/I to occur through cracks and open joints in sewer pipes. Through pipe relining, the volume of stormwater entering the sanitary and combined sewer networks can be reduced. Approximately 1,300 km of sanitary and combined pipes with varying diameters are located in low-lying areas across the city.

19. Focus areas for the program are selected according to the SIRP risk ranking and low-lying areas with surface ponding of greater than 0.3 meters. As described earlier, the SIRP risk ranking is developed based on a combination of risk level from four different consequence categories: Health and Safety, Environmental, Financial and Social. Each storm sub-area is then placed into one of eight risk groups (A to H) and assigned a Risk Level of High, Medium High, Medium, Medium Low, and Low.

20. The I/I relining program priorities are now also driven by growth and capacity needs identified through Sanitary Integrated Resource Plan (SanIRP). SanIRP has identified five priority sanitary planning areas where the confluence of the City's priority growth nodes/corridors and existing piping infrastructure can greatly benefit from increased I/I management. The I/I Relining program will focus investment in 5 priority Sanitary Planning areas for the purpose of reducing the need to build new capacity locally. The 5 priority areas targeted in the 2025-2027 PBR term are Jasper Place, Mill Woods, Yellowhead West, Calgary Trail, and Castle Downs.

21. The scope of this program for the 2025-2027 PBR term includes:

- Review of existing inspection reports of sanitary and combined pipes in low-lying areas to confirm the suitability for relining. This process is required to identify if open cut repairs are required prior to relining due to structural damage of the pipe section.
- Cleaning all pipes and carrying out Closed Circuit Televising (CCTV) inspections to identify any structural damage, if needed, prior to relining.
- Relining of an estimated 40 km of sanitary and combined pipes with diameters of equal or less than 750 mm at low lying areas with surface ponding of greater than 0.3 meters.
- Relining of service laterals as needed. An estimate of 5.5 km of service relines will be required for the 2025-2027 term.
- Temporary bypass pumping required during relining of the pipes.
- Restoring all service lateral connections.

22. Proactive pipe relining reduces the risk of sewer backup and basement flooding due to excessive I/I entering the sanitary and combined sewers at known surface ponding areas. It also creates capacity in the sanitary system to accommodate future growth projections. The program will coordinate with other sewer relining initiatives to ensure alignment and avoid any conflicts of schedule.

23. If it is determined that I/I is a result of sever asset condition deterioration requiring structural repairs then the pipe will fall under the scope of its respective rehabilitation program.

5.0 ALTERNATIVES CONSIDERED

5.1. Alternative 1 – Do Nothing

24. A do-nothing alternative was considered for this project. Not pursuing I/I reduction poses a risk of continued flooding to residents. Significant I/I defects could also lead to failure of the sewers, resulting in a significant service disruption to customers. Unplanned emergency repairs also tend to be more costly than a planned approach.

5.2. Alternative 2 – External Wraps

25. Wraps are a flexible and adhesive butyl material with an abrasion resistant backing. Installation of wraps in place of relining manholes would require excavation and is usually more expensive than relining. The cost for excavation, restoration and external wraps is approximately $10,000 per manhole.

5.3. Alternative 3 – Replace Manholes and/or Pipes

26. This alternative would replace the assets through open cut methods instead of through relining. In general, replacing manholes and pipes is more costly than relining and new installation may not be effective in preventing I/I. For example, the unit cost for relining a 600 mm diameter pipe is about $500/m, while the unit cost for installing a new 600 mm diameter pipe is about $7,500/m. Therefore, in this example, the unit cost for new pipe installation is about 15 times higher than the relining works. In situations where the asset structural condition has deteriorated to the point of requiring replacement, the work would be completed under a separate program, such as Local Sewer Rehabilitation.

6.0 COST FORECAST

27. The program cost estimates are based on previous projects and historical costs. Table 6.0.1 provides the capital expenditures forecast for the 2025-2027 PBR term.

Table 6.0-1
I/I Relining Program Capital Expenditure Forecast ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	9.5	9.7	10.0	29.2

28. Table 6.0.2 provides the estimated capital expenditures for I/I by program during the 2025-2027 PBR term.

Table 6.0-2
I/I Relining Program Capital Expenditure Forecast by Asset Type ($ millions)

Project	Capital Expenditure Forecast
1. Proactive Manhole Sealing	12.7
2. Proactive Pipe Relining	16.5
3. Total Capital Expenditures	29.2

7.0 KEY RISKS AND MITIGATION PLANS

29. Table 7.0-1 provides a summary of the key risk associated with executing this program and EWS's plans to mitigate these risks.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – High I/I can cause flooding and sewer backup which pose as a drowning and health risk to residents.	Proactive relining of pipes and manholes will reduce the amount of I/I and the associated risk of flooding and sewer backup.
2. Environmental Risks – High I/I can cause flooding and sewer backup which can release untreated sewage into the environment and violate the Approval-to-Operate.	Proactive relining of pipes and manholes in the high risk areas will reduce the amount of I/I and the associated risk of flooding and sewer backup.
3. Execution Risks – Using equipment such as jackhammers when replacing manhole structure may expose workers to silica dust, which over prolonged exposure can lead to silicosis. This condition is serious and can increase the individual's risk of developing cancer among other diseases. Furthermore, working in confined space without proper equipment, training, or permit results in injuries and potential fine from Occupational Health and Safety.	EWS will ensure contractors meet EPCOR safety standards and that contractors provide and follow all work safety plans including emergency response and rescue plan. Additionally, EWS will use appropriate kind of respirator to filter out silica (and other harmful substances) particles suspended in the air as well as using mechanized equipment so that workers are not directly exposed to the dust.
4. Financial Risks – Liner not properly cured resulting in rework and extra cost to the project. Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing. Risk that liner does not properly cure resulting in rework and extra cost to the project.	EWS will require contractors to submit the quality assurance/quality control plan including curing and temperature duration, confirm types of curing using and add clause for contractor to include monitoring for curing time and temperature. The activities in this program have been previously carried out, and a general understanding of the tasks and costs have been developed. Project costing is typically reviewed to ensure it aligns with assumptions and expectations. To mitigate cost escalations, thorough planning and proactive measures are essential. This can

	include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.
5. Customer Impact Risks – Risk of odour release through opening manholes during relining operations.	EWS will use non-odour releasing products, continuously monitor odour and assess the area during construction. EWS will ensure coordination so the manhole are not opened for extended periods of time.

8.0 RESOURCES

30. This program will be delivered by a design bid build method. EWS will complete site inspection, design, procurement, and construction using existing relining master service agreements as it does not have the equipment and expertise in installing liner to pipes and manholes.

EPCOR WATER SERVICES

Appendix G-10

Business Case

LARGE TRUNK REHABILITATION PROGRAM

May 31, 2024

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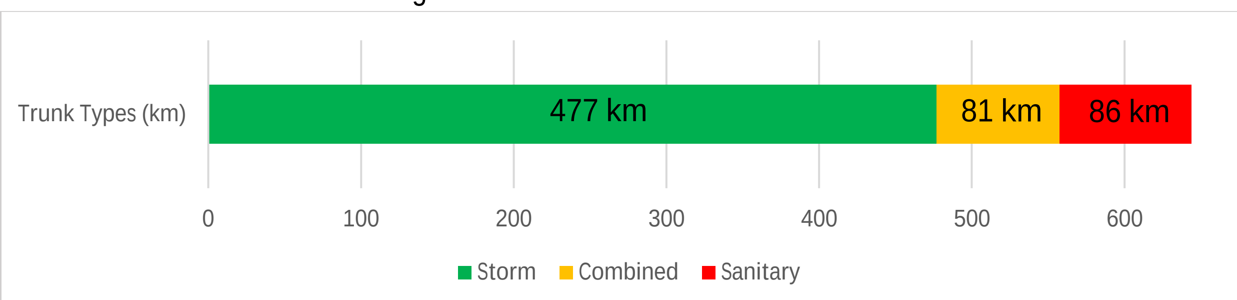
1.0 OVERVIEW

1. The Large Trunk Rehabilitation Program focuses on the rehabilitation of aging large trunks across the city of Edmonton. Large trunks are gravity fed sanitary, storm, and combined sewers greater than or equal to 1,200 mm in diameter. The scope of work includes inspections and rehabilitation of large trunks at a total spend of $85.8 million over the 2025-2027 PBR term.

2.0 BACKGROUND

2. There are approximately 643 km of sanitary, storm, and combined large trunk sewers constructed over the past 100 years to varying standards and specifications. Figure 2.0-1 shows the breakdown of the large trunk infrastructure into sanitary, storm and combined waste types. The average ages for sanitary, storm and combined trunk sewers are 37, 40 and 64 years, respectively. Additionally, premature deterioration has been accelerated by hydrogen sulfide (H_2S) induced corrosion in the sanitary and combined trunks, posing further challenges to the integrity of the infrastructure.

Figure 2.0-1
Large Trunk Infrastructure Breakdown



3. EPCOR Water Services' (EWS) Corrosion and Odour Reduction Strategy (CORe) was initiated in 2019 to understand, mitigate and prevent sewer odour issues across the city using a combination of capital and operational interventions. The CORe strategy focuses on preventing the formation of H_2S gas, reducing community odour impacts, and lengthening the life of sewer network assets. Under CORe, EWS segregates the city into regions with consistent odour issues, those with dynamic odour issues, and those with emerging odour issues. Different approaches have been proposed for each region to ensure that causes of the odour are fully understood and to ensure that capital projects will provide sustainable relief. The capital projects and operating

activities in CORe can be classified into four themes of investment: PREVENT, OPTIMIZE, MONITOR and CONTROL.

4. In 2023, a condition assessment study of the entire large trunk sewer network was completed using both observed defects and deterioration models based on age, material type, and waste type and produced a condition rating for each pipe. The resulting condition ratings were used to develop the Likelihood of Failure (LOF) for each pipe. Along with the LOF scores, Consequences of Failure (COF) scores were also completed across all six consequence categories using the EPCOR Risk Management Standards and Risk Matrix. The six consequence categories include Health and Safety, Environment, Regulatory, Reputation, Service Interruption, and Financial. A theoretical risk score was then calculated for each pipe and the results are shown on the matrices in Figure 2.0-2 and Figure 2.0-3, broken down into storm and sanitary/combined. Figure 2.0-4 shows that of the large trunks, the majority were constructed with concrete materials.

Figure 2.0-2
Storm Trunks Risk Matrix

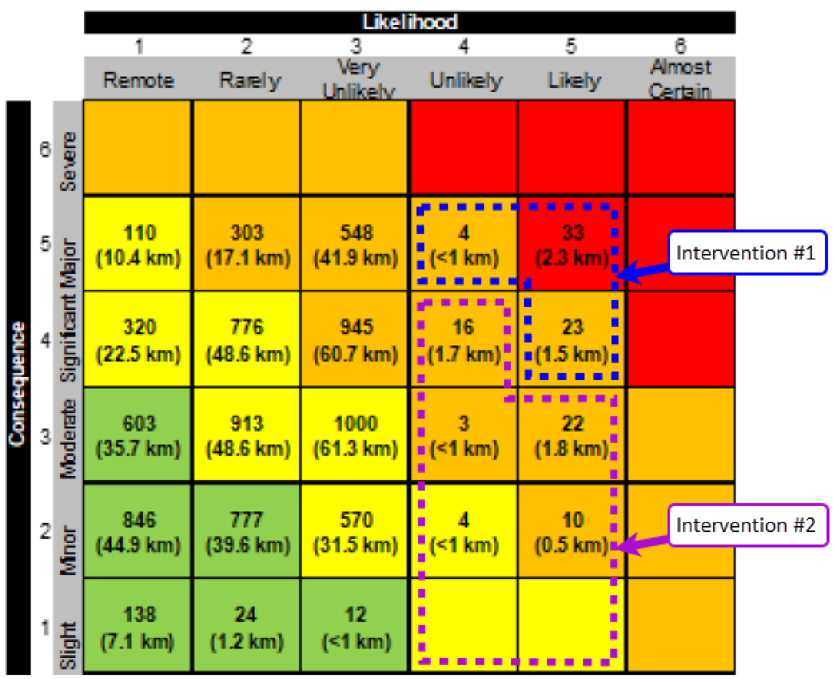


Figure 2.0-3
Sanitary/Combined Trunks Risk Matrix

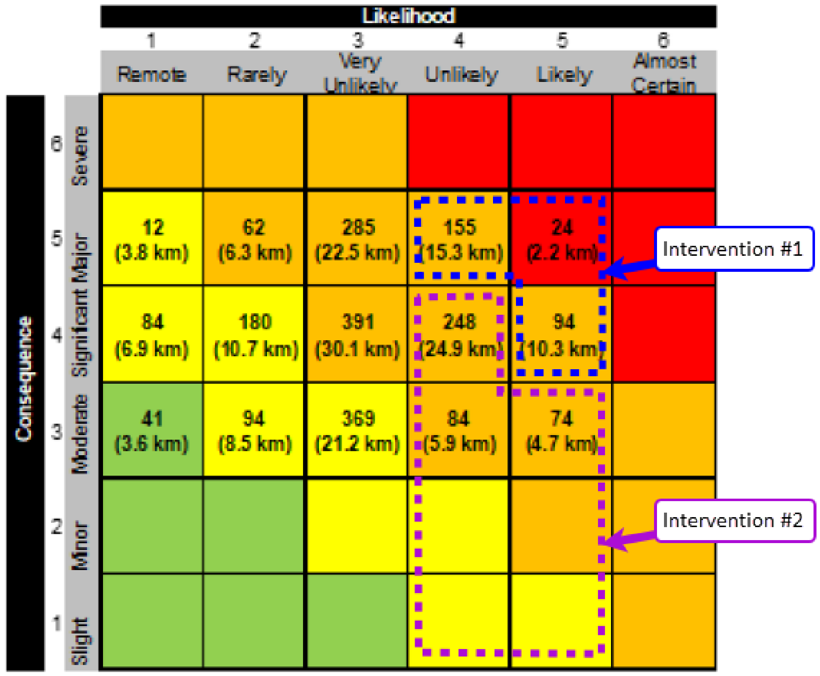
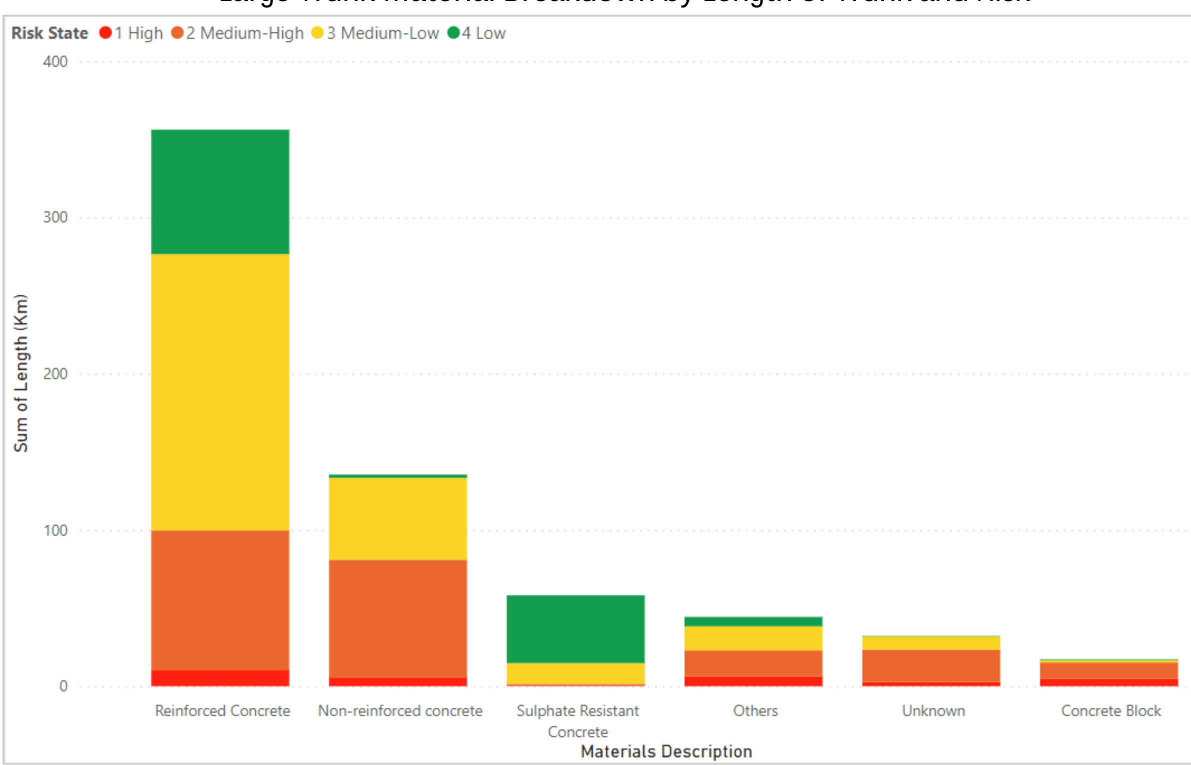


Figure 2.0-4
Large Trunk Material Breakdown by Length of Trunk and Risk



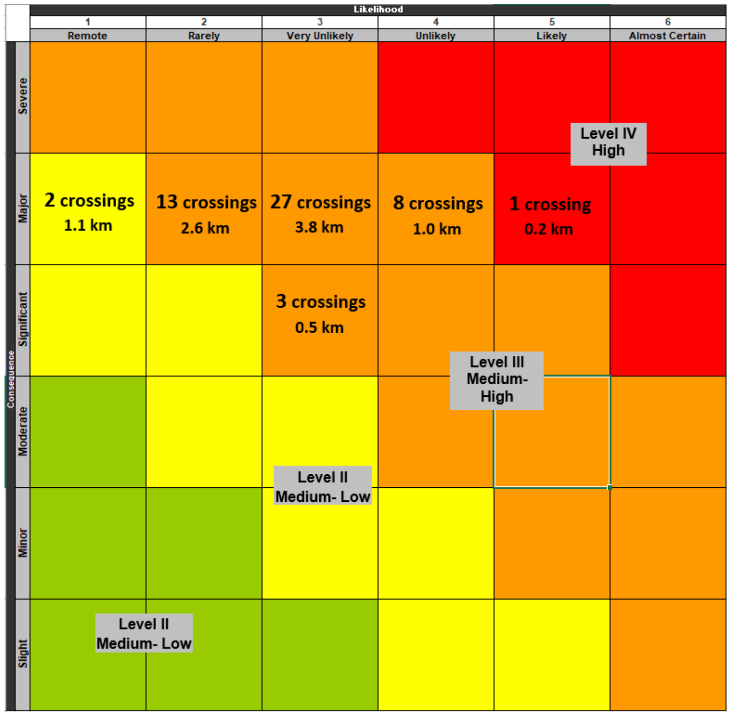
5. As illustrated on Figure 2.0-2 and Figure 2.0-3, each matrix can be divided into intervention actions for rehabilitation planning based on level of risk. There are about 73 km of trunks that fall into Intervention 1 and 2, with 65 km of those being sanitary or combined. This breakdown was used to prioritize further investigation and/or rehabilitation.

6. The Large Trunk Rehabilitation Program is a critical component of the CORe strategy under the PREVENT theme. The program focuses on the rehabilitation of large combined and sanitary trunk sewers greater than or equal to 1,200 mm in diameter. The rehabilitation projects are required primarily to prevent further corrosion to the system and lengthen the life of the assets damaged due to the corrosive gases in the wastewater collection system.

7. In addition to rehabilitation activities, EWS has identified that failures in the large trunk system can be reduced by enabling quick and efficient responses to perform emergency repairs on large trunks. Investments in capital upgrades, improvements or supporting infrastructure that provides bypass capacity is very effective at reducing risk for assets where the consequence of failure (COF) is the main driver.

8. Sections of large trunk that cross under sensitive areas such as the North Saskatchewan River, creeks, lakes, freeways, railways, pipeline corridors and buildings have been identified as assets where a focus on reducing the COF greatly reduces overall risk for the system. EWS is classifying trunk sections passing beneath those areas as major crossings. Major crossings are the focus area for sewer bypass investments. The risk of the top 55 major crossings is shown in Figure 2.0-5.

Figure 2.0-5
Risk Positions for Top 55 Major Crossings



9. A total of 269 major crossings for large trunks have been identified across the collection system. From those, 55 major crossings were further evaluated to identify bypass actions. The 55 major crossings were categorized into five scenarios with their own unique bypass approaches. The scenario types are detailed in Table 2.0-1.

Table 2.0-1
Bypass Approaches by Trunk Scenario

Scenario #	Scenario Description	Bypass Approaches	# Major Crossings
1	Existing pipe(s), route(s) and control structures available when a Bypass is needed.	Using the existing alternative route(s) or control structures.	18
2	Dry weather flows are not high (<1,000 L/s), and the flow can be diverted.	Using temporary pump station(s) / bypass skid(s).	21
3	Dry weather flows are high, and the flow cannot be diverted at the trunk location.	Multiple diversions built upstream or a redundant bypass trunk.	6
4	Dry weather flows are high, but the flow may be diverted or controlled using control gates.	Install control structures or gates to divert flows.	4
5	Dry weather flows are very high, and the flow cannot be diverted anywhere.	Proactive interventions; install a redundant trunk.	6

3.0 JUSTIFICATION

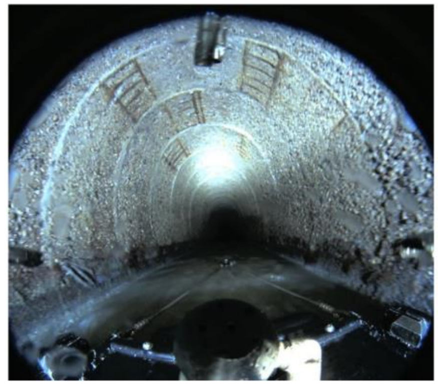
10. Assessing the condition of an aging sewer system, planning for rehabilitation, and improving bypass capacity is crucial for maintaining public health, environmental sustainability, and overall infrastructure resilience. As the system ages, it is prone to deterioration, leaks, and structural issues that can lead to contamination of water sources and pose health hazards. Failure to undertake the rehabilitation of large trunks in High and Medium-High risk categories could result in unexpected large trunk failures. Such failures may incur high emergency costs associated with repairs and have potential to affect large service areas and populations across the city. There are several risks associated with the deterioration and failure of large trunks:

- Health and Safety Risk – Failure of a large trunk could cause a subsidence on high traffic roadways or structural stability issues for infrastructure which poses a safety risk to the public. Replacing or rehabilitating pipe, maintenance hole and chamber will extend the life of the trunk and lower the risks of trunk failure.
- Environmental Risk – Failure of a sanitary or combined large trunk could cause a sewage spill to environment or water bodies (river, creeks, storm water management facilities, etc.) and potential fines. Replacing or rehabilitating pipe, maintenance hole and chamber will extend the life of the trunk and lower the risks of failure.
- Customer Disruption Risk – Failure of large trunks can cause disruption to large service areas impacting many customers and businesses for a few weeks or months and can cause sewer backups into customer's basements. Failed trunks also lead to emergency repairs which are more disruptive to high traffic roadways and therefore to the public. The odour reports and direct measurements of sewer gas surrounding certain assets is an indicator that sewer corrosion is a major risk factor in many trunk lines. Finding the affected trunk lines and implementing appropriate trunk rehabilitation will lower the risks of trunk failure and service interruption.
- Financial Risk – Emergency repairs of failed large trunks are more costly. Depending on the location and consequence of the failure. The proposed large trunk rehabilitation will lower the risks of trunk failure and, therefore, reduce the emergency replacement costs.

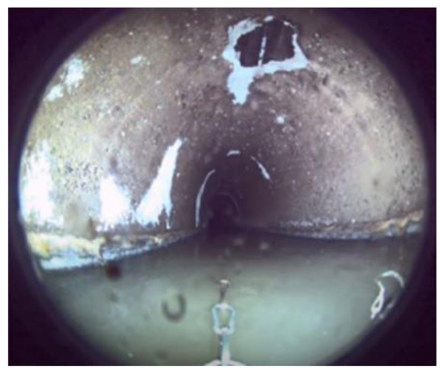
11. Figure 3.0-1 shows examples of severe deterioration and voids in large trunks. Capital investment is aimed at mitigating the risk of trunk failure through rehabilitation activities or by minimizing the consequences of failure through efficient bypass approaches. Proactive implementation with steady investment levels will ensure that high-cost emergency replacements are reduced.

Figure 3.0-1
Examples of Currently Identified Trunk Defects

CMB 14


CMB 104

SAN 8


CMB 51

4.0 PROGRAM SCOPE

12. The Large Trunk Rehabilitation Program will focus on the rehabilitation and/or replacement of large combined and sanitary trunks rated as High and Medium-High risk. Given the complexity of the large trunk rehabilitation work, each project can span multiple years from inspection and design to construction completion, depending on the scope and site-specific constraints. Consequently, there will be multiple large trunk rehabilitation projects ongoing during the 2025-2027 PBR term. Some projects may carry over from previous years or extend beyond 2027 into the next PBR term. A breakdown of the proposed scope is as follows:

- Complete the rehabilitation of the Mill Creek Combined and Combined 94 trunks through on-going rehabilitation projects that will extend into the 2025-2027 PBR term. The projected capital spend during the PBR term is $26.5 million, contributing to a total project cost of $48.9 million.

- Rehabilitate an additional 2-4 km of trunks through new rehabilitation projects with a projected capital spend of $51.3 million.
- Improve two to three critical crossings by incorporating by-pass improvements with a projected capital spend of $15.0 million.

4.1. Trunk Rehabilitation

13. Trunk risk scores are used as the criteria to build the scope of the program. The highest risk candidates in Interventions 1 and 2 are reviewed and considered for inspection to ensure the most risk reduction to the system. In addition to risk, several other factors such as operational issues or synergy with other projects will be considered when refining the prioritization of rehabilitation projects.

14. Of the 65 km of combined and sanitary trunks categorized as High and Medium-High risk in the Intervention 1 and 2 groupings, approximately 11 km, or about 17%, have previously been inspected. Through these existing inspections, it has been determined that 13 large sanitary and combined trunk sections across 10 areas in the city require some type of rehabilitation or replacement. This work is required to address observed issues and defects that reduce the integrity of the trunk and could lead to failures. The locations are detailed in Table 4.0-2.

Table 4.1-2: Currently Identified Trunk Rehabilitation Candidates

Area	Trunk Name	Issues/Defects	Size (mm)	Depth (m)
Bulyea Heights	San 29	Wall Loss exceeds 60%	1200	7.4
McCauley	Cmb_8	Steel Ribbing is exposed	2250x1800	32
Glenora	Cmb_51	Large hole present	1895x1200	28
	CMB_38	Wall Loss reaching 40%	1895x1573	28
University Farm	Cmb_83	Reinforcement exposed, Multiple small holes	1500	23
Meadowlark/Jasper Park	San_8	Multiple small holes and exposed reinforcement, Pipe void	1473x1219	26
Mill Creek	Cmb_40	Wall loss reaching 50%	2630x1685	27
	Cmb 49	Significant corrosion	1200	27
	Cmb_41	Wall loss reaching 50%	1500	32
Belvedere	San_13	Wall loss reaching 50% with exposed reinforcement	1200	10
Lauderdale	Cmb_14	Wall Loss exceeds 60%	1200	9.5
Parkdale	Cmb_104	Reinforcement exposed	1200	17
Parsons Industrial	San_38	Wall loss reaching 55%	1500	24

Lansdown/Malmo Plains	San_3	Large void, multiple small holes and damaged points	1200	15

15. The most cost-effective solution will be developed and implemented and can include relining, spot repair and full replacement. The development of preliminary project scopes began in 2023 based on the pipe condition assessments. All trunk defects, failures and deficiencies were described and rated through an engineering review process that considered their nature, severity, and accessibility. Potential mitigation opportunities were discussed at internal workshops where they were evaluated by their technical viability, safety, and cost. Full projects scopes are scheduled to be completed by mid-2024 and then will be actioned for completion. Prioritization of these locations will be based on the known trunk risk, severity of the defects and resource needs.

4.2. Major Crossings

16. Capital investment for major crossings will be allocated towards both the acquisition of field equipment, such as surface bypass pumping rigs, and the construction of bypass assets. Construction of new bypass assets will primarily focus on the identified Scenario 2 major crossings. While the approximate spending will vary depending on project specific constraints and needs, it is estimated that approximately $2.3 million will be allocated for field equipment purchases and $12.8 million for construction projects. Of the $12.8 million, about $11.3 million will be focused on Scenario 2 major crossings projects, while about $1.5 million will be focused on Scenario 3 major crossing projects.

17. Scenario 2 activities will involve the construction of trunk access shafts on trunks where the flow is sufficiently low to be able to be served by above ground bypass pumps. Scenario 3 activities will involve the construction of bypass pipes or other diversion structures, however during the 2025-2027 PBR term, activities for Scenario 3 trunks are likely to be limited to their identification, preliminary planning, and possibly detailed planning. Construction of new assets for Scenario 3 trunks will continue into the subsequent PBR term.

5.0 ALTERNATIVES CONSIDERED

5.1. Alternative 1 – Do Nothing

18. An alternative to this program is to do nothing and not proactively inspect and rehabilitate high risk large trunk sewers. If nothing is done, the risk is that the infrastructure may be close to failure and if left to deteriorate, will likely cause emergency situations that would result in costly and disruptive repairs. Residents depend on a reliable sewage system that will not cause sewer backups, subsidence, or flooding and if this program is does not continue, it will lead to increased levels of customer dissatisfaction. By targeting inspections of the highest risk local sewers, EWS will have the knowledge and ability to rehabilitate, replace or bypass sections of pipe where the risk of failure is high. This will result in prolonging the useful life of the pipes, improving the overall physical condition, and reducing the risk in the sewer system.

5.2. Alternative 2 – Reduced Scope relative to the Proposed Plan

19. This alternative reduces the number of kilometers rehabilitated or replaced under the program. This reduction in scope could also include patching the worst areas to reduce further deterioration instead of full rehabilitation or replacement, and the locations could be reassessed in the future. A reduced scope decreases the immediate impact to rate payers in the short term as work will be deferred to future PBR terms. However, fewer critical assets will be addressed which can lead to trunk failures causing sewer backups, subsidence, or flooding. By focusing on risk reduction and balancing risk assessments, existing inspections, known deterioration and defects, as well as considering budget and rate impacts, it is not recommended to reduce the targeted scope. This alternative was rejected as it does not address the long-term risks associated with the deteriorated trunk condition.

5.3. Alternative 3 – Accelerated Scope relative to the Proposed Plan

20. This alternative increases the number of kilometers rehabilitated or replaced under the program. This approach would have the opposite affect of reducing scope with more immediate impacts to rate payers in the short term with a corresponding reduction to the likelihood and impact of trunk failures, sewer backups, subsidence, or flooding. Further acceleration of the program will prove challenging to concurrently execute with current resources. EWS would need to scale up its resources internally and acquire new capacity externally. The increased costs are

expected to have a disproportionate impact on customer rates relative to the benefits realized for customers, so this alternative is not recommended for the 2025-2027 PBR term.

6.0 COST FORECAST

21. The program cost estimates for the 2025-2027 PBR term are shown in Table 6.0-1 and are based on costs of trunk rehabilitation from previous projects with the similar scope. The assumptions are as follows:

- The unit construction costs of rehabilitation in place range from $5,000m to $10,000/m depending on the size, depth and location of the rehabilitation.
- An overall contingency of 30% has been included for the estimates based on the current maturity level.
- Trunk rehabilitation construction will most likely use external resources for execution.
- Multi Sensor Inspections (MSI) investigation, geotech investigations and environmental assessments will be completed using external resources.
- In-house resources will be utilized for rehabilitation design, project coordination, engineering during construction, construction completion certification and inspections.

Table 6.0-1
Large Trunk Rehabilitation Program Capital Expenditure Forecast (2025-2027) ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	34.3	34.7	16.8	85.8

22. In addition to the table above, Table 6.0-2 provides the estimated capital expenditure for the Large Trunk Rehabilitation by project area during the 2025-2027 PBR term.

Table 6.0-2
Large Trunk Rehabilitation Program Capital Expenditure Forecast by Project 2025-2027 ($ millions)

Project	2025	2026	2027	Total
1. Mill Creek Combined	10.5	9.0	-	19.5
2. Combined 94	2.8	4.2	-	7.0
3. New Rehabilitation Projects	16.1	16.4	11.7	44.2
4. Sewer Bypass	4.9	5.0	5.1	15.0
5. Total Capital Expenditures	34.3	34.7	16.8	85.8

7.0 KEY RISKS AND MITIGATION PLAN

23. Completion of the large trunk rehabilitation/replacement work would lower the risks associated with the potential trunk failure. The risks associated with execution of the work have also been identified and summarized in Table 7.0-1.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks - Working in confined space without proper training or permit results in injuries and potential fine from OH&S during construction.	EWS will ensure that contractors have a safe work plan, emergency response plan and other plans to ensure that it meets EPCOR standards.
2. Environmental Risks - Risk of sewage leakage associated with flow bypass methods during construction results in environmental incompliance and potential fines of several million dollars.	EWS will develop detailed flow monitoring and bypass plan with sufficient standby capacity to reduce the risk of bypass leakage.
3. Execution Risks - Limited access to perform the rehabilitation work may result in construction delays and construction cost increase. Many of the trunks are located beneath arterial roads that require considerable traffic mitigation planning. Critical by-passes are in areas where many of the crossings are untenable to frequent or long interruptions such as provincial highways, city freeways, railroad crossings and environmentally sensitive areas such as rivers and creeks. These locations also cannot be removed from service for extended periods due to the impacts on customers. Each location will require coordination with multiple authorities and stakeholders as well as additional approvals and access agreements. Standard surface-run bypass methods may be unacceptably disruptive to other agencies, authorities, stakeholders, and the public.	At a minimum EWS will develop rehabilitation or replacement alternatives to select the most cost-effective option to perform the work. EWS will engage with stakeholder and identify approval and access agreement needs as a key step early in the project and stage gate process. Alternative bypass methods will be reviewed and infrastructure will be pre-placed where appropriate to allow for rapid deployment of bypass equipment to minimize the environmental impacts and disruption to other infrastructure and the public.
4. Customer Impact Risks - Stakeholder communication issue/concern during construction results in business, resident and councilor inquiries. Additionally, construction on congested road will disrupt traffic.	EWS will prepare a stakeholder communication plan. EWS will also engage experienced construction manager and project manager to develop an optimal construction staging plan and coordinate with the City to obtain OSCAM permits.
5. Financial Risks - Limited access to the trunk to perform the rehabilitation work may result in construction delays and construction cost increase. Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	EWS will develop rehabilitation or replacement alternatives to obtain/construct the required access to perform the work. EWS will include contractors early in the process, clearly identify scope requirements and evaluate options such as bundling multiple project scopes approach when efficiencies can be identified. EWS manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. The financial risks will become more evident as further design is completed and scope will be adjusted accordingly.

8.0 RESOURCES

24. All activities related to project management, drafting, construction coordination and inspection, and as-built recording, will be undertaken internally by EWS. Concept development, design, and construction will be completed by both internal and external resources. Geotechnical assessments and MSI inspections will be completed by external resources.

EPCOR WATER SERVICES

Appendix G-11

Business Case

LOCAL SYSTEM REHABILITATION PROGRAM

May 31, 2024

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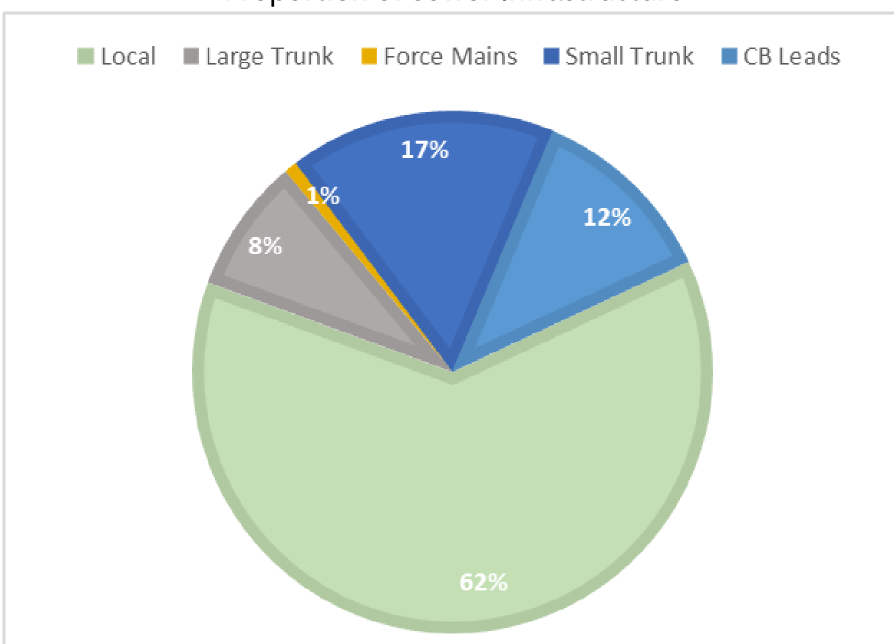
1.0 OVERVIEW

1. The Local System Rehabilitation Program consists of several annual programs focusing on the renewal and replacement of aging local sanitary, storm and combined sewers around the City of Edmonton. The scope of work includes targeted inspections, relining, and open cut repairs of local sewers at a total spend of $60.1 million over the 2025-2027 PBR term. The program expects to rehabilitate 20-25 km of local sewer per year.

2.0 BACKGROUND

2. Local sewers are classified as any mainline sewer smaller than 600 mm. They receive flows from service connections, catch basins, catch basin leads, and other local sewers, and convey the flows to the small and large trunk sewers. Local sewers account for the largest portion of underground pipe in the entire sewer system at approximately 4,900 km and have been constructed over the past 100 years with varying standards and specifications. The graph in Figure 2.0-1 shows the proportions of sewer infrastructure with local sewers accounting for 62% of the total sewer length.

Figure 2.0-1
Proportion of Sewer Infrastructure



3. In 2023, a condition study assessment of the entire local sewer network was completed using both observed defects and deterioration models based on age, material type, and waste

type which produced a condition rating for each pipe. The observed defects were found through Closed Circuit Televising (CCTV) inspections, covering about 39% of the local sewer system. The resulting condition ratings were used to develop the Likelihood of Failure (LOF) for each pipe. Along with the LOF scores, Consequences of Failure (COF) were also completed across all six consequence categories using the EPCOR Risk Management Standards and Risk Matrix. The six consequence categories include Health and Safety, Environment, Regulatory, Reputation, Service Interruption, and Financial. A theoretical risk score was then calculated for each pipe and the results are shown on the matrix in Figure 2.0-2. Figure 2.0-3 below shows that of those local sewers in the Medium-High and High risk categories, the vast majority are made of concrete or clay tile pipe.

Figure 2.0-2
Local Sewer Risk Matrix

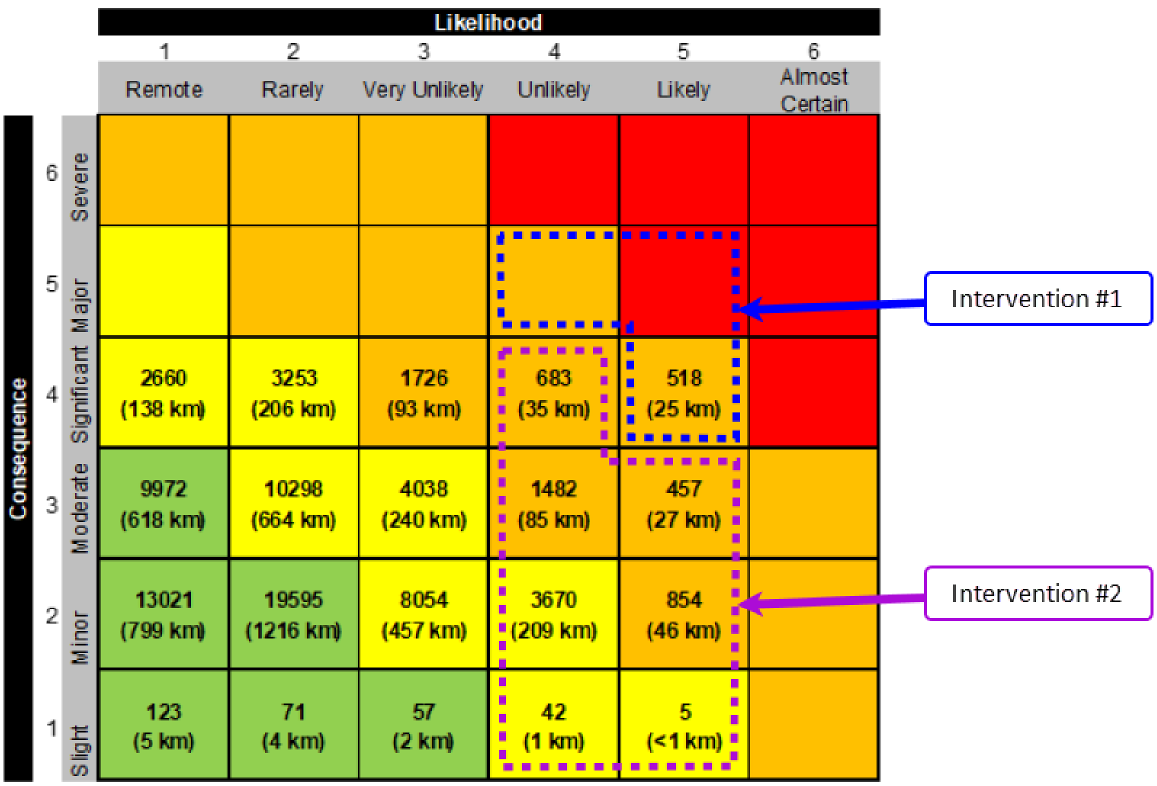
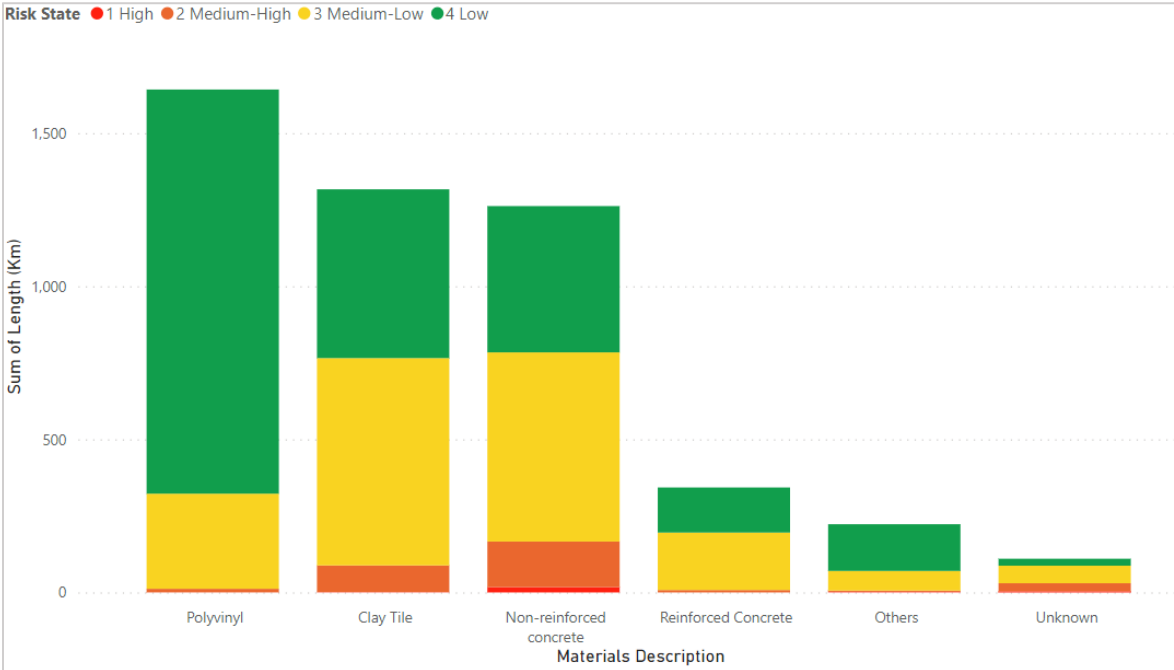


Figure 2.0-3
Risk Ranking by Material Type



4. The results show that just over 300 km of local sewers are considered Medium-High and High risk. As illustrated on the figure, the matrix can be divided into intervention actions for rehabilitation planning based on level of risk. The intervention boundaries were developed based on risk reduction, where assets with LOF scores of 4 or 5 are generally targeted first as they are critical assets that may have failed or are near end of life. Assets with high COF scores but lower LOF are typically in fair condition and can be monitored for any changes in their condition. There are 25 km of pipes that fall into Intervention 1, while about 400 km fall into Intervention 2. Of the 400 km, about 190 are considered Medium-High risk. This intervention breakdown can help to prioritize pipes for further investigation and/or rehabilitation.

5. Historically, the Drainage Neighbourhood Renewal Program renewed local sewers based on neighbourhood boundaries and although the goal was to reduce the potential risk in the system, high risk areas may have been missed. By targeting proactive renewal based on risk, while continuing to coordinate with City of Edmonton (COE) roadway renewal programs such as Neighbourhood Renewal, Alley Renewal, and Arterial and Collector Renewal, EWS is able to inspect and rehabilitate aging local sewer infrastructure through relining and open cut renewal methods on high risk assets, therefore reducing the overall risk in the system.

3.0 JUSTIFICATION

6. Assessing the condition of an aging sewer system and planning for rehabilitation is crucial for maintaining public health, environmental sustainability, and overall infrastructure resilience. As the system ages, it is prone to deterioration, leaks, and structural issues that can lead to contamination of water sources and pose health hazards. There are several key risks categories associated with the deterioration and failure of local sewer infrastructure:

- Health and Safety – Failure of local sewer infrastructure could cause a roadway subsidence which poses a safety risk to the public.
- Environmental – Failure of a sanitary or combined local sewer could cause a sewage spill to the local environment or to the river.
- Customer Disruptions – Failure of local sewers can cause disruption to large service areas which would impact many customers, and can also cause sewer backups into customer's basements. Failed sewers also lead to more emergency repairs which are more disruptive to the roadway and therefore to the public.
- Financial – Emergency repairs of failed local sewers can be more costly than proactive renewal. Claims against EPCOR for sewer backups can also lead to a financial impact.

7. Regular assessments of local sewer pipes help to identify vulnerabilities and enable proactive rehabilitation measures, thereby mitigating the risks identified above. Capital investment should be aimed at reducing the LOF by improving asset condition and extending the life of the infrastructure. Proactive implementation with steady investment levels will ensure that high-cost emergency replacements are reduced.

4.0 PROGRAM SCOPE

8. The Local System Rehabilitation Program scope will consist of both proactive and reactive renewal to address condition and operational issues within the local sewer system. Local sewer rehabilitation can include mainline pipes, catch basins, catch basin leads, or maintenance hole infrastructure. This risk based proactive and reactive renewal approach allows for the optimization of resources by focusing on the pipes with the highest risk first. It ensures that critical issues are addressed promptly, while also considering the cost-effectiveness of rehabilitating pipes with lower risk levels.

4.1 Proactive Renewal

9. Risk scores are used as the criteria for inspection of local sewers to build the proactive scope of the program. Each year, the highest risk candidates are reviewed and considered for inspection to ensure the most risk reduction to the system. As shown in the risk matrix in Figure 2.0-2, the program will target High and Medium-High risk pipes in the Intervention 1 and Intervention 2 groupings. In addition to risk, several other factors will be considered when refining the prioritization of inspections. Coordination with the COE's roadway renewal programs will be assessed, and any medium-high risk local sewers within those locations will be prioritized for inspection. This is estimated to be between 2 to 8 km of pipe.

10. A total of 50 km of inspection will be completed each year. Inspection needs are based on known risk levels, risk targets and projected conditions of this asset type over time. Based on these inspections, the drainage infrastructure will be given a grade according to the Pipe Assessment Certification Program (PACP) and the Manhole Assessment Certification Program (MACP) Ranking System. PACP and MACP are the North American standard for pipe and manhole defect identification and assessment, providing standardization and consistency to the methods in which pipe conditions are identified, evaluated, and managed. Once the infrastructure has been reviewed and graded, a risk assessment and evaluation will be undertaken for each segment to determine a LOF and COF score. From this post-inspection rating, pipes classified as High risk are prioritized for rehabilitation as they are in a condition where attention is required to address serious defects. Pipes classified as Medium-High and Medium-Low risk will be evaluated to determine the necessity of rehabilitation based on their individual scores, the type and severity of defects, and budget availability. There may also be an operational and maintenance reason for renewal or replacement of a pipe such as roots, sags or infiltration. If sags are identified for rehabilitation, they will be dealt with through open cut repairs.

11. Based on historical years of proactive inspections, typically about 40% of the inspected pipe under the current intervention groupings requires relining, while about 1-2% of the pipe requires open cut. Therefore, we expect about 20 km of reline and about 500 m of open cut to be identified from these inspections each year.

12. In addition, the program will coordinate construction with improvements that have been identified through other initiatives that could be completed and/or coordinated at the same time. These types of improvements include Low Impact Development (LID) features, flood proofing, service renewal, inflow and infiltration reduction and/or odour reduction. These

improvements will be funded through separate program budgets. Capitalizing on synergies and aligning with other initiatives improves cost efficiency, ensuring that resources and budgets are utilized optimally, and redundancies are minimized.

4.2 Reactive Renewal

13. The reactive renewal work responds to needs identified in the system through routine inspections or by responding to customer complaints of issues. Sewer defects that require capital funding to address include deformations, holes, root intrusions, cracking, fractures, and/or breaks. Most issues require open cut replacement; however some issues are less significant and can be completed through relining. Locations are identified by EPCOR's operational teams, and if the issue requires an emergency response, the location is sent directly to the High Priority Repair Program for immediate attention. If the issue is not an emergency, then the closed-circuit televising (CCTV) is reviewed, and the infrastructure will be given a grade based on the PACP Ranking System and will follow the process described above to determine the necessity of rehabilitation.

14. Historically, the amount of open cut replacement requirements that are identified through routine inspections or through customer complaints each year is approximately 120 m, while the number of relining requirements identified is approximately 2.5 km annually.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Nothing

15. An alternative to this program is to do nothing and not proactively inspect and rehabilitate high risk local sewers or deal reactively with emerging local sewer issues. If nothing is done, the risk is that the infrastructure may be close to failure and if left to deteriorate, will likely cause emergency situations and disruptive repairs. Although the advantage of doing nothing may be short-term cost savings for the rate payer, more expensive emergency repairs will result from infrastructure failures, increasing future capital needs for the High Priority Repair emergency program. Residents depend on a reliable sewage system that won't cause sewer backups, subsidence, or flooding and if this program is cancelled, it will lead to increased levels of customer dissatisfaction. By targeting inspections of the highest risk local sewers, EWS will have the knowledge and ability to rehabilitate or replace sections of pipe that are at risk of failure. This

will result in prolonging the useful life of the pipes, improving the overall physical condition and reducing the risk in the sewer system.

5.2 Alternative 2 – Increase Scope Relative to this Proposal

16. A second alternative is to increase the length of pipe that would be addressed under this program. While an increase in small trunk renewal would provide a greater risk reduction, it would require a higher capital investment which would directly impact the rate payer. Although increased risk reduction is a favourable outcome, it is essential to balance the funding needs of the local sewer assets with the overall system needs. Considering the impact to the rate payer, capital funds must be optimized across the needs and requirements of all assets, ensuring the longevity and reliability of our entire system. By evaluating factors such as local sewer asset condition and risk levels, resource availability, and budget constraints, it is not recommended to increase the scope for this program at this time. The projection of 60-70 km of renewal over the PBR term will allow EWS to target the highest risk local sewers in the Intervention 1 grouping as well as about 40% of the Medium-High risk pipes in Intervention 2, significantly reducing risk in the system. In future PBR terms, the remaining pipes in Intervention 2 will be targeted.

5.3 Alternative 3 – Reduce Scope Relative to this Proposal

17. Similarly, a third alternative is to decrease the length of pipe that would be addressed under this program. While a decrease in local sewer renewal would reduce the impact to the rate payer in the short term, a decrease in scope would reduce the risk reduction that can be achieved over the PBR term. This could result in a higher number of costly and disruptive emergency repairs, impacting the rate payer in the long term. In order to target the highest risk pipes and reduce the risk of pipes in Intervention 1 and 2, it is important to maintain 60-70 km of renewal over the PBR term.

6.0 COST FORECAST

18. The project cost estimates are based on historical information such as average annual lengths of inspections required, average annual reline and open cut lengths, and unit costs from design and construction of past local sewer projects. Assumptions and approach are as follows based on EWS's experience and learnings from past years:

- All CCTV inspections will be completed internally.

- Approximately 50 km of local sewers will be inspected.
- Design for rehabilitation repairs will be completed internally.
- Relining will be completed by external resources.
- Open cut will be completed by internal resources and external resources.

19. Table 6.0-1 provides the forecast capital expenditures for this program for the 2025-2027 PBR term.

Table 6.0-1
Local System Rehabilitation Program Capital Expenditure Forecast 2025-2027 ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	20.2	19.7	20.2	60.1

20. In addition to the table above, Table 6.0-2 provides the estimated capital expenditure for the Local System Rehabilitation by sub-program during the 2025-2027 PBR term.

Table 6.0-2
Local System Rehabilitation Program Capital Expenditure Forecast by Project 2025-2027 ($ millions)

Project	Capital Expenditure Forecast
1. Proactive Local Sewer	53.6
2. Reactive Local Sewer	6.5
3. Total Capital Expenditures	60.1

7.0 KEY RISKS AND MITIGATION PLANS

21. Table 7.0-1 provides the key risks and mitigation associated with executing this program.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks - There is a risk of local drainage asset failure such as main lines and services that could result in sewer backup which is a potential health risk to the public.	Replacing or rehabilitating local infrastructure would extend the life of the assets and lower the risks of asset failure.
2. Execution Risks - The program is subject to such execution risks including utility conflicts, unexpected scope increases, poor soil conditions, new road restoration requirements, increase in overall construction prices, and section conflicts with other construction projects in the area.	EWS will circulate all projects through the Utility Line Assignment (ULA) system, deal with force accounts on an individual basis. To manage program schedules, EWS will ensure inspectors are recording all delays and force accounts. EWS will work with the COE to identify and clarify new requirements and or changes to the project and will coordinate construction with other utilities and COE.

	EWS's internal resources will undertake all project related activities including any required inspection, project management, design, construction coordination and survey as well as-built recording. EWS will employ pre-qualified external contractors for additional CCTV inspection required due to lack of internal resources availability, open cut and relining works to complete construction.
3. Traffic Disruption Risks - The COE's commitment to prevent significant traffic impacts from construction, especially downtown, may impact EWS's ability to get OSCAM permits or restrict our work to off-peak hours.	EWS will advise the COE's Traffic Operations Group of all projects where roads are affected well in advance of construction.
4. Customer Impacts - There is a risk of sewer failure that could result in service interruption affecting the residents in the neighbourhoods for a few weeks.	The proposed rehabilitation would lower the risks of sewer failure and service interruption in the neighbourhoods.
4. Financial - The potential sewer main failure could result in more costly emergency replacement. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	The proposed renewal program would lower the risks of sewer failure in the and therefore reduce emergency replacement costs. The activities in this program have been previously carried out, and a general understanding of the tasks and costs have been developed. Project costing is typically reviewed to ensure it aligns with assumptions and expectations. To mitigate cost escalations, thorough planning and proactive measures are essential. This can include detailed cost estimates during the planning phase, contingency budgets, and a comprehensive risk identification and analysis. Contracts should be clear with provisions for addressing unforeseen cost increases. Regular monitoring, strong relationships with contractors and suppliers, and experienced project managers are important to reduce the likelihood of cost increases. Value engineering to evaluate alternative materials, construction methods, or design modifications can also help to mitigate price increases.

8.0 RESOURCES

22. All activities related to project management, inspections, assessment, design, and open cut construction will be undertaken by internal EPCOR resources. EPCOR will employ pre-qualified external contractors to complete the relining scope.

EPCOR WATER SERVICES

Appendix G-12

Business Case

MAINTENANCE HOLE AND CATCH BASIN REPLACEMENT PROGRAM

May 31, 2024

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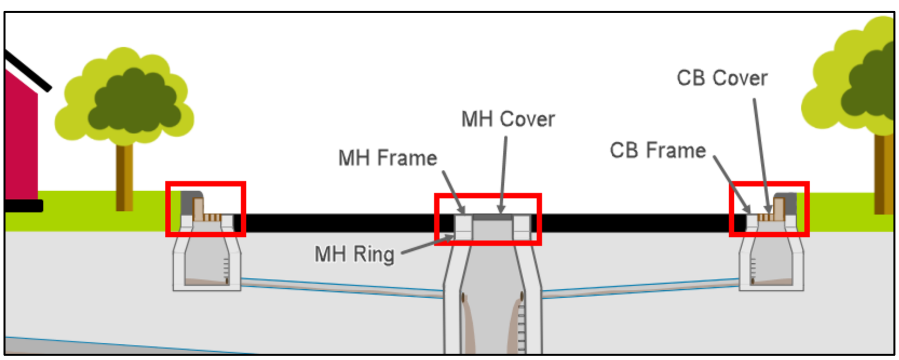
1.0 OVERVIEW

1. The Maintenance Hole (MH) and Catch Basin (CB) Replacement Program is to assess and replace the shallow portion of MHs and CBs before end of life. These replacements will be done in coordination with EPCOR Water Services (EWS) rehabilitation programs and City of Edmonton roadway rehabilitation programs. The total estimated cost for this program for the 2025-2027 PBR term is $11.8 million.

2.0 BACKGROUND

2. The wastewater collection system comprises of over 100,000 MHs and 70,000 CBs. To address the challenge of failing or failed MHs and CBs, an ongoing replacement program has been implemented. A failed asset refers to infrastructure that can no longer perform its function as intended or has become a hazard to the public, while a failing asset is deficient in some capacity but is still able to perform its function. This program replaces the shallow portion of MHs and CBs including the frame, cover, and rings, which are typically the components with the shortest lifespan. This ensures the continued functionality and reliability of the wastewater collection infrastructure. Figure 2.0-1 outlines the portion of the MHs and CBs that are covered by this program.

Figure 2.0-1
Maintenance Hole and Catch Basin Schematic

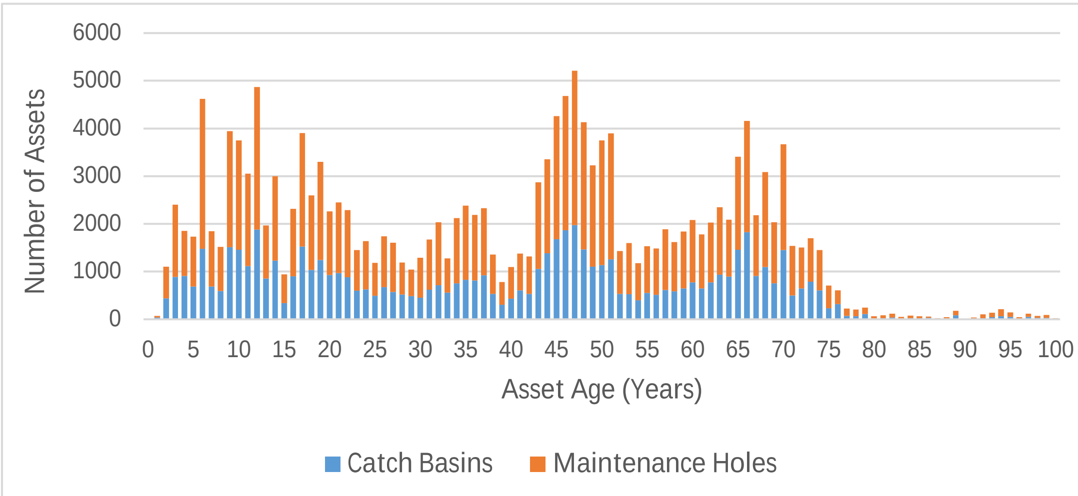



- Portion of Assets covered by the MH and CB Replacement Program

3. MH and CB replacements under this program are primarily a result of aging infrastructure and the wearing down of these highly visible assets. Figure 2.0-2 depicts the age distribution of MHs and CBs and as shown in the figure, over 50% of these assets are over 40 years of age. With an expected lifespan of 75 years, these aging assets are expected to contribute to future waves

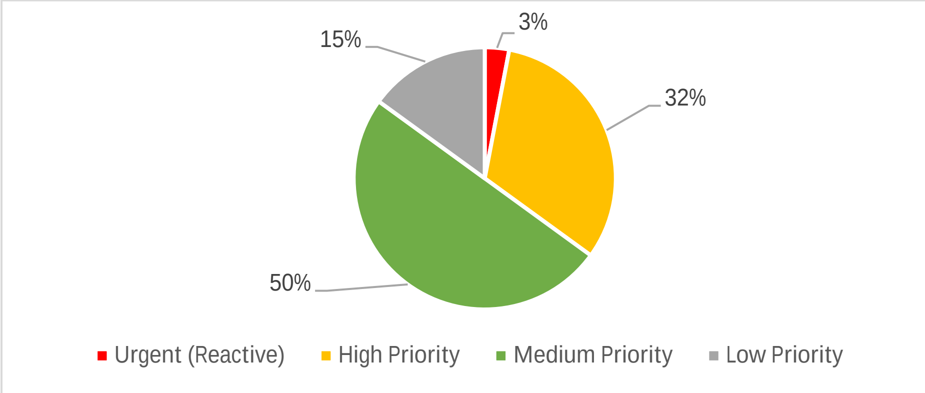
of shallow asset replacements conducted under this program. In addition to age, the wearing down of the shallow portion of MHs and CBs is highly dependent on asset location. Assets in high traffic locations such as arterial roadways usually wear down more quickly which impacts the lifespan of the assets. Therefore, the lifespan of these assets can vary greatly.

Figure 2.0-2
Number of MHs and CBs by Asset Age



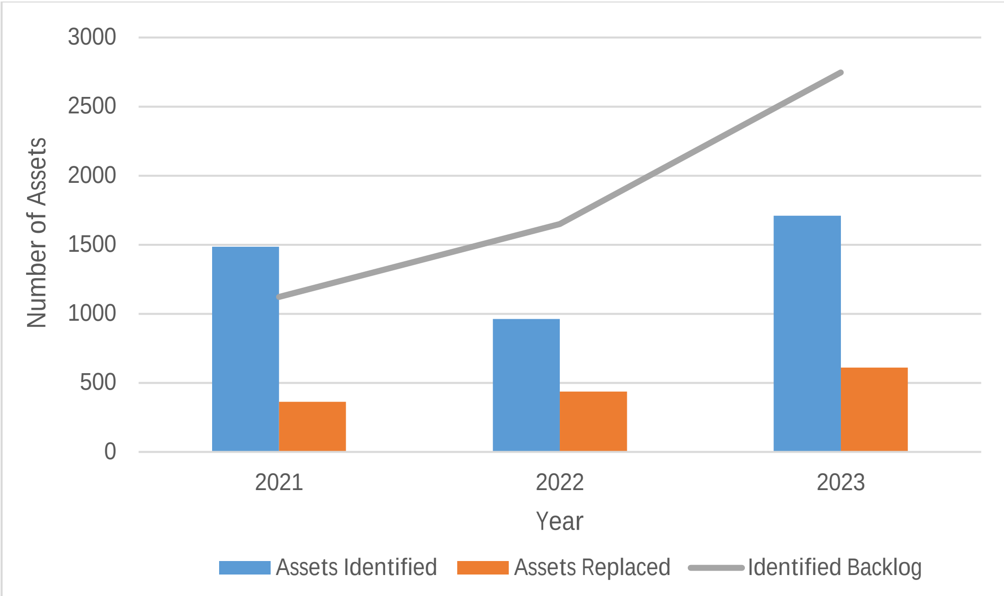
4. MHs and CBs are inspected on an ongoing basis. These inspections are conducted in response to field crews and/or customers identifying facility issues, and by proactively targeting areas around the city. During this process, assets with issues are categorized by field crews as urgent, or prioritized as high, medium, or low priority. Classification is based on the extent of issues, safety concerns, and impact on the public. Assets categorized as urgent pose an imminent safety hazard to the public and require immediate repair, while assets categorized as high priority also pose a hazard to the public but the risk can be temporarily mitigated with barricades until a replacement can be scheduled. Medium and low priority assets do not pose a hazard to the public or require barricades. Between 2021 and 2023, an average of 1400 new assets were identified to have issues each year. Figure 2.0-3 depicts the average breakdown of priority classification for assets identified to have issues under this program.

Figure 2.0-3
Average Priority Classification of Assets Identified to have Issues



5. Based on inspection data, by the end of 2023 approximately 2700 assets had been identified to have existing issues, with roughly a third being CBs and the remaining being MHs. Figure 2.0-4 depicts the number of assets identified to have issues and replaced each year from 2021-2023, and the corresponding changes to the identified backlog. The backlog is continuously updated as new assets are identified to have issues through inspections and assets previously identified to have issues are replaced and removed from the backlog. The tracking of assets with identified issues and their subsequent replacements began in 2020, thus data for the identified backlog begins in 2021. As supported by the figure, the identified backlog of assets is increasing over time and is expected to continue increasing year-over-year as more facilities are inspected.

Figure 2.0-4
MH and CB Replacement Program by Year



6. This program works to address the existing identified backlog and perform the replacements required for MHs and CBs. The historical number of assets replaced under this program from 2020-2023 are shown in Table 2.0-1.

Table 2.0-1
MH and CB Asset Replacements 2020-2023

Year	Assets Replaced		
	Maintenance Holes	Catch Basins	Total
2020	422	82	504
2021	194	170	364
2022	289	147	436
2023	447	164	611

7. The MH and CB replacement program utilizes proactive and reactive strategies to prioritize the replacement of the shallow portion of MHs and CBs. These strategies include proactively replacing high, medium, and low priority assets in the identified backlog that are expected to fail in the near future, and reactively replacing failed assets that have been identified as urgent and require immediate repair. Reactive replacements can include situations in which there is active subsidence around a failed facility, or any other circumstances in which a damaged or failed facility will cause a hazard for the public if not replaced. Proactive work is conducted on facilities with notable wear and/or aging that require non-urgent replacement, such as MHs or CBs with worn-out frames and covers. The non-urgent nature of this work allows for the coordination of these replacements to optimize time and resources. Proactive replacement is the preferred approach to asset replacement as, compared to reactive replacement, it is more effective at reducing risk to public safety and can minimize traffic disruptions and replacement costs. Currently, approximately 90% of work completed is proactive and the remaining 10% is reactive. This program aims to reduce the quantity of reactive replacements required through utilizing proactive approaches to monitor and rehabilitate facilities prior to their end of life. This program will work in collaboration with the Inflow and Infiltration Relining Program developed in with the Stormwater Integrated Resource Plan (SIRP) and will utilize the planning done under SIRP to prioritize some of the MH replacement work.

8. Replacement work under this program also considers asset replacement and road restoration work planned under City of Edmonton roadway rehabilitation programs. As part of their roadway rehabilitation programs such as Neighbourhood Renewal or Arterial and Collector Roadway Renewal, MHs and CBs can be replaced through their work, further reducing the number of assets needing to be replaced.

3.0 JUSTIFICATION

9. Failed MHs and CBs present a public safety risk, and timely replacement of these assets is critical. By implementing this program, the potential for injury resulting from failed drainage infrastructure is significantly reduced, enhancing overall safety for the community.

10. Without this program, the failed MHs and CBs would remain in place, increasing the public safety risk to customers associated with the potential for personal injury and damage to vehicles. Figure 3.0-1 depicts an example of an active subsidence surrounding a failed MH. Having a quick turn around on failed and failing infrastructure ensures the risks posed to customer safety are mitigated.

Figure 3.0-1
Active Subsidence around a Failed MH

11. In decreasing risk to public safety, this program also reduces the number of insurance claims against EPCOR and reduces liability. In 2023 there were 37 claims made against EPCOR related to MH and CB deficiencies, while in 2022 there were 57 claims made. Historically, these claims typically consist of tire/wheel damage, but there have been claims that have included personal injuries. In these cases, if EPCOR is aware that these assets were deficient prior to their failure, it can open EPCOR to being liable for damages caused by these facilities. Therefore, it is important that the backlog be proactively addressed.

12. By addressing infrastructure issues before they lead to failures, EWS also aims to minimize disruptions to customers, particularly on major roadways. By coordinating the replacement of these assets prior to failure, traffic disruptions will be less frequent and less disruptive. Work on

major roadways can be scheduled during low traffic periods, and with enough anticipated work, EWS will engage an external contractor for roadway restoration to ensure the road closures are minimized. Coordination of replacement work with EWS rehabilitation programs and City of Edmonton roadway rehabilitation programs also ensures traffic disruptions are minimized while allowing for a more efficient allocation of resources.

4.0 PROGRAM SCOPE

13. The MH and CB Replacement Program identifies, inspects, and replaces the shallow portion of MHs and CBs (up to 1.2m from grade) including frames, covers, and rings. For MHs, ring replacement will be completed to a depth of up to 1.1 m below the ground surface, while for CBs, ring replacement will be completed at a depth of up to 0.75 m, as per design standards.

14. MHs and CBs are replaced on a proactive and reactive basis. Proactive replacement refers to replacement work conducted on MHs and CBs that are approaching failure likely within a few months, but do not require immediate replacement. This includes the replacement of high, medium, and low priority assets that have been identified to have issues. Reactive replacement refers to work on failed MHs and CBs that have been identified as urgent and require immediate replacement. Assets that are proactively replaced can be scheduled in advance, allowing for an optimization of resources as nearby assets can be replaced together. In the case of reactive replacements, due to the pressing and expedited nature of the work, crews conducting these replacements commonly replace one asset at a time. The goal is to complete asset replacements proactively before assets fail and become public safety hazards. Reducing the quantity of reactive replacements mitigates risk to public safety and minimizes the burden and cost implications of having to plan and coordinate emergency replacement work.

15. Identification of replacement projects under this program occurs in several ways, including:

- Field crews identifying worn out or broken MHs and CBs through their regular work activities.
- Customer notification of failed or failing MHs or CBs.
- Examination of MH and CB condition in locations where other rehabilitation work is planned to create opportunities for coordination between rehabilitation programs.
- City road programs identifying and replacing deficient MHs and CBs in their activities.
- Proactive inspections targeting areas where no recent inspection data is available, prioritizing high traffic locations and areas with older facilities.

16. Prioritization of work is dependent on several factors, including asset condition, age, location, and likelihood of failure. Assets that have failed or are failing and are in high-risk locations are given priority. High-risk locations include areas within the wheel path of vehicles on major roadways, where infrastructure is expected to wear down more quickly and asset failure is at increased risk of injuring the public and causing damages to vehicles. In these areas, emergency repairs would cause major traffic interruptions. Additionally, this program will work in collaboration with the Inflow and Infiltration Relining program to assess MHs located in localized sag areas of high-risk sub-basins and identify high priority MHs that can be included in this program.

17. Approximately 1,200-1,600 MHs are expected to be replaced in the 2025-2027 PBR term. These replacements include reactive replacements which will be completed as required, and proactive replacements which will be conducted on an ongoing basis. Replacement work is conducted to address the highest priority assets. For proactive replacement work this generally includes prioritizing assets that have been categorized as high priority and utilizing remaining resources for medium priority asset replacements. Scheduling of this work will optimize resources by batching together nearby previously identified repairs. In addition, the work will be coordinated with other rehabilitation programs such as Local Sewer Rehabilitation and Inflow and Infiltration Relining as well as City of Edmonton roadway rehabilitation projects such as the Arterial and Collector Roadway Renewal Program. In cases where the City of Edmonton is renewing a roadway but does not plan to replace the drainage infrastructure, this program will proactively inspect and replace MHs and CBs that require replacement.

18. This program focuses only on the top portion of MHs and CBs. These portions of the assets generally have a shorter life span when compared to deeper components of the asset, requiring them to be replaced at a higher frequency. Replacement of the deeper components of MHs and CBs are out of scope for this program and would require different equipment, material, and procedures than shallow infrastructure replacements. Full depth MH and CB replacements will be included in other program scopes such as Local Sewer Rehabilitation and High Priority Repair.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Not Implement this Program (Rely on Other Programs)

19. This alternative would involve not implementing the MH and CB Replacement Program. This would leave all MH and CB replacements to the Local Sewer Rehabilitation and High Priority Repair Programs. While these other programs work on MHs and CBs, they focus on deeper sections of these assets, therefore shallow replacement work would not be prioritized. Thus, not undertaking this program would result in the shallow portions of these assets failing at an increased rate as these portions of the assets commonly require replacement at a higher frequency than allowed by the Local Sewer Rehabilitation and High Priority Repair programs. This alternative would insufficiently address the risk failing infrastructure poses to public safety and would result in an increased number of urgent replacements which are more costly and disruptive. This option is not recommended.

5.2 Alternative 2 - Increase Scope

20. This alternative involves conducting reactive replacements and an increased quantity of proactive replacements on MHs and CBs to completely address the existing backlog and maintain this backlog at zero. With implementation of this option, EWS would expect to see a decrease in the quantity of reactive replacements required over time as more of these assets are replaced prior to failure. This would allow for increased risk reduction but would call for increased capital investment, impacting the rate payer. In the 2025-2027 PBR term, this approach would require an estimated 3000+ replacements to address the pre-existing backlog and an additional estimated 1400 replacements per year (based on historical inspection data) to replace the assets identified to have issues through ongoing inspections. To complete these replacements, additional labourers, vehicles, and replacement equipment would be required to supplement current internal resources and an external contractor would likely need to be hired to conduct replacement work. This would require a budget of approximately $50 million for the 2025-2027 PBR term. Furthermore, although this alternative would decrease the risk of MH and CB failure, it is not feasible to anticipate all MH and CB failures, thereby making it unlikely that reactive replacements can be completely avoided. This is not a recommended option.

5.3 Alternative 3 - Reduce Scope - Conduct Reactive Replacements Only

21. This alternative would only replace completely failed infrastructure and would conduct no proactive replacement work. While this would reduce the program's budget requirement to approximately $1.0 million dollars for the 2025-2027 PBR term, this approach fails to mitigate the heightened risk to public safety posed by infrastructure that is near failure. It is essential to address these potential risks, particularly in high-risk locations such as major roadways, through proactive measures rather than waiting for failures to occur. Not only do proactive replacements reduce the risk to the public, planned work is typically less costly and less disruptive to the public. Additionally, there are liability risks for EPCOR if failing assets are not addressed. Although implementation of this approach would be less costly initially, this would push back asset replacements and result in a greater number of reactive replacements in the future. Conducting only reactive replacements is a more costly approach in the long term and would negatively impact EPCOR's reputation. This option is not recommended.

6.0 COST FORECAST

22. The cost estimates are based on replacements completed in 2022 using current replacement methodology of pre-saw cutting and utilizing in house backhoes and crews to conduct the replacement. The paving restoration of the work will be conducted by a private contractor.

23. Table 6.0-1 provides the cost forecast for this program for the 2025-2027 PBR term.

Table 6.0-1
MH and CB Replacement Program Capital Expenditure Forecast ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	3.4	4.0	4.4	11.8

24. The assumed yearly breakdown on costs between MH and CB replacements under this program based on historical data is provided in Table 6.0-2. This assumes that 60% and 40% of costs are allocated to MH replacements and CB replacements, respectively.

Table 6.0-2
MH and CB Replacement Program Capital Expenditure Forecast by Asset Type ($ millions)

Asset Type	2025	2026	2027	Total
1. Maintenance Holes	2.4	2.8	3.1	8.2
2. Catch Basins	1.0	1.2	1.3	3.5
3. Total	3.4	3.9	4.4	11.8

25. Table 6.0-3 shows the assumed cost allocation between proactive and reactive replacement approaches for the 2025-2027 PBR term. This assumes a cost breakdown of 90% and 10% between proactive replacements and reactive replacements, respectively, and is based on historical data.

Table 6.0-3
MH and CB Replacement Program Capital Expenditure Forecast by Replacement Approach ($ millions)

Replacement Approach	2025	2026	2027	Total
1. Proactive Replacement	3.1	3.6	4.0	10.6
2. Reactive Replacement	0.3	0.4	0.4	1.2
3. Total	3.4	3.9	4.4	11.8

26. Based on historical data, less than 2% of this program's budget is expected to be allocated to coordination with City of Edmonton roadway programs.

7.0 KEY RISKS AND MITIGATION PLANS

27. Table 7.0-1 provides the key risks and mitigations plans associated with the implementation of this program.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risk – There is a risk that the failure of MHs and CBs could result a safety risk to the public. Worn frame or cover assets can become serious tripping hazards for the public. It is possible for applied pressure on one side of a worn MH cover to cause it to flip open and expose the MH, which can result in a member of the public falling into the MH or driving into open MHs. The flipped MH can also contact the tires and/or underside of a vehicle causing extensive damage.	By maintaining the frame and cover of these assets through this replacement program, the possibility of such incidents occurring becomes smaller.

2. Execution Risk – Using equipment such as jackhammers when replacing MH structures may expose workers to silica dust, which over prolonged exposure can lead to silicosis. This condition is serious and can increase the individual's risk of developing cancer among other diseases. Additionally, there is risk associated with working on busy roadways.	Risk is mitigated by using the appropriate kind of respirator to filter out silica (and other) particles suspended in the air as well as using mechanized equipment so that workers are not directly exposed to the dust. Also moving to mechanized solutions in place of jackhammers to remove workers from the line of fire altogether. To mitigate the risks to work safety on high traffic roadways, work on high traffic roads will be scheduled during lower traffic periods.
3. Traffic Disruption Risk – emergency replacements could result in traffic interruptions.	This program will prioritize the proactive repair of assets in high traffic location, so that these assets are failed prior to failure, minimizing traffic disruptions during peak hours on high traffic roadways.
4. Financial Risk – Emergency replacements often result in more costly replacements. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing. Further change orders or unknown conditions that cannot be foreseen.	Proactive replacement of assets under this program allows for the coordination of nearby assets to be replaced together, reducing mobilization costs. EWS manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. The financial risks will become more evident as further design is completed. A competitive procurement strategy will also be implemented to ensure the best value is achieved.

8.0 RESOURCES

28. Internal resources will be used to complete the reactive and proactive replacements. External resources will be used to complete the restoration work.

EPCOR WATER SERVICES

Appendix G-13

Business Case

SMALL TRUNK REHABILITATION PROGRAM

May 31, 2024

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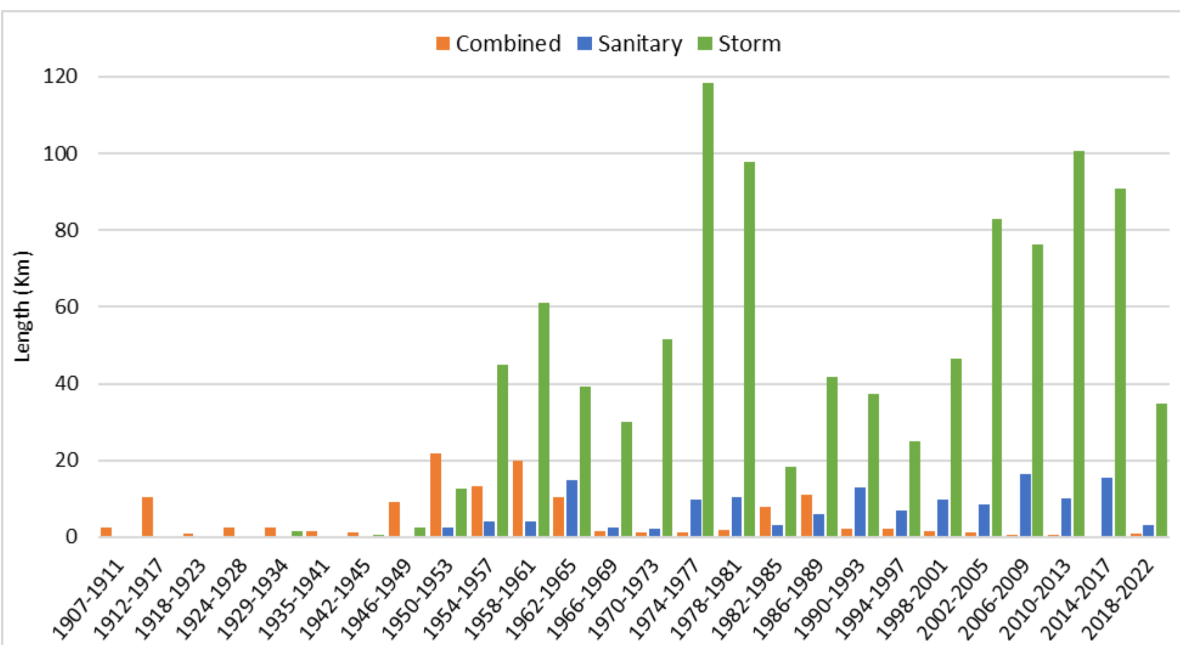
1.0 OVERVIEW

1. The Small Trunk Rehabilitation Program focuses on the rehabilitation of aging small trunks around the city of Edmonton. Small trunks are gravity fed and are used to convey sanitary, storm, and combined flows from local drainage pipes to larger trunks throughout the system. The scope of work includes targeted inspections, relining, and open cut repairs of small trunks at a total spend of $35.8 million over the 2025-2027 PBR term.

2.0 BACKGROUND

2. Small trunks range in diameter from 600 mm to less than 1200 mm, and include pipes on trestles across the city. Small trunks account for the second largest portion of underground pipe in the sewer system at approximately 1,310 km and have been constructed over the past 100 years to varying standards and specifications. Figure 2.0-1 shows the year of construction for small trunks, indicating that the majority were constructed since the 1950's. The average age of small trunks is 37 years. In general, the useful life of a small trunk is expected to be 75 years for all waste types, however many are failing and becoming high risk before their theoretical useful life.

Figure 2.0-1
Small Trunks Year of Construction



3. In 2023, a condition assessment study of the entire small trunk sewer network was completed using both observed defects and deterioration models based on age, material type, and waste type and produced a condition rating for each pipe. The resulting condition ratings were used to develop the Likelihood of Failure (LOF) for each pipe. Along with the LOF scores, Consequences of Failure (COF) were also completed across all six consequence categories using the EPCOR Risk Management Standards and Risk Matrix. The six consequence categories include Health and Safety, Environment, Regulatory, Reputation, Service Interruption, and Financial. A theoretical risk score was then calculated for each pipe and the results are shown on the matrix in Figure 2.0-2. Figure 2.0-3 below shows that of those small trunk sewers, the vast majority are made of concrete or clay tile pipe.

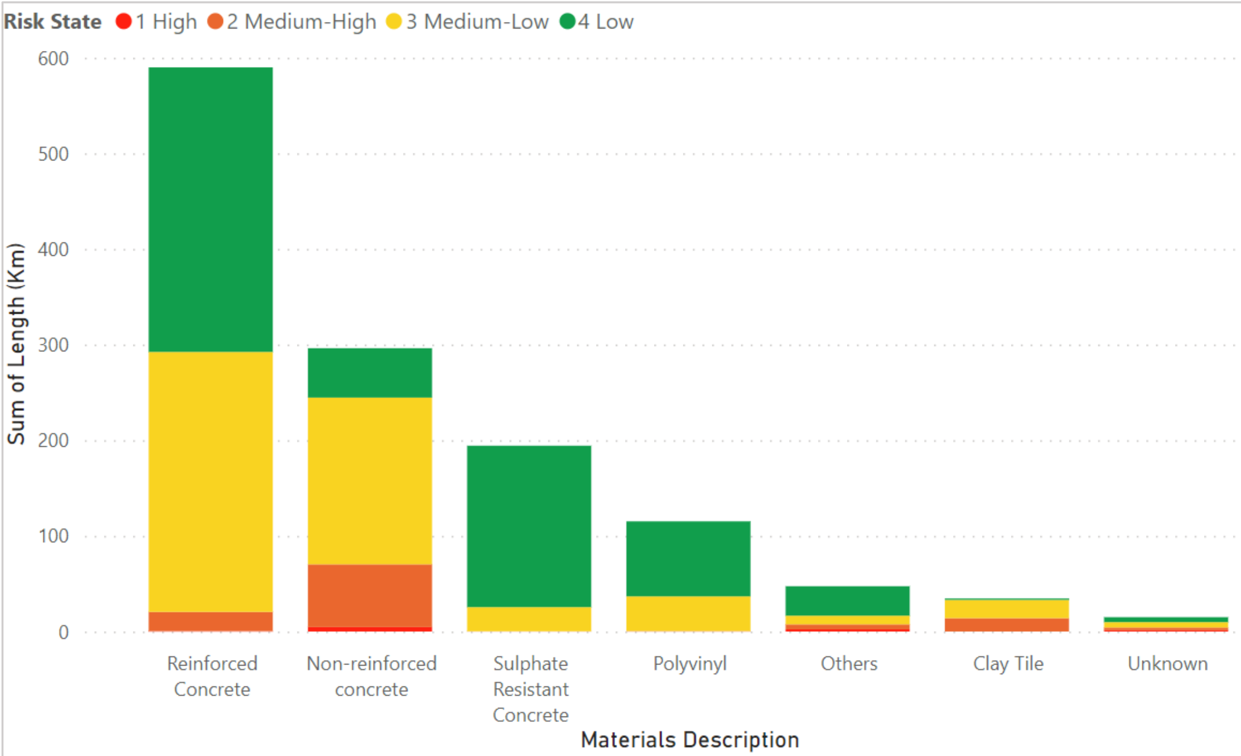
Figure 2.0-2
Small Trunk Risk Matrix

Consequence \ Likelihood	1 Remote	2 Rarely	3 Very Unlikely	4 Unlikely	5 Likely	6 Almost Certain
6 Severe						
5 Major		3 (<1 km)	1 (<1 km)		2 (<1 km)	
4 Significant	1141 (75 km)	1060 (65 km)	613 (40 km)	341 (20 km)	177 (9 km)	
3 Moderate	4137 (253 km)	2718 (169 km)	2037 (125 km)	587 (36 km)	159 (7 km)	
2 Minor	3948 (223 km)	2229 (140 km)	1199 (69 km)	633 (38 km)	92 (5 km)	
1 Slight	173 (8 km)	44 (2 km)	16 (1 km)	9 (<1 km)	1 (<1 km)	

Intervention #1

Intervention #2

Figure 2.0-3
Condition Score by Material Type



4. The results show that about 115 km of small trunk sewers are considered Medium-High and High risk. As illustrated on the figure, the matrix can be divided into intervention actions for rehabilitation planning based on level of risk. The intervention boundaries were developed based on risk reduction, where assets with LOF scores of 4 or 5 are generally targeted first as they are critical assets that may have failed or are near end of life. Assets with high COF scores but lower LOF are typically in fair condition and can be monitored for any changes in their condition. There are about 10 km of pipes that fall into Intervention 1, while about 107 km fall into Intervention 2. Of the 107 km, about 65 km are considered Medium-High risk. This intervention breakdown can help to prioritize pipes for further investigation and/or rehabilitation.

5. Recognizing that small trunks have unique characteristics, inspection technique requirements, bypass needs, and methods of construction that differ from other linear assets, the Small Trunk Rehabilitation Program was initiated during the current 2022-2024 PBR term. Reactive projects are costly and disruptive, and this proactive program was established to focus on risk reduction within the small trunk asset class and to minimize major failures and emergency projects.

3.0 JUSTIFICATION

6. Assessing the condition of an aging sewer system and planning for rehabilitation is crucial for maintaining public health, environmental sustainability, and overall infrastructure resilience. As the system ages, it is prone to deterioration, leaks, and structural issues that can lead to contamination of water sources and pose health hazards. There are several key risk categories associated with the deterioration and failure of small trunk infrastructure:

- Health and Safety – Failure of a small trunk could cause a subsidence on roadways which poses a safety risk to the public. The release of hydrogen sulfide gas (H_2S) can also be a risk when working on sanitary or combined pipes.
- Environmental – Failure of a sanitary or combined small trunk could cause a sewage spill to the local environment or water bodies.
- Customer Disruptions – Failure of small trunks can cause disruption to large service areas impacting many customers and can also cause sewer back up into customer's basements. Failed trunks also lead to emergency repairs, which are more disruptive to high traffic roadways and therefore to the public.
- Financial – Emergency repairs of failed small trunks are more costly than proactive rehabilitation. Typically an emergency repair will require more open cut replacement, which is more expensive than relining. By completing the rehabilitation work proactively through relining there are significant cost savings.

7. Since much of the pipe material is concrete, several failure modes and defects would require attention, such as wall loss due to corrosion, joint separation, fractures, breaks and holes. Figure 3.0-1 below shows some typical deterioration found within small trunks such as visible steel reinforcement, corrosion, concrete wall loss, and a PVC material change which may indicate a past failure.

Figure 3.0-1
Deterioration of Small Trunks

8. Regular assessments of small trunk infrastructure helps to identify vulnerabilities and enable proactive rehabilitation measures, thereby mitigating the risks identified above. Capital investment should be aimed at reducing the LOF by improving asset condition and extending the life of the infrastructure. Proactive implementation with steady investment levels will ensure that high-cost emergency replacements are reduced.

4.0 PROGRAM SCOPE

9. Theoretical risk scores are used as the criteria for inspection of small trunks to build the scope of the program. Each year, the highest risk candidates are reviewed and considered for inspection to ensure the most risk reduction to the system. In addition to risk, several other factors such as operational issues or synergy with other projects will be considered when refining the prioritization of inspections. For this PBR term, the focus will be on the Intervention 1 pipes shown on the small trunk risk matrix.

10. Closed-circuit televising (CCTV) inspections or Multi-Sensor Inspections (MSI) of the prioritized highest risk pipes will be required in order to determine locations for renewal. The inspections will also be used to validate locations and confirm the extent of capital investments required for renewal. Inspections will be reviewed and given a grade based on the Pipe Assessment Certification Program (PACP) Ranking System. PACP is the North American standard for pipe defect identification and assessment, providing standardization and consistency to the methods in which pipe conditions are identified, evaluated, and managed. Once the

infrastructure has been reviewed and graded, a risk assessment and evaluation will be undertaken for each segment to determine a LOF and COF score. From this post-inspection rating, trunks classified as High risk will be prioritized for rehabilitation as they are considered to be in a condition where attention is required to address potential issues. Pipes classified as Medium-High will be evaluated to determine the necessity and timing of rehabilitation based on their individual scores, the type and severity of defects, and budget availability.

11. In addition, there are about 65 km of existing small trunk inspections with a risk level in Intervention 1 and 2. These existing inspections will be reviewed to determine capital needs and the highest risk locations will be considered as part of this program.

12. Over the course of the 2025-2027 PBR term, approximately 10.8 km of small trunk sewer will be renewed. This estimate assumes that 10 km will be through relining, and 800 m will be replaced through open cut. This work may also include rehabilitation of the Trestle #2 on the Clareview Sanitary Trunk (CST) as part of a broader rehabilitation of the entire CST line. Initial scope plans for this PBR term have been developed based on condition ratings, past inspection and repair data, projected conditions of this asset type over time and risk assessment.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – Do Nothing

13. An alternative to this program is to do nothing and not proactively rehabilitate any small trunks. If nothing is done, the infrastructure will be at risk of eventual failure, especially the sanitary and combined trunks made of concrete and steel, as they can be subject to significant corrosion from H_2S. Failure of storm trunks may result in subsidence, blockages, and flooding. Although the advantage of doing nothing may be short-term cost savings for the rate payer, more expensive emergency repairs will result from infrastructure failures, increasing future capital needs for the High Priority Repair emergency program. Customers will also experience loss of service. Due to aging and deterioration of drainage infrastructure, unexpected failures may occur that disrupt sewer services to homeowners, cause roadway subsidence, or accidental sewage releases to the ground or river. It is more expensive to fix an unexpected failure than to address it proactively. A typical planned relining is at a unit cost of about $3,000/m, while unplanned emergency replacements require open cut spot replacement which averages about $5,000/m.

5.2 Alternative 2 – Increase Scope Relative to this Proposal

14. A second alternative is to increase the length of pipe that would be addressed under this program. While an increase in small trunk renewal would provide a greater risk reduction, it would require a higher capital investment which would directly impact the rate payer. Although increased risk reduction is a favourable outcome, it is essential to balance the funding needs of the small trunk assets with the overall system needs. Considering the impact to the rate payer, capital funds must be optimized across the needs and requirements of all assets, ensuring the longevity and reliability of our entire system. By evaluating factors such as small trunk asset condition and risk levels, resource availability, and budget constraints, it is not recommended to increase the scope for this program at this time. Our projection of 10 km of renewal over the PBR term will allow EWS to target the highest risk small trunks in the Intervention 1 grouping, significantly reducing risk in the system. In future PBR terms, pipes in Intervention 2 will be targeted.

5.3 Alternative 3 – Reduce Scope Relative to this Proposal

15. Similarly, a third alternative is to decrease the length of pipe that would be addressed under this program. While a decrease in small trunk renewal would reduce the impact to the rate payer in the short term, a decrease in scope would reduce the risk reduction that can be achieved over the PBR term. This could result in a higher number of costly and disruptive emergency repairs, impacting the rate payer in the long term. In order to target the highest risk pipes and reduce the risk of pipes in Intervention 1, it is important to maintain the 10 km of renewal over the PBR term.

6.0 COST FORECAST

16. The program cost estimates for the 2025-2027 PBR term are shown in Table 6.0-1. They are based on historical information such as past inspection costs, past design costs and past construction costs of similar small trunk projects. Assumptions for the 2025-2027 PBR term are as follows:

- CCTV inspections will be completed by internal resources, while MSI will be completed by external resources
- 10 km of full relining will be completed
- 800 m of full replacement will be completed
- Relining will be completed by external contractors

- Replacements will be completed by internal resources
- Geotechnical investigations will be completed by external contractors

Table 6.0-1
Small Trunk Rehabilitation Program Capital Expenditure Forecast 2025-2027 ($ millions)

	2025	2026	2027	Total
Total Capital Expenditures	13.3	12.9	9.6	35.8

7.0 KEY RISKS AND MITIGATION PLANS

17. Table 7.0-1 provides key risks and mitigation plans associated with this program.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Health and Safety Risks – Failed small trunks could result in sinkholes on busy roadways and a safety risk to pedestrians and motorists. Failed trestle pipes could result in collapse above public trails and result in danger to the public.	This program will reduce the risks of small trunk failures and the associated occurrence of sinkholes or trestle pipe collapse.
2. Environmental Risks – Failed small trunks can allow the release of untreated sewage into the environment which violates the Approval-to-Operate	This program will reduce the risks of small trunk failures and the associated environmental risks.
3. Execution Risks – Utility conflicts, unexpected scope increases, bad soil conditions, new road restoration requirements, and conflicts with other construction projects in the area.	EWS will circulate all projects through the Utility Line Application (authorization for utility installations within public road right of way) system. EWS will deal with force accounts (additional work not within the original scope in the contract) on an individual basis and ensure inspectors are recording all delays and force accounts
4. Financial Risks – Potential trunk failure could result in more costly emergency replacement. Increase to overall construction prices based on market conditions	This program will reduce the risks of trunk failure and the associated emergency replacement costs. EWS will include contractors early on in the process, clearly identify scope requirements and evaluate options such as bundling multiple project scope or using a design-build approach when efficiencies can be identified.

8.0 RESOURCES

18. All activities related to project management, inspections, assessment, design, and open cut construction will be undertaken by internal EPCOR resources. EPCOR will employ pre-qualified external contractors to complete the relining scope.

EPCOR WATER SERVICES

Appendix G-14

Business Case

SMART PONDS PROGRAM

May 31, 2024

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1.0 OVERVIEW

1. The Smart Ponds Program is a capital program that converts existing Stormwater Management Facilities into smart ponds for enhanced storm water management. Smart ponds use technology such as automatic gates, water level and flow sensors, and weather radar/precipitation data to create a system wide control system. This approach optimizes the utilization of existing capacity during a rainstorm event to reduce flooding risks in the community. Smart Ponds are a critical element of EPCOR Water Services' (EWS) Stormwater Integrated Resource Plan (SIRP) to mitigate flood risk across Edmonton through the SIRP-Predict component of the plan. During the 2025-2027 PBR term, this program is forecast to initiate 5 areas projects per year. The total capital spend is $18.9 million. Of that total cost, $6.7 million is estimated to be covered by grant funding, resulting in net capital expenditures of $12.2 million.

2.0 BACKGROUND

2. Smart Pond installations are part of the PREDICT theme of the SIRP strategy. SIRP is a system wide integrated approach to mitigate flood risk by reducing the health, safety, and social risk of flooding with lower overall capital investment than compared to traditional engineering approaches. SIRP recommended a five-theme strategy for flood mitigation (SLOW, MOVE, SECURE, PREDICT and RESPOND) that included a mix of grey infrastructure (trunks and tunnels) and green infrastructure (dry ponds, low impact development). The PREDICT theme focuses on predicting and managing the movement of stormwater through implementation of smart sensors and technologies that integrate into the existing collection system. Under the SIRP Predict theme, EWS has initiated a new program to install smart technology on all the existing 117 stormwater wet ponds. The proposed technology includes automated gates, flow and water level sensors, and the incorporation of weather radar/precipitation data as part of the overall control system.

3. Smart Ponds serve to reduce overland flooding by optimizing existing storage in the collection system during a rainstorm event. Utilizing the full potential of the storage within the system limits stress to downstream assets such as the Gold Bar Wastewater Treatment Plant (GBWWTP) and outfalls on the receiving creeks and the North Saskatchewan River (NSR) and improves the drainage capacity in neighbourhoods hit hardest by large storm events. Using this storage during storms will also reduce bed and shore erosion of receiving streams, particularly during short duration and high intensity storms.

4. The monitoring systems and real time data analytics platforms developed through this program will permit system wide flood optimization during large storms. Smart infrastructure

can leverage underutilized stormwater management assets to maximize city-wide stormwater storage capacity across the city.

5. Smart technology has been used in other community sewer systems throughout North America with much success, such as predicting and moving sanitary flows in combined sewer systems to reduce combined sewer overflows in South Bend, Indiana. EWS has implemented a partial system utilizing similar technology in its Kennedale sewershed several years ago and has built insight into best management practices for Edmonton's collection system. Under this application, EWS will begin system-wide implementation of smart technology across all stormwater management facilities in Edmonton, starting with wet ponds.

6. The Smart Ponds Program is partially funded by the federal Disaster Mitigation Adaption Fund (DMAF) with 40% of eligible funds being covered by the federal grant, significantly reducing the cost to ratepayers over the next decade. The estimated cost for each project will be site specific for each individual pond and is forecasted to range between $300,000 to $800,000 per location.

7. Most storms in Edmonton are small, with intense events affecting smaller areas over a short duration. Edmonton's storms are often localized and intense, surrounded by areas of less intense rainfall. Storm water management assets that are located along the storm's periphery can be underutilized while the pipes and ponds located a short distance away in the intense core of the storm can be exceeding their design capacity. Using sensors to identify capacity opportunities along a storms path to fill and store additional storm water in underutilized assets provides the means to provide capacity relief for the storm management assets operating within the more intense core of a storm.

8. Smart ponds enable widespread optimization of the existing stormwater management system infrastructure including not only the stormwater management facilities where automation is installed, but for all the interconnected storm sewers. The regulation of flows facilitated by the smart ponds will see the greatest benefit in areas of the sewershed that currently do not have a storm water management facility. The total area benefiting from the program is 26,000 ha or 47% of the total area of the city.

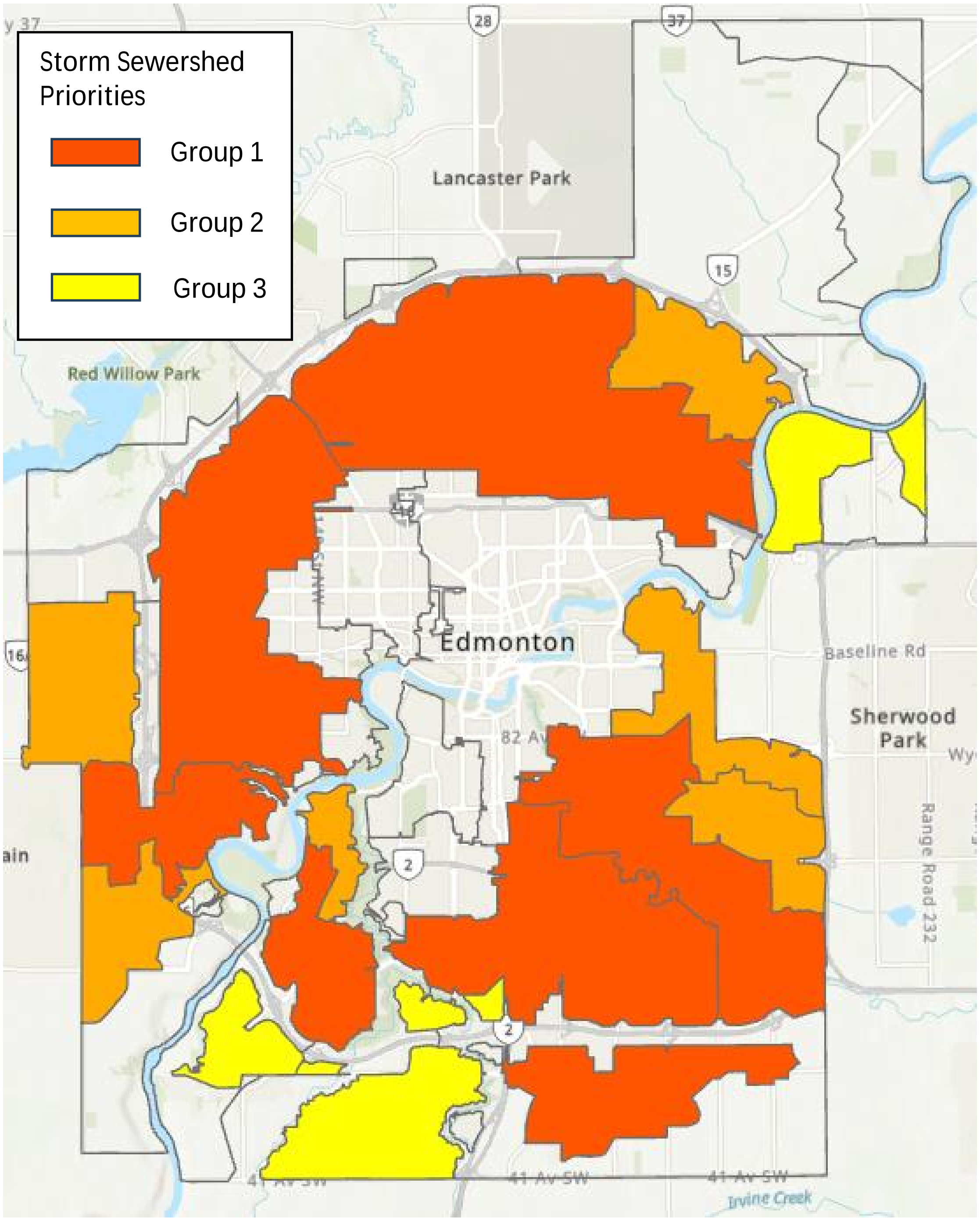
9. EWS has risk ranked each storm sewershed that contains a wet stormwater management facility based on the proportion of the sewershed which will benefit from the project, the overall population benefited, the presence of critical infrastructure within the sewershed and the presence of any known issues within the sewershed (i.e. hydraulic capacity of the sewer system,

stability of the receiving watercourse). This will allow EWS to prioritize installation based on the storm sewershed with the highest urban flood risk. This risk ranking is shown in Table 2.0-1 and Figure 2.0-1 shown below.

Table 2.0-1
Sewershed Profiles

Storm Sewershed	No. of Wet Ponds	Total Area (ha)	Population	% Area Benefited	Population Benefited	Priority	Stage
Kennedale	24	7,311	187,733	79	148,006	GROUP 1	Underway
30th Avenue	10	5,191	126,306	90	113,853	GROUP 1	Underway
Mill Creek	10	3,434	50,968	77	39,288	GROUP 1	Underway
Quesnell	12	6,957	8,121	79	6,434	GROUP 1	Underway
Blackmud Creek North	12	1,857	37,819	50	18,910	GROUP 1	Completed in 2025-2027
Wedgewood North	13	1,592	3,714	67	2,476	GROUP 1	Completed in 2025-2027
Clareview	6	1,343	31,923	61	19,566	GROUP 2	Completed in 2025-2027
Fulton Creek	1	1,128	5,383	76	4,084	GROUP 2	Completed in 2025-2027
Gold Bar	4	1,483	12,044	68	8,240	GROUP 2	Initiated in 2025-2027
Blackmud Creek South	7	1,090	27,113	60	16,268	GROUP 2	Initiated in 2025-2027
Riverbend	1	422	4,960	42	2,067	GROUP 2	Initiated in 2025-2027
Wedgewood South	2	1,145	380	82	311	GROUP 2	Initiated in 2025-2027
Bearspaw	1	92	2,738	80	2,191	GROUP 3	Initiated in 2025-2027
Whitemud Creek North	1	207	10,663	50	5,331	GROUP 3	Initiated in 2025-2027
Whitemud Creek South	3	590	14,012	60	8,407	GROUP 3	Initiated in 2025-2027
Windermere	4	682	2,270	82	1,857	GROUP 3	Initiated in 2025-2027
Aurum Road	1	238	0	33	0	GROUP 3	Initiated in 2025-2027
East Anthony Henday	2	853	0	50	0	GROUP 3	Initiated in 2025-2027
Glenridding	3	643	4,332	67	2,888	GROUP 3	Initiated in 2025-2027

Figure 2.0-1
Targeted Sewershed areas for Smart Pond Projects



3.0 JUSTIFICATION

10. By moving forward with this program, EWS will become more resilient to urban and riverine flood risks. Edmonton and surrounding communities will be better protected and experience minimal disruption to essential services during severe flood events.

11. An economic impact assessment completed for the federal DMAF grant application shows significant benefits from the smart ponds program, with estimated savings of $159.5 million in direct damages mitigated due to flooding. The projects completed in the 2025-2027 PBR period will account for $130.0 million of the $159.5 million in damage mitigation. Additionally, there is an anticipated economic impact reduction of $1.4 million from minimizing disruptions to business operations.

12. Smart ponds also provide mitigation benefits across a variety of risk categories:

- Health and Safety Risks – Basement flooding can put residents, contractors, and EWS employees at risk through contact with raw sewage and can affect the physical and mental health of the occupants. Surface flooding and street ponding increases risk of traffic accidents and injuries.
- Environmental Risks – Excessive combined flows can lead to floods, sewage spills and excessive erosion that damages and contaminates the natural environment. This can affect usage of facilities by the public, require substantial investment to restore the areas, and violate the Approval-to-Operate issued by Alberta Environment and Protected Areas (AEPA).
- Financial Risks – Surface flooding and basement backups from large storm events can be costly to manage and clean up and can lead to significant claims from customers.
- Reputational Risk – Surface ponding in localized sag areas during large storm events can cause water to access the sanitary pipes and/or foundation drains of properties without adequate flood proofing and enter the building, causing flooding and damage.

4.0 PROGRAM SCOPE

13. During the 2025-2027 PBR term, this program is forecast to initiate 5 areas projects per year, project. These projects include optimized flow control strategy including implementation, flow and water level sensors, and flow control structures. Each pond will have between three to four sensors installed at the pond and along its supporting pipe infrastructure with a total of 300 sensor installations in the 2025-2027 PBR term.

14. Project prioritization is driven by the estimated sewershed priority which is based on the estimated proportion of the sewershed that benefit from the project, affected population, the presence of critical infrastructure and any known issues in the sewershed area. Each sewershed is expected to have smart pond projects underway or initiated during the 2025-2027 PBR term.

15. The Kennedale, 30th Avenue, Mill Creek and Quesnell sewersheds are currently in progress during the current PBR and, except for Kennedale, will extend into the 2025-2027 PBR term for completion.

16. Blackmud Creek North, Wedgewood North, Clareview and Fulton Creek will all be initiated and completed during the 2025-2027 PBR term.

17. The remaining sewersheds will be initiated during the 2025-2027 PBR term and completed in the subsequent PBR term.

5.0 ALTERNATIVES CONSIDERED

5.1. Alternative 1 – Do Nothing

18. Not implementing smart pond projects would limit EWS's ability to minimize flooding and reduce impacts to the public. In a do-nothing scenario, residents and businesses would incur direct costs from flooding.

19. This program is partially funded by the federal DMAF grant based on scope of work and timelines committed to with the Federal Government. Not completing the projects would likely result in the withdrawal of $17.1 million in federal funding including $3.1 million that would be received for already completed work.

5.2. Alternative 2 – Accelerated Investment relative to this Proposal

20. Further accelerating investment in smart ponds would present resourcing and costing challenge that would be disproportionately larger than the resulting reduction in risk. The current rate of investment is based on the capabilities of existing internal and external resources to engineer and execute the work. The recommended pace aligns with the operational and capital capacity to execute on the work effectively.

5.3. Alternative 3 – Decelerated Investment relative to this Proposal

21. The overall capital investment during the 2025-2027 PBR term could be reduced by extending the timeframe to complete the smart pond infrastructure. Under this alternative, EWS would still complete all of the proposed ponds within a 20-30 year period, however, some of the ponds would be shifted beyond the next two PBR terms. The risk with this approach is that ongoing flooding risks within high-risk stormwater subbasins would continue, resulting in higher risk of property damage to residents. Additionally, there are financial risks associated with potentially not fully utilizing the DMAF grant funding if EWS is not able to complete the agreed scope of work prior to the agreed timelines committed with the Federal Government. This alternative was rejected based on this additional risk.

6.0 COST FORECAST

22. EWS has forecast total program capital expenditures during the 2025-2027 PBR term at $18.9 million. The program cost estimates are shown in Table 6.0-1 and are based on detailed project costing estimates provided in the DMAF funding application for federal approval of the grants and have the following assumptions:

- No significant utility conflicts.
- Standard construction methods and timelines will be applied.
- External consultants will be used during the extent of the project for design and construction support.
- External contractors will be used for construction.
- Contingencies are based on project phase and complexity and range from 30-50%

Table 6.0-1
Smart Ponds Program Capital Expenditure Forecast ($ millions)

	2025	2026	2027	Total
1. Total Capital Expenditures	5.5	5.9	7.5	18.9
2. Less Grant Funding	2.0	2.0	2.7	6.7
3. Net Project Costs	3.5	3.9	4.8	12.2

7.0 KEY RISKS AND MITIGATION PLANS

23. Table 7.0-1 provides a summary of key risks associated with executing the Smart Ponds Program.

Table 7.0-1
Key Risks and Mitigation Plans

Risk	Mitigation Plan
1. Execution Risks - Some smart pond project sites may have limitations due to being within environmentally sensitive areas or areas under the river valley bylaw.	EWS will ensure all procedures for working within environmentally sensitive areas are followed and will design and time the projects to minimize the impacts to water ways and minimize disruptions to existing vegetations. Designs will be optimized with the intent of minimizing the need to remove trees.
2. Financial Risks - Availability of DMAF funding. Actual contractor bids may vary from the estimates. Materials and skilled labour are subject to market variability. There are also project unknowns that may affect costing.	EWS has put together a Grant Funding Committee to assist with development and delivery of grant funding. If projects are undertaken within proposed program timelines, then funding should be available. EWS will include contractors early in the process, clearly identify scope requirements and evaluate options such as bundling multiple project scopes approach when efficiencies can be identified. EWS manages financial risks by conducting preliminary design and obtaining manufacturer's quotes for establishing the project budget. The financial risks will become more evident as further design is completed and scope will be adjusted accordingly.
3. Storm Event Risk – There is a risk of a severe storm event occurring during the construction phase.	EWS will make use of weather forecast tools to schedule construction projects and emergency response plans to enhance safety and prevent damages.

8.0 RESOURCES

24. An external consultant will be hired for the extent of the project. They will complete concept validation, preliminary and detailed design, as well as construction support. As an external cost, this will be applicable for DMAF reimbursement. EWS will handle delivery of the project and will outsource construction services as per requirements of grant funding. DMAF grant funding is contingent on use of external contractors for design and construction.

Appendix H

EPCOR WATER SERVICES

Stakeholder Engagement Report

May 31, 2024

1.0 STAKEHOLDER ENGAGEMENT REPORT

1. As required by the regulatory process for PBR applications, EPCOR Water Services (EWS) provided Utility Committee with a public awareness and engagement plan consistent with the City's public engagement policy and carried out activities consistent with the plan. This document outlines the principles and processes EPCOR follows when engaging with the public and community members, and the results of such engagement.

1.1 Overall Public Engagement Approach

2. EWS believes in listening to and engaging with the community. We demonstrate social responsibility by building and sustaining relationships through effective consultation. Our consultation process ensures that community members have opportunities to provide meaningful input into projects and operations that affect them. Our resulting decisions and actions are guided by our understanding of their interests, priorities and values.

3. Due to the complexity of the PBR process, the engagement focuses on understanding the public's values and policy preferences at a high level. Concepts are presented using non-technical language to help ensure meaningful input.

1.2 Objectives for Public Engagement

4. Through the public engagement process for the PBR Application, EWS' objectives are to:

- Have public and community input inform policy choices, priority-setting for operations and capital programs, performance measurement and rate design;
- Provide the public with opportunities to ask questions, express concerns and raise issues with respect to the PBR renewal and their utility services;
- Maintain positive and productive relationships with key audience and community members throughout the development and implementation of the PBR application; and
- Report on how community feedback was used in the PBR application.

5. In addition, public engagement activities help inform communications and campaigns to educate customers on the wastewater collection and treatment utilities.

1.3 Key Audience Overview

6. The primary audiences for engagement are wastewater collection (sanitary/stormwater drainage) and wastewater treatment utility customers within the City of Edmonton. They include:

- Residential and multi-residential customers
- Commercial customers, with an emphasis on:
  - large stormwater/wastewater customers, such as schools; food service, production & processors; the City of Edmonton (sports, parks & recreation); hospitals; the University of Alberta; and
  - overstrength commercial customers (customers who send specific compounds that are above defined concentrations into the wastewater collection system as part of their commercial processes, e.g. car washes, hair salons, etc.)
- Stormwater customers who sit on a large site and may have a sizeable stormwater utility charge (cemeteries, golf courses, rugby clubs, farms, etc.)
- Developers and property managers
- The Gold Bar community, and communities surrounding the Gold Bar Wastewater Treatment Plant

1.4 Topics for Public Input

7. The PBR application includes a series of policy, program and rate recommendations related to building, operating and maintaining wastewater collection and treatment systems and services. The public engagement process identifies public and customer values and preferences for the utility services they receive and weighs the benefits of the proposed utility programs against the impacts and costs.

2.0 SURVEY RESULTS

8. Earlier in 2024, EWS engaged the services of a third-party research company, Stone-Olafson, to provide assistance in conducting residential and commercial customer surveys to help inform the PBR Application. During March 2024, Stone-Olafson, conducted an online survey of Edmonton residents based on age, gender, and macro area. In addition, a live link to the survey was posted on EPCOR's website to enable any member of the public to participate.

9. Following is a summary of the residential and commercial survey results. Complete survey results are included under Attachment 1 of this document.

2.1 Residential Survey Results Summary

10. A total of 1,219 fully-completed surveys were analyzed. Of this, 29% of respondents were multi-residential customers (roughly half that own, and half that rent). The remaining either rented or owned freestanding dwellings, the majority of which owned a single residential home (58%). The margin of error for a random sample of this size is +/-2.8%, 19 times out of 20.

EPCOR's Awareness is High in Edmonton and Customers Remain Satisfied with EPCOR's Services

- Seven in ten respondents, on an unaided basis, indicated EPCOR provided their wastewater and stormwater services and eight in ten named EPCOR on an aided basis.
- 43% of respondents have high satisfaction, 88% overall are satisfied, though satisfaction ratings have declined 2% overall and high satisfaction ratings declined significantly more. Cost is the main reason that satisfaction levels have softened (cost represents 56% of reasons provided), though the desire for overall continued improvement and reduced odour are also indicated (18% of responses each).

Top Concerns of Edmontonians Show a Considerable Shift since 2020

- Cost is now the most significant top of mind concern, followed by concerns about infrastructure, odour issues, and satisfaction with service.
- On a prompted basis, reliability of infrastructure is the top concern at 46%, followed by sewer back up and flood risk. Overall, most prompted issues fall in a relatively narrow range of 'concern' between 37% and 46%. While sewer odour is in the lower end of the list, it had the highest overall 'very concerned' score indicating that for those whom it does concern it's more significant.

Priorities Remain - Environment, Safety, Responsible Investment Supporting Reliability

- For wastewater the top priorities for residential consumers remain consistent with 2020: reducing contaminants going to the river (#1) and public and employee safety (#2). Reducing odour is the third priority, followed by reducing energy use in operations.
- For stormwater the top two priorities are also consistent with 2020: quick response times for blocked sewers and emergencies (#1), and reducing contaminants that could enter the river (#2). However, residents this year put a much higher priority on

reducing the number of blocked main-line sewers (this moved from #7 to #3), and ease of reporting issues also gained significant priority (moving from #8 to #5).

- For both wastewater treatment and stormwater management the combined view of unaided concerns and ranked priorities tells us that infrastructure and maintenance are of extreme importance, though when paired with the top of mind concern about cost, efficiency should be factored in. The goal of investment is creating long term efficiencies, sustained reliability, and consistency.

Billing Stability is Very Strongly Supported

- 62% of respondents indicated ‘keeping bills constant from month to month’ is an 8, 9, or 10 out of 10 priority area. Further, 85% of residential consumers indicate their preference is for EPCOR to hold back surpluses to mitigate fluctuations. This makes sense with 63% of Edmontonians feeling they are either struggling or simply managing ‘ok’ economically. I.e. when money is tight, there is little room for surprises (Note: this data comes from other surveys). The significant majority want EPCOR to equalize costs in the background.

2.2 Commercial Survey Results Summary

- Customers remain satisfied with EPCOR services (52% high satisfaction, 79% overall satisfaction), WWT and WWC services are rated higher with 94% overall satisfaction.
- Cost is the main reason that satisfaction levels have softened with 46% indicating the cost for wastewater treatment is unfair, and 61% indicating sewer and drainage services are unfair.
- Despite cost concerns, commercial customers expect to continue an increase in investment to promote long-term efficiencies and system performance. This demonstrates how important a well-functioning and predictable system is to commercial operators.

Billing stability strongly supported

- Similar to the residential results, commercial and multi-res respondents strongly favoured consistent and predictable billing, with 61% ranking it as very important.

2.3 Next steps

11. EWS will be conducting small group interviews with developer organizations and the Gold Bar Community Liaison Group, which consists of 10-15 people representing communities and organizations surrounding, or with a connection to, the Gold Bar Wastewater Treatment Plant.

3.0 CONCLUSION

12. EPCOR's surveys of residential commercial and mutli-residential customers have revealed four key themes that are reflected in the PBR application:

- EPCOR remains a known and trusted utility service provider;
- Cost/affordability, environmental and river protection and safety are key priorities for customers;
- Efficient investment in reliability of infrastructure is supported; and
- Stability of bills is strongly supported.

EPCOR PROVIDING MORE

EPCOR WWC & WWT PBR 2024 Public Consultation

Edmonton Residential

Quantitative Survey Results

April 22, 2024

Stone Olafson

Stone — Olafson

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EPCOR

Background

EPCOR Water Services Inc. is regulated by City Council in accordance with their Performance Based Regulation (PBR) plan. The purpose of this type of regulatory framework is to create incentives for operators to improve their efficiency, and to focus on both price (rates) and quality of service in areas that are important to stakeholders. As Wastewater Collection (WWC) and Wastewater Treatment (WWT) utilities prepares for PBR renewal, they are conducting public engagement as part of this process to learn how important their current areas of performance are to stakeholders as well as uncover any other (new or unknown) areas that that should be part of the plan. Ultimately, the PBR application will include recommended operational and capital programs, performance measures and rates, in a way that's informed by the public engagement process.

The goals of public engagement of are to:

- Have public and community input inform policy choices, priority-setting for operations and capital programs, performance measurement and rate design;
- Provide the public with opportunities to ask questions, express concerns and raise issues with respect to the PBR renewal and their utility services;
- Maintain positive and productive relationships with key audience and community members throughout the development and implementation of the PBR application; and
- Report on how community feedback was used in the PBR application.
- Maintain positive and productive relationships with the key decision makers and stakeholders on the PBR development and implementation
- Report back to stakeholders as the PBR renewal process progresses on how their feedback was used by EPCOR
- Help inform communications and campaigns to educate customers on their water & wastewater utilities.

EPCOR is seeking input on four key areas;

- Values
- Performance Priorities
- Cost and Risk Sharing
- Rates

PBR Consultation: Objectives

The first phase of the EPCOR PBR study is an online survey with EPCOR decision maker customers including residential and multi residential.

The objectives of this study are:

- To understand values & high-level performance areas
- Identify overarching and most sensitive areas of how EPCOR performs that matters most
- Gather feedback on existing or proposed broad areas of performance
- Early analysis of rate sensitivity
- What to do with the information: Data will inform EPCOR with key areas of focus for more detailed engagement, support the prioritization of focus areas, and validate and/or refine performance measures (weighting and categories)

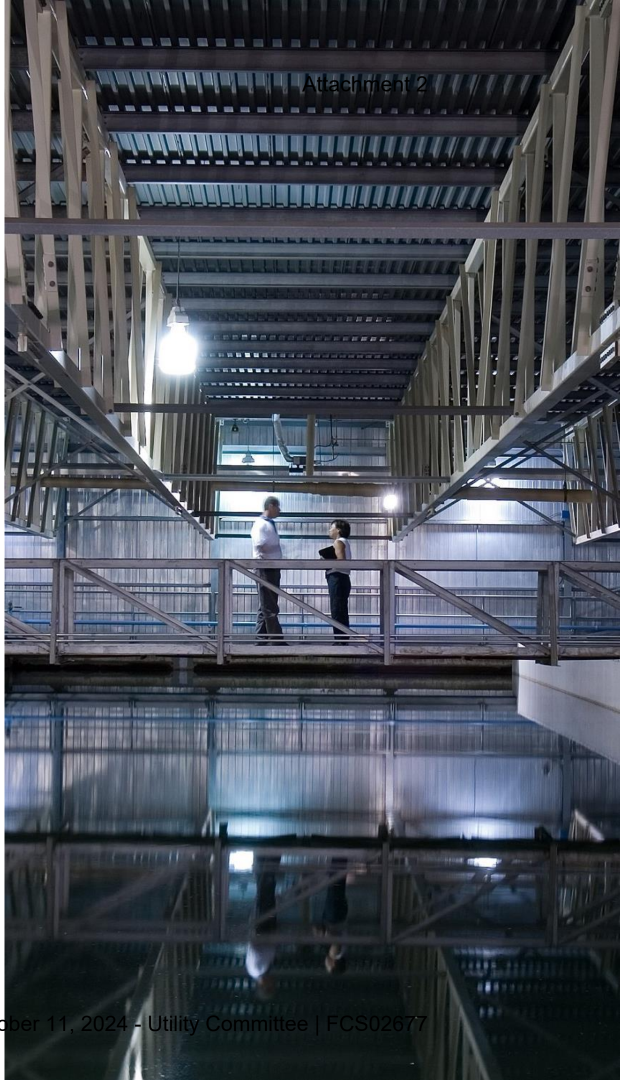
Methodology

Stone-Olafson conducted an online survey among an online sample of Edmonton residents representative of the GEA based on age, gender, and macro area. In addition, a live link to the survey was posted on EPCOR's website to enable any member of the public to participate in the survey.

A total of n=1,219 fully completed surveys were retained in our analysis following a four part data cleaning process. The margin of error for a random sample of this size is +/-2.8%, 19 times out of 20. Of this, 29% of respondents were multi-residential residents (roughly half that own, and half that rent). The remaining either rented or owned freestanding dwellings, the majority of which owned a single residential home (58%).

The data was collected between March 3 and 24th, 2024.

Note: Compared to 2020 PBR residential consultation, the methodology used changed in terms of sample base. In 2020, the survey was sent directly to EPCOR customers via EPCOR contact lists with the logo and knowledge of who was conducting the survey visible. In 2024, the survey was conducted via external sample, and remained blind (survey sponsor not identified) until detailed questions were asked.



The story on one page…

- **EPCOR awareness is high in Edmonton**, with seven in ten indicating EPCOR on an unaided basis for WWC and WWT services, and eight in ten naming EPCOR on an aided basis.
- **Customers remain satisfied with EPCOR services** (43% high satisfaction, 88% overall satisfaction), **though satisfaction ratings have declined** 2% overall and high satisfaction ratings declined significantly more.
- **Cost is the main reason that satisfaction levels have softened** (cost represents 56% of reasons provided), though the desire for overall continued improvement and reduced odour are also indicated (18% of responses each).
- **Top of mind concerns of Edmontonians show a considerable shift** since 2020, with cost now the most significant top of mind concern followed by concerns about infrastructure, odour issues, and satisfaction with service cited most often.
- **On a prompted basis, *reliability of infrastructure* is the top concern** at 46% followed *sewer back up and flood risk*. Overall, most prompted issues fall in a relatively narrow range of 'concern' between 37% and 46%. While sewer odour is in the lower end of the list, it had the highest overall 'very concerned' score indicating that for those whom it does concern it's more significant.

PBR Priority Areas (prompted)

- **WWT** – 7 priority areas tested: the top priorities for residential consumers remains consistent with 2020; reducing contaminants (#1) and public and employee safety (#2). Reducing odour is the third priority, followed by reducing energy use in operations.
- **WWC 9** – 10 priority areas tested: Similarly, the top two priorities for WWC are also consistent with 2020; Quick response times for blocked sewers and emergencies (#1), and reducing contaminants that could enter the river (#2). However, residents this year put a much higher priority on reducing the number of blocked main-line sewers (this moved from #7 to #3), and ease of reporting issues also gained significant priority (moving from #8 to #5).
- **In terms of billing strategy, consistency is highly valued** with 62% indicating 'keeping bills constant from month to month' is an 8, 9, or 10 out of 10 priority area. Further, 85% of residential consumers indicate their preference is for EPCOR to hold back surpluses to mitigate fluctuations. This makes sense with 63% of Edmontonians feeling they are either struggling or simply managing 'ok' economically. I.e. when money is tight, there is little room for surprises.

What it means

1. **EPCOR overall is coming under more scrutiny through inflationary times, though expectations of the communities served remain consistent.**

- Constituent priorities have held, and in spite of cost concerns, Edmontonians want to ensure the river, public, and employees are secure to the point they are still willing to invest.

2. **While Edmontonians prioritize protection even if it means investment, the goal is long term efficiency.**

- Note that for both WWT and WWC the combined view of unaided concerns and ranked priorities tells us that infrastructure and maintenance are of extreme importance, though when paired with the top of mind concern about cost, efficiency should be factored in. The goal of investment is creating long term efficiencies, sustained reliability, and consistency.

3. **Consistency in cost/billing is particularly critical.**

- Leaning towards investment in a financially challenged environment means Edmontonians don't feel they can afford surprises. The significant majority want EPCOR to equalize costs in the background.

4. **Rates/pricing should always communicated in connection to supporting service reliability AND long - term efficiency.**

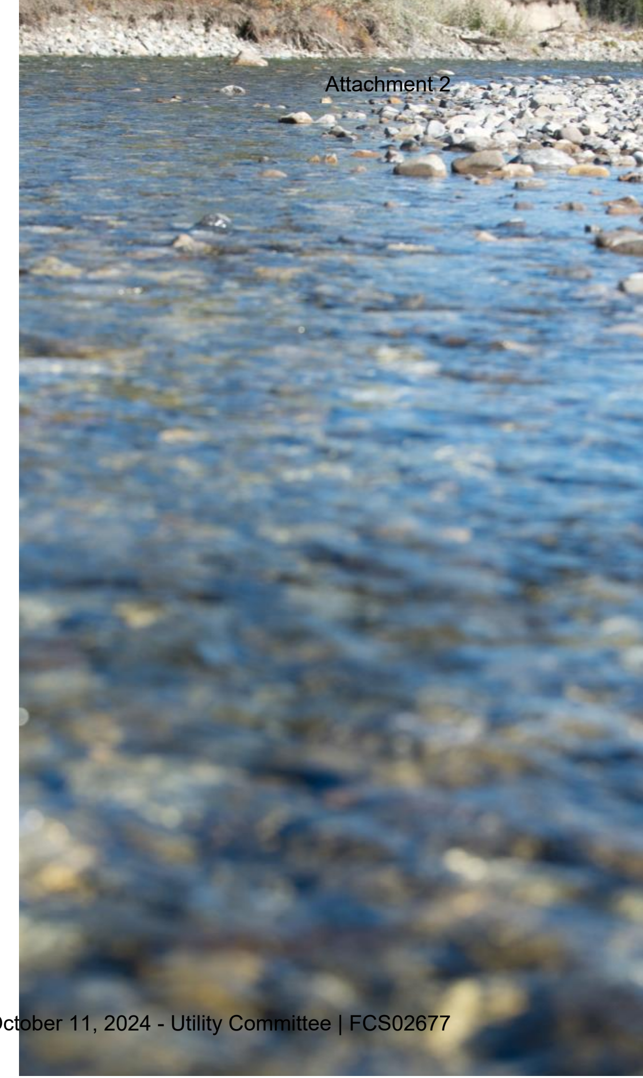
- Edmontonians want to know that efficiency and good use of funds matters. With satisfaction waning, it will be important that EPCOR speaks to understanding this environment and the long term efficiencies/benefits that will be gained.

5. **Rates/investment should always communicated in connection to supporting community protection AND long-term efficiency.**

- Edmontonians want to know that efficiency and good use of funds matters to EPCOR. With satisfaction waning in the face of inflation, further improvement wanted, and slightly higher emphasis on 'ease of getting through' and 'service', EPCOR will want to ensure that Edmontonians feel heard before significant investment is visible.

EPCOR PROVIDING MORE

Detailed Findings: Residential Customers



Stone — Olafson

Stone—Olafson

Detailed Results

THE CONTEXT

EPCOR Awareness, Reputation, Satisfaction, & Community Ratings

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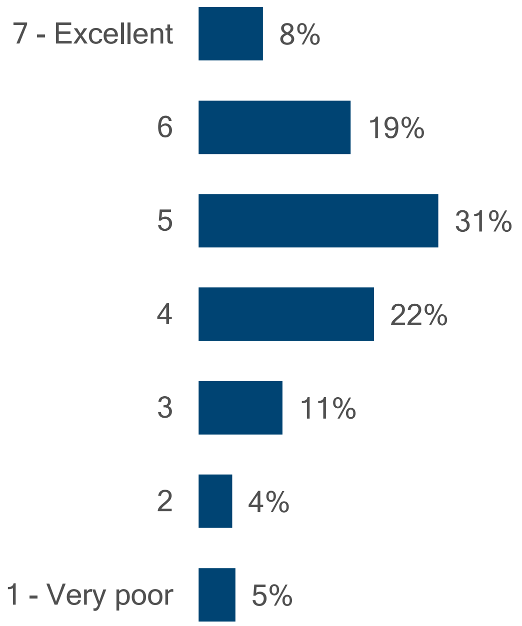
The context highlights:

- Awareness of EPCOR is high with the majority able to name EPCOR as the service provider of Wastewater Treatment (71%), Drainage Services (69%) and Storm Water Collection (66%) on an unaided basis, and 8 in 10 indicate EPCOR on an aided basis.
- Residential customers are satisfied with their service (4-7 out of 7) at 88%, and very satisfied (6-7 out of 7) at 43%.

  Note; this represents a decline since 2020, with the majority of dissatisfaction ratings due to high cost (56%), overall room for improvement (18%), and issues with quality/odour (18%)
- Consistent with most satisfaction ratings, a lack of issues drives satisfaction (i.e. out of sight, out of mind), followed by good service and reliability.

Just under 1/3 of Edmontonians are highly satisfied with utility services overall, and 20% are dissatisfied.

Overall Satisfaction with Utility Service in Edmonton



Top 2 Box:
27%

Top 4 Box:
80%

Positive ratings are higher among males, those with incomes over $100,000 per year, living centrally, and those who have a post-graduate education.

Bottom 3 Box:
20%

Base: All respondents: Residential (n=1,219)

Q2. Thinking broadly, how would you rate the quality of utility services in Edmonton overall?

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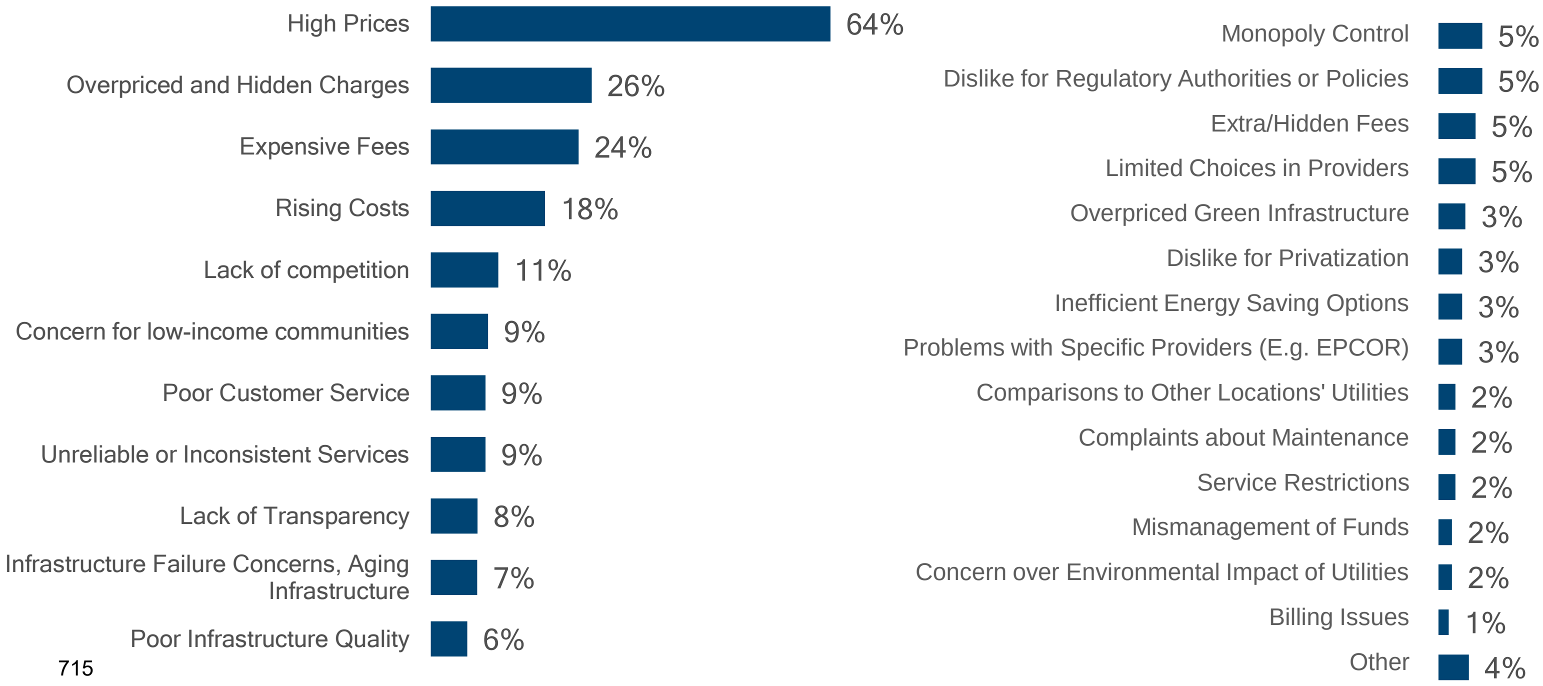
Those who are dissatisfied with utility services in Edmonton indicate costs, rising costs, and fees as the primary issues.

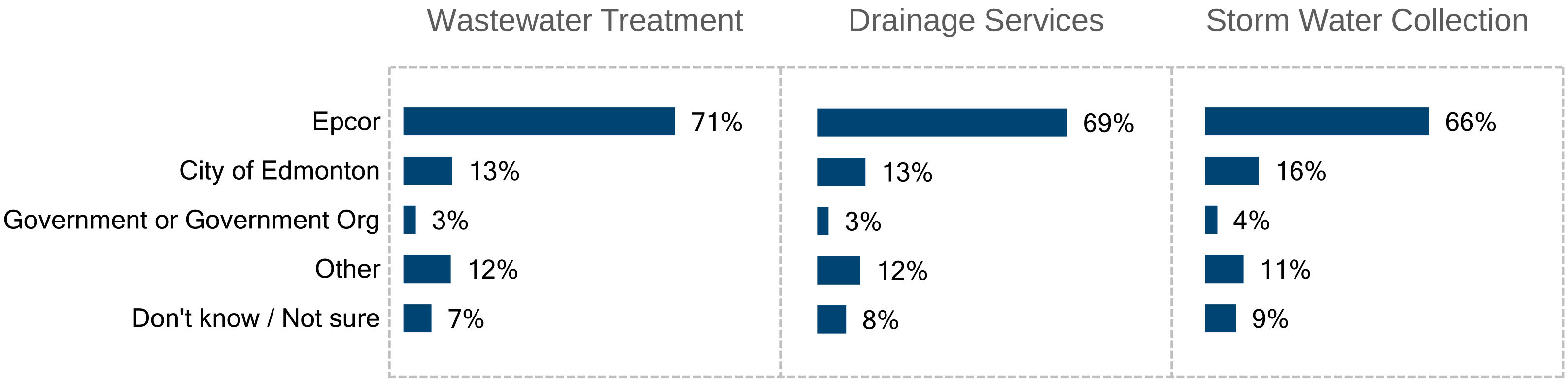
Reason for Dissatisfaction with Edmonton Utilities
(1+2+3 out of 7, n=239)



Q8. What is the main reason that you gave this rating?

Awareness of EPCOR as the service provider is high.

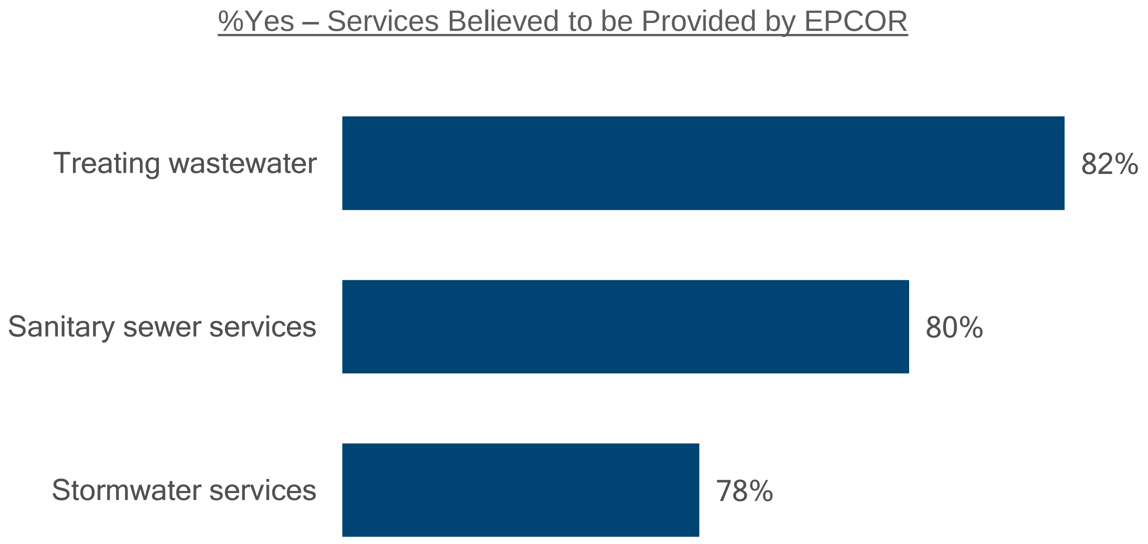
Roughly two thirds or more of EPCOR residents are aware that EPCOR manages all wastewater treatment, drainage, and collection services by name. The remaining primarily identify the city of Edmonton.



Those who are not aware of EPCOR as a service provider by name are more likely to be 18-34, self-identify as a visible minority, and rent or live in a multi-residential property.

Base: All respondents: Residential (n=1,219)
Q5. To the best of your knowledge, who is responsible for supplying the below services to your home?

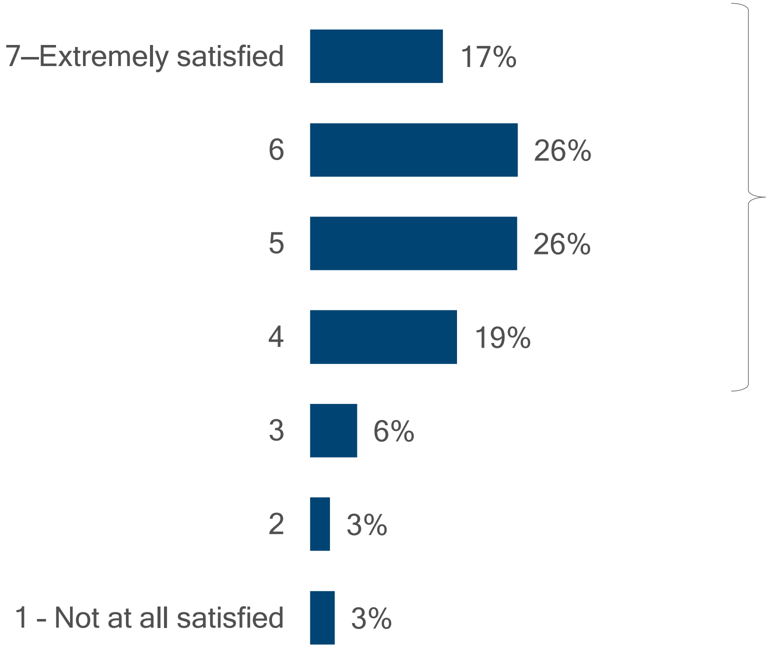
When asked about EPCOR specifically (prompted) confirmation of EPCOR as utility provider of WWC and WWT increases to 80%.



Base: All respondents: Residential (n=1,219)
Q6. To the best of your knowledge, is EPCOR responsible for providing these services in Edmonton?

The majority of Edmontonians (88%) are satisfied with EPCOR WWC and WWT Services, with 43% very satisfied (top 2 box).

Overall Satisfaction with EPCOR Water Services



Top 2 Box:
43%

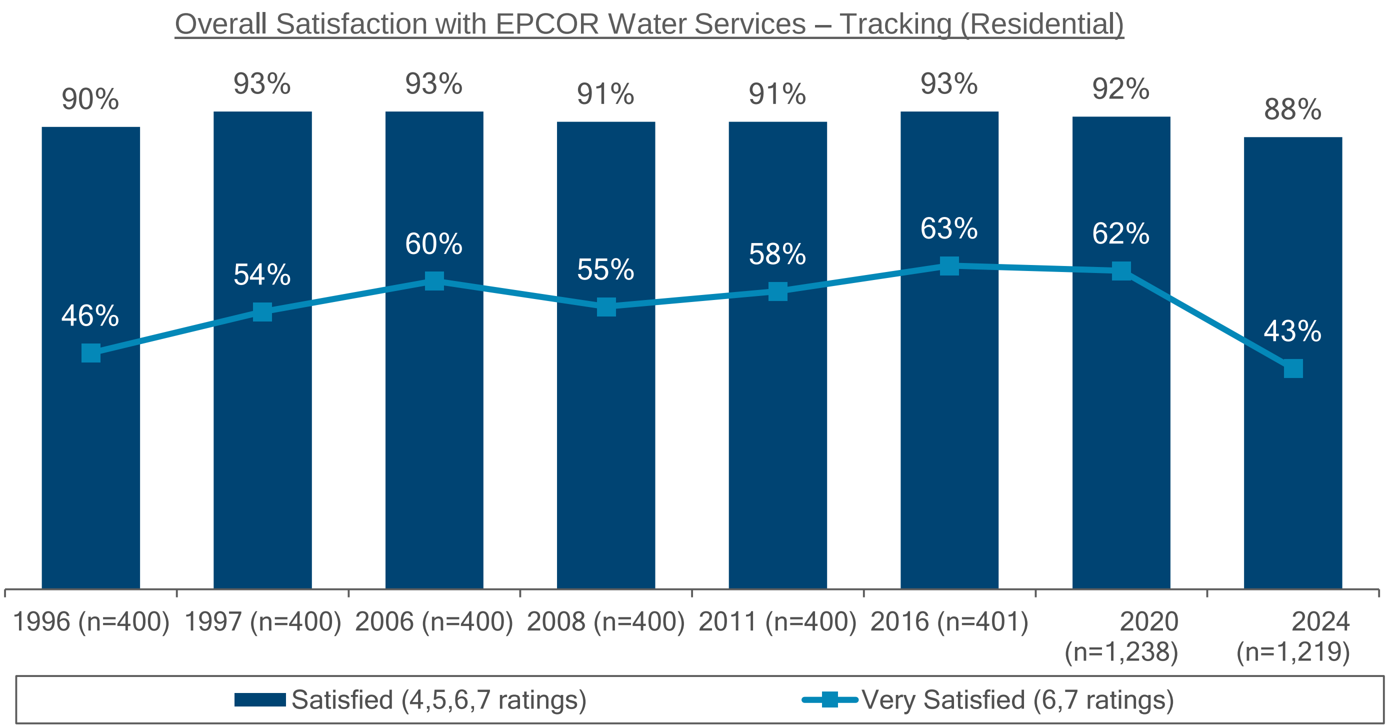
Top 4 Box:
88%

Residents satisfied with EPCOR Services are more likely to be aware that EPCOR is their provider by around 2%. Southwest residents, detached homeowners, males, and those that believe EPCOR rates are fair are the most satisfied.

Renters, women, and those who believe rates to be unfair indicate the lowest satisfaction.

Base: All respondents: Residential (n=1,219)
Q7. How would you rate your OVERALL satisfaction with your water, water treatment, and sewer services?

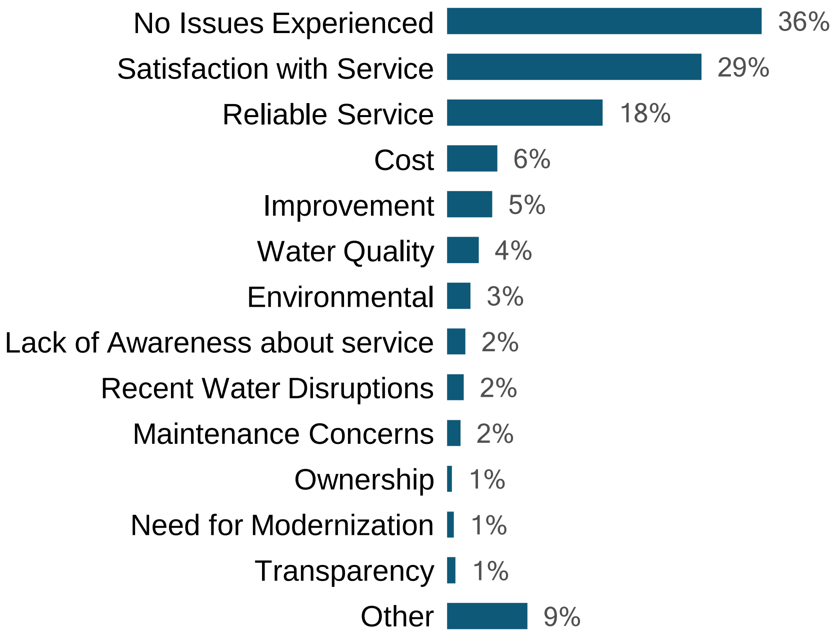
While overall satisfaction softened just slightly, the % very satisfied shows a distinct decline.



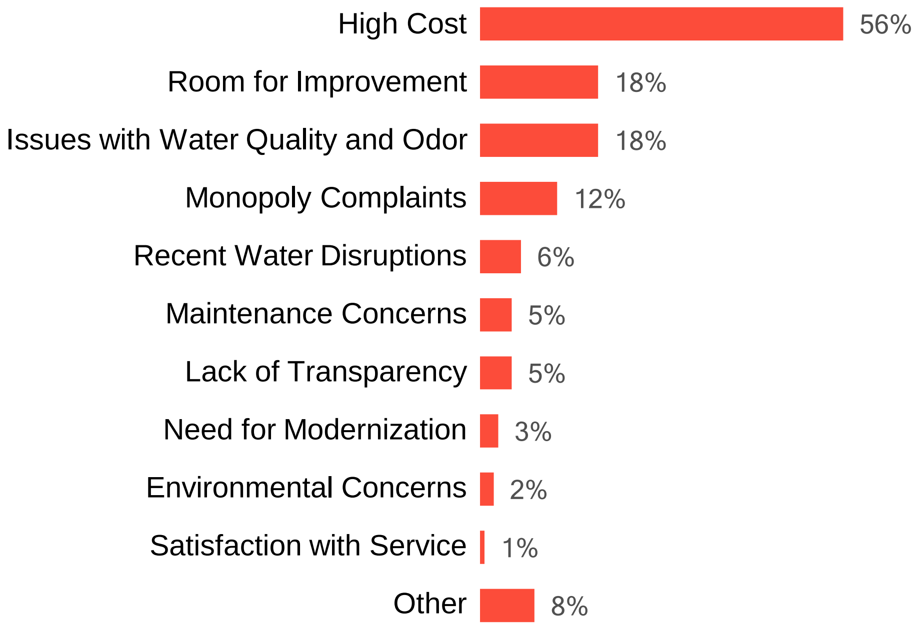
Base: All respondents: Residential (n=1,219)
Q7. How would you rate your OVERALL satisfaction with your water, water treatment, and sewer services?

Positive satisfaction ratings are driven by consistency in service, while negative ratings are driven by *cost, desired improvements, and odour.*

Reason for Rating (Very Satisfied (6+7, n=528)



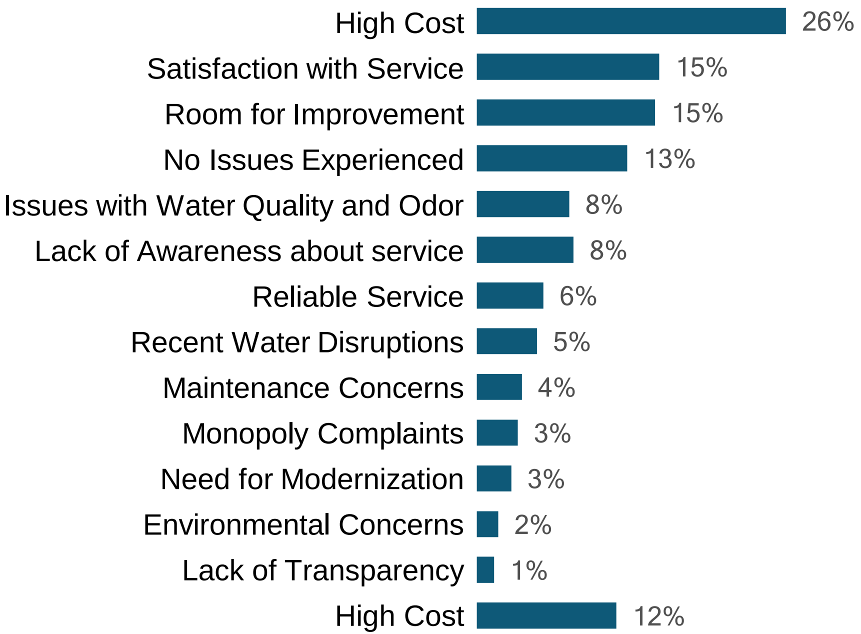
Reason for Rating (Not Satisfied (1+2+3, n=142)



Q8. What is the main reason that you gave this rating?

The majority of respondents gave soft-positive satisfaction ratings, with the dominant reason being high-cost perceptions.

Reason for Rating (Very Satisfied (4+5, n=549)



Q8. What is the main reason that you gave this rating?


Stone Olafson
EPCOR
Detailed Results
Values, Concerns, & PBR Performance Areas
EPCOR PROVIDING MORE

Concerns, Values & Priorities

- Roughly two thirds of Edmontonians can name a top-of-mind concern regarding wastewater treatment and collection, the most significant of which are; cost, regarding aging infrastructure, odour mitigation, and service.
- Respondents were asked to rank their top three priorities for each WWT and WWC. The data was then analyzed using Thurstone analysis to determine the magnitude of importance for each priority. The results show more variety of opinion than in prior years, however, the overall results are fairly consistent.
- **WWT Top 5 Priorities:**
  i. Reducing contamination in treated water going back to the river
  ii. Public and employee safety in operations
  iii. Odour mitigation
  iv. Reduce energy use in treatment operations
  v. Customer service/support that is easily accessible
- **WWC Top 5 Priorities:**
  i. Quick response time for blocked sewers/emergencies
  ii. Reduce contaminants from drainage that could enter the river
  iii. Reduce the number of blocked main-line sewers
  iv. Maintain sewer drainage performance (reduce flood risk)
  v. Ease of reporting issues
- Following open end and prompted questions, 84% of respondents indicted they could think of no other suggestions. Of the 16% who could offer another suggestion, cost mitigation was the strongest theme.

Stone — Olafson

To validate PBR performance areas and weighting, we asked participants questions in three different ways (below).

Recommendations based on our findings are shown on the next page followed by the detailed results

1. Top of mind (or ‘unaided’) concerns.

This allowed us to explore customer’s own language and any issues they felt were important about their water treatment, and drainage services that may not have been identified in the existing PBR.

2. Importance of prompted concerns and performance areas for each line of business

A list of potential impact areas (concerns) as well as performance areas were identified through past research, customer listening tools, and secondary sources. The lists were then tailored for each line of business and presented for customers to rate importance (i.e. prompted ratings).

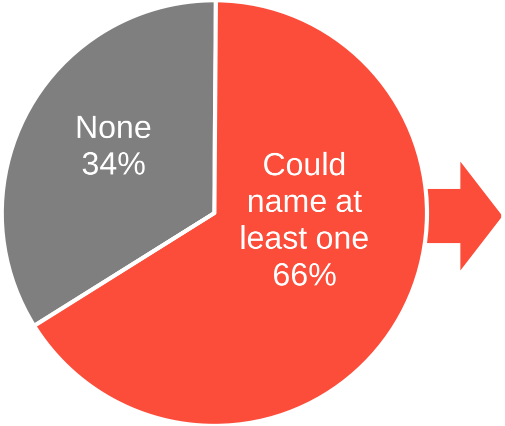
3. A sorting task of PBR performance areas and Thurstone analysis to identify *degree* of importance

Finally, customers were asked to conduct a ranking of potential future areas of performance for each line of business in terms of what mattered to them most.

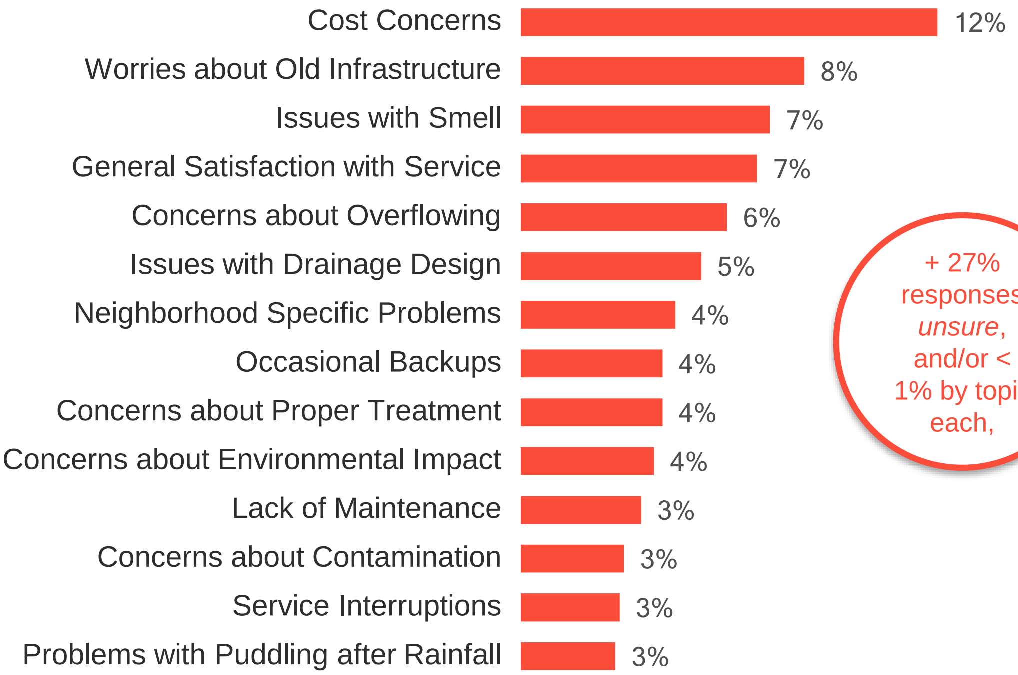
This was followed up by a direct question asking if there are any other areas EPCOR should be considering.

Two thirds of Edmontonians have top of mind concern, with cost, aging infrastructure, and odour being dominant themes.

% of Respondents indicating a 'top of mind concern'



% of Concerns by Theme

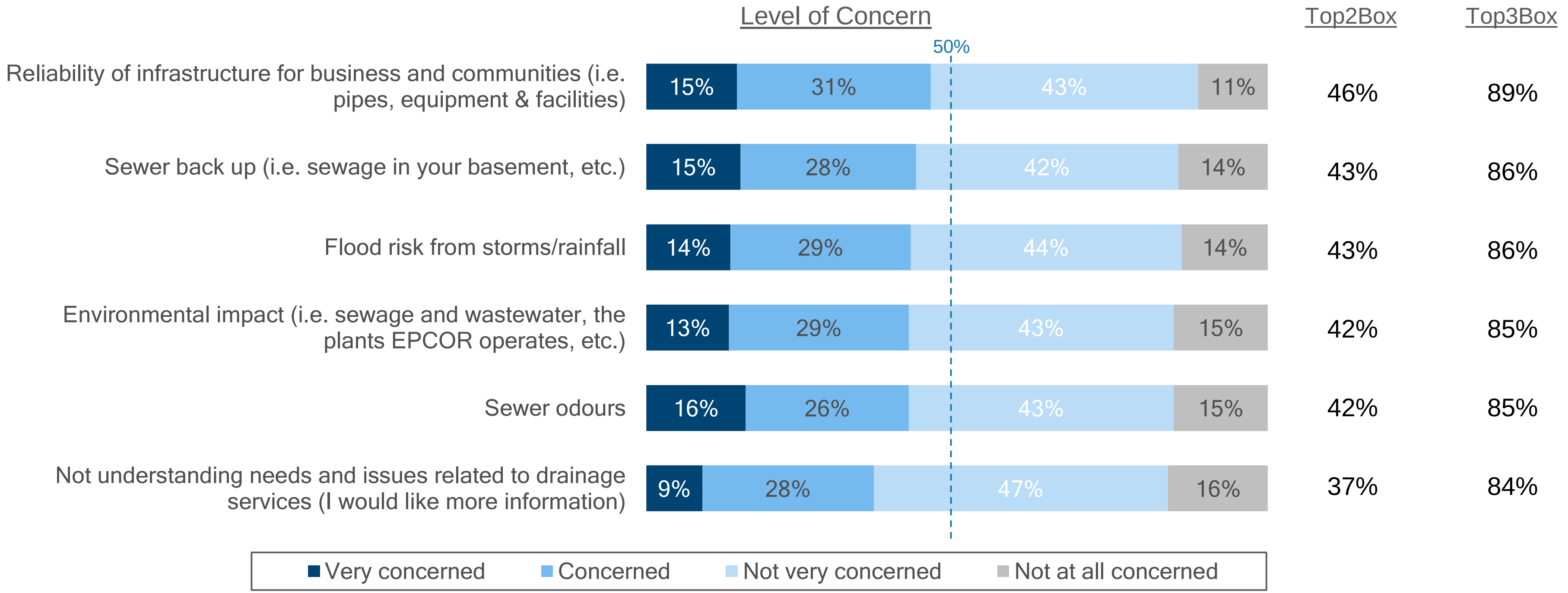


+ 27% responses *unsure*, and/or < 1% by topic each,

Base: All respondents: Residential (n=1,219)
Q9. What concerns, if any, do you have about wastewater treatment, and/or drainage storm or sewer in your neighbourhood?

Prompted: Infrastructure reliability and sewer backup lead concerns

Those central and those 18-34 are much more concerned with environmental impact, sewer odours, and not being familiar enough with drainage services.



Base: All respondents: Residential (n=1,219)
Q10. EPCOR provides wastewater treatment and drainage services, including sanitary sewer and stormwater, in the City of Edmonton. How concerned are you with the following in your neighbourhood?

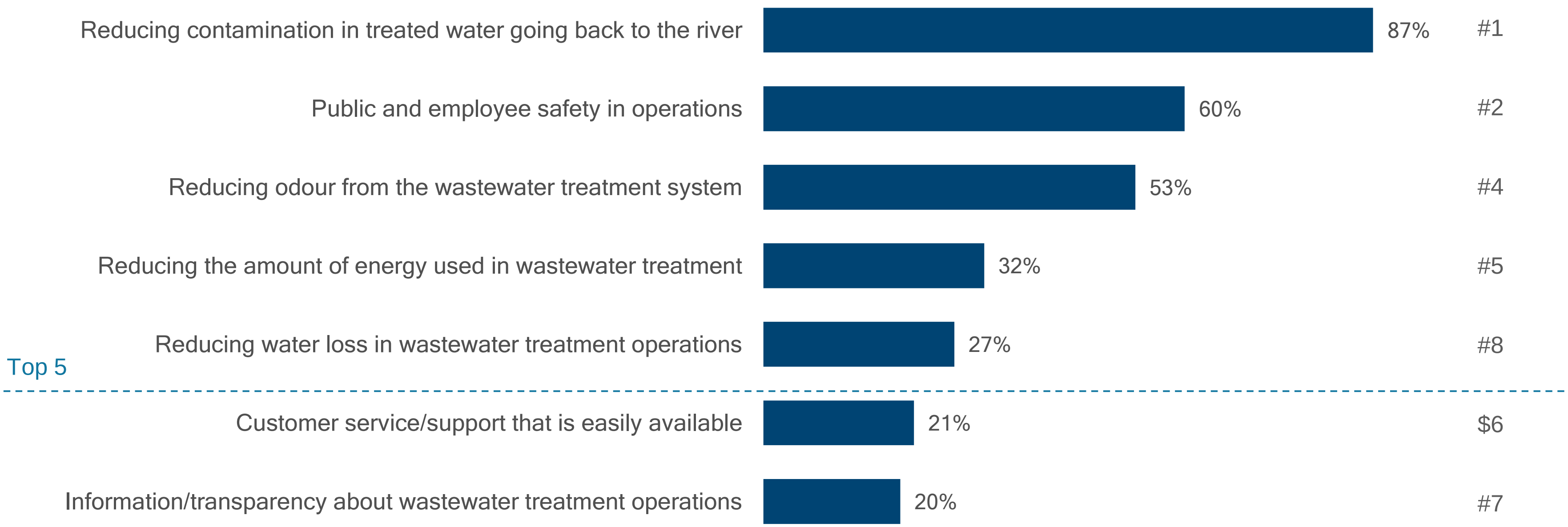
WWT Priorities

Protecting the river, the public, and employees are the highest priorities given for wastewater treatment, followed by odour mitigation.

Note: the options offered varied slightly from 2020 (9 total)

Priorities for Managing Water Treatment (% Top 3)

Rank '20



Base: All respondents: Residential (n=1,219) Q11. The following is a list of considerations that operators look at when treating wastewater created by communities and businesses. We would like you to rank how important each one is to you personally, where 1 is most important to you, followed by 2, 3, etc. Please drag and drop the below into your preferred order.

WWC Priorities

Respondents are most concerned about *response times* for blocked sewers and emergencies and *protecting the river* from contaminants.

Base: All respondents: Residential (n=1,219)

Q12. The following is a list of considerations that operators look at when managing sanitary sewer and stormwater drainage in communities. We would like you to rank how important each one is to you personally, where 1 is most important to you, followed by 2, 3, etc.

What is a Thurstone Analysis?

Example: Sorting preferred ice cream flavours

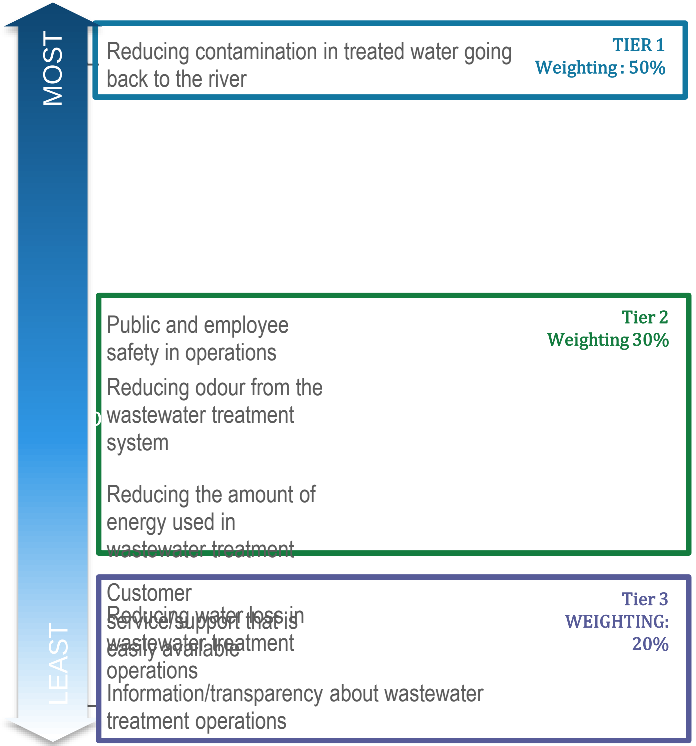
As part of the survey, customers were asked to rank performance areas in terms of what is most important to them.

While sorting and ranking preferences is helpful, it is limiting in that it doesn't allow us to understand the degree of preference within options.

A **Thurstone Case V Scaling** analysis is a simple analytic tool that takes a ranking question from beyond order of preference to showing how much more each item is preferred, relative to the other choices. This technique eliminates any "ties" that occur in preference ratings, is easy to interpret, and provide more actionable data overall.

Thurstone Analysis Output for EPCOR WWT Priorities:

IMPORTANCE Residential (n=1219)



Observations:

- There was very little difference in priorities between residential and multi-residential (the rank order is identical).
- Compared to 2020, magnitude of importance is more evenly distributed (tier 2 and 3 have elevated in priority vs. 2020)
- There is slightly more emphasis on safety and odour reduction than before.
- Customer service and support is now slightly more important than reducing water loss in treatment operations.

Thurstone Analysis Output for EPCOR WWC Priorities:

IMPORTANCE Residential (n=1219)

MOST

TIER 1
Weighting : 40%

- Quick response times for blocked sewers or emergencies
- Reducing contaminants from drainage that could enter the river

Tier 2
Weighting 30%

- Reducing the number of blocked main-line sewers
- Maintaining sewer drainage performance to reduce flood risk
- Easy to report any issues with sewer or stormwater drainage

Tier 3
WEIGHTING: 20%

- Customer service/support that is easily available to ask…
- Maintaining sewer drainage performance to reduce odour in communities
- Public and employee safety in operations

Tier 4
WEIGHTING: 10%

- Public safety initiatives
- Timely communications on construction or facilities or operations in your area

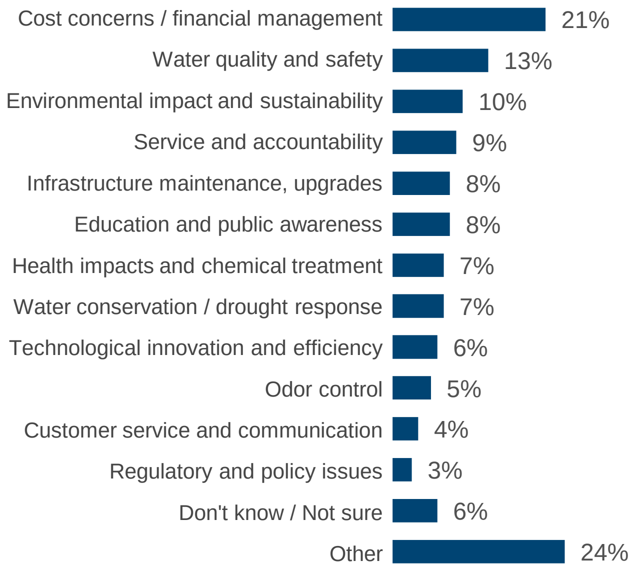
LEAST

Observations:

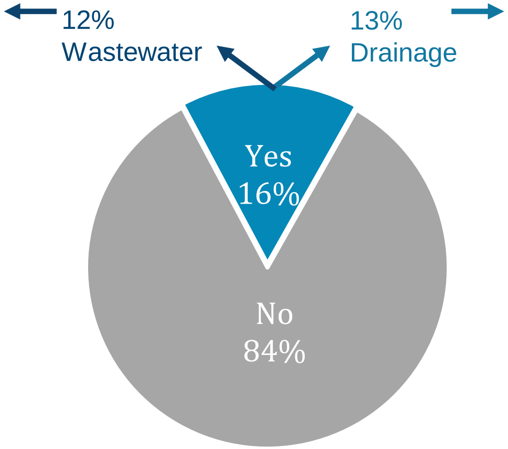
- There was very little difference in priorities between residential and multi-residential (the rank order is almost identical, though reducing contaminants is just slightly higher for multi-residential)
- While quick response time for emergencies has remained the #1 priority (as in 2020), reducing contaminants has increased in importance as has reducing the overall number of blocked main-line sewers.
- Compared to 2020, magnitude of importance is again more evenly distributed, to the point that we wee four distinct priority ‘tiers’ vs. three.

16% of respondents felt additional priorities should be considered, most indicating both for treatment and drainage. Cost considerations are most dominant in both cases.

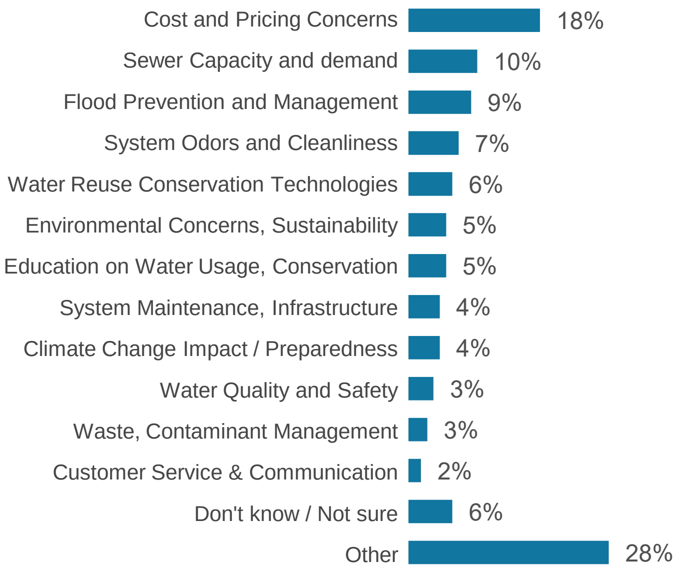
Extra Considerations – Wastewater



Any other concerns?



Extra Considerations - Drainage

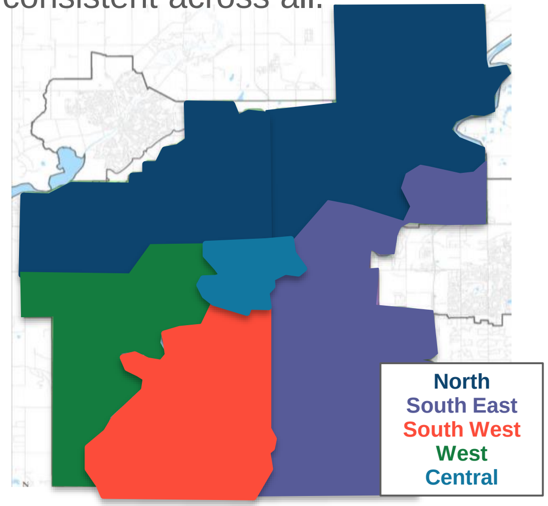


Base: Provided other considerations

Q13. Now that you have had a chance to think about your wastewater treatment, and stormwater and sewer drainage utilities, we would like to know what else (if anything) is important to you in how these services are managed that was not already mentioned. Do you have any other considerations you would like to suggest?

Stone—Olafson

By Quadrant: Concerns and priorities varied slightly by quadrant, as does appetite for investment. Top priorities, however, are consistent across all.



Southwest	
Satisfaction % Top 2 box	43%
Invest for improvement (6-10)	62%

Top 3 Concerns
- Cost
- Overflow
- Neighbourhood specific concerns

Put a higher priority on…
- Information/transparency about operation
- Maintain performance to reduce odour
- Public safety initiatives

North	
Satisfaction % Top 2	39%
Invest for improvement (6-10)	60%

Top 3 Concerns
- Cost
- Old infrastructure
- Service

Put a higher priority on…
- Maintaining performance to reduce odour
- Customer service/support that is easily available
- Information/transparency about wastewater treatment operations

West	
Satisfaction % Top 2 box	41%
Invest for improvement (6-10)	62%

Top 3 Concerns
- Cost
- Old infrastructure
- Overflow

Put a higher priority on…
- Reduce energy use in wastewater treatment
- Easily available customer service/support
- Easy to report any issues with sewer or stormwater drainage

Central/Inner city	
Satisfaction % Top 2 box	51%
Invest for improvement (6-10)	64%

Top 3 Concerns
- Service
- Old infrastructure
- Service interruptions

Put a higher priority on…
- Public safety initiatives (flood prevention, drowning prevention, etc.)
- Reducing contaminants from drainage that could enter the river
- Public and employee safety in operations

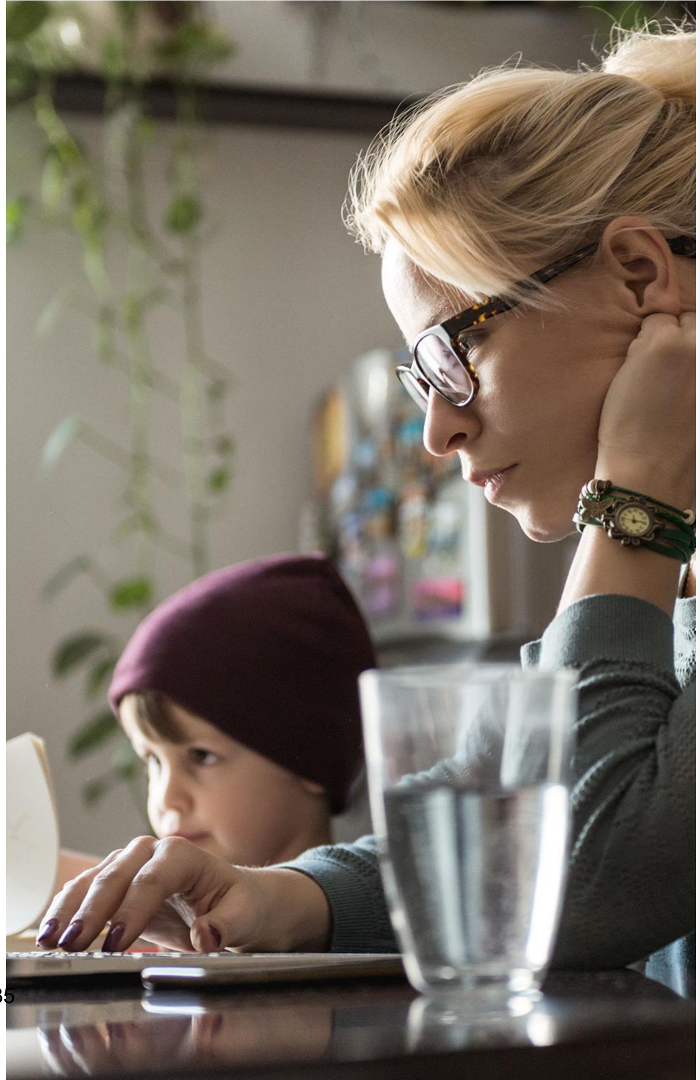
Southeast	
Satisfaction Top 2 box	43%
Invest for improvement (6-10)	64%

Top 3 Concerns
- Cost
- Odour
- Service

Put a higher priority on…
- Public and employee safety in operations
- Timely communications on construction/facilities/operations in area
- Reducing contamination in treated water going back to the river

Detailed Results

Rate Sensitivity



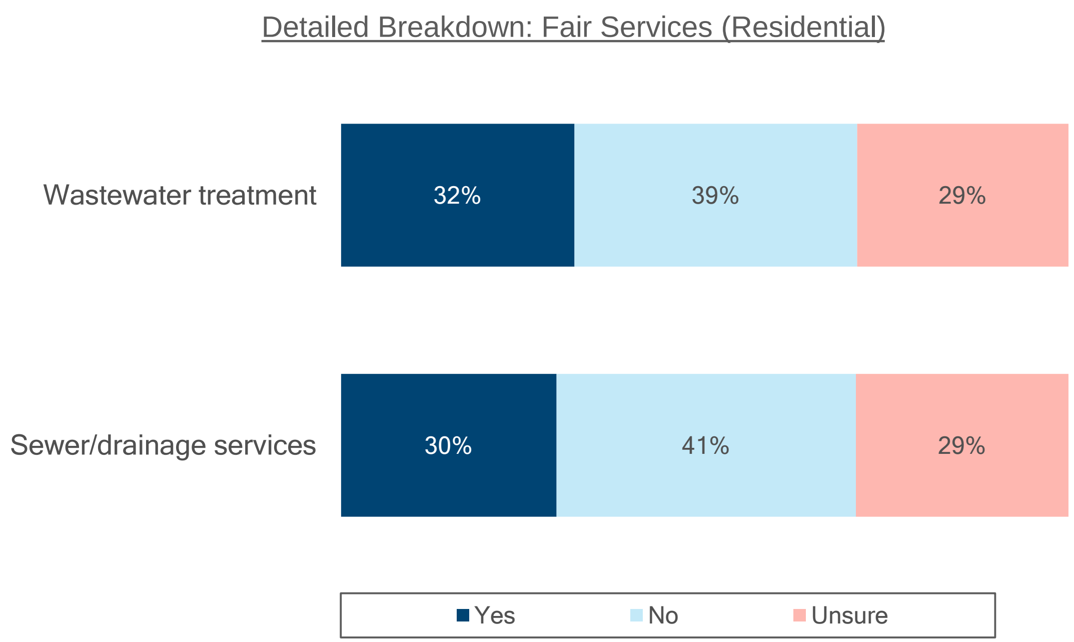
Stone — Olafson

Rate Sensitivity

- More Edmontonians today indicate the rates they pay for WWC and WWT are not fair (40%) than fair (31%), while almost as many (29%) indicating they are unsure.
- Lower agreement with fair rates is a change in position from 2020, though explained by the fact that residents believe the cost of utilities have increased by more than the rate of inflation (43%)
- In spite of the fact that cost is the most significant concern, more respondents still feel investment for future protection of the infrastructure and efficiencies is worth the investment (62%) vs. status quo (30%) or reducing investment (8%).
- Residents also place a very high level of importance around predictability in billing (62%), and the vast majority (85%) would like EPCOR to "*Hold and manage seasonal surpluses to offset seasonal deficits to keep bills stable and predictable over time.*"

In 2024, customers are more likely to indicate their rates are *not fair* (40%), with the remaining roughly split between *fair* and *uncertain.*

Stone Olafson

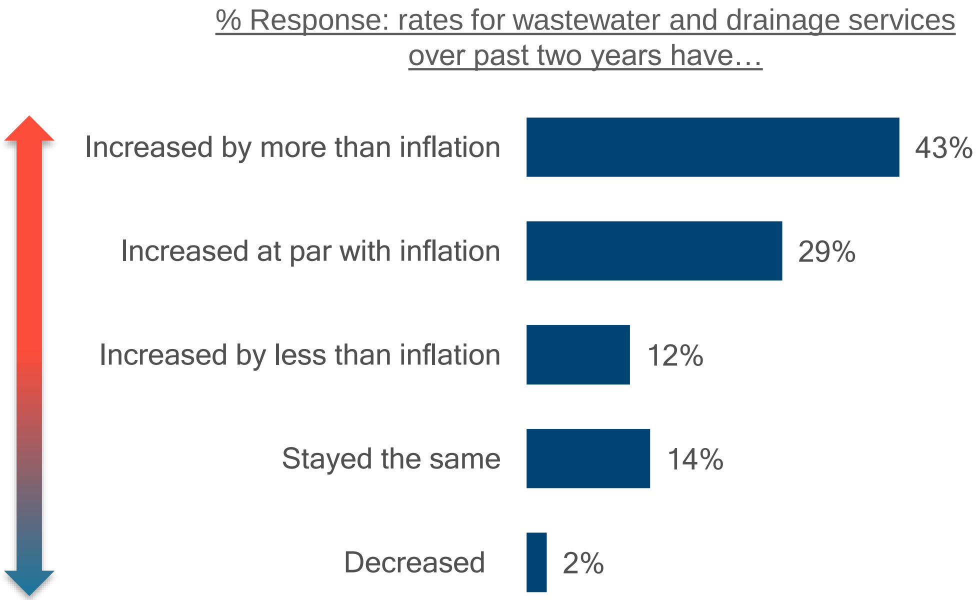


Base: All respondents: Residential (n=1,219)
PS1. The monthly rates charged for water supply, wastewater treatment, and sewer/drainage services are determined through bylaw principles and used to both operate and maintain/improve the system. In your opinion, is the rate you pay for these services today fair?

The strongest opinion is that rates have increased by more than inflation (43%).

Attachment 2

Stone Olafson



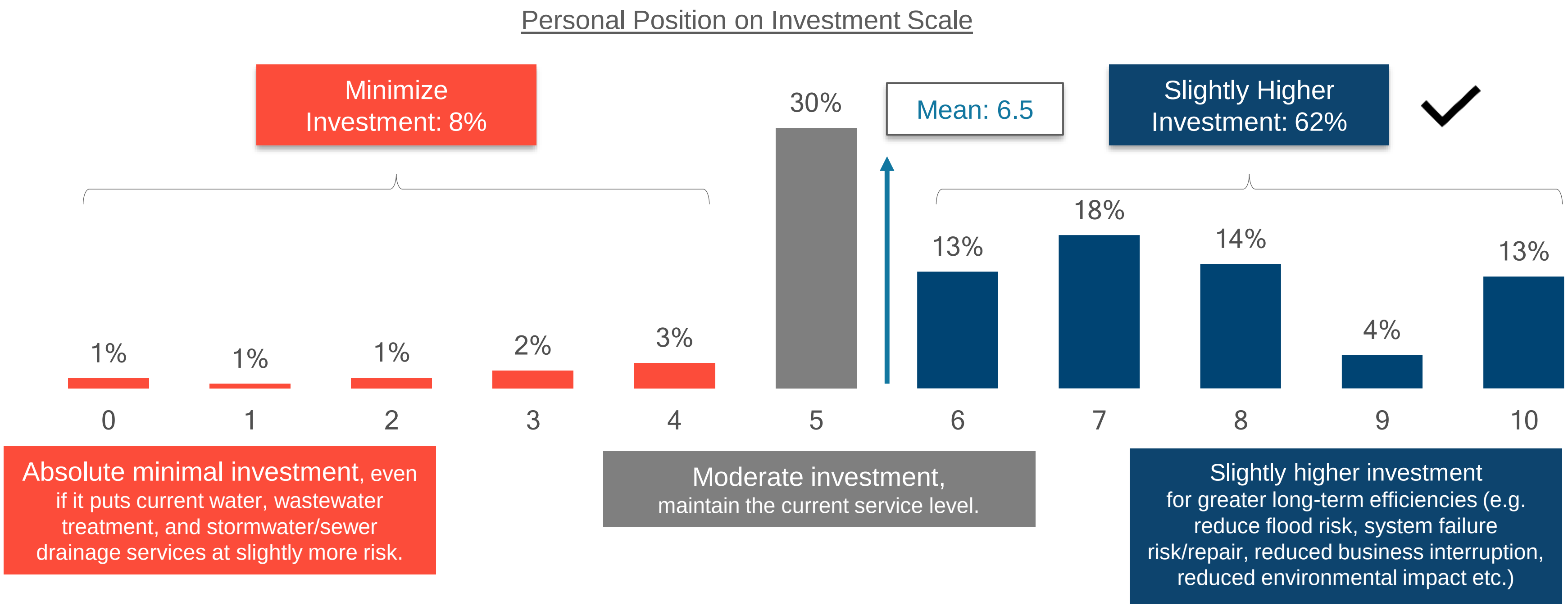
Base: All respondents: Residential (n=1,219)

PS2. How do you think rates for wastewater and drainage services have changed over the past two years?

Stone Olafson

The majority of Edmontonians agree with slightly higher investment in services to allow for longer-term benefits and efficiencies (62%)

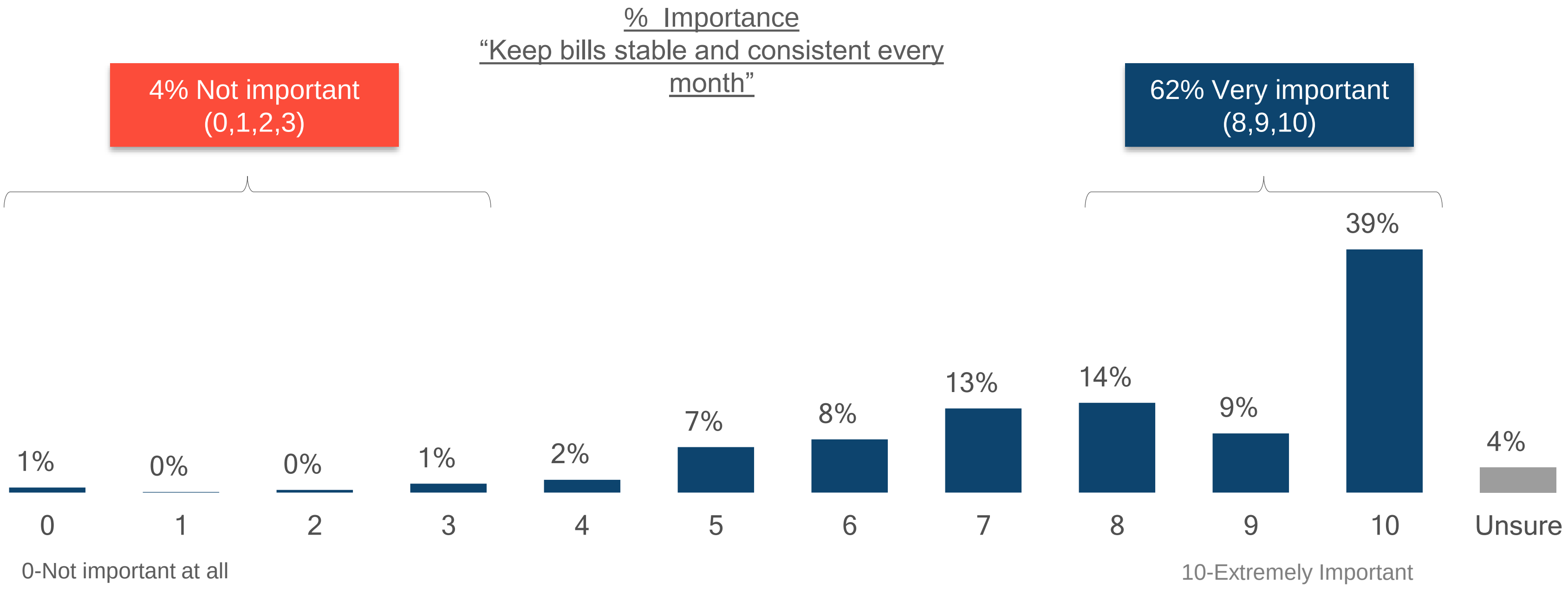
Or, at the very least, maintain status quo (30%). Less than one in ten want to minimize investment.



Base: All respondents: Residential (n=1,219)

PS3. Wastewater treatment and stormwater and sewer services require ongoing investment. Some recent investments have reduced odour in the system and helped prevent neighbourhood flooding. Looking ahead to the next several years, in principle, where would you position yourself on the following investment scale?

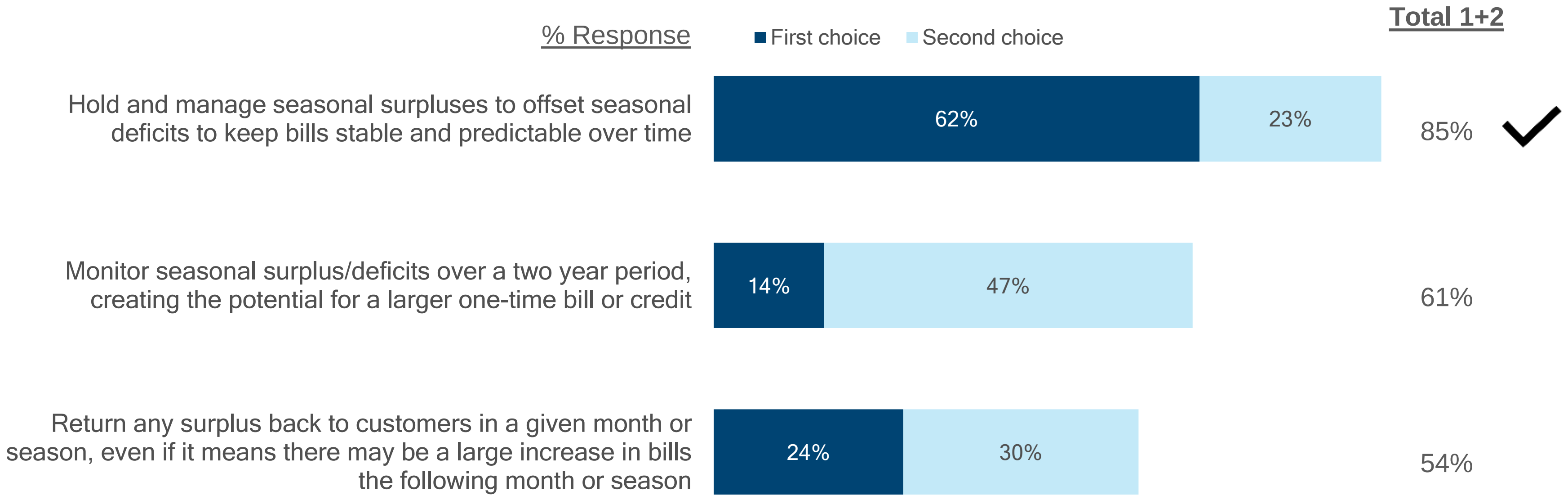
The majority of Edmontonians place a high level of importance on keeping bills "stable and consistent every month"



Base: All respondents: Residential (n=1,219)

PS4. The cost of managing stormwater can change from month to month, based on things like weather and the amount of rainfall. On a scale of 1-10, how important is it to you that EPCOR tries to keep bills stable and consistent every month?

Managing a surplus to offset increases and maintain stable billing is the clear preferred approach to manage fluctuations in cost.



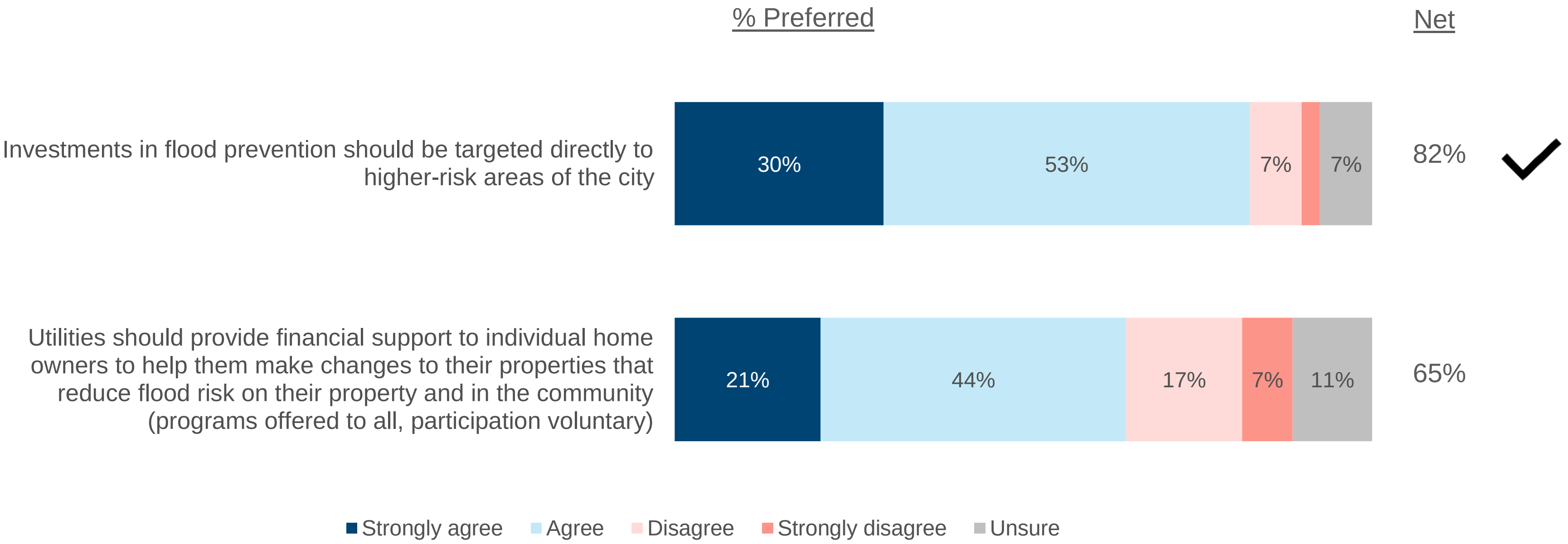
Those under 35 prefer more frequent rebates, whereas those over 55 prefer the option of offsetting with a surplus.

Base: All respondents: Residential (n=1,219)

PS5. Because the cost to manage stormwater can change based on weather, EPCOR could potentially see billing surpluses or deficits in a given season. How would you prefer EPCOR manage this in terms of your bill? Please choose your first choice by putting a 1 beside your most preferred answer, and second choice by putting a 2 beside your second most preferred answer.

Stone — Olafson

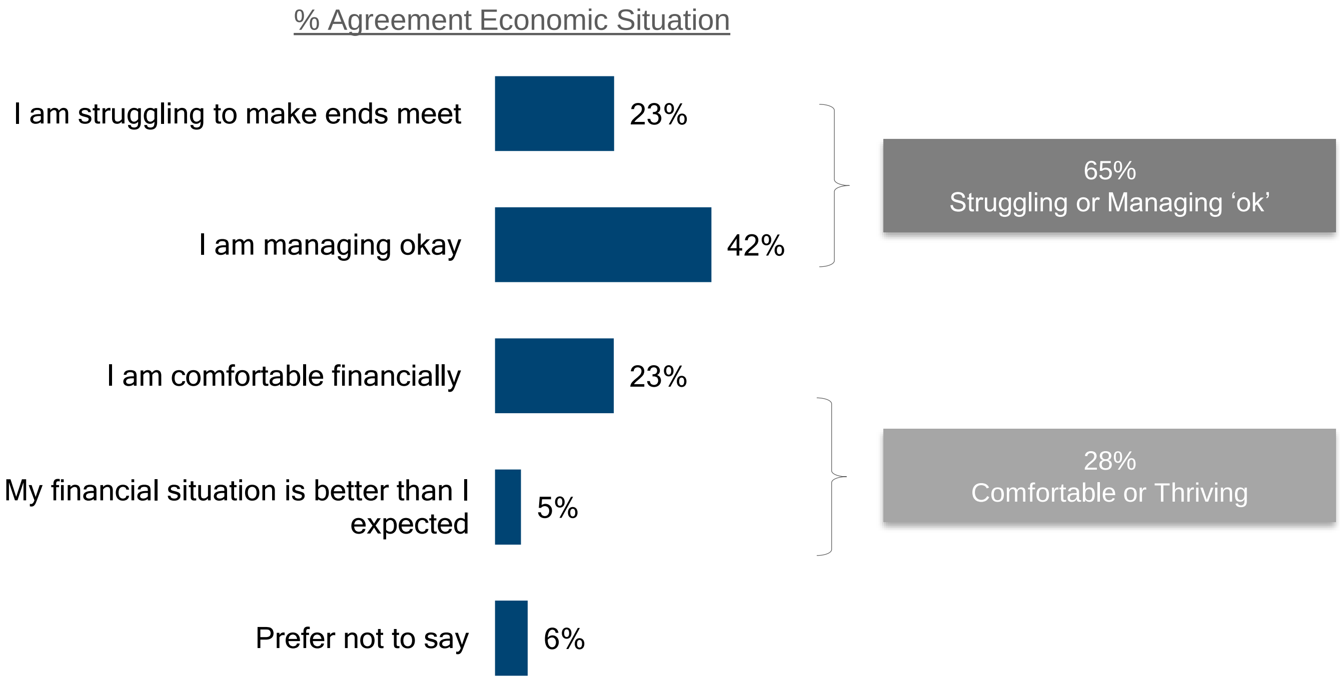
There is more support for managing flood risk mitigation by focusing on high-risk areas of the city (targeted) vs. offering incentives for homeowners (general), though there is overall support for both concepts



Base: All respondents: Residential (n=1,219)
PS6. There are different ways utilities can invest money to help reduce the risk of flooding in communities and homes. Two opportunity areas are indicated below. How much do you agree with each?

Stone — Olafson

Economic comfort shows modest recovery vis. the pandemic lock down period (when asked last), though it indicates a community that is still 'managing' vs. thriving.



Base: All respondents: Residential (n=1,219)
'D6. Which of the following most accurately reflects your financial situation?

Stone — Olafson

Detailed Results

Information Gathering

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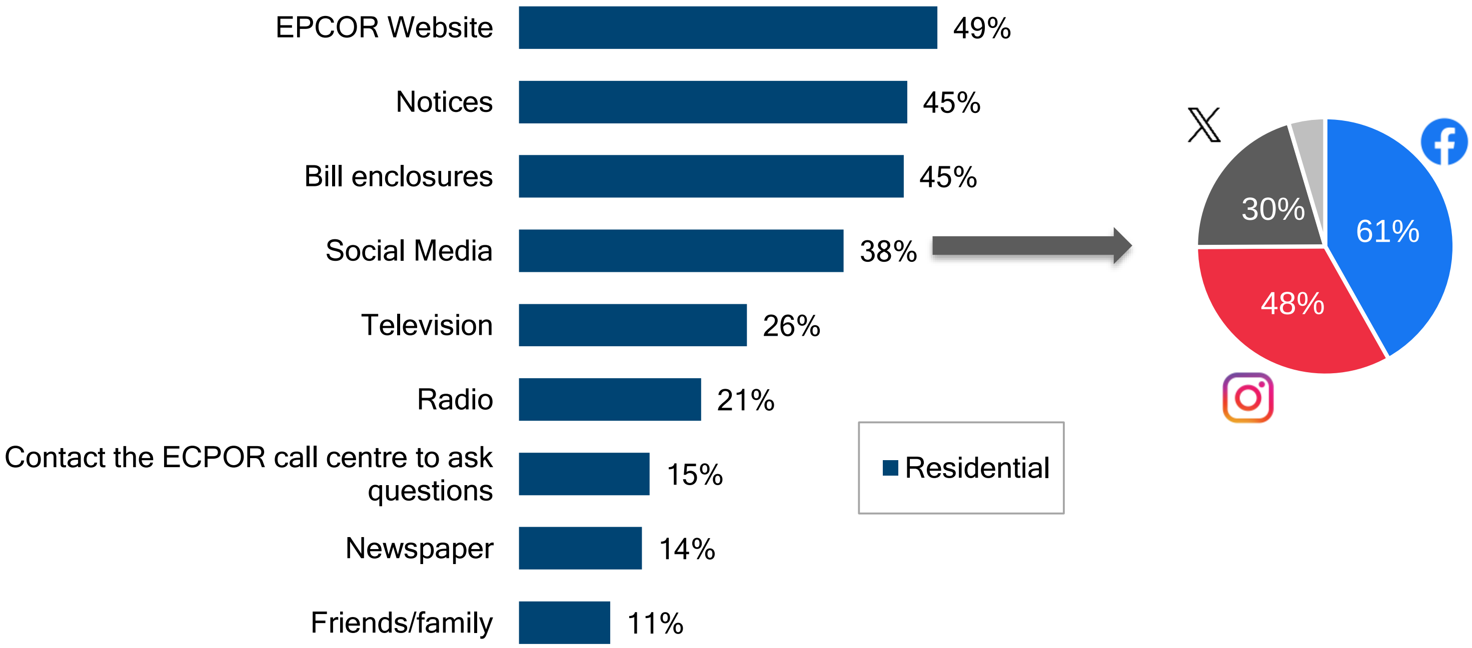
Most residents prefer to get information from EPCOR through the website, bill enclosures, and notices.

Preferred Source of Information About EPCOR



Base: All respondents: Residential (n=1,219)
Q14. Where do you prefer to receive information about wastewater treatment and drainage utility services? Please select all that apply.
Q14A. Which social media channel is preferred?

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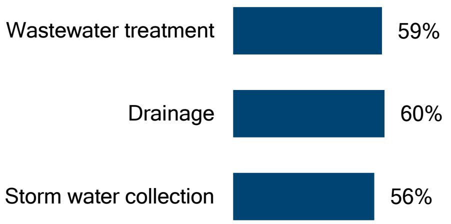
Detailed Findings:
Multi Residential Customers

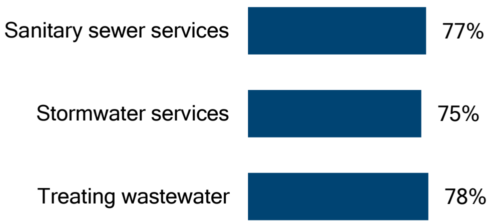
Stone Olafson

Multi-Residential customers are aware EPCOR supplies their water services, with three-quarters satisfied.

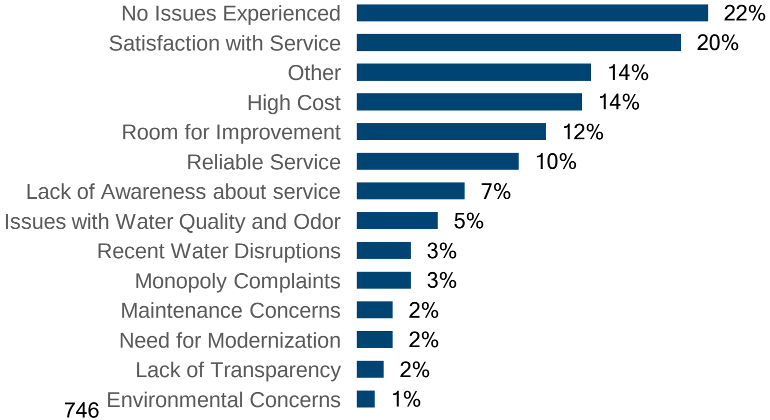
Responsibility of EPCOR (unaided)



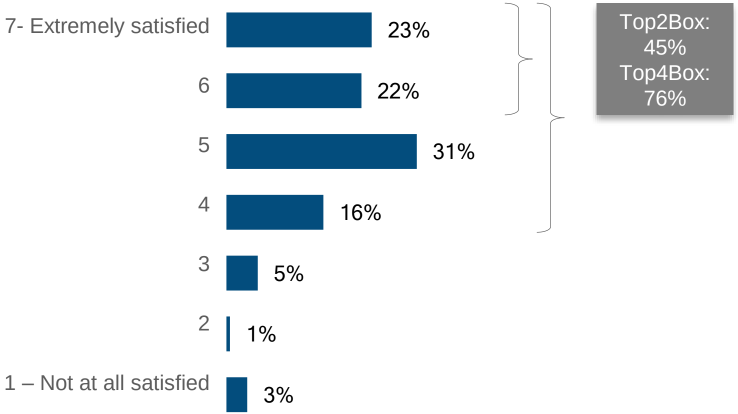
Responsibility of EPCOR (aided)



Reason for Satisfaction Rating



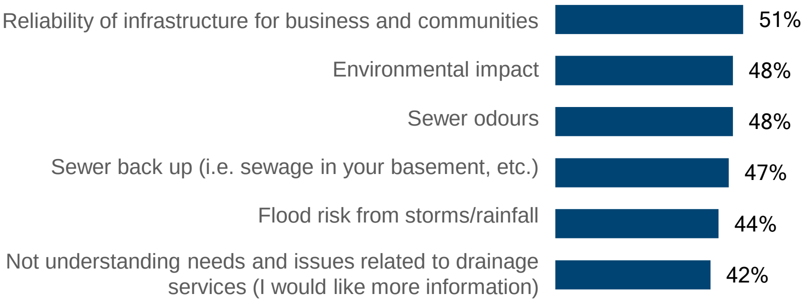
Overall Satisfaction with Water Services



Base: Multi-Residential customers (n=180)

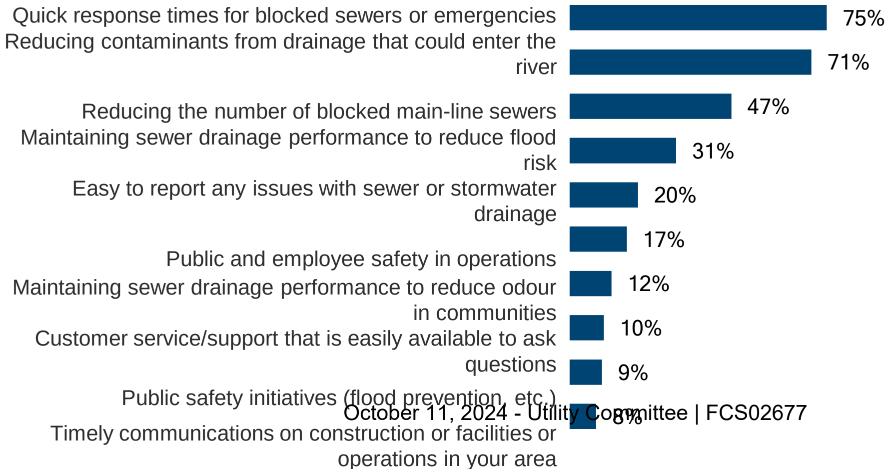
Multi-residential customers are most concerned with flood risk, followed by sewer back up, and infrastructure reliability.

Community Characteristics Rating



Wastewater Considerations

Drainage Considerations



Base: Multi-Residential customers (n=180)

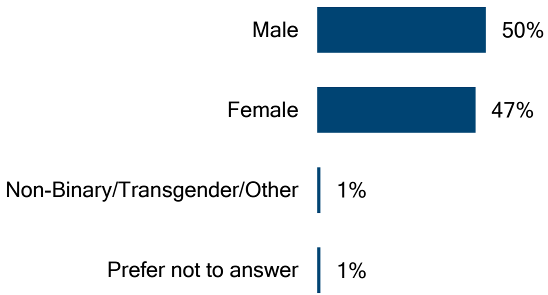
EPCOR PROVIDING MORE

Demographics

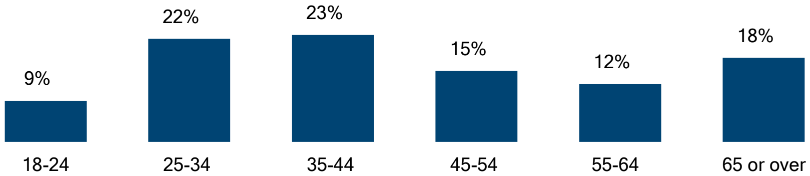
Stone — Olafson

Demographics

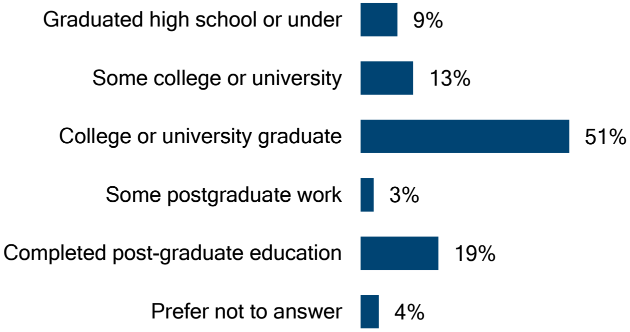
Gender



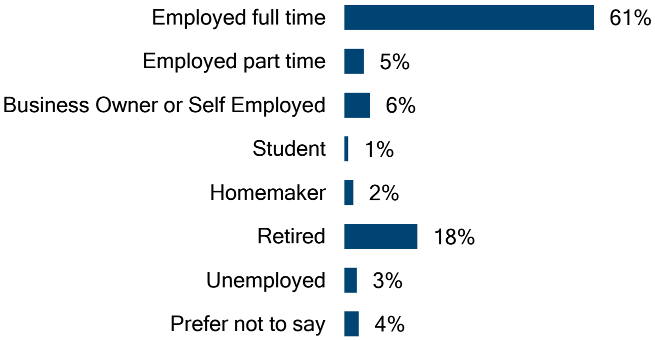
Age



Education



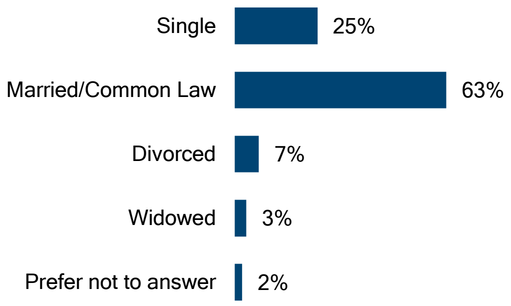
Employment Status



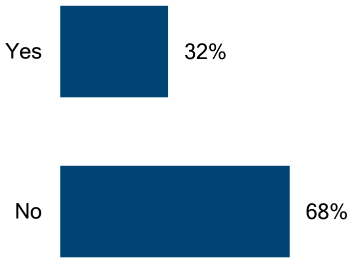
Base: All respondents: Residential (n=1,219), Multi-Residential (n=21*)
*Caution: Small sample size

Demographics, continued

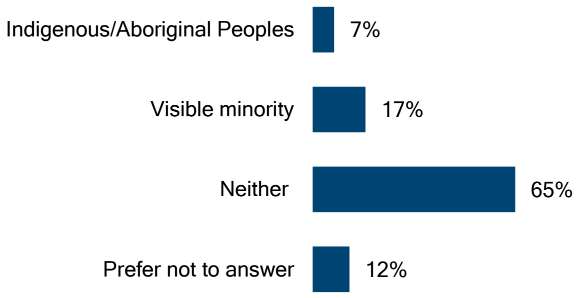
Marital Status



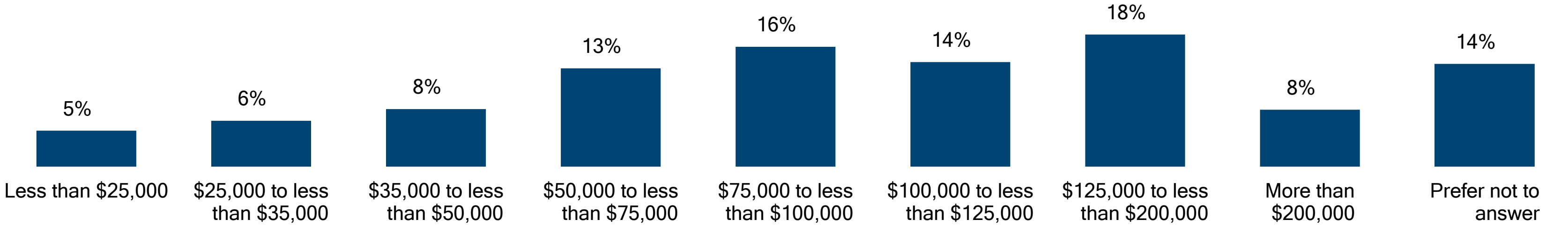
Children in Household



Self Classification



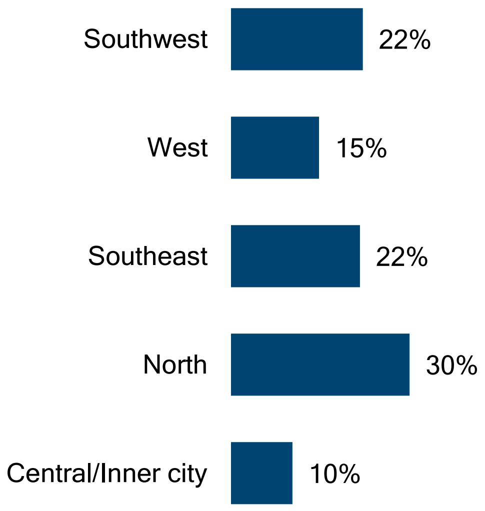
Household Income



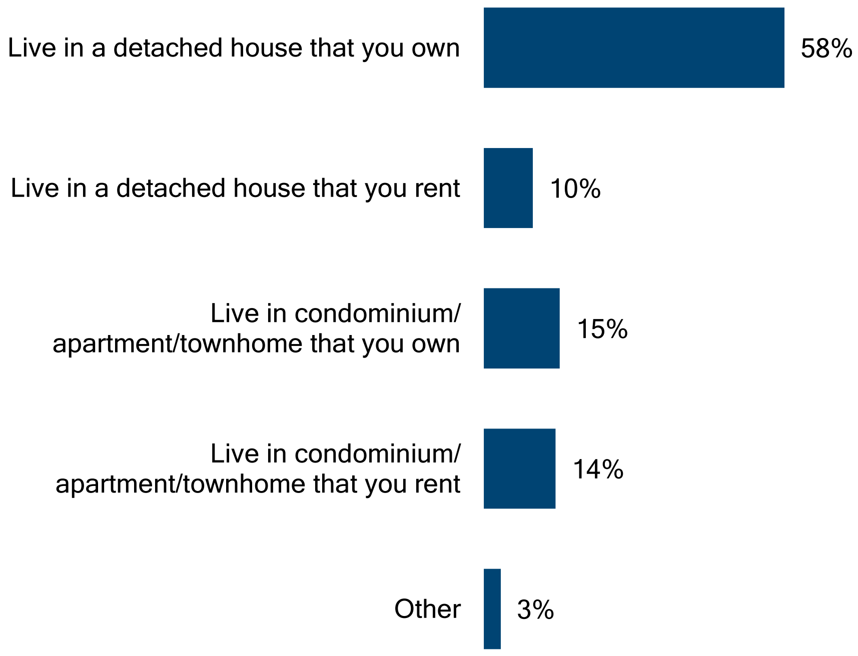
Base: All respondents: Residential (n=1,219)

Demographics, continued

Area of Edmonton



Type of Dwelling



Base: All respondents: Residential (n=1,219), Multi-Residential (n=21*)
*Caution: Small sample size

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EPCOR WWC & WWT PBR 2024 Public Consultation

Edmonton Commercial and Multi-residential Operators

Quantitative Survey Results

May 24, 2024

Stone—Olafson

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Background

EPCOR Water Services Inc. is regulated by City Council in accordance with their Performance Based Regulation (PBR) plan. The purpose of this type of regulatory framework is to create incentives for operators to improve their efficiency, and to focus on both price (rates) and quality of service in areas that are important to stakeholders. As Wastewater Collection (WWC) and Wastewater Treatment (WWT) utilities prepares for PBR renewal, they are conducting customer engagement as part of this process to learn how important their current areas of performance are to stakeholders as well as uncover any other (new or unknown) areas that that should be part of the plan. Ultimately, the PBR application will include recommended operational and capital programs, performance measures and rates, in a way that's informed by the customer engagement process.

The goals of customer engagement are to:

- Have input to inform policy choices, priority-setting for operations and capital programs, performance measurement and rate design;
- Provide commercial customer with opportunities to ask questions, express concerns and raise issues with respect to the PBR renewal and their utility services;
- Maintain positive and productive relationships with key audience and customer throughout the development and implementation of the PBR application; and
- Report on how their feedback was used in the PBR application.
- Maintain positive and productive relationships with the key decision makers and stakeholders on the PBR development and implementation
- Report back to stakeholders as the PBR renewal process progresses on how their feedback was used by EPCOR
- Help inform communications and campaigns to educate customers on their water & wastewater utilities.

EPCOR is seeking input on four key areas;

- Values
- Performance Priorities
- Cost and Risk Sharing
- Rates

PBR Consultation: Objectives

This phase of the EPCOR PBR study is an online survey with EPCOR decision maker customers including over-strength small business and commercial customers.

The objectives of this study are:

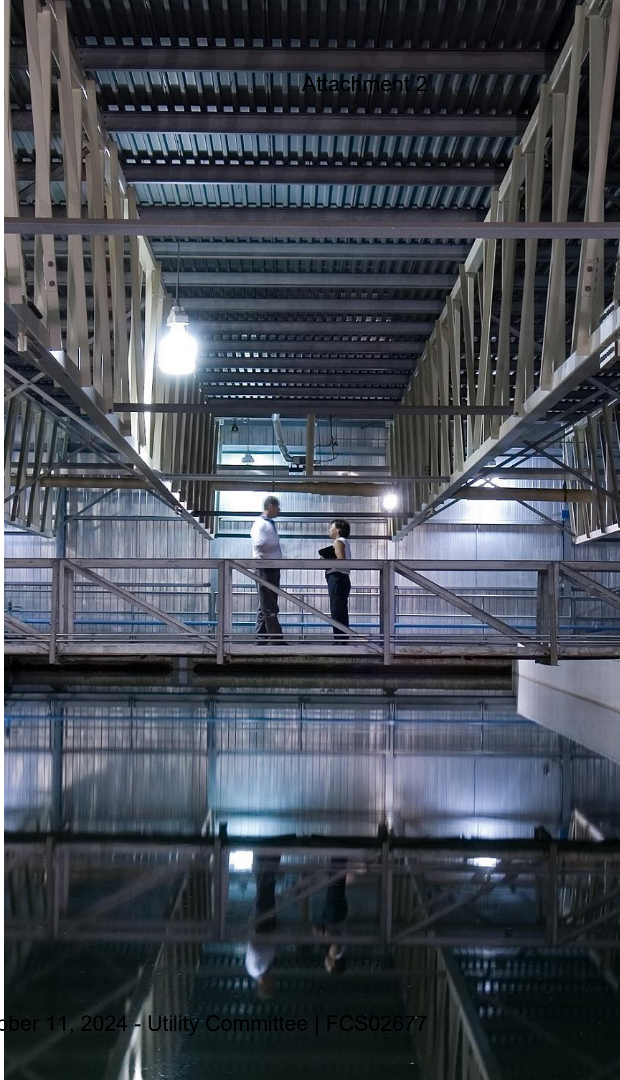
- To understand values & high-level performance areas
- Identify overarching and most sensitive areas of how EPCOR performs that matters most
- Gather feedback on existing or proposed broad areas of performance
- Early analysis of rate sensitivity
- What to do with the information: Data will inform EPCOR with key areas of focus for more detailed engagement, support the prioritization of focus areas, and validate and/or refine performance measures (weighting and categories)

Methodology

Stone-Olafson conducted an online survey among a sample of existing commercial customers, including large water users, overstrength, and stormwater fees.

A total of n=41 fully completed surveys were retained in our analysis following a four-part data cleaning process. Of this, 76% of respondents were multi-residential operators while the remaining 26% were *other* commercial customers.

The data was collected between March 3 and 24th, 2024.



Stone Olafson

The story on one page…

- **EPCOR awareness is high in Edmonton**, with 88% indicating EPCOR WWT services, 85% in sanitary sewer services and 83% in stormwater services.
- **Customers remain satisfied with EPCOR services** (52% high satisfaction, 79% overall satisfaction), **WWT and WWC services are rated higher with 94% overall satisfaction.**
- **Cost is the main reason that satisfaction levels have softened** with 46% indicating the cost for wastewater treatment is unfair, and 61% indicating sewer and drainage services are unfair.
- **Service costs have increased** with 59% of customers believing that these costs have increased beyond the level of inflation.
- **Despite cost concerns, commercial customers expect to continue an increase in investment to promote long-term efficiencies and system performance**. This demonstrates how important a well-functioning and predictable system is to commercial operators.
- **Top of mind concerns of Edmonton commercial customers** are *flood risks* and *sewer back up* with **30% very concerned with sewer backup.** Overall, not understanding needs and issues was the least concerning for customers.

PBR Priority Areas:

- **WWT** – Of the 7 priority areas tested, the top priorities for commercial customers and multi-residential operators are; reducing contaminants (#1), reducing odor from the wastewater treatment system (#2), customer service and support (#3), and information/transparency about operations (#4).
- **WWC 9** – Of the 10 priority areas tested, the top two priorities for WWC are; quick response times for blocked sewers and emergencies (#1), reducing the number of blocked main-line sewers **and** maintaining sewer drainage performance to reduce odor (both tied for #2), ,maintaining sewer drainage performance to reduce flood risk (#4).
- **The importance of predictable billing is high** with 71% indicating stable monthly billing is *very* important. The majority (74%) support managing seasonal surpluses to help offset higher service periods to keep billing stable.

What it means

1. EPCOR overall is coming under more scrutiny through inflationary times, though expectations of the commercial customers served remains consistent.

- Constituent priorities have held despite cost concerns. Commercial and multi-residential operators want to ensure the operational excellence to prevent river contamination, mitigate emergencies, and have quick response if issues occur.

2. While Edmonton commercial customers prioritize protection even if it means investment, the goal is long term *efficiency.*

- Note that for both WWT and WWC the combined view concerns and ranked priorities tells us that infrastructure and maintenance are of extreme importance, though when paired with the top-of-mind cost mitigation priorities, efficiency should be factored in. The goal of investment is creating long term efficiencies, sustained reliability, and consistency.

3. Consistency in cost/billing is particularly critical.

- Leaning towards investment in a financially challenged environment means Edmonton doesn't feel they can afford surprises. The significant majority want EPCOR to equalize costs in the background through managing seasonal surplus and deficits to help support during inflationary periods.

4. Rates/pricing should always be communicated in connection to supporting service reliability AND long - term efficiency.

- Customers want to know that efficiency and operational protection is the focus of any investment. It will be important that EPCOR acknowledges these values, and the long-term efficiencies/benefits that will be gained are clearly communicated with all projects.

5. Delivering service/support and access to information will ensure customers have the information they need when they need it.

- Although not the highest rated priority, customers do find significant value in access to information. For commercial customers, the EPCOR website and notices are both equally valuable, with information contained within the bill enclosures preferred.

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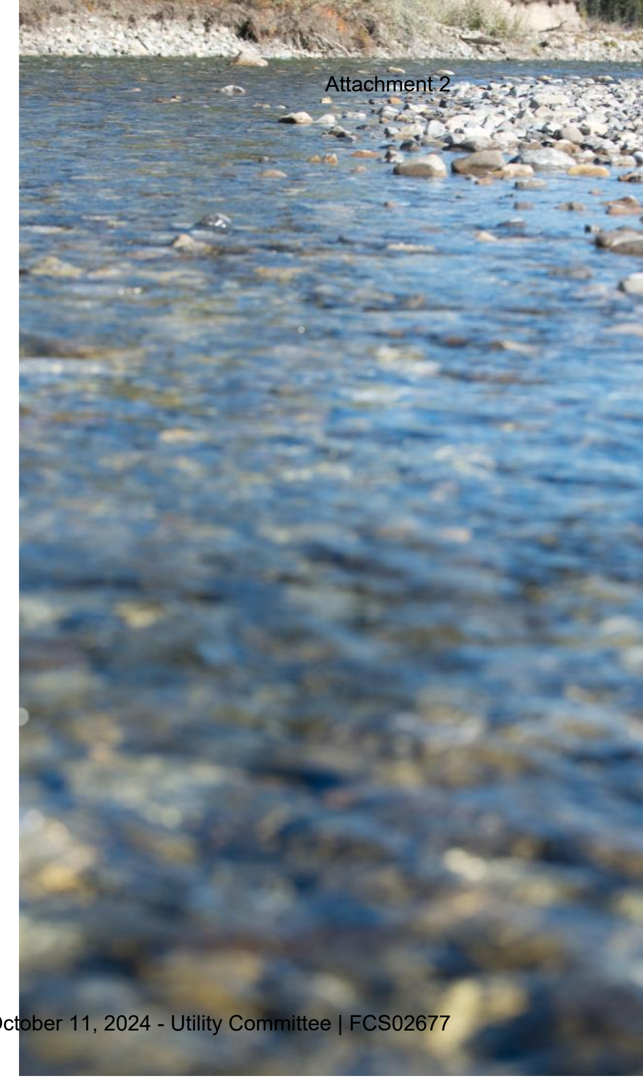
Detailed Findings: Commercial & Multi-Residential Operators



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Detailed Results

THE CONTEXT

EPCOR Awareness, Reputation & Satisfaction

Stone Olafson

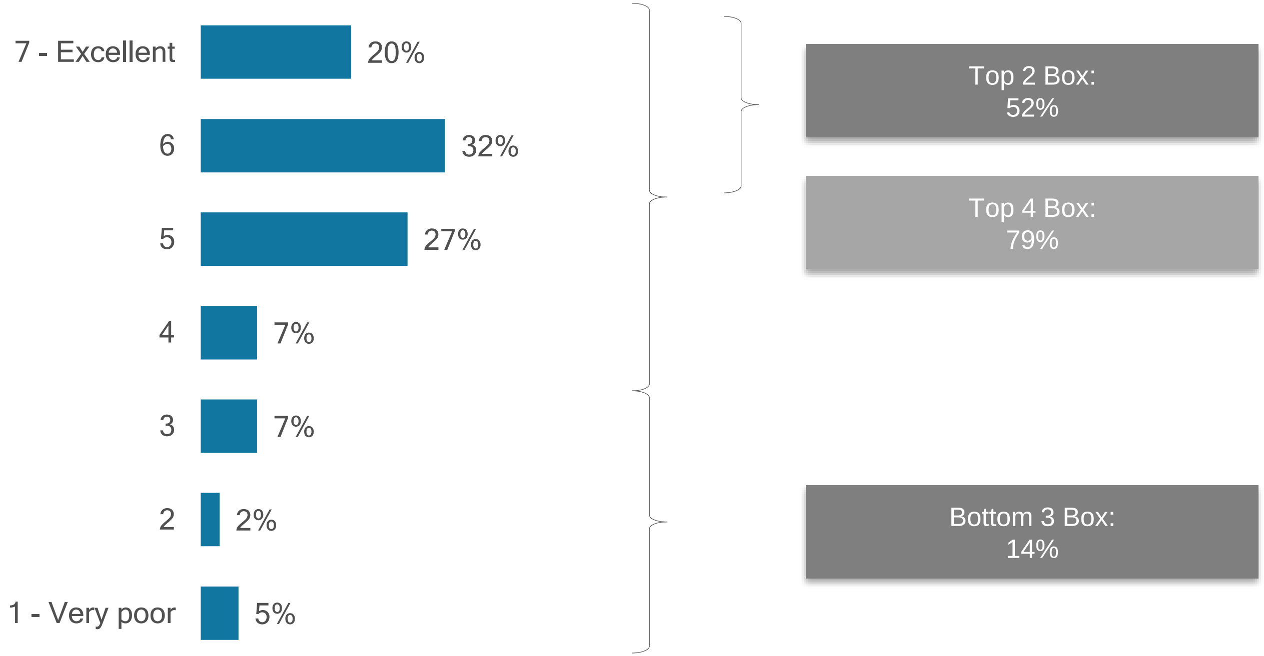
The context highlights:

- Awareness of EPCOR is high with the majority able to name EPCOR as the service provider of Wastewater Treatment (88%), Drainage Services (85%) and Storm Water Collection (83%).
- 79% of commercial customers are satisfied with their overall service (4-7 out of 7), and 52% very satisfied (6-7 out of 7).
- Satisfaction is even more positive when considering service specific to wastewater collection and treatment (4-7 out of 7) at 94%, and very satisfied (6-7 out of 7) at 52%.

Consistent with most satisfaction ratings, a lack of issues drives satisfaction (i.e. out of sight, out of mind), followed by good service and reliability.

More than half of Commercial and Multi-Residential Building Operators rate Edmonton’s utility services as excellent

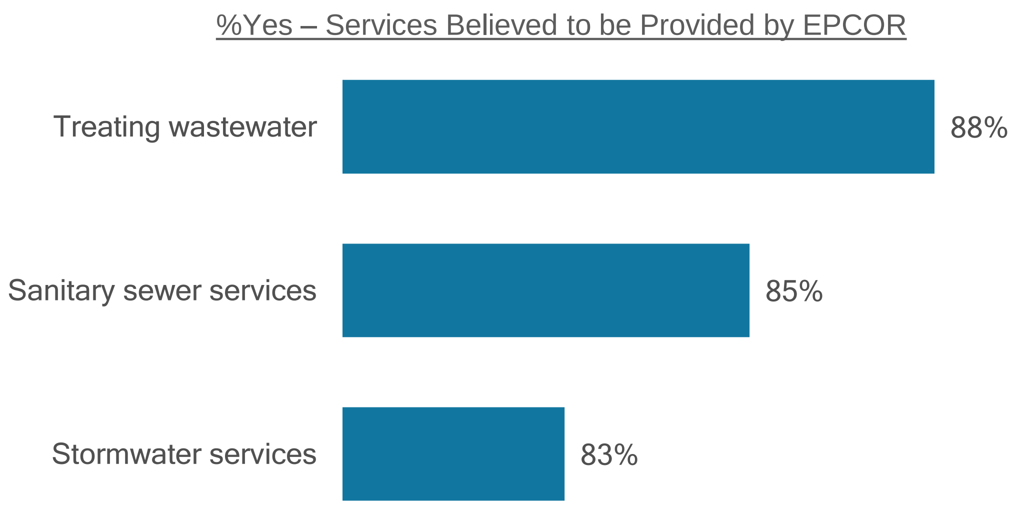
Overall Satisfaction with Utility Service in Edmonton



Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
Q2. Thinking broadly, how would you rate the quality of utility services in Edmonton overall?

Awareness of EPCOR as the service provider is high.

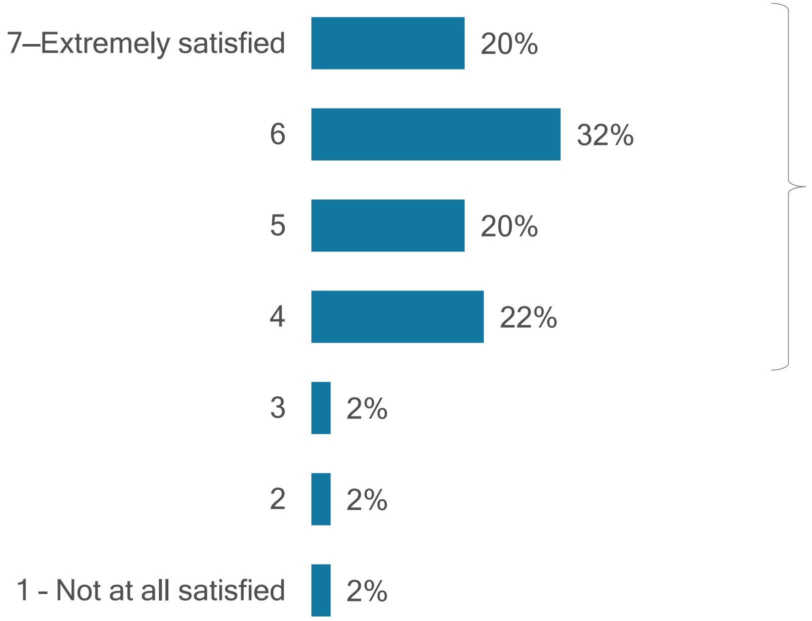
More than 4 in 5 of EPCOR's commercial customer base are aware that EPCOR manages all wastewater treatment, drainage, and collection services for the community.



Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
Q6. To the best of your knowledge, is EPCOR responsible for providing these services in Edmonton?

The majority Commercial/Multi-Residential building operators (94%) are satisfied with EPCOR WWC and WWT Services, with 52% very satisfied (top 2 box).

Overall Satisfaction with EPCOR Water Services



Top 2 Box:
52%

Top 4 Box:
94%

Satisfaction with EPCOR's water services remains high despite concerns regarding overall cost, showing a high degree of trust in the customer relationship.

Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
Q7. How would you rate your OVERALL satisfaction with your water, water treatment, and sewer services?

Detailed Results

Values, Concerns, & PBR Performance Areas

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To validate PBR performance areas and weighting, we asked participants questions in three different ways (below).

1. Top of mind concerns of multi-residential operators

This allowed us to explore customer's own language and any issues they felt were important about their water treatment, and drainage services that may not have been identified in the existing PBR.

2. Customer sensitivity pertaining to rate fluctuation, predictability, and investment

Determining how fluctuating rates have impacted customers over a two-year period and the importance of having stable and predictable bills each month. We also explored the importance of future investment and how customers believe those investments should be managed.

3. A sorting task of PBR performance areas and Thurstone analysis to identify *degree* of importance

Finally, customers were asked to conduct a ranking of potential future areas of performance for each line of business in terms of what mattered to them most.

This was followed up by a direct question asking if there are any other areas EPCOR should be considering.

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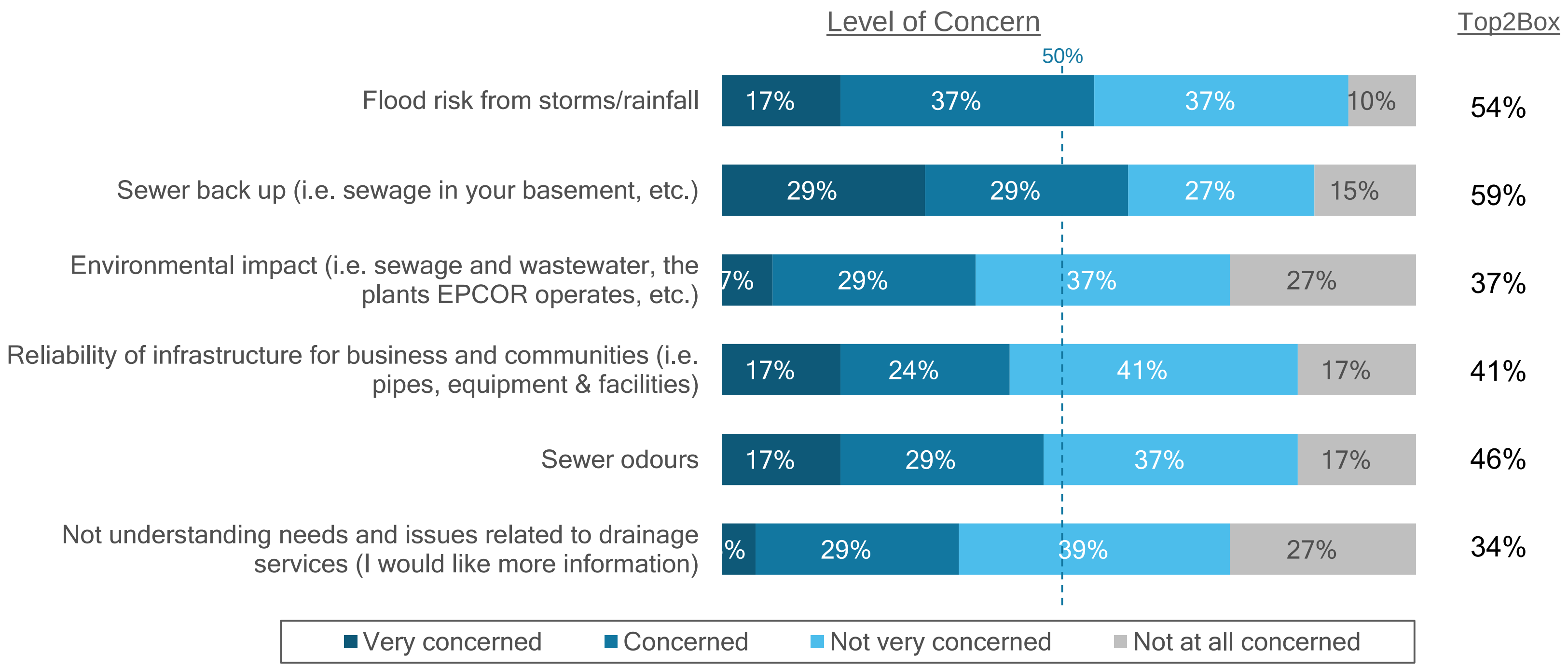
Prompted: Flood risk and sewer backup are the greatest issues of concern to commercial and multi-residential respondents.



Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
Q10. EPCOR provides wastewater treatment and drainage services, including sanitary sewer and stormwater, in the City of Edmonton. How concerned are you with the following in your neighbourhood?

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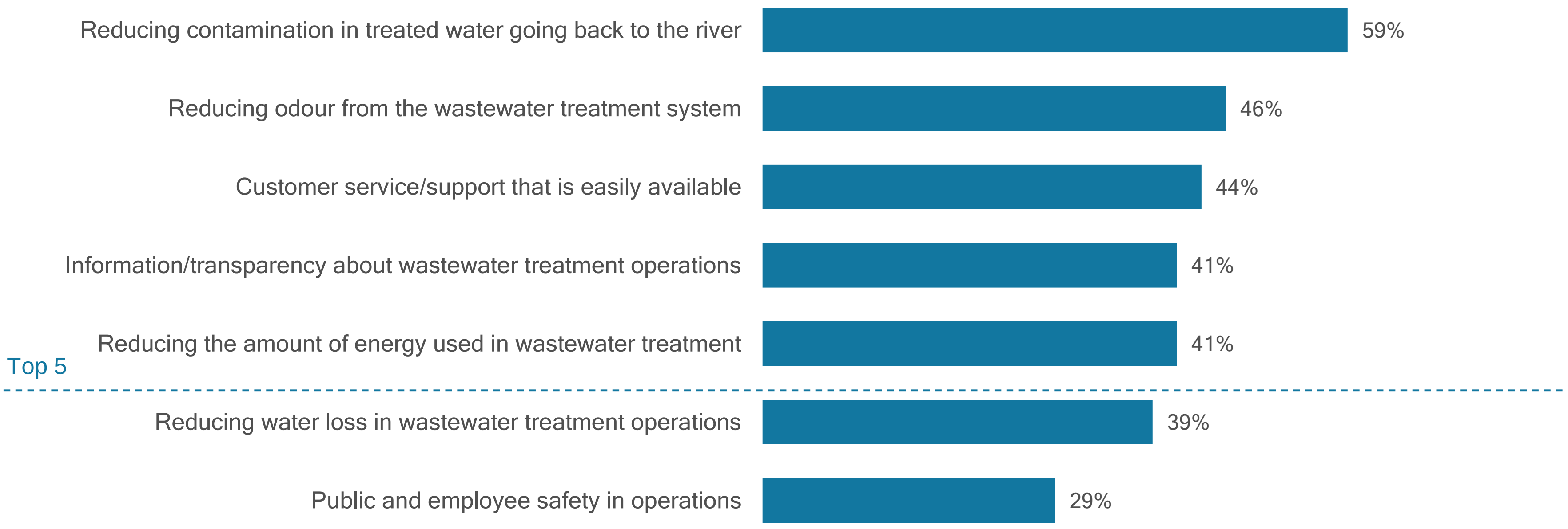
WWT Priorities

Protecting the river, odour mitigation, and customer service/support access are top priorities for commercial and multi-residential operators.

Note: customer service and support is significantly higher in priority for commercial and multi-residential customers.

Priorities for Managing Water Treatment (% Top 3)

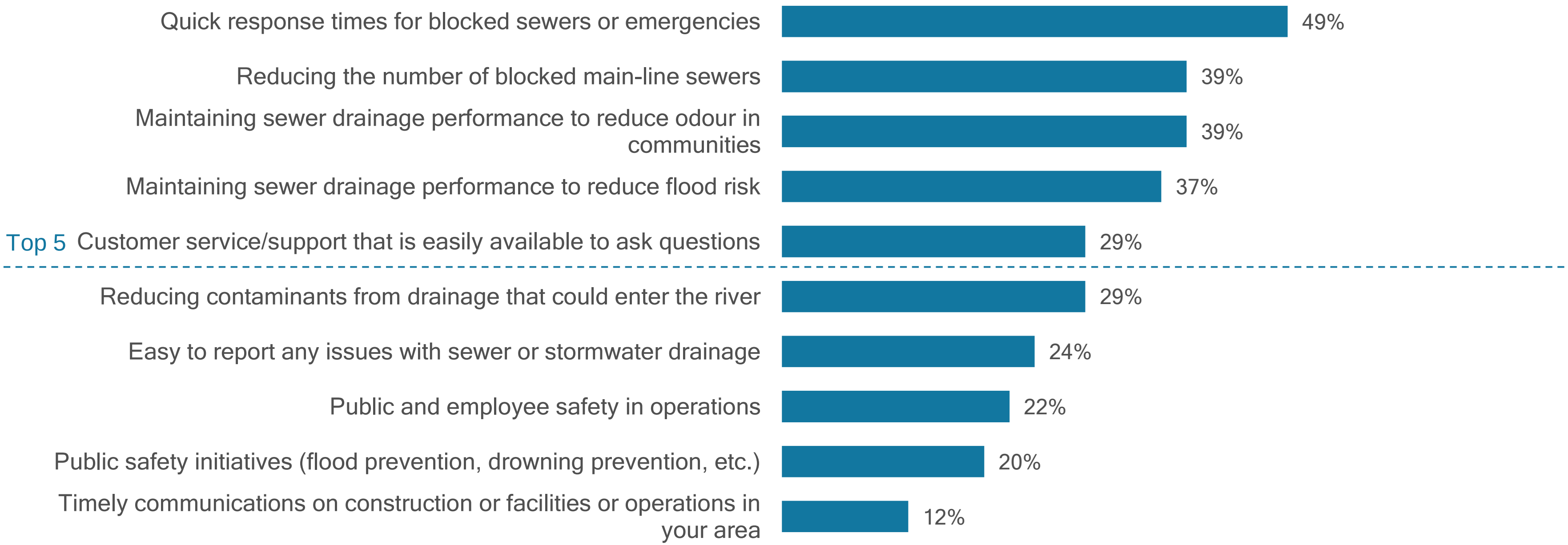


Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
Q11. The following is a list of considerations that operators look at when treating wastewater created by communities and businesses. We would like you to rank how important each one is to you personally, where 1 is most important to you, followed by 2, 3, etc. Please drag and drop the below into your preferred order.

WWC Priorities

Respondents are most concerned about *response times* for blocked sewers and emergencies and *reducing the number of blocked main-line sewars*

Priorities for Managing Sanitary Sewer & Stormwater Drainage (% Top 3)



Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
Q12. The following is a list of considerations that operators look at when managing sanitary sewer and stormwater drainage in communities. We would like you to rank how important each one is to you personally, where 1 is most important to you, followed by 2, 3, etc.

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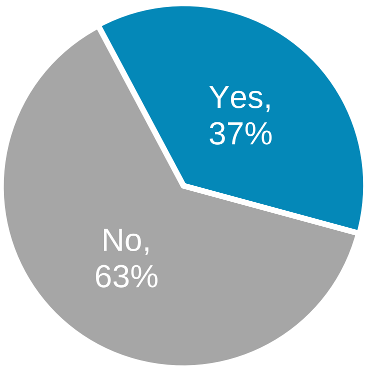
37% of respondents felt additional priorities should be considered, most indicating both for treatment and drainage. Cost and accountability considerations are most dominant in both cases

Any other concerns?

24% Wastewater

34% Drainage



Extra Considerations – Wastewater

Consideration:	Number of Instances
Cost concerns / financial management	3
Service and accountability	2
Water quality and safety	1
Environmental impact and sustainability	1
Health impacts and chemical treatment	1
Infrastructure maintenance, upgrades	0
Customer service and communication	0
Regulatory and policy issues	0

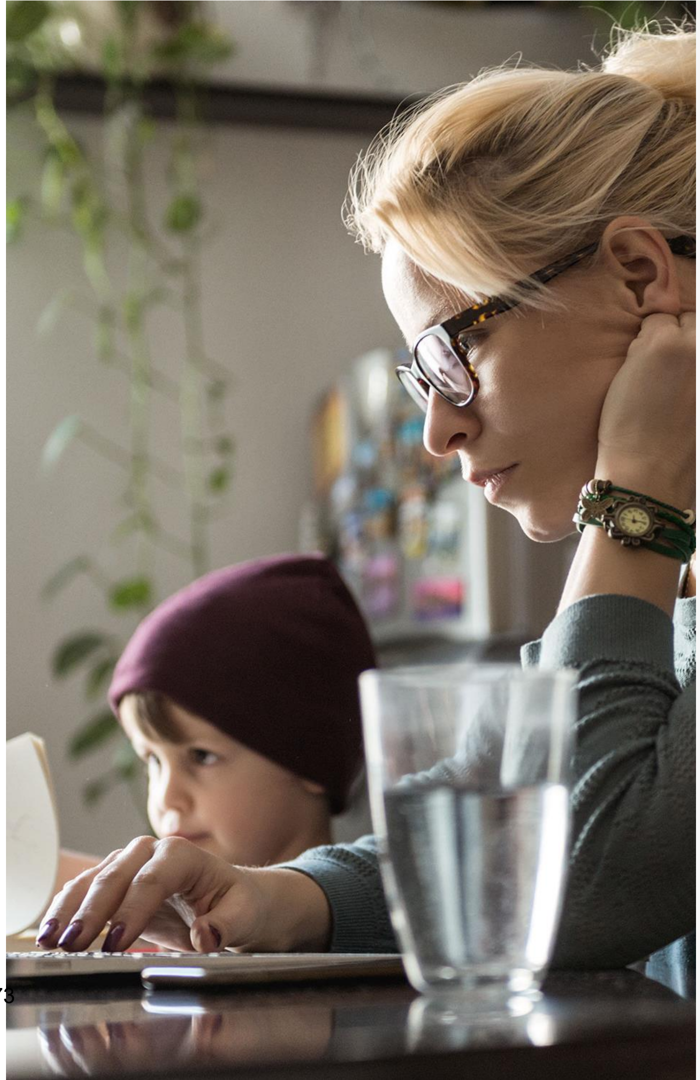
Extra Considerations - Drainage

Consideration:	Number of Instances
Cost concerns / financial management	4
Service and accountability	3
Infrastructure maintenance, upgrades	3
Water quality and safety	1
Environmental impact and sustainability	1
Customer service and communication	1
Regulatory and policy issues	1
Health impacts and chemical treatment	0

Base: Provided other considerations
Q13. Now that you have had a chance to think about your wastewater treatment, and stormwater and sewer drainage utilities, we would like to know what else (if anything) is important to you in how these services are managed that was not already mentioned. Do you have any other considerations you would like to suggest?

Detailed Results

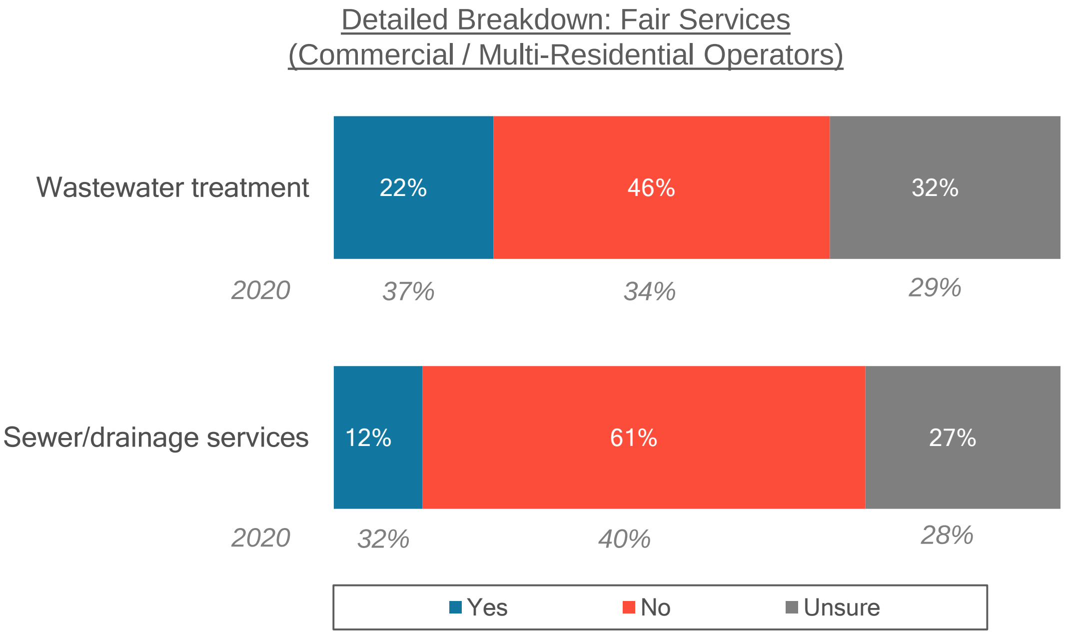
Rate Sensitivity



Rate Sensitivity

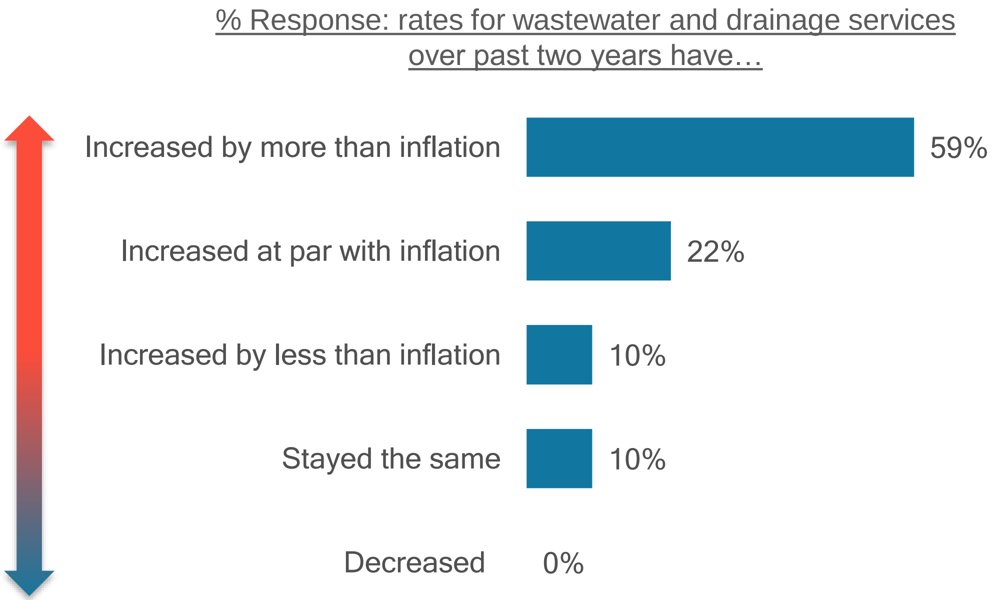
- More customers today indicate the rates they pay for WWC and WWT are unfair (46%) than fair (22%), while almost as many (32%) indicating they are unsure.
- Lower agreement with fair rates is high though this can be explained by the fact that commercial custoemrs believe the cost of utilities have increased by more than the rate of inflation (59%)
- Despite that cost is the most significant concern, more respondents still feel investment for future protection of the infrastructure and efficiencies is worth the investment (63%) vs. status quo (26%) or reducing investment (11%).
- Resident operators also place a very high level of importance around predictability in billing (71%), and the vast majority (93%) would like EPCOR to "*Hold and manage seasonal surpluses to offset seasonal deficits to keep bills stable and predictable over time.*"

In 2024, the number of customers indicating rates are not fair for WWT and WWC is significantly higher than in 2020, with WWC being the most concerning.



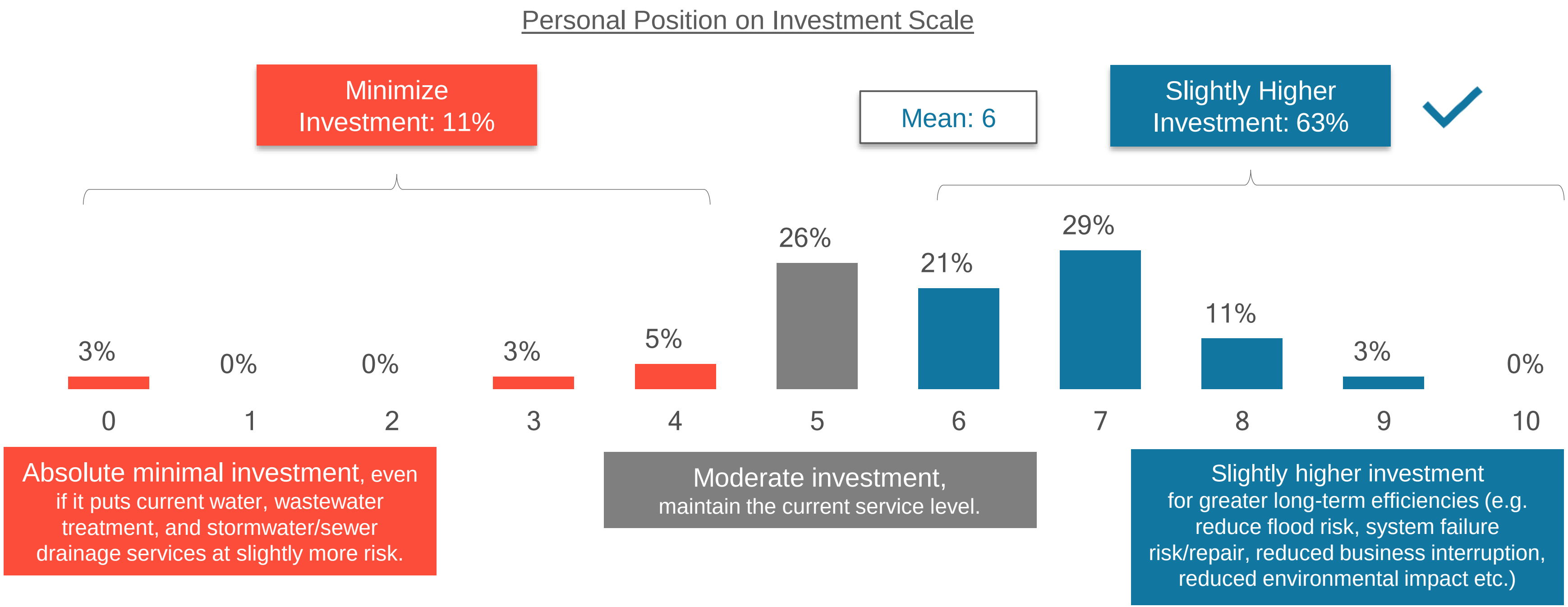
Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
PS1. The monthly rates charged for water supply, wastewater treatment, and sewer/drainage services are determined through bylaw principles and used to both operate and maintain/improve the system. In your opinion, is the rate you pay for these services today fair?

The strongest opinion is that rates have increased by more than inflation (59%).



Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
PS2. How do you think rates for wastewater and drainage services have changed over the past two years?

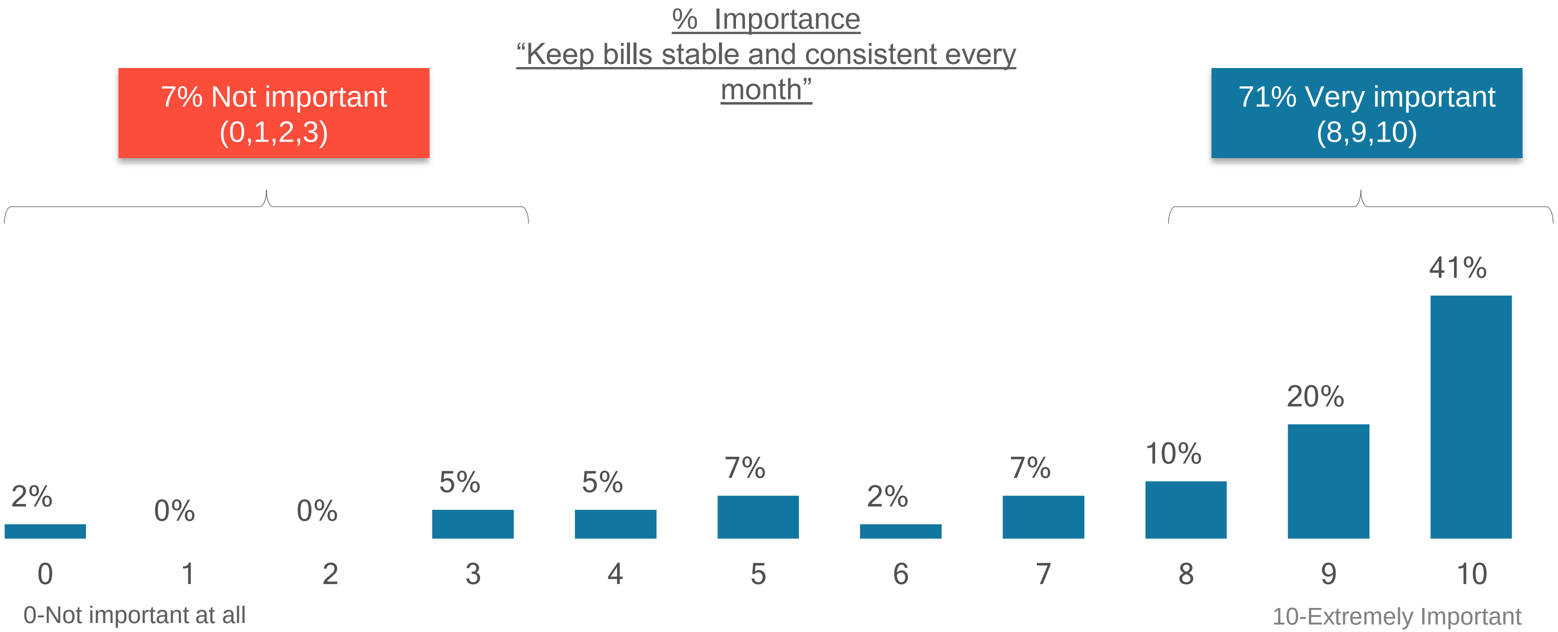
Commercial and multi-residential operators support slightly higher investment in services to allow for longer-term benefits and efficiencies (64%)



Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)

PS3. Wastewater treatment and stormwater and sewer services require ongoing investment. Some recent investments have reduced odour in the system and helped prevent neighbourhood flooding. Looking ahead to the next several years, in principle, where would you position yourself on the following investment scale?

Commercial and multi-residential operators place a high level of importance on consistent and predictable billing.

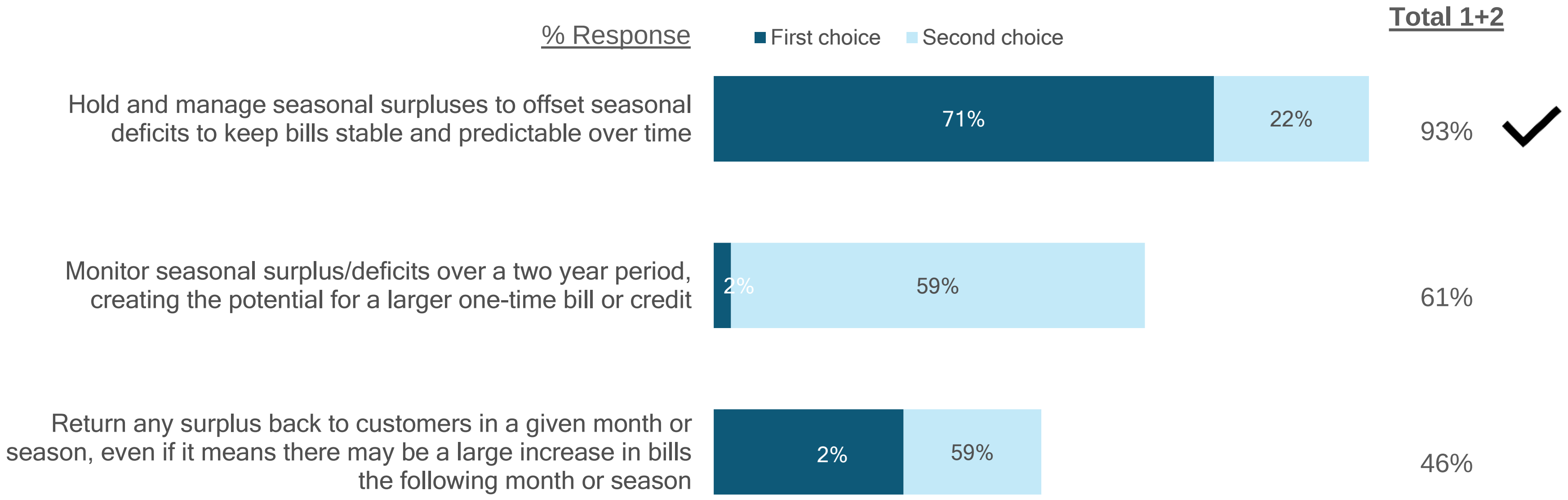


Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)

PS4. The cost of managing stormwater can change from month to month, based on things like weather and the amount of rainfall. On a scale of 1-10, how important is it to you that EPCOR tries to keep bills stable and consistent every month?

Similar to residential customers, commercial and multi-residential operators have a clear preference for EPCOR holding seasonal surpluses to offset seasonal deficits over time

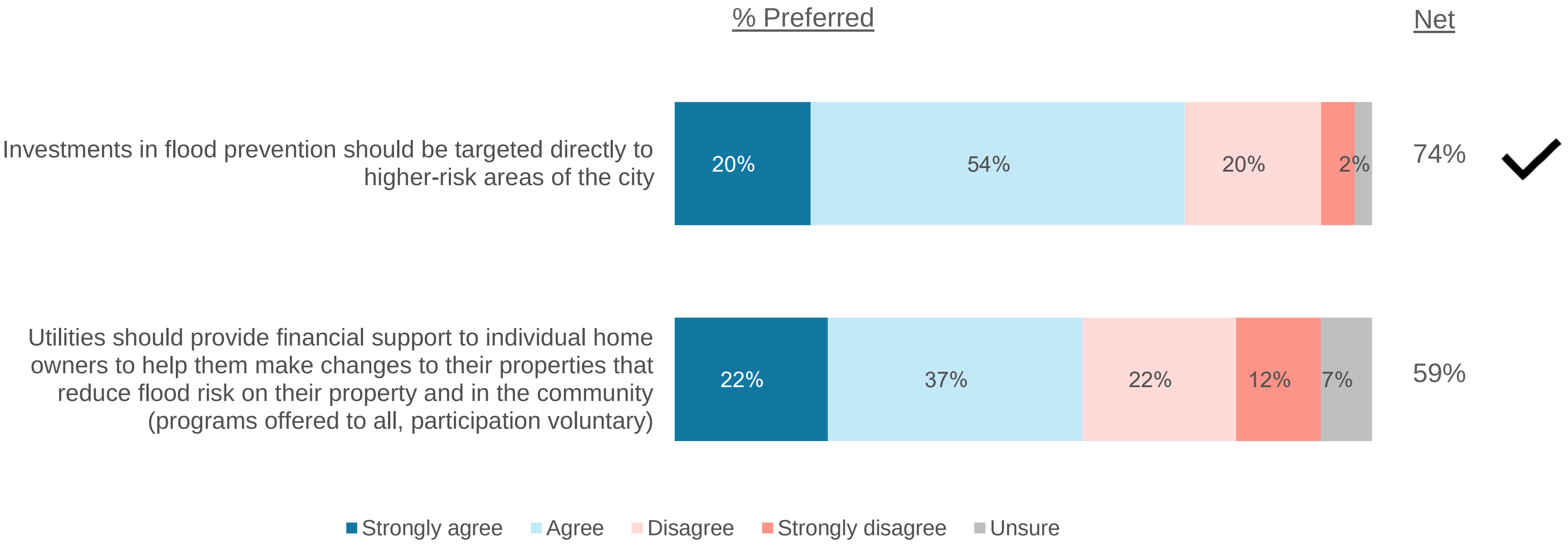
Attachment 2



Those under 35 prefer more frequent rebates, whereas those over 55 prefer the option of offsetting with a surplus.

Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
PS5. Because the cost to manage stormwater can change based on weather, EPCOR could potentially see billing surpluses or deficits in a given season. How would you prefer EPCOR manage this in terms of your bill? Please choose your first choice by putting a 1 beside your most preferred answer, and second choice by putting a 2 beside your second most preferred answer.

There is more support for flood risk mitigation by focusing on high-risk areas of the city (targeted) vs. offering incentives for homeowners (general), though there is overall support for both concepts



Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
PS6. There are different ways utilities can invest money to help reduce the risk of flooding in communities and homes. Two opportunity areas are indicated below. How much do you agree with each?

Detailed Results

Information Gathering

The EPCOR website and/or notices are the most effective way to reach commercial and multi-residential operators

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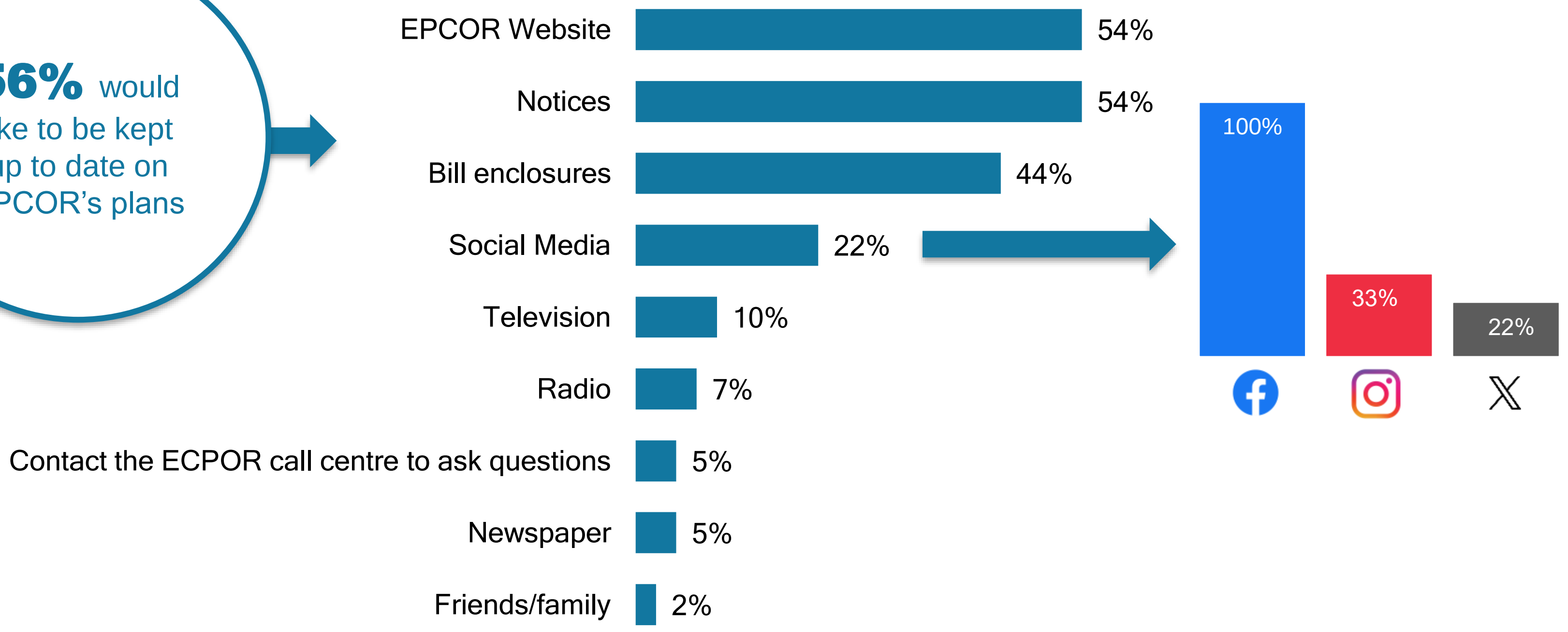
56% would like to be kept up to date on EPCOR's plans

Preferred Source of Information About EPCOR

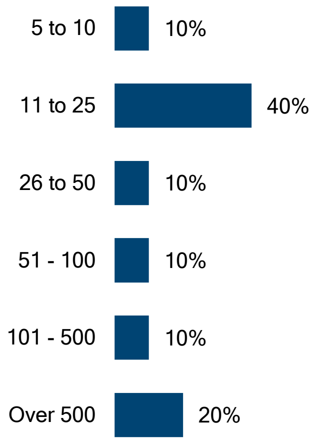


Base: All respondents: Commercial + Multi-Residential Building Operators (n=41)
Q14. Where do you prefer to receive information about wastewater treatment and drainage utility services? Please select all that apply.
Q14A. Which social media channel is preferred?

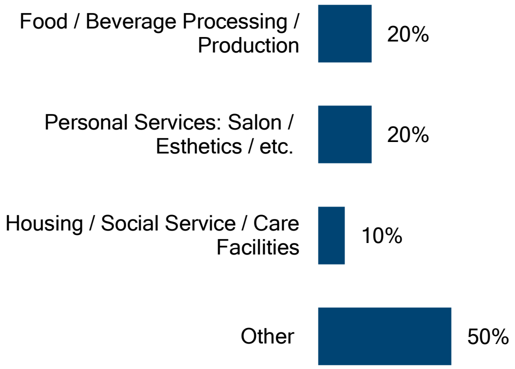
Customer Profile

Customer Profile

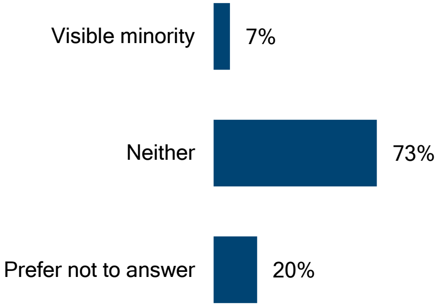
Company Size



Industry



Diversity



Base: All respondents: Residential (n=1,219), Multi-Residential (n=21*)

*Caution: Small sample size

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Understanding people. It's what we do.

Appendix I

EPCOR WATER SERVICES

Corporate Costs Allocation Methodology

May 31, 2024

1.0 OVERVIEW

1. EPCOR Water Services ("EWS") obtains corporate services from its parent corporation, EPCOR Utilities Inc. ("EUI" or "EPCOR"). Corporate services are comprised of activities that are centrally managed within the EPCOR group due to their nature and/or for the purpose of realizing economies of scale and greater effectiveness. The amounts paid by EWS in respect of these services include Corporate Shared Service costs. The Corporate Shared Service costs are determined on a cost recovery basis in accordance with EPCOR's Inter-Affiliate Code of Conduct and are reflected in a Service Agreement between the parties.

2. This section describes the corporate services received from EUI. The process used to develop the forecast of Corporate Shared Services costs is described in Section 1.1. The process used to allocate Corporate Shared Services costs to the business units is described in Section 1.2 below.

3. Appendix J describes the shared services and costs related to services provided by functional groups that are a part of the EWS business unit. For some functional categories, such as Human Resources, Supply Chain and Communications and Public Engagement, services are provided from both EUI and EWS. In these instances, the services provided by EUI tend to be limited to governance, oversight and broad policy considerations, while the services provided by EWS are more tactical and are specifically driven by the business needs of EWS. In the case of Information Services, the EUI cost allocation is generally related to corporate applications such as the financial and human resources systems while EWS Information Services costs are generally related to applications and technical infrastructure unique to EWS, such as the geographic information system (GIS).

1.1 Corporate Service Cost Forecast Process

4. The forecast Corporate Shared Services costs for the 2024 base year are based on EUI's 2024 budget. In developing its budget, EUI used a "bottom up" approach to forecast expenditures based on the best available information with respect to historical workloads, expected work activity and cost levels.

1.2 Corporate Service Cost Allocation Process

5. Consistent with its approach in previous years, EUI allocates Corporate Shared Services costs to the EPCOR business units using the following five step process:

1. Categorize Corporate Shared Services costs as directly assignable or allocable.
2. Assign directly assignable costs to the appropriate business unit.
3. Review/develop/modify allocation method for allocable costs.
4. Apply allocation method to allocable costs.
5. Conduct a final review for reasonableness.

Step 1 - Categorize Corporate Shared Services costs as either directly assignable or allocable.

6. The first step in developing Corporate Service Charges was to review the components of Corporate Shared Services costs and categorize them into two defined groups:

- Directly assignable costs; and
- Allocable costs.

7. Directly assignable costs are those costs that are directly associated with a particular business unit's activity or operation. The relevant Corporate Services department and business unit work together to determine the quantum of directly assigned costs, if any, related to the Corporate Service in question.

8. Allocable costs are those costs that provide benefits to EUI business units but by their nature cannot be directly assigned and are charged to business units using an appropriate cost allocator. These costs are allocated among EPCOR business units using cost allocators that reflect the factor or factors that drive the cost of providing the Corporate Service to each business unit.

9. Directly assignable Corporate Services costs include the following:

- Certain information system operating costs that can be directly attributable to business units (e.g., support costs for business unit specific applications and databases; server costs and licensing fees that relate to business unit specific applications; and desktop support costs for desktops that are used by a business unit).
- Space rent costs for office space in the EPCOR Tower.
- Corporate security costs incurred directly on behalf of business units.
- Health and Safety costs incurred directly on behalf of business units.
- Community sponsorship.
- Fleet Safety Services costs such as permits, vehicle collision investigations, inspections and skills evaluations that can be directly attributable to the business units.

Step 2 - Assign directly assignable costs to Business Units

10. Once the directly assignable costs are identified and determined they are charged directly to each business unit. Directly assignable costs are included in the budgets of the business units and excluded from the respective Corporate Service departments. In other words, the allocated corporate costs exclude directly assignable corporate costs.

Step 3 - Review/develop/modify allocation method for allocable costs

11. EPCOR's cost allocation process is designed to ensure that the allocation of Corporate Shared Services costs among business units is appropriate, fair and reasonable, cost-effective, predictable, reflects the benefit received by function (i.e., cost causation), and is consistent with the transfer pricing principles in EPCOR's Inter-Affiliate Code of Conduct. In situations where a revision to the cost allocator or allocation method is deemed necessary, soliciting input from the business unit is a vital step. This process ensures that the allocation process is not only accurate and efficient but also enables informed decisions.

12. The costs associated with a Corporate Services department, except for the Treasurer-Corporate Finance and Treasury Operations, are allocated on one of two bases: (i) using a single "functional cost causation allocator", or (ii) using a "composite cost causation allocator". The allocation method for Treasurer – Corporate Finance costs uses a weighting of three financial drivers: PPE, Acquisitions and Capital Expenditures. This is deemed as an appropriate allocator as each driver is directly related to the amount of effort required to obtain financing and service a business unit's share of funding, for either maintenance of existing assets or new growth by

means of capital expenditures or acquisitions. The Treasury Operations costs are allocated using a composite of the Net Income, Depreciation and Debt allocators. This is an appropriate allocator as it reflects the activities and level of effort required to manage cash flow in each business unit.

13. A functional cost causation allocator has been used where the costs can be logically allocated using an identified cost causation driver, such as headcount. The composite cost causation allocator has been used where the costs cannot be allocated using a particular functional cost causation allocator. The latter types of costs tend to be related to Corporate Services that are of a governance nature, and it is appropriate that these types of costs be allocated based on a composite cost allocator which factors in the business unit's share of EPCOR's group revenues, assets, and headcount.

14. The allocation methods applicable to EUI's allocable Corporate Shared Services costs for 2025 to 2027 are summarized in Table 1.2-1 below.

Table 1.2-1
Allocation Methods by Department and Function

	Department and Function	A EUI – EWS Allocators
	Board Costs	
1	All Costs	Composite - EUI Revenue, Assets, Headcount
	Executive and Executive Assistants	
2	All Costs	Composite - EUI Revenue, Assets, Headcount
	Corporate Finance Services	
3	Corporate Finance	Composite - EUI Revenue, Assets, Headcount
4	Accounts Payable	Functional Cost Causation – Number of Invoices
5	Accounts Receivable	Functional Cost Causation – Number of AR Invoices
	Treasury	
6	Treasurer - Corporate Finance	40% PPE, 30% Capital Expenditures, 30% Acquisitions
7	Treasury Operations	50% of (Net Income + Depreciation), 50% Debt
8	Taxation	Composite - EUI Revenue, Assets, Headcount
	Audit & Risk Management	
9	Internal Audit	Composite - EUI Revenue, Assets, Headcount
10	Risk Management	Functional Cost Causation - PP&E
11	Centre of Excellence	Composite - EUI Revenue, Assets, Headcount
12	Organizational Project Management	Functional Cost Causation – PP&E
	Human Resources	
13	Total Rewards	Functional Cost Causation – Headcount
14	Human Resources Consulting	Functional Cost Causation – Headcount
15	Talent Development	Functional Cost Causation – Headcount
16	Learning and Development	Functional Cost Causation – Headcount
	Information Services	
17	Application Services	Functional Cost Causation - Headcount
18	Infrastructure Operations	Functional Cost Causation - Direct IS Costs
19	Major Capital Projects	Functional Cost Causation - Headcount
	Supply Chain Management	
20	Contract Management	Functional Cost Causation - SCM Embedded Headcount
21	Facility Operations	Composite - EUI Revenue, Assets, Headcount
22	Mailroom	Functional Cost Causation –Headcount
23	SCM Corporate Services - Tower Rent, Maintenance, Security	Composite - EUI Revenue, Assets, Headcount
24	Disaster Recovery Planning	Functional Cost Causation - Direct IS Costs
	Communications and Public Engagement	
25	Community Relations	Functional Cost Causation - Net Income
26	Corporate Communications	Functional Cost Causation - Net Income
27	Government Relations	Composite - EUI Revenue, Assets, Headcount
	Legal Services	
28	All Costs	Composite - EUI Revenue, Assets, Headcount
	Health, Safety, Security and Environment	
29	Health, Safety and Environment	Functional Cost Causation - Headcount
30	Security	Functional Cost Causation – Headcount
	Incentive Compensation	
31	All Costs	Average Corporate Cost Allocation
	Asset Usage Fees	
32	Leasehold Assets	Proportional Corporate Costs.

	Department and Function	A EUI – EWS Allocators
33	Human Resource System	Functional Cost Causation – Headcount
34	Information Systems	Direct IS Operating Costs
35	Financial System	Weighted average of finance and payroll function and weighted average of the Purchase Order Lines
36	Furniture and Fixtures	Proportional Corporate Costs
37	Vehicles	Proportional Corporate Costs
38	Customer Information System	Proportional Customer Sites

Step 4 – Apply allocation methods to allocable costs

15. Once the allocation methods are determined, they are applied against EUI's final budgeted Corporate Services costs to arrive at the amounts charged to each business unit.

Step 5 - Final review of Corporate Service Charges for reasonableness

16. The resulting Corporate Services charges were carefully reviewed by EUI and EWS senior management to confirm that the process set out above was properly applied, and that the resulting charges were reasonable.

1.3 Allocated Corporate Costs

17. Further details regarding the allocated corporate costs are provided for each Corporate Service department in the subsections that follow.

1.3.1 Board

18. EUI's Board of Directors (the "Board") provides corporate governance functions to EWS and other EPCOR subsidiaries. The governance functions include:

- Establishing the strategic objectives and direction of the EPCOR group.
- Maintaining and enforcing articles and corporate bylaws.
- Electing and appointing corporate officers.
- Delegating special authorities to management.
- Reviewing and approving corporate policies.
- Providing direction and oversight to safeguard and maintain the long-term value of corporate assets.
- Reviewing and approving significant financial matters.

- Making recommendations to the shareholder.
- Participating in the strategic planning process for the EPCOR group.
- Approving capital and operating budgets to meet the objectives established in the EPCOR group's strategic plan.
- Approving compensation policies and programs for employees.
- Evaluating and assessing corporate performance against strategic, operating and capital plans.
- Understanding and monitoring corporate business risks.
- Approving and monitoring compliance with all significant corporate policies and procedures.
- Directing management to ensure compliance with legal requirements.

19. Board costs include Director's fees, Director and Officer insurance costs, travel expenses, legal fees incurred at the Board level and other related expenses, such as external consultants and experts as required.

20. The Board is comprised of members that are independent from EPCOR, which ensures that there is an appropriate segregation of duties and responsibilities between the Board and CEO. This independence in oversight is a best practice in governance and is necessary to ensure that EUI and its subsidiaries meet their obligations and responsibilities free from conflicts of interest.

21. The Board members are not members of management and have no direct or indirect material relationships with EPCOR; as such, the Board members provide a third party service to EUI and its subsidiaries. Board members are appointed by the City of Edmonton in its role as shareholder of EUI, and are compensated for their services. Director compensation is regularly reviewed by the Corporate Governance & Nominating Committee, which receives independent advice from a third party compensation expert, and makes recommendations to the City of Edmonton to determine Directors' compensation.

1.3.2 Executive and Executive Assistants

22. Executives provide governance and leadership services to EWS and other EUI subsidiaries. These activities include:

- Establishing and recommending broad corporate policies for approval by the Board of Directors.
- Reviewing and recommending significant financial matters/decisions for approval by the Board of Directors.
- Developing corporate-level strategy and plans for approval by the Board of Directors.
- Carrying out the special authorities delegated by the Board of Directors.
- Establishing and maintaining an adequate control framework in relation to internal controls over financial reporting and disclosure controls and procedures, conducive to fulfilling compliance with National Instrument 52-109, the Canadian legislation equivalent to the United States Sarbanes–Oxley Act (commonly referred to as "CSOx").
- Establishing appropriate processes, procedures and controls to ensure the EPCOR group fulfills its statutory obligations to provide utility services and contractual obligations to service its commercial customers.
- Corporate Secretarial services include providing assistance with Board, Committee and Shareholder material submissions and preparing resolutions.

23. The costs are made up of salaries and related costs for four senior EUI Executives and their respective Executive Assistants ("EAs"). The four senior Executives include:

- President and Chief Executive Officer ("CEO");
- Senior Vice President and Chief Financial Officer ("CFO")
- Senior Vice President, Sustainability, General Counsel and Corporate Secretary; and
- Senior Vice President Corporate Services.

24. Four EAs provide administrative support for the four Executives' activities.

25. Executive leadership and related support is needed to provide corporate governance and oversight over EPCOR group business operations; to develop policies and provide strategic direction for EUI and its subsidiaries; to make strategic-level decisions on significant financial

matters; to manage the enterprise risk of EUI and its subsidiaries; and to ensure that the EPCOR group has the overall resources necessary to enable it to meet the group's duties and obligations.

1.3.3 Finance

1.3.3.1 Corporate Finance Services

26. The Corporate Finance department provides services to EWS and other EUI subsidiaries in the areas of:

- Corporate Finance
    - Corporate Accounting;
    - Consolidated Reporting and Analysis;
    - Audit Fees;
- Accounts Payable; and
- Accounts Receivable.

1.3.3.1.1 Corporate Accounting

27. The Corporate Accounting function develops and maintains corporate accounting policies, procedures and internal controls, and provides advice and direction to EWS and other EPCOR subsidiaries with respect to these policies, procedures and internal controls. Corporate Accounting also includes accounting activities in support of the financing provided to EWS and other EPCOR subsidiaries, as well as accounting for and calculating the allocation of corporate costs to each of the EPCOR subsidiaries and maintaining and reviewing the allocation methodologies applied to those corporate costs to ensure they are fair, reasonable and reflective of services provided. In connection with these activities, the Corporate Accounting group assists with the preparation of all regulatory related documentation and filings involving the allocation of corporate costs.

1.3.3.1.2 Consolidated Reporting and Analysis

28. The Consolidated Reporting and Analysis group is responsible for the preparation of consolidated financial statements and analysis and discussion of the results. More specifically, this includes:

- Ensuring appropriate accounting policies are developed and the relevant accounting standards are properly and consistently applied by all EPCOR subsidiaries;

- Ensuring appropriate internal controls over financial reporting are developed and consistently applied by all EPCOR subsidiaries to ensure that EUI interim and annual consolidated financial statements accurately and fairly present the financial results of the company;
- Preparing EUI interim and annual consolidated financial statements and management discussion and analysis as required under securities regulations;
- Preparing internal consolidated financial statements and analysis for executives.
- Reviewing audited financial statements prepared by EUI subsidiaries to ensure they are prepared in accordance with accounting standards and consistent presentation and disclosure with the audited consolidated financial statements of EUI;
- Providing the executive with profitability, cost-effectiveness and other analyses as required; and
- Managing the annual budgeting and quarterly re-forecasting processes for all of EPCOR including performing various ad hoc analyses as required by EUI and its various subsidiaries.

1.3.3.1.3 Audit Fees

29. Audit Fees relate to the outsourced function of performing audits and quarterly reviews of EUI's annual and quarterly interim consolidated financial statements.

30. External financial statement audit services are necessary for EWS to provide utility service. In order to access capital, EWS relies on EUI to meet the financial reporting requirements set by creditors. If EUI's financial statements are not audited, access to capital could be restricted, which could in turn limit the utilities' ability to make infrastructure investments.

31. By statute, financial statement audits can only be provided by chartered accounting firms. Therefore, the Audit fees function is solely comprised of external resources.

1.3.3.1.4 Accounts Payable

32. The Accounts Payable function maintains vendor master files that are used for various purchasing, contract management and vendor payment functions. In addition, the Accounts Payable department is responsible for the management of procurement cards and processes all vendor invoices, credit notes and adjustments for payment on a periodic basis. The Accounts

Payable function also develops and maintains all of the accounts payable related forms, policies, procedures and controls to be applied by all EPCOR's activities.

33. Accounts Payable is necessary for EWS and other EUI subsidiaries to provide utility service as each utility incurs costs from external parties related to utility service and these costs require payment. Accounts Payable classifies costs for management reporting and analysis purposes and ensures that invoices are paid on time. In doing so, Accounts Payable can take advantage of cash discount terms where appropriate.

1.3.3.1.5 Accounts Receivable

34. The Accounts Receivable function is responsible for the management and processing of all customer invoices (excluding customer utility billings), credit notes and adjustments on a periodic basis. The Accounts Receivable function also develops and maintains all of the accounts receivable related forms, policies, procedures and controls to be applied by all EPCOR's activities.

35. Accounts Receivable is necessary for EWS and other EUI subsidiaries to provide utility service as each utility has commercial and intercompany activities that require invoicing to external and intercompany parties to ensure timely collection.

1.3.4 Treasury

36. The Treasury department provides the following services to EWS and other EUI subsidiaries:

- Treasurer – Corporate Finance;
- Treasury Operations; and
- Taxation.

1.3.4.1.1 Treasurer – Corporate Finance

37. The Treasurer – Corporate Finance function performs the services associated with raising capital, primarily through the issuance of debt, necessary to finance EWS's and other EPCOR subsidiaries' capital expenditures and working capital requirements. The activities within this service include:

- Preparing prospectuses for EUI's issuance of public debt for the benefit of EWS and other EPCOR subsidiaries.
- Raising capital in the public and private markets for EUI and its subsidiaries.

- Meeting with credit rating agencies and providing the information required by the rating agencies to provide credit ratings.
- Preparing short-term and long-term loan arrangements between EUI and the subsidiaries.
- Performing credit reviews and analysis of commercial counterparties for EUI and its subsidiaries.
- Providing subsidiaries with financing and capital structuring advice for capital projects and acquisitions.
- Managing the strategic planning process and developing EUI's corporate strategy and annually refreshing its five year long-term plan; assisting EUI subsidiaries in developing their long-term plans; developing and maintaining the EPCOR groups' long-term planning model; providing financial and analytical support to EUI subsidiaries in relation to long-term planning; and completing an annual valuation of EUI and its subsidiaries.
- Providing financial projections that underlie the strategic plan and preparing other long range financial forecasts.
- Providing business development support, including all valuations work, for EUI and its subsidiaries.

38. The Treasurer – Corporate Finance function's activities are necessary for EWS to provide utility service. The ability to raise capital is fundamental to the sustainability of utility operations and the Treasurer – Corporate Finance function lowers costs by optimizing borrowings and negotiating cost-effective terms and conditions.

1.3.4.1.2 Treasury Operations

39. Treasury Operations provides banking and cash management services to EWS and other EPCOR subsidiaries. The activities within this service include:

- Opening and closing bank accounts;
- Arranging and maintaining operating credit facilities with lenders;
- Cash forecasting and processing;
- Accounting for all of the treasury transactions and loans between EPCOR entities; and
- Managing exposure to foreign currency and interest rate fluctuations on behalf of all EPCOR entities.

40. Treasury Operations services are activities that are necessary for EWS to provide utility service. This function ensures that the EPCOR group's short-term working capital requirements are met and that there is an availability of cash on a day-to-day basis.

1.3.4.1.3 Taxation Services

41. Taxation Services include all reporting and compliance related to taxes, inclusive of property taxes and linear taxes related to business unit property and utility assets, Goods and Services Taxes ("GST") and harmonized Sales taxes ("HST") related to business unit operations, Provincial Sales Taxes ("PST") related to business unit operations, Canadian and U.S. federal, provincial and state income taxes in relation to taxable business units, non-resident withholding taxes ("NRWT") on services performed on behalf of the business units by non-resident corporations, contractors and consultants, and customs duties related to materials and equipment imported by the business units.

42. The activities performed by the Taxation group include:

- Preparing and filing returns and remittances related to GST, HST, PST, income taxes, property and linear taxes, and NRWT.
- Reviewing the appropriateness and accuracy of assessments and reassessments issued by tax authorities in relation to all forms of tax, including the preparation and filing of any required notices of objection.
- Performing research and generally maintaining a current level of knowledge related to all present and proposed forms of tax to ensure compliance with related rules and regulations conducive to minimizing interest and penalties on assessment and reassessment.
- Planning and executing system and process changes required to implement new and revised taxes and tax rates (e.g., changes in HST and GST rates).
- Performing employee training sessions on the various forms of tax to ensure compliance at the business unit level.
- Providing advice to Corporate and business unit management on the development of policies and procedures that may be affected by any form of tax.
- Performing acquisition due diligence.
- Liaising with federal, provincial, state, municipal and county auditors on behalf of the business units in relation to audits performed of any form of tax.

- Providing tax planning services to minimize tax expenses.

43. The Taxation group ensures that EWS is compliant with all tax legislation. This group also devises tax strategies to ensure that EWS has minimized its GST, PST, and NRWT, property tax, linear tax and income tax liabilities.

1.3.5 Audit and Risk Management

44. The Audit and Risk Management department provides the following services to EWS and other EUI subsidiaries:

- Internal Audit;
- Risk Management;
- Centre of Excellence; and
- Organizational Project Management (OPM).

1.3.5.1.1 Internal Audit

45. The Internal Audit ("IA") department provides services to EWS and other EUI subsidiaries in the areas of:

- Administration of the EPCOR group's internal program that ensures compliance with National Instrument 52-109, the Canadian legislation equivalent to the United States' Sarbanes-Oxley Act (commonly referred to as "CSOx"), including:
    - Providing administration, oversight, advisory and testing services to assist management in meeting its reporting obligations with respect to Disclosure Controls and Procedures ("DC&P'') and Internal Controls over Financial Reporting ("ICoFR").
    - Coordinating quarterly CSOx sub-certifications with internal business process owners on the design and effectiveness of the key controls mitigating financial reporting risk.
    - Continuing to improve and align internal business processes and accompanying controls with the external auditor to effectively meet the objectives of this program and improve overall internal and external audit efficiencies.
- Providing assurance and advisory services under the EPCOR group's annual risk based audit plan to independently examine, evaluate and report on the adequacy,

effectiveness and efficiency of the systems of internal controls across EPCOR's operations. Specific types of services include operational audits, information systems audits, environmental, health and safety audits, fraud detection and prevention, and audit advisory services.

- Managing the follow-up of open audit items, including reporting to Senior Management and the Audit Committee, to ensure audit items are remediated in a timely manner.

46. The activities performed by IA are necessary for EWS to provide utility service. These activities serve to reduce risks by evaluating the design and/or effectiveness of systems of internal controls in addition to risk mitigation strategies that provide management and the Board with assurance information needed to fulfill their managerial and governance responsibilities. They also serve to reduce or avoid costs, especially through the performance of operational audits.

1.3.5.1.2 Risk Management

47. Risk Management provides insurance and enterprise risk management ("ERM") services to EWS and other EUI subsidiaries. The activities within this service include:

- Managing all EPCOR business units' insurance requirements with overall responsibility for EPCOR's corporate insurance program. This includes coverage determination, negotiation and placement of insurance contracts as well as surety bonds, facilitating insurer loss control activities, negotiating and settling insured losses and insurance contract/legal review including risk identification.
- Developing and maintaining an ERM framework and risk management process standard for all EPCOR business units and facilitating operational risk assessments across EPCOR. This program includes the integrated identification, analysis and monitoring of the top risks across EPCOR, including strategic and operational activities, with quarterly reporting to the Board of Directors.

48. Risk Management activities are necessary for EWS to provide utility service. The Risk Management group manages the risk of damage to or caused by physical assets owned by EWS. This service ensures that all EPCOR group operations are protected by the broadest coverage available in the insurance market. Having the appropriate amount of insurance is commonly required for debt issuances that might be secured by physical assets.

1.3.5.2 Centre of Excellence

49. The Centre of Excellence provides leadership, best practices, research, support and training for the Oracle Financial suite of products and the Adaptive budgeting and forecasting tool. The Centre of Excellence fosters a culture of process improvement while ensuring that existing processes are maintained.

50. The activities performed by the Centre of Excellence group include:

- Identification and analysis of issues that impact operational performance and lead the implementation of any new improvements across EPCOR.
- Leading groups of knowledgeable employees that are assigned to contribute to specific group objectives on a part time basis (Communities of Practice).
- Delivery of training and support utilizing multiple methods of delivery such as eLearning, face-to face instruction, on the job support tools and knowledge portals.
- Performing conversion and training related to acquisition integration.

51. The Centre of Excellence group ensures that EWS staff are properly trained and following consistent EPCOR wide processes and procedures. The focus on process improvement and a consistent approach fosters best practices and allows the finance groups across EPCOR to rotate staff with minimal disruption.

1.3.5.3 Organizational Project Management

52. Organizational Project Management ("OPM") was transferred to Corporate in June 2020 to develop a company-wide standardized approach for project management (i.e., standardized systems, processes and practices) and ensure cross-functional efficiencies. An example of a cross-functional efficiency is the coordination of the water, wastewater, drainage and electrical work necessary for large projects such as the utility work related to the light rail transit expansions. The goal is to visit the work site in a manner that decreases disruption to the area and completes the work in the most cost-effective manner. EPCOR established an Organizational Project Management Committee made up of members from across EPCOR's business areas to collaborate and develop new project management standards for the EPCOR group. The OPM function will improve the EPCOR group's ability to efficiently, safely, consistently and successfully manage field-related capital and operating projects through their initiation, planning, executing, monitoring and controlling, and closing lifecycle phases. The OPM function is currently in Corporate to achieve a collaborative solution for the impacted business units.

53. The activities performed by the OPM Committee include:

- Defining a company-wide project management framework to support EPCOR's strategic objectives within project, program and portfolio management.
- Developing a company-wide project governance model for monitoring and approving project performance activities.
- Supporting project managers by enhancing the tools and processes at their disposal.
- Developing a Project Management Information Technology roadmap, implementing and enhancing systems in accordance with this roadmap.
- Developing and delivering training and support utilizing multiple methods of delivery such as eLearning, face-to-face instruction, on-the-job support tools and knowledge portals.

1.3.6 Human Resources Services

54. The functions in the HR department include the administration and management of employee compensation and benefits programs, support of recruitment efforts, job and organizational design, coaching and conflict resolution, succession and workforce planning and performance management for corporate shared service departments and the continued delivery of professional development courses. The Human Resources ("HR") department provides the following services to EWS and other EUI business units:

- Total Rewards;
- Human Resources Consulting;
- Talent Development; and
- Learning and Development

1.3.6.1 Total Rewards

55. The Total Rewards department provides oversight and services related to Payroll, Oracle HRIS & Analytics, Labour Relations and the planning, design and administration of the overall EPCOR compensation, benefits, pension and savings plans.

56. The Labour Relations function is responsible for the planning and execution of collective bargaining for all of EPCOR's unions across the enterprise, and includes direction, administration and support for managers on the dispute resolution processes found in all of EPCOR's collective agreements.

57. The Human Resources Information System ("HRIS") is an enterprise-wide system that is used to manage all employee data for the purpose of payroll, pension, compensation, benefits and organizational structure. The support for HRIS is included in the Total Rewards area. This involves managing the development, ongoing enhancements and maintenance of the Oracle-based HRIS application. HRIS & Analytics activities include employee data management and analysis, troubleshooting, and managing system enhancements. HR Analytics is also included under Total Rewards. This includes collecting, reporting and analyzing human capital metrics for EPCOR enterprise-wide.

1.3.6.2 Human Resources Consulting

58. Human Resources Consulting ("HR Consulting") provides services such as recruitment and selection, job and organizational design, coaching and conflict resolution, succession and workforce planning, performance management, diversity and inclusion, and engagement action planning.

59. The services provided by HR Consulting are required to ensure that each Corporate Services department/EPCOR business unit is staffed appropriately to provide the services it delivers. HR Consulting provides recruitment services, conducts succession planning, and provides advice and support to managers regarding EPCOR's corporate policies and legislative and regulatory requirements for employee performance management. HR Consulting provides support to managers to develop and implement action plans to improve employee engagement based on employee responses to EPCOR's engagement survey. HR Consulting provides support and advice to managers to implement changes that will achieve key company goals related to building a diverse and inclusive workplace. HR Consulting also ensures that the recruiting process enables EPCOR to attract qualified candidates, while adhering to corporate standards and policies and the requirements of collective agreements in place for unionized employees. These services are necessary for the recruitment, training and retention of high quality staff with technical and operational knowledge and experience for EWS and other EUI subsidiaries.

60. The payroll processing function performs the following activities in connection with paying employees' wages:

- Maintains the employee master files, which form the foundation for all human resources and payroll functions including new-hire, life event changes, transfers, promotions, termination, and wage rate changes.
- Performs pension administration.

- Performs full payroll services, including bi-weekly payroll processing.
- Preparation of all statutory filings and source deduction and other remittances including workers compensation remittances.
- Develops and maintains appropriate payroll policies, procedures and controls for all EPCOR subsidiaries and assists in developing employee benefit policies.

61. The services provided by Total Rewards are required to enable EWS to provide utility service to customers. Total Rewards provides EWS and other EUI subsidiaries with labour relations support, compensation programs, benefit and retirement programs, maintains employee records and provides all payroll and pension administration services, including any payroll-related compliance requirements. Total Rewards performs a key strategic function in developing a compensation program that positions EWS and other EUI subsidiaries to successfully attract and retain employees and ensuring that employees are paid for the work performed.

1.3.6.3 Talent Development

62. The Talent Development team provides services, programs, and tools that support employee training, professional growth, career development, leadership assessment, leadership development, and succession planning. This ensures that members of the EPCOR group have the leadership and staff bench strength required to run their businesses and an increasingly skilled pipeline of future leaders and staff to support succession and company growth. The caliber of EPCOR's leadership team directly impacts the employee experience, and its brand in the employment marketplace. Having highly effective leaders supports the attraction, development, engagement, and retention of highly qualified employees. As such, services provided by Talent Development are required to enable EWS to effectively and efficiently provide utility service to customers.

63. The shared services approach to delivering Talent Development services permits EUI to develop, train, engage, retain and promote internal staff while fostering a shared culture across the organization. The Talent Development group develops training materials and delivers programs to a number of business units. This provides EWS with economies of scale that would not be possible if the services were provided within EWS and other EUI subsidiaries at the subsidiary-level, allowing EWS to access and leverage highly-effective programming developed for use across EPCOR on a cost-effective basis.

1.3.6.4 Learning and Development

64. The Learning and Development group provides the processes, programs, systems, and structures to ensure that each business unit is able to meet its legislated training requirements. The Corporate Services Learning and Development group is focused on the following activities:

- Developing core curriculum that can be augmented and delivered by embedded business unit teams.
- Delivering training programs that are generic across the company (e.g., First Aid, Cannabis in the Workplace, Ethics training, Mental Health training).
- Developing the learning systems and processes required to support records administration, course hosting, and tracking information related to competency-based assessments.
- Developing and maintaining processes, standards, tools and templates to enable the work of embedded business unit teams (e.g., competency framework, Emergency Operations Centre (EOC)).
- Developing, delivering and tracking legislatively mandated compliance training (e.g., Workplace Hazard Materials Information System (“WHMIS”), Transportation of Dangerous Goods (“TDG”), legislation awareness training about key sections of Alberta’s OH&S Act, Regulation and Code; Harassment and Bullying, or First Aid).
- Developing, delivering and tracking conformance training (i.e., Alcohol and Drug Standard training, Life Saving Rules, and driving training).

65. The services provided by Corporate Services Learning and Development are required to enable EWS to provide utility service to customers. Corporate Services Learning and Development provides EWS and other EUI subsidiaries with effective, consistent and efficient training services. The various activities carried out by the Corporate Services Learning and Development group outlined earlier in this section are all required to enable EWS to provide utility service.

1.3.7 Information Services

66. The IS department provides the following services to EWS and other EUI subsidiaries:

- Major Capital Projects;
- Application Services; and
- Infrastructure Operations.

1.3.7.1 Application Services

67. Application Services provides user support services related to shared business system applications such as the various Oracle modules (Financials, Human Resources Information System, Projects, Assets, Time and Labour) as well the various EWS specific business systems such as the GIS systems, AMI, internet and intranet user support and database administration support.

68. Application Services are required for EWS to provide utility services. EWS is heavily dependent on IS infrastructure in providing utility services. The activities as outlined above, performed by the Application Services function are required to support the corporate Enterprise Resource Planning ("ERP") application used by Corporate Services staff and staff within EWS. These systems provide the core finance and HR system functions to the organization. These systems must be maintained, and occasionally upgraded to meet vendor and other stakeholder requirements (e.g., regulatory change).

69. In addition to the important role this team plays in supporting and maintaining the critical Finance and HR applications used by EWS, the Application Services team provides both Database and Web design services. Both of these services increase the quality of the systems implemented at EUI and in the case of the Web designer team they also enhance the customer contact experience with EWS.

1.3.7.2 Infrastructure Operations

70. Infrastructure Operations provides the following services:

- Manages the operation and maintenance of the computer hardware platforms (i.e., servers, networks, etc.) and operating systems that shared applications (i.e., Oracle business system) and EWS and other EUI subsidiaries specific systems applications (i.e., CIS retail utility billing and information system).
- Supports telecommunications services and desktop applications (i.e., all Microsoft applications including electronic mail) for EWS and other EUI subsidiaries.
- Conducts cyber security threat and risk analysis and delivers IT security planning and services. The group ensures that data which is stored cannot be compromised and provides mitigation plans for threats or vulnerabilities that may jeopardize the systems.

- Provides governance services such as oversight, management compliance monitoring of EPCOR’s internal information services governance and control policies and procedures and oversight.
- Manages EPCOR’s internal system recovery for contingency planning testing such as disaster recovery and pandemic planning.

71. Infrastructure Operations services are required for EWS to provide utility service. EWS is heavily dependent on IS infrastructure in providing utility services. The Infrastructure Operations service is by nature a critical operational role, in that it provides oversight as well as strategic infrastructure and governance activities. This team provides governance and control services, including the development and maintenance of internal policies, procedures and controls for the outsourced services that provide the infrastructure backbone that EUI and its subsidiaries rely on. The infrastructure they support provides the base for the corporate and business specific applications and the communication network used by EWS and is sourced through this group to external service providers. As such, this group relies heavily on third party service providers. Infrastructure Operations’ use of third party service providers is appropriate and fiscally prudent.

1.3.7.3 Major Capital Projects

72. Major Capital Projects manages the implementation of major applications and the installation of major computer hardware devices. In addition, project management services may extend to managing major projects of a non-IT nature for EPCOR subsidiaries, such as constructing leasehold improvements in the EPCOR Tower. Major Capital Projects services include:

- Planning and architecture services, including the creation and continuing maintenance of EPCOR's information services strategic plan, 5-year tactical business system plans (including 5-year and annual capital planning), IT architectural design services, as well as the elicitation and completion of all business requirements related to information technology projects.
- Development of business cases to support utilities’ requirements and the regulatory process, as well as the post-implementation review process.
- Overall program and project execution management, including a governance and approval structure. Services include: management and oversight of all IT projects and project management services such as project integration, scope, time, cost, quality, human resource, communications, risk, and procurement management.

- Project planning and architecture services such as data analysis and database design to integrate data.
- Project Management Office services, including progress reporting, cost forecasting, training, scheduling and continuous improvement.

73. Major Capital Project services are required for EWS to provide utility service. EWS is heavily dependent on IS infrastructure in providing utility services. The activities outlined above performed by the Major Capital Projects team are generally required by most major corporations that have a significant IS capital project budget. It is a prudent practice for organizations to take a hands-on role in large Capital IT projects and to have in place capital project processes and governance to manage both the delivery of and capital expenditures for each project.

1.3.8 Supply Chain Management

74. The services in Supply Chain Management are:

- Contract Management (formerly Corporate Procurement);
- Facility Operations (formerly Real Estate)
- Mailroom;
- SCM Corporate Services; and
- Disaster Recovery Planning Facilities.

1.3.8.1 Contract Management (formerly Corporate Procurement)

75. The Contract Management (renamed from Corporate Procurement) group includes a centralized procurement and warehousing function to support EWS and other EUI subsidiaries. This group improves the efficiency and effectiveness of the EPCOR group's procurement function and other related supply chain functions such as warehousing.

76. The primary functions within the Procurement group include:

- Reporting and Analytics
- Transactional Centre

77. The reporting and analytics group provides the following services:

- Maintain and monitor adherence to policy and procedures;
- Ensure compliance with legislation;

- Provide training and support of procurement processes;
- Conduct market analysis;
- Analyze spending trends by the EPCOR group;
- Develop procurement strategies;
- Manage the end-to-end procurement processes to ensure that the EPCOR group obtains the best pricing available for their required goods and services; and
- Implement process improvements by developing processes, procedures, and training content.

78. The centralized Transactional Centre provides the following services:

- Manage the acquisition of goods and services on behalf of Corporate Services Departments and the business units;
- Undertake vendor management, including management and development of vendor contract terms and conditions and contract negotiation, ensuring standardization and mitigation of contract risk exposures as required by EUI's Corporate Services departments.

79. The reporting and analytics function runs reports, creates dashboards and generates meaningful information required to efficiently and accurately review spend data, track efficiencies and look for opportunities to analyze common spend in order to prioritize strategic sourcing initiatives and further test the market. It also allows EPCOR to monitor adherence with the trade agreements EPCOR operates under.

80. The Transactional Centre primarily processes purchase requisitions within Corporate and the business units into purchase orders, which are binding agreements with suppliers. The Transactional Centre also supports and manages low risk procurements from across Corporate and the business units. The Transactional Centre provides benefits to the business units by ensuring requisitions are entered into the Oracle system in a consistent manner, requisitions with errors are rejected and, because the team members have been trained to process the requisitions in a standardized manner, requisitions are handled in a more efficient manner.

1.3.8.2 Facility Operations (formerly Real Estate)

81. The Facility Operations (renamed from Real Estate) maintains and operates EPCOR's corporate facilities including: budgeting and administration; planning, design, parking

administration, space and project management and move coordination; and tenant services. The services also include negotiating and managing facility leases, and paying the rent and operating costs associated with premises leased by members of the EPCOR group.

82. The Facility Operations is required to ensure that the staff and contractors operating within EWS and other EUI subsidiaries have a safe and clean environment to work in and that facilities are leased or purchased at a reasonable price.

1.3.8.3 Mailroom

83. Mailroom services are provided to EPCOR locations and include processing incoming and outgoing internal mail between all EPCOR locations as well as external mail through outsourced couriers and Canada Post.

1.3.8.4 SCM Corporate Services

84. SCM Corporate Services is comprised of space rent associated with EPCOR's Corporate Services departments and business units that are located in EPCOR Tower. Space rent costs are directly assigned to specific business units that have employees that work in EPCOR Tower. These costs are identified as business unit recoveries and are directly assigned to the business units. EPCOR also charges space rent costs to Capital Power Corporation ("CPC") for their employees that work out of EPCOR Tower. These costs are identified as cost recoveries and are directly charged to CPC.

1.3.8.5 Disaster Recovery Planning Facilities

85. Disaster Recovery Planning Facilities provides services for maintaining continuity of the critical information systems of EUI, EWS, EDTI, EEA, and other members of the EPCOR group in the event of a disaster, including the operation and maintenance of an off-site data centre for IT infrastructure.

86. Disaster Recovery Planning Facilities services are required to enable EWS to provide utility service to customers. It is prudent for the company to take reasonable steps to maintain its business operations, and thus its ability to maintain service, in the event of a disaster.

1.3.9 Legal and External Relations

87. Legal and External Relations provides the following services to EWS and other EUI subsidiaries:

- Communications and Public Engagement;
- Legal Services;
- Health, Safety, Security and Environmental Services; and
- Security.

1.3.9.1 Communications and Public Engagement

88. Communications and Public Engagement provides the following services to EWS and other EUI subsidiaries:

- Corporate Communications;
- Government Relations; and
- Community Relations.

1.3.9.1.1 Corporate Communications

89. Corporate Communications provides strategic advice and support in responding to customer, stakeholder and community-based issues that may arise in relation to the EPCOR group's business activities, or broader industry developments. Corporate Communications provides services for external and internal employee communications, which include media relations; reporting of quarterly and annual financial results; annual sustainability targets and progress reporting; major employee learning events and corporate announcements; customer, stakeholder and public safety communications online and through social media; communications support to Corporate Services departments; company-wide employee health and safety promotions and events; and communications for learning and development.

90. Corporate Communications services are required for EWS and other EUI subsidiaries to provide utility services to customers through facilitating timely and relevant communications and providing access to information.

1.3.9.1.2 Government Relations

91. Government Relations provides liaison services and briefing support in relation to all three levels of government (federal, provincial, and municipal), as well as government agencies and staff, with respect to existing or proposed policies and legislation. Indigenous Relations is also part of Government Relations. Government Relations also provides analysis and advice to EPCOR businesses respecting the impact of current or contemplated government policy and

legislation. Government Relations is responsible for developing and managing the corporation's Political Involvement Policy.

92. Government Relations services are required to enable EWS to provide utility services to customers by ensuring that government at all three levels are aware of issues that could impact EWS and its customers. Government Relations staff work directly with elected officials and their key staff on behalf of EWS on a regular basis to influence policy development and regulation change to minimize any potential negative impact on EWS's customers.

1.3.9.1.3 Community Relations

93. Community Relations services utilizes community engagement tools, processes and investment strategies to support EPCOR's reputation and relationship objectives. This includes establishing the brand design and creative guidelines for all EPCOR communications productions, developing and delivering education programs such as public safety awareness and school electrical safety awareness and developing on-line educational materials about electricity, water and energy conservation. The Community Relations group is also responsible for advancing the achievement of EPCOR's long-term plans by implementing strategies that enhance the profile, reputation, and image of EPCOR with key audiences and providing strategic advice on the most effective means to interface with customers to ensure consistent, clear and proper messaging.

94. Services are also provided by this group to EPCOR Human Resources in support of employee recruiting, retention and engagement. This includes planning and delivering recruiting materials and planning and executing employee events.

95. Services provided by Community Relations are required to enable EWS and other EUI subsidiaries to provide utility services to customers. Community Relations is EPCOR's face in the community and ensures customers are aware as to who is providing utility services. Community Relations also makes items such as conservation, customer service and safety matters accessible and understandable to the general public.

1.3.9.2 Legal Services

96. Legal Services is responsible for providing legal, governance and compliance related activities to EWS and other EUI business units and subsidiaries.

97. Legal Services include:

- Managing all claims and litigation affecting EUI and its business units and subsidiaries.

- Negotiating, drafting and monitoring material contracts and contractual matters with employees, vendors and other parties.
- Creating and updating EUI and its business units and subsidiaries' standard form contracts and other precedent documents to reflect changes in law or business context.
- Providing advice with respect to contracts entered into by EUI and its business units and subsidiaries with its suppliers and customers.
- Providing legal research, advice, drafting of various documents and agreements and services on capital projects, mergers and acquisitions and other transactions undertaken by EUI and its business units and subsidiaries.
- Analyzing legal risks and providing advice to project teams regarding all legal issues which may affect the viability of a business initiative and/or project.
- Providing legal research, advice and services on numerous other corporate/commercial, financing and securities matters.
- Providing advice, research and assistance on regulatory law matters, including regulatory applications.

98. Governance oversight services include:

- Reporting all material claims and litigation affecting EUI and its business units and subsidiaries.
- Providing oversight, advice and reports on transactions undertaken by EUI and its business units and subsidiaries.
- Providing advice regarding corporate governance matters, including information on company structure, ownership and directors' and officers' information.
- Providing input into annual reports and filings as well as numerous corporate policies.
- Maintaining corporate records including registrations and preparation of supporting documentation of applications as it relates to changes to directors, officers and/or shareholders to comply with legislation.
- Preparing corporate documentation including supporting annual resolutions for all subsidiary corporations in order to comply with legislation. For example, appointing or dispensing with an auditor is requirement of business corporation legislation.

99. Compliance services include administration and oversight in the areas of ethics, privacy, the Code of Conduct Regulation, the EPCOR Inter-Affiliate Code of Conduct, and records management for EUI and its Canadian business units and subsidiaries' activities. These responsibilities include developing and implementing policies and procedures, educating and training employees, monitoring compliance, coordinating documentation, internal and external reporting, investigating and resolving complaints and violations, and interfacing with auditors and regulators. Records management services include developing, implementing and overseeing hardcopy and electronic document retention schedules.

100. All of these services are required by EWS. Legal Services provides these services using the shared service model to achieve economies of scale benefits and cost efficiencies for EWS and other EUI Canadian subsidiaries. Legal Services provides the majority of Canadian legal services using internal legal, paralegal and administration staff. Performing oversight, governance and corporate secretarial services internally ensures that there is an appropriate level of control in EUI and its subsidiaries and is consistent with best industry practices.

1.3.9.3 Health, Safety, Security and Environment

101. The Health, Safety, Security and Environment ("HSSE") group provides the following services to EWS and other EUI subsidiaries:

- Health, Safety and Environment; and
- Security.

102. In April 2022, the Security group was transferred to HSSE from Supply Chain Management.

1.3.9.3.1 Health, Safety and Environment

103. The Health, Safety and Environment ("HSE") department functions include:

- Governance, maintenance, and ongoing implementation of the Integrated Health, Safety and Environment Management System, which conforms to ISO 14001 (Environment) and OHSAS 18001 (Health and Safety) requirements, and is implemented across all business units within EPCOR. In March 2021, OHSAS 18001 was replaced by ISO 45001 (published on March 12, 2018).
- Trend analysis, evaluation, and reporting for the EPCOR group to assist business units in ensuring that regulatory monitoring and reporting requirements are met.

- Creation and management of a detailed HSE strategic plan and updating corporate HSE policies, standards, procedures and related documentation for all EPCOR business units to ensure consistent and efficient delivery of HSE programs.
- Governance and oversight of fundamental HSE processes such as hazard identification and operational controls, employee competency and training, HSSE role expectations, incident management, worksite inspections, performance measurement, communication, safety culture assessment for consistency and improved overall safety.
- Management and Administration of the Event Reporting System (ERS), Alcohol and Drug Program, Contractor Management, Occupational Health and Hygiene programs, Vision Care Program, and other related HSE Corporate Programs and Standards within EPCOR's HSE Management System to ensure consistent and efficient delivery of HSE programs and information systems across EPCOR.
- Ensuring a comprehensive HSE performance assessment process is in place, including leading and lagging metric indicators along with an operational and management review process to improve health and safety performance through early identification of trends and safety issues.
- Facilitation and administration for various HSE Committees and oversight and approval of content of the Corporate HSE Website, improving safety-related communications and safety performance across EPCOR's business units through information sharing.
- Providing subject matter expertise for corporate groups and business units as required – Legal Requirements, Audits, Human Resources, Security, Emergency Management, Training, Communications and Public Engagement and Business Resilience.

104. EWS has an obligation to ensure that its employees can perform their duties in a safe environment. Corporate HSE reduces potential costs associated with operational and litigation risk by creating corporate policies that minimize workplace and environmental incidents. These services are necessary to enable EWS to provide utility service to its customers, and the costs of providing these services are reasonable.

1.3.9.3.2 Security

105. Security provides continuous threat and risk analysis of all physical security respecting EPCOR's businesses and facilities, including those arising from criminals, terrorists and employees. Other services provided by this function include conducting training exercises, awareness sessions, and providing guidance to prepare EWS and other EUI subsidiaries to prevent and minimize losses during an emergency or disaster. Security guard protection services are entirely outsourced across EPCOR.

106. Security services are required to enable EWS and other EUI subsidiaries to provide utility services to customers. The services are required to ensure staff and contractors operating within EWS and other EUI subsidiaries have a safe and secure environment to work in. Security services are also essential to ensure that the workforce, both contractors and employees, is properly background screened. Security services are also required to ensure that facilities are protected from break-ins, damage, theft, and terrorism threats.

1.3.10 Incentive Compensation

107. Corporate incentive compensation is paid to Corporate Services employees based on individual performance ratings and EUI's overall annual corporate targets. The EPCOR groups' structure for compensating its non-union employees has four components: base compensation (annual salary), employer paid benefits, Short Term Incentive ("STI"), and Mid Term Incentive ("MTI") for participating Directors, VPs and Executives. EPCOR's structure for compensating unionized employees has three components: base compensation (hourly wages / annual salaries), employer paid benefits and STI. The compensation was designed to bring employee total compensation to a level which is at par with comparable positions in the market from which EPCOR must draw employees (i.e., to market value).

1.3.11 Asset Usage Fees

108. EUI charges fees relating to general plant assets owned by EUI that are used in providing Corporate Services to EPCOR business units. These fees are referred to as Corporate Asset Usage Fees. The categories of assets for which Corporate Asset Usage Fees are charged include the following:

- Leasehold Assets;
- Human Resources Information System ("HRIS");
- Information System ("IS") Infrastructure;

- Financial System;
- Furniture and Fixtures;
- Vehicles; and
- Customer Information System ("CIS").

109. The forecast Asset Usage Fee for each category of corporate assets comprises both a "return of" capital (or depreciation expense) and a "return on" capital. The return on capital component is calculated using EWS's weighted average cost of capital.

1.3.11.1 Leasehold Assets

110. Leasehold Assets include:

- Disaster Recovery Leasehold; and
- EPCOR Tower (Station Lands) Leasehold Improvements.

1.3.11.2 Human Resources Information System

111. The HRIS is a software application that is used by EUI's HR department to manage the employees of the EPCOR group, including such things as recruiting, hiring, managing and paying employees (including the calculation of pensions, CPP, UIC, income tax and other payroll deductions).

1.3.11.3 Information Systems Infrastructure

112. The Information System's assets include servers, electronic storage devices, information system networks, desktops and Information System Applications used by Corporate Services departments to provide services to EWS and other EUI subsidiaries.

1.3.11.4 Financial System

113. The Financial System costs represent the current financial application that is used to pay invoices, record and report financial information, prepare financial statements, calculate depreciation, purchase goods and services and manage project costs. The software application, Oracle Financials, uses modules that include Accounts Payable, Accounts Receivable, General Ledger, Purchasing, Projects and Fixed Assets.

1.3.11.5 Furniture and Fixtures

114. These asset costs represent furniture such as offices, workstations, chairs, tables, file cabinets and shelves used by employees in Corporate Services departments.

1.3.11.6 Vehicles

115. Vehicle assets are used for security and for employees at EPCOR Tower to travel to meetings at EUI sties.

1.3.11.7 Customer Information System ("CIS")

116. The Customer Information System ("CIS") is a single, integrated system that ensures that EPCOR continues to be able to respond to customer account inquiries, set up or remove services, maintain customer accounts and transaction history, calculate and generate bills, and receive payments.

Appendix J

EPCOR WATER SERVICES

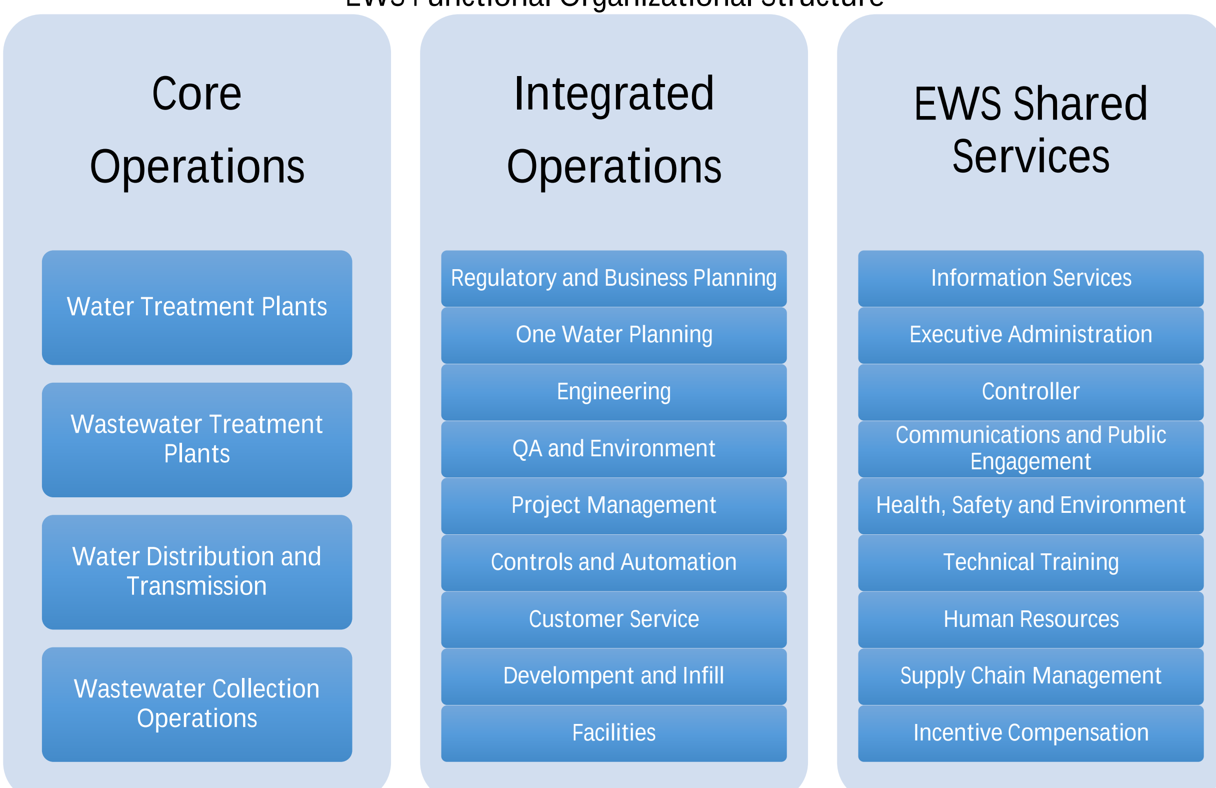
Integrated Operations and Shared Services Allocation Methodology

May 31, 2024

1.0 OVERVIEW

1. In 2023, EPCOR completed a comprehensive restructuring of its organizational framework, merging and integrating the two distinct businesses of Water and Drainage into a unified business unit. The primary goal of this integration is to streamline operations across the entire water cycle by adopting a “One Water” approach, while enhancing customer experiences and optimizing resource utilization across the entire water cycle. The unified strategy involves transitioning from the previous asset-based resource management structure to a more integrated cross-functional structure. To enable this transition, numerous decentralized and embedded functions within the Water and Drainage operations were centralized to establish the new integrated business unit. Figure 1.0-1 shows the restructured organizational structure of EWS.

Figure 1.0-1
EWS Functional Organizational Structure



2. The integration of Water and Drainage operations resulted in the creation of the following centralized functional areas to facilitate enhanced decision making, service delivery and resource management across the entire water cycle: Regulatory and Business Planning, One Water Planning, Engineering, Quality Assurance and Environment, Project Management, Controls and Automation, Customer Service, Development and Infill and Facilities, collectively referred to as "Integrated Operations".

3. The water treatment plants, water distribution and transmission system, Gold Bar wastewater treatment plant, and sanitary and stormwater collection functions are collectively referred to as "Core Operations". The integrated functions support the core functions to optimally manage the water and wastewater operations and infrastructure by applying a "One Water" approach, from planning to implementation.

4. The core and integrated functions receive support services from shared functional areas such as EWS Executive, Finance, Health, Safety and Environment, Human Resources, Information Services, etc. These shared functional areas are referred to as "EWS Shared Services". EWS Shared Services comprise allocated charges and direct charges for specific services provided to Water, Wastewater Treatment and Wastewater Collection operations.

5. EWS also obtains certain corporate services from its parent corporation, EPCOR Utilities Inc. ("EUI" or "EPCOR"), which are primarily comprised of activities that are centrally managed within the EPCOR group due to their nature and/or for the purpose of realizing economies of scale. Appendix I describes the corporate services provided by EUI to EWS.

6. A brief description of the specific integrated and shared services provided by EWS, including the methodologies employed to determine the service charges for Water, Wastewater Treatment and Wastewater Collection operations, is presented in the following sections.

2.0 INTEGRATED OPERATIONS

2.1 Integrated Operations Provided by EWS

7. A brief description of the integrated services provided by the centralized functions within EWS is as follows:

2.1.1 Regulatory and Business Planning

8. Regulatory and Business Planning is responsible for regulatory research and strategy, PBR application development, annual performance reporting, and management of relationships with several stakeholders including the City of Edmonton and the Regional Water Customer Group (RWCG). In addition, this group facilitates and manages continuous improvement initiatives for EWS to achieve operational efficiencies and strategic objectives; regulatory financial planning; tracking and reporting of key performance indicators and enterprise risk management for EWS; and manages billing exceptions and customer inquiries for the stormwater services.

2.1.2 One Water Planning

9. One Water Planning leads the strategic planning for the entire water cycle, ensuring sustainable water management through holistic and integrated approaches. This includes developing integrated resource plans for the water, sanitary and storm systems to define capital and operational strategies that ensure the growth and resilience of the one water system. Four key groups comprise One Water Planning:

- Integrated Resource Planning;
- Pipe Strategies;
- Plant Strategies; and
- Land Strategies.

10. The Integrated Resource Planning team ensures that the various Integrated Resource Plans (WatIRP, SIRP, WWIRP) are aligned and optimized. This involves initiating and advancing projects with multi-system one water co-benefits such as LID, inflow and infiltration reduction and resource recovery, in addition to capital investments based on asset life cycle replacement. Working closely with the Pipe, Plant, and Land Strategies groups along with EWS Core Operations, the team develops a balanced capital portfolio based on consistent asset risk frameworks and aligns with City Plan strategic objectives, all while ensuring affordable utility services.

11. The Pipe Strategies team develops the IRP components for linear assets. This includes planning the water and wastewater pipes for growth and resiliency, working closely with the City of Edmonton on concept development for major infrastructure relocations due to transportation initiatives, and coordinating with the development community in the early stages of land development to optimize servicing through the development and utilization of pipe modelling

tools. This includes prioritizing system investment (monitoring, inflow and infiltration reduction techniques, bypass strategies, enhancements, etc.) by geographic area.

12. The Plant Strategies team focuses on long-term planning activities and initiatives for the water and wastewater treatment plants, reservoirs and lift stations. This includes the development of IRPs for the water and wastewater treatments plants, resource recovery, pump stations and storage to ensure the continued growth and resiliency of the system. Regional coordination is prioritized to optimize water and wastewater service delivery to a growing capital region.

13. The Land Strategies team focuses on stormwater and watershed management (through the Integrated Watershed Management Strategy), climate adaptation, and integrated resource planning. This includes the development and optimization of SIRP to improve flood resiliency and planning widespread LID to slow the flow of stormwater to the system and reduce loading to protect the North Saskatchewan River.

2.1.3 Engineering

14. The Engineering group provides design engineering and technical support for all EWS asset areas. This also includes process safety services, asset management and planning, drafting and hydraulic modelling support.

2.1.4 Quality Assurance and Environment

15. The Quality Assurance and Environment group is responsible for:

- Monitoring and testing water quality to ensure that quality standards are maintained;
- Monitoring and testing treated wastewater to ensure that effluent standards are maintained;
- Quality assurance and auditing of operational water and wastewater quality data;
- Environmental services that include monitoring, tracking and reporting of environmental and public health incidents within Water and Wastewater and providing support to operation for incident management,
- Supporting EWS's Environmental Management Systems;
- Management of EWS' watershed programs;
- Management of EWSI's Cross Connection Control program;

- Monitoring of and tracking developing regulations and industry concerns to determine impact on EWS strategies and plans;
- Maintaining a water and wastewater treatment process optimization program;
- Working with environmental regulators and ensuring EWS reporting requirements are met;
- Managing process optimization activities within the Centre of Excellence's pilot laboratory and pilot plant as well as providing technical support to Operations and Engineering teams; and
- Providing foresight on emerging trends and wastewater research activities as well as supporting a networking function that links pilot and operational-scale issues to outside subject matter experts such as consultants, academics and government agencies/departments.

2.1.5 Project Management

16. The Project Management group is accountable for delivering projects effectively and efficiently. Project managers lead project teams to plan and execute the design, construction and commissioning of infrastructure improvements. They ensure that the projects meet quality requirements, are cost effective, completed in a timely manner and encourage collaboration.

17. The Inspection Services Group is responsible for making sure that EWS capital construction projects are constructed as per design and construction standards by conducting all necessary site inspections during the construction phase. The construction-related activities include quality assurance, safety and environmental inspections, tracking construction milestones, and completing the documentation review to process construction completion and Final Acceptance Certificates. The inspection group supports project managers by providing regular updates on projects progress, providing change order opinion or recommendations and conducting joint measurements to verify invoice quantities.

18. The Project Management Office ("PMO") is responsible for developing, documenting and delivering the annual and long-term capital plans. Developing project and portfolio related processes, procedures, tools and templates in order to bring consistency to the project management function. Providing training and support to the project and program managers and providing annual capital program oversight are also key components of the PMO's deliverables.

2.1.6 Controls and Automation

19. Controls and Automation is a specialized engineering group responsible for the design, operation and asset management of the instrumentation, process control communication networks, cybersecurity and the control systems required for the reporting, monitoring and automation of water treatment, wastewater treatment, and wastewater collection operations, including supervisory control and data acquisition (SCADA) systems. As well, this group establishes and maintains design practices and standards while providing support to operational and capital projects as required. This group also includes a Situational Awareness team that is accountable for providing internal users better access to data and tools to visualize data. This team develops the plan for new technology and data to support EWS' business plans, defines and implements the data architecture needs that support improved access to data.

2.1.7 Customer Service

20. The Customer service group includes customer agents who assist with scheduling appointments for water meter installations and provide technical support to assist customers in understanding their consumption patterns. This team also supports customers to identify leaks that could be contributing to higher water bills.

2.1.8 Development and Infill

21. Development and Infill is responsible for ensuring that expansion of the water system proceeds in accordance with planning documents approved by the City of Edmonton, and in conformance with EPCOR Design and Construction standards. Development and Infill is also responsible for reviewing and approving new water and sewer servicing at the subdivision, lot level and providing technical and administrative support to EWS construction crews to install the new water and sewer services. The Land Administration function works with private developers, the City of Edmonton and other entities to put utility easements, restrictive covenants, crossing agreements, and facility proximity agreements into place to protect EWS infrastructure.

2.1.9 Facilities

22. Facility Operations is responsible for all building related costs such as operations, maintenance, utilities, and lease costs.

2.2 Integrated Operations Forecast

23. EWS' Integrated Operations forecast by function for 2024-2027 are summarized in Table 2.2-1. The 2024 approved amounts with EWS' latest forecast for 2024 are provided for comparison.

Table 2.2-1
2024-2027 Integrated Operations Forecast
($ millions)

	Function	A 2024D	B 2024F	C 2025F	D 2026F	E 2027F
1	Regulatory and Business Planning	2.9	2.9	2.9	2.9	3.0
2	One Water Planning	6.9	6.6	6.9	6.6	6.7
3	Engineering	7.0	10.1	7.0	10.1	10.2
4	Quality Assurance and Environment	11.5	11.4	11.5	11.4	11.6
5	Project Management	7.0	3.8	7.0	3.8	3.9
6	Controls and Automation	3.3	5.1	3.3	5.1	5.2
7	Customer Service	1.6	2.8	1.6	2.8	2.8
8	Development and Infill	1.8	2.3	1.8	2.3	2.4
9	Facilities	3.6	3.6	3.6	3.6	3.7
10	Total	45.6	48.6	45.6	48.6	49.5

2024 Decision to 2024 Forecast

24. The 2024 forecast Integrated Operations cost reflects an overall increase of $3.0 million compared to the approved amounts. This overall increase is primarily driven by the reallocation of resources and the transfer of associated expenses from the previous asset-based organizational structure to the centralized and integrated organizational structure implemented in 2023. The functions with significant variances are as follows:

- Engineering and Project Management: A $3.1 million increase in the Engineering function, accompanied by a corresponding decrease in the Project Management function, due to the transfer of staff and related costs previously part of the Project Management function under the former organizational structure and the 2024 approved amounts;
- Controls and Automation: A $1.8 million increase in the Controls and Automation function primarily due to the transfer of staff and related costs of $1.3 million from Wastewater Collection Core Operations operating and maintenance, and an additional $0.5 million for establishing the Situational Awareness function; and

- Customer Service: A $1.2 million increase in Customer Service function due to the transfer of staff and related costs previously embedded and included within Wastewater Collection operations in the 2024 approved amounts.

2025 Forecast to 2027 Forecast

25. The year-over-year increase in Integrated Operations costs for the 2025-2027 forecast period is due to inflation.

2.3 Integrated Operations Cost Allocation Methodology

26. The centralization of the various integrated functions within EWS necessitates the implementation of a cost allocation process to ensure that the expenses associated with the services and benefits provided by these integrated functions are accurately reflected in the operational costs of the Water, Wastewater Treatment, and Wastewater Collection operations. To address this, EWS developed a cost allocation methodology for the Integrated Operations costs with the primary aim of ensuring that the allocated costs are fair and reasonable, cost-effective, predictable and reflective of the benefits provided by these functions (i.e., cost causation).

27. Table 2.3-1 outlines the cost allocators used to allocate Integrated Operations costs to the regulated Water, Wastewater Treatment and Wastewater Collection operations. A functional cost causation allocator has been used for costs that can be logically allocated using an identified cost causation driver, such as headcount. For costs that cannot be allocated using a specific functional cost causation allocator, a composite cost causation allocator has been utilized.

Table 2.3-1
EWS Integrated Operations Cost Allocators

	Function	A EWS Allocator
1	Regulatory and Business Planning	Composite – Revenue, Assets, Headcount
2	One Water Planning	Composite - Revenue, Assets, Headcount
3	Engineering	Functional Cost Causation – Capitalized Staff Costs
4	Quality Assurance and Environment	Staff Time
5	Project Management	Functional Cost Causation – Capitalized Staff Costs
6	Controls and Automation	Allocated Equally
7	Customer Service	Composite - Revenue, Assets, Headcount
8	Development and Infill	Composite - Revenue, Assets, Headcount
9	Facilities	Functional Cost Causation – Headcount

28. Table 2.3-2 provides a comparison between the approved amounts for 2024 and EWS' most recent forecast, including a comparative overview of the cost allocation percentages and allocated costs to regulated Water, Wastewater Treatment and Wastewater Collection operations.

Table 2.3-2
Allocation of Integrated Operations
2024 Decision vs. 2024 Forecast
($ millions)

	Regulated Operations	A 2024D %	B 2024F %	C 2024D $	D 2024F $
1	Water	42%	43%	19.0	20.7
2	Wastewater Treatment	22%	24%	10.1	11.6
3	Wastewater Collection	36%	33%	16.5	16.3
4	Total	100%	100%	45.6	48.6

3.0 EWS SHARED SERVICES

3.1 Shared Services Provided by EWS

29. A brief description of the shared services provided by EWS to the regulated Water, Wastewater Treatment and Wastewater Collections operations is provided in section 3.1.1 to 3.1.9.

3.1.1 Information Services

30. Information Services includes charges related to EWS' unique applications and costs associated with desktops, printers and network support.

3.1.2 Executive Administration

31. Executive Administration includes the costs of providing senior management oversight and administrative support to the regulated Water, Wastewater Treatment and Wastewater Collection operations of EWS. This includes staff cost for EWS Senior Vice President, Directors, Administrative Assistants and associated ancillary costs.

3.1.3 Controller

32. Controller includes staff costs and associated ancillary costs for EWS' Controller function required to provide financial oversight and accounting services. Controller includes the following functions:

- Financial oversight;
- Preparation of financial reports and analysis;
- Administration of the financial reporting services;
- Asset accounting administration;
- Budget administration;
- Development and maintenance of accounting policies and procedures;
- Financial support for regulatory applications; and
- Costs associated with maintaining office space in EPCOR tower.

3.1.4 Communications and Public Engagement

33. Communications and Public Engagement includes staff costs and associated ancillary costs of EWS' communications and public engagement function required to provide stakeholder and public consultation requirements. Specific functions include:

- Stakeholder relations and public consultation services;
- Internal communications related to business unit matters; and

- External communications such as the coordination of public notices, performance reports, public addresses and presentations, print collateral, and operational communications.

3.1.5 Health, Safety & Environment

34. Health, Safety & Environment includes staff costs and associated ancillary costs related to the EWS Health, Safety & Environment function required to maintain appropriate health and safety practices that are in compliance with legislation. Specific functions include:

- Ensuring that existing health and safety practices and procedures are well designed and in compliance with legislation and compatible with service provider safety management policies;
- Business services including internal loss management, safety and training and related support staff;
- Health, safety & environment audit and inspections;
- Environmental issues management; and
- Health, safety & environment training, legal compliance and reporting.

3.1.6 Technical Training

35. Technical Training includes staff costs and associated ancillary costs of EWS Technical Training function required to design, develop and deliver technical training to operations staff and monitor staff compliance with regulatory requirements to maintain continuous and current health, safety and technical training.

3.1.7 Human Resources

36. Human Resources includes staff costs and associated ancillary costs of EWS' embedded Human Resources function, which includes human resources management; human resources consulting, talent management, facilitating the management of return-to-work scenarios for short-term disability, long-term disability as well as Workers' Compensation Board and non--supported claims management.

3.1.8 Supply Chain Management

37. Supply Chain Management includes staff costs and associated ancillary costs of EWS' embedded Supply Chain Management function required to provide services for warehousing,

inventory, reverse logistics, purchasing and strategic sourcing including management of the end-to-end procurement process for the goods required by the regulated Water, Wastewater Treatment, and Wastewater Collections operations. Specific functions include:

- Administration of procurement services, including but not limited to competitive bidding, PO creation resulting from the competitive bidding process, issuing requests for quotations and requests for proposals, contract negotiation and execution, contract administration and supplier relationship management;
- Administration of the warehousing and materials management services; and
- Administration of facility services for building related activities such as administration of the operations and maintenance of buildings and surrounding land, and lease agreement management.

3.1.9 Incentive Compensation

38. Incentive compensation is paid to EWS employees based on individual performance ratings and overall annual corporate targets. EPCOR's structure for compensating its non-union employees has four components: base compensation (annual salary), employer paid benefits, Short Term Incentive (STI), and Mid-Term Incentive (MTI) for participating Directors and Executives. EPCOR's structure for compensating unionized employees has three components: base compensation (hourly wages / annual salaries), employer paid benefits and STI. The compensation was designed to bring employee total compensation to a level which is at par with comparable positions in the market from which EPCOR must draw employees (i.e., to market value).

3.2 EWS Shared Services Forecast

39. EWS' Shared Services forecast by function for 2024-2027 are summarized in Table 3.2-1. The 2024 approved amounts with EWS' latest forecast for 2024 are provided for comparison.

Table 3.2-1
2024-2027 EWS Shared Services Forecast
($ millions)

		A	B	C	D	E
	Function	2024D	2024F	2025F	2026F	2027F
1	Information Services	7.9	9.2	9.4	9.6	9.8
2	Executive Administration	7.7	8.4	8.6	8.7	8.9
3	Controller	5.4	6.1	6.2	6.3	6.4
4	Communications and Public Engagement	4.0	3.7	3.7	3.8	3.8

	Function	A	B	C	D	E
		2024D	2024F	2025F	2026F	2027F
5	Health, Safety and Environment	4.2	4.3	4.4	4.5	4.5
6	Technical Training	3.1	2.9	3.0	3.0	3.1
7	Human Resources	1.2	1.2	1.2	1.3	1.3
8	Supply Chain Management	4.7	5.8	5.9	6.0	6.2
9	Incentive Compensation	8.5	9.0	9.2	9.4	9.6
10	Total	46.7	50.6	51.6	52.6	53.6

40. The 2024 forecast Shared Services cost reflects an overall increase of $3.9 million compared to the approved amounts. This overall increase is primarily driven by higher information services and supply chain management costs. The functions with significant variances are as follows:

- A $1.3 million increase in Information Services operating costs due to higher Corporate Application and Infrastructure costs;
- A $0.7 million increase in Executive Administration operating costs is primarily due to higher insurance costs;
- A $0.7 million increase in Controller operating costs primarily due to higher rent and staff costs, partially offset by lower contractor costs; and
- A $1.1 million increase in Supply Chain Management operating costs primarily due to higher staff costs of $0.5 million and higher materials costs of $0.6 million.

41. The year-over-year increase in EWS' Shared Services costs for the 2025-2027 forecast period is due to inflation.

3.3 Shared Services Allocation

42. Table 3.3-1 outlines the cost allocators used to allocate Shared Service costs to the regulated Water, Wastewater Treatment and Wastewater Collection operations, along with a comparison of the cost allocators used previously. Cost allocators for some of the functions were updated with the primary aim of ensuring that the allocated costs are fair and reasonable, cost-effective, predictable and reflective of the benefits provided by these functions (i.e., cost causation).

Table 3.3-1
EWS Shared Services Cost Allocators

	Shared Services Function	A 2024D	B 2024F-2027F
1	Information Services	Functional Cost Causation – EWSI Total Assets	Functional Cost Causation – EWS Headcount
2	Executive Administration	Composite - EWSI Revenue, Assets, Headcount	Composite - EWS Revenue, Assets, Headcount
3	Controller	Composite - EWSI Revenue, Assets, Headcount	Composite - EWS Revenue, Assets, Headcount
4	Communications and Public Engagement	Composite - EWSI Revenue, Assets, Headcount	Composite - EWS Revenue, Assets, Headcount
5	Health, Safety and Environment	Functional Cost Causation – EWSI Total Assets	Functional Cost Causation – EWS Headcount
6	Technical Training	Functional Cost Causation – EWSI Headcount	Functional Cost Causation – EWS Headcount
7	Human Resources	Functional Cost Causation – EWSI Headcount	Functional Cost Causation – EWS Headcount
9	Supply Chain Management	Composite - EWSI Revenue, Assets, Headcount	Functional Cost Causation – Purchase Orders and non-salary operating expenditures
10	Incentive Compensation	Average based on allocated costs above	Average based on allocated costs above

43. Table 3.3-2 provides a comparison between the approved amounts for 2024 and EWS' most recent forecast, including a comparative overview of the cost allocation percentages and allocated costs to regulated Water, Wastewater Treatment and Wastewater Collection operations.

Table 3.3-2
Allocation of EWS Shared Services
2024 Decision vs. 2024 Forecast
($ millions)

	Regulated Operations	A 2024D %	B 2024F %	C 2024D $	D 2024F $
1	Water	39%	38%	18.1	19.2
2	Wastewater Treatment	11%	18%	5.3	9.2
3	Wastewater Collection	50%	44%	23.3	22.2
4	Total	100%	100%	46.7	50.6

Appendix K-1

EPCOR WATER SERVICES

HDR Cost of Service Studies

May 31, 2024

Final Report

2023 Sanitary and Stormwater Drainage Cost of Service Study

April 2024

April 29, 2024

Mr. Santosh Appukuttan
EPCOR Water Services, Inc.
9496 Rossdale Road NW
Edmonton, Alberta T5K 0A5

Subject: Sanitary and Stormwater Drainage Cost of Service Study Final Report

Dear Mr. Appukuttan:

HDR Engineering, Inc. (HDR) was retained by EPCOR Water Services, Inc. (EPCOR) to provide technical assistance in the update of EPCOR's sanitary and stormwater drainage cost of service analyses (Study) to support EPCOR's development of cost-based drainage rates for its customers. The Study was completed in conjunction with HDR's wastewater treatment cost of service analysis which is found in a separate report. EPCOR's drainage utility provides two key services: wastewater collection and stormwater management.

For the sanitary and stormwater drainage study, EPCOR was responsible for the development of the revenue requirement analysis and HDR was responsible for the development of the cost of service analysis. The objective of the cost of service analysis is to proportionally distribute EPCOR's sanitary and stormwater drainage costs to the customer classes of service. This is accomplished by using industry accepted cost of service principles and methodologies and tailoring them to the specific and unique characteristics and operations of EPCOR's drainage system.

In developing these analyses, HDR has relied on EPCOR's accounting, operating and management records. From our analyses, HDR has provided our findings, conclusions, and recommendations. This report details our approach and methodology for the sanitary and stormwater drainage utilities. The model and technical analyses are intended to provide cost-based, defensible, and proportional sanitary and stormwater drainage rates.

We appreciate the opportunity to provide technical assistance to EPCOR. We also appreciate the assistance provided by EPCOR management and staff in the development of the Study.

Sincerely yours,
HDR Engineering, Inc.

Shawn Koorn
Associate Vice President

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Stormwater Drainage Technical Appendix B 1

1 Introduction and Overview

EPCOR Water Services, Inc. (EPCOR) provides drainage utility services related to the collection of wastewater (sanitary drainage) and the management of stormwater runoff (stormwater drainage). These services are provided under a combined drainage utility. While they appear to be two separate and distinct utility services, which they are, they do share certain facilities and resources. Given that, the Study will examine each service, sanitary drainage, and stormwater drainage, on a separate stand-alone basis.

HDR Engineering, Inc. (HDR) was retained by EPCOR to provide technical assistance in the development of a sanitary and stormwater drainage cost of service analysis to support EPCOR's historical practice of establishing cost-based drainage rates. This report outlines the approach, methodology, findings, and conclusions of the sanitary and stormwater cost of service analyses.

This report was developed utilizing EPCOR's accounting, operating and management records. HDR has relied on this information to develop our analyses, from which we draw our findings, conclusions, and recommendations. The sanitary and stormwater cost of service analyses were developed utilizing generally accepted utility rate setting and cost of service principles and methodologies. This report provides EPCOR with the basis for developing and implementing sanitary and stormwater drainage rates which are cost-based and defensible to its customers.

1.1 Study Goals and Objectives

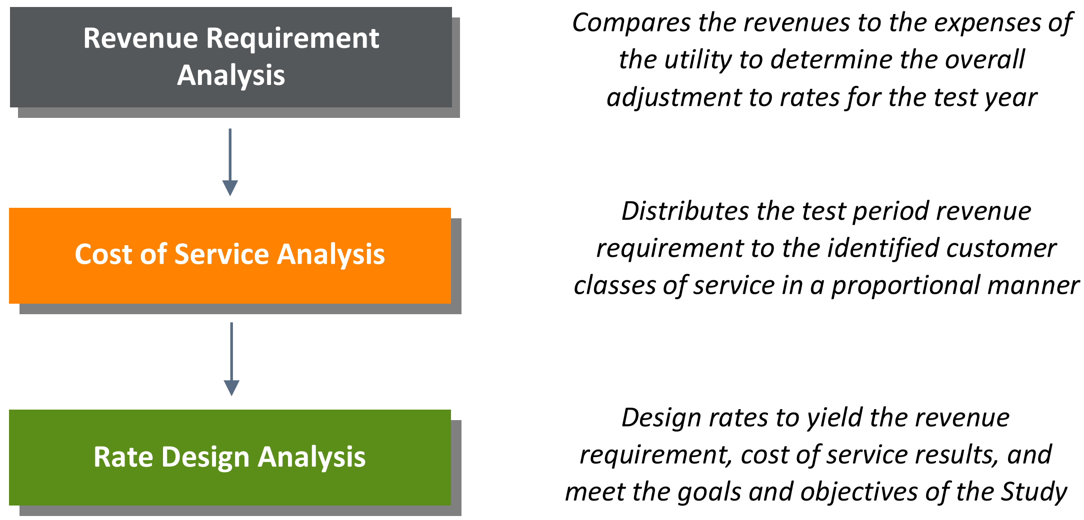
The development of the Study was based on several key rate study goals and objectives. In general, these were as follows:

- Develop a sanitary drainage (wastewater collection) cost of service analysis that is consistent with the principles and methodologies established by the Water Environment Federation Manual of Practice No. 27, Financing and Charges for Wastewater Systems
- Develop a stormwater drainage cost of service analysis that is consistent with industry best-practices and cost of service principles and methodologies for stormwater utilities
- Develop sanitary and stormwater cost of service methodologies to proportionally distribute the cost of providing these services to the customer classes served
- Review the current sanitary and stormwater drainage rate structures
- Provide EPCOR with a sanitary and stormwater cost of service model to use and evaluate the distribution of future sanitary and stormwater drainage costs and rate impacts

1.2 Overview of the Comprehensive Rate Study Process

Provided in Figure 1 – 1 is an overview of the steps required to conduct a comprehensive rate study.

Figure 1 – 1
Overview of the Comprehensive Rate Study Process



These generally accepted methodologies are based on rate-setting principles and practices described in the Water Environment Federation Manual of Practice #27 (WEF MOP). The framework or methodology shown in Figure 1 – 1 provides an overview of the typical components of a comprehensive rate study, regardless of the utility being analyzed. An important aspect of the Study is incorporating and "tailoring" those analytical elements to reflect the specific circumstances of EPCOR's sanitary and stormwater drainage system.

1.3 Report Organization

This report is designed to discuss and document the technical analyses undertaken within this study. To that end, this report is organized as follows:

- Section 2 provides an overview, discussion, and summary of the sanitary and stormwater drainage revenue requirement analyses, which was developed by EPCOR
- Section 3 reviews the development of the sanitary drainage cost of service analysis
- Section 4 reviews and discusses the development of the stormwater cost of service analysis
- Section 5 provides a discussion of the current sanitary and stormwater drainage rates
- Technical Appendix A is the sanitary drainage detailed technical exhibits
- Technical Appendix B is the stormwater drainage detailed technical exhibits

1.4 Summary

This report provides a summary of the technical analyses undertaken to develop the sanitary and stormwater drainage cost of service analysis based on generally accepted methodologies which will provide EPCOR with the information necessary to continue to develop cost-based and proportional rates applicable to its sanitary and stormwater utility. The approach used to split the combined assets between sanitary and stormwater drainage appears reasonable and HDR did not encounter any evidence that would suggest a different approach should be used.

2 Drainage Utility Revenue Requirement

This section of the report discusses the development of the revenue requirement for EPCOR's sanitary and stormwater drainage utility. A revenue requirement analysis provides a technical framework around which to evaluate the overall adequacy of EPCOR's current drainage rates, both sanitary and stormwater.

It is important to note that EPCOR's drainage utility is operated and accounted for on a combined utility basis. For purposes of the comprehensive rate study - and the cost of service analyses in particular - the revenue requirement will be segregated between sanitary drainage and stormwater drainage. EPCOR management and staff developed the revenues and expenses (i.e., costs) included in the drainage revenue requirement analyses and provided them to HDR. In addition, EPCOR was responsible for the final segregation of drainage costs between the sanitary and stormwater utility functions/services.

Provided below is a detailed discussion of the drainage utility revenue requirement analysis. The segregated revenue requirement analyses for the sanitary and stormwater drainage ultimately becomes the initial input into the sanitary and stormwater drainage cost of service analyses developed for EPCOR by HDR.

2.1 Revenue Requirement Framework

By virtue of the differences between a public utility and a private utility, the revenue requirement is often based upon different elements or methodologies. Most private or regulated utilities utilize what is known as a "utility or accrual" basis of determining revenue requirement for setting rate levels. This convention calculates a utility's annual revenue requirement by aggregating a test period's operation and maintenance (O&M) expenses, taxes, annual depreciation expense and a return on investment.

In contrast to the utility or accrual method of developing the revenue requirement for privately-owned public utilities, a different method of determining the revenue requirement is often used for governmentally-owned public utilities. The convention used by most governmental or public utilities is called the "cash basis" methodology of setting revenue requirement. As the name implies, a public utility aggregates its cash expenditures to determine its total revenue requirement for a specified period of time.

Table 2 - 1 summarizes and compares the cash and utility/accrual basis methodologies.

Table 2 – 1 Cash versus Utility Basis Comparison			
	Cash Basis		**Utility Basis (Accrual)**
+	O&M Expenses	+	O&M Expenses
+	Taxes/Transfer Payments	+	Taxes/Transfer Payments
+	Capital Improv. Funded From Rates (≥ Depreciation Expense)	+	Depreciation Expense
+	Debt Service (Principal + Interest)	+	Return on Investment
=	**Total Revenue Requirement**	=	**Total Revenue Requirement**

For this particular study, given that EPCOR is a regulated utility, the utility/accrual basis approach was utilized. This methodology is consistent with EPCOR's past rate setting methodologies and practices.

2.2 Development of the Drainage Revenue Requirement

The first step of the comprehensive rate study process is the development of the revenue requirement analysis. The drainage utility revenue requirement used for this study was developed by EPCOR management and staff. This section of the report will discuss and summarize EPCOR's drainage utility revenue requirement analysis.

The initial step in calculating the drainage utility revenue requirement was to establish a test period or time frame around which the revenue requirement would be reviewed. For this particular analysis, the drainage utility revenue requirement analysis has been developed based on EPCOR's revenue requirement for 2024 though 2027 and then projected from 2028 through 2033.

2.3 Summary of the Drainage Revenue Requirement

Summarized below in Table 2 - 2 is a summary of the sanitary drainage revenue requirement for years 2023 – 2033. Table 2 - 3 on the following page is the stormwater drainage revenue requirement.

Table 2 – 2
Summary of the Sanitary Drainage Revenue Requirement ($000)

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
Rate Revenues	$171,409	$184,562	$198,221	$212,749	$216,153	$219,612	$223,125	$226,695	$230,322	$234,008
Other Revenues	3,589	3,658	3,722	3,782	3,842	3,904	3,966	4,030	4,094	4,160
Total Revenues	**$174,998**	**$188,221**	**$201,944**	**$216,531**	**$219,996**	**$223,515**	**$227,092**	**$230,725**	**$234,417**	**$238,167**
Expenses										
O&M Expenses	$69,213	$70,011	$71,586	$73,118	$74,654	$76,221	$77,822	$79,456	$81,125	$82,828
Property Tax	469	480	494	503	429	437	446	454	463	471
Depreciation	20,725	26,210	28,166	29,972	31,874	33,886	36,011	38,258	40,632	43,140
Return on Rate Base - Debt	23,325	25,828	28,713	31,576	34,733	38,207	42,027	46,230	50,853	55,938
Return on Rate Base - Equity	33,740	40,529	47,624	50,551	53,634	56,906	60,377	64,060	67,968	72,114
Total Expenses	**$147,473**	**$163,058**	**$176,583**	**$185,719**	**$195,325**	**$205,657**	**$216,684**	**$228,459**	**$241,040**	**$254,492**
Bal. / (Def.) of Funds	$27,525	$25,162	$25,360	$30,812	$24,671	$17,859	$10,408	$2,267	($6,623)	($16,325)

Table 2 – 3
Summary of the Stormwater Drainage Revenue Requirement ($000)

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
Rate Revenues	$120,545	$130,959	$143,287	$155,241	$157,880	$160,564	$163,294	$166,070	$168,893	$171,764
Other Revenues	658	662	674	685	697	709	721	733	745	758
Total Revenues	**$121,203**	**$131,622**	**$143,960**	**$155,926**	**$158,577**	**$161,273**	**$164,015**	**$166,803**	**$169,638**	**$172,522**
Expenses										
O&M Expenses	$55,183	$53,116	$54,229	$55,289	$56,450	$57,635	$58,846	$60,081	$61,343	$62,631
Property Tax	751	760	768	779	791	803	815	827	840	852
Depreciation	26,486	26,425	28,627	30,974	33,418	36,022	38,796	41,751	44,897	48,245
Return on Rate Base - Debt	24,593	27,191	29,667	32,734	35,844	39,249	42,978	47,061	51,532	56,427
Return on Rate Base - Equity	35,357	42,668	49,206	52,406	55,812	59,440	63,303	67,418	71,800	76,467
Total Expenses	**$142,370**	**$150,161**	**$162,498**	**$172,182**	**$182,315**	**$193,149**	**$204,738**	**$217,138**	**$230,411**	**$244,623**
Bal. / (Def.) of Funds	($21,167)	($18,539)	($18,537)	($16,256)	($23,738)	($31,877)	($40,724)	($50,336)	($60,773)	($72,101)

As noted previously, both the sanitary and stormwater drainage revenue requirement analyses summarized above were developed by EPCOR and provided to HDR. This revenue and cost information provides the basis for the cost of service analysis for each utility.

2.4 Summary

This section of the report has provided a summary of the sanitary and stormwater drainage revenue requirement as developed by EPCOR. The revenue requirement results for test year 2024 were used by HDR as the starting point for the sanitary and stormwater drainage cost of service analyses. The next section of the report will discuss the development of the sanitary drainage cost of service analysis.

3 Sanitary Drainage Cost of Service Analysis

This section of the report details the development of the sanitary drainage cost of service analysis. Sanitary drainage is related to the collection of wastewater for treatment at EPCOR's wastewater treatment facilities. The sanitary drainage cost of service analysis proportionally distributes the sanitary drainage revenue requirement previously summarized in Table 2 - 2. Provided below is a more detailed discussion of the key technical steps of the sanitary drainage cost of service analysis conducted by HDR, along with our findings, conclusions, and recommendations.

3.1 Overview and Purpose of the Cost of Service Analysis

The objective of a cost of service analysis is to proportionally distribute the utility's revenue requirement to the various customer classes of service. Following generally accepted cost of service guidelines, principles and methodologies will inherently lead to sanitary drainage rates which are cost-based and proportional.

There are two primary objectives in conducting a cost of service analysis:

1. Proportionally distribute the revenue requirement among the customer classes of service
2. Derive average unit costs for subsequent reference/use in designing final rates

The objectives of a cost of service analysis are different than determining a revenue requirement. As noted in the previous section, a revenue requirement analysis determines the utility's overall financial needs, while the cost of service analysis provides a methodology to determine the proportional manner in which to apportion or collect the revenue requirement across the various customer classes of service (e.g., residential, commercial).

The second rationale for conducting a cost of service analysis is to design a rate such that it properly reflects the costs incurred by the utility. For example, a sanitary drainage (or collection) system primarily incurs costs related to the total flow of wastewater. Given that, those customers impacting the system and total flows should be assigned a proportional share of the costs based upon their contribution to total wastewater flow. Wastewater flow is one type of cost incurred on a wastewater system. Each type of cost may be collected in a slightly different manner as to allow for the development of rates that collect costs in roughly the same manner as they are incurred.

3.2 Establishing Sanitary Drainage Customer Classes of Service

The first step in a cost of service study is to determine the customer classes of service which costs will be proportionally distributed to. To establish the classes of service, the utility must segregate individual customers into groups of customers (i.e., classes of service) that have similar usage patterns and facility requirements. For EPCOR's sanitary drainage cost of service analysis, the following customer classes of service were utilized.

- Residential
- Multi-Residential
- Commercial
- University of Alberta (U of A)

During the development of the sanitary drainage cost of service, a review of the classes of service for this analysis was conducted. After discussions with EPCOR staff, it was concluded that the current sanitary drainage customer classes of service appear to be reasonable and follow industry practices. The establishment of customer classes of service allows for the development of cost-based rates and the ability to establish sanitary drainage rate structures, by customer class of service, reflective of their cost of service.

3.3 Sanitary Drainage Key Cost of Service Assumptions

A number of key assumptions were used within the EPCOR sanitary drainage cost of service study. Listed below is a brief summary of the key assumptions used.

- The test year used for the sanitary drainage cost of service analyses was the 2024 forecasted revenue requirement.
- The revenue and expense data utilized by HDR within this study was provided by EPCOR
- A "utility basis" approach was utilized for the revenue requirement and cost of service analysis. This is a generally accepted cost of service methodology.
- The allocation and distribution of plant in service and the revenue requirement was based on EPCOR specific data and information. Where key assumptions or estimates were required, HDR relied on EPCOR's staff understanding of the system and customers and HDR's direct industry experience in similar cost of service studies.
- The distribution factors developed as a part of the sanitary drainage cost of service analysis used EPCOR specific customer data. In particular, the data and information used to develop the volume distribution factor was provided by EPCOR.

3.4 General Cost of Service Procedures

A cost of service analysis utilizes a three-step approach to review costs and these analytical steps take the form of ***functionalization***, ***allocation***, and ***distribution***. Provided below is a more detailed discussion of the sanitary drainage cost of service analysis, and the specific steps taken within the analysis.

3.4.1 Functionalization of Sanitary Drainage Costs

The first analytical step of the sanitary drainage cost of service analysis is called ***functionalization***. Functionalization is the arrangement of asset (plant/infrastructure) data and expenses (costs) by major operating functions within the utility (e.g., collection, pumping). Within this study, the functionalization of the sanitary drainage cost data was accomplished through EPCOR's sanitary drainage system of accounts. EPCOR's plant accounts are segregated between the major categories of sanitary, stormwater, and common. The sanitary plant assets were included within the sanitary cost of service analysis. The common (shared) plant assets were proportionally assigned between the sanitary and stormwater drainage utilities based upon the relative plant assets of each utility.

3.4.2 Allocation of Sanitary Drainage Costs

The second analytical task performed in the sanitary drainage cost of service analysis is the ***allocation*** of the costs. The allocation of sanitary drainage costs is a process which reviews each cost and determines why the expense was incurred or what type of need (e.g., volume/flow-, customer-related) is being met. The sanitary drainage utility's plant accounts and revenue requirement were reviewed and allocated using generally accepted cost of service principles and methodologies. Provided below is an overview of the various types of allocated costs used in the sanitary drainage cost of service analysis.

- **Volume-Related Costs:** Volume-related costs are those costs which tend to vary with the total quantity of wastewater collected and conveyed.
- **Capacity/Demand-Related Costs:** Capacity/demand costs are costs which are related to the capacity requirements of the system. This allocation method is used to reflect that the sanitary collection system is a function of both the number of customers on the system (i.e., a network of pipes and pumps), and a function of the maximum flows that customers place on the system.
- **Customer-Related Costs:** Customer-related costs are those costs which vary with the addition or deletion of a customer or a cost which is a function of the number of customers served. Customer-related costs typically include the costs of accounting, billing, and collecting, and accounting. Customer costs can also be segregated between *actual* and *weighted*. An actual customer cost does not vary on a per customer basis, regardless of the size or usage of the customer (e.g., postage on a bill). In contrast, certain customer-related costs may vary by customer, on a per customer cost basis. For example, the cost of metering can vary given a customer with a larger sized meter.
- **Revenue-Related Costs:** Revenue-related costs are those costs which vary with the amount of revenue received by the utility. An example of a revenue-related cost would be a utility tax which is based (i.e., assessed) on gross utility revenue.

The basis, or methodology, for the allocation of EPCOR's sanitary drainage plant assets and costs is based on generally accepted wastewater cost of service principles and methodologies. These wastewater cost of service principles and methodologies are discussed and outlined in the Water Environment Federation, Manual of Practice #27, Financing and Charges for Wastewater Systems. The principles and methodologies discussed and outlined in this wastewater rate setting manual were adapted and tailored to be reflective of EPCOR's specific and unique facilities, customers, costs, and operations.

3.4.3 Development of the Sanitary Drainage Distribution Factors

Once the allocation of sanitary drainage assets and costs is complete - and the customer groups defined - the third analytical task is the proportional ***distribution*** of allocated costs to each customer class of service using distribution factors. EPCOR's sanitary drainage allocated assets and costs were distributed to the various customer classes of service using the following sanitary drainage distribution factors.

- **Volume Distribution Factor:** Volume-related costs are generally distributed on the basis of estimated contributions to wastewater flows. Wastewater flows are not typically metered and must be estimated using a reasonable surrogate for a customer class's contribution. In wastewater cost of service analyses, metered water consumption, adjusted for outdoor irrigation usage, is often used as a reasonable surrogate for wastewater volume contributions. As part of the data and information provided by EPCOR to HDR, estimates of volume contributions of each class of service was provided. These volumetric estimates by sanitary drainage customer class of service were used as the basis for the volume distribution factor. The development and calculation of the volume distribution factor is shown in Exhibit 3 of the Sanitary Drainage Technical Appendix.
- **Capacity/Demand Distribution Factor:** Capacity/demand-related costs, and the distribution factor developed for them, considers both the number of customers served by the system, but also the capacity use or maximum volumes a customer can place upon the system. This distribution factor is based on an equivalent meter analysis which takes into consideration the number of meters by customer class of service (i.e., number of customers), but also the size of each individual meter and the capacity flow from that meter. This capacity/demand concept was used to allocate and proportionally distribute a portion of the sanitary drainage systems collection lines. The development and calculation of the capacity/demand distribution factor is shown in Exhibit 4 of the Sanitary Drainage Technical Appendix.
- **Customer Distribution Factors:** Customer costs within the sanitary drainage cost of service analysis are distributed to the various customer classes of service based upon their respective number of customer accounts. For EPCOR's sanitary drainage cost of service analysis, two basic types of customer distribution factors were developed – actual and weighted. The actual customer distribution factor reflects that there is no disproportionate cost associated with serving a customer and distributes costs on the basis of the number of customers/accounts. In contrast, a weighted customer distribution factor typically assumes that there is some disproportionality associated with serving different types of customers and attempts to estimate the level of difference in serving the customers. For EPCOR's weighted distribution factor for customer service and accounting, it was based on the number of equivalent meters for each customer class of service. Exhibit 5 of the Sanitary Drainage Technical Appendix provides the development and calculation of the actual and weighted customer distribution factors.
- **Revenue Related Distribution Factor:** The revenue related allocation factor was developed from the projected rate revenues for 2024 for each customer class of service, as developed in EPCOR's revenue requirement analysis. A summary of the revenue distribution factor is provided in Exhibit 6 of the Sanitary Drainage Technical Appendix.

The development of the distribution factors is based on generally accepted principles and methodologies. Given the development of the distribution factors, the final step in the cost of service analysis is to distribute the allocated costs to the customer classes of service and summarize the results.

3.5 Functionalization and Allocation of Net Plant in Service

A necessary step of the cost of service is the functionalization and allocation of the sanitary drainage net plant in service. Net plant in service is defined as the original cost (OC) of plant in service, less the accumulated depreciation. The net plant in service balances were provided by EPCOR and were reflective as of December 31, 2022.

In performing the functionalization of net plant in service, HDR utilized EPCOR's historical plant records. The drainage utility's total assets were then split into three categories: sanitary, stormwater, and common. The shared or common plant assets are related to sections of EPCOR's system where there are legacy "combined" sanitary and stormwater drainage system components. For the shared or common assets, a determination was made on how to proportionally divide or split the costs. In general, the costs of common plant assets were split based on the percentage of the sanitary and stormwater drainage assets as a percent of the total assets less the common assets. HDR reviewed with EPCOR staff the assignment of the common plant assets to confirm the appropriateness of their assignment between sanitary and stormwater drainage net plant assets.

Provided below in Table 3 – 1 is a summary of the allocation of the common net plant in service to the sanitary and stormwater drainage plant in service.

Table 3 – 1
Summary of the Assignment of Net Plant in Service [1]
Between Sanitary and Stormwater Drainage ($000)

Plant Components	Total	Sanitary	Stormwater
Common Plant			
Collection	$209,141	$95,557	$113,584
General Plant	80,974	30,698	50,275
Pumping	2,532	2,257	275
Storage	1,918	175	1,743
Total Common Plant	**$294,565**	**$128,688**	**$165,877**
Sanitary Plant	$1,894,260	$1,894,260	$0
Stormwater Plant	2,695,256	0	2,695,256
Total Net Plant in Service	**$4,884,081**	**$2,022,948**	**$2,861,133**

[1] – Net plant as of December 31, 2022

Given the assignment of the common plant in service and the functionalization of net plant in service, HDR then allocated each plant asset category (i.e., collection, pumping, and storage) to the appropriate cost allocation components previously described.

The allocation process included reviewing each plant line item and determining which cost components the assets were related to. The proposed allocations are based on HDR's understanding of EPCOR's current sanitary drainage facilities, their current operations, and generally accepted allocation methodologies for sanitary/wastewater utilities. HDR's proposed allocations of net plant in service to the various cost components were reviewed with EPCOR's staff to confirm that the allocated plant components reasonably reflect the facilities and operations of EPCOR's sanitary drainage plant. Table 3 - 2 provides a summary of the allocated net plant in service for the sanitary drainage utility.

Table 3 – 2
Summary of the Allocation of Sanitary Drainage Plant in Service ($000)

	Total Net Plant	Volume	Capacity Demand
Collection	$1,743,515	$1,394,812	$348,703
Collection - Common	95,557	76,446	19,111
Pumping Stations	88,092	88,092	0
Pumping - Common	2,257	2,257	0
Storage	61,253	49,002	12,251
Storage - Common	175	140	35
Biosolids	0	0	0
Total before General	**$1,990,850**	**$1,610,750**	**$380,100**
General Plant	$1,400	$1,132	$267
General Plant - Common	30,698	24,837	5,861
Grand Total	**$2,022,948**	**$1,636,720**	**$386,228**

A detailed exhibit of the functionalization and allocation of plant investment can be found in the Sanitary Drainage Technical Appendix A, Exhibit 7.

3.6 Functionalization and Allocation of the Revenue Requirement

Operating expenses are generally functionalized and allocated in a manner similar to the corresponding plant account. This approach to allocation of operating expenses was used for this analysis. For the cost of service study, the 2024 revenue requirement for the sanitary drainage utility prepared by EPCOR was functionalized, allocated, and distributed. As noted previously, the revenue requirement was developed utilizing the utility/accrual basis methodology which was comprised of operation and maintenance expenses, depreciation, revenue tax, and a return on rate base. Provided in Table 3 – 3 is a summary of the allocated revenue requirement for EPCOR's sanitary drainage.

Table 3 – 3
Summary of the Allocation of the Sanitary Drainage
2024 Revenue Requirement ($000)

	Total	Volume	Actual Customer	Capacity Demand	Revenue Related
Total O&M	$69,213	$39,178	$7,291	$9,245	$13,500
Property Taxes	469	0	0	0	469
Depreciation	20,725	11,731	2,183	2,768	4,042
Return on Rate Base - Debt	23,325	13,203	2,457	3,116	4,550
Return on Rate Base - Equity	33,740	19,098	3,554	4,507	6,581
Total Rev. Require.	**$147,473**	**$83,211**	**$15,485**	**$19,636**	**$29,141**

Table 3 – 3 Summary of the Allocation of the Sanitary Drainage 2024 Revenue Requirement ($000)					
	Total	**Volume**	**Actual Customer**	**Capacity Demand**	**Revenue Related**
Less: Non-Op Rev.	($3,589)	($2,025)	($377)	($478)	($709)
Net Rev. Require.	**$143,884**	**$81,186**	**$15,108**	**$19,158**	**$28,432**

A more detailed exhibit of the functionalization and allocation of the sanitary drainage revenue requirements can be found on Exhibit 8 of the Sanitary Drainage Technical Appendix.

3.7 Summary of the Sanitary Drainage Cost of Service Analysis

In summary form, the sanitary drainage cost of service analysis began by functionalizing the sanitary drainage net plant asset records and revenue requirements. The functionalized net plant and expense accounts were then allocated into their various cost components. The individual allocation totals were then distributed to the various customer classes of service based upon the use of proportional and equitable distribution factors. The distributed revenue requirement (i.e., expenses) for each customer class of service were then aggregated to determine each customer group's overall revenue responsibility. A summary of the detailed cost responsibility developed for each sanitary drainage class of service for 2024 is shown below in Table 3 - 4.

Table 3 – 4 Summary of the Sanitary Drainage Cost of Service Analysis ($000)				
	Present Revenue	**Allocated Costs**	**$ Difference**	**% Difference**
Residential	$106,582	$91,149	$15,433	-14.5%
Multi-Residential	28,349	23,269	5,080	-17.9%
Commercial	34,899	28,161	6,738	-19.3%
University of Alberta [1]	1,579	1,305	274	-17.3%
Total	**$171,409**	**$143,884**	**$27,525**	**-16.1%**

[1] – Distributed cost for U of A include a collection system discount of 44% which U of A owns and operates

The distribution of costs reflects the facilities and costs proportionally distributed to each customer class based on their implied benefit. The cost of service results indicated that some cost differences exist between the customer classes of service, however, the differences are very minor. A cost of service analysis is a dynamic analysis, and the results can change from year to year as changes in costs and customer usage occurs. Given this variability, HDR typically reviews the summary of a cost of service analysis to determine whether a class of service is within a reasonable range of the cost to provide service. The metric that HDR utilizes is a class of service is assumed to be within a "reasonable range" if the class is within ± 5% of the overall required adjustment. In other words, given EPCOR's –16.1% overall adjustment in this analysis, a class of service would be considered within a reasonable range if they are within the range of -21.1% to –11.1%.

The results above indicate that the classes of service are within a reasonable range of covering their respective costs. It is important to note that the above results are based upon a specific time period (i.e., one year) and a specific time period's costs and usage characteristics. As a result, "cost of service" for a class of service is often best determined over an extended number of studies. It is recommended that EPCOR continues to review and update the sanitary drainage cost of service before making interclass adjustments. As can be seen in Table 3 - 4, the current sanitary drainage revenues exceed the current sanitary drainage expenses. However, overall the drainage revenues, combined sanitary and stormwater, approximately equal the drainage expenses. As EPCOR continues to evaluate costs associated with each service, the revenues and expenses should become closer with further analysis and assumptions of the split of costs between the services.

The detailed summary of the sanitary drainage cost of service analysis can be found in the Sanitary Drainage Technical Appendix A, Exhibits 9 through 11.

3.8 Sanitary Drainage Average Unit Costs

Average unit costs are essentially cost-based rates. In this case, the distributed sanitary drainage costs are converted from dollars to per unit costs. The per unit costs take the form of a fixed and variable (volumetric) average cost. Provided in Table 3 - 5 is a summary of the calculated average unit cost for the sanitary drainage utility.

Table 3 – 5
Summary of the Sanitary Drainage Average Unit Costs

	System Average	Residential	Multi-Residential	Commercial	Univ. of Alberta [1]
Variable Costs –					
Volume-Related $/m³	**$0.82**	**$0.83**	**$0.83**	**$0.83**	**$0.46**
Fixed Costs – $/Eq. Mtr./Mth					
Actual Customer	$3.76	$4.32	$0.85	$1.57	$0.02
Weighted Customer	0.00	0.00	0.00	0.00	0.00
Capacity/Demand	4.77	4.77	4.77	4.77	4.77
RR/Dir. Assign.	7.07	5.43	21.69	10.68	102.48
Total Fixed Costs	**$15.60**	**$14.52**	**$27.31**	**$17.02**	**$107.27**

[1] – Calculated average unit costs has included the discount for U of A

The calculated average unit costs for the sanitary drainage utility have placed the distributed "variable" costs in the context of $/m^3 and the "fixed" costs in a $/equivalent meter/month. It is important to understand that these average unit costs are the starting point for proposed sanitary drainage rate designs. Final rate designs, as discussed in Section 5 can consider other rate design attributes other than strictly cost of service. In addition, the average unit costs are also impacted by those costs which are considered "fixed" versus "variable." For example, in this calculation of the average unit costs, the capacity/demand-related costs have entirely been included in the fixed (meter charge) costs. There certainly could be a perspective that these specific costs could be semi-fixed/semi-variable which, in that case, would shift some costs to the variable average unit cost and increase that component, while decreasing the fixed average unit cost.

EPCOR uses a performance-based-ratemaking (PBR) in the development of their utility rates. In short, PBR attempts to link rate adjustments (price) to performance. In contrast, traditional ratemaking simply links price to cost. Regardless of the ratemaking method utilized, including PBR, the starting point for establishing the rates is the cost of service analysis. The following notes this cost of service perspective:

> *"The starting point for utility rates generally is a cost of service study. The subsequent years' rates are determined by applying the PBR formula to adjust the previous rates for the effects of inflation and for productivity improvements."* [1]

As noted above, the starting point for establishing the sanitary drainage rates is the cost of service analysis. In particular, the sanitary drainage cost of service analysis provides two important items of information which may be used to establish the sanitary drainage rates. These items are as follows:

- Target revenue levels by customer class of service
- Average Unit Costs

The target revenue levels or allocated costs from the cost of service analysis (Table 3 - 4) establish the level of revenue to be derived from each customer class of service. In comparison, the average unit costs (Table 3 - 5), as developed in the cost of service analysis, provide the cost basis for the fixed and variable charges associated with each customer class of service. The detailed exhibit of the development of the sanitary drainage average unit costs can be found in the sanitary drainage technical appendix A, Exhibit 12.

3.9 Summary

This section of the report has reviewed the sanitary drainage cost of service analysis. This analysis was developed using EPCOR specific asset and expense records and information. The overall cost of service methodology for the sanitary drainage utility was based upon generally accepted cost of service principles and methodologies, tailored to reflect EPCOR's specific and unique system.

[1] Performance-Based Ratemaking: Theory and Practice, Dr. Michael R. Schmidt, Public Utilities Reports, Inc., Vienna, Virginia, 2000, p. 2.

4 Stormwater Drainage Cost of Service Analysis

This section of the report details the development of the stormwater drainage cost of service analysis. Stormwater drainage is related to the management of stormwater runoff. The stormwater drainage cost of service analysis proportionally distributes the stormwater drainage revenue requirement summarized in Table 2 - 3. Provided below is a more detailed discussion of the key technical steps of the stormwater drainage cost of service analysis, conducted by HDR, along with our findings, conclusions, and recommendations.

4.1 Overview and Purpose of the Cost of Service Analysis

The objective of a cost of service analysis is to proportionally distribute a utility's revenue requirement to the various customer classes of service. Following generally accepted cost of service guidelines, principles and methodologies will inherently lead to stormwater drainage rates which are equitable, cost-based, and not viewed as arbitrary or capricious in nature.

There are two primary objectives in conducting a cost of service analysis:

1. Proportionally distribute the revenue requirement among the customer classes of service
2. Derive average unit costs for subsequent reference/use in designing final rates

The objectives of a cost of service analysis are different than determining a revenue requirement. As noted previously, a revenue requirement analysis determines the utility's overall financial needs, while the cost of service analysis provides a methodology to proportionally collect the revenue requirement from the various customer groups (e.g., residential, commercial).

The second rationale for conducting a cost of service analysis is so that the proposed stormwater drainage rate is designed such that it properly reflects the costs incurred by the utility. For example, stormwater runoff and costs are a function of a parcel's impervious area and intensity of development/runoff coefficient. Given that, those customers with larger areas and higher intensity development should have rates reflective of those parcel characteristics and relative stormwater runoff contributions.

4.2 Establishing Stormwater Drainage Customer Classes of Service

The first step in a cost of service study is to determine the customer classes of service which costs will be proportionally distributed to. To establish the classes of service, the utility must segregate customers into groups of customers (i.e., classes of service) that have similar stormwater characteristics, parcels and/or facility requirements. For EPCOR's stormwater drainage cost of service analysis, the following customer classes of service were utilized.

- Residential
- Multi-Residential
- Commercial

During the development of the stormwater drainage cost of service, a review of the classes of service for this analysis was conducted. After discussions with EPCOR staff, it was concluded that these stormwater drainage customer classes of service appear to be reasonable and are reflective of industry practices. The establishment of customer classes of service allows for the development of cost-based rates and, if desired, the ability to establish stormwater drainage rate structures, by customer class of service, reflective of their cost of service.

4.3 Stormwater Drainage Key Cost of Service Assumptions

A number of key assumptions were used within the EPCOR stormwater drainage cost of service analysis. Listed below is a brief summary of the key assumptions used.

- The test year used for the stormwater drainage cost of service analyses was the 2024 forecasted revenue requirement
- The revenue and expense data utilized by HDR within the Study was provided by EPCOR
- A "utility basis" approach was utilized for the revenue requirement and cost of service analysis. This is a generally accepted cost of service methodology
- The allocation and distribution of plant in service and the revenue requirement was based upon EPCOR specific data and information. Where key assumptions or estimates were required, HDR relied upon our direct industry experience in similar cost of service studies and EPCOR staff's understanding of the stormwater drainage system and facilities.
- The equivalent stormwater unit distribution factor developed as a part of the stormwater drainage cost of service analysis used EPCOR specific customer data and billing information. These ESUs by customer class of service were provided by EPCOR to HDR.

4.4 General Cost of Service Procedures

A cost of service analysis utilizes a three-step approach to review costs and these analytical steps take the form of ***functionalization***, ***allocation***, and ***distribution***. Provided below is a more detailed discussion of the stormwater drainage cost of service analysis, and the specific steps taken within the analysis.

4.4.1 Functionalization of Stormwater Drainage Costs

The first analytical step of the stormwater drainage cost of service analysis is called ***functionalization***. Functionalization is the arrangement of asset (plant) data and expenses (costs) by major operating functions within the utility (e.g., collection, pumping, storage). Within the Study, the functionalization of the stormwater cost data was accomplished through EPCOR's existing stormwater drainage system of accounts. EPCOR's plant accounts are segregated between the major categories of sanitary, stormwater and common. In this case, the stormwater plant assets were included within the stormwater cost of service analysis. The common (shared) plant assets were proportionally assigned between the sanitary and stormwater drainage utilities based upon the relative plant assets of each utility.

4.4.2 Allocation of Stormwater Drainage Costs

The second analytical task performed in the stormwater drainage cost of service analysis is the ***allocation*** of the costs. The allocation of stormwater drainage costs is a process which reviews each cost and determines why the expense was incurred or what type of need (e.g., volume/flow, customer-related) is being met. The stormwater drainage utility's plant accounts and revenue requirement were reviewed and allocated using generally accepted cost of service principles and methodologies. Provided below is an overview of the various types of allocated costs used in the stormwater drainage cost of service analysis.

- **Equivalent Stormwater Unit (ESU)-Related Costs:** An equivalent stormwater unit (ESU) is an equivalency measure of run-off contributions (i.e., volume) and typically this approach, or similar approaches, are used for billing stormwater customers. An ESU considers a parcel's area, development intensity, and runoff coefficient.
- **Customer-Related Costs:** Customer-related costs are those costs which vary with the addition or deletion of a customer or a cost which is a function of the number of customers served. Customer-related costs typically include the costs of accounting, billing, collection, and accounting. Similar to the sanitary drainage cost of service analysis, a weighted customer cost may reflect a disproportionate customer-related cost.
- **Revenue-Related Costs:** Revenue-related costs are those costs which vary with the amount of revenue received by the utility. An example of a revenue-related cost would be a utility tax which is based (i.e., assessed) on gross utility revenue.

The basis, or methodology for the allocation of EPCOR's stormwater drainage plant assets and costs is based upon generally accepted cost of service principles and methodologies. These generally accepted cost of service principles and methodologies were adapted and tailored to be reflective of EPCOR's specific and unique facilities, customers, costs, and operations.

4.4.3 Development of the Stormwater Drainage Distribution Factors

Once the allocation of stormwater drainage assets and costs is complete, and the customer groups have been defined, the allocated costs are proportionally distributed to each customer group using distribution factors. EPCOR's stormwater drainage allocated assets and costs were distributed to the customer classes of service using the following stormwater drainage distribution factor.

- **Equivalent Stormwater Unit (ESU) Distribution Factor:** Equivalent stormwater units are an equivalency measure for estimating surface water runoff from a parcel. EPCOR's existing stormwater rates develop billing units reflective of a parcel's area, stated in m^2, along with a development intensity factor and a runoff coefficient which is based upon the zoning of the premises. The intensity factor is assumed to be 1.0, except for properties where the parcel owners have demonstrated that they contribute less stormwater per m^2 (e.g., retention/detention) during rainfall than similarly zoned parcels. This distribution factor was based upon EPCOR's current billing units which take these factors into account and are reflective of the relative runoff contributions. Exhibit 3 of the stormwater drainage technical appendix provides the calculation of the ESU distribution factor.

The development of the distribution factor is based on generally accepted principles and methodologies. Given the development of the distribution factors, the final step in the cost of service analysis is to distribute the allocated costs to the various customer classes of service and summarize the results.

Given the general overview above of the procedures used in EPCOR's stormwater drainage cost of service analysis, the focus shifts to a more specific discussion of the key assumptions and details used in this analysis.

4.5 Functionalization and Allocation of Net Plant in Service

A necessary step of the cost of service is the functionalization and allocation of the stormwater drainage net plant in service. Net plant in service is defined as the original cost (OC) of plant in service, less the accumulated depreciation. The net plant in service balances were provided by EPCOR and were reflective of December 31, 2022.

Section 3.5 provided a detailed discussion of the process used to assign net plant in service for sanitary and stormwater drainage. Provided below in Table 4 – 1 is a summary of the allocation of the common net plant in service to the sanitary and stormwater drainage plant in service.

Table 4 – 1
Summary of the Assignment of Net Plant in Service Between Sanitary and Stormwater Drainage ($000)

Plant Components	Total	Sanitary	Stormwater
Common Plant			
Collection	$209,141	$95,557	$113,584
General Plant	80,974	30,698	50,275
Pumping Stations	2,532	2,257	275
Storage	1,918	175	1,743
Subtotal Common Plant	**$294,565**	**$128,688**	**$165,877**
Sanitary Plant	$1,894,260	$1,894,260	$0
Stormwater Plant	2,695,256	0	2,695,256
Total Net Plant in Service	**$4,884,081**	**$2,022,948**	**$2,861,133**

Given the assignment of the common plant in service and the functionalization of net plant in service, HDR then allocated each stormwater plant asset category (i.e., collection, pumping, and storage) to the various cost allocation components previously described.

The allocation process included reviewing each plant line item and determining which cost components the assets were related to. The proposed allocations are based on HDR's understanding of EPCOR's current stormwater drainage facilities, their current operations, and "generally accepted" allocation methodologies for stormwater utilities. HDR's proposed allocations of net plant in service to the various cost components were reviewed with EPCOR's staff to confirm that the allocated stormwater plant components reasonably reflect the facilities and operations of EPCOR's stormwater drainage plant. In this case, the allocation of the plant in service was entirely based on ESU's, which reflect the billing unit used by EPCOR for stormwater drainage rates. Table 4 - 2 provides a summary of the allocated net plant in service for the stormwater drainage utility.

Table 4 – 2 Summary of the Allocation of Stormwater Drainage Plant in Service ($000)		
	Total Net Plant	**Eqv. Storm Unit**
Collection	$2,072,424	$2,072,424
Collection - Common	113,584	113,584
Pumping Stations	10,741	10,741
Pumping - Common	275	275
Storage	609,799	609,799
Storage - Common	1,743	1,743
Total before General	**$2,808,566**	**$2,808,566**
General Plant	$2,292	$2,292
General Plant – Common	50,275	50,275
Grand Total	**$2,861,133**	**$2,861,133**

Tables 4 - 2 provides a summary of the basic functionalization and allocation of EPCOR's stormwater drainage net plant in service. A detailed exhibit of the functionalization and allocation of plant investment can be found in the Stormwater Drainage Technical Appendix, Exhibit 6.

4.6 Functionalization and Allocation of the Revenue Requirement

Operating expenses are generally functionalized and allocated in a manner similar to the corresponding plant account. This approach to allocation of operating expenses was used for this analysis. For the cost of service study, the 2024 revenue requirement for the stormwater drainage utility prepared by EPCOR was functionalized, allocated, and distributed. As noted previously, the revenue requirement was developed utilizing the utility/accrual basis methodology which was comprised of operation and maintenance expenses, depreciation, revenue tax, and a return on rate base. Shown below in Table 4 – 3 is a summary of the allocated revenue requirement for EPCOR's stormwater drainage utility.

Table 4 – 3 Summary of the Allocation of the Stormwater Drainage 2024 Revenue Requirement ($000)		
	Total Rev. Req.	**Eqv. Storm Unit**
Total O&M	$55,183	$55,183
Property Taxes	751	751
Depreciation	26,486	26,486
Return on Rate Base - Debt	24,593	24,593
Return on Rate Base - Equity	35,357	35,357
Total	**$142,370**	**$142,370**
Less: Non-Op Rev.	($658)	($658)
Net Total	**$141,712**	**$141,712**

Similar to the allocation of plant in service, the revenue requirement was allocated 100% on the basis of ESUs. This reflects the allocation and distribution of costs based on the definition of an equivalent unit, which is applied to all customers. A more detailed review of the allocation of EPCOR's stormwater drainage revenue requirement can be found in the Technical Appendix B in Exhibit 7.

4.7 Summary of the Stormwater Drainage Cost of Service Analysis

In summary form, the stormwater drainage cost of service analysis began by functionalizing the stormwater drainage net plant asset records and revenue requirements. The functionalized net plant and expense accounts were then allocated into their appropriate cost component. The individual allocation totals were then distributed to the customer classes of service based upon the use of proportional and equitable distribution factors. The distributed revenue requirement (i.e., expenses) for each customer class of service were then aggregated to determine each customer group's overall revenue responsibility. A summary of the detailed cost responsibility developed for each stormwater drainage class of service for 2024 is shown below in Table 4 - 4.

Table 4 – 4
Summary of the Stormwater Drainage Cost of Service Analysis ($000)

	Present Revenue	Allocated Costs	$ Difference	% Difference
Residential	$63,582	$74,694	($11,112)	17.5%
Multi-Residential	6,757	8,113	(1,355)	20.1%
Commercial	51,406	58,906	(7,499)	14.6%
Total	**$121,745**	**$141,712**	**($19,967)**	**16.4%**

The distribution of costs reflects the facilities and costs proportionally distributed to each customer class, reflective of their respective benefit. The cost of service results indicated no cost differences between the customer classes of service, primarily as a result of allocating and distributing costs based on an equivalent billing unit. A cost of service analysis is a dynamic analysis, and the results may change over time as costs and development impacts change. Given that dynamic, HDR typically reviews the summary of a cost of service analysis to determine whether a class of service is within a reasonable range of the cost to provide service. The metric that HDR utilizes is a class of service is assumed to be within a "reasonable range" if the class is within ± 5% of the overall required adjustment. In other words, given EPCOR's 16.4% overall adjustment in this analysis, a class of service would be considered within a reasonable range if they are within the range of 11.4% to 21.4%.

The results above indicate that all classes of service are within a reasonable range of covering their respective costs. As noted above, a cost of service analysis is a dynamic analysis and as such, the "cost of service" for a class of service is often best determined over an extended number of studies. It is recommended that EPCOR continue to review and update the stormwater drainage cost of service. This will provide a sound basis for any future interclass adjustments that may be proposed by EPCOR. Similar to the sanitary drainage analysis, as shown in Table 4 - 4, the current sanitary drainage revenues are less than the current sanitary drainage expenses. However, overall the drainage revenues, combined sanitary and stormwater, approximately equal the drainage expenses. As EPCOR continues to evaluate costs associated with each service, the revenues and expenses should become closer with further analysis and assumptions of the split of costs between the services.

The detailed summary of the stormwater drainage cost of service analysis can be found in the Wastewater Treatment Technical Appendix B, Exhibits 7 through 9.

4.8 Stormwater Drainage Average Unit Costs

Average unit costs are essentially cost-based rates. In this case, the distributed stormwater drainage costs are converted from dollars to per unit costs, stated as $/square metre ($m^2$). Provided below in Table 4 - 5 is a summary of the calculated average unit cost for the sanitary drainage utility.

Table 4 – 5
Summary of the Stormwater Drainage Average Unit Costs

	System Average	Residential	Multi-Residential	Commercial
Unit Costs – $/square metre				
Equiv. Storm Unit (ESU)	$0.0834	$0.0834	$0.0834	$0.0834
Total $/square metre ($m^2$)	**$0.0834**	**$0.0834**	**$0.0834**	**$0.0834**

The calculated average unit costs for the stormwater drainage utility are very straight-forward. The total stormwater drainage costs were allocated to the equivalent stormwater unit (ESU) cost component. Thus, all costs are placed in the context of a $ / ESU.

Similar to EPCOR's other utility rates, performance-based-ratemaking (PBR) is a component of the development of stormwater drainage utility rates. Like the sanitary drainage cost of service analysis, the stormwater drainage cost of service analysis provides two important items of information which may be used to establish the stormwater drainage rates. These items are as follows:

- Target revenue levels by customer class of service
- Average Unit Costs

The target revenue levels or allocated costs from the cost of service analysis (Table 4 - 4) establish the level of revenue to be derived from each customer class of service. In comparison, the average unit costs, as developed in the cost of service analysis, provide the cost basis for any fixed and variable charges associated with each customer class of service. At the present time, and as a point of reference, EPCOR does not have stormwater rates by class of service, and the utility assesses a flat rate per m^2. The average unit costs from the stormwater drainage cost of service analysis are shown in Exhibit 10 of the Stormwater Drainage Technical Appendix.

4.9 Summary

This section of the report has reviewed the stormwater drainage cost of service analysis. This analysis was developed using EPCOR specific asset and expense records and information. The overall cost of service methodology for the stormwater drainage utility was based upon generally accepted cost of service principles and methodologies, tailored to reflect EPCOR's specific and unique stormwater system.

5 Drainage Rate Design

The final step of a comprehensive sanitary and stormwater drainage rate study is the review of rates for both utilities which meet the overall rate design goals and objectives of EPCOR and collect the appropriate (i.e., cost-based) levels of revenue, based on the results of the revenue requirement and cost of service analyses.

5.1 Rate Design Goals and Objectives

In reviewing utility rate designs, consideration is given to the ***level*** of the rates and the ***structure*** of the rates. *Level* refers to the total revenue to be collected from a rate design; while *structure* refers to how (fixed vs. variable) the revenue is collected, or how the customer is ultimately charged. Provided below is an overview of the rate design considerations for EPCOR's sanitary and stormwater drainage utilities.

5.1.1 Rate Design Criteria and Considerations

The key to developing a successful rate design is to gain an understanding of the utility's goals and objectives and how different rate structures and the relationship between the monthly fixed charges and consumption/volumetric charges can help achieve those goals and objectives. Typical rate design goals and objectives include items such as rates being cost-based, easy to understand and administer and that are set at a level that produce sufficient revenues.

Principles of Public Utility Rates[2] by James C. Bonbright's is often cited as an important source or guide on the development of rates. Bonbright developed a list of key attributes (i.e., goals and objectives) that may be considered in the establishment of utility rates. Provided below is a paraphrased list of Bonbright's attributes.

Revenue-Related Attributes:

- Rates should be designed to ***meet the total revenue requirement needs*** under the "utility/accrual basis approach".[3]
- Rates should provide ***revenue stability and predictability***; with a minimum of unexpected changes seriously adverse to the utility (e.g., annual swings in planned revenue should, for example, be no greater than +10% or –10%).
- From the customer's perspective, the rates should result in ***customer bills that are stable and predictable***. The implementation of new rate structures should be consistent with past rate setting philosophy and minimize customer bill impacts during any change in rate

[2] James C. Bonbright; Albert L. Danielsen and David R. Kamerschen, Principles of Public Utility Rates, (Arlington, VA: Public Utilities Report, Inc., Second Edition, 1988), p. 383-384.

[3] The Water Environment Federation, Manual of Practice #27, Financing and Charges for Wastewater Systems, discusses two "generally-accepted" methodologies for establishing revenue requirements; the cash basis and utility/accrual basis. Most private utilities, including EPCOR utilize the "utility/accrual basis" methodology. Under this approach, a utility sums its O&M, taxes, depreciation expense and return on rate base (investment) to equal its revenue requirements.

structure.

Cost-Related Attributes:

- The rate structure should **promote efficient use** of services and discourage or penalize inefficient uses.
- The rate structure should **reflect all traditional internal costs** (direct and indirect) incurred, **and under appropriate situations and conditions** (e.g., rapid growth) may also **include present and future costs and benefits** (i.e., marginal cost and/or value of commodity).
- **Fairness of the rates** in the allocation of total costs of service among the different ratepayers so as to **avoid arbitrariness, capriciousness and to attain equity**. The rates and the rate structure shall be based upon a fair allocation of total cost of service among the customer classes of service by use of a "generally accepted" cost of service methodology such as defined in the Water Environment Federation Manual of Practice #27.
- The rates should be, as practically possible, **non-discriminatory**, between customer groups, and within each customer group. The rate structures should avoid interclass subsidies whenever possible to ensure each class pays its full cost of service.
- The **responsiveness of the rate to respond to changes in demand and supply patterns**. The rate structure should be developed such that it either responds appropriately or alternatively, contains the flexibility to allow the utility to respond to the changing needs as a result of supply, demand, and/or environmental concerns.

Practical-Related Attributes:

- From the customer's perspective, the rate structure should be **simple to understand**, such that the customer can easily understand the bill. From the utility's perspective, the rate structure should be **easy to administer**. Finally, the rate structure should have acceptance by the majority of the customers that the rate structure and resulting bills are "fair and equitable."
- **Freedom from controversies** as to the application of the rate schedule to the customer and calculation of the customer's bill. It should be simple to explain and understand by the average customer to minimize any misinterpretation regarding the customer's bill and the overall goals that the rate structure has been developed to meet.

While the above rate design goals and objectives (i.e., attributes) are intended for all rate designs, certain goals and objectives may be more relevant than others, particularly when comparing the differences between an electric, water, wastewater, or stormwater utility. For that reason alone, EPCOR should review the different rate design goals and objectives and determine those with the highest relevance and priority for the particular utility rates being reviewed.

5.2 Review of the Current Drainage Rates

As noted above, it is important to understand that all of the rate design goals and objectives cannot be achieved in a single rate design, and in some cases, certain goals and objectives may be in conflict with each other. For example, rates which promote conservation may be so complex that they do not achieve the objective of ease of customer understanding and administration. In that respect, EPCOR must consider each of these goals and objectives and attempt to balance them in a way that meets the utility's overall rate goals and objectives. The rate design goals and objectives for the sanitary drainage rates may be different than the goals and objectives for the stormwater utility.

For EPCOR, these rate design goals and objectives can be used as a starting point in considering proposed changes to the sanitary and stormwater drainage rate designs.

5.2.1 Current Sanitary Drainage Rates

The current sanitary drainage rates are designed to collect the costs associated with wastewater collection services. The current sanitary drainage rate design is composed of a flat monthly service charge and a variable charge. Provided below in Table 5 - 1 is a summary of the current sanitary drainage rate design.

Table 5 - 1
Overview of the EPCOR's Present Sanitary Drainage Rates[1]

Rate Component	Present Rates
Flat Monthly Service Charge (Per Meter Size)	
16mm	$11.30
20mm	20.34
25mm	31.62
40mm	60.99
50mm	83.57
75mm	172.68
100mm	321.63
150mm	608.38
200mm	970.66
250mm	2,408.89
300mm	2,408.89
400mm	2,635.90
500mm	2,838.04
Variable Monthly Charge - $/m^3	
All Customers	$1.3100
Large Wholesale w/ collection system	0.7366

[1] – Rates shown are effective January 1, 2023

EPCOR's present sanitary drainage rate schedules use the same schedule for fixed charges for all customer classes of service. The flat monthly service charge is based on meter size. In contrast to the fixed monthly service charge, the variable or volumetric charge for sanitary drainage is a uniform volumetric structure which is the same for all residential, multi-residential and commercial customers. The variable rate is stated in \$/cubic metre (\$/m^3). There is a separate variable rate for the University of Alberta (U of A). The U of A is a large wholesale customer with it's own sanitary collection system. Given that, the U of A has their own variable rate. U of A is provided with a lower rate since they own and operate their own on-campus collection system and only utilize a portion of EPCORs collection and conveyance system. For billing of variable charges, the volume billing is determined based upon the following:

- **i.** Water consumption for the premises;
- **ii.** Sewer discharge for a premises on which a sewer meter has been installed; or
- **iii.** Water consumption for the premises as discounted by the application of a utility credit as approved in accordance with EPCOR's bylaws (e.g., wholesale w/ collection system).

The current rate design approach used by EPCOR for their sanitary drainage utility rates is contemporary in approach and design. Most wastewater utilities have sewer rates (i.e., treatment and collection) which contain a fixed and variable component. The variable component is typically based upon metered water consumption, similar to EPCOR's approach, but in some cases, the volume billed may be "capped" at a specified volume to try and segregate water consumption between indoor and outdoor uses. In areas with significant outdoor water use, the approach of using average winter water use (AWWU) to cap sewer volumes is common.

5.2.2 Current Stormwater Drainage Rates

Provided below in Table 5 - 2 is EPCOR's current stormwater drainage rate.

Table 5 - 2
Overview of EPCOR's Present Stormwater Drainage Rate [1]

Rate Component	Rate - $ / Sq. Metre
All Parcels (Customers)	$0.064768

[1] – Rates shown are effective January 1, 2023

As can be seen, EPCOR's current stormwater rate appears to be very simple and straight-forward. While that may appear to be the case, in actuality, the basis for the billing of the stormwater rate is more complex. Specifically, EPCOR's stormwater fee is a monthly charge that is calculated using the following formula:

A x **I** x **R** x **Rate**, where:

A: The area of the property in square metres (m^2), and the proportion of the building lot area attributable to each unit for multiple units sharing a single building of property

I: The measure of the portion of lot being used for its intended development. The development intensity factor is 1.0 as default, except for properties where owners demonstrate they contribute significantly less stormwater runoff per property area to the City's land drainage system during rainfalls than other similarly-zone properties.

R: Runoff coefficient—the permeability of your lot's surface (i.e., grass versus concrete), based on land zoning

Rate: The monthly charge of $0.064768 per square metre (m2).

The runoff coefficient has a specific schedule for each land zone. The runoff coefficient ranges from 0.20 (e.g., agricultural zone AG) to 0.95 (e.g., commercial business zone CB2). As point of reference, a single-detached residential home (Zone RF1) has a runoff coefficient of 0.50. EPCOR recently updated the coefficients for their customers which has been reflected in the calculation of this Study.

For each parcel, EPCOR calculates a billable stormwater area stated in square metres (m^2). The determination of this billable area is accomplished by reviewing the area of each parcel and then adjusting for development intensity and runoff coefficient. The use of development intensity (**I**) takes into consideration those parcels which have significantly less runoff than similarly zoned parcels. This lowering of runoff is often accomplished via retention/detention ponds or other stormwater best practices.

EPCOR's approach to stormwater rates contains all of the elements and components that would be expected from a contemporary stormwater rate design. Stormwater utilities may administer these elements in a slightly different manner, but their rate design approach considers area, development intensity and any credits for stormwater management (e.g., retention/detention, etc.). One area where EPCOR may differ from other stormwater utilities is their billing of single-family residential parcels. For administrative and cost reasons, many stormwater utilities charge residential customers on a flat, $/month, basis regardless of the parcel size or intensity. While there are certain inequities with this approach, it eliminates a number of administrative issues and concerns with a large majority of the system's parcels. EPCOR has obviously gone one step further and refined their residential rates to be reflective of the specific residential lot size (area) and development intensity. HDR would not recommend EPCOR going "backwards" on their stormwater rate design, but rather, points this out to highlight the enhanced equity of this approach.

5.3 Future Drainage Rate Structure Considerations

The results of the revenue requirement and cost of service analysis provide the basis for establishing cost-based rates. However, other policy considerations, other than strictly cost of service, may be considered when establishing final proposed sanitary and stormwater drainage rates.

As EPCOR continues forward with the development of alternative sanitary or stormwater drainage rates, a decision will need to be made as to how closely the proposed rates should follow cost of service results, and if so, how best to transition to a cost of service based rate over time. In this transition process, EPCOR will likely want to attempt to minimize overall rate impacts over time. While the cost of service analyses for both drainage utilities did show some minor cost differences, there does not appear to be any huge cost of service or transition issues on the horizon. If changes are proposed, implementing a smooth transition towards the cost of service results allows for customer outreach, avoids rate shock, and allows the utility to track cost of service results over a number of years and adjust rates accordingly.

5.4 Summary

This section of the report has provided an overview of the rate design process. The results of the sanitary and stormwater drainage revenue requirement and cost of service analysis provide the basis and guidance for establishing and implementing cost-based utility rates. A key objective of a cost of service analysis is to develop rates that are cost-based while, at the same time, providing proportionality between customers.

Sanitary Drainage Technical Appendix A

EPCOR
Drainage COSA
Summary of the Revenue Requirement - Sanitary
Exhibit 1

	Projected									
	2024	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Revenues										
Rate Revenues	$171,408,909	$184,562,200	$198,221,432	$212,749,096	$216,153,081	$219,611,530	$223,125,315	$226,695,320	$230,322,445	$234,007,604
Miscellaneous Revenues	3,588,923	3,658,446	3,722,237	3,781,963	3,842,474	3,903,954	3,966,417	4,029,880	4,094,358	4,159,867
Total Revenues	**$174,997,832**	**$188,220,645**	**$201,943,670**	**$216,531,058**	**$219,995,555**	**$223,515,484**	**$227,091,732**	**$230,725,200**	**$234,416,803**	**$238,167,472**
Expenses										
Franchise Fees	$13,499,709	$13,678,837	$14,221,679	$15,000,618	$15,315,631	$15,637,259	$15,965,641	$16,300,920	$16,643,239	$16,992,747
Total Drainage Operations	21,292,333	21,846,264	22,243,512	22,631,362	23,106,620	23,591,859	24,087,289	24,593,122	25,109,577	25,636,878
Total One Water Planning and Project Support	5,968,720	6,135,788	6,227,462	6,321,107	6,453,851	6,589,382	6,727,759	6,869,041	7,013,291	7,160,570
Total Operational Support Services	1,367,453	1,407,347	1,427,433	1,448,189	1,478,600	1,509,651	1,541,354	1,573,722	1,606,770	1,640,513
Total Billing and Meter Reading	5,923,296	5,372,071	5,470,251	5,563,721	5,680,559	5,799,851	5,921,648	6,046,002	6,172,968	6,302,601
Total General and Admin Services	11,576,377	11,799,943	12,034,471	12,008,267	12,260,441	12,517,910	12,780,786	13,049,182	13,323,215	13,603,003
Corporate Allocations	9,585,534	9,770,707	9,961,028	10,144,791	10,357,832	10,575,346	10,797,428	11,024,174	11,255,682	11,492,051
Efficiencies	0	0	0	0	0	0	0	0	0	0
Total O&M Expenses	**$69,213,420**	**$70,010,956**	**$71,585,837**	**$73,118,054**	**$74,653,534**	**$76,221,258**	**$77,821,904**	**$79,456,164**	**$81,124,744**	**$82,828,363**
Property Taxes	$469,089	$480,304	$493,708	$503,147	$429,110	$437,264	$445,572	$454,037	$462,664	$471,455
Depreciation	20,725,092	26,210,464	28,166,409	29,971,644	31,874,294	33,885,576	36,011,391	38,257,948	40,631,790	43,139,800
Total Return on Rate Base - Debt	23,325,438	25,827,833	28,713,366	31,575,749	34,733,323	38,206,656	42,027,321	46,230,053	50,853,059	55,938,365
Total Return on Rate Base - Equity	33,739,722	40,528,944	47,623,924	50,550,762	53,634,359	56,906,055	60,377,324	64,060,341	67,968,022	72,114,071
Total Revenue Requirement	**$147,472,762**	**$163,058,500**	**$176,583,244**	**$185,719,357**	**$195,324,621**	**$205,656,808**	**$216,683,512**	**$228,458,544**	**$241,040,278**	**$254,492,054**
Bal. / (Def.) of Funds	$27,525,070	$25,162,146	$25,360,426	$30,811,701	$24,670,935	$17,858,676	$10,408,220	$2,266,655	($6,623,475)	($16,324,583)
Balance a % of Rate Adj. Req'd	-16.1%	-13.6%	-12.8%	-14.5%	-11.4%	-8.1%	-4.7%	-1.0%	2.9%	7.0%

EPCOR
Drainage COSA
Revenue Requirement - Sanitary
Exhibit 2

					Projected						
	2024	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	***Notes***
Revenues											
Rate Revenues											
Residential	$106,581,626	$115,209,927	$124,376,485	$134,174,191	$136,320,978	$138,502,114	$140,718,148	$142,969,638	$145,257,152	$147,581,267	1.6% Inc / Yr 2028-2033
Multi-Residential	28,349,157	30,545,977	32,720,338	35,023,724	35,584,104	36,153,450	36,731,905	37,319,615	37,916,729	38,523,397	1.6% Inc / Yr 2028-2033
Commercial	34,899,000	37,124,290	39,344,176	41,667,999	42,334,687	43,012,042	43,700,235	44,399,439	45,109,830	45,831,587	1.6% Inc / Yr 2028-2033
U of A	1,579,127	1,682,005	1,780,433	1,883,181	1,913,312	1,943,925	1,975,028	2,006,628	2,038,734	2,071,354	1.6% Inc / Yr 2028-2033
Total Rate Revenues	**$171,408,909**	**$184,562,200**	**$198,221,432**	**$212,749,096**	**$216,153,081**	**$219,611,530**	**$223,125,315**	**$226,695,320**	**$230,322,445**	**$234,007,604**	
Other Revenues											
Biosolids	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	1.6% Inc / Yr 2028-2033
Compliance and monitoring	2,986,846	3,052,880	3,106,000	3,156,317	3,206,818	3,258,127	3,310,257	3,363,221	3,417,033	3,471,705	1.6% Inc / Yr 2028-2033
Pipeline Maintenance	255,786	260,492	267,761	272,881	277,247	281,683	286,190	290,769	295,421	300,148	1.6% Inc / Yr 2028-2033
Late payment charges	340,523	339,267	342,507	346,681	352,228	357,864	363,589	369,407	375,317	381,322	1.6% Inc / Yr 2028-2033
Other	5,767	5,808	5,970	6,084	6,181	6,280	6,381	6,483	6,587	6,692	1.6% Inc / Yr 2028-2033
Billing error/bad debts - Sanitary	0	0	0	0	0	0	0	0	0	0	1.6% Inc / Yr 2028-2033
Billing error/bad debts - Stormwater	0	0	0	0	0	0	0	0	0	0	1.6% Inc / Yr 2028-2033
Total Other Revenues	**$3,588,923**	**$3,658,446**	**$3,722,237**	**$3,781,963**	**$3,842,474**	**$3,903,954**	**$3,966,417**	**$4,029,880**	**$4,094,358**	**$4,159,867**	
Total Revenues	**$174,997,832**	**$188,220,645**	**$201,943,670**	**$216,531,058**	**$219,995,555**	**$223,515,484**	**$227,091,732**	**$230,725,200**	**$234,416,803**	**$238,167,472**	
Franchise Fees	**$13,499,709**	**$13,678,837**	**$14,221,679**	**$15,000,618**	$15,315,631	$15,637,259	$15,965,641	$16,300,920	$16,643,239	$16,992,747	2.1% Inc / Yr 2028-2033
Drainage Operations											
Biosolids Management	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	2.1% Inc / Yr 2028-2033
Pipeline Maintenance	1,602,846	1,649,608	1,673,151	1,697,480	1,733,127	1,769,523	1,806,683	1,844,623	1,883,360	1,922,911	2.1% Inc / Yr 2028-2033
Hazardous and Sanitary Waste	724,597	738,581	753,279	767,365	783,480	799,933	816,732	833,883	851,395	869,274	2.1% Inc / Yr 2028-2033
Industrial Monitoring	8,278,493	8,438,268	8,606,189	8,767,125	8,951,235	9,139,211	9,331,134	9,527,088	9,727,157	9,931,427	2.1% Inc / Yr 2028-2033
Compliance	5,893,876	6,007,627	6,127,179	6,241,757	6,372,834	6,506,664	6,643,304	6,782,813	6,925,252	7,070,682	2.1% Inc / Yr 2028-2033
General Maintenance	226,722	313,177	317,647	322,266	329,033	335,943	342,998	350,201	357,555	365,064	2.1% Inc / Yr 2028-2033
Preventative Mtnc - WWC	1,576,957	1,622,964	1,646,127	1,670,063	1,705,134	1,740,942	1,777,502	1,814,829	1,852,940	1,891,852	2.1% Inc / Yr 2028-2033
Inspections and Investigations	1,377,748	1,417,942	1,438,179	1,459,091	1,489,732	1,521,017	1,552,958	1,585,570	1,618,867	1,652,863	2.1% Inc / Yr 2028-2033
Responsive Maintenance and Repair	1,611,094	1,658,096	1,681,761	1,706,214	1,742,045	1,778,628	1,815,979	1,854,115	1,893,051	1,932,805	2.1% Inc / Yr 2028-2033
Total Drainage Operations	**$21,292,333**	**$21,846,264**	**$22,243,512**	**$22,631,362**	**$23,106,620**	**$23,591,859**	**$24,087,289**	**$24,593,122**	**$25,109,577**	**$25,636,878**	
One Water Planning and Project Support											
One Water Planning	$1,121,913	$1,154,644	$1,171,123	$1,188,152	$1,213,103	$1,238,578	$1,264,588	$1,291,144	$1,318,258	$1,345,942	2.1% Inc / Yr 2028-2033
Engineering	1,260,158	1,296,922	1,315,431	1,334,559	1,362,584	1,391,199	1,420,414	1,450,243	1,480,698	1,511,792	2.1% Inc / Yr 2028-2033
Project Management	796,942	820,192	831,898	843,994	861,718	879,814	898,291	917,155	936,415	956,080	2.1% Inc / Yr 2028-2033
Controls and Automation	589,924	607,134	615,799	624,753	637,873	651,269	664,945	678,909	693,166	707,723	2.1% Inc / Yr 2028-2033
Operations Mgmt and Admin	(224,030)	(230,565)	(233,856)	(237,256)	(242,239)	(247,326)	(252,520)	(257,823)	(263,237)	(268,765)	2.1% Inc / Yr 2028-2033
Private Development & Commissioning	(48,755)	(50,177)	(50,894)	(51,634)	(52,718)	(53,825)	(54,955)	(56,109)	(57,288)	(58,491)	2.1% Inc / Yr 2028-2033
Utility Line Assignment (ULA)	379,787	390,867	396,445	402,210	410,656	419,280	428,085	437,074	446,253	455,624	2.1% Inc / Yr 2028-2033
Distribution Maintenance	127,775	131,503	133,380	135,319	138,161	141,062	144,025	147,049	150,137	153,290	2.1% Inc / Yr 2028-2033
Customer Services	208,711	214,800	217,865	221,033	225,675	230,414	235,253	240,193	245,237	250,387	2.1% Inc / Yr 2028-2033
Yards & Buildings	676,681	696,423	706,362	716,633	731,682	747,048	762,736	778,753	795,107	811,804	2.1% Inc / Yr 2028-2033
Facility Operations	364,139	374,763	380,111	385,638	393,737	402,005	410,447	419,067	427,867	436,852	2.1% Inc / Yr 2028-2033
Regulatory and Business Planning	715,475	729,284	743,797	757,706	773,618	789,864	806,451	823,386	840,677	858,332	2.1% Inc / Yr 2028-2033
Total One Water Planning and Project Support	**$5,968,720**	**$6,135,788**	**$6,227,462**	**$6,321,107**	**$6,453,851**	**$6,589,382**	**$6,727,759**	**$6,869,041**	**$7,013,291**	**$7,160,570**	
Operational Support Services											
Operations Mgmt and Admin	$65,671	$67,587	$68,551	$69,548	$71,009	$72,500	$74,022	$75,577	$77,164	$78,784	2.1% Inc / Yr 2028-2033
Survey Operations	262,983	270,656	274,518	278,510	284,359	290,330	296,427	302,652	309,008	315,497	2.1% Inc / Yr 2028-2033
General Maintenance	887,375	913,264	926,298	939,767	959,502	979,652	1,000,224	1,021,229	1,042,675	1,064,571	2.1% Inc / Yr 2028-2033
Open Cut Services	1,341,563	1,380,702	1,400,407	1,420,770	1,450,606	1,481,069	1,512,171	1,543,927	1,576,350	1,609,453	2.1% Inc / Yr 2028-2033
In-house Tunnelling	537,841	553,532	561,432	569,596	581,557	593,770	606,239	618,970	631,969	645,240	2.1% Inc / Yr 2028-2033
Equipment Dispatch	(1,727,981)	(1,778,393)	(1,803,774)	(1,830,002)	(1,868,433)	(1,907,670)	(1,947,731)	(1,988,633)	(2,030,394)	(2,073,033)	2.1% Inc / Yr 2028-2033
Total Operational Support Services	**$1,367,453**	**$1,407,347**	**$1,427,433**	**$1,448,189**	**$1,478,600**	**$1,509,651**	**$1,541,354**	**$1,573,722**	**$1,606,770**	**$1,640,513**	

EPCOR
Drainage COSA
Revenue Requirement - Sanitary
Exhibit 2

	Projected										
	2024	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	***Notes***
Billing and Meter Reading											
CUS Charges (billing and collections)	$3,190,183	$3,241,463	$3,297,244	$3,350,079	$3,420,430	$3,492,259	$3,565,597	$3,640,474	$3,716,924	$3,794,980	2.1% Inc / Yr 2028-2033
Operations Mgmt and Admin	238,049	242,643	247,472	252,100	257,394	262,799	268,318	273,953	279,706	285,579	2.1% Inc / Yr 2028-2033
Meter Reading	1,459,796	832,717	849,288	865,170	883,338	901,888	920,828	940,165	959,909	980,067	2.1% Inc / Yr 2028-2033
Mtce - Meters	158,795	161,859	165,080	168,167	171,699	175,304	178,986	182,745	186,582	190,500	2.1% Inc / Yr 2028-2033
Operations Mgmt and Admin (2)	196,462	200,253	204,239	208,058	212,427	216,888	221,443	226,093	230,841	235,689	2.1% Inc / Yr 2028-2033
Dispatch	484,672	494,026	503,857	513,279	524,058	535,063	546,299	557,772	569,485	581,444	2.1% Inc / Yr 2028-2033
Customer Services	195,339	199,109	203,071	206,869	211,213	215,648	220,177	224,801	229,522	234,342	2.1% Inc / Yr 2028-2033
Total Billing and Meter Reading	**$5,923,296**	**$5,372,071**	**$5,470,251**	**$5,563,721**	**$5,680,559**	**$5,799,851**	**$5,921,648**	**$6,046,002**	**$6,172,968**	**$6,302,601**	
General and Admin Services											
Information Services	$2,177,317	$2,219,339	$2,263,504	$2,305,832	$2,354,254	$2,403,694	$2,454,171	$2,505,709	$2,558,329	$2,612,053	2.1% Inc / Yr 2028-2033
General Admin	3,673,066	3,743,956	3,818,460	3,889,866	3,971,553	4,054,955	4,140,109	4,227,052	4,315,820	4,406,452	2.1% Inc / Yr 2028-2033
Controller	708,343	722,014	736,383	750,153	765,906	781,990	798,412	815,179	832,297	849,776	2.1% Inc / Yr 2028-2033
Marketing and Product Development	890,988	908,184	926,257	943,578	963,393	983,624	1,004,280	1,025,370	1,046,903	1,068,888	2.1% Inc / Yr 2028-2033
Health Safety and Loss Prevention	1,017,776	1,037,419	1,058,064	1,077,850	1,100,484	1,123,595	1,147,190	1,171,281	1,195,878	1,220,991	2.1% Inc / Yr 2028-2033
Training	687,848	701,123	715,075	728,447	743,745	759,363	775,310	791,591	808,215	825,187	2.1% Inc / Yr 2028-2033
Incentive and Other Compensation - STIP/MTIP	829,369	845,376	862,199	878,322	896,766	915,598	934,826	954,457	974,501	994,966	2.1% Inc / Yr 2028-2033
Contract Management	237,385	242,109	246,637	0	0	0	0	0	0	0	2.1% Inc / Yr 2028-2033
Inventory Management	405,097	412,915	421,132	429,007	438,017	447,215	456,606	466,195	475,985	485,981	2.1% Inc / Yr 2028-2033
Physical Security & EMBR	160,864	163,968	167,231	170,358	173,936	177,589	181,318	185,126	189,013	192,983	2.1% Inc / Yr 2028-2033
Incentive and Other Compensation - Other Wages	788,324	803,539	819,530	834,855	852,387	870,287	888,563	907,223	926,274	945,726	2.1% Inc / Yr 2028-2033
Total General and Admin Services	**$11,576,377**	**$11,799,943**	**$12,034,471**	**$12,008,267**	**$12,260,441**	**$12,517,910**	**$12,780,786**	**$13,049,182**	**$13,323,215**	**$13,603,003**	
Corporate Allocations	**$9,585,534**	**$9,770,707**	**$9,961,028**	**$10,144,791**	**$10,357,832**	**$10,575,346**	**$10,797,428**	**$11,024,174**	**$11,255,682**	**$11,492,051**	2.1% Inc / Yr 2028-2033
Efficiencies	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Total O&M Expenses	**$69,213,420**	**$70,010,956**	**$71,585,837**	**$73,118,054**	**$74,653,534**	**$76,221,258**	**$77,821,904**	**$79,456,164**	**$81,124,744**	**$82,828,363**	
Property Taxes	**$469,089**	**$480,304**	**$493,708**	**$503,147**	**$429,110**	**$437,264**	**$445,572**	**$454,037**	**$462,664**	**$471,455**	
Depreciation	$37,225,883	$43,780,246	$46,307,259	$48,676,455	$51,158,954	$53,768,060	$56,510,231	$59,392,253	$62,421,258	$65,604,742	5.1% Inc / Yr 2028-2033
Less: Contributions Amortization	(16,500,791)	(17,569,782)	(18,140,851)	(18,704,810)	(19,284,659)	(19,882,484)	(20,498,841)	(21,134,305)	(21,789,468)	(22,464,942)	3.1% Inc / Yr 2028-2033
Total Depreciation	**$20,725,092**	**$26,210,464**	**$28,166,409**	**$29,971,644**	**$31,874,294**	**$33,885,576**	**$36,011,391**	**$38,257,948**	**$40,631,790**	**$43,139,800**	
Return on Rate Base - Debt	$23,325,438	$25,827,833	$28,713,366	$31,575,749	$34,733,323	$38,206,656	$42,027,321	$46,230,053	$50,853,059	$55,938,365	10.0% Inc / Yr 2028-2033
Total Return on Rate Base - Debt	**$23,325,438**	**$25,827,833**	**$28,713,366**	**$31,575,749**	**$34,733,323**	**$38,206,656**	**$42,027,321**	**$46,230,053**	**$50,853,059**	**$55,938,365**	
Return on Rate Base - Equity	$33,739,722	$40,528,944	$47,623,924	$50,550,762	$53,634,359	$56,906,055	$60,377,324	$64,060,341	$67,968,022	$72,114,071	6.1% Inc / Yr 2028-2033
Total Return on Rate Base - Equity	**$33,739,722**	**$40,528,944**	**$47,623,924**	**$50,550,762**	**$53,634,359**	**$56,906,055**	**$60,377,324**	**$64,060,341**	**$67,968,022**	**$72,114,071**	
Total Revenue Requirement	**$147,472,762**	**$163,058,500**	**$176,583,244**	**$185,719,357**	**$195,324,621**	**$205,656,808**	**$216,683,512**	**$228,458,544**	**$241,040,278**	**$254,492,054**	
Bal. / (Def.) of Funds	$27,525,070	$25,162,146	$25,360,426	$30,811,701	$24,670,935	$17,858,676	$10,408,220	$2,266,655	($6,623,475)	($16,324,583)	
Balance a % of Rate Adj. Req'd	-16.1%	-13.6%	-12.8%	-14.5%	-11.4%	-8.1%	-4.7%	-1.0%	2.9%	7.0%	

EPCOR
Drainage COSA
Exhibit 3
Volume Distribution Factor - Sanitary

	2024 Annual Flow (ML)	15.5% Inflow and Infiltration [1]	Total Annual Flow at Plant (ML)	Avg. Daily Flow At Plant (ML)	% of Total	% of Total
Residential	46,011	7,132	53,143	53,143	54.7%	53.5%
Multi-Residential	18,197	2,820	21,017	21,017	21.6%	21.2%
Commercial	19,863	3,079	22,942	22,942	23.6%	23.1%
U of A	1,951	302	2,254	2,254	0.0%	2.3%
Total	**86,023**	**13,334**	**99,356**	**99,356**	**100.0%**	**100.0%**
					(VOL w/o)	***(VOL)***

Notes

[1] - Estimated

EPCOR
Drainage COSA
Exhibit 4
Capacity Demand Distribution Factors - Sanitary

	Capacity Demand	
	Equivalent Meters [3]	**% of Total**
Residential	271,487	81.1%
Multi-Residential	18,066	5.4%
Commercial	45,178	13.5%
U of A	213	0.1%
	----------	----------
Total	**334,944**	**100.0%**
		(CD)

Notes

[1] - Based onHistorical Billing Data and meter sizes

EPCOR
Drainage COSA
Exhibit 5
Customer Distribution Factors - Sanitary

	Actual Customer		*Cust. Serv. & Acntg*		
	Number of Account [1]	**% of Total**	**Weight Factor [2]**	**Wt. Acct.**	**% of Total**
Residential	291,827	93.2%	1.02	296,907	81.9%
Multi-Residential	3,820	1.2%	4.81	18,385	5.1%
Commercial	17,627	5.6%	2.68	47,162	13.0%
U of A	1	0.0%	213.00	213	0.1%
	----------	----------		----------	----------
Total	**313,274**	**100.0%**		**362,667**	**100.0%**
		(AC)			***(WCA)***

Notes

[1] - Based on 2023 Billing Data
[2] - Based on Historical Billing Data and meter sizes

EPCOR
Drainage COSA
Exhibit 6
Revenue Distribution Factor - Sanitary

	Projected 2024	% of Total
Residential	$106,581,626	62.2%
Multi-Residential	28,349,157	16.5%
Commercial	34,899,000	20.4%
U of A	1,579,127	0.9%
	-----------------	----------
Total	**$171,408,909**	**100.0%**
		(RR)

EPCOR
Drainage COSA
Exhibit 7
Net Plant in Service - Sanitary

	As of 12/31/22	Volume (VOL)	Actual Customer (AC)	Customer Acct/Svcs (ESU)	Capacity Demand (CD)	Revenue (RR)	Direct (DA)	Basis of Classification			
		Weighted for									
Collection	$1,743,515,019	$1,394,812,016	$0	$0	$348,703,004	$0	$0	80.0%	VOL	20.0%	CD
Collection - Common	95,557,274	76,445,819	0	0	19,111,455	0	0	80.0%	VOL	20.0%	CD
Pumping Stations	88,092,272	88,092,272	0	0	0	0	0	100.0%	VOL	0.0%	CD
Pumping - Common	2,257,175	2,257,175	0	0	0	0	0	100.0%	VOL	0.0%	CD
Storage	61,253,067	49,002,453	0	0	12,250,613	0	0	80.0%	VOL	20.0%	CD
Storage - Common	175,063	140,051	0	0	35,013	0	0	80.0%	VOL	20.0%	CD
Biosolids	0	0	0	0	0	0	0	100.0%	AC		
Plant Before General Plant	**$1,990,849,870**	**$1,610,749,785**	**$0**	**$0**	**$380,100,085**	**$0**	**$0**				
% Plant Before General Plant	***100.0%***	***80.9%***	***0.0%***	***0.0%***	***19.1%***	***0.0%***	***0.0%***	*Factor PBGP*			
General Plant											
General Plant	$1,399,535	$1,132,331	$0	$0	$267,204	$0	$0	*As Factor PBGP*			
General Plant - Common	30,698,489	24,837,425	0	0	5,861,064	0	0	*As Factor PBGP*			
Total General Plant	**$32,098,024**	**$25,969,756**	**$0**	**$0**	**$6,128,268**	**$0**	**$0**				
Net Plant in Service	**$2,022,947,895**	**$1,636,719,542**	**$0**	**$0**	**$386,228,353**	**$0**	**$0**				

EPCOR
Drainage COSA
Exhibit 9
Allocation of the Revenue Requirement - Sanitary

	Test Year 2024	Volume (VOL)	*Weighted* Actual Customer (AC)	Customer Acct/Svcs (ESU)	Capacity Demand (CD)	Revenue (RR)	Direct (DA)	*Basis of Classification*	
Franchise Fees	$13,499,709	$0	$0	$0	0	$13,499,709	$0	100.0%	RR
Drainage Operations									
Biosolids Management	$0	$0	$0	$0	$0	$0	$0	As Net Plant	
Pipeline Maintenance	1,602,846	1,296,825	0	0	306,021	0	0	As Net Plant	
Flow control Facilities	0	0	0	0	0	0	0	As Net Plant	
Hazardous and Sanitary Waste	724,597	586,254	0	0	138,343	0	0	As Net Plant	
Industrial Monitoring	8,278,493	6,697,934	0	0	1,580,559	0	0	As Net Plant	
Compliance	5,893,876	4,768,596	0	0	1,125,280	0	0	As Net Plant	
General Maintenance	226,722	183,436	0	0	43,287	0	0	As Net Plant	
Preventative Mtnc - WWC	1,576,957	1,275,879	0	0	301,078	0	0	As Net Plant	
Inspections and Investigations	1,377,748	1,114,703	0	0	263,044	0	0	As Net Plant	
Responsive Maintenance and Repair	1,611,094	1,303,498	0	0	307,596	0	0	As Net Plant	
CORe	0	0	0	0	0	0	0	100.0%	VOL
SIRP	0	0	0	0	0	0	0	100.0%	VOL
Total Drainage Operations	**$21,292,333**	**$17,227,125**	**$0**	**$0**	**$4,065,207**	**$0**	**$0**		
One Water Planning and Project Support									
One Water Planning	$1,121,913	$907,713	$0	$0	$214,200	$0	$0	As Net Plant	
Engineering	1,260,158	1,019,564	0	0	240,594	0	0	As Net Plant	
Project Management	796,942	644,787	0	0	152,155	0	0	As Net Plant	
Project Management - CORe	0	0	0	0	0	0	0	As Net Plant	
Controls and Automation	589,924	477,293	0	0	112,630	0	0	As Net Plant	
Operations Mgmt and Admin	(224,030)	(181,257)	0	0	(42,773)	0	0	As Net Plant	
Private Development & Commissioning	(48,755)	(39,447)	0	0	(9,308)	0	0	As Net Plant	
Utility Line Assignment (ULA)	379,787	307,276	0	0	72,510	0	0	As Net Plant	
Distribution Maintenance	127,775	103,380	0	0	24,395	0	0	As Net Plant	
Customer Services	208,711	168,863	0	0	39,848	0	0	As Net Plant	
Yards & Buildings	676,681	547,487	0	0	129,194	0	0	As Net Plant	
Facility Operations	364,139	294,616	0	0	69,523	0	0	As Net Plant	
Regulatory and Business Planning	715,475	578,874	0	0	136,601	0	0	As Net Plant	
Total One Water Planning and Project Support	**$5,968,720**	**$4,829,151**	**$0**	**$0**	**$1,139,569**	**$0**	**$0**		
Operational Support Services									
Operations Mgmt and Admin	$65,671	$0	$65,671	$0	$0	$0	$0	100.0%	AC
Survey Operations	262,983	0	262,983	0	0	0	0	100.0%	AC
General Maintenance	887,375	0	887,375	0	0	0	0	100.0%	AC
Open Cut Services	1,341,563	0	1,341,563	0	0	0	0	100.0%	AC
In-house Tunnelling	537,841	0	537,841	0	0	0	0	100.0%	AC
Equipment Dispatch	(1,727,981)	0	(1,727,981)	0	0	0	0	100.0%	AC
Total Operational Support Services	**$1,367,453**	**$0**	**$1,367,453**	**$0**	**$0**	**$0**	**$0**		

EPCOR
Drainage COSA
Exhibit 9
Allocation of the Revenue Requirement - Sanitary

	Test Year 2024	Volume (VOL)	*Weighted* Actual Customer (AC)	Customer Acct/Svcs (ESU)	Capacity Demand (CD)	Revenue (RR)	Direct (DA)	Basis of Classification	
Billing and Meter Reading									
CUS Charges (billing and collections)	$3,190,183	$0	$3,190,183	$0	$0	$0	$0	100.0%	AC
Operations Mgmt and Admin	238,049	0	238,049	0	0	0	0	100.0%	AC
Meter Reading	1,459,796	0	1,459,796	0	0	0	0	100.0%	AC
Mtce - Meters	158,795	0	158,795	0	0	0	0	100.0%	AC
Operations Mgmt and Admin (2)	196,462	0	196,462	0	0	0	0	100.0%	AC
Dispatch	484,672	0	484,672	0	0	0	0	100.0%	AC
Customer Services	195,339	0	195,339	0	0	0	0	100.0%	AC
Total Billing and Meter Reading	**$5,923,296**	**$0**	**$5,923,296**	**$0**	**$0**	**$0**	**$0**		
General and Admin Services									
Information Services	$2,177,317	$1,761,616	$0	$0	$415,701	$0	$0	As Net Plant	
General Admin	3,673,066	2,971,791	0	0	701,275	0	0	As Net Plant	
General & Tax Accounting	0	0	0	0	0	0	0	As Net Plant	
Controller	708,343	573,104	0	0	135,239	0	0	As Net Plant	
Marketing and Product Development	890,988	720,877	0	0	170,111	0	0	As Net Plant	
Health Safety and Loss Prevention	1,017,776	823,459	0	0	194,317	0	0	As Net Plant	
Training	687,848	556,521	0	0	131,326	0	0	As Net Plant	
Incentive and Other Compensation - STIP/MTIP	829,369	671,023	0	0	158,346	0	0	As Net Plant	
Contract Management	237,385	192,063	0	0	45,322	0	0	As Net Plant	
Inventory Management	405,097	327,754	0	0	77,343	0	0	As Net Plant	
Physical Security & EMBR	160,864	130,151	0	0	30,713	0	0	As Net Plant	
Incentive and Other Compensation - Other Wages	788,324	637,815	0	0	150,510	0	0	As Net Plant	
Total General and Admin Services	**$11,576,377**	**$9,366,174**	**$0**	**$0**	**$2,210,203**	**$0**	**$0**		
Corporate Allocations	**$9,585,534**	$0	$9,585,534	$0	$0	$0	$0	100.0%	AC
Efficiencies	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	As Net Plant	
Total O&M Expenses	**$69,213,420**	**$31,422,450**	**$16,876,282**	**$0**	**$7,414,979**	**$13,499,709**	**$0**		

EPCOR
Drainage COSA
Exhibit 9
Allocation of the Revenue Requirement - Sanitary

	Test Year 2024	Volume (VOL)	Weighted Actual Customer (AC)	Weighted Customer Acct/Svcs (ESU)	Capacity Demand (CD)	Revenue (RR)	Direct (DA)	Basis of Classification
Property Taxes	**$469,089**	**$0**	**$0**	**$0**	**0**	**$469,089**	**$0**	100.0% RR
Depreciation	$37,225,883	$16,900,313	$9,076,773	$0	$3,988,087	$7,260,710	$0	As O&M Expenses
Less: Contributions Amortization	(16,500,791)	(7,491,254)	(4,023,381)	0	(1,767,764)	(3,218,391)	0	As O&M Expenses
Total Depreciation	**$20,725,092**	**$9,409,059**	**$5,053,391**	**$0**	**$2,220,323**	**$4,042,319**	**$0**	
Return on Rate Base - Debt	$23,325,438	$10,589,600	$5,687,433	$0	$2,498,903	$4,549,502	$0	As O&M Expenses
Total Return on Rate Base - Debt	**$23,325,438**	**$10,589,600**	**$5,687,433**	**$0**	**$2,498,903**	**$4,549,502**	**$0**	
Return on Rate Base - Equity	$33,739,722	$15,317,618	$8,226,744	$0	$3,614,607	$6,580,753	$0	As O&M Expenses
Total Return on Rate Base - Equity	**$33,739,722**	**$15,317,618**	**$8,226,744**	**$0**	**$3,614,607**	**$6,580,753**	**$0**	
Total Revenue Requirement	**$147,472,762**	**$66,738,728**	**$35,843,850**	**$0**	**$15,748,812**	**$29,141,372**	**$0**	
Less: Non-Operating Revenue								
Biosolids	$0	$0	$0	$0	$0	$0	$0	As Revenue Requirement
Compliance and monitoring	2,986,846	1,351,696	725,965	0	318,969	590,216	0	As Revenue Requirement
Pipeline Maintenance	255,786	115,756	62,170	0	27,316	50,545	0	As Revenue Requirement
Late payment charges	340,523	154,104	82,766	0	36,365	67,289	0	As Revenue Requirement
Other	5,767	2,610	1,402	0	616	1,140	0	As Revenue Requirement
Billing error/bad debts - Sanitary	0	0	0	0	0	0	0	As Revenue Requirement
Billing error/bad debts - Stormwater	0	0	0	0	0	0	0	As Revenue Requirement
Total Other Revenues	**$3,588,923**	**$1,624,165**	**$872,302**	**$0**	**$383,266**	**$709,189**	**$0**	
Net Revenue Requirement	**$143,883,839**	**$65,114,563**	**$34,971,547**	**$0**	**$15,365,547**	**$28,432,182**	**$0**	

EPCOR
Drainage COSA
Exhibit 10
Distribution of Total Revenue Requirement - Sanitary

		Residential	Multi-Residential	Commercial	U of A	*Basis*
Volume Related	$65,114,563	$34,828,094	$13,773,961	$15,035,547	$1,476,961	*(VOL)*
*Less: Collection Discount**	0	355,662	140,659	153,542	(649,863)	*(VOL w/o)*
Net Volume Related Costs	**$65,114,563**	**$35,183,756**	**$13,914,620**	**$15,189,089**	**$827,098**	
Customer Related						
Actual Customer	$34,971,547	$32,577,302	$426,380	$1,967,754	$112	*(AC)*
Weighted Customer	0	0	0	0	0	*(ESU)*
Capacity Demand	15,365,547	12,454,458	828,777	2,072,539	9,771	*(CD)*
Total Customer Related	**$50,337,094**	**$45,031,760**	**$1,255,157**	**$4,040,294**	**$9,883**	
Revenue Related	$28,432,182	$17,679,059	$4,702,372	$5,788,817	$261,935	*(RR)*
Direct Assignment	$0	$0	$0	$0	$0	*(DA)*
Total Revenue Requirements	**$143,883,839**	**$97,894,575**	**$19,872,149**	**$25,018,199**	**$1,098,916**	

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Drainage COSA
Exhibit 11
Cost of Service Analysis Summary - Sanitary

	2024	Residential	Multi-Residential	Commercial	U of A
Revenues at Present Rates	**$171,408,909**	$106,581,626	$28,349,157	$34,899,000	$1,579,127
Allocated Revenue Requirement	**$143,883,839**	$97,894,575	$19,872,149	$25,018,199	$1,098,916
Balance / (Deficiency) of Funds	**$27,525,070**	**$8,687,051**	**$8,477,008**	**$9,880,801**	**$480,210**
Required % Change in Rates	**-16.1%**	**-8.2%**	**-29.9%**	**-28.3%**	**-30.4%**

EPCOR
Drainage COSA
Exhibit 12
Unit Costs Summary - Sanitary

	System Average	Residential	Multi-Residential	Commercial	U of A
Variable					
Volume Related	$0.66	$0.66	$0.66	$0.66	$0.37
Fixed					
Actual Customer	$8.70	$10.00	$1.97	$3.63	$0.04
Weighted Customer	0.00	0.00	0.00	0.00	0.00
Capacity Demand	3.82	3.82	3.82	3.82	3.82
RR / DA	7.07	5.43	21.69	10.68	102.48
Total	**$19.59**	**$19.25**	**$27.48**	**$18.13**	**$106.34**
Basic Data					
Volume / Flow (m^3)	99,356,159	53,143,037	21,017,232	22,942,244	2,253,645
Customers	313,274	291,827	3,820	17,627	1
Wt. Customers	362,667	296,907	18,385	47,162	213
Equiv. Meters	334,944	271,487	18,066	45,178	213

Stormwater Drainage Technical Appendix B

EPCOR
Drainage COSA
Summary of the Revenue Requirement - Stormwater
Exhibit 1

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
Rate Revenues	$120,545,319	$130,959,475	$143,286,837	$155,241,289	$157,880,391	$160,564,357	$163,293,951	$166,069,949	$168,893,138	$171,764,321
Miscellaneous Revenues	658,168	662,214	673,602	685,089	696,735	708,580	720,626	732,876	745,335	758,006
Total Revenues	**$121,203,487**	**$131,621,688**	**$143,960,438**	**$155,926,378**	**$158,577,126**	**$161,272,937**	**$164,014,577**	**$166,802,825**	**$169,638,473**	**$172,522,327**
Expenses										
Franchise Fees	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Drainage Operations	$22,949,196	$23,662,669	$24,171,048	$24,651,151	$25,168,825	$25,697,371	$26,237,015	$26,787,993	$27,350,541	$27,924,902
Total One Water Planning and Project Support	9,051,619	9,174,443	9,387,443	9,585,796	9,787,098	9,992,627	10,202,472	10,416,724	10,635,475	10,858,820
Total Operational Support Services	(1,042,061)	(4,423,676)	(4,527,646)	(4,624,260)	(4,721,370)	(4,820,518)	(4,921,749)	(5,025,106)	(5,130,633)	(5,238,376)
Total Billing and Meter Reading	3,067,006	3,136,491	3,207,630	3,276,437	3,345,242	3,415,492	3,487,217	3,560,449	3,635,218	3,711,558
Total General and Admin Services	11,571,882	11,795,219	12,029,944	12,254,904	12,512,257	12,775,014	13,043,290	13,317,199	13,596,860	13,882,394
Corporate Allocations	9,585,534	9,770,707	9,961,028	10,144,791	10,357,832	10,575,346	10,797,428	11,024,174	11,255,682	11,492,051
Efficiencies	0	0	0	0	0	0	0	0	0	0
Total O&M Expenses	**$55,183,175**	**$53,115,852**	**$54,229,447**	**$55,288,819**	**$56,449,884**	**$57,635,332**	**$58,845,674**	**$60,081,433**	**$61,343,143**	**$62,631,349**
Property Taxes	$750,911	$760,192	$768,373	$779,379	$791,070	$802,936	$814,980	$827,205	$839,613	$852,207
Depreciation	26,486,464	26,425,330	28,626,596	30,974,267	33,418,069	36,022,189	38,796,349	41,750,842	44,896,555	48,245,013
Total Return on Rate Base - Debt	24,592,761	27,191,284	29,667,184	32,734,333	35,844,095	39,249,284	42,977,966	47,060,872	51,531,655	56,427,162
Total Return on Rate Base - Equity	35,357,067	42,668,467	49,205,924	52,405,582	55,811,945	59,439,722	63,303,304	67,418,018	71,800,190	76,467,202
Total Revenue Requirement	**$142,370,377**	**$150,161,127**	**$162,497,523**	**$172,182,380**	**$182,315,063**	**$193,149,462**	**$204,738,272**	**$217,138,370**	**$230,411,156**	**$244,622,933**
Bal. / (Def.) of Funds	($21,166,890)	($18,539,438)	($18,537,085)	($16,256,002)	($23,737,937)	($31,876,525)	($40,723,695)	($50,335,545)	($60,772,683)	($72,100,606)

EPCOR
Drainage COSA
Revenue Requirement - Stormwater
Exhibit 2

	Projected										
	2024	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	***Notes***
Revenues											
Rate Revenues											
Residential	$63,581,905	$69,231,807	$75,341,097	$81,930,044	$83,322,854	$84,739,343	$86,179,912	$87,644,970	$89,134,935	$90,650,229	1.7% Inc / Yr 2028-2033
Multi-Residential	6,757,135	7,272,207	7,801,876	8,364,067	8,506,256	8,650,862	8,797,927	8,947,492	9,099,599	9,254,292	1.7% Inc / Yr 2028-2033
Commercial	51,406,279	55,655,460	60,143,863	64,947,179	66,051,281	67,174,152	68,316,113	69,477,487	70,658,604	71,859,800	1.7% Inc / Yr 2028-2033
Commercial - Leakage	(1,200,000)	(1,200,000)	0	0	0	0	0	0	0	0	1.7% Inc / Yr 2028-2033
Total Rate Revenues	**$120,545,319**	**$130,959,475**	**$143,286,837**	**$155,241,289**	**$157,880,391**	**$160,564,357**	**$163,293,951**	**$166,069,949**	**$168,893,138**	**$171,764,321**	
Other Revenues											
Biosolids	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	1.7% Inc / Yr 2028-2033
Pipeline Maintenance	409,459	412,288	416,725	422,694	429,880	437,188	444,620	452,179	459,866	467,684	1.7% Inc / Yr 2028-2033
Late payment charges	239,477	240,733	247,585	252,970	257,271	261,644	266,092	270,616	275,216	279,895	1.7% Inc / Yr 2028-2033
Other	9,233	9,192	9,291	9,424	9,584	9,747	9,913	10,082	10,253	10,427	1.7% Inc / Yr 2028-2033
Total Other Revenues	**$658,168**	**$662,214**	**$673,602**	**$685,089**	**$696,735**	**$708,580**	**$720,626**	**$732,876**	**$745,335**	**$758,006**	
Total Revenues	**$121,203,487**	**$131,621,688**	**$143,960,438**	**$155,926,378**	**$158,577,126**	**$161,272,937**	**$164,014,577**	**$166,802,825**	**$169,638,473**	**$172,522,327**	
Franchise Fees	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Drainage Operations											
Biosolids Management	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	2.1% Inc / Yr 2028-2033
Pipeline Maintenance	2,543,486	2,576,749	2,637,310	2,693,587	2,750,152	2,807,905	2,866,871	2,927,076	2,988,544	3,051,304	2.1% Inc / Yr 2028-2033
Flow control Facilities	12,800,668	13,256,710	13,520,518	13,773,352	14,062,592	14,357,907	14,659,423	14,967,270	15,281,583	15,602,496	2.1% Inc / Yr 2028-2033
General Maintenance	359,776	489,195	500,692	511,376	522,115	533,080	544,274	555,704	567,374	579,289	2.1% Inc / Yr 2028-2033
Preventative Mtnc - WWC	2,502,404	2,535,130	2,594,713	2,650,081	2,705,732	2,762,553	2,820,566	2,879,798	2,940,274	3,002,020	2.1% Inc / Yr 2028-2033
Inspections and Investigations	2,186,287	2,214,879	2,266,935	2,315,308	2,363,930	2,413,572	2,464,257	2,516,007	2,568,843	2,622,789	2.1% Inc / Yr 2028-2033
Responsive Maintenance and Repair	2,556,574	2,590,008	2,650,881	2,707,447	2,764,303	2,822,354	2,881,623	2,942,137	3,003,922	3,067,005	2.1% Inc / Yr 2028-2033
Total Drainage Operations	**$22,949,196**	**$23,662,669**	**$24,171,048**	**$24,651,151**	**$25,168,825**	**$25,697,371**	**$26,237,015**	**$26,787,993**	**$27,350,541**	**$27,924,902**	
One Water Planning and Project Support											
One Water Planning	$1,780,314	$1,803,596	$1,845,986	$1,885,377	$1,924,970	$1,965,394	$2,006,668	$2,048,808	$2,091,833	$2,135,761	2.1% Inc / Yr 2028-2033
Engineering	1,999,689	2,025,840	2,073,453	2,117,698	2,162,170	2,207,575	2,253,934	2,301,267	2,349,594	2,398,935	2.1% Inc / Yr 2028-2033
Project Management	1,264,632	1,281,171	1,311,282	1,339,263	1,367,388	1,396,103	1,425,421	1,455,355	1,485,917	1,517,122	2.1% Inc / Yr 2028-2033
Controls and Automation	936,124	948,366	970,656	991,368	1,012,187	1,033,443	1,055,145	1,077,303	1,099,927	1,123,025	2.1% Inc / Yr 2028-2033
Operations Mgmt and Admin	(355,503)	(360,152)	(368,616)	(376,482)	(384,388)	(392,460)	(400,702)	(409,117)	(417,708)	(426,480)	2.1% Inc / Yr 2028-2033
Private Development & Commissioning	(77,367)	(78,379)	(80,221)	(81,933)	(83,654)	(85,410)	(87,204)	(89,035)	(90,905)	(92,814)	2.1% Inc / Yr 2028-2033
Utility Line Assignment (ULA)	602,667	610,548	624,898	638,232	651,635	665,320	679,291	693,556	708,121	722,992	2.1% Inc / Yr 2028-2033
Distribution Maintenance	202,761	205,413	210,240	214,727	219,236	223,840	228,541	233,340	238,240	243,243	2.1% Inc / Yr 2028-2033
Customer Services	331,194	335,525	343,411	350,739	358,104	365,624	373,302	381,142	389,146	397,318	2.1% Inc / Yr 2028-2033
Yards & Buildings	1,073,796	1,087,838	1,113,406	1,137,164	1,161,045	1,185,427	1,210,321	1,235,738	1,261,688	1,288,183	2.1% Inc / Yr 2028-2033
Facility Operations	577,836	585,393	599,151	611,937	624,787	637,908	651,304	664,981	678,946	693,204	2.1% Inc / Yr 2028-2033
Regulatory and Business Planning	715,475	729,284	743,797	757,706	773,618	789,864	806,451	823,386	840,677	858,332	2.1% Inc / Yr 2028-2033
Total One Water Planning and Project Support	**$9,051,619**	**$9,174,443**	**$9,387,443**	**$9,585,796**	**$9,787,098**	**$9,992,627**	**$10,202,472**	**$10,416,724**	**$10,635,475**	**$10,858,820**	
Operational Support Services											
Operations Mgmt and Admin	$104,210	$105,573	$108,054	$110,360	$112,677	$115,044	$117,460	$119,926	$122,445	$125,016	2.1% Inc / Yr 2028-2033
Survey Operations	417,317	422,774	432,711	441,944	451,225	460,701	470,375	480,253	490,338	500,636	2.1% Inc / Yr 2028-2033
General Maintenance	1,408,137	1,426,552	1,460,080	1,491,237	1,522,553	1,554,526	1,587,171	1,620,502	1,654,532	1,689,277	2.1% Inc / Yr 2028-2033
Open Cut Services	2,128,867	2,156,707	2,207,397	2,254,500	2,301,844	2,350,183	2,399,537	2,449,927	2,501,375	2,553,904	2.1% Inc / Yr 2028-2033
In-house Tunnelling	853,476	864,638	884,959	903,843	922,824	942,203	961,990	982,191	1,002,817	1,023,877	2.1% Inc / Yr 2028-2033
Equipment Dispatch	(2,742,057)	(2,777,916)	(2,843,205)	(2,903,876)	(2,964,857)	(3,027,119)	(3,090,689)	(3,155,593)	(3,221,861)	(3,289,520)	2.1% Inc / Yr 2028-2033
Capital OH Clearing	(3,212,011)	(6,622,005)	(6,777,641)	(6,922,268)	(7,067,635)	(7,216,056)	(7,367,593)	(7,522,312)	(7,680,281)	(7,841,567)	2.1% Inc / Yr 2028-2033
Total Operational Support Services	**($1,042,061)**	**($4,423,676)**	**($4,527,646)**	**($4,624,260)**	**($4,721,370)**	**($4,820,518)**	**($4,921,749)**	**($5,025,106)**	**($5,130,633)**	**($5,238,376)**	

EPCOR
Drainage COSA
Revenue Requirement - Stormwater
Exhibit 2

	Projected										
	2024	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	***Notes***
Billing and Meter Reading											
CUS Charges (billing and collections)	$2,190,534	$2,243,102	$2,296,463	$2,348,231	$2,397,544	$2,447,893	$2,499,298	$2,551,784	$2,605,371	$2,660,084	2.1% Inc / Yr 2028-2033
Operations Mgmt and Admin	196,462	200,253	204,239	208,058	212,427	216,888	221,443	226,093	230,841	235,689	2.1% Inc / Yr 2028-2033
Dispatch	484,672	494,026	503,857	513,279	524,058	535,063	546,299	557,772	569,485	581,444	2.1% Inc / Yr 2028-2033
Customer Services	195,339	199,109	203,071	206,869	211,213	215,648	220,177	224,801	229,522	234,342	2.1% Inc / Yr 2028-2033
Total Billing and Meter Reading	**$3,067,006**	**$3,136,491**	**$3,207,630**	**$3,276,437**	**$3,345,242**	**$3,415,492**	**$3,487,217**	**$3,560,449**	**$3,635,218**	**$3,711,558**	
General and Admin Services											
Information Services	$2,177,317	$2,219,339	$2,263,504	$2,305,832	$2,354,254	$2,403,694	$2,454,171	$2,505,709	$2,558,329	$2,612,053	2.1% Inc / Yr 2028-2033
General Admin	3,673,066	3,743,956	3,818,460	3,889,866	3,971,553	4,054,955	4,140,109	4,227,052	4,315,820	4,406,452	2.1% Inc / Yr 2028-2033
Controller	708,343	722,014	736,383	750,153	765,906	781,990	798,412	815,179	832,297	849,776	2.1% Inc / Yr 2028-2033
Marketing and Product Development	890,988	908,184	926,257	943,578	963,393	983,624	1,004,280	1,025,370	1,046,903	1,068,888	2.1% Inc / Yr 2028-2033
Health Safety and Loss Prevention	1,017,776	1,037,419	1,058,064	1,077,850	1,100,484	1,123,595	1,147,190	1,171,281	1,195,878	1,220,991	2.1% Inc / Yr 2028-2033
Training	687,848	701,123	715,075	728,447	743,745	759,363	775,310	791,591	808,215	825,187	2.1% Inc / Yr 2028-2033
Incentive and Other Compensation - STIP/MTII	829,369	845,376	862,199	878,322	896,766	915,598	934,826	954,457	974,501	994,966	2.1% Inc / Yr 2028-2033
Contract Management	232,891	237,385	242,109	246,637	251,816	257,104	262,504	268,016	273,645	279,391	2.1% Inc / Yr 2028-2033
Inventory Management	405,097	412,915	421,132	429,007	438,017	447,215	456,606	466,195	475,985	485,981	2.1% Inc / Yr 2028-2033
Physical Security & EMBR	160,864	163,968	167,231	170,358	173,936	177,589	181,318	185,126	189,013	192,983	2.1% Inc / Yr 2028-2033
Incentive and Other Compensation - Other Wa	788,324	803,539	819,530	834,855	852,387	870,287	888,563	907,223	926,274	945,726	2.1% Inc / Yr 2028-2033
Total General and Admin Services	**$11,571,882**	**$11,795,219**	**$12,029,944**	**$12,254,904**	**$12,512,257**	**$12,775,014**	**$13,043,290**	**$13,317,199**	**$13,596,860**	**$13,882,394**	
Corporate Allocations	**$9,585,534**	**$9,770,707**	**$9,961,028**	**$10,144,791**	**$10,357,832**	**$10,575,346**	**$10,797,428**	**$11,024,174**	**$11,255,682**	**$11,492,051**	2.1% Inc / Yr 2028-2033
Efficiencies	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Total O&M Expenses	**$55,183,175**	**$53,115,852**	**$54,229,447**	**$55,288,819**	**$56,449,884**	**$57,635,332**	**$58,845,674**	**$60,081,433**	**$61,343,143**	**$62,631,349**	
Property Taxes	**$750,911**	**$760,192**	**$768,373**	**$779,379**	$791,070	$802,936	$814,980	$827,205	$839,613	$852,207	1.5% Inc / Yr 2028-2033
Depreciation	$60,284,216	$60,955,669	$64,412,549	$67,985,172	$71,724,356	$75,669,196	$79,831,002	$84,221,707	$88,853,901	$93,740,865	5.5% Inc / Yr 2028-2033
Less: Contributions Amortization	(33,797,752)	(34,530,339)	(35,785,953)	(37,010,905)	(38,306,287)	(39,647,007)	(41,034,652)	(42,470,865)	(43,957,345)	(45,495,852)	3.5% Inc / Yr 2028-2033
Total Depreciation	**$26,486,464**	**$26,425,330**	**$28,626,596**	**$30,974,267**	**$33,418,069**	**$36,022,189**	**$38,796,349**	**$41,750,842**	**$44,896,555**	**$48,245,013**	
Return on Rate Base - Debt	$24,592,761	$27,191,284	$29,667,184	$32,734,333	$35,844,095	$39,249,284	$42,977,966	$47,060,872	$51,531,655	$56,427,162	9.5% Inc / Yr 2028-2033
Total Return on Rate Base - Debt	**$24,592,761**	**$27,191,284**	**$29,667,184**	**$32,734,333**	**$35,844,095**	**$39,249,284**	**$42,977,966**	**$47,060,872**	**$51,531,655**	**$56,427,162**	
Return on Rate Base - Equity	$35,357,067	$42,668,467	$49,205,924	$52,405,582	$55,811,945	$59,439,722	$63,303,304	$67,418,018	$71,800,190	$76,467,202	6.5% Inc / Yr 2028-2033
Total Return on Rate Base - Equity	**$35,357,067**	**$42,668,467**	**$49,205,924**	**$52,405,582**	**$55,811,945**	**$59,439,722**	**$63,303,304**	**$67,418,018**	**$71,800,190**	**$76,467,202**	
Total Revenue Requirement	**$142,370,377**	**$150,161,127**	**$162,497,523**	**$172,182,380**	**$182,315,063**	**$193,149,462**	**$204,738,272**	**$217,138,370**	**$230,411,156**	**$244,622,933**	
Bal. / (Def.) of Funds	($21,166,890)	($18,539,438)	($18,537,085)	($16,256,002)	($23,737,937)	($31,876,525)	($40,723,695)	($50,335,545)	($60,772,683)	($72,100,606)	

EPCOR
Drainage COSA
Exhibit 3
Equivalent Unit Distribution Factor - Stormwater

	# of Storm Equivalents [1]	% of Total	
Residential	895,557,570	52.7%	*52.2%*
Multi-Residential	97,267,142	5.7%	*5.6%*
Commercial	706,258,260	41.6%	*42.2%*
	------------------	----------	
Total	**1,699,082,972**	**100.0%**	
		(ESU)	

Notes

[1] - Based on Historical data and 2024 projection

EPCOR
Drainage COSA
Exhibit 4
Customer Distribution Factors - Stormwater

	Acutal Customer		Cust. Serv. & Acntg		
	Number of Account [1]	% of Total	Weight Factor [2]	Wt. Acct.	% of Total
Residential	293,396	93.1%	1.00	293,396	93.1%
Multi-Residential	3,848	1.2%	1.00	3,848	1.2%
Commercial	18,018	5.7%	1.00	18,018	5.7%
	-------------	----------		-------------	----------
Total	**315,262**	**100.0%**		**315,262**	**100.0%**
		(AC)			***(WCA)***

Notes

[1] - Based on Historical data and 2024 projection
[2] - No Cost Difference Identified

EPCOR
Drainage COSA
Exhibit 5
Revenue Distribution Factor - Stormwater

	Projected 2024	% of Total
Residential	$63,581,905	52.2%
Multi-Residential	6,757,135	5.6%
Commercial	51,406,279	42.2%
	------------------	----------
Total	**$121,745,319**	**100.0%**
		(RR)

EPCOR
Drainage COSA
Exhibit 6
Net Plant in Service - Storm

	As of 12/31/22	Volume (VOL)	Actual Customer (AC)	Customer Acct/Svcs (WCA)	Equivalent SW Unit (ESU)	Revenue (RR)	Direct (DA)	Basis of Classification
		Weighted for						
Collection	$2,072,423,598	$0	$0	$0	$2,072,423,598	$0	$0	100.0% ESU
Collection - Common	113,583,850	0	0	0	113,583,850	0	0	100.0% ESU
Pumping Stations	10,741,371	0	0	0	10,741,371	0	0	100.0% ESU
Pumping - Common	275,224	0	0	0	275,224	0	0	100.0% ESU
Storage	609,799,293	0	0	0	609,799,293	0	0	100.0% ESU
Storage - Common	1,742,827	0	0	0	1,742,827	0	0	100.0% ESU
Plant Before General Plant	**$2,808,566,163**	**$0**	**$0**	**$0**	**$2,808,566,163**	**$0**	**$0**	
% Plant Before General Plant	***100.0%***	***0.0%***	***0.0%***	***0.0%***	***100.0%***	***0.0%***	***0.0%***	*Factor PBGP*
General Plant								
General Plant	$2,292,025	$0	$0	$0	$2,292,025	$0	$0	*As Factor PBGP*
General Plant - Common	50,275,055	0	0	0	50,275,055	0	0	*As Factor PBGP*
Total General Plant	**$52,567,080**	**$0**	**$0**	**$0**	**$52,567,080**	**$0**	**$0**	
Net Plant in Service	**$2,861,133,243**	**$0**	**$0**	**$0**	**$2,861,133,243**	**$0**	**$0**	

EPCOR
Drainage COSA
Exhibit 7
Allocation of the Revenue Requirement - Stormwater

	Test Year 2024	Volume (VOL)	Actual Customer (AC)	Weighted Customer Acct/Svcs (WCA)	Equivalent SW Unit (ESU)	Revenue (RR)	Direct (DA)	Basis of Classification
Franchise Fees	**$0**	$0	$0	$0	$0	$0	$0	100.0% RR
Drainage Operations								
Biosolids Management	$0	$0	$0	$0	$0	$0	$0	As Net Plant
Pipeline Maintenance	2,543,486	0	0	0	2,543,486	0	0	As Net Plant
Flow control Facilities	12,800,668	0	0	0	12,800,668	0	0	As Net Plant
Hazardous and Sanitary Waste	0	0	0	0	0	0	0	As Net Plant
Industrial Monitoring	0	0	0	0	0	0	0	As Net Plant
Compliance	0	0	0	0	0	0	0	As Net Plant
General Maintenance	359,776	0	0	0	359,776	0	0	As Net Plant
Preventative Mtnc - WWC	2,502,404	0	0	0	2,502,404	0	0	As Net Plant
Inspections and Investigations	2,186,287	0	0	0	2,186,287	0	0	As Net Plant
Responsive Maintenance and Repair	2,556,574	0	0	0	2,556,574	0	0	As Net Plant
CORe	0	0	0	0	0	0	0	As Net Plant
SIRP	0	0	0	0	0	0	0	As Net Plant
Total Drainage Operations	**$22,949,196**	**$0**	**$0**	**$0**	**$22,949,196**	**$0**	**$0**	
One Water Planning and Project Support								
One Water Planning	$1,780,314	$0	$0	$0	$1,780,314	$0	$0	As Net Plant
Engineering	1,999,689	0	0	0	1,999,689	0	0	As Net Plant
Project Management	1,264,632	0	0	0	1,264,632	0	0	As Net Plant
Project Management - CORe	0	0	0	0	0	0	0	As Net Plant
Controls and Automation	936,124	0	0	0	936,124	0	0	As Net Plant
Operations Mgmt and Admin	(355,503)	0	0	0	(355,503)	0	0	As Net Plant
Private Development & Commissioning	(77,367)	0	0	0	(77,367)	0	0	As Net Plant
Utility Line Assignment (ULA)	602,667	0	0	0	602,667	0	0	As Net Plant
Distribution Maintenance	202,761	0	0	0	202,761	0	0	As Net Plant
Customer Services	331,194	0	0	0	331,194	0	0	As Net Plant
Yards & Buildings	1,073,796	0	0	0	1,073,796	0	0	As Net Plant
Facility Operations	577,836	0	0	0	577,836	0	0	As Net Plant
Regulatory and Business Planning	715,475	0	0	0	715,475	0	0	As Net Plant
Total One Water Planning and Project Support	**$9,051,619**	**$0**	**$0**	**$0**	**$9,051,619**	**$0**	**$0**	
Operational Support Services								
Operations Mgmt and Admin	$104,210	$0	$0	$0	$104,210	$0	$0	As Net Plant
Survey Operations	417,317	0	0	0	417,317	0	0	As Net Plant
General Maintenance	1,408,137	0	0	0	1,408,137	0	0	As Net Plant
Open Cut Services	2,128,867	0	0	0	2,128,867	0	0	As Net Plant
In-house Tunnelling	853,476	0	0	0	853,476	0	0	As Net Plant
Equipment Dispatch	(2,742,057)	0	0	0	(2,742,057)	0	0	As Net Plant
Capital OH Clearing	(3,212,011)	0	0	0	(3,212,011)	0	0	As Net Plant
Total Operational Support Services	**($1,042,061)**	**$0**	**$0**	**$0**	**($1,042,061)**	**$0**	**$0**	

EPCOR
Drainage COSA
Exhibit 7
Allocation of the Revenue Requirement - Stormwater

	Test Year 2024	Volume (VOL)	Weighted Actual Customer (AC)	Customer Acct/Svcs (WCA)	Equivalent SW Unit (ESU)	Revenue (RR)	Direct (DA)	Basis of Classification
Billing and Meter Reading								
CUS Charges (billing and collections)	$2,190,534	$0	$0	$0	$2,190,534	$0	$0	As Net Plant
Meter Reading	0	0	0	0	0	0	0	As Net Plant
Mtce - Meters	0	0	0	0	0	0	0	As Net Plant
Operations Mgmt and Admin	196,462	0	0	0	196,462	0	0	As Net Plant
Dispatch	484,672	0	0	0	484,672	0	0	As Net Plant
Customer Services	195,339	0	0	0	195,339	0	0	As Net Plant
Total Billing and Meter Reading	**$3,067,006**	**$0**	**$0**	**$0**	**$3,067,006**	**$0**	**$0**	
General and Admin Services								
Information Services	$2,177,317	$0	$0	$0	$2,177,317	$0	$0	As Net Plant
General Admin	3,673,066	0	0	0	3,673,066	0	0	As Net Plant
General & Tax Accounting	0	0	0	0	0	0	0	As Net Plant
Controller	708,343	0	0	0	708,343	0	0	As Net Plant
Marketing and Product Development	890,988	0	0	0	890,988	0	0	As Net Plant
Health Safety and Loss Prevention	1,017,776	0	0	0	1,017,776	0	0	As Net Plant
Training	687,848	0	0	0	687,848	0	0	As Net Plant
Incentive and Other Compensation - STIP/MTIP	829,369	0	0	0	829,369	0	0	As Net Plant
Contract Management	232,891	0	0	0	232,891	0	0	As Net Plant
Inventory Management	405,097	0	0	0	405,097	0	0	As Net Plant
Physical Security & EMBR	160,864	0	0	0	160,864	0	0	As Net Plant
Incentive and Other Compensation - Other Wages	788,324	0	0	0	788,324	0	0	As Net Plant
Total General and Admin Services	**$11,571,882**	**$0**	**$0**	**$0**	**$11,571,882**	**$0**	**$0**	
Corporate Allocations	**$9,585,534**	**$0**	**$0**	**$0**	**$9,585,534**	**$0**	**$0**	As Net Plant
Efficiencies	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	As Net Plant
Total O&M Expenses	**$55,183,175**	**$0**	**$0**	**$0**	**$55,183,175**	**$0**	**$0**	

EPCOR
Drainage COSA
Exhibit 7
Allocation of the Revenue Requirement - Stormwater

	Test Year 2024	Volume (VOL)	*Weighted* Actual Customer (AC)	*Weighted* Customer Acct/Svcs (WCA)	*Weighted* Equivalent SW Unit (ESU)	Revenue (RR)	Direct (DA)	*Basis of Classification*
Property Taxes	**$750,911**	**$0**	**$0**	**$0**	**$750,911**	**$0**	**$0**	As O&M Expenses
Depreciation	$60,284,216	$0	$0	$0	$60,284,216	$0	$0	As O&M Expenses
Less: Contributions Amortization	(33,797,752)	0	0	0	(33,797,752)	0	0	As O&M Expenses
Total Depreciation	**$26,486,464**	**$0**	**$0**	**$0**	**$26,486,464**	**$0**	**$0**	
Return on Rate Base - Debt	$24,592,761	$0	$0	$0	$24,592,761	$0	$0	As O&M Expenses
Total Return on Rate Base - Debt	**$24,592,761**	**$0**	**$0**	**$0**	**$24,592,761**	**$0**	**$0**	
Return on Rate Base - Equity	$35,357,067	$0	$0	$0	$35,357,067	$0	$0	As O&M Expenses
Total Return on Rate Base - Equity	**$35,357,067**	**$0**	**$0**	**$0**	**$35,357,067**	**$0**	**$0**	
Total Revenue Requirement	**$142,370,377**	**$0**	**$0**	**$0**	**$142,370,377**	**$0**	**$0**	
Less: Non-Operating Revenue								
Biosolids	$0	$0	$0	$0	$0	$0	$0	As Revenue Requirement
Compliance and monitoring	0	0	0	0	0	0	0	As Revenue Requirement
Pipeline Maintenance	409,459	0	0	0	409,459	0	0	As Revenue Requirement
Late payment charges	239,477	0	0	0	239,477	0	0	As Revenue Requirement
Other	9,233	0	0	0	9,233	0	0	As Revenue Requirement
Billing error/bad debts - Sanitary	0	0	0	0	0	0	0	As Revenue Requirement
Billing error/bad debts - Stormwater	0	0	0	0	0	0	0	As Revenue Requirement
Total Other Revenues	**$658,168**	**$0**	**$0**	**$0**	**$658,168**	**$0**	**$0**	
Net Revenue Requirement	**$141,712,209**	**$0**	**$0**	**$0**	**$141,712,209**	**$0**	**$0**	

EPCOR
Drainage COSA
Exhibit 8
Distribution of Total Revenue Requirement - Stormwater

		Residential	Multi-Residential	Commercial	Basis
Volume Related	$0	$0	$0	$0	*(VOL)*
Customer Related					
Actual Customer	$0	$0	$0	$0	*(AC)*
Weighted Customer	0	0	0	0	*(WCA)*
Equivalent Stormwater Unit	141,712,209	74,694,081	8,112,577	58,905,551	*(ESU)*
Total Customer Related	**$141,712,209**	**$74,694,081**	**$8,112,577**	**$58,905,551**	
Revenue Related	$0	$0	$0	$0	*(RR)*
Direct Assignment	$0	$0	$0	$0	*(DA)*
Total Revenue Requirements	**$141,712,209**	**$74,694,081**	**$8,112,577**	**$58,905,551**	

EPCOR
Drainage COSA
Exhibit 9
Cost of Service Analysis Summary - Stormwater

	2024	Residential	Multi-Residential	Commercial
Revenues at Present Rates	**$121,745,319**	$63,581,905	$6,757,135	$51,406,279
Distributed Revenue Requirement	**$141,712,209**	$74,694,081	$8,112,577	$58,905,551
Balance / (Deficiency) of Funds	**($19,966,890)**	**($11,112,176)**	**($1,355,442)**	**($7,499,272)**
Required % Change in Rates	**16.4%**	**17.5%**	**20.1%**	**14.6%**

EPCOR
Drainage COSA
Exhibit 10
Unit Costs Summary - Stormwater

	System Average	Residential	Multi-Residential	Commercial
Unit Cost - $ / Storm Equiv.				
Volume Related	$0.0000	$0.0000	$0.0000	$0.0000
Actual Customer	0.0000	0.0000	0.0000	0.0000
Weighted Customer	0.0000	0.0000	0.0000	0.0000
Equivalent Stormwater Unit	0.0834	0.0834	0.0834	0.0834
RR / DA	0.0000	0.0000	0.0000	0.0000
	-----------	-----------	-----------	-----------
Total	**$0.0834**	**$0.0834**	**$0.0834**	**$0.0834**
	Current Rates			
Basic Data				
Equivalent Stormwater Units	1,699,082,972	895,557,570	97,267,142	706,258,260

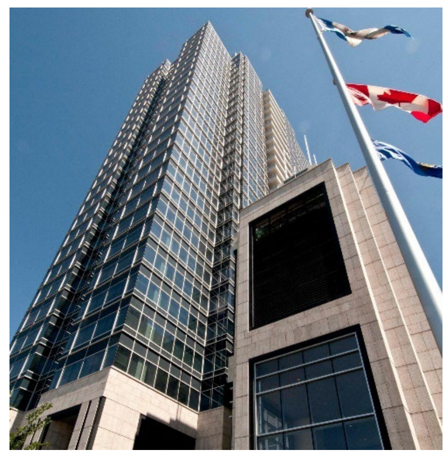
Appendix K-2

EPCOR WATER SERVICES

HDR Cost of Service Studies

May 31, 2024

Final Report



2023 Wastewater Treatment Cost of Service Study

April 2024

April 29, 2024

Mr. Santosh Appukuttan
EPCOR Water Services, Inc.
9496 Rossdale Road NW
Edmonton, Alberta T5K 0A5

Subject: Comprehensive Wastewater Treatment Cost of Service Study Final Report

Dear Mr. Appukuttan:

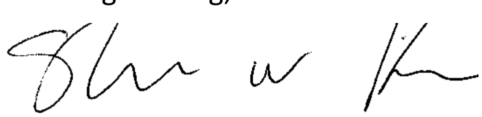
HDR Engineering, Inc. (HDR) was retained by EPCOR Water Services, Inc. (EPCOR) to provide technical assistance in the update of EPCOR’s wastewater treatment cost of service analysis to support EPCOR’s efforts in establishing cost-based rates for its wastewater treatment customers.

EPCOR was responsible for the development of the revenue requirement data which was provided to HDR for input into the cost of service analysis (model). The model and analysis were developed utilizing EPCOR’s accounting, operating and management records. Based on the revenue requirement developed by EPCOR, HDR then developed a cost of service analysis to determine the equitable distribution of costs between the various wastewater treatment customer classes of service. HDR has relied on this information to develop our analyses, from which we draw our findings, conclusions and recommendations.

The analysis and model developed for EPCOR was prepared using generally accepted cost of service and rate making methodologies and principles. These generally accepted industry standard cost of service methodologies and principles are defined by the Water Environment Federation (WEF). The cost of service methodology used for EPCOR has been tailored to the specific and unique circumstances and facilities owned and operated by EPCOR. This report details the findings and conclusions of the analysis conducted herein. The development of the model and technical analysis is intended to provide cost-based, defensible, and equitable wastewater rates to EPCOR’s wastewater treatment customers.

We appreciate the opportunity to provide technical assistance to EPCOR. We also appreciate the assistance provided by EPCOR management and staff in the development of this study.

Sincerely yours,
HDR Engineering, Inc.



Shawn Koorn
Associate Vice President

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1 Introduction and Overview

HDR Engineering, Inc. (HDR) was retained by EPCOR Water Services, Inc. (EPCOR) to provide technical assistance in the development of a wastewater treatment cost of service analysis (the Study) to support EPCOR's historical practice of establishing cost-based rates. This report outlines the approach, methodology, findings, and conclusions of the cost of service analysis developed for EPCOR's wastewater treatment services.

This report was developed utilizing EPCOR's accounting, operating and management records, and revenue requirement as provided by EPCOR. HDR has relied on this information to develop the wastewater treatment cost of service analysis, from which we have drawn our findings, conclusions, and recommendations. At the same time, the Study was developed utilizing generally accepted utility rate setting methodologies and principles as outlined by the Water Environment Federation (WEF). This report provides EPCOR with the basis for developing and implementing wastewater rates which are cost-based to its customers.

1.1 Study Goals and Objectives

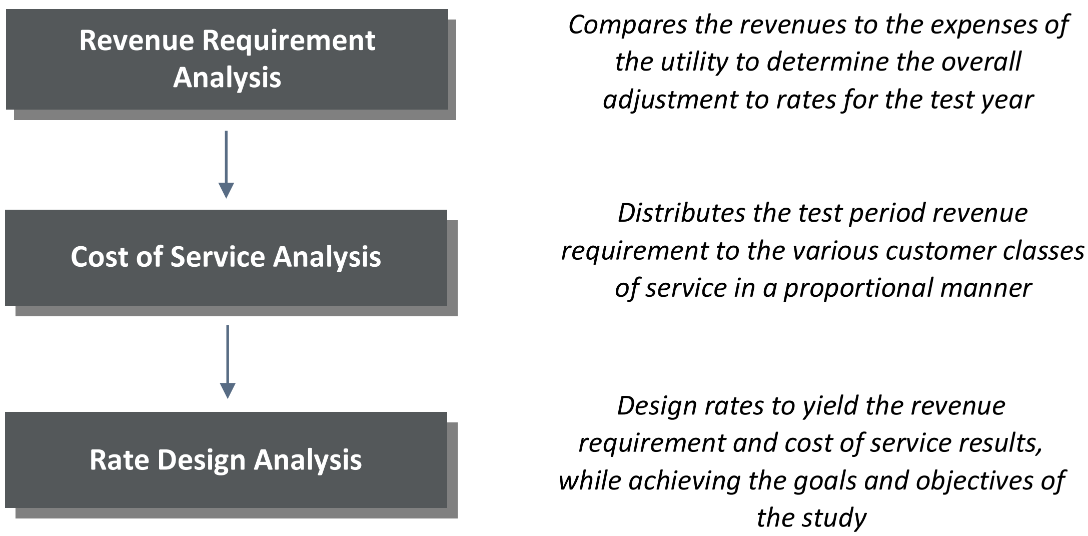
The development of the Study was based on several key goals and objectives. In general, these were as follows:

- Develop a wastewater treatment cost of service analysis that is consistent with the principles and methodologies established by the WEF Manual of Practice No. 27, Financing and Charges for Wastewater Systems.
- Develop a cost of service methodology to proportionally distribute the cost of providing wastewater treatment to various customer classes of service.
- Review the current wastewater treatment rate structure for discussion and review by EPCOR for their future consideration.
- Provide EPCOR with a cost of service model to use and evaluate the distribution of future wastewater treatment costs and rate impacts.

1.2 Overview of the Comprehensive Rate Study Process

Provided below in Figure 1 – 1 is an overview of the steps required to conduct a comprehensive rate study.

Figure 1 – 1
Overview of the Comprehensive Rate Study Process



The framework or methodology shown in Figure 1 - 1 provides an overview of the typical components of a comprehensive study. Each of these steps of the rate setting process and the technical analyses associated with them are based on the generally accepted wastewater rate-setting methodologies and principles described in the WEF Manual of Practice (MOP) #27. An important aspect of the Study is incorporating and tailoring each of these analytical elements to reflect the specific and unique circumstances and characteristics of EPCOR's wastewater treatment system.

1.3 Summary

This report provides a summary of the technical analyses undertaken to develop EPCOR's wastewater treatment cost of service analysis. The Study has been developed using generally accepted wastewater cost of service methodologies and principles. This report and our analyses are designed and intended to provide EPCOR with the information necessary to continue to develop cost-based and proportional rates applicable to its wastewater treatment utility. At the conclusion of this report, a technical appendix is attached which provides the detailed exhibits and technical analyses completed to support the wastewater treatment cost of service analysis.

2 Wastewater Treatment Revenue Requirement

This section of the report discusses the revenue requirement for EPCOR's wastewater treatment utility. EPCOR management and staff developed the test period wastewater treatment costs and associated revenue requirement analysis. The results of the revenue requirement analysis provide a framework around which to evaluate the overall adequacy of EPCOR's current wastewater treatment rates. Provided below is a detailed discussion of the revenue requirements as independently developed by EPCOR management and staff. This wastewater treatment revenue requirement is then carried forward and utilized within the cost of service analysis developed for EPCOR by HDR.

2.1 Revenue Requirement Framework

By virtue of the differences between a public utility and a private utility, the revenue requirement is often based upon different elements or methodologies. Most private or regulated utilities utilize what is known as a "utility or accrual" basis of determining the revenue requirement. This approach calculates a utility's annual revenue requirement by aggregating operation and maintenance (O&M) expenses, taxes, depreciation expense and return on investment.

In contrast to the utility or accrual method of developing the revenue requirement for privately-owned utilities, a different method of determining annual revenue requirement is often used for governmentally-owned public utilities. The "cash basis" methodology is used by most governmental or public utilities for developing the revenue requirement. As the name implies, a public utility aggregates its cash expenditures to determine its total revenue requirement for a specified period of time.

Table 2 - 1 summarizes and compares the components of the cash and utility/accrual basis methodologies.

Table 2 – 1
Cash versus Utility Basis Comparison

	Cash Basis		Utility Basis (Accrual)
+	O&M Expenses	+	O&M Expenses
+	Taxes/Transfer Payments	+	Taxes/Transfer Payments
+	Capital Improv. Funded From Rates (≥ Depreciation Expense)	+	Depreciation Expense
+	Debt Service (Principal + Interest)	+	Return on Investment
=	**Total Revenue Requirement**	=	**Total Revenue Requirement**

EPCOR is a regulated utility providing wastewater treatment services and, therefore, the utility basis approach was utilized. This methodology is consistent with EPCOR's past rate setting methodologies and practices.

2.2 Revenue Requirement Analysis

The second step is to determine a method of accumulating costs. As discussed above, EPCOR used a utility basis methodology. Given this basic analytical framework, the wastewater treatment revenue requirement was developed for the review period. As noted above, the wastewater treatment revenue requirement used for the study was developed by EPCOR management and staff. This portion of the report will summarize and discuss the basic components and results of EPCOR's wastewater treatment revenue requirement analysis. The initial step in calculating the revenue requirement was to establish a time period around which the revenue requirement would be reviewed. The revenue requirement was developed by EPCOR for 2024 - 2027 and then projected for 2028 through 2033 based on assumed rates of revenue and expense escalation. Provided below in Table 2 - 2 is a summary of the wastewater treatment revenue requirement developed by EPCOR.

Table 2 – 2
Summary of the Wastewater Treatment Revenue Requirement ($000)

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
Rate Revenues	$142,799	$147,205	$149,725	$151,757	$154,792	$157,888	$161,046	$164,267	$167,552	$170,903
Other Revenues	7,969	8,132	8,158	8,240	8,355	8,472	8,591	8,711	8,833	8,957
Total Revenues	**$150,768**	**$155,336**	**$157,883**	**$159,997**	**$163,147**	**$166,360**	**$169,636**	**$172,978**	**$176,385**	**$179,860**
Expenses										
O&M Expenses	$79,129	$84,316	$85,886	$87,393	$89,053	$90,745	$92,470	$94,227	$96,017	$97,841
Taxes	$931	$949	$967	$984	$1,003	$1,022	$1,041	$1,061	$1,081	$1,102
Depreciation	28,004	30,119	31,285	32,704	33,325	33,958	34,604	35,261	35,931	36,614
Financing Costs	10,682	11,720	12,249	14,138	15,057	16,036	17,078	18,188	19,371	20,630
Return on Investment	31,642	29,677	30,514	26,904	26,904	26,904	26,904	26,904	26,904	26,904
Total Expenses	**$150,387**	**$156,782**	**$160,901**	**$162,123**	**$165,342**	**$168,665**	**$172,096**	**$175,641**	**$179,303**	**$183,090**
Bal. / (Def.) of Funds	$381	($1,446)	($3,017)	($2,126)	($2,195)	($2,305)	($2,460)	($2,663)	($2,919)	($3,230)

As noted previously, the above wastewater treatment revenue requirement was developed by EPCOR and provided to HDR as the basis for the costs to be proportionally distributed within the cost of service analysis.

2.3 Summary

This section of the report has provided a summary of the wastewater treatment revenue requirements as developed by EPCOR. The costs within the revenue requirement analysis were used by HDR as the starting point for the wastewater treatment cost of service analysis. The next section of the report will discuss the development of the EPCOR's wastewater treatment cost of service analysis.

3 Wastewater Treatment Cost of Service Analysis

This section of the report details the wastewater treatment cost of service analysis developed by HDR Engineering, Inc. (HDR) for EPCOR's wastewater treatment utility. The cost of service proportionally distributes the revenue requirement as provided in Section 2. Provided below is a more detailed discussion of the key technical steps of the cost of service analysis undertaken and a summary of our findings, conclusions and recommendations.

3.1 Cost of Service Analysis

The objective of the cost of service analysis is to proportionally distribute the revenue requirement to the various customer classes of service (e.g., residential, commercial, etc.). By following the generally accepted guidelines and principles of a cost of service analysis, wastewater treatment rates are developed which are proportional and cost-based.

As discussed in Section 2, the utility basis approach is the generally accepted methodology used by EPCOR to establish the level of costs to be proportionally distributed within the cost of service analysis. There are two primary objectives in conducting a cost of service analysis:

1. Proportionally distribute the revenue requirement among the customer classes of service
2. Derive average unit costs for subsequent reference/use in designing final rates

The objectives of the cost of service analysis are different from determining the revenue requirement. As noted in the previous section, a revenue requirement analysis determines the utility's level of revenue required, while the cost of service analysis provides a methodology to determine the proportional manner in which to collect the revenue from the various customer classes of service.

The second rationale for conducting a cost of service analysis is to ensure a rate is designed such that it properly reflects the costs incurred by the utility. For example, a wastewater utility incurs costs related to wastewater flow, strength, and customer cost components. A wastewater utility typically designs and builds infrastructure to sufficiently handle both the total flow as well as the wastewater strength delivered to the treatment plant. Therefore, those customers impacting the wastewater treatment system in these different ways should contribute their proportional share of the costs, based upon the respective burdens each place upon the system (e.g., high flow / low strength, low flow / high strength, etc.). Each of these types of costs may be collected in a slightly different manner as to allow for the development of wastewater treatment rates that collect costs in roughly (i.e., proportionally) the same manner as they are incurred.

3.2 Establishing Customer Classes of Service

The first step in a cost of service study is to determine the customer classes of service. To proportionally distribute costs, the utility must develop customer classes of service. Generally, the utility will group customers in classes of service that have similar usage patterns and facility requirements.

EPCOR's current wastewater treatment rate schedules (classes of service) are as follows:

- Single Family
- Multi-Family
- Commercial
- Overstrength (High Strength Wastewater Customers)

During the development of the cost of service study, various alternative customer classes of service were discussed with EPCOR staff. As a starting point for that discussion, HDR noted that EPCOR has established a set of customer classes of service which appear to be reasonable and, in HDR's opinion, follow current wastewater utility industry approaches. The establishment of customer classes of service allows for the development of cost-based wastewater treatment rates and the ability to establish rate structures for each customer class of service that reflects the overall goals and objectives of EPCOR.

3.3 Key Assumptions of the Cost of Service

A number of key assumptions were used within EPCOR's wastewater treatment cost of service study. Listed below is a brief discussion of the major assumptions used.

- The test year used for the wastewater treatment cost of service analysis was the forecasted or projected 2024 revenue requirement
- The revenue and expense data utilized by HDR within the Study was provided by EPCOR
- A utility basis approach or methodology was utilized for the cost of service analysis. This is a generally accepted methodology for accumulating costs and distributing them within a cost of service analysis. This generally accepted methodology is described in detail in the Water Environment Federation, Manual of Practice No. 27.
- The allocation and distribution of EPCOR's plant in service and revenue requirement was also developed based on generally accepted methodologies as described in the Water Environment Federation, Manual of Practice No. 27. The methodologies were tailored to reflect EPCOR's specific and unique treatment plant facilities and operations.
- The distribution factors for volume and strength, used within EPCOR's cost of service analysis to proportionally assign costs to the identified classes of service, were developed using EPCOR specific data as provided by EPCOR

3.4 General Cost of Service Procedures

In order to determine the cost to serve each customer class of service on the system, a cost of service analysis is conducted. A cost of service study utilizes a three-step approach to develop the cost to provide service to each customer class. These steps take the form of functionalization, allocation, and distribution. Provided below is a more detailed discussion of the wastewater treatment cost of service study, and the specific steps taken within EPCOR's analysis.

3.4.1 Functionalization of Costs

The first analytical step in the wastewater treatment cost of service process is called ***functionalization***. Functionalization is the arrangement of expenses and asset (plant) data by major operating components and functions within the treatment plant. Within the Study, the functionalization of the cost data was already largely accomplished through EPCOR's accounting and asset records.

3.4.2 Allocation of Costs

The second analytical task performed in a wastewater treatment cost of service study is the ***allocation*** of the costs. Allocation determines why the expenses were incurred or what type of need is being met. The utility's plant accounts (assets) and revenue requirement were reviewed and allocated.

- **Volume Related Costs:** Volume related costs are those costs which tend to vary with the total quantity or volumes of wastewater treated.
- **Strength-Related Costs:** Wastewater strength is a label which describes the physical, biological and chemical characteristics of the wastewater. Strength-related costs refer to specific wastewater characteristics and the process/cost associated with treating different contaminants and their concentration in the effluent. Higher strength discharges require additional treatment to meet discharge requirements. Strength levels or the parameters of wastewater can be measured in a variety of ways. For purposes of EPCOR's cost of service analysis, strength was characterized/measured based the following parameters: biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), total nitrogen (TKN), total phosphorous (TP), and oil and grease (OG). As already noted, increased or higher levels of these strength constituents generally equate to increased treatment costs for most wastewater treatment systems.
- **Customer-Related Costs:** Customer-related costs vary with the addition or deletion of a customer or a cost which varies as a function of the number of customers served. Customer related costs typically include the costs of billing, collecting, and accounting.
- **Revenue-Related Costs:** Some costs associated with the utility may vary with the amount of revenue received by the utility. An example of a revenue related cost would be a utility tax, or franchise fee, which is based on gross utility revenue.

Given the above types of costs, EPCOR's revenue requirement is allocated to the appropriate cost component(s) based upon the reason why the cost was incurred (e.g., to meet a volume-related need, etc.) as outlined in industry standard wastewater cost of service principles and specific operation of EPCOR's treatment process.

3.4.3 Development of Distribution Factors

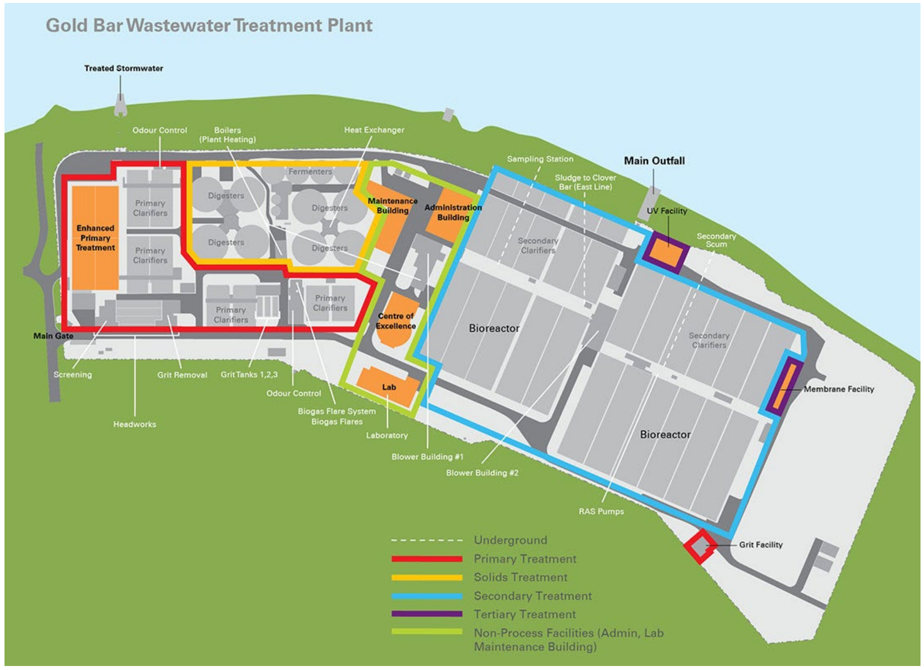
Once the allocation process is complete, and the customer groups have been defined, the each of the allocated cost components are proportionally ***distributed*** to each customer class of service, or rate schedule. EPCOR's wastewater treatment utility's allocated costs were distributed to the various customer groups using the following distribution factors.

- **Volume Distribution Factor:** Volume-related costs are distributed on the basis of estimated class contributions to wastewater flows. Wastewater flows are not typically metered and given that, a reasonable methodology or surrogate must be used in order to estimate each customer class's contribution. As part of the data and information that EPCOR provided HDR, there was an estimate developed for each customer type which was used as the basis for the distribution of costs related to volume allocated costs. To verify the reasonableness of the estimated flows, the calculated total flows used in this distribution factor was compared to the recent historical flows at the treatment plant. The total volume in the distribution factor was approximately the same as the historical flows at the treatment plant. The calculation of the volume distribution factor is shown in Exhibit 3 of the technical appendix.
- **Customer Distribution Factor:** Customer costs, within the cost of service analysis, are distributed to each customer classes of service based upon their respective number of customer accounts. Two types of customer distribution factors were developed – actual and weighted. The actual customer distribution factor assumes that there is no disproportionate cost associated with serving a customer (e.g., postage for bills is the same cost per customer, regardless of the size or usage of the customer). In contrast, a weighted customer distribution factor assumes that there is some disproportionality associated with serving different types of customers and attempts to estimate the level of difference in serving the customers. It is important to note that for this Study, no per customer cost differences or weighting differences between customers was assumed. Exhibit 4 of the technical appendix provides the calculation of the customer allocation factors.
- **Strength-Distribution Factor:** Strength-related costs are allocated (i.e., assigned) between the wastewater parameters of BOD, COD, TKN, TP, TKN, OG, and TSS. Each of these specific types of strength-related costs are then equitably distributed to each class of service based upon flow contributions and the assumed strength level the class of service is contributing. For the Single Family, Multi-Family and Commercial customers, the assumed wastewater strength-levels were set at domestic level strengths. In contrast to this, Overstrength customers reflect those customers with higher strength wastewater discharged to EPCOR's wastewater treatment system and their strength levels are based on actual kilograms removed for each constituent from the actual testing done on overstrength customers. Exhibit 5 in the technical appendix provides the calculation of the strength-distribution factors.
- **Revenue-Related Distribution Factor:** The revenue related distribution factor was developed from the projected rate revenues for 2024 for each customer class of service. These revenue projects were developed as a part of the revenue requirement analysis (Exhibit 2). A summary of the revenue-related distribution factor is provided in Exhibit 6 of the technical appendix.

Given the development of the distribution factors, the final step in the wastewater treatment cost of service analysis was to distribute the allocated costs to the various customer classes of service.

3.5 Functionalization and Allocation of Plant in Service (Rate Base)

A necessary step of the cost of service is the functionalization and allocation of wastewater treatment plant in service (assets and infrastructure). In performing the functionalization of plant in service, HDR utilized EPCOR's historical plant account records. The purpose of the allocation step of the cost of service is to determine why the specific plant assets (treatment plant components) are in place, and what function they provide in the treatment process. In other words, which allocation component (Vol, BOD, COD, TKN, etc.) does the asset support or provide a benefit to.



The functionalization of EPCOR's wastewater treatment plant assets (plant in service) was largely accomplished from the existing asset records. The net plant in service balances were provided by EPCOR and were reflective as of December 31, 2022. Once the treatment assets were functionalized, the analysis shifted to allocation of the asset. The allocation process included reviewing each line item and determining which allocation cost components the assets were related to. During the course of the development of this portion of the analysis, there was significant review and discussion on the functionalization and allocation of the treatment plant and its components in the prior study. This allocation approach was reviewed and discussed with EPCOR treatment plant and engineering staff to finalize the allocations of the treatment plant assets. The proposed allocations are based on HDR and EPCOR's understanding of the treatment facilities which are currently in place, their current operations, and generally accepted allocation methodologies for wastewater treatment. Table 3 - 1 provides the basis for the allocation of EPCOR's Gold Bar Wastewater Treatment Plant in service.

Table 3 – 1
Summary of the Wastewater Treatment Net Plant in Service ($000)

		Strength – Related						
	VOL	**BOD**	**COD**	**TKN**	**TP**	**OG**	**TSS**	**Cust**
Land	$0	$0	$0	$0	$0	$0	$0	$421
WWTP								
Admin	$0	$0	$0	$0	$0	$0	$0	$2,819
Air Scrub	0	0	0	0	0	5,357	5,357	0
Main Control Room	23	26	28	55	65	47	87	2
Aux Control Room	13	15	16	31	36	27	49	1
Blowers	0	1,220	488	2,683	488	0	0	0
Boilers	885	1,019	1,088	2,131	2,518	1,837	3,392	87
CBF (inc. Ostara)	2,163	2,490	2,659	5,208	6,152	4,489	8,288	212
Center of Excellence	9,521	0	0	0	0	0	0	0
Digesters	0	12,084	5,179	17,263	17,263	17,263	17,263	0
Distribution Station	29	33	36	70	83	60	111	3
Enhanced Prim. Treat. (PRI)	0	0	16,479	7,553	0	24,718	19,912	0
Flare	0	81	35	115	115	115	115	0
Grit	0	0	4,310	1,437	0	1,437	7,183	0
Laboratory	195	703	703	703	703	195	703	0
Maintenance Building	136	156	167	326	386	281	520	13
Outfall	0	0	0	0	0	0	0	0
Penthouse	24	28	30	59	69	51	93	2
Screens	1,551	0	0	0	0	0	3,619	0
Sampling	9	31	31	31	31	9	31	0
Scum	0	497	0	0	0	1,160	0	0
Bioreactor/Secondary Clarifier	0	10,374	4,446	22,229	29,639	0	7,410	0
Substation	48	56	59	116	137	100	185	5
UV	2,266	0	0	0	0	0	0	0
Waste Activated Sludge	0	647	277	1,386	1,848	0	462	0
Pre Treatment / Diversion	19,734	0	0	0	0	0	46,046	0
Lagoon	0	443	190	633	633	633	633	0
Effluent Water	0	211	90	301	301	301	301	0
Fermenter	0	0	0	4,019	18,948	0	0	0
Sludge	0	4,761	2,040	6,801	6,801	6,801	6,801	0
CWIP	0	0	0	0	0	0	0	0
Total	**$36,598**	**$34,873**	**$38,349**	**$73,150**	**$86,215**	**$64,881**	**$128,560**	**$3,566**
General Plant	$4,260	$4,902	$5,235	$10,254	$12,113	$8,838	$16,319	$418
Total Net Plant in Service	**$41,285**	**$40,558**	**$44,234**	**$84,849**	**$99,959**	**$75,022**	**$146,933**	**$4,026**

Table 3 - 1 provides a summary of the basic functionalization and allocation of EPCOR's wastewater treatment plant assets. A detailed exhibit of the functionalization and allocation of plant investment can be found in the Technical Appendix, Exhibit 7c.

Provided in Table 3 – 2 is a summary of the percentage allocation to the various cost components of EPCOR's total wastewater treatment plant in service.

Table 3 – 2
Summary of the Wastewater Treatment Net Plant in Service Allocation ($000)

			Strength – Related						
	Total	**VOL**	**BOD**	**COD**	**TKN**	**TP**	**OG**	**TSS**	**Cust**
Total Allocation	100.0%	*7.7%*	*7.5%*	*8.2%*	*15.8%*	*18.6%*	*14.0%*	*27.4%*	*0.7%*

3.6 Functionalization and Allocation of Operating Expenses

Operating expenses are generally functionalized and allocated in a manner similar to the corresponding plant account (i.e., Tables 3 - 1 and 3 - 2). This approach to the allocation of operating expenses was used within EPCOR's wastewater treatment analysis. For the cost of service study, the 2024 revenue requirement for the wastewater treatment utility prepared by EPCOR was functionalized and allocated based on the allocation of treatment plant.

As noted previously, the revenue requirement was developed utilizing the utility/accrual basis methodology which was comprised of operation and maintenance expenses, annual depreciation expense, revenue tax, and a return on rate base (net plant in service). Similar to the allocation of plant in service, the analysis reviewed each line of the revenue requirement to determine the appropriate allocation of the revenue requirement component. In general, the majority of the revenue requirement was allocated as "net plant", or the overall percentages shown above in Table 3 - 2. However, there were also specific line items that were allocated to specific cost components. As examples, item such as franchise fees were allocated as revenue-related, chemicals were assigned to the strength related categories of phosphorus (TP) and suspended solids (TSS), and billing, meters, and customer service were allocated to the customer-related cost component.

One key objective of EPCOR's cost of service analysis is to review the costs associated with providing high strength treatment services, or service to "overstrength" customers. In reviewing the allocation of the revenue requirement, EPCOR has a separate line item that is related to managing and monitoring the overstrength customer program. This cost was directly assigned to the overstrength customer class of service so that the overstrength customers assume the cost responsibility for the administration and activities associated with the overstrength program. Provided in Table 3 – 3 is a summary of the allocated revenue requirement for EPCOR's wastewater treatment utility.

Table 3 – 3
Summary of the 2024 Wastewater Treatment Expense Allocation ($000)

		Strength – Related								
	VOL	BOD	COD	TKN	TP	OG	TSS	Cust	RR	DA
Total $	$7,531	$7,398	$8,069	$15,477	$18,740	$13,685	$38,947	$20,520	$10,469	$1,583
Total %	5.3%	5.2%	5.7%	10.9%	13.2%	9.6%	27.3%	14.4%	*7.4%*	*1.1%*

As shown in Table 3 - 3, EPCOR's total revenue requirement has been allocated between the various cost components. A more detailed review of the allocation of EPCOR's wastewater treatment revenue requirement can be found in the Technical Appendix on Exhibit 8.1. These totals are then distributed between each customer class of service (rate schedule) based on their proportional share (i.e., contribution) of the allocated costs. As a point of reference, the DA (direct assignment) is the allocation of the overstrength program costs to the overstrength customers.

3.7 Distribution of the Revenue Requirement

The next step in the cost of service process is the proportional distribution of the allocated costs to the customer classes of service. As noted in Section 3.4.3, a distribution factor was developed for each cost component. The distribution factor provides the basis for the proportional distribution of each cost component to each customer class of service. Provided below in Table 3 - 4 is a summary of the distributed revenue requirement to each customer class of service.

Table 3 – 4
Summary of the Distributed 2024 Revenue Requirement ($000)

	Total	Single Family	Multi-Family	Commercial	Over-Strength
Volume Related	**$7,531**	**$4,028**	**$1,593**	**$1,910**	**$0**
Strength Related					
Biochemical Oxygen Demand	$7,398	$3,608	$1,427	$1,711	$652
Total Suspended Solids	38,947	20,017	7,916	9,490	1,524
Chemical Oxygen Demand	8,069	4,290	1,696	2,034	49
Total Nitrogen	15,477	7,755	3,067	3,677	978
Oil & Grease	13,685	6,863	2,714	3,254	854
Total Phosphorous	18,740	9,677	3,827	4,588	648
Total Strength Related	**$102,316**	**$52,209**	**$20,648**	**$24,753**	**$4,706**
Customer Related					
Actual Customer	$20,520	$19,115	$250	$1,155	$0
Weighted Customer	0	0	0	0	0
Total Customer Related	**$20,520**	**$19,115**	**$250**	**$1,155**	**$0**
Revenue Related	**$10,469**	**$6,409**	**$1,862**	**$2,197**	**$0**
Direct Assignment	**$1,583**	**$0**	**$0**	**$0**	**$1,583**
Total Revenue Requirement	**$142,419**	**$81,762**	**$24,353**	**$30,015**	**$6,289**

As shown in Table 3 - 4, the distribution of the revenue requirement is developed for each allocation component. Another key component to note is that overstrength customers are only allocated strength-related costs and the direct assignment costs. This reflects the fact that the volume component is picked up through the treatment rate for the customer (e.g., commercial rate), and the overstrength component is for the additional impacts over and above typical (domestic) strength levels for each constituent as developed by EPCOR. A summary of the distribution of the revenue requirement is provided in Exhibit 9b of the technical appendix.

3.8 Summary of the Cost of Service Results

In summary form, EPCOR's wastewater treatment cost of service analysis began by functionalizing the plant asset records and revenue requirement. The functionalized plant and expense accounts were then allocated to the appropriate cost component(s). The individual allocation totals were then distributed to each of the customer classes of service based on the appropriate distribution factor. The distributed expenses for each customer class of service were then aggregated to determine each customer class's overall revenue responsibility. The total distributed costs are then compared to the current revenues received from each customer class of service to provide a measure of the current rates to each class's cost responsibility, if the cost of service results were implemented. A summary of the detailed cost responsibility developed for each class of service for 2024 is summarized below in Table 3 - 5.

Table 3 – 5
Summary of the EPCOR 2024 Cost of Service Results ($000)

	Present Revenue	Distributed Costs	$ Difference	% Difference
Single Family	$83,824	$81,762	$2,062	-2.5%
Multi-Family	24,354	24,353	1	0.0%
Commercial	28,740	30,015	(1,275)	4.4%
Overstrength	5,881	6,289	(407)	6.9%
Total	**$142,799**	**$142,419**	**$381**	**-0.3%**

The distribution of costs reflects the facilities and costs proportionally distributed to each customer class, reflective of their respective benefit. The cost of service results indicated that minor cost differences exist between the customer classes of service. A cost of service analysis is a dynamic analysis and the results change over time as costs change and as customer usage changes. Given that dynamic, HDR typically reviews a cost of service to determine whether a class of service is within a "reasonable range of their cost of service." The metric that HDR utilizes is a class of service is assumed to be within a "reasonable range of their cost of service" if the class is within ± 5% of the overall required adjustment. In other words, given EPCOR's -0.3% overall adjustment in this analysis, a class of service would be considered within a "reasonable range of their cost of service" if they are within the range of +5.0% to –5.0%.

The results above indicate that all but the overstrength customer class of service are "within a reasonable range of their cost of service", however, they are only very slightly outside the range. As noted previously, a key component of the Study was the review of costs distributed to the overstrength customers to determine if overstrength rates are set at an appropriate level. Given these results, it would support the movement, or adjustment, of overstrength rates towards the cost of service results.

As noted above, this cost of service has been based upon a specific time period (2024), and costs and usage can change over time. As a result, HDR believes that cost of service is often best determined over an extended number of studies. It is recommended that EPCOR continues to review the wastewater treatment cost of service for the various customer classes before making interclass adjustments. The detailed summary of the cost of service analysis can be found in the Wastewater Treatment Technical Appendix, Exhibits 9a, 9b, and 10.

3.9 PBR Rate Setting and the Use of the Cost of Service Analysis

EPCOR uses a performance-based-ratemaking (PBR) approach for establishing its wastewater treatment rates. As the name implies, the PBR approach to ratemaking attempts to link rate adjustments (price) to performance. In contrast, traditional ratemaking simply links price to cost, regardless of performance or efficiency. Under either ratemaking framework, including PBR, the starting point for establishing the final wastewater treatment rates is the cost of service analysis. The following notes this cost of service perspective:

> *"The starting point for utility rates generally is a cost of service study. The subsequent years' rates are determined by applying the PBR formula to adjust the previous rates for the effects of inflation and for productivity improvements."* [1]

As cited above, the starting point for establishing utility rates, including EPCOR's wastewater treatment rates, is the cost of service analysis (Study). In particular, the cost of service analysis provides two important items of information which are used to establish the initial PBR rates. These items are as follows:

- ✓ Target revenue levels by customer class of service
- ✓ Average unit costs (cost-based rates)

The target revenue levels establish the level of revenue to be derived from each customer class of service. The average unit costs, as developed in the cost of service, provide the cost-basis for beginning to establish the fixed and variable wastewater treatment charges associated with each customer group. The average unit costs from the cost of service study are shown in Exhibits 11a and 11b of the Technical Appendix.

3.10 Summary

This section of the report has provided a summary of the wastewater treatment utility cost of service analysis completed for EPCOR. This analysis was prepared using generally accepted cost

[1] Performance-Based Ratemaking: Theory and Practice, Dr. Michael R. Schmidt, Public Utilities Reports, Inc., Vienna, Virginia, 2000, p. 2

of service techniques, which have been tailored to reflect EPCOR's specific and unique wastewater treatment system and operations.

4 Wastewater Treatment Rate Design

The final step of a comprehensive wastewater treatment rate study is the design of rates to collect the desired levels of revenue, based on the results of the revenue requirement and cost of service analyses. This section of the report will discuss the key considerations and costs for the development of EPCOR's wastewater treatment rates.

4.1 Rate Design Goals and Objectives

In reviewing water rate designs, consideration is given to both the ***level*** of the rates and the ***structure*** of the rates. Level refers to the total revenue to be collected from a rate design; while structure refers to the way or manner (fixed vs. variable) the revenue is collected (i.e., how the customer is ultimately assessed for service). Provided below is an overview of the rate design process for EPCOR's wastewater treatment cost of service study.

4.1.1 Rate Design Criteria and Considerations

The key starting point for developing EPCOR's wastewater treatment rate design is to gain an understanding of EPCOR's specific rate design goals and objectives. Understanding EPCOR's rate design goals and objectives for their wastewater treatment rates can lead to exploring different rate structures, including the relationship between the monthly fixed charges and volumetric charges, along with how strength charges may be handled. Typical utility rate design goals and objectives include items such as rates being cost-based, easy to understand and administer, and that are set at a level that produce adequate revenues.

The rate manual, Principles of Public Utility Rates[2] by James C. Bonbright, is often cited as an important source or guide on the development of rates, particularly as it relates to determining rate design goals and objectives. In this rate manual, Bonbright created a list of key attributes (i.e. goals and objectives) that may be considered in the establishment of utility rates. Provided below is a paraphrased list of Bonbright's key rate design attributes.

Revenue-Related Attributes:

- Rates should be designed to **meet the total revenue requirement needs** under the "utility/accrual basis approach".[3]
- Rates should provide **revenue stability and predictability**; with a minimum of unexpected changes seriously adverse to the utility (e.g., annual swings in planned revenue should, for example, be no greater than +10% or –10%).
- From the customer's perspective, the rates should result in **customer bills that are stable**

[2] James C. Bonbright; Albert L. Danielsen and David R. Kamerschen, Principles of Public Utility Rates, (Arlington, VA: Public Utilities Report, Inc., Second Edition, 1988), p. 383-384.

[3] The AWWA M-1 Manual, Principles of Water Rates, Fees and Charges, discusses two "generally-accepted" methodologies for establishing revenue requirements; the cash basis and utility/accrual basis. Most private utilities, including EPCOR utilize the "utility/accrual basis" methodology. Under this approach, a utility sums its O&M, taxes, depreciation expense and return on rate base (investment) to equal its revenue requirements.

and predictable. The implementation of new rate structures should be consistent with past rate setting philosophy and minimize customer bill impacts during any change in rate structure.

Cost-Related Attributes:

- The rate structure should **promote efficient use** of services and discourage or penalize inefficient uses.
- The rate structure should **reflect all traditional internal costs** (direct and indirect) incurred, **and under appropriate situations and conditions** (e.g., severe drought) may also **include present and future costs and benefits** (i.e., marginal cost and/or value of commodity).
- **Fairness of the rates** in the distribution of total costs of service among the different ratepayers so as to **avoid arbitrariness, capriciousness and to attain equity**. The rates and the rate structure shall be based upon a fair distribution of total cost of service among the customer classes of service by use of a "generally accepted" cost of service methodology such as defined in the Water Environment Federation Manual of Practice #27.
- The rates should be, as practically possible, **non-discriminatory**, between customer groups, and within each customer group. The rate structures should avoid interclass subsidies whenever possible to ensure each class pays its full cost of service.
- The **responsiveness of the rate to respond to changes in demand and supply patterns**. The rate structure should be developed such that it either responds appropriately or alternatively, contains the flexibility to allow the utility to respond to the changing needs as a result of supply, demand, and/or environmental concerns (e.g., drought conditions).

Practical-Related Attributes:

- From the customer's perspective, the rate structure should be **simple to understand**, such that the customer can easily understand the bill. From the utility's perspective, the rate structure should be **easy to administer**. Finally, the rate structure should have acceptance by the majority of the customers that the rate structure and resulting bills are "fair and equitable."
- **Freedom from controversies** as to the application of the rate schedule to the customer and calculation of the customer's bill. It should be simple to explain and understand by the average customer to minimize any misinterpretation regarding the customer's bill and the overall goals that the rate structure has been developed to meet.

4.2 Current Wastewater Treatment Rates

In reviewing the above rate design goals and objectives it is important to understand that all of these goals and objectives cannot be achieved in a single rate design, and in some cases, certain goals and objectives may be in conflict with each other. For example, rates that are cost-based may be challenging from a customer affordability perspective. In that respect, EPCOR must consider each of these goals and objectives and attempt to balance them in a way that meets the utility's overall rate design goals and objectives.

Table 4 - 1 summarizes the present wastewater treatment rate schedules for EPCOR's customers. EPCOR's rates generally reflect what is considered industry best-practices in that the rates are composed of a fixed service charge and a volumetric charge as well as overstrength charges for applicable customers.

Table 4 - 1
Present Wastewater Treatment Rates

Rate Component	Present Rates
Flat Monthly Service Charge –	$6.22/month
Variable Monthly Charges –	***$ / m³***
Residential	$1.2334
Commercial	
0 – 10,000 m^3	$1.2334
10,000 – 100,000 m^3	0.9542
100,000 + m^3	0.4979
Overstrength Charges –	
(Exceeding Domestic Strength Levels)	***$ / kg***
BOD (>300 mg/L)	$0.7743
COD (>600 mg/L)	0.7743
Oil and Grease (>100 mg/L)	0.6769
Phosphorous (10 mg/L)	6.4427
TSS (>300 mg/L)	0.7028
TKN (>50 mg/L)	1.6445
BOD (>3000 mg/L)	$0.7743
COD (>6000 mg/L)	0.7743
Oil and Grease (>400 mg/L)	0.6769
Phosphorous (75 mg/L)	6.4427
TSS (>3000 mg/L)	0.7028
TKN (>200 mg/L)	1.6445

There are three rate components to EPCOR's current wastewater treatment rates: a flat monthly service charge, a variable (volumetric) charge and an overstrength charge. The flat monthly service charge applies to all customer classes of service. In contrast, the variable or volumetric charges are segregated between residential and commercial customers and the billing is based total water consumption. Finally, the overstrength charges are applicable to those customers with strength levels which exceed EPCOR's defined domestic level strengths. These specific customers are part of the overstrength program and their strength levels are monitored and tested for purposes of billing the overstrength charges. At the present time, the overstrength charges reflect two levels of high strength waste. The first is for over domestic strength, but under the higher next step. These customers are charged the overstrength charge for the loadings. The second step adds the same charge, for all loadings over the higher strength loadings. This essentially doubles the overstrength charge for those over the higher strength level.

4.3 Future Wastewater Treatment Rate Structure Considerations

The results of the revenue requirement and cost of service analysis provide the basis for establishing cost-based rates. However, other policy considerations - other than strictly cost of service - may be considered when establishing final proposed wastewater treatment rates. Some examples of other considerations may include policy items such as revenue stability or sufficiency, economic development, ease of understanding and administration, ability to pay, etc.

It appears that EPCOR has taken policy considerations into account in the PBR process that has established the current wastewater treatment rates. As EPCOR continues forward with the development of the final proposed rates, a policy decision will need to be made whether to follow cost of service results; smoothly transition to a cost of service basis to attempt to minimize overall rate impacts to customers; or apply an "across the board" rate adjustment to all classes of service.

While the cost of service did show cost differences between classes of service for the wastewater treatment utility, a smooth transition to rates may take precedence over attempting to strictly follow the cost of service results. This recommendation of implementing a smooth transition towards cost of service results allows for better customer outreach, avoids rate shock, and allows the utility to track cost of service results over a number of years and adjust rates accordingly.

4.4 Summary

This section of the report has provided an overview of the rate design process. The results of the revenue requirement and cost of service analysis provide the basis and guidance for establishing and implementing cost-based wastewater treatment rates. A key objective of a cost of service study is to develop rates that are cost based while, at the same time, providing equity between customers.

5 Wastewater Treatment Technical Appendix

EPCOR
Wastewater Treatment COSA
Summary of the Revenue Requirement
Exhibit 1

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
Rate Revenue	$142,799,274	$147,204,535	$149,725,336	$151,756,962	$154,792,102	$157,887,944	$161,045,702	$164,266,616	$167,551,949	$170,902,988
Miscellaneous Revenues	7,968,963	8,131,607	8,157,988	8,239,743	8,355,099	8,472,071	8,590,680	8,710,949	8,832,902	8,956,563
Total Revenues	**$150,768,238**	**$155,336,142**	**$157,883,324**	**$159,996,705**	**$163,147,201**	**$166,360,014**	**$169,636,382**	**$172,977,566**	**$176,384,851**	**$179,859,551**
Expenses										
Franchise Fees	$10,637,027	$10,969,964	$11,156,387	$11,303,963	$11,518,739	$11,737,595	$11,960,609	$12,187,861	$12,419,430	$12,655,399
Total Power, Other Utilities & Chemicals	6,405,179	8,865,373	9,032,929	9,197,328	9,372,077	9,550,147	9,731,599	9,916,500	10,104,913	10,296,907
Total Wastewater Treatment Plant	38,460,199	39,175,559	39,915,977	40,642,448	41,414,654	42,201,533	43,003,362	43,820,426	44,653,014	45,501,421
Total Operational Support Services	6,989,611	7,295,095	7,432,972	7,568,252	7,712,049	7,858,578	8,007,891	8,160,041	8,315,082	8,473,068
Capital Overhead	(3,466,181)	(2,201,650)	(2,245,463)	(2,287,454)	(2,330,915)	(2,375,203)	(2,420,331)	(2,466,318)	(2,513,178)	(2,560,928)
Total Billing, Meters, & Customer Service	5,813,614	5,656,110	5,763,011	5,867,898	5,979,388	6,092,996	6,208,763	6,326,730	6,446,937	6,569,429
Total EWSI Shared Service	8,429,184	8,585,967	8,748,242	8,907,460	9,076,702	9,249,159	9,424,893	9,603,966	9,786,441	9,972,384
Corporate Shared Services	5,860,564	5,969,570	6,082,395	6,193,095	6,310,763	6,430,668	6,552,851	6,677,355	6,804,224	6,933,505
Total O&M Expenses	**$79,129,197**	**$84,315,988**	**$85,886,450**	**$87,392,990**	**$89,053,457**	**$90,745,473**	**$92,469,637**	**$94,226,560**	**$96,016,864**	**$97,841,185**
Property Taxes	$931,356	$948,679	$966,609	$984,202	$1,002,901	$1,021,957	$1,041,374	$1,061,160	$1,081,322	$1,101,867
Depreciation	28,003,585	30,119,371	31,284,587	32,703,884	33,325,258	33,958,438	34,603,648	35,261,118	35,931,079	36,613,769
Total Finance Costs	10,681,816	11,720,455	12,249,392	14,138,214	15,057,198	16,035,916	17,078,250	18,188,336	19,370,578	20,629,666
Return on Investment	31,641,532	29,677,456	30,513,783	26,903,547	26,903,547	26,903,547	26,903,547	26,903,547	26,903,547	26,903,547
Total Revenue Requirement	**$150,387,486**	**$156,781,949**	**$160,900,820**	**$162,122,837**	**$165,342,361**	**$168,665,330**	**$172,096,456**	**$175,640,721**	**$179,303,390**	**$183,090,034**
Bal. / (Def.) of Funds	$380,752	($1,445,807)	($3,017,496)	($2,126,132)	($2,195,160)	($2,305,316)	($2,460,074)	($2,663,155)	($2,918,539)	($3,230,483)
Balance a % of Rate Adj. Req'd	-0.3%	1.0%	2.0%	1.4%	1.4%	1.5%	1.5%	1.6%	1.7%	1.9%

EPCOR
Wastewater Treatment COSA
Revenue Requirement
Exhibit 2

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	*Notes*
Revenues											
Rate Revenue											
Residential	$83,823,718	$86,382,765	$88,340,252	$90,019,478	$91,819,868	$93,656,265	$95,529,390	$97,439,978	$99,388,778	$101,376,553	2.0% Inc / Yr 2028-2033
Multi-Res	24,354,308	24,935,579	25,338,425	25,653,959	26,167,038	26,690,379	27,224,186	27,768,670	28,324,043	28,890,524	2.0% Inc / Yr 2028-2033
Commercial	28,739,916	29,026,530	29,082,698	29,040,157	29,620,960	30,213,380	30,817,647	31,434,000	32,062,680	32,703,934	2.0% Inc / Yr 2028-2033
Overstrength Surcharges	5,881,333	6,859,661	6,963,961	7,043,368	7,184,236	7,327,920	7,474,479	7,623,968	7,776,448	7,931,977	2.0% Inc / Yr 2028-2033
Total Rate Revenues	**$142,799,274**	**$147,204,535**	**$149,725,336**	**$151,756,962**	**$154,792,102**	**$157,887,944**	**$161,045,702**	**$164,266,616**	**$167,551,949**	**$170,902,988**	
Miscellaneous Revenue											
Late Payment Charges	$232,576	$236,902	$241,379	$245,772	$249,213	$252,702	$256,240	$259,827	$263,465	$267,154	1.4% Inc / Yr 2028-2033
Surplus Sales	3,732	3,801	3,873	3,944	3,999	4,055	4,112	4,169	4,228	4,287	1.4% Inc / Yr 2028-2033
ACRWC Swap	1,076,000	1,096,014	1,116,728	1,137,053	1,152,971	1,169,113	1,185,481	1,202,077	1,218,906	1,235,971	1.4% Inc / Yr 2028-2033
Suburban	768,229	782,518	797,308	811,819	823,184	834,709	846,395	858,244	870,260	882,444	1.4% Inc / Yr 2028-2033
Lab	298,000	303,543	309,280	314,909	319,317	323,788	328,321	332,917	337,578	342,304	1.4% Inc / Yr 2028-2033
Ostara	364,001	370,771	377,779	384,655	390,040	395,500	401,037	406,652	412,345	418,118	1.4% Inc / Yr 2028-2033
Biosolids											
ACRWC Recovery	$5,226,425	$5,338,057	$5,311,641	$5,341,592	5,416,374	5,492,203	5,569,094	5,647,061	5,726,120	5,806,286	1.4% Inc / Yr 2028-2033
BMA - true-up	0	0	0	0	0	0	0	0	0	0	1.4% Inc / Yr 2028-2033
Correction of 2022 billing error	0	0	0	0	0	0	0	0	0	0	1.4% Inc / Yr 2028-2033
Total Other Revenues	**$7,968,963**	**$8,131,607**	**$8,157,988**	**$8,239,743**	**8,355,099**	**8,472,071**	**8,590,680**	**8,710,949**	**8,832,902**	**8,956,563**	
Total Revenues	**$150,768,238**	**$155,336,142**	**$157,883,324**	**$159,996,705**	**$163,147,201**	**$166,360,014**	**$169,636,382**	**$172,977,566**	**$176,384,851**	**$179,859,551**	
Franchise Fees	**$10,637,027**	**$10,969,964**	**$11,156,387**	**$11,303,963**	**$11,518,739**	**$11,737,595**	**$11,960,609**	**$12,187,861**	**$12,419,430**	**$12,655,399**	1.9% Inc / Yr 2028-2033
Power, Other Utilities & Chemicals											
Power	$4,848,546	$7,279,787	$7,417,375	$7,552,371	$7,695,866	$7,842,088	$7,991,087	$8,142,918	$8,297,633	$8,455,288	1.9% Inc / Yr 2028-2033
Natural Gas	307,008	312,718	318,629	324,428	330,592	336,873	343,274	349,796	356,442	363,214	1.9% Inc / Yr 2028-2033
Water	461,370	469,951	478,834	487,548	496,812	506,251	515,870	525,671	535,659	545,837	1.9% Inc / Yr 2028-2033
Chemicals - WWTP	313,462	319,292	325,327	331,248	337,541	343,955	350,490	357,149	363,935	370,850	1.9% Inc / Yr 2028-2033
Chemicals - Ostara	474,793	483,624	492,765	501,733	511,266	520,980	530,879	540,965	551,244	561,717	1.9% Inc / Yr 2028-2033
Total Power, Other Utilities & Chemicals	**$6,405,179**	**$8,865,373**	**$9,032,929**	**$9,197,328**	**$9,372,077**	**$9,550,147**	**$9,731,599**	**$9,916,500**	**$10,104,913**	**$10,296,907**	
Wastewater Treatment Plant											
Plant Operations	$7,903,408	$8,050,411	$8,202,564	$8,351,850	$8,510,536	$8,672,236	$8,837,008	$9,004,911	$9,176,005	$9,350,349	1.9% Inc / Yr 2028-2033
Ostara (Phosphorous)	410,169	417,798	425,694	433,442	441,677	450,069	458,621	467,334	476,214	485,262	1.9% Inc / Yr 2028-2033
Clover Bar (Biosolids)	17,650,577	17,978,877	18,318,678	18,652,078	19,006,468	19,367,591	19,735,575	20,110,551	20,492,651	20,882,012	1.9% Inc / Yr 2028-2033
WWT Maintenance	10,887,482	11,089,989	11,299,590	11,505,242	11,723,842	11,946,595	12,173,580	12,404,878	12,640,571	12,880,742	1.9% Inc / Yr 2028-2033
Monitoring and Compliance	1,608,565	1,638,484	1,669,451	1,699,835	1,732,132	1,765,043	1,798,578	1,832,751	1,867,574	1,903,058	1.9% Inc / Yr 2028-2033
Total Wastewater Treatment Plant	**$38,460,199**	**$39,175,559**	**$39,915,977**	**$40,642,448**	**$41,414,654**	**$42,201,533**	**$43,003,362**	**$43,820,426**	**$44,653,014**	**$45,501,421**	

EPCOR
Wastewater Treatment COSA
Revenue Requirement
Exhibit 2

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Notes
Operational Support Services											
Wastewater Laboratory	$4,080,205	$4,178,670	$4,257,647	$4,335,136	$4,417,504	$4,501,437	$4,586,964	$4,674,116	$4,762,924	$4,853,420	1.9% Inc / Yr 2028-2033
Project Engineering	738,156	772,716	787,321	801,650	816,881	832,402	848,218	864,334	880,756	897,490	1.9% Inc / Yr 2028-2033
Gold Bar Administration	2,171,250	2,343,708	2,388,004	2,431,466	2,477,664	2,524,740	2,572,710	2,621,591	2,671,401	2,722,158	1.9% Inc / Yr 2028-2033
Total Operational Support Services	**$6,989,611**	**$7,295,095**	**$7,432,972**	**$7,568,252**	**$7,712,049**	**$7,858,578**	**$8,007,891**	**$8,160,041**	**$8,315,082**	**$8,473,068**	
Capital Overhead	**($3,466,181)**	**($2,201,650)**	**($2,245,463)**	**($2,287,454)**	($2,330,915)	($2,375,203)	($2,420,331)	($2,466,318)	($2,513,178)	($2,560,928)	1.9% Inc / Yr 2028-2033
Billing, Meters, & Customer Service											
CUS Charges - Metering	$934,246	$685,986	$698,951	$711,672	$725,194	$738,972	$753,013	$767,320	$781,899	$796,755	1.9% Inc / Yr 2028-2033
CUS Charges - Billing & Collections	3,794,053	3,864,623	3,937,664	4,009,329	4,085,507	4,163,131	4,242,231	4,322,833	4,404,967	4,488,661	1.9% Inc / Yr 2028-2033
Customer Service	1,085,315	1,105,502	1,126,396	1,146,897	1,168,688	1,190,893	1,213,520	1,236,576	1,260,071	1,284,013	1.9% Inc / Yr 2028-2033
Total Billing, Meters, & Customer Service	**$5,813,614**	**$5,656,110**	**$5,763,011**	**$5,867,898**	**$5,979,388**	**$6,092,996**	**$6,208,763**	**$6,326,730**	**$6,446,937**	**$6,569,429**	
EWSI Shared Service											
Allocation from BU 8F	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	1.9% Inc / Yr 2028-2033
Information Services	1,445,813	1,472,705	1,500,539	1,527,849	1,556,878	1,586,459	1,616,601	1,647,317	1,678,616	1,710,510	1.9% Inc / Yr 2028-2033
SVP	1,191,418	1,213,578	1,236,514	1,259,019	1,282,940	1,307,316	1,332,155	1,357,466	1,383,258	1,409,540	1.9% Inc / Yr 2028-2033
Controller	490,888	500,019	509,469	518,741	528,597	538,641	548,875	559,303	569,930	580,759	1.9% Inc / Yr 2028-2033
Public and Government Affairs	509,136	518,606	528,408	538,025	548,247	558,664	569,278	580,095	591,116	602,348	1.9% Inc / Yr 2028-2033
Health, Safety and Environment	675,838	688,409	701,420	714,185	727,755	741,582	755,672	770,030	784,661	799,569	1.9% Inc / Yr 2028-2033
Technical Training	456,754	465,250	474,043	482,671	491,841	501,186	510,709	520,412	530,300	540,376	1.9% Inc / Yr 2028-2033
HR	192,134	195,707	199,406	203,035	206,893	210,824	214,830	218,911	223,071	227,309	1.9% Inc / Yr 2028-2033
Incentive and Other Compensation	1,994,121	2,031,211	2,069,601	2,107,268	2,147,306	2,188,105	2,229,679	2,272,043	2,315,212	2,359,201	1.9% Inc / Yr 2028-2033
Supply Chain Management	1,473,083	1,500,483	1,528,842	1,556,667	1,586,243	1,616,382	1,647,093	1,678,388	1,710,277	1,742,773	1.9% Inc / Yr 2028-2033
Total EWSI Shared Service	**$8,429,184**	**$8,585,967**	**$8,748,242**	**$8,907,460**	**$9,076,702**	**$9,249,159**	**$9,424,893**	**$9,603,966**	**$9,786,441**	**$9,972,384**	
Corporate Shared Services	**$5,860,564**	**$5,969,570**	**$6,082,395**	**$6,193,095**	$6,310,763	$6,430,668	$6,552,851	$6,677,355	$6,804,224	$6,933,505	1.9% Inc / Yr 2028-2033
Total O&M Expenses	**$79,129,197**	**$84,315,988**	**$85,886,450**	**$87,392,990**	**$89,053,457**	**$90,745,473**	**$92,469,637**	**$94,226,560**	**$96,016,864**	**$97,841,185**	
Property Taxes	**$931,356**	**$948,679**	**$966,609**	**$984,202**	$1,002,901	$1,021,957	$1,041,374	$1,061,160	$1,081,322	$1,101,867	1.9% Inc / Yr 2028-2033
Depreciation	$28,929,408	$31,045,194	$32,210,409	$33,624,797	$34,263,668	$34,914,677	$35,578,056	$36,254,039	$36,942,866	$37,644,781	1.9% Inc / Yr 2028-2033
Less: Contributions Amortization	*($925,823)*	*($925,823)*	*($925,823)*	*($920,912)*	(938,410)	(956,239)	(974,408)	(992,922)	(1,011,787)	(1,031,011)	1.9% Inc / Yr 2028-2033
Total Depreciation	**$28,003,585**	**$30,119,371**	**$31,284,587**	**$32,703,884**	**$33,325,258**	**$33,958,438**	**$34,603,648**	**$35,261,118**	**$35,931,079**	**$36,613,769**	
Finance Costs	$10,681,816	$11,720,455	$12,249,392	$14,138,214	$15,057,198	$16,035,916	$17,078,250	$18,188,336	$19,370,578	$20,629,666	6.5% growth
Total Finance Costs	**$10,681,816**	**$11,720,455**	**$12,249,392**	**$14,138,214**	**$15,057,198**	**$16,035,916**	**$17,078,250**	**$18,188,336**	**$19,370,578**	**$20,629,666**	
Return on Investment											
Net Income	$27,354,488	$29,677,456	$30,513,783	$26,903,547	$26,903,547	$26,903,547	$26,903,547	$26,903,547	$26,903,547	$26,903,547	
Consumption Deferral	4,287,043	0	0	0	0	0	0	0	0	0	
Total Return on Investment	**$31,641,532**	**$29,677,456**	**$30,513,783**	**$26,903,547**	**$26,903,547**	**$26,903,547**	**$26,903,547**	**$26,903,547**	**$26,903,547**	**$26,903,547**	
Total Revenue Requirement	**$150,387,486**	**$156,781,949**	**$160,900,820**	**$162,122,837**	**$165,342,361**	**$168,665,330**	**$172,096,456**	**$175,640,721**	**$179,303,390**	**$183,090,034**	

EPCOR
Wastewater Treatment COSA
Exhibit 3
Volume Distribution Factor

	Annual Flow (m^3) [1]	15.5% Inflow and Infiltration [2]	Total Annual Flow at Plant (m^3)	Avg. Daily Flow at Plant (ML / Day)	% of Total
Single Family	46,011,288	7,131,750	53,143,037	145.60	53.5%
Multi-Family	18,196,737	2,820,494	21,017,232	57.58	21.2%
Commercial	21,814,623	3,381,267	25,195,890	69.03	25.4%
Total	**86,022,648**	**13,333,510**	**99,356,159**	**272.21**	**100.0%**
		Actual Flows [3]	**95,082,500**	***260.50***	
					(VOL)

Notes

[1] - Based on projection for 2024
[2] - Estimated
[3] - Per EPCOR data, CY 2022

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Wastewater Treatment COSA
Exhibit 4
Customer Distribution Factors

	Actual Customer			Cust. Serv. & Acntg		
	Number of Account [1]	% of Total		Weight Factor	Wt. Accounts	% of Total
Single Family	291,827	93.2%		1.00	291,827	93.2%
Multi-Family	3,820	1.2%		1.00	3,820	1.2%
Commercial	17,627	5.6%		1.00	17,627	5.6%
Overstrength	0	0.0%		0.00	0	0.0%
	----------	----------			----------	----------
Total	**313,273**	**100.0%**			**313,273**	**100.0%**
		(AC)				***(WCA)***

Notes

[1] - For 2024 based on 2023 projection

EPCOR
Wastewater Treatment COSA
Exhibit 5
Strength Distribution Factors

	Biochemical Oxygen Demand				Total Suspended Solids		
	Daily Flow (ML / Day)	**Avg. Factor (mg/l)**	**Calculated Kilograms [1]**	**% of Total**	**Avg. Factor (mg/l)**	**Calculated Kilograms [1]**	**% of Total**
Single Family	145.60	415	22,054,361	48.8%	340	18,068,633	51.4%
Multi-Family	57.58	415	8,722,151	19.3%	340	7,145,859	20.3%
Commercial	69.03	415	10,456,294	23.1%	340	8,566,602	24.4%
Overstrength			3,985,731	8.8%		1,375,641	3.9%
Tier 1			3,713,741	*8.2%*		1,297,402	*3.7%*
Tier 2			271,990	*0.6%*		78,239	*0.2%*
Total	**272.21**		**45,218,537**	**100.0%**		**35,156,735**	**100.0%**
	Total Kg's Removed [2] [3]		*45,300,000*	***(BOD)***	*Total Kg's Removed [2]*	*35,498,123*	***(TSS)***

	Chemical Oxygen Demand				Oil & Grease		
	Daily Flow (ML / Day)	**Avg. Factor (mg/l)**	**Calculated Kilograms [1]**	**% of Total**	**Avg. Factor (mg/l)**	**Calculated Kilograms [1]**	**% of Total**
Single Family	145.60	800	42,514,430	53.2%	45	2,391,437	50.1%
Multi-Family	57.58	800	16,813,785	21.0%	45	945,775	19.8%
Commercial	69.03	800	20,156,712	25.2%	45	1,133,815	23.8%
Overstrength			485,380	0.6%		297,695	6.2%
Tier 1			477,820	*0.6%*		278,924	*5.8%*
Tier 2			7,560	*0.0%*		18,771	*0.4%*
Total	**272.21**		**79,970,307**	**100.0%**		**4,768,722**	**100.0%**
	Total Kg's Removed [2] [3]		*80,800,000*	***(COD)***	*Total Kg's Removed [2]*		***(OG)***

	Total Nitrogen				Total Phosphorous		
	Daily Flow (ML / Day)	**Avg. Factor (mg/l)**	**Calculated Kilograms [1]**	**% of Total**	**Avg. Factor (mg/l)**	**Calculated Kilograms [1]**	**% of Total**
Single Family	145.60	39	2,072,578	50.1%	6.50	345,430	51.6%
Multi-Family	57.58	39	819,672	19.8%	6.50	136,612	20.4%
Commercial	69.03	39	982,640	23.8%	6.50	163,773	24.5%
Overstrength			261,334	6.3%		23,148	3.5%
Tier 1			223,629	*5.4%*		23,148	*3.5%*
Tier 2			37,705	*0.9%*		0	*0.0%*
	272.21		**4,136,224**	**100.0%**		**668,963**	**100.0%**
	Total Kg's Removed [2]		*4,197,936*	***(TKN)***	*Total Kg's Removed [2]*	*666,541*	***(TP)***

Notes

[1] - Calculated Kilograms = Daily Flow * Factor
[2] - Based on CY 2022 performance data
[3] - BOD / COD Kg removed split is 70% / 30%

EPCOR
Wastewater Treatment COSA
Exhibit 6
Revenue Distribution Factor

	Projected 2024	% of Total
Single Family	$83,823,718	61.2%
Multi-Family	24,354,308	17.8%
Commercial	28,739,916	21.0%
Overstrength		0.0%
Tier 1	$5,492,976	
Tier 2	388,357	
	-----------------	----------
Total	**$136,917,941**	**100.0%**
		(RR)

			Strength Related										
	As of **12/31/22**	**Volume** *(VOL)*	**Biochemical Oxygen Demand** *(BOD)*	**Chemical Oxygen Demand** *(COD)*	**Total Nitrogen** *(TKN)*	**Total Phosphorous** *(TP)*	**Oil & Grease** *(OG)*	**Total Suspended Solids** *(TSS)*	**Actual Customer** *(AC)*	**Customer Serv & Actng.** *(WCA)*	**Revenue Related** *(RR)*	**Direct Assignment** *(DA)*	*Basis of Classification*
Land	$420,842	$0	$0	$0	$0	$0	$0	$0	$420,842	$0	$0	$0	100.0% AC
WWTP													
Admin	$3,558,607	$0	$0	$0	$0	$0	$0	$0	$3,558,607	$0	$0	$0	100.0% AC
Air Scrub	15,002,168	0	0	0	0	0	7,501,084	7,501,084	0	0	0	0	50.0% TSS 50.0% OG
Main Control Room	1,327,389	90,701	104,383	111,467	218,338	257,914	188,191	347,487	8,908	0	0	0	*As all other treatment*
Aux Control Room	388,804	26,567	30,575	32,650	63,953	75,545	55,123	101,782	2,609	0	0	0	*As all other treatment*
Blowers	6,302,888	0	1,575,722	630,289	3,466,588	630,289	0	0	0	0	0	0	25.0% BOD 10.0% COD 55.0% TKN 10.0% TP
Boilers	17,875,041	1,221,413	1,405,653	1,501,056	2,940,210	3,473,155	2,534,233	4,679,365	119,956	0	0	0	*As all other treatment*
CBF (inc. Ostara)	41,505,773	2,836,116	3,263,920	3,485,446	6,827,156	8,064,652	5,884,479	10,865,466	278,537	0	0	0	*As all other treatment*
Center of Excellence	11,755,218	11,755,218	0	0	0	0	0	0	0	0	0	0	100.0% VOL
Dewater	7,256,888	0	1,015,964	435,413	1,451,378	1,451,378	1,451,378	1,451,378	0	0	0	0	BOD/COD, TKN, TP, OG, & TSS Equally
Digesters	116,289,156	0	16,280,482	6,977,349	23,257,831	23,257,831	23,257,831	23,257,831	0	0	0	0	BOD/COD, TKN, TP, OG, & TSS Equally
Distribution Station	483,799	33,058	38,045	40,627	79,579	94,003	68,591	126,650	3,247	0	0	0	*As all other treatment*
Enhanced Prim. Treat. (PRI)	101,488,357	0	0	24,357,206	11,163,719	0	36,535,809	29,431,624	0	0	0	0	24.0% COD 29.0% TSS 11.0% TKN 36.0% OG
Flare	885,321	0	123,945	53,119	177,064	177,064	177,064	177,064	0	0	0	0	*As Biogas*
Grit	17,045,539	0	0	5,113,662	1,704,554	0	1,704,554	8,522,770	0	0	0	0	10.0% TKN 50.0% TSS 30.0% COD 10.0% OG
Laboratory	6,163,190	308,160	1,109,374	1,109,374	1,109,374	1,109,374	308,160	1,109,374	0	0	0	0	5.0% VOL 5.0% OG 18.0% BOD/COD/TKN/TSS/TP
Maintenance Building	3,780,589	258,330	297,297	317,475	621,857	734,576	535,993	989,690	25,371	0	0	0	*As all other treatment*
Outfall	14,551	14,551	0	0	0	0	0	0	0	0	0	0	100.0% VOL
Penthouse	717,794	49,047	56,446	60,277	118,068	139,469	101,765	187,906	4,817	0	0	0	*As all other treatment*
Screens	6,604,623	1,981,387	0	0	0	0	0	4,623,236	0	0	0	0	30.0% VOL 70.0% TSS
Sampling	202,191	10,110	36,394	36,394	36,394	36,394	10,110	36,394	0	0	0	0	5.0% VOL 5.0% OG 18.0% BOD/COD/TKN/TSS/TP
Scum	2,092,400	0	627,720	0	0	0	1,464,680	0	0	0	0	0	30.0% BOD 70.0% OG
Bioreactor/Secondary Clarifier	117,508,590	0	16,451,203	7,050,515	35,252,577	47,003,436	0	11,750,859	0	0	0	0	20.0% COD 30.0% TKN 10.0% TSS 40.0% TP
Substation	1,422,334	97,189	111,849	119,440	233,955	276,362	201,651	372,341	9,545	0	0	0	*As all other treatment*
UV	2,955,519	2,955,519	0	0	0	0	0	0	0	0	0	0	100.0% VOL
Waste Activated Sludge	8,915,842	0	1,248,218	534,951	2,674,753	3,566,337	0	891,584	0	0	0	0	20.0% COD 30.0% TKN 10.0% TSS 40.0% TP
Pre Treatment / Diversion	78,315,362	23,494,609	0	0	0	0	0	54,820,753	0	0	0	0	30.0% VOL 70.0% TSS
Lagoon	6,493,575	0	909,101	389,615	1,298,715	1,298,715	1,298,715	1,298,715	0	0	0	0	As Digesters
Effluent Water	2,524,196	0	353,387	151,452	504,839	504,839	504,839	504,839	0	0	0	0	As Digesters
Fermenter	31,911,112	0	0	0	5,584,445	26,326,667	0	0	0	0	0	0	17.5% TKN 82.5% TP
Sludge	49,286,216	0	6,900,070	2,957,173	9,857,243	9,857,243	9,857,243	9,857,243	0	0	0	0	As Digesters
RSV	6,832,423	466,864	537,286	573,752	1,123,844	1,327,553	968,666	1,788,606	45,851	0	0	0	*As all other treatment*
Plant Before General Plant	**$667,326,297**	**$45,598,839**	**$52,477,034**	**$56,038,702**	**$109,766,435**	**$129,662,798**	**$94,610,158**	**$174,694,041**	**$4,478,289**	**$0**	**$0**	**$0**	
% Plant Before General Plant	***100.0%***	***6.8%***	***7.9%***	***8.4%***	***16.4%***	***19.4%***	***14.2%***	***26.2%***	***0.7%***	***0.0%***	***0.0%***	***0.0%***	*Factor PBGP*

EPCOR
Wastewater Treatment COSA
Exhibit 7a
Plant in Service - Original Cost

			Strength Related										
	As of 12/31/22	**Volume** *(VOL)*	**Biochemical Oxygen Demand** *(BOD)*	**Chemical Oxygen Demand** *(COD)*	**Total Nitrogen** *(TKN)*	**Total Phosphorous** *(TP)*	**Oil & Grease** *(OG)*	**Total Suspended Solids** *(TSS)*	**Actual Customer** *(AC)*	**Customer Serv & Actng.** *(WCA)*	**Revenue Related** *(RR)*	**Direct Assignment** *(DA)*	*Basis of Classification*
General Plant													
Furnature	$687,593	$46,984	$54,071	$57,741	$113,100	$133,601	$97,483	$179,999	$4,614	$0	$0	$0	*As Factor PBGP*
Software	4,725,151	322,873	371,575	396,794	777,225	918,106	669,908	1,236,960	31,710	0	0	0	*As Factor PBGP*
Hardware	4,206,312	287,420	330,775	353,225	691,883	817,295	596,350	1,101,137	28,228	0	0	0	*As Factor PBGP*
Tools	2,517,297	172,009	197,955	211,390	414,062	489,116	356,890	658,983	16,893	0	0	0	*As Factor PBGP*
Vehicles	1,862,846	127,289	146,490	156,432	306,414	361,955	264,105	487,660	12,501	0	0	0	*As Factor PBGP*
Guardhouse	331,049	22,621	26,033	27,800	54,453	64,323	46,934	86,663	2,222	0	0	0	*As Factor PBGP*
Grounds	9,308,663	636,067	732,012	781,695	1,531,153	1,808,691	1,319,735	2,436,841	62,469	0	0	0	*As Factor PBGP*
Common Air	861,532	58,869	67,749	72,347	141,711	167,397	122,144	225,534	5,782	0	0	0	*As Factor PBGP*
Electrical	30,892,086	2,110,876	2,429,284	2,594,162	5,081,344	6,002,392	4,379,724	8,086,993	207,310	0	0	0	*As Factor PBGP*
Natural Gas	514,843	35,180	40,486	43,234	84,685	100,035	72,992	134,777	3,455	0	0	0	*As Factor PBGP*
Pipe Rack	7,099,788	485,133	558,311	596,204	1,167,822	1,379,503	1,006,572	1,858,597	47,645	0	0	0	*As Factor PBGP*
Potable Water	7,711,939	526,962	606,449	647,610	1,268,513	1,498,445	1,093,360	2,018,847	51,753	0	0	0	*As Factor PBGP*
Glycol	8,454,636	577,711	664,853	709,978	1,390,677	1,642,752	1,198,656	2,213,272	56,737	0	0	0	*As Factor PBGP*
Control Systems	19,024,406	1,299,950	1,496,036	1,597,574	3,129,266	3,696,479	2,697,184	4,980,248	127,669	0	0	0	*As Factor PBGP*
Inspection	3,191,191	218,056	250,948	267,980	524,909	620,055	452,431	835,397	21,415	0	0	0	*As Factor PBGP*
Odor	1,179,401	80,589	92,745	99,040	193,996	229,160	167,210	308,746	7,915	0	0	0	*As Factor PBGP*
Total General Plant	**$102,568,733**	**$7,008,588**	**$8,065,774**	**$8,613,206**	**$16,871,213**	**$19,929,304**	**$14,541,678**	**$26,850,652**	**$688,318**	**$0**	**$0**	**$0**	
Total Plant in Service	**$769,895,030**	**$52,607,427**	**$60,542,808**	**$64,651,908**	**$126,637,648**	**$149,592,103**	**$109,151,836**	**$201,544,693**	**$5,166,606**	**$0**	**$0**	**$0**	

EPCOR
Wastewater Treatment COSA
Exhibit 7b
Plant in Service - Depreciation

	As of 12/31/22	Volume (VOL)	Strength Related: Biochemical Oxygen Demand (BOD)	Chemical Oxygen Demand (COD)	Total Nitrogen (TKN)	Total Phosphorous (TP)	Oil & Grease (OG)	Total Suspended Solids (TSS)	Actual Customer (AC)	Customer Serv & Actng. (WCA)	Revenue Related (RR)	Direct Assignment (DA)
Land	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WWTP												
Admin	$739,795	$0	$0	$0	$0	$0	$0	$0	$739,795	$0	$0	$0
Air Scrub	4,288,071	0	0	0	0	0	2,144,036	2,144,036	0	0	0	0
Main Control Room	994,554	67,959	78,209	83,518	163,591	193,244	141,003	260,356	6,674	0	0	0
Aux Control Room	201,123	13,743	15,816	16,889	33,082	39,079	28,514	52,650	1,350	0	0	0
Blowers	1,424,061	0	356,015	142,406	783,234	142,406	0	0	0	0	0	0
Boilers	4,916,635	335,957	386,633	412,874	808,722	955,312	697,056	1,287,087	32,995	0	0	0
CBF (inc. Ostara)	9,845,328	672,738	774,214	826,761	1,619,428	1,912,966	1,395,821	2,577,330	66,070	0	0	0
Center of Excellence	2,234,139	2,234,139	0	0	0	0	0	0	0	0	0	0
Dewater	5,183,180	0	725,645	310,991	1,036,636	1,036,636	1,036,636	1,036,636	0	0	0	0
Digesters	29,976,158	0	4,196,662	1,798,569	5,995,232	5,995,232	5,995,232	5,995,232	0	0	0	0
Distribution Station	57,893	3,956	4,553	4,862	9,523	11,249	8,208	15,155	389	0	0	0
Enhanced Prim. Treat. (PRI)	32,827,201	0	0	7,878,528	3,610,992	0	11,817,792	9,519,888	0	0	0	0
Flare	309,675	0	43,355	18,581	61,935	61,935	61,935	61,935	0	0	0	0
Grit	2,679,931	0	0	803,979	267,993	0	267,993	1,339,966	0	0	0	0
Laboratory	2,259,393	112,970	406,691	406,691	406,691	406,691	112,970	406,691	0	0	0	0
Maintenance Building	1,795,651	122,698	141,206	150,790	295,361	348,898	254,578	470,069	12,050	0	0	0
Outfall	14,551	14,551	0	0	0	0	0	0	0	0	0	0
Penthouse	361,552	24,705	28,432	30,361	59,471	70,250	51,259	94,648	2,426	0	0	0
Screens	1,435,099	430,530	0	0	0	0	0	1,004,569	0	0	0	0
Sampling	30,987	1,549	5,578	5,578	5,578	5,578	1,549	5,578	0	0	0	0
Scum	435,069	0	130,521	0	0	0	304,548	0	0	0	0	0
Bioreactor/Secondary Clarifier	43,410,974	0	6,077,536	2,604,658	13,023,292	17,364,390	0	4,341,097	0	0	0	0
Substation	716,197	48,938	56,320	60,143	117,805	139,158	101,539	187,487	4,806	0	0	0
UV	689,170	689,170	0	0	0	0	0	0	0	0	0	0
Waste Activated Sludge	4,296,828	0	601,556	257,810	1,289,048	1,718,731	0	429,683	0	0	0	0
Pre Treatment / Diversion	12,536,065	3,760,820	0	0	0	0	0	8,775,246	0	0	0	0
Lagoon	3,327,504	0	465,851	199,650	665,501	665,501	665,501	665,501	0	0	0	0
Effluent Water	1,018,330	0	142,566	61,100	203,666	203,666	203,666	203,666	0	0	0	0
Fermenter	8,943,695	0	0	0	1,565,147	7,378,548	0	0	0	0	0	0
Sludge	15,279,707	0	2,139,159	916,782	3,055,941	3,055,941	3,055,941	3,055,941	0	0	0	0
RSV	571,083	39,022	44,909	47,957	93,936	110,963	80,965	149,499	3,832	0	0	0
Plant Before General Plant	**$192,799,600**	**$8,573,444**	**$16,821,426**	**$17,039,478**	**$35,171,803**	**$41,816,374**	**$28,426,742**	**$44,079,946**	**$870,387**	**$0**	**$0**	**$0**
% Plant Before General Plant	***100.0%***	***4.4%***	***8.7%***	***8.8%***	***18.2%***	***21.7%***	***14.7%***	***22.9%***	***0.5%***	***0.0%***	***0.0%***	***0.0%***

EPCOR
Wastewater Treatment COSA
Exhibit 7b
Plant in Service - Depreciation

	As of 12/31/22	Volume (VOL)	Biochemical Oxygen Demand (BOD)	Chemical Oxygen Demand (COD)	Total Nitrogen (TKN)	Total Phosphorous (TP)	Oil & Grease (OG)	Total Suspended Solids (TSS)	Actual Customer (AC)	Customer Serv & Actng. (WCA)	Revenue Related (RR)	Direct Assignment (DA)
			Strength Related									
General Plant												
Furnature	$470,942	$32,180	$37,034	$39,547	$77,464	$91,505	$66,768	$123,284	$3,160	$0	$0	$0
Software	3,311,033	226,245	260,372	278,044	544,622	643,340	469,422	866,769	22,220	0	0	0
Hardware	3,942,376	269,385	310,020	331,061	648,469	766,011	558,930	1,032,043	26,456	0	0	0
Tools	1,442,206	98,547	113,412	121,109	237,224	280,223	204,469	377,544	9,678	0	0	0
Vehicles	826,394	56,468	64,986	69,396	135,931	160,570	117,162	216,335	5,546	0	0	0
Guardhouse	53,262	3,639	4,188	4,473	8,761	10,349	7,551	13,943	357	0	0	0
Grounds	2,233,943	152,647	175,672	187,595	367,454	434,059	316,717	584,806	14,992	0	0	0
Common Air	346,829	23,699	27,274	29,125	57,049	67,390	49,172	90,794	2,327	0	0	0
Electrical	12,545,219	857,223	986,528	1,053,484	2,063,524	2,437,560	1,778,598	3,284,113	84,188	0	0	0
Natural Gas	96,944	6,624	7,623	8,141	15,946	18,836	13,744	25,378	651	0	0	0
Pipe Rack	273,069	18,659	21,474	22,931	44,916	53,058	38,714	71,485	1,833	0	0	0
Potable Water	792,554	54,156	62,325	66,555	130,365	153,995	112,364	207,476	5,319	0	0	0
Glycol	854,063	58,359	67,162	71,720	140,482	165,946	121,085	223,578	5,731	0	0	0
Control Systems	11,624,311	794,297	914,110	976,151	1,912,047	2,258,626	1,648,036	3,043,036	78,008	0	0	0
Inspection	1,256,048	85,827	98,773	105,477	206,603	244,053	178,076	328,811	8,429	0	0	0
Odor	160,001	10,933	12,582	13,436	26,318	31,089	22,684	41,885	1,074	0	0	0
Total General Plant	**$40,229,194**	**$2,748,887**	**$3,163,533**	**$3,378,245**	**$6,617,176**	**$7,816,611**	**$5,703,492**	**$10,531,281**	**$269,970**	**$0**	**$0**	**$0**
Total Plant Depreciation	**$233,028,794**	**$11,322,331**	**$19,984,959**	**$20,417,723**	**$41,788,979**	**$49,632,984**	**$34,130,234**	**$54,611,227**	**$1,140,357**	**$0**	**$0**	**$0**

EPCOR
Wastewater Treatment COSA
Exhibit 7c
Plant in Service - Net Book Value

			Strength Related									
	As of 12/31/22	**Volume** *(VOL)*	**Biochemical Oxygen Demand** *(BOD)*	**Chemical Oxygen Demand** *(COD)*	**Total Nitrogen** *(TKN)*	**Total Phosphorous** *(TP)*	**Oil & Grease** *(OG)*	**Total Suspended Solids** *(TSS)*	**Actual Customer** *(AC)*	**Customer Serv & Actng.** *(WCA)*	**Revenue** *(RR)*	**Direct** *(DA)*
Land	$420,842	$0	$0	$0	$0	$0	$0	$0	$420,842	$0	$0	$0
WWTP												
Admin	$2,818,812	$0	$0	$0	$0	$0	$0	$0	$2,818,812	$0	$0	$0
Air Scrub	10,714,097	0	0	0	0	0	5,357,049	5,357,049	0	0	0	0
Main Control Room	332,835	22,743	26,173	27,950	54,747	64,670	47,188	87,130	2,234	0	0	0
Aux Control Room	187,681	12,824	14,759	15,761	30,871	36,467	26,608	49,132	1,259	0	0	0
Blowers	4,878,827	0	1,219,707	487,883	2,683,355	487,883	0	0	0	0	0	0
Boilers	12,958,406	885,456	1,019,020	1,088,182	2,131,488	2,517,844	1,837,177	3,392,278	86,961	0	0	0
CBF (inc. Ostara)	31,660,445	2,163,379	2,489,706	2,658,685	5,207,729	6,151,686	4,488,658	8,288,136	212,467	0	0	0
Center of Excellence	9,521,079	9,521,079	0	0	0	0	0	0	0	0	0	0
Dewater	2,073,708	0	290,319	124,422	414,742	414,742	414,742	414,742	0	0	0	0
Digesters	86,312,998	0	12,083,820	5,178,780	17,262,600	17,262,600	17,262,600	17,262,600	0	0	0	0
Distribution Station	425,906	29,102	33,492	35,765	70,056	82,754	60,383	111,495	2,858	0	0	0
Enhanced Prim. Treat. (PRI)	68,661,156	0	0	16,478,677	7,552,727	0	24,718,016	19,911,735	0	0	0	0
Flare	575,646	0	80,590	34,539	115,129	115,129	115,129	115,129	0	0	0	0
Grit	14,365,608	0	0	4,309,682	1,436,561	0	1,436,561	7,182,804	0	0	0	0
Laboratory	3,903,797	195,190	702,683	702,683	702,683	702,683	195,190	702,683	0	0	0	0
Maintenance Building	1,984,938	135,632	156,091	166,685	326,496	385,677	281,414	519,621	13,321	0	0	0
Outfall	0	0	0	0	0	0	0	0	0	0	0	0
Penthouse	356,242	24,342	28,014	29,915	58,597	69,219	50,506	93,258	2,391	0	0	0
Screens	5,169,524	1,550,857	0	0	0	0	0	3,618,667	0	0	0	0
Sampling	171,203	8,560	30,817	30,817	30,817	30,817	8,560	30,817	0	0	0	0
Scum	1,657,331	0	497,199	0	0	0	1,160,132	0	0	0	0	0
Bioreactor/Secondary Clarifier	74,097,616	0	10,373,666	4,445,857	22,229,285	29,639,046	0	7,409,762	0	0	0	0
Substation	706,137	48,251	55,529	59,298	116,150	137,204	100,113	184,854	4,739	0	0	0
UV	2,266,349	2,266,349	0	0	0	0	0	0	0	0	0	0
Waste Activated Sludge	4,619,014	0	646,662	277,141	1,385,704	1,847,606	0	461,901	0	0	0	0
Pre Treatment / Diversion	65,779,297	19,733,789	0	0	0	0	0	46,045,508	0	0	0	0
Lagoon	3,166,071	0	443,250	189,964	633,214	633,214	633,214	633,214	0	0	0	0
Effluent Water	1,505,866	0	210,821	90,352	301,173	301,173	301,173	301,173	0	0	0	0
Fermenter	22,967,417	0	0	0	4,019,298	18,948,119	0	0	0	0	0	0
Sludge	34,006,509	0	4,760,911	2,040,391	6,801,302	6,801,302	6,801,302	6,801,302	0	0	0	0
RSV	6,261,340	427,841	492,378	525,796	1,029,908	1,216,591	887,701	1,639,106	42,019	0	0	0
Plant Before General Plant	**$474,526,697**	**$37,025,396**	**$35,655,608**	**$38,999,225**	**$74,594,632**	**$87,846,425**	**$66,183,416**	**$130,614,095**	**$3,607,902**	**$0**	**$0**	**$0**
% Plant Before General Plant	***100.0%***	***7.8%***	***7.5%***	***8.2%***	***15.7%***	***18.5%***	***13.9%***	***27.5%***	***0.8%***	***0.0%***	***0.0%***	***0.0%***

EPCOR
Wastewater Treatment COSA
Exhibit 7c
Plant in Service - Net Book Value

			Strength Related									
	As of 12/31/22	**Volume** *(VOL)*	**Biochemical Oxygen Demand** *(BOD)*	**Chemical Oxygen Demand** *(COD)*	**Total Nitrogen** *(TKN)*	**Total Phosphorous** *(TP)*	**Oil & Grease** *(OG)*	**Total Suspended Solids** *(TSS)*	**Actual Customer** *(AC)*	**Customer Serv & Actng.** *(WCA)*	**Revenue** *(RR)*	**Direct** *(DA)*
General Plant												
Furnature	$216,651	$14,804	$17,037	$18,193	$35,636	$42,096	$30,716	$56,715	$1,454	$0	$0	$0
Software	1,414,118	96,628	111,203	118,751	232,604	274,766	200,487	370,191	9,490	0	0	0
Hardware	263,936	18,035	20,755	22,164	43,414	51,283	37,420	69,094	1,771	0	0	0
Tools	1,075,091	73,462	84,543	90,281	176,838	208,892	152,421	281,439	7,215	0	0	0
Vehicles	1,036,452	70,821	81,504	87,036	170,483	201,385	146,943	271,325	6,955	0	0	0
Guardhouse	277,787	18,981	21,845	23,327	45,692	53,975	39,383	72,720	1,864	0	0	0
Grounds	7,074,720	483,420	556,340	594,099	1,163,699	1,374,632	1,003,018	1,852,035	47,477	0	0	0
Common Air	514,703	35,170	40,475	43,222	84,662	100,008	72,972	134,740	3,454	0	0	0
Electrical	18,346,867	1,253,653	1,442,756	1,540,678	3,017,819	3,564,832	2,601,126	4,802,880	123,122	0	0	0
Natural Gas	417,899	28,555	32,863	35,093	68,739	81,199	59,248	109,398	2,804	0	0	0
Pipe Rack	6,826,719	466,474	536,838	573,273	1,122,906	1,326,445	967,858	1,787,112	45,813	0	0	0
Potable Water	6,919,385	472,806	544,125	581,055	1,138,148	1,344,450	980,996	1,811,371	46,435	0	0	0
Glycol	7,600,573	519,352	597,692	638,258	1,250,195	1,476,806	1,077,571	1,989,694	51,006	0	0	0
Control Systems	7,400,095	505,653	581,927	621,423	1,217,219	1,437,853	1,049,148	1,937,212	49,661	0	0	0
Inspection	1,935,143	132,230	152,175	162,504	318,306	376,002	274,355	506,586	12,986	0	0	0
Odor	1,019,400	69,656	80,163	85,604	167,678	198,071	144,525	266,861	6,841	0	0	0
Total General Plant	**$62,339,539**	**$4,259,701**	**$4,902,241**	**$5,234,961**	**$10,254,038**	**$12,112,694**	**$8,838,186**	**$16,319,372**	**$418,348**	**$0**	**$0**	**$0**
Net Plant in Service	**$536,866,236**	**$41,285,097**	**$40,557,849**	**$44,234,185**	**$84,848,670**	**$99,959,118**	**$75,021,601**	**$146,933,466**	**$4,026,249**	**$0**	**$0**	**$0**

EPCOR
Wastewater Treatment COSA
Exhibit 8.1
Allocation of the Revenue Requirement

	Test Year 2024	Volume (VOL)	Strength Related: Biochemical Oxygen Demand (BOD)	Strength Related: Chemical Oxygen Demand (COD)	Strength Related: Total Nitrogen (TKN)	Strength Related: Total Phosphorous (TP)	Strength Related: Oil & Grease (OG)	Strength Related: Total Suspended Solids (TSS)	Actual Customer (AC)	Customer Serv & Actng. (WCA)	Revenue (RR)	Direct (DA)	Basis of Classification
Franchise Fees	**$10,637,027**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$10,637,027**	**$0**	100.0% RR
Power, Other Utilities & Chemicals													
Power	$4,848,546	$372,854	$366,286	$399,488	$766,285	$902,751	$677,535	$1,326,985	$36,362	$0	$0	$0	As Net Plant
Natural Gas	307,008	23,609	23,193	25,295	48,521	57,162	42,901	84,024	2,302	0	0	0	As Net Plant
Water	461,370	35,479	34,854	38,014	72,917	85,902	64,472	126,271	3,460	0	0	0	As Net Plant
Chemicals - WWTP	313,462	24,105	23,681	25,827	49,541	58,363	43,803	85,790	2,351	0	0	0	As Net Plant
Chemicals - Ostara	474,793	0	0	0	0	474,793	0	0	0	0	0	0	100.0% TP
Total Power, Other Utilities & Chemicals	**$6,405,179**	**$456,048**	**$448,014**	**$488,624**	**$937,264**	**$1,578,971**	**$828,711**	**$1,623,071**	**$44,475**	**$0**	**$0**	**$0**	
Wastewater Treatment Plant													
Plant Operations	$7,903,408	$607,773	$597,067	$651,188	$1,249,089	$1,471,535	$1,104,421	$2,163,062	$59,272	$0	$0	$0	As Net Plant
Ostara (Phosphorous)	410,169	0	0	0	0	410,169	0	0	0	0	0	0	100.0% TP
Clover Bar (Biosolids)	17,650,577	0	0	0	0	0	0	17,650,577	0	0	0	0	100.0% TSS
WWT Maintenance	10,887,482	837,249	822,501	897,056	1,720,705	2,027,140	1,521,415	2,979,765	81,651	0	0	0	As Net Plant
Monitoring and Compliance	1,608,565	0	0	0	0	0	0	0	0	0	0	1,608,565	100.0% DA
Total Wastewater Treatment Plant	**$38,460,199**	**$1,445,022**	**$1,419,568**	**$1,548,244**	**$2,969,794**	**$3,908,844**	**$2,625,836**	**$22,793,404**	**$140,923**	**$0**	**$0**	**$1,608,565**	
Operational Support Services													
Wastewater Laboratory	$4,080,205	$313,768	$308,241	$336,182	$644,853	$759,693	$570,167	$1,116,700	$30,600	$0	$0	$0	As Net Plant
Project Engineering	738,156	56,764	55,764	60,819	116,661	137,437	103,150	202,024	5,536	0	0	0	As Net Plant
Gold Bar Administration	2,171,250	166,969	164,028	178,896	343,154	404,265	303,410	594,244	16,283	0	0	0	As Net Plant
Total Operational Support Services	**$6,989,611**	**$537,502**	**$528,034**	**$575,897**	**$1,104,668**	**$1,301,396**	**$976,727**	**$1,912,968**	**$52,419**	**$0**	**$0**	**$0**	

EPCOR
Wastewater Treatment COSA
Exhibit 8.1
Allocation of the Revenue Requirement

	Test Year 2024	Volume (VOL)	*Strength Related* Biochemical Oxygen Demand (BOD)	Chemical Oxygen Demand (COD)	Total Nitrogen (TKN)	Total Phosphorous (TP)	Oil & Grease (OG)	Total Suspended Solids (TSS)	Actual Customer (AC)	Customer Serv & Actng. (WCA)	Revenue (RR)	Direct (DA)	*Basis of Classification*
Capital Overhead	**($3,466,181)**	**($266,550)**	**($261,854)**	**($285,590)**	**($547,810)**	**($645,368)**	**($484,364)**	**($948,650)**	**($25,995)**	**$0**	**$0**	**$0**	As Net Plant
Billing, Meters, & Customer Service													
CUS Charges - Metering	$934,246	$0	$0	$0	$0	$0	$0	$0	$934,246	$0	$0	$0	100.0% AC
CUS Charges - Billing & Collections	3,794,053	0	0	0	0	0	0	0	3,794,053	0	0	0	100.0% AC
Customer Service	1,085,315	0	0	0	0	0	0	0	1,085,315	0	0	0	100.0% AC
Total Billing, Meters, & Customer Service	**$5,813,614**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$5,813,614**	**$0**	**$0**	**$0**	
EWSI Shared Service													
Allocation from BU 8F	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	100.0% AC
Information Services	1,445,813	0	0	0	0	0	0	0	1,445,813	0	0	0	100.0% AC
SVP	1,191,418	0	0	0	0	0	0	0	1,191,418	0	0	0	100.0% AC
Controller	490,888	0	0	0	0	0	0	0	490,888	0	0	0	100.0% AC
Public and Government Affairs	509,136	0	0	0	0	0	0	0	509,136	0	0	0	100.0% AC
Health, Safety and Environment	675,838	0	0	0	0	0	0	0	675,838	0	0	0	100.0% AC
Technical Training	456,754	0	0	0	0	0	0	0	456,754	0	0	0	100.0% AC
HR	192,134	0	0	0	0	0	0	0	192,134	0	0	0	100.0% AC
Incentive and Other Compensation	1,994,121	0	0	0	0	0	0	0	1,994,121	0	0	0	100.0% AC
Supply Chain Management	1,473,083	0	0	0	0	0	0	0	1,473,083	0	0	0	100.0% AC
Total EWSI Shared Service	**$8,429,184**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$8,429,184**	**$0**	**$0**	**$0**	
Corporate Shared Services	**$5,860,564**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$5,860,564**	**$0**	**$0**	**$0**	100.0% AC
Total O&M Expenses	**$79,129,197**	**$2,172,022**	**$2,133,761**	**$2,327,175**	**$4,463,916**	**$6,143,843**	**$3,946,911**	**$25,380,794**	**$20,315,184**	**$0**	**$10,637,027**	**$1,608,565**	
Property Taxes	**$931,356**	**$71,621**	**$70,360**	**$76,738**	**$147,196**	**$173,409**	**$130,148**	**$254,900**	**$6,985**	**$0**	**$0**	**$0**	As Net Plant
Depreciation	$28,929,408	$2,224,676	$2,185,488	$2,383,590	$4,572,129	$5,386,366	$4,042,591	$7,917,611	$216,957	$0	$0	$0	As Net Plant
Less: Contributions Amortization	($925,823)	(71,196)	(69,942)	(76,282)	(146,321)	(172,379)	(129,374)	(253,386)	(6,943)	0	0	0	As Net Plant
Total Depreciation	**$28,003,585**	**$2,153,480**	**$2,115,546**	**$2,307,308**	**$4,425,808**	**$5,213,987**	**$3,913,216**	**$7,664,225**	**$210,014**	**$0**	**$0**	**$0**	
Finance Costs	$10,681,816	$821,433	$806,964	$880,110	$1,688,201	$1,988,847	$1,492,675	$2,923,477	$80,109	$0	$0	$0	As Net Plant
Total Finance Costs	**$10,681,816**	**$821,433**	**$806,964**	**$880,110**	**$1,688,201**	**$1,988,847**	**$1,492,675**	**$2,923,477**	**$80,109**	**$0**	**$0**	**$0**	

EPCOR
Wastewater Treatment COSA
Exhibit 8.1
Allocation of the Revenue Requirement

	Test Year 2024	Volume (VOL)	Strength Related: Biochemical Oxygen Demand (BOD)	Chemical Oxygen Demand (COD)	Total Nitrogen (TKN)	Total Phosphorous (TP)	Oil & Grease (OG)	Total Suspended Solids (TSS)	Actual Customer (AC)	Customer Serv & Actng. (WCA)	Revenue (RR)	Direct (DA)	*Basis of Classification*
Return on Investment													
Net Income	$27,354,488	$2,103,564	$2,066,510	$2,253,827	$4,323,222	$5,093,132	$3,822,512	$7,486,576	$205,146	$0	$0	$0	As Net Plant
Consumption Deferral	4,287,043	329,674	323,867	353,224	677,543	798,205	599,071	1,173,309	32,151	0	0	0	As Net Plant
Total Return on Investment	**$31,641,532**	**$2,433,239**	**$2,390,377**	**$2,607,050**	**$5,000,765**	**$5,891,336**	**$4,421,583**	**$8,659,885**	**$237,297**	**$0**	**$0**	**$0**	
Total Revenue Requirement	**$150,387,486**	**$7,651,796**	**$7,517,007**	**$8,198,381**	**$15,725,885**	**$19,411,423**	**$13,904,532**	**$44,883,282**	**$20,849,589**	**$0**	**$10,637,027**	**$1,608,565**	
Less: Non-Operating Revenue													
Late Payment Charges	$232,576	$11,834	$11,625	$12,679	$24,320	$30,020	$21,504	$69,413	$32,244	$0	$16,450	$2,488	As Revenue Requirement
Surplus Sales	3,732	190	187	203	390	482	345	1,114	517	0	264	40	As Revenue Requirement
ACRWC Swap	1,076,000	54,747	53,783	58,658	112,516	138,886	99,485	321,133	149,176	0	76,106	11,509	As Revenue Requirement
Suburban	768,229	39,088	38,399	41,880	80,333	99,160	71,029	229,279	106,507	0	54,337	8,217	As Revenue Requirement
Lab	298,000	15,162	14,895	16,245	31,162	38,465	27,552	88,938	41,314	0	21,078	3,187	As Revenue Requirement
Ostara	364,001	0	0	0	0	364,001	0	0	0	0	0	0	100.0% TP
Biosolids													
ACRWC Recovery	$5,226,425	$0	$0	$0	$0	$0	$0	$5,226,425	$0	$0	$0	$0	100.0% TSS
Total Other Revenues	**$7,968,963**	**$121,021**	**$118,889**	**$129,666**	**$248,722**	**$671,013**	**$219,915**	**$5,936,302**	**$329,758**	**$0**	**$168,236**	**$25,441**	
Net Revenue Requirement	**$142,418,523**	**$7,530,774**	**$7,398,118**	**$8,068,715**	**$15,477,163**	**$18,740,410**	**$13,684,617**	**$38,946,980**	**$20,519,830**	**$0**	**$10,468,791**	**$1,583,123**	

EPCOR
Wastewater Treatment COSA
Exhibit 8.2
Direct Assignment of the Revenue Requirement

	Total	Single Family	Multi-Family	Commercial	Overstrength Tier 1	Overstrength Tier 2	Notes
Franchise Fees	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Power, Other Utilities & Chemicals							
Power	$0	$0	$0	$0	$0	$0	
Natural Gas	0	0	0	0	0	0	
Water	0	0	0	0	0	0	
Chemicals - WWTP	0	0	0	0	0	0	
Chemicals - Ostara	0	0	0	0	0	0	
Total Power, Other Utilities & Chemicals	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Wastewater Treatment Plant							
Plant Operations	$0	$0	$0	$0	$0	$0	
Ostara (Phosphorous)	0	0	0	0	0	0	
Clover Bar (Biosolids)	0	0	0	0	0	0	
WWT Maintenance	0	0	0	0	0	0	
Monitoring and Compliance	1,608,565	0	0	0	804,282	804,282	
Total Wastewater Treatment Plant	**$1,608,565**	**$0**	**$0**	**$0**	**$804,282**	**$804,282**	
Operational Support Services							
Wastewater Laboratory	$0	$0	$0	$0	$0	$0	
Project Engineering	0	0	0	0	0	0	
Gold Bar Administration	0	0	0	0	0	0	
Total Operational Support Services	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Capital Overhead	$0	$0	$0	$0	$0	$0	

EPCOR
Wastewater Treatment COSA
Exhibit 8.2
Direct Assignment of the Revenue Requirement

	Total	Single Family	Multi-Family	Commercial	Overstrength Tier 1	Overstrength Tier 2	Notes
Billing, Meters, & Customer Service							
CUS Charges - Metering	$0	$0	$0	$0	$0	$0	
CUS Charges - Billing & Collections	0	0	0	0	0	0	
Customer Service	0	0	0	0	0	0	
Total Billing, Meters, & Customer Service	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
EWSI Shared Service							
Allocation from BU 8F	$0	$0	$0	$0	$0	$0	
Information Services	0	0	0	0	0	0	
SVP	0	0	0	0	0	0	
Controller	0	0	0	0	0	0	
Public and Government Affairs	0	0	0	0	0	0	
Health, Safety and Environment	0	0	0	0	0	0	
Technical Training	0	0	0	0	0	0	
HR	0	0	0	0	0	0	
Incentive and Other Compensation	0	0	0	0	0	0	
	0	0	0	0	0	0	
Total EWSI Shared Service	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Corporate Shared Services	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Total O&M Expenses	**$1,608,565**	**$0**	**$0**	**$0**	**$804,282**	**$804,282**	
Property Taxes	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Depreciation	$0	$0	$0	$0	$0	$0	
Less: Contributions Amortization	0	0	0	0	0	0	
Total Depreciation	$0	$0	$0	$0	$0	$0	
Finance Costs							
Total Finance Costs	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Return on Investment							
Net Income	$0	$0	$0	$0	$0	$0	
Consumption Deferral	0	0	0	0	0	0	
Total Return on Investment	**$0**	**0**	**0**	**0**	**0**	**0**	
Total Revenue Requirement	**$1,608,565**	**$0**	**$0**	**$0**	**$804,282**	**$804,282**	
Less: Non-Operating Revenue							
Late Payment Charges	$2,488	$0	$0	$0	$1,244	$1,244	
Surplus Sales	40	0	0	0	20	20	
ACRWC Swap	11,509	0	0	0	5,755	5,755	
Suburban	8,217	0	0	0	4,109	4,109	
Lab	3,187	0	0	0	1,594	1,594	
Ostara	0	0	0	0	0	0	
Biosolids	0	0	0	0	0	0	
ACRWC Recovery	0	0	0	0	0	0	
Total Other Revenues	**$25,441**	**$0**	**$0**	**$0**	**$12,721**	**$12,721**	
Net Revenue Requirement	**$1,583,123**	**$0**	**$0**	**$0**	**$791,562**	**$791,562**	

EPCOR
Wastewater Treatment COSA
Exhibit 9a
Distribution of Total Revenue Requirement

					Overstrength		
		Single Family	**Multi-Family**	**Commercial**	*Tier 1*	*Tier 2*	*Basis of Allocation*
Volume Related	**$7,530,774**	**$4,028,016**	**$1,593,017**	**$1,909,741**	**$0**	**$0**	*(VOL)*
Strength Related							
Biochemical Oxygen Demand	$7,398,118	$3,608,271	$1,427,014	$1,710,734	$607,598	$44,500	*(BOD)*
Total Suspended Solids	38,946,980	20,016,611	7,916,253	9,490,167	1,437,275	86,674	*(TSS)*
Chemical Oxygen Demand	8,068,715	4,289,552	1,696,450	2,033,739	48,210	763	*(COD)*
Total Nitrogen	15,477,163	7,755,294	3,067,096	3,676,898	836,788	141,087	*(TKN)*
Oil & Grease	13,684,617	6,862,613	2,714,055	3,253,665	800,417	53,866	*(OG)*
Total Phosphorous	18,740,410	9,676,910	3,827,065	4,587,964	648,471	0	*(TP)*
	$102,316,003	**$52,209,252**	**$20,647,934**	**$24,753,168**	**$4,378,759**	**$326,890**	
	$109,846,778	**$56,237,268**	**$22,240,951**	**$26,662,909**	**$4,378,759**	**$326,890**	

EPCOR
Wastewater Treatment COSA
Exhibit 9b
Distribution of Total Revenue Requirement

		Single Family	Multi-Family	Commercial	Overstrength	*Basis of Allocation*
Volume Related	**$7,530,774**	**$4,028,016**	**$1,593,017**	**$1,909,741**	**$0**	*(VOL)*
Strength Related						
Biochemical Oxygen Demand	$7,398,118	$3,608,271	$1,427,014	$1,710,734	$652,098	*(BOD)*
Total Suspended Solids	38,946,980	20,016,611	7,916,253	9,490,167	1,523,949	*(TSS)*
Chemical Oxygen Demand	8,068,715	4,289,552	1,696,450	2,033,739	48,973	*(COD)*
Total Nitrogen	15,477,163	7,755,294	3,067,096	3,676,898	977,875	*(TKN)*
Oil & Grease	13,684,617	6,862,613	2,714,055	3,253,665	854,284	*(OG)*
Total Phosphorous	18,740,410	9,676,910	3,827,065	4,587,964	648,471	*(TP)*
Total Strength Related	**$102,316,003**	**$52,209,252**	**$20,647,934**	**$24,753,168**	**$4,705,649**	
Customer Related						
Actual Customer	$20,519,830	$19,115,049	$250,183	$1,154,599	$0	*(AC)*
Weighted Customer	0	0	0	0	0	*(WCA)*
Total Customer Related	**$20,519,830**	**$19,115,049**	**$250,183**	**$1,154,599**	**$0**	
Revenue Related	**$10,468,791**	**$6,409,189**	**$1,862,138**	**$2,197,464**	**$0**	*(RR)*
Direct Assignment	**$1,583,123**	**$0**	**$0**	**$0**	**$1,583,123**	*(DA)*
Total Revenue Requirements	**$142,418,523**	**$81,761,506**	**$24,353,272**	**$30,014,972**	**$6,288,772**	

EPCOR
Wastewater Treatment COSA
Exhibit 10
Cost of Service Analysis Summary

	Test Year 2024	Single Family	Multi-Family	Commercial	Overstrength
Revenues at Present Rates	**$142,799,274**	$83,823,718	$24,354,308	$28,739,916	$5,881,333
Allocated Revenue Requirement	**$142,418,523**	$81,761,506	$24,353,272	$30,014,972	$6,288,772
Balance / (Deficiency) of Funds	**$380,752**	**$2,062,211**	**$1,036**	**($1,275,056)**	**($407,439)**
Required % Change in Rates	**-0.3%**	**-2.5%**	**0.0%**	**4.4%**	**6.9%**

EPCOR
Wastewater Treatment COSA
Exhibit 11a
Unit Costs Summary

	System Average	Single Family	Multi-Family	Commercial	Overstrength *Tier 1*	Overstrength *Tier 2*
Variable						
Volume Costs - \$ / m^3	\$0.0875	\$0.0875	\$0.0875	\$0.0875		
BOD Costs - \$ / m^3	0.0860	0.0784	0.0784	0.0784		
TSS Costs - \$ / m^3	0.4528	0.4350	0.4350	0.4350		
COD Costs - \$ / m^3	0.0938	0.0932	0.0932	0.0932		
TKN Costs - \$ / m^3	0.1799	0.1686	0.1686	0.1686		
OG Costs - \$ / m^3	0.1591	0.1492	0.1492	0.1492		
TP Costs - \$ / m^3	0.2179	0.2103	0.2103	0.2103		
RR+DA Costs - \$ / m^3	0.0117	0.0116	0.0085	0.0084		
Total	**\$1.2886**	**\$1.2339**	**\$1.2308**	**\$1.2306**		
Fixed						
Customer - \$ / Acct. / Mo	\$5.46	\$5.46	\$5.46	\$5.46		
Total	**\$5.46**	**\$5.46**	**\$5.46**	**\$5.46**		
Basic Data						
Billed Volumes	86,022,648	46,011,288	18,196,737	21,814,623	0	0
Number of Accounts	313,273	291,827	3,820	17,627	0	
Number of Wt Units	313,273	291,827	3,820	17,627	0	
Kilograms						
BOD	45,218,537	22,054,361	8,722,151	10,456,294	3,713,741	271,990
TSS	35,156,735	18,068,633	7,145,859	8,566,602	1,297,402	78,239
COD	79,970,307	42,514,430	16,813,785	20,156,712	477,820	7,560
TKN	4,136,224	2,072,578	819,672	982,640	223,629	37,705
OG	4,768,722	2,391,437	945,775	1,133,815	278,924	18,771
TP	668,963	345,430	136,612	163,773	23,148	0

EPCOR
Wastewater Treatment COSA
Exhibit 11b
Unit Costs Summary - Kilograms

		Single Family	Multi-Family	Commercial	Overstrength *Tier 1*	Overstrength *Tier 2*
Surcharge per Kilogram						
BOD Costs - $ / Kg	$0.16	$0.16	$0.16	$0.16	$0.22	$0.22
TSS Costs - $ / Kg	1.11	1.11	1.11	1.11	1.48	1.48
COD Costs - $ / Kg	0.10	0.10	0.10	0.10	0.13	0.13
TKN Costs - $ / Kg	3.74	3.74	3.74	3.74	5.00	5.00
OG Costs - $ / Kg	2.87	2.87	2.87	2.87	3.84	3.84
TP Costs - $ / Kg	28.01	28.01	28.01	28.01	37.44	0.00
Limits (mg/l)						
BOD		N/A	N/A	N/A	> 300	> 3,000
TSS		N/A	N/A	N/A	> 300	> 3,000
COD		N/A	N/A	N/A	> 600	> 6,000
TKN		N/A	N/A	N/A	> 50	> 200
OG		N/A	N/A	N/A	> 100	> 400
TP		N/A	N/A	N/A	> 10	> 75

Appendix L

EPCOR WATER SERVICES

Lead Lag Studies

May 31, 2024

APPENDIX N
Lead Lag Studies

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1.0 INTRODUCTION

1. This lead-lag study has been undertaken to support the necessary working capital allowance for EWS' Wastewater Collection and Wastewater Treatment operations for the 2025 to 2027 PBR filing with the City of Edmonton. EWS has prepared the lead-lag analysis for Wastewater Collection and Treatment separately. However, given the commonalities of the lead-lags in both operations, EWS will present the results together in this study.

2. A lead-lag study recognizes the timing differences between EWS' provision of a service and payment by customers, (revenue lag), and the timing differences between when an expense is incurred and subsequently paid by EWS, (expense lag). The net lag for an expense category is the difference between the associated revenue lag and the expense lag.

3. Lags are derived from analysis of each revenue and expense streams and are broken down into their individual components in order to more precisely determine the total lag. EWS' revenues are derived from fixed and metered consumption charges for residential, multi-residential, commercial customers, and other sources. Since revenue cycles and the lead periods for each are not significantly different, they are considered together. Operating expenses are broken down into labour, salary and benefits, incentives, general expenses, property taxes, parent charges and franchise fees. An overall operating expense lag is then calculated on a weighted average basis and netted against the appropriate revenues. Net lags are also calculated for GST and individual capital expenses including debt interest, retained earnings, dividends, and depreciation.

4. The working capital ratio (net lag/365) is then applied against the corresponding expense amount in order to determine the portion of necessary working capital related to each component.

5. Lags are made up of two general components: consumption and payment.

- Consumption lag is the lag between when a service is provided or good consumed and the end of a consumption period. For example, if a service is billed on a weekly basis, the consumption period is a week and the consumption lag would vary between zero and seven days, depending on when the service was provided. As it is generally assumed that consumption occurs evenly over the consumption period, the mid-point of a consumption period is used to determine the consumption lag. For example, in a weekly consumption period, the consumption lag would be 3.5 days (7/2) or in a monthly consumption period with 30 days the consumption lag would be 15 days (30/2).

- Payment lag is the time between the end of the consumption period and the receipt of cash. The payment lag sometimes includes a processing lag, which is the time required to receive, process, and issue the order to proceed, however this is not always considered separately from the payment lag. The payment lag is also measured in days and is the length between the last day of the consumption period and payment issue.

6. The lead-lag methodology used in this report is consistent with studies prepared in prior EWS PBR applications. See further discussion in the Study Results section.

2.0 STUDY SUMMARY

7. The overall impact of the lead-lag study using 2020, 2021 and 2022 actual financial results are shown in Table 2.0-1 and Table 2.0-2 for wastewater treatment and wastewater collection, respectively.

Table 2.0-1
Summary of Necessary Working Capital – Wastewater Treatment
($ millions)

		A	B	C	D	E	F	G	H	I
		2020			**2021**			**2022**		
		Actual	**Ratio**	**Working Cap**	**Actual**	**Ratio**	**Working Cap**	**Actual**	**Ratio**	**Working Cap**
1	Operating Expense	54.0	2.9%	1.6	56.7	2.4%	1.4	70.6	2.2%	1.6
2	Depreciation	19.7	12.6%	2.5	20.8	12.6%	2.6	23.3	12.6%	2.9
3	Retained Earnings	20.1	12.6%	2.5	29.0	12.6%	3.7	26.9	12.6%	3.4
4	Dividends	10.0	-50.1%	(5.0)	10.0	-50.0%	(5.0)	35.0	-50.0%	(17.5)
5	Interest Expense	11.6	-3.4%	(0.4)	11.6	-3.2%	(0.4)	11.0	-2.3%	(0.3)
6	GST Collection	0.0	0.1%	0.0	0.0	0.1%	0.0	0.0	0.1%	0.0
7	GST Input Tax Credit	2.4	5.9%	0.1	2.7	5.9%	0.2	2.4	5.9%	0.1
8	**Necessary Working Capital**			**1.3**			**2.4**			**(9.7)**

Table 2.0-2
Summary of Necessary Working Capital – Wastewater Collection
($ millions)

		A	B	C	D	E	F	G	H	I
		2020			**2021**			**2022**		
		Actual	**Ratio**	**Working Cap**	**Actual**	**Ratio**	**Working Cap**	**Actual**	**Ratio**	**Working Cap**
1	Operating Expense	124.8	3.2%	4.0	132.9	3.6%	4.7	127.7	3.7%	4.8
2	Depreciation	39.7	12.6%	5.0	38.0	12.6%	4.8	39.7	12.6%	5.0
3	Retained Earnings	30.3	12.6%	3.8	34.3	12.6%	4.3	48.1	12.6%	6.1
4	Dividends	-	-50.1%	-	-	-50.0%	-	-	-50.0%	-
5	Interest Expense	22.1	-0.6%	(0.1)	24.2	-1.4%	(0.3)	35.1	3.2%	1.1
6	GST Collection	-	0.1%	-	-	0.1%	-	-	0.1%	-
7	GST Input Tax Credit	9.6	5.9%	0.6	10.1	5.9%	0.6	9.1	5.9%	0.5
8	**Necessary Working Capital**			13.2			14.1			17.6

8. The ratios used to determine EWS' necessary working capital requirements reflect the revenue and expense lags as shown in Tables 2.0-3 to 2.0-5. As confirmed by the results, lead/lags for both wastewater treatment and wastewater collection are very similar.

Table 2.0-3
Summary of Lags and Working Capital Ratio – 2020
(days)

		A	B	C	D	E	F	G	H
		Waste Water Treatment				**Waste Water Collection**			
		Revenue	**Expense**	**Net**	**Ratio**	**Revenue**	**Expense**	**Net**	**Ratio**
1	Revenue	46.0	35.4	10.6	2.9%	46.0	34.4	11.6	3.2%
2	GST Collection	46.0	45.8	0.3	0.1%	46.0	45.8	0.3	0.1%
3	GST Input Tax Credit	66.8	45.2	21.6	5.9%	66.8	45.2	21.6	5.9%
	Capital Expenses	**Revenue**	**Expense**	**Net**	**Ratio**	**Revenue**	**Expense**	**Net**	**Ratio**
4	Debt interest	46.0	58.3	(12.3)	(3.4%)	46.0	48.0	(2.0)	(0.6%)
5	Retained Earnings	46.0	-	46.0	12.6%	46.0	-	46.0	12.6%
6	Dividends	-	183.0	(183.0)	(50.1%)	-	183.0	(183.0)	(50.1%)
7	Depreciation	46.0	-	46.0	12.6%	46.0	-	46.0	12.6%

Table 2.0-4
Summary of Lags and Working Capital Ratio – 2021
(days)

		A	B	C	D	E	F	G	H
		Waste Water Treatment				**Waste Water Collection**			
		Revenue	**Expense**	**Net**	**Ratio**	**Revenue**	**Expense**	**Net**	**Ratio**
1	Revenue	46.0	37.2	8.8	2.4%	46.0	33.0	13.0	3.6%
2	GST Collection	46.0	45.6	0.4	0.1%	46.0	45.6	0.4	0.1%
3	GST Input Tax Credit	66.6	45.1	21.5	5.9%	66.6	45.1	21.5	5.9%
	Capital Expenses	**Revenue**	**Expense**	**Net**	**Ratio**	**Revenue**	**Expense**	**Net**	**Ratio**
4	Debt interest	46.0	57.7	(11.7)	(3.2%)	46.0	51.1	(5.1)	(1.4%)
5	Retained Earnings	46.0	-	46.0	12.6%	46.0	-	46.0	12.6%
6	Dividends	-	182.5	(182.5)	(50.0%)	-	182.5	(182.5)	(50.0%)
7	Depreciation	46.0	-	46.0	12.6%	46.0	-	46.0	12.6%

Table 2.0-5
Summary of Lags and Working Capital Ratio – 2022
(days)

		A	B	C	D	E	F	G	H
		Waste Water Treatment				**Waste Water Collection**			
		Revenue	**Expense**	**Net**	**Ratio**	**Revenue**	**Expense**	**Net**	**Ratio**
1	Revenue	46.1	38.0	8.0	2.2%	46.1	32.4	13.7	3.7%
2	GST Collection	46.1	45.6	0.4	0.1%	46.1	45.6	0.4	0.1%
3	GST Input Tax Credit	66.6	45.1	21.5	5.9%	66.6	45.1	21.5	5.9%
	Capital Expenses	**Revenue**	**Expense**	**Net**	**Ratio**	**Revenue**	**Expense**	**Net**	**Ratio**
4	Debt interest	46.1	54.6	(8.5)	(2.3%)	46.1	34.2	11.8	3.2%
5	Retained Earnings	46.1	-	46.1	12.6%	46.1	-	46.1	12.6%
6	Dividends	-	182.5	(182.5)	(50.0%)	-	182.5	(182.5)	(50.0%)
7	Depreciation	46.1	-	46.1	12.6%	46.1	-	46.1	12.6%

9. Generally, working capital lags for both business units between 2020 and 2022 have remained relatively consistent compared to the previous study. Changes in expense lags are primarily attributable to changes in the levels of incentives, which are paid annually in arrears and have longer lags. As well, debt issuances in the latter part of each year, and timing of interest payments are reasons for changes in the interest expense lag. See Table 2.0-6 below for a comparison of the current and previous lag studies.

Table 2.0-6
Comparison of Working Capital Lead/(Lag) Days

		WWT				WWC			
		A	B	C	D	E	F	G	H
		Current Study Ratio	**Current Study Lag Day**	**Previous Study Ratio**	**Previous Study Lead/Lag Day**	**Current Study Ratio**	**Current Study Lag Day**	**Previous Study Ratio**	**Previous Study Lead/Lag Day**
1	Operating Expense	2.5%	9.1	4.9%	17.9	3.5%	12.8	4.0%	14.4
2	Depreciation	13%	46.0	13.9%	50.7	12.6%	46.0	13.5%	49.1
3	Retained Earnings	13%	46.0	13.9%	50.7	12.6%	46.0	13.5%	49.1
4	Dividends	-50%	(182.7)	-50.0%	(182.6)	-50.0%	(182.7)	-50.0%	(182.5)
5	Interest Expense	-3%	(10.8)	-2.5%	(9.0)	0.4%	1.6	-5.6%	(20.4)
6	GST collection	0%	0.4	1.4%	5.1	0.1%	0.4	1.0%	3.5
7	GST Input Tax Credit	6%	21.5	5.8%	21.2	5.9%	21.5	5.8%	21.2

3.0 REVENUE

10. The revenue lag is the measure of time from consumption or provision of a service by EWS to the receipt of payment from the customer. All of EWS' revenue streams, including: metered, fixed, overstrength surcharges, stormwater and miscellaneous revenues, are subject to similar billing and payment cycles. Therefore, since these revenues are all billed in the same manner and are based on the same payment and consumption schedules, the lag period is similar for each revenue function and will not be considered separately for the purposes of this report. Similarly, wastewater treatment and wastewater collection are billed at the same time and follow the same revenue cycle. As such, the revenue lead-lags for wastewater treatment and wastewater collection are the same.

3.1 Average Consumption Period Lag

11. In order to determine the average lag for each consumption period, an average consumption period between meter readings must be determined. Each site is billed once per month, or 12 times per year. Given 365 days in 1 year, the average consumption period billed is calculated to be 30.42 days (365 divided by 12 = 30.42). EWS has used the mid-point of the average consumption period billed as the consumption period lag (30.4 days divided by 2 = 15.2 days).

3.2 Average Tariff Bill File Publish Lag and Invoice Lag

12. EWS publishes each billing cycle exactly 6 business days after the scheduled meter reading date. This is in accordance with performance requirements as specified in Section 2.13 of the Alberta Tariff Billing Code Rules[1]. As such, the actual calendar lag is 7 days. Billing occurs the following business day after the Tariff Bill File (TBF) is published and invoicing occurs the following business days after billing. Since meter reading operations and billing cycles are performed on a business day schedule, the actual calendar day lag is 9 days for 3 out of the 5 cycles billed in a week (Monday – Wednesday) and 11 days for the tariff files published on Thursdays and Fridays, which factors in the extra weekend. These lags are summarized in Table 3.2-1.

Table 3.2-1
Tariff Bill File Publish Lag and Invoice Lag
(days)

	A **Bill Cycle**	B **Meter Reading**	C **Tariff Bill File Publish**	D **Billing**	E **Invoicing**	F **TBF Lag**	G **Invoice Lag**	H **Total Lag**
1	1	Friday	Following Friday	Monday	Tuesday	7	4	11
2	2	Monday	Following Monday	Tuesday	Wednesday	7	2	9
3	3	Tuesday	Following Tuesday	Wednesday	Thursday	7	2	9
4	4	Wednesday	Following Wednesday	Thursday	Friday	7	2	9
5	5	Thursday	Following Thursday	Friday	Monday	7	4	11
6					**Average**	**7**	**2.8**	**9.8**

3.3 Customer Payment Lags

13. Payment for invoices is due from customers 21 days after the invoice date. The overall revenue lags for EWS revenues are summarized in Table 3.3-1.

[1] https://media.www.auc.ab.ca/prd-wp-uploads/regulatory_documents/Consultations/Rule004.pdf

Table 3.3-1
Revenue Lag Summary
(days)

		A **2020**	B **2021**	C **2022**
1	Consumption period mid-point	15.25	15.21	15.21
2	TBF Publish lag	7.00	7.00	7.00
3	Invoicing lag	2.80	2.80	2.80
4	Customer payment	21.00	21.00	21.00
5	**Total**	**46.05**	**46.01**	**46.01**

14. As most expense lags are netted against these revenue lags to determine the corresponding working capital ratios and requirements, revenue lags play a significant role in the determination of EWS' overall working capital requirement.

4.0 EXPENSES

15. EWS examined operating expenses by breaking them down into the categories of labour, salary and benefits, incentive, property taxes, franchise fees, parent charges (inter-company allocations) and general operating expenses. The total operating expense lag is calculated by taking the weighted average of these components on a yearly basis.

4.1 Labour, Salary and Benefits

16. Labour expense is comprised of salary and benefits, including remittances to CRA, Sun Life and other employee benefits and withholding categories. The total labour and benefits lag is calculated using the weighted average of all expenses types (incentive is calculated separately). Contractor fees are included in general operating expense as they are paid through the general accounts payable process.

17. The individual labour and benefits lag for EWS was essentially unchanged between 2020 and 2022, which is as expected. The overall lag remained relatively flat from the prior lead lag studies.

18. Components of the labour lag other than salaries, overtime and wages are based on lag times and weightings calculated by the Payroll department of EWS' parent corporation EPCOR Utilities Inc. (EUI) for the EPCOR group of companies as a whole. These weighting reflect the fact that these payments are processed centrally for all EPCOR subsidiaries, so the lag times will not differ between the various EPCOR subsidiaries.

4.2 Incentive Payments

19. Employee incentives are categorized separately from other operating costs as they have a longer payment lag of approximately 290 days compared to 45 days for other operating costs and only 16 to17 days for other labour costs. Employee incentives are paid annually in the second pay period of April for the previous fiscal year, resulting in a consumption lag of 182 days and a payment lag of 108 days in 2020, 106 days in 2021, and 104 days in 2022. Total lags for incentives were 290 days in 2020, 288 days in 2021 and 286 days in 2022.

4.3 Parent Charges

20. EPCOR Corporate or “Parent” EUI charges are categorized separately from other operating costs such as material costs and contractor costs as they have a shorter payment lag. Parent charges are allocated from corporate on a monthly basis. Therefore, the lag is the average monthly consumption period of approximately 15 days compared to around 45 days for other operating costs.

4.4 Property Taxes

21. Property taxes are due June 30 for the current fiscal year, halfway through the consumption period. Accordingly, the property tax lead is 1 day for 2020 and 1.5 days for 2021 and 2022.

4.5 Franchise Fees

22. EWS submits franchise fees to the City on a monthly basis. Franchise fees for the month are paid at the end of the same month. It is therefore assumed that the lag period is the average monthly consumption periods of approximately 15 days.

4.6 General Operating Expenses

23. A majority of EWS’ general operating expenses are paid within 30 days of receiving the invoice; therefore, assuming expenses are incurred evenly over a month, the average consumption period is approximately 15 days. Assuming all expenses incurred during a given month are paid at the end of the next month, the total lag for general operating expenses is 45.2 days in 2020, and 45.1 days in each of 2021 and 2022.

24. Net lags for revenues and expenses for 2020 to 2022 are summarized in Tables 4.6-1 to 4.6-3. for wasterwater treatment and wastewater collection.

Table 4.6-1
Net Lag (Lead) for Revenues and Expenses – 2020
($ thousands)

		A	B	C	D	E	F	G	H
		Wastewater Treatment				**Wastewater Collection**			
		Amount	**Percentage**	**Lag Days**	**Weighted Days**	**Amount**	**Percentage**	**Lag Days**	**Weighted Days**
1	**REVENUE LAG**	**105,412**	**100%**		**47.4**	**214,348**	**100%**		**47.4**
	EXPENDITURES								
2	Labour, salaries & benefits	17,006	31.5%	16.0	5.0	54,022	43.3%	15.96	6.9
3	Incentive	1,427	2.6%	290.0	7.7	4,443	3.6%	290.0	10.3
4	Other operating expenses	23,177	42.9%	45.2	19.4	38,301	30.7%	45.2	13.9
5	Parent charges	4,123	7.6%	15.3	1.2	17,364	13.9%	15.3	2.1
6	Property tax	593	1.1%	(1.0)	(0.0)	918	0.7%	(1.0)	(0.0)
7	Franchise fees	7,678	14.2%	15.3	2.2	9,715	7.8%	15.3	1.2
8	**Subtotal**	**54,002**	**100%**			**124,763**	**100%**		
9	**NET EXPENSE LAG**				**35.4**				**34.4**
10	**Net Lag (Lead) For Receipts & Payments 2020**				**10.6**				**11.6**

Table 4.6-2
Net Lag (Lead) for Revenues and Expenses – 2021
($ thousands)

		A	B	C	D	E	F	G	H
		Wastewater Treatment				**Wastewater Collection**			
		Amount	**Percentage**	**Lag Days**	**Weighted Days**	**Amount**	**Percentage**	**Lag Days**	**Weighted Days**
1	**REVENUE LAG**	**117,031**	**100%**		**47.4**	**231,490**	**100%**		**47.**4
	EXPENDITURES								
2	Labour, salaries & benefits	16,082	28.4%	16.6	4.7	54,116	40.7%	16.6	6.7
3	Incentive	1,835	3.2%	288.0	9.3	3,756	2.8%	288.0	8.1
4	Other operating expenses	24,548	43.3%	45.1	19.5	43,262	32.5%	45.1	14.7
5	Parent charges	4,946	8.7%	15.0	1.3	20,258	15.2%	15.0	2.3
6	Property tax	642	1.1%	(1.5)	(0.0)	1,351	1.0%	(1.5)	(0.0)
7	Franchise fees	8,630	15.2%	15.2	2.3	10,191	7.7%	15.2	1.2
8	**Subtotal**	56,682	**100%**			132,935	**100%**		
9	**NET EXPENSE LAG**				**37.2**				**33.0**
10	**Net Lag (Lead) For Receipts & Payments 2021**				**8.8**				**13.0**

Table 4.6-3
Net Lag (Lead) for Revenues and Expenses – 2022
($ thousands)

		A	B	C	D	E	F	G	H
		Wastewater Treatment				**Wastewater Collection**			
		Amount	**Percentage**	**Lag Days**	**Weighted Days**	**Amount**	**Percentage**	**Lag Days**	**Weighted Days**
1	**REVENUE LAG**	**131,369**	**100%**		**47.5**	**250,029**	**100%**		**47.**5
	EXPENDITURES								
2	Labour, salaries & benefits	17,790	25.2%	16.4	4.1	52,698	41.3%	16.4	6.8
3	Incentive	2,043	2.9%	286.0	8.3	3,528	2.8%	286.0	7.9
4	Other operating expenses	35,043	49.6%	45.1	22.4	40,012	31.3%	45.1	14.1
5	Parent charges	5,182	7.3%	15.2	1.1	19,013	14.9%	15.2	2.3
6	Property tax	678	1.0%	(1.5)	(0.0)	1,402	1.1%	(1.5)	(0.0)
7	Franchise fees	9,897	14.0%	15.2	2.1	11,064	8.7%	15.2	1.3
8	**Subtotal**	**70,633**	**100%**			**127,718**	100%		
9	**NET EXPENSE LAG**				38.0				**34.2**
10	**Net Lag (Lead) For Receipts & Payments 2022**				8.0				**13.7**

25. Overall for Wastewater Treatment, the net lags for receipts and payments are 10.6 days in 2020, 8.8 days in 2021, and 8.0 days in 2022. For Wastewater Collection, the net lags for receipts and payments are 11.6 days in 2020, 13.0 days in 2021, and 13.7 days in 2022. The changes in net lag times between 2020 and 2022 are primarily due to changes in expense levels. These expenses are based on the 2020 to 2022 actual costs. The lag days are converted to working capital ratios (i.e., net lag days/365) and are applied to the overall operating expense, net of revenue offsets, to calculate the appropriate necessary working capital for this component.

5.0 CAPITAL EXPENSES

26. Capital expenses include four categories: interest, retained earnings, common dividends and depreciation. Table 5.0-1 and Table 5.0-2 provides the capital expense lags from 2020 to 2022 for Wastewater Treatment and Collection, respectively.

Table 5.0-1
Capital Expense Lags 2020 to 2022 - WWT
($ millions)

		A	B	C	D	E	F
		2020		**2021**		**2022**	
	Expense	**Lag Days**	**Expense**	**Lag Days**	**Expense**	**Lag Days**	**Expense**
1	Interest	58.3	11.6	57.7	11.6	54.6	11.0
2	Retained Earnings	-	20.1	-	29.0	-	26.9
3	Dividends	183.0	10.0	182.5	10.0	182.5	35.0
4	Depreciation	-	19.7	-	20.8	-	23.3

Table 5.0-2
Capital Expense Lags 2020 to 2022 - WWC
($ millions)

		A	B	C	D	E	F
		2020		**2021**		**2022**	
	Expense	**Lag Days**	**Expense**	**Lag Days**	**Expense**	**Lag Days**	**Expense**
1	Interest	48.0	22.1	51.1	24.2	34.2	35.1
2	Retained Earnings	-	30.3	-	34.3	-	48.1
3	Dividends	183.0	-	182.5	-	182.5	-
4	Depreciation	-	39.7	-	38.0	-	39.7

5.1 Retained Earnings and Depreciation

27. Consistent with the generally accepted practice for lead-lag studies, retained earnings and depreciation both have expense lags equivalent to zero days.

5.2 Interest on Long Term Debt

28. EWS pays interest on inter-company long term debt issued by its parent EUI as well as interest on the City of Edmonton Debentures (COE debt). Both the COE debt and inter-company notes are paid at various times throughout the year. Wastewater Treatment's interest payments are paid on a semi-annual basis. Whereas interest payments for Wastewater Collection are paid on a semi-annual and annual basis. For this reason, there are differences in interest related lag days for the two utilities. The midpoint of the consumption period for long term interest is 182.5 days, or July 2. The overall lag (lead) for interest expense is calculated as the weighted average lag (lead) for each issued debt.

5.3 Common Dividends

29. EWS issued dividends annually during 2020 to 2022 period and annual dividends are expected to be issued over the 2025 - 2027 forecast period. As a result, common dividends have been included in the current lead lag study. EWS issues common dividends on December 31 for each fiscal year, at the end of the consumption period. Accordingly, the common dividend lag is 182.5 days (365/2) for 2020, 2021, and 2022.

6.0 GST

30. The Goods and Services Tax (GST) is not applicable to water sales, so EWS only collects GST on a small proportion of its revenues, mainly for surplus sales, facility revenues and miscellaneous fees. Accordingly, EWS is always in a refund position with the Canada Revenue Agency (CRA). GST returns are filed monthly (usually on the last business day of the following month). Input credits are normally received from the CRA within 2-4 weeks of filing the GST returns. Calculation of the GST remittance lag is shown in Appendix 5.

31. The day factor on GST applicable expenses is based on the lead-lag days for general operating expenses, since capital expenditures excluding labour are assumed to be on the same payment schedule as all other operating costs.

32. As shown in Table 6.0-1 and Table 6.0-2, the impact of GST on working capital is negligible. For Wastewater treatment it results in an increase to necessary working capital of $0.14 million in 2020, $0.16 million in 2021, and $0.14 million in 2022. For Wastewater collection it results in an increase to necessary working capital of $0.57 million in 2020, $0.60 million in 2021, and $0.54 million in 2022.

Table 6.0-1
GST Impact on Working Capital – WWT
($)

		A	B **2020**	C **2021**	D **2022**
	REVENUE				
1	Net Receipts applicable to GST		367,324	273,099	406,171
2	GST rate		5.00%	5.00%	5.00%
3	GST collected	(a)	18,366	13,655	20,309
4	Day factor - revenue lag		46.0	46.0	46.1
5	Day factor - GST Remittance		45.8	45.6	45.6
6	Net	(b)	0.26	0.38	0.42
7	Impact on Working Capital	(a)*(b)/365	13	14	24
	EXPENDITURES				
8	Other operating costs		23,176,790	24,548,495	24,468,065
9	Capital expenditures excluding labour (assume 65%)		24,903,260	29,326,535	23,765,964
10	Net costs applicable to GST		48,080,050	53,875,030	48,234,028
11	GST rate		5.00%	5.00%	5.00%
12	GST remitted	(d)	2,404,002	2,693,751	2,411,701
13	Day factor - GST refund lag		66.8	66.6	66.6
14	Day factor - GST applicable expense lag		45.2	45.1	45.1
15	Net	(e)	21.58	21.50	21.50
16	Impact on Working Capital	(d)*(e)/365	141,766	158,673	142,059
17	**Net GST impact on Working Capital**		**141,779**	**158,687**	**142,083**

Table 6.0-2
GST Impact on Working Capital – WWC
($)

		A	B **2020**	C **2021**	D **2022**
	REVENUE				
1	Net Receipts applicable to GST		-	-	-
2	GST rate		5.00%	5.00%	5.00%
3	GST collected	(a)	-	-	-
4	Day factor - revenue lag		46.0	46.0	46.1
5	Day factor - GST Remittance		45.8	45.6	45.6
6	Net	(b)	0.26	0.38	0.42
7	Impact on Working Capital	(a)*(b)/365	-	-	-
	EXPENDITURES				
8	Other operating costs		38,300,758	43,261,937	27,545,399
9	Capital expenditures excluding labour (assume 65%)		153,463,333	159,111,240	155,405,452
10	Net costs applicable to GST		191,764,091	202,373,177	182,950,851
11	GST rate		5.00%	5.00%	5.00%
12	GST remitted	(d)	9,588,205	10,118,659	9,147,543
13	Day factor - GST refund lag		66.8	66.6	66.6
14	Day factor - GST applicable expense lag		45.2	45.1	45.1
15	Net	(e)	21.58	21.50	21.50
16	Impact on Working Capital	(d)*(e)/365	565,425	596,031	538,828
17	**Net GST impact on Working Capital**		**565,425**	**596,031**	**538,828**

7.0 STUDY RESULTS

33. For the 2025-2027 PBR Term, EWS is proposing the lead lag ratios and days shown in Table 2.0-5 above and repeated below in Table 7.0-1 (columns A and C).

Table 7.0-1
Summary of 2020-2022
Lead Lag Ratios

		WWT		WWC	
		A	B	C	D
		Current Study Ratio	**Current Study Lag Day**	**Current Study Ratio**	**Current Study Lag Day**
1	Operating Expense, net of revenue offsets	2.5%	9.1	3.5%	12.8
2	Depreciation	12.6%	46.0	12.6%	46.0
3	Retained Earnings	12.6%	46.0	12.6%	46.0
4	Dividends	-50.0%	(182.7)	-50.0%	(182.7)
5	Interest Expense	-3.0%	(10.8)	0.4%	1.6
6	GST collection	0.1%	0.4	0.1%	0.4
7	GST Input Tax Credit	5.9%	21.5	5.9%	21.5

34. Comparison of EWS' Lead Lag Study with those of other Canadian regulated entities shows that both the items included in the lead lag study and the resulting working capital ratios are consistent with those of other Canadian regulated entities.

35. Table 7.0-2 compares working capital ratios among other regulated entities. Review of the calculation of these ratios shows a high degree of consistency in study methodology among regulated entities.

Table 7.0-2
Comparative Study Working Capital Ratios
(%)

	A	B	C	D	E	F	G	H	I	J	K
	Comparative Studies						**Range**			**WWT**	**WWC**
	EDTI Tran[2]	**ATCO Gas**[3]	**ENMAX**[4]	**AltaLink**[5]	**Hydro One**[6]	**Hydro One**[7]	**Low**	**High**	**Avg**	**Avg**	**Avg**
1 O&M Expenses	4.7	1.5	4.3	9.5	1.6	5.1	1.5	9.5	4.4	2.5	3.5
2 Income Tax Installments	N/A	4.8	N/A	(0.1)	5.6	9.4	(0.1)	9.4	4.9	N/A	N/A
3 Other Taxes	(0.1)	(6.7)	0.7	(4.4)			(6.7)	0.7	(2.6)	0.1	0.1
4 Long Term Debt Interest	(37.8)	4.1	(10.6)	(12.7)	6.4	11.3	(37.8)	11.3	(6.6)	(3.0)	0.4
5 Common Dividends	(0.1)	(15.0)	-	(0.1)	N/A	N/A	(15.0)	-	(3.8)	(50.0)	(50.0)
6 Retained Earnings	12.4	8.5	12.5	12.2	N/A	N/A	8.5	12.5	11.4	12.6	12.6
7 Depreciation Expense	12.4	8.5	12.5	12.2	N/A	N/A	8.5	12.5	11.4	12.6	12.6

36. Comparison of EWS' working capital ratios to those of the other companies included in Table 7.0-2 shows the following:

- EWS' working capital ratios for O&M Expenses and Other Taxes are well within the range of the other companies included in the comparison;
- Since EWS is not subject to income taxes this category does not apply to it;
- EWS' working capital ratio for Dividends are higher than the other companies. The other companies included in the comparison issue dividends either quarterly or mid-year. EWS issue its dividend at the end of the year, resulting in a higher working capital lag;
- EWS' working capital ratios for retained earnings and depreciation are higher than those of the other companies included in Table 7.0-2. These ratios are based on revenue lag days. Since all of EWS' revenues are derived from retail customers, rather than settlement with the Alberta Electric System Operator (AESO) or other system operators, EWS' collection periods are longer than those of the comparators. Accordingly, EWS' ratios are reasonable; and

[2] EDTI 2020-2022 TFO Tariff Application, MFR Schedules, Schedule 11-3.
[3] ATCO Gas GRA Filing 2011-2012, December 2010.
[4] Exhibit 23966-X0060; EPC 2018-2020 Transmission General Tariff Application, Appendix Q - EPC Lead Lag Study (Chymko)
[5] Exhibit 23848-X0003.01; Altalink 2019-2021 General Tariff Application, MFR Schedules, Schedule 11-3
[6] Hydro One Exhibit C, August 5, 2021, A determination of the Working Capital Requirements of Hydro One's Transmission (2023-2027)
[7] Hydro One Exhibit C, August 5, 2021, A determination of the Working Capital Requirements of Hydro One's Distribution (2023-2027)

- EWS' long term debt interest ratios are within the range of the other companies in Table 7.0-2. These ratios are based on the difference between revenue lag days and interest expense lag days. EWS based its calculation of interest expense lag days on the actual dates of interest paid during the year, a methodology also used by ENMAX, HydroOne, and AltaLink. This methodology provides a representative view of actual cash flows throughout the year. Accordingly, EWS' long term debt interest ratio is reasonable.

Appendix M

EPCOR WATER SERVICES

Depreciation Studies

May 31, 2024

EPCOR

Wastewater Treatment Plant Assets

DEPRECIATION STUDY

at DECEMBER 31, 2022

ALLIANCE CONSULTING GROUP

http://www.utilityalliance.com

EPCOR
WASTEWATER TREATMENT PLANT ASSETS

DEPRECIATION STUDY

EXECUTIVE SUMMARY

EPCOR (the “Company”) engaged Alliance Consulting Group to conduct a depreciation study of its depreciable assets related to Wastewater Treatment operations as of December 31, 2022.

Overall, this study proposes the use of 850 asset categories to depreciate fixed assets used to support wastewater treatment operations. Seventy-one asset categories propose a revised service life, 161 asset categories retained the existing service lives, and 112 asset categories were split into components with unique service lives, resulting in 506 new asset categories.

The most significant change in this depreciation study is the identification of 30 new components to better define the various lives within each category of plant. When these 30 new components are assigned to each wastewater treatment category, the result is an addition of 506 new asset categories that will be used for future investment. For example, piping assets are currently recorded in 20 asset categories in the fixed asset records. This study proposes four components for each of the asset categories for piping that is used in the multiple processes throughout wastewater treatment operations. The proposed components related to each of the piping asset categories are 15-year, 25-year, 40 year, and 65-year components, which resulted in 80 asset categories instead of the original 20. To further explain this movement, currently, there is one asset category for lagoon piping assets. This study recommends that future investment related to lagoon piping assets use four asset categories using the proposed lives to better model the discrete lives found within the lagoon piping assets. Each of the existing asset categories that was split into components is discussed in more detail in this report. Current investment will continue to use the existing service life assigned and the new asset categories and existing asset categories with revised lives will be applied prospectively to future investment.

Appendix A contains a table that lists the existing and proposed service life by asset category for Wastewater Treatment operations.

EPCOR
WASTEWATER TREATMENT PLANT ASSETS
DEPRECIATION STUDY
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PURPOSE

The purpose of this study is to review the mix of assets and current asset service lives assigned to each major asset category for depreciable property related to Wastewater Treatment operations as recorded on EPCOR's books at December 31, 2022. EPCOR directed Alliance to review the currently approved service lives for the mix of assets in each major asset category, propose revised service lives and recommend additional asset categories where appropriate to be applied prospectively to future plant investment. The study also recommends consistent asset categories and service lives for similar assets, such as tools and vehicles, utilized in both Wastewater Collection and Wastewater Treatment operations.

The Company currently calculates depreciation using a straight line, broad life group depreciation system that is designed to recover the total remaining undepreciated investment for the analyzed accounts, over the life of the property on a straight-line basis. Assets are retired when they are no longer used or useful in utility operations. EPCOR's methodology for handling the cost of retired assets that have not been fully accrued is to amortize the unrecovered balance over the original remaining life of the asset. This approach is in essence using the group depreciation principle of recovering the full cost of retired assets from accumulated depreciation on retirement of an asset. EPCOR informed Alliance that the Company will retain its current depreciation system and calculate depreciation using the proposed lives on a prospective basis for future investment.

EPCOR provides wastewater treatment services in Edmonton at Gold Bar, which began operating in 1956. Gold Bar is an advanced wastewater treatment plant ("WWTP") with a focus on three areas of treatment:

i. During normal weather conditions the plant processes on average 288 megaliters per day with full treatment including biological nutrient removal and pathogen reduction.

ii. During wet weather conditions, including heavy rain or snow melt, the plant processes increased flows from EPCOR's combined sanitary and stormwater sewer system:

a. Up to 600 megaliters per day of enhanced primary treatment.

b. Up to 1,200 megaliters per day of primary treatment processes; and

c. Removal of floatable objects up to a capacity of 2,200 megaliters per day.

Annually, Gold Bar treats approximately 100,000 megaliters of wastewater flow. Gold Bar is also responsible for management and operations of biosolids. Biosolids management includes interim storage, dewatering and beneficial use of the biosolids produced at Gold Bar and the Alberta Capital Region Wastewater Commission plants.

STUDY RESULTS

Since EPCOR took over Gold Bar in 2009, there was limited retirement experience available to conduct life analysis. Therefore, the service lives developed in this study rely on the limited retirement experience available, as well as information obtained from subject matter experts from finance, management, and operational areas of the Company, and incorporate professional judgement of the Managing Partner as a professional engineer and obtained while performing depreciation studies for similar assets across North America for more than 35 years. The asset categories with the largest increase and decrease in proposed lives are shown below:

Asset Category	Current Life	Proposed Life
VEHICL-TRAILR-FLTDEC-	15	20
VEHICL-TRAILR-FLTDEC-NONE	10	20
VEHICL-TRAILR-TILT-	15	20
VEHICL-TRAILR-TILT-NONE	15	20
VEHICL-TRAILR-UTILIT-	15	20
VEHICL-TRAILR-UTILIT-NONE	15	20
VEHICL-VAN-E4CMET-NONE	7	12
WWTPLT-CBF-LOAD-SMET	45	25
WWTPLT-CHEMS-AIRSCR-TANK	25	30
WWTPLT-GROUND-SITLIT-SCAM	30	7
WWTPLT-SEC-BIO-SMET	45	25
WWTPLT-SEC-SECCLR-SMET	55	25
WWTPLT-UTL-EPSD-CABL	65	45

In many cases, the life changes above were from relatively minor categories but were identified as having materially different lives or were the result of new asset types within an original category. Appendix A contains a table comparing the current and proposed lives for each major asset category. The mix of assets and information provided by Company subject matter experts related to each asset category are discussed in more detail in the Life Analysis portion of this report.

GENERAL DISCUSSION

Definition

The term "depreciation" as used in this study is considered in the accounting sense, that is, a system of accounting that distributes the cost of assets, less net salvage (if any), over the estimated useful life of the assets in a systematic and rational manner. It is a process of allocation, not valuation. This expense is systematically allocated to accounting periods over the life of the properties. The amount allocated to any one accounting period does not necessarily represent the loss or decrease in value that will occur during that particular period. EPCOR accrues depreciation on the basis of the original cost of all depreciable property by functional property group.

Judgment

Any depreciation study requires informed judgment by the analyst conducting the study. A knowledge of the property being studied, company policies and procedures, general trends in technology and industry practice, and a sound basis of understanding depreciation theory are needed to apply this informed judgment. Judgment was used in areas such as individual asset life selection.

Judgment is not defined as being used in cases where there are specific, significant pieces of information that influence the choice of a life. Those cases would simply be a reflection of specific facts into the analysis. Where there are multiple factors, activities, actions, property characteristics, property mix in accounts, or a multitude of other considerations that impact the analysis (potentially in various directions), judgment is used to consider all of these factors and synthesize them into a general direction or understanding of the characteristics of the property. Individually, no one factor in these cases may have a substantial impact on the analysis, but, overall, may shed light on the utilization and characteristics of assets. Judgment may also be defined as deduction, inference, wisdom, common sense, or the ability to make sensible decisions. There is no answer absent judgment. At the very least, for example, any analysis requires choosing upon which facts and information to place more emphasis.

The establishment of appropriate average service lives for Wastewater Treatment Operations accounts requires judgment to incorporate the understanding of the operation of the system with the available accounting, manufacturing, and operational information incorporated in life analysis. The appropriateness of lives assigned to various assets depends not only on current experience, but also on how well future life expectations for the assets will match past experience.

Current applications and trends in use of the equipment also need to be factored into life recommendations to ensure appropriate capital recovery to occur.

DETAILED DISCUSSION

Depreciation Study Process

This depreciation study encompassed four distinct phases. The first phase involved data collection and field interviews. The second phase was where the initial data analysis occurred. The third phase was where the information and analysis were evaluated. Once the first three stages were complete, the fourth phase began. This phase involved documenting the corresponding recommendations. The Company will use the existing lives to calculate straight line depreciation for current investment and the proposed lives will be used to calculate depreciation for future investment.

During the Phase 1 data collection process, historical data was compiled from continuing property records and general ledger systems. Data was validated for accuracy by extracting and comparing to multiple financial system sources. Audit of this data was validated against historical data from prior periods, historical general ledger sources, and field personnel discussions. This data was reviewed extensively to be put in the proper format for a depreciation study. Also as part of the Phase 1 data collection process, numerous discussions were conducted with operations personnel to obtain information that would assist in formulating life recommendations in this study. One of the most important elements of performing a proper depreciation study involved understanding how EPCOR utilized assets and the environment of those assets. Interviews with operations personnel served as important ways to allow the analyst to obtain information that was beneficial when evaluating EPCOR's asset utilization and environment. Information that was gleaned in these discussions is found both in the life analysis section of this study and also in workpapers.

Phase 2 is where the review of the lives of each asset is performed. EPCOR personnel reviewed the account records and determined if any asset should be classified in a different asset category. Phase 2 and 3 overlap to a significant degree. The detailed property records information was used in phase 2 to develop revised asset lives for each asset in service in EPCOR's depreciable property. This information was then carried forward into phase 3 for the evaluation process.

Phase 3 was the evaluation process that synthesized analysis, interviews, and operational characteristics into a final selection of asset lives. The analysis and interviews were further enhanced by the incorporation of recent or future changes in the characteristics or operations of assets that were revealed in Phase 1. Phases 2 and 3 allowed the depreciation analyst to validate the asset characteristics as seen in the accounting transactions with actual EPCOR operational experience.

Finally, Phase 4 involved making recommendations and documenting the conclusions in a final report. Recommendations for the various accounts are contained within the Detailed Discussion of this report. The depreciation study flow diagram (shown as Figure 1[1]) documents the steps used in conducting this study. Depreciation Systems, page 289 documents the same basic processes in performing a depreciation study that are: statistical analysis, evaluation of statistical analysis, discussions with management, forecasting assumptions, writing the logic supporting estimates, and writing the final report.

[1] Public Utility Finance & Accounting, A Reader

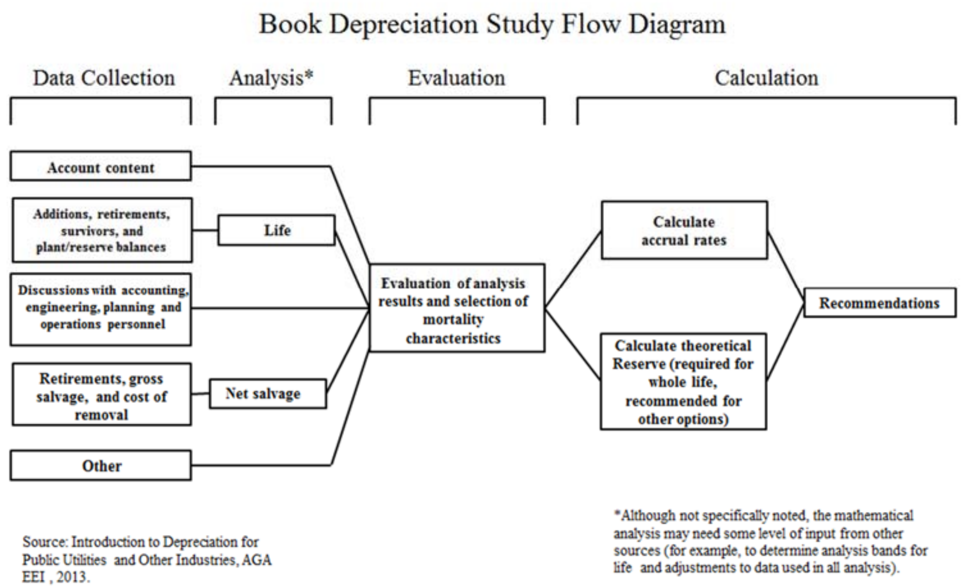

Figure 1

EPCOR WASTEWATER TREATMENT OPERATIONS DEPRECIATION STUDY PROCESS

Depreciation Accrual Calculation

EPCOR Wastewater Treatment historically has used a broad group approach to depreciating assets. This study uses the same approach. Annual depreciation expense amounts for the depreciable property for EPCOR Wastewater Treatment will continue to be calculated using the straight-line method, broad group procedure. With this approach, asset lives are assigned to each major, minor, and sub-category of assets. Annual accrual amounts for current investment in each existing asset category will be computed and validated to ensure no category is over-accrued in the annual computation. Current investment accrual amounts will continue to use the existing service lives and annual accrual amounts for future investment will be computed using the revised lives and new asset categories while using the same methodology.

LIFE ANALYSIS

By interviewing operational personnel to better understand the operations and expectations for each asset group, as well as using judgment as a professional engineer and gained through analyzing like assets over 35 years, asset categories and mix of assets were reviewed and assigned lives based on their major, minor, and subcategories along with the asset description and usage. Some asset categories were split into multiple components. For example, tools is an asset category that contain assets with unique operating lives that range from 3 years to 15 years based on the type of tool and usage. This study proposes to split the tools asset category into four unique components to better reflect the various unique life characteristics of the assets within the group. The proposed components for tools are 3-year, 5-year, 10-year, and 15-year life groups. Future investment for tools will be assigned to a component based on the type of tool, estimated operating life, and usage. The Company is looking to consistently assign the same life to similar tools used across both wastewater treatment and wastewater collection operations. The same analysis is applied to other asset categories within wastewater treatment operations. The following asset categories were split into additional component asset categories:

- Buildings
- Chains
- Electrical Equipment
- Generators
- Instrumentation
- Liners
- Mechanical Equipment
- Piping
- Programmable Control Systems
- Structures

- Tools

ASSET CATEGORY SPECIFIC INFORMATION
WASTEWATER TREATMENT OPERATIONS

As discussed earlier, the table below lists the existing asset categories that are recommended to be split into new asset categories to better reflect the various life characteristics of multiple components within the existing asset groups. The proposed asset category (and resulting proposed service life) will be assigned to new assets on an ongoing basis based on the specific characteristic of the asset being capitalized.

Existing Asset Category	Existing Life	Proposed Asset Category	Proposed Life
Buildings	25	SUPC	10 years
Chains	10	CHN1	10 years
		CHN2	30 years
Electrical Equipment	25	ELE1	5 years
		ELE2	15 years
		ELE3	25 years
		ELE4	40 years
Generator	25	GEN1	15 years
		GEN2	25 years
Instrumentation	15	INS1	5 years
		INS2	15 years
		INS3	25 years
Liners		LINE	20 years
Mechanical Equipment	25	MECH1	10 years
		MECH2	15 years
		MECH3	25 years
		MECH4	40 years
Programable Control Systems (PCS)	10	PCS1	10 years
		PCS2	15 years
		PCS3	25 years
		PCS4	40 years
Piping	35	PIP1	15 years

		PIP2	25 years
		PIP3	40 years
		PIP4	65 years
Structures	55-75	STR2	20 years
Tools	10	TOOL1	3 years
		TOOL2	5 years
		TOOL3	10 years
		TOOL4	15 years

Building Asset Category

This major asset category consists of building assets used to support wastewater treatment operations. The estimated operating lives for these assets range from 10 to 65 years. The existing lives were retained for building asset categories related to the substructure, such as foundations, with an operating life of 65 years and the superstructure A and B asset categories that include concrete walls, roofing, and plumbing assets with operating lives of 45 and 25 years respectively. Discussion with operational subject matter experts revealed there are shorter-lived assets within the building such as thermostats, fans, heat exchangers, and hot water tanks. This study proposes to add a new 10-year superstructure C asset category for building assets. Based on the current mix of assets in this category, information provided by Company subject matter experts, and professional judgement, this study recommends the following new asset category for future investment related to building assets:

Existing Asset Category	Proposed Asset Category	Proposed Service Life
Buildings	SUPC	10 years

Chain Asset Categories

This major asset category consists of chains used to support wastewater treatment operations. The estimated operating lives for these assets are 10 years and 30 years. Clarifier chains and screen chains used in the primary and secondary clarifiers have a short estimated operating life of 10 years. Whereas other chain assets such as the DAF Tank chains have a longer estimated operating life of 30 years. Based on the current mix of assets in this category, information provided by Company subject matter experts, and professional judgment, this study recommends the following asset categories for future investment related to chain assets:

Existing Asset Category	Proposed Asset Category	Proposed Service Life
Chains	CHN1	10 years
	CHN2	30 years

Electrical Equipment Asset Categories

This major asset category consists of electrical equipment used to support wastewater treatment operations. The estimated operating lives for these assets range from 5 years to 40 years. Discussions with operational personnel noted that there is a wide mix of electrical equipment assets. These assets would have a wide range of lives based on the equipment type and usage. This study recommends creating life groups that can consistently be applied to electrical equipment throughout wastewater treatment operations. Below is a table that lists the new asset categories, proposed service lives, and a sample of the type of electrical equipment that have estimated operating lives in each life category.

Proposed Asset Category	Proposed Service Life	Life Category	Sample Components in Asset Category
ELE1	5 years	Very Short Life	Non-Flooded Batteries, Scum Trough Actuators, Active Harmonic Filters
ELE2	15 years	Short Life	Motors up to 50hP, Variable Frequency Drives (VFDs), Power Supplies, Surge Protectors, Relays, Motor Starters, Lighting
ELE3	25 years	Medium Life	Dry & Isolation Transformers, Uninterruptible Power Supplies (UPS), Arresters, Motor Control Centers (MCCs), Molded Case Circuit Breakers, Panel Boards, Transfer switches, Disconnects, Capacitor Banks, Motors larger than 50 hP (<600V)
ELE4	40 years	Long Life	Oil Filled Transformers, Polymer Encapsulated Dry Type Transformer, Busbars, Power Capacitors, Substation Power Circuit Breakers, Motors above 600V, cable tray and support

Generator Asset Category

This major asset category consists of generators used to support wastewater treatment operations. The expected operating lives for these assets are 15 years and 25 years. Generator controls and battery charging systems have a short estimated operating life of 15 years. Whereas other generator assets such as standby generators and the peripheral systems including the motor and cooling system would have a longer expected operating life of 25 years. Based on the current mix of assets in this category, discussions with Company subject matter experts, and professional judgement, this study recommends the following asset categories for future investment related to generator assets:

Existing Asset Category	Proposed Asset Category	Proposed Service Life
Generator	GEN1	15 years
	GEN2	25 years

Instrumentation Asset Category

This major asset category consists of various instrumentation and related equipment used to support wastewater treatment operations. Instrumentation is used across various areas of the wastewater treatment process and have operating lives between 5 and 25 years based on the type of instrumentation and usage. Devices such as analytical sensors and portable instrumentation have a short expected operating life of 5 years. Other instrumentation including process measurement and control devices have a longer operating life expectation of 15 years. Longer-lived instrumentation includes motor-controlled actuators would have a longer estimated operating life of 25 years. This study recommends creating life groups that can consistently be applied to electrical equipment throughout wastewater treatment. Below is a table that lists the new asset categories, proposed service lives, and a sample of the type of electrical equipment that have estimated operating lives in each life category.

Proposed Asset Category	Proposed Service Life	Life Category	Sample Components in Asset Category
INS1	5 years	Short Life	Portable Gas Detectors, Handheld Test and Measurement Instrument, Portable Data Loggers, Process analytical sensors (pH, ORP, Cl2, NH4, DO, conductivity) Fugitive Gas sensors (H2S, CO, Cl2, NOx, catalytic-bead LEL)
INS2	15 years	Medium Life	Process measurement sensors, transmitters, switches, & indicators Alarm indicators (beacons, buzzers, horns), Fugitive Gas sensors Process measurement switches (flow, level, pressure, temperature, position), Valve accessories (solenoids, positioners, pressure regulators)
INS3	25 years	Long Life	Pneumatic actuators, motor operated actuators for control valves and gates

Liners Asset Category

This major asset category consists of the liners used in different areas of the treatment process to support wastewater treatment operations. The liners and coating assets within structures and other treatment plant have a shorter operating life than the structure asset themselves. Liner assets such as the channel wall coatings, digester liners, and diversion liners within treatment structures all have an estimated operating life of 20 years. Based on discussions with Company subject matter experts and professional judgement, this study recommends the following asset category with a 20-year life for future investment in liner assets:

Existing Asset Category	Proposed Asset Category	Proposed Service Life
Liners	LINE	20 years

Mechanical Equipment

This major asset category consists of mechanical equipment used to support wastewater treatment operations. The estimated operating lives for these assets range from 10 years to 40 years. Operational personnel noted that they experience mechanical equipment assets having a wide range of lives based on the equipment type and usage. This study recommends creating life groups that can consistently be applied to mechanical equipment throughout wastewater treatment operations. Below is a table that lists the new asset categories, proposed service lives, and a sample of the type of mechanical equipment that have estimated operating lives in each life category.

Proposed Asset Category	Proposed Service Life	Life Category	Sample Components in Asset Category
MECH1	10 years	Very Short Life	Screens, bioreactor mixers, blend tank mixers
MECH2	15 years	Short Life	Compressors, Small valves, supernatant / sludge line valving, Hydraulics, conveyors, macerators, sump pumps, small blowers, small gear boxes, fermenter internals, grit augers, Chemical makeup systems
MECH3	25 years	Medium Life	Diesel & NG Generators, medium valves, Large Gearboxes, dryers, large blowers, scum troughs, Linear Motion Mixers, large pumps
MECH4	40 years	Long Life	Cranes, Weirs, Large Valves, Fermenter internals, Fire suppression

Programmable Control Systems

This major asset category consists of programmable control systems ("PCS") used in various processes to support wastewater treatment operations. Control systems used across various areas of the wastewater treatment process have operating lives between 10 and 40 years. The estimated lives of the PCS are impacted by how quickly technology is changing, frequency of hardware and software upgrades and replacements, and how closely integrated the controls are to the equipment it supports. Shorter-lived control systems include network communication devices, computer hardware, and distributed control systems. Longer-lived control equipment includes programmable logic controllers and fiber optic cable. This study recommends creating life groups that can consistently be applied to programmable control systems throughout wastewater treatment operations. Below is a table that lists the new asset categories, life groups, and a sample of the type of control systems have estimated operating lives in each asset category.

Proposed Asset Category	Proposed Service Life	Life Category	Sample Components in Asset Category
PCS1	10 years	Short Life	Network Communication Devices & Computer Hardware, Data Historian, Servers, Modems, Power supplies, etc.

PCS2	15 years	Medium Life	Distributed Control System (DCS), Delta V Contollers, I/O Cards, Operator & Engineering Stations (Computers)
PCS3	25 years	Long Life	Programmable Logic Controllers (PLCs), SCADA (Supervisory Control and Data Acquisition) Systems
PCS4	40 years	Extreme Long Life	Fiber Optic Cable

Piping Asset Categories

This major asset category consists of various kinds of piping used for wastewater treatment operations. The estimated operating lives for piping assets range from 15 to 65 years and are typically impacted by the material and usage of the piping. Piping with a 15-year operating life includes small diameter, non-metallic chemical piping used in the citric acid treatment process. High pressure, metallic piping, or plastic piping in a more corrosive operating environment are expected to have an operating life of 25 years. Piping with a longer operating life between 40 and 65 years includes low pressure, buried steel piping such as sludge piping and boiler feed piping. Based on the current mix of assets in this category, information provided by Company subject matter experts, and professional judgement, this study recommends the following asset categories related to piping assets:

Existing Asset Category	Proposed Asset Category	Proposed Service Life
Piping	PIP1	15 years
	PIP2	25 years
	PIP3	40 years
	PIP4	65 years

Structure Asset Category

This asset category includes structural assets used to support wastewater treatment operations such as hatches, outside tank covers and operational platforms. Discussion with operational subject matter experts revealed there are shorter-lived assets within the operational structures that see more frequent replacement such as equipment hatches, tank covers, ladders, and other related short-lived structures. This study proposes to add a new 20-year asset category for future investment related to these shorter-lived wastewater structure assets. Based on information provided by Company subject matter experts and professional judgement, this study recommends the following new asset category for future investment related to structure assets:

Proposed Asset Category	Proposed Service Life	Life Category	Sample Components in Asset Category
STR2	20 years	Short Life	Hatches, outside tank covers (steel or fiberglass), ladders, railings, platforms

Tools Asset Categories

This major asset category consists of various tools used to support wastewater treatment operations. The existing lives for the assets in this category are 3, 5, and 10 years. The experience of operational personnel finds that the estimated operating life for tools varies based on the type of tool and usage. For example, monitoring devices and electronic tools experience a relatively short operating life between 3 and 5 years, while a boring machine or drill rig typically experiences a longer operating life between 10 and 15 years. Operational personnel expect tools used in both wastewater collection and wastewater treatment operations to have the same operational life. The Company is looking to consistently assign tools to unique life groups based on the type of tool and usage across both operating areas. Based on information provided by Company personnel and the mix of assets in this asset category, this study recommends the following asset categories for future investment related to tools:

Existing Asset Category	Proposed Asset Category	Proposed Service Life
Tools	TOOL1	3 years
	TOOL2	5 years
	TOOL3	10 years
	TOOL4	15 years

Vehicles

This major asset category consists of vehicles, pickup trucks, and other related construction equipment used in wastewater treatment operations. The existing lives for the assets in this category range from 5 to 25 years. This study retains the existing asset categories and proposes revised lives based on the type of vehicle and usage for each asset category. Operational subject matter experts shared that the existing assets have relatively low mileage and the operating lives are primarily impacted by idle time and maintenance costs. Cars and light duty trucks are currently being replaced around 7 years. Heavy trucks and vans are estimated to have an operating life between 10 and 12 years. Trailers have an operating life between 15 and 20 years. Operational personnel expect vehicles used in both wastewater collection and wastewater treatment operations to have the same operational life. The Company is looking to assign the same life to each type of vehicle consistently across both operating areas. Based on information provided by Company personnel and the mix of assets in this asset category, this study recommends using the following lives for the vehicles in this major asset category.

Asset Category	Existing Life	Proposed Life
VEHICL-CARS-MEDIUM-NONE	7	7
VEHICL-CARS-SUBCPT-NONE	9	7
VEHICL-EQPCON-BKHOEW-NONE	5	7
VEHICL-EQPCON-CRANE-NONE	10	10
VEHICL-EQPCON-FRKHVY-NONE	15	12
VEHICL-EQPCON-FRKLFT-NONE	15	12
VEHICL-EQPCON-SKDSTR-NONE	7	7
VEHICL-EQPCON-TRENCH-NONE	8	7
VEHICL-HVYTRK-DIGGER-NONE	10	10
VEHICL-HVYTRK-DUMP-NONE	11	9
VEHICL-HVYTRK-DUMPW-NONE	9	9
VEHICL-HVYTRK-FLTCRN-NONE	10	10
VEHICL-LGTTRK-F150-NONE	9	7

VEHICL-LGTTRK-F250-NONE	9	7
VEHICL-LGTTRK-F350-NONE	8	7
VEHICL-LGTTRK-F450-NONE	8	12
VEHICL-LGTTRK-F550-NONE	12	12
VEHICL-LGTTRK-QTRTON-NONE	7	7
VEHICL-LGTTRK-WTROUB-NONE	5	5
VEHICL-TRAILR-CABOFF-NONE	25	15
VEHICL-TRAILR-FLTDEC-NONE	10	20
VEHICL-TRAILR-HYDROV-NONE	10	12
VEHICL-TRAILR-REEL-NONE	15	15
VEHICL-TRAILR-TILT-NONE	15	20
VEHICL-TRAILR-UTILIT-NONE	15	20
VEHICL-VAN-E2CCRG-NONE	8	7
VEHICL-VAN-E2CMET-NONE	5	7
VEHICL-VAN-E3CCRG-NONE	12	7
VEHICL-VAN-E3CMET-NONE	10	7
VEHICL-VAN-E4CCUB-NONE	12	12
VEHICL-VAN-E4CMET-NONE	7	12
VEHICL-VAN-E5CCUB-NONE	12	12
VEHICL-VAN-MNVVAN-NONE	10	7

APPENDIX A

Current versus Proposed Life Parameter Table

Wastewater Treatment Asset Categories

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
FURN-NONE-NONE-NONE	8	8
HRDWRE-IT-NONE-NONE	4	5
LAND-NONE-NONE-NONE	1	1
SFTWRE-IT-ACQRD-SWI	10	10
SFTWRE-IT-INTNAL-SWI	10	10
TOOLS-NONE-NONE-10YEAR		10
TOOLS-NONE-NONE-15YEAR		15
TOOLS-NONE-NONE-3YEAR		3
TOOLS-NONE-NONE-5YEAR		5
TOOLS-NONE-NONE-NONE	10	New SubCategory
VEHICL-CARS-MEDIUM-	9	7
VEHICL-CARS-MEDIUM-NONE	7	7
VEHICL-CARS-SUBCPT-	9	7
VEHICL-CARS-SUBCPT-NONE	9	7
VEHICL-EQPCON-BKHOE-	10	7
VEHICL-EQPCON-BKHOET-	7	7
VEHICL-EQPCON-BKHOEW-	5	7
VEHICL-EQPCON-BKHOEW-NONE	5	7
VEHICL-EQPCON-CRANE-	10	10
VEHICL-EQPCON-CRANE-NONE	10	10
VEHICL-EQPCON-FRKHVY-	15	12
VEHICL-EQPCON-FRKHVY-NONE	15	12
VEHICL-EQPCON-FRKLFT-	15	12
VEHICL-EQPCON-FRKLFT-NONE	15	12
VEHICL-EQPCON-SKDSTR-	10	7
VEHICL-EQPCON-SKDSTR-NONE	7	7
VEHICL-EQPCON-TRENCH-	10	7
VEHICL-EQPCON-TRENCH-NONE	8	7
VEHICL-HVYTRK-DIGGER-	11	10
VEHICL-HVYTRK-DIGGER-NONE	10	10
VEHICL-HVYTRK-DUMP-	11	9
VEHICL-HVYTRK-DUMP-NONE	11	9
VEHICL-HVYTRK-DUMPW-NONE	9	9
VEHICL-HVYTRK-FLTCRN-	10	10
VEHICL-HVYTRK-FLTCRN-NONE	10	10
VEHICL-HVYTRK-HYDROV-NONE	10	12
VEHICL-LGTTRK-F150-	11	7
VEHICL-LGTTRK-F150-NONE	9	7
VEHICL-LGTTRK-F250-	11	7
VEHICL-LGTTRK-F250-NONE	9	7
VEHICL-LGTTRK-F350-	11	7
VEHICL-LGTTRK-F350-NONE	8	7

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
VEHICL-LGTTRK-F450-	11	12
VEHICL-LGTTRK-F450-NONE	8	12
VEHICL-LGTTRK-F550-	12	12
VEHICL-LGTTRK-F550-NONE	12	12
VEHICL-LGTTRK-QTRTON-	11	7
VEHICL-LGTTRK-QTRTON-NONE	7	7
VEHICL-TRAILR-CABOFF-	25	15
VEHICL-TRAILR-CABOFF-NONE	25	15
VEHICL-TRAILR-FLTDEC-	15	20
VEHICL-TRAILR-FLTDEC-NONE	10	20
VEHICL-TRAILR-HYDROV-NONE	10	12
VEHICL-TRAILR-REEL-	15	15
VEHICL-TRAILR-TILT-	15	20
VEHICL-TRAILR-TILT-NONE	15	20
VEHICL-TRAILR-UTILIT-	15	20
VEHICL-TRAILR-UTILIT-NONE	15	20
VEHICL-VAN-E2CAER-	11	7
VEHICL-VAN-E2CCRG-	11	7
VEHICL-VAN-E2CCRG-NONE	8	7
VEHICL-VAN-E2CCUB-	11	7
VEHICL-VAN-E2CMET-	11	7
VEHICL-VAN-E2CMET-NONE	5	7
VEHICL-VAN-E2CRLY-	11	7
VEHICL-VAN-E2CRRF-	11	7
VEHICL-VAN-E2CSGB-	11	7
VEHICL-VAN-E2CSIG-	11	7
VEHICL-VAN-E2CTHM-	11	7
VEHICL-VAN-E3CAER-	12	7
VEHICL-VAN-E3CCRG-	12	7
VEHICL-VAN-E3CCRG-NONE	12	7
VEHICL-VAN-E3CCUB-	12	7
VEHICL-VAN-E3CMET-	12	7
VEHICL-VAN-E3CMET-NONE	10	7
VEHICL-VAN-E3CRLY-	12	7
VEHICL-VAN-E3CRRF-	12	7
VEHICL-VAN-E3CSGB-	12	7
VEHICL-VAN-E3CSIG-	12	7
VEHICL-VAN-E3CTHM-	12	7
VEHICL-VAN-E4CAER-	12	12
VEHICL-VAN-E4CCRG-	12	12
VEHICL-VAN-E4CCUB-	12	12
VEHICL-VAN-E4CCUB-NONE	12	12

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
VEHICL-VAN-E4CMET-	12	12
VEHICL-VAN-E4CMET-NONE	7	12
VEHICL-VAN-E4CRLY-	12	12
VEHICL-VAN-E4CRRF-	12	12
VEHICL-VAN-E4CSGB-	12	12
VEHICL-VAN-E4CSIG-	12	12
VEHICL-VAN-E4CTHM-	12	12
VEHICL-VAN-E5CAER-	12	12
VEHICL-VAN-E5CCRG-	12	12
VEHICL-VAN-E5CCUB-	12	12
VEHICL-VAN-E5CCUB-NONE	12	12
VEHICL-VAN-E5CMET-	12	12
VEHICL-VAN-E5CRLY-	12	12
VEHICL-VAN-E5CRRF-	12	12
VEHICL-VAN-E5CSGB-	12	12
VEHICL-VAN-E5CSIG-	12	12
VEHICL-VAN-E5CTHM-	12	12
VEHICL-VAN-MNVVAN-	11	7
VEHICL-VAN-MNVVAN-NONE	10	7
WWTPLT-BLDGS-AAQMS-SUBS	65	65
WWTPLT-BLDGS-AAQMS-SUPA	45	45
WWTPLT-BLDGS-AAQMS-SUPB	25	25
WWTPLT-BLDGS-ADMIN-SUPB	25	25
WWTPLT-BLDGS-ADMIN-SUPC		10
WWTPLT-BLDGS-AIRSCR-SUPA	45	45
WWTPLT-BLDGS-AIRSCR-SUPB	25	25
WWTPLT-BLDGS-AIRSCR-SUPC		10
WWTPLT-BLDGS-AUXCR-SUPA	45	45
WWTPLT-BLDGS-AUXCR-SUPB	25	25
WWTPLT-BLDGS-AUXCR-SUPC		10
WWTPLT-BLDGS-BLOWER-SUBS	65	65
WWTPLT-BLDGS-BLOWER-SUPA	45	45
WWTPLT-BLDGS-BLOWER-SUPB	25	25
WWTPLT-BLDGS-BLOWER-SUPC		10
WWTPLT-BLDGS-BOILRM-SUBS	65	65
WWTPLT-BLDGS-BOILRM-SUPA	45	45
WWTPLT-BLDGS-BOILRM-SUPB	25	25
WWTPLT-BLDGS-BOILRM-SUPC		10
WWTPLT-BLDGS-CBF-SUBS	65	65
WWTPLT-BLDGS-CBF-SUPA	45	45
WWTPLT-BLDGS-CBF-SUPB	25	25
WWTPLT-BLDGS-CBF-SUPC		10

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-BLDGS-COEX-SUBS	65	65
WWTPLT-BLDGS-COEX-SUPA	45	45
WWTPLT-BLDGS-COEX-SUPB	25	25
WWTPLT-BLDGS-COEX-SUPC		10
WWTPLT-BLDGS-DEWAT-SUBS	65	65
WWTPLT-BLDGS-DEWAT-SUPA	45	45
WWTPLT-BLDGS-DEWAT-SUPB	25	25
WWTPLT-BLDGS-DEWAT-SUPC		10
WWTPLT-BLDGS-DIGSQ-SUBS	65	65
WWTPLT-BLDGS-DIGSQ-SUPA	45	45
WWTPLT-BLDGS-DIGSQ-SUPB	25	25
WWTPLT-BLDGS-DIGSQ-SUPC		10
WWTPLT-BLDGS-DISSTN-SUBS	65	65
WWTPLT-BLDGS-DISSTN-SUPA	45	45
WWTPLT-BLDGS-DISSTN-SUPB	25	25
WWTPLT-BLDGS-DISSTN-SUPC		10
WWTPLT-BLDGS-EPTCHM-SUBS	65	65
WWTPLT-BLDGS-EPTCHM-SUPA	45	45
WWTPLT-BLDGS-EPTCHM-SUPB	25	25
WWTPLT-BLDGS-EPTCHM-SUPC		10
WWTPLT-BLDGS-EPT-SUPA	45	45
WWTPLT-BLDGS-EPT-SUPB	25	25
WWTPLT-BLDGS-EPT-SUPC		10
WWTPLT-BLDGS-FLARE-SUPA	45	45
WWTPLT-BLDGS-FLARE-SUPB	25	25
WWTPLT-BLDGS-FLARE-SUPC		10
WWTPLT-BLDGS-GRIT-SUPA	45	45
WWTPLT-BLDGS-GRIT-SUPB	25	25
WWTPLT-BLDGS-GRIT-SUPC		10
WWTPLT-BLDGS-GUARD-SUBS	65	65
WWTPLT-BLDGS-GUARD-SUPA	45	45
WWTPLT-BLDGS-GUARD-SUPB	25	25
WWTPLT-BLDGS-GUARD-SUPC		10
WWTPLT-BLDGS-LAB-SUBS	65	65
WWTPLT-BLDGS-LAB-SUPA	45	45
WWTPLT-BLDGS-LAB-SUPB	25	25
WWTPLT-BLDGS-LAB-SUPC		10
WWTPLT-BLDGS-LAGOON-SUBS	65	65
WWTPLT-BLDGS-LAGOON-SUPA	45	45
WWTPLT-BLDGS-LAGOON-SUPB	25	25
WWTPLT-BLDGS-LAGOON-SUPC		10
WWTPLT-BLDGS-MAINT-SUBS	65	65

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-BLDGS-MAINT-SUPA	45	45
WWTPLT-BLDGS-MAINT-SUPB	25	25
WWTPLT-BLDGS-MAINT-SUPC		10
WWTPLT-BLDGS-MCONR-SUBS	65	65
WWTPLT-BLDGS-MCONR-SUPA	45	45
WWTPLT-BLDGS-MCONR-SUPB	25	25
WWTPLT-BLDGS-MCONR-SUPC		10
WWTPLT-BLDGS-OUTFAL-SUPA	45	45
WWTPLT-BLDGS-OUTFAL-SUPB	25	25
WWTPLT-BLDGS-OUTFAL-SUPC		10
WWTPLT-BLDGS-PENT-SUPA	45	45
WWTPLT-BLDGS-PENT-SUPB	25	25
WWTPLT-BLDGS-PENT-SUPC		10
WWTPLT-BLDGS-PIPRCK-SUBS	65	65
WWTPLT-BLDGS-PRITUN-SUBS	65	65
WWTPLT-BLDGS-SAMPLE-SUPA	45	45
WWTPLT-BLDGS-SAMPLE-SUPB	25	25
WWTPLT-BLDGS-SAMPLE-SUPC		10
WWTPLT-BLDGS-SCREEN-SUPA	45	45
WWTPLT-BLDGS-SCREEN-SUPB	25	25
WWTPLT-BLDGS-SCREEN-SUPC		10
WWTPLT-BLDGS-SCUM-SUPA	45	45
WWTPLT-BLDGS-SCUM-SUPB	25	25
WWTPLT-BLDGS-SCUM-SUPC		10
WWTPLT-BLDGS-SEC-SUBS	65	65
WWTPLT-BLDGS-SEC-SUPA	45	45
WWTPLT-BLDGS-SEC-SUPB	25	25
WWTPLT-BLDGS-SEC-SUPC		10
WWTPLT-BLDGS-SLUDGE-SUBS	65	65
WWTPLT-BLDGS-SLUDGE-SUPA	45	45
WWTPLT-BLDGS-SLUDGE-SUPB	25	25
WWTPLT-BLDGS-SLUDGE-SUPC		10
WWTPLT-BLDGS-SUBSTN-SUBS	65	65
WWTPLT-BLDGS-SUBSTN-SUPA	45	45
WWTPLT-BLDGS-SUBSTN-SUPB	25	25
WWTPLT-BLDGS-SUBSTN-SUPC		10
WWTPLT-BLDGS-UV-SUBS	65	65
WWTPLT-BLDGS-UV-SUPA	45	45
WWTPLT-BLDGS-UV-SUPB	25	25
WWTPLT-BLDGS-UV-SUPC		10
WWTPLT-BLDGS-WAS-SUPB	25	25
WWTPLT-BLDGS-WAS-SUPC		10

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-CBF-DEWAT-MECH	25	New Other Category
WWTPLT-CBF-DEWAT-MECH1		10
WWTPLT-CBF-DEWAT-MECH2		15
WWTPLT-CBF-DEWAT-MECH3		25
WWTPLT-CBF-DEWAT-MECH4		40
WWTPLT-CBF-LAGOON-CCL	40	40
WWTPLT-CBF-LAGOON-ECL	25	25
WWTPLT-CBF-LAGOON-ELE1		5
WWTPLT-CBF-LAGOON-ELE2		15
WWTPLT-CBF-LAGOON-ELE3		25
WWTPLT-CBF-LAGOON-ELE4		40
WWTPLT-CBF-LAGOON-ELEC	25	New Other Category
WWTPLT-CBF-LAGOON-MECH	25	New Other Category
WWTPLT-CBF-LAGOON-MECH1		10
WWTPLT-CBF-LAGOON-MECH2		15
WWTPLT-CBF-LAGOON-MECH3		25
WWTPLT-CBF-LAGOON-MECH4		40
WWTPLT-CBF-LAGOON-MPIP	45	New Other Category
WWTPLT-CBF-LAGOON-PIP1		15
WWTPLT-CBF-LAGOON-PIP2		25
WWTPLT-CBF-LAGOON-PIP3		40
WWTPLT-CBF-LAGOON-PIP4		65
WWTPLT-CBF-LAGOON-SUBS	65	65
WWTPLT-CBF-LOAD-ELE1		5
WWTPLT-CBF-LOAD-ELE2		15
WWTPLT-CBF-LOAD-ELE3		25
WWTPLT-CBF-LOAD-ELE4		40
WWTPLT-CBF-LOAD-ELEC	25	New Other Category
WWTPLT-CBF-LOAD-MECH	20	New Other Category
WWTPLT-CBF-LOAD-MECH1		10
WWTPLT-CBF-LOAD-MECH2		15
WWTPLT-CBF-LOAD-MECH3		25
WWTPLT-CBF-LOAD-MECH4		40
WWTPLT-CBF-LOAD-SMET	45	25
WWTPLT-CBF-STRVTE-ELE1		5
WWTPLT-CBF-STRVTE-ELE2		15
WWTPLT-CBF-STRVTE-ELE3		25
WWTPLT-CBF-STRVTE-ELE4		40
WWTPLT-CBF-STRVTE-ELEC	25	New Other Category
WWTPLT-CBF-STRVTE-MECH	20	New Other Category
WWTPLT-CBF-STRVTE-MECH1		10
WWTPLT-CBF-STRVTE-MECH2		15

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-CBF-STRVTE-MECH3		25
WWTPLT-CBF-STRVTE-MECH4		40
WWTPLT-CBF-STRVTE-STR2		20
WWTPLT-CBF-STRVTE-STRU	65	65
WWTPLT-CHEMS-AIRSCR-TANK	25	30
WWTPLT-CHEMS-AIRSCR-TKEQ	25	New Other Category
WWTPLT-CHEMS-EPT-EQUP	15	15
WWTPLT-CHEMS-EPT-TANK	45	30
WWTPLT-CHEMS-HYDPR-MECH	20	New Other Category
WWTPLT-CHEMS-HYDPR-MECH1		10
WWTPLT-CHEMS-HYDPR-MECH2		15
WWTPLT-CHEMS-HYDPR-MECH3		25
WWTPLT-CHEMS-HYDPR-MECH4		40
WWTPLT-CHEMS-SECALM-TKEQ	45	30
WWTPLT-CHEMS-WASPLY-EQUP	25	25
WWTPLT-CHEMS-WASPLY-INS1		5
WWTPLT-CHEMS-WASPLY-INS2		15
WWTPLT-CHEMS-WASPLY-INS3		25
WWTPLT-CHEMS-WASPLY-INST	15	New Other Category
WWTPLT-CHEMS-WASPLY-MECH	25	New Other Category
WWTPLT-CHEMS-WASPLY-MECH1		10
WWTPLT-CHEMS-WASPLY-MECH2		15
WWTPLT-CHEMS-WASPLY-MECH3		25
WWTPLT-CHEMS-WASPLY-MECH4		40
WWTPLT-DIG-BIOGAS-ELE1		5
WWTPLT-DIG-BIOGAS-ELE2		15
WWTPLT-DIG-BIOGAS-ELE3		25
WWTPLT-DIG-BIOGAS-ELE4		40
WWTPLT-DIG-BIOGAS-ELEC	25	New Other Category
WWTPLT-DIG-BIOGAS-INS1		5
WWTPLT-DIG-BIOGAS-INS2		15
WWTPLT-DIG-BIOGAS-INS3		25
WWTPLT-DIG-BIOGAS-INST	15	New Other Category
WWTPLT-DIG-BIOGAS-MECH1		10
WWTPLT-DIG-BIOGAS-MECH2		15
WWTPLT-DIG-BIOGAS-MECH3		25
WWTPLT-DIG-BIOGAS-MECH4		40
WWTPLT-DIG-BIOGAS-MPIP	45	New Other Category
WWTPLT-DIG-BIOGAS-MROT	20	New Other Category
WWTPLT-DIG-BIOGAS-PIP1		15
WWTPLT-DIG-BIOGAS-PIP2		25
WWTPLT-DIG-BIOGAS-PIP3		40

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-DIG-BIOGAS-PIP4		65
WWTPLT-DIG-BIOGAS-STR2		20
WWTPLT-DIG-BIOGAS-STRU	65	65
WWTPLT-DIG-BLEND-INS1		5
WWTPLT-DIG-BLEND-INS2		15
WWTPLT-DIG-BLEND-INS3		25
WWTPLT-DIG-BLEND-INST	15	New Other Category
WWTPLT-DIG-BLEND-MECH	25	New Other Category
WWTPLT-DIG-BLEND-MECH1		10
WWTPLT-DIG-BLEND-MECH2		15
WWTPLT-DIG-BLEND-MECH3		25
WWTPLT-DIG-BLEND-MECH4		40
WWTPLT-DIG-BLEND-STR2		20
WWTPLT-DIG-BLEND-STRU	65	65
WWTPLT-DIG-DIGEST-ELE1		5
WWTPLT-DIG-DIGEST-ELE2		15
WWTPLT-DIG-DIGEST-ELE3		25
WWTPLT-DIG-DIGEST-ELE4		40
WWTPLT-DIG-DIGEST-ELEC	25	New Other Category
WWTPLT-DIG-DIGEST-INS1		5
WWTPLT-DIG-DIGEST-INS2		15
WWTPLT-DIG-DIGEST-INS3		25
WWTPLT-DIG-DIGEST-INST	15	New Other Category
WWTPLT-DIG-DIGEST-LINE	20	20
WWTPLT-DIG-DIGEST-MECH	25	New Other Category
WWTPLT-DIG-DIGEST-MECH1		10
WWTPLT-DIG-DIGEST-MECH2		15
WWTPLT-DIG-DIGEST-MECH3		25
WWTPLT-DIG-DIGEST-MECH4		40
WWTPLT-DIG-DIGEST-MPIP	45	New Other Category
WWTPLT-DIG-DIGEST-PIP1		15
WWTPLT-DIG-DIGEST-PIP2		25
WWTPLT-DIG-DIGEST-PIP3		40
WWTPLT-DIG-DIGEST-PIP4		65
WWTPLT-DIG-DIGEST-STR2		20
WWTPLT-DIG-DIGEST-STRU	65	65
WWTPLT-DIS-CHANNL-LINE		20
WWTPLT-DIS-CHANNL-STR2		20
WWTPLT-DIS-CHANNL-STRU	65	65
WWTPLT-DIS-UV-BULB	5	4
WWTPLT-DIS-UV-ELE1		5
WWTPLT-DIS-UV-ELE2		15

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-DIS-UV-ELE3		25
WWTPLT-DIS-UV-ELE4		40
WWTPLT-DIS-UV-ELEC	25	New Other Category
WWTPLT-DIS-UV-INS1		5
WWTPLT-DIS-UV-INS2		15
WWTPLT-DIS-UV-INS3		25
WWTPLT-DIS-UV-INST	15	New Other Category
WWTPLT-DIS-UV-MECH	45	New Other Category
WWTPLT-DIS-UV-MECH1		10
WWTPLT-DIS-UV-MECH2		15
WWTPLT-DIS-UV-MECH3		25
WWTPLT-DIS-UV-MECH4		40
WWTPLT-FERMNT-FERM-ELE1		5
WWTPLT-FERMNT-FERM-ELE2		15
WWTPLT-FERMNT-FERM-ELE3		25
WWTPLT-FERMNT-FERM-ELE4		40
WWTPLT-FERMNT-FERM-ELEC	25	New Other Category
WWTPLT-FERMNT-FERME-SUPB	25	25
WWTPLT-FERMNT-FERME-SUPC		10
WWTPLT-FERMNT-FERM-INS1		5
WWTPLT-FERMNT-FERM-INS2		15
WWTPLT-FERMNT-FERM-INS3		25
WWTPLT-FERMNT-FERM-INST	15	New Other Category
WWTPLT-FERMNT-FERM-MECH	25	New Other Category
WWTPLT-FERMNT-FERM-MECH1		10
WWTPLT-FERMNT-FERM-MECH2		15
WWTPLT-FERMNT-FERM-MECH3		25
WWTPLT-FERMNT-FERM-MECH4		40
WWTPLT-FERMNT-FERM-STR2		20
WWTPLT-FERMNT-FERM-STRU	50	50
WWTPLT-GROUND-FENCE-NONE	30	30
WWTPLT-GROUND-GMWELL-NONE	30	30
WWTPLT-GROUND-SITLIT-NONE	30	30
WWTPLT-GROUND-SITLIT-SCAM	30	7
WWTPLT-GROUND-STRMDR-NONE	30	30
WWTPLT-GROUND-TRANSP-NONE	30	30
WWTPLT-INSPCT-NONE-NONE	10	10
WWTPLT-LABEQP-NONE-	5	5
WWTPLT-LABEQP-NONE-10YEAR		10
WWTPLT-ODR-AAQMS-ELE1		5
WWTPLT-ODR-AAQMS-ELE2		15
WWTPLT-ODR-AAQMS-ELE3		25

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-ODR-AAQMS-ELE4		40
WWTPLT-ODR-AAQMS-ELEC	25	New Other Category
WWTPLT-ODR-AAQMS-INS1		5
WWTPLT-ODR-AAQMS-INS2		15
WWTPLT-ODR-AAQMS-INS3		25
WWTPLT-ODR-AAQMS-MECH1		10
WWTPLT-ODR-AAQMS-MECH2		15
WWTPLT-ODR-AAQMS-MECH3		25
WWTPLT-ODR-AAQMS-MECH4		40
WWTPLT-ODR-AAQMS-STRU	65	65
WWTPLT-ODR-AIRSCR-ELE1		5
WWTPLT-ODR-AIRSCR-ELE2		15
WWTPLT-ODR-AIRSCR-ELE3		25
WWTPLT-ODR-AIRSCR-ELE4		40
WWTPLT-ODR-AIRSCR-ELEC	25	New Other Category
WWTPLT-ODR-AIRSCR-INS1		5
WWTPLT-ODR-AIRSCR-INS2		15
WWTPLT-ODR-AIRSCR-INS3		25
WWTPLT-ODR-AIRSCR-INST	15	New Other Category
WWTPLT-ODR-AIRSCR-MECH	20	New Other Category
WWTPLT-ODR-AIRSCR-MECH1		10
WWTPLT-ODR-AIRSCR-MECH2		15
WWTPLT-ODR-AIRSCR-MECH3		25
WWTPLT-ODR-AIRSCR-MECH4		40
WWTPLT-ODR-AIRSCR-MPIP	45	New Other Category
WWTPLT-ODR-AIRSCR-PIP1		15
WWTPLT-ODR-AIRSCR-PIP2		25
WWTPLT-ODR-AIRSCR-PIP3		40
WWTPLT-ODR-AIRSCR-PIP4		65
WWTPLT-ODR-AIRSCR-STR2		20
WWTPLT-ODR-AIRSCR-STRU	65	65
WWTPLT-ODR-GENE-INS1		5
WWTPLT-ODR-GENE-INS1		5
WWTPLT-ODR-GENE-INS2		15
WWTPLT-ODR-GENE-INS2		15
WWTPLT-ODR-GENE-INS3		25
WWTPLT-ODR-GENE-INS3		25
WWTPLT-ODR-GENE-INST	15	New Other Category
WWTPLT-ODR-GENE-STR2		20
WWTPLT-ODR-GENE-STRU	65	65
WWTPLT-ODR-GENE-SWI	10	10
WWTPLT-ODR-GEN-INS1		5

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-ODR-GEN-INS2		15
WWTPLT-ODR-GEN-INS3		25
WWTPLT-ODR-GEN-INST	15	New Other Category
WWTPLT-ODR-GEN-STR2		20
WWTPLT-ODR-GEN-STRU	65	New Other Category
WWTPLT-ODR-GEN-SWI	10	10
WWTPLT-PCS1		10
WWTPLT-PCS2		15
WWTPLT-PCS3		25
WWTPLT-PCS4		40
WWTPLT-PCS-NONE-	10	New Minor Category
WWTPLT-PRI-BYPASS-MECH1		10
WWTPLT-PRI-BYPASS-MECH2		15
WWTPLT-PRI-BYPASS-MECH3		25
WWTPLT-PRI-BYPASS-MECH4		40
WWTPLT-PRI-CHANNL-LINE		20
WWTPLT-PRI-CHANNL-STR2		20
WWTPLT-PRI-CHANNL-STRU	75	75
WWTPLT-PRI-CLARFR-CHN1		10
WWTPLT-PRI-CLARFR-CHN2		30
WWTPLT-PRI-CLARFR-CHNS	10	New Other Category
WWTPLT-PRI-CLARFR-ELE1		5
WWTPLT-PRI-CLARFR-ELE2		15
WWTPLT-PRI-CLARFR-ELE3		25
WWTPLT-PRI-CLARFR-ELE4		40
WWTPLT-PRI-CLARFR-ELEC	25	New Other Category
WWTPLT-PRI-CLARFR-INS1		5
WWTPLT-PRI-CLARFR-INS2		15
WWTPLT-PRI-CLARFR-INS3		25
WWTPLT-PRI-CLARFR-INST	15	New Other Category
WWTPLT-PRI-CLARFR-MECH	20	New Other Category
WWTPLT-PRI-CLARFR-MECH1		10
WWTPLT-PRI-CLARFR-MECH2		15
WWTPLT-PRI-CLARFR-MECH3		25
WWTPLT-PRI-CLARFR-MECH4		40
WWTPLT-PRI-CLARFR-STR2		20
WWTPLT-PRI-CLARFR-STRU	65	65
WWTPLT-PRI-CLARFR-SUPB	25	25
WWTPLT-PRI-CLARF-SUPB	25	25
WWTPLT-PRI-CLARF-SUPC		10
WWTPLT-PRI-EPEPMP-MECH1		10
WWTPLT-PRI-EPEPMP-MECH2		15

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-PRI-EPEPMP-MECH3		25
WWTPLT-PRI-EPEPMP-MECH4		40
WWTPLT-PRI-EPEPMP-MPIP	45	New Other Category
WWTPLT-PRI-EPEPMP-PIP1		15
WWTPLT-PRI-EPEPMP-PIP2		25
WWTPLT-PRI-EPEPMP-PIP3		40
WWTPLT-PRI-EPEPMP-PIP4		65
WWTPLT-PRI-EPEPMP-STR2		20
WWTPLT-PRI-EPEPMP-STRU	65	65
WWTPLT-PRI-SCUM-MECH	20	New Other Category
WWTPLT-PRI-SCUM-MECH1		10
WWTPLT-PRI-SCUM-MECH2		15
WWTPLT-PRI-SCUM-MECH3		25
WWTPLT-PRI-SCUM-MECH4		40
WWTPLT-PTR-AERSY-INS1		5
WWTPLT-PTR-AERSY-INS2		15
WWTPLT-PTR-AERSY-INS3		25
WWTPLT-PTR-AERSY-INST	15	New Other Category
WWTPLT-PTR-AERSYS-INS1		5
WWTPLT-PTR-AERSYS-INS2		15
WWTPLT-PTR-AERSYS-INS3		25
WWTPLT-PTR-AERSYS-MECH1		10
WWTPLT-PTR-AERSYS-MECH2		15
WWTPLT-PTR-AERSYS-MECH3		25
WWTPLT-PTR-AERSYS-MECH4		40
WWTPLT-PTR-CHANNL-CHAN	75	75
WWTPLT-PTR-CHANNL-ELE1		5
WWTPLT-PTR-CHANNL-ELE2		15
WWTPLT-PTR-CHANNL-ELE3		25
WWTPLT-PTR-CHANNL-ELE4		40
WWTPLT-PTR-CHANNL-ELEC	25	New Other Category
WWTPLT-PTR-CHANNL-INS1		5
WWTPLT-PTR-CHANNL-INS2		15
WWTPLT-PTR-CHANNL-INS3		25
WWTPLT-PTR-CHANNL-INST	15	New Other Category
WWTPLT-PTR-CHANNL-LINE		20
WWTPLT-PTR-CHANNL-MECH	25	New Other Category
WWTPLT-PTR-CHANNL-MECH1		10
WWTPLT-PTR-CHANNL-MECH2		15
WWTPLT-PTR-CHANNL-MECH3		25
WWTPLT-PTR-CHANNL-MECH4		40
WWTPLT-PTR-DIVCBR-ELE1		5

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-PTR-DIVCBR-ELE2		15
WWTPLT-PTR-DIVCBR-ELE3		25
WWTPLT-PTR-DIVCBR-ELE4		40
WWTPLT-PTR-DIVCBR-ELEC	25	New Other Category
WWTPLT-PTR-DIVCBR-MECH	25	New Other Category
WWTPLT-PTR-DIVCBR-MECH1		10
WWTPLT-PTR-DIVCBR-MECH2		15
WWTPLT-PTR-DIVCBR-MECH3		25
WWTPLT-PTR-DIVCBR-MECH4		40
WWTPLT-PTR-DIVCBR-STR2		20
WWTPLT-PTR-DIVCBR-STRU	65	65
WWTPLT-PTR-GRIT-ELE1		5
WWTPLT-PTR-GRIT-ELE2		15
WWTPLT-PTR-GRIT-ELE3		25
WWTPLT-PTR-GRIT-ELE4		40
WWTPLT-PTR-GRIT-ELEC	25	New Other Category
WWTPLT-PTR-GRIT-MECH	25	New Other Category
WWTPLT-PTR-GRIT-MECH1		10
WWTPLT-PTR-GRIT-MECH2		15
WWTPLT-PTR-GRIT-MECH3		25
WWTPLT-PTR-GRIT-MECH4		40
WWTPLT-PTR-GRIT-MPIP	45	New Other Category
WWTPLT-PTR-GRIT-PIP1		15
WWTPLT-PTR-GRIT-PIP2		25
WWTPLT-PTR-GRIT-PIP3		40
WWTPLT-PTR-GRIT-PIP4		65
WWTPLT-PTR-GRIT-STR2		20
WWTPLT-PTR-GRIT-STRU	65	65
WWTPLT-PTR-SCNSYS-ELE1		5
WWTPLT-PTR-SCNSYS-ELE2		15
WWTPLT-PTR-SCNSYS-ELE3		25
WWTPLT-PTR-SCNSYS-ELE4		40
WWTPLT-PTR-SCNSYS-ELEC	25	New Other Category
WWTPLT-PTR-SCNSYS-MECH	25	New Other Category
WWTPLT-PTR-SCNSYS-MECH1		10
WWTPLT-PTR-SCNSYS-MECH2		15
WWTPLT-PTR-SCNSYS-MECH3		25
WWTPLT-PTR-SCNSYS-MECH4		40
WWTPLT-SEC-AERPIP-MPIP	45	New Other Category
WWTPLT-SEC-AERPIP-PIP1		15
WWTPLT-SEC-AERPIP-PIP2		25
WWTPLT-SEC-AERPIP-PIP3		40

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-SEC-AERPIP-PIP4		65
WWTPLT-SEC-BIO-ELE1		5
WWTPLT-SEC-BIO-ELE2		15
WWTPLT-SEC-BIO-ELE3		25
WWTPLT-SEC-BIO-ELE4		40
WWTPLT-SEC-BIO-ELEC	25	New Other Category
WWTPLT-SEC-BIO-INS1		5
WWTPLT-SEC-BIO-INS2		15
WWTPLT-SEC-BIO-INS3		25
WWTPLT-SEC-BIO-INST	15	New Other Category
WWTPLT-SEC-BIO-MECH	25	New Other Category
WWTPLT-SEC-BIO-MECH1		10
WWTPLT-SEC-BIO-MECH2		15
WWTPLT-SEC-BIO-MECH3		25
WWTPLT-SEC-BIO-MECH4		40
WWTPLT-SEC-BIO-MPIP	45	New Other Category
WWTPLT-SEC-BIO-PIP1		15
WWTPLT-SEC-BIO-PIP2		25
WWTPLT-SEC-BIO-PIP3		40
WWTPLT-SEC-BIO-PIP4		65
WWTPLT-SEC-BIO-SMET	45	25
WWTPLT-SEC-BIO-STR2		20
WWTPLT-SEC-BIO-STRU	55	55
WWTPLT-SEC-BLWR-ELE1		5
WWTPLT-SEC-BLWR-ELE2		15
WWTPLT-SEC-BLWR-ELE3		25
WWTPLT-SEC-BLWR-ELE4		40
WWTPLT-SEC-BLWR-ELEC	25	New Other Category
WWTPLT-SEC-BLWR-INS1		5
WWTPLT-SEC-BLWR-INS2		15
WWTPLT-SEC-BLWR-INS3		25
WWTPLT-SEC-BLWR-INST	15	New Other Category
WWTPLT-SEC-BLWR-STR2		20
WWTPLT-SEC-BLWR-STRU	55	55
WWTPLT-SEC-CHANNL-CHAN	75	75
WWTPLT-SEC-CHANNL-LINE		20
WWTPLT-SEC-OUTFLL-CHAN	75	75
WWTPLT-SEC-SECCLR-CHN1		10
WWTPLT-SEC-SECCLR-CHN2		30
WWTPLT-SEC-SECCLR-CHNS	10	New Other Category
WWTPLT-SEC-SECCLR-ELE1		5
WWTPLT-SEC-SECCLR-ELE2		15

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-SEC-SECCLR-ELE3		25
WWTPLT-SEC-SECCLR-ELE4		40
WWTPLT-SEC-SECCLR-ELEC	25	New Other Category
WWTPLT-SEC-SECCLR-INS1		5
WWTPLT-SEC-SECCLR-INS2		15
WWTPLT-SEC-SECCLR-INS3		25
WWTPLT-SEC-SECCLR-INST	15	New Other Category
WWTPLT-SEC-SECCLR-MECH	20	New Other Category
WWTPLT-SEC-SECCLR-MECH1		10
WWTPLT-SEC-SECCLR-MECH2		15
WWTPLT-SEC-SECCLR-MECH3		25
WWTPLT-SEC-SECCLR-MECH4		40
WWTPLT-SEC-SECCLR-SMET	55	25
WWTPLT-SEC-SECCLR-STR2		20
WWTPLT-SEC-SECCLR-STRU	55	55
WWTPLT-SEC-SECCLR-SUPB	25	25
WWTPLT-SEC-SECCL-SUPB	25	25
WWTPLT-SEC-SECCL-SUPC		10
WWTPLT-SSP-PIPING-ELE1		5
WWTPLT-SSP-PIPING-ELE2		15
WWTPLT-SSP-PIPING-ELE3		25
WWTPLT-SSP-PIPING-ELE4		40
WWTPLT-SSP-PIPING-ELEC	25	New Other Category
WWTPLT-SSP-PIPING-MPIP	35	New Other Category
WWTPLT-SSP-PIPING-PIP1		15
WWTPLT-SSP-PIPING-PIP1		15
WWTPLT-SSP-PIPING-PIP2		25
WWTPLT-SSP-PIPING-PIP2		25
WWTPLT-SSP-PIPING-PIP3		40
WWTPLT-SSP-PIPING-PIP3		40
WWTPLT-SSP-PIPING-PIP4		65
WWTPLT-SSP-PIPING-PIP4		65
WWTPLT-SSP-PIPING-STR2		20
WWTPLT-SSP-PIPING-STRU	65	65
WWTPLT-SSP-PUMPNG-ELE1		5
WWTPLT-SSP-PUMPNG-ELE2		15
WWTPLT-SSP-PUMPNG-ELE3		25
WWTPLT-SSP-PUMPNG-ELE4		40
WWTPLT-SSP-PUMPNG-ELEC	25	New Other Category
WWTPLT-SSP-PUMPNG-INS1		5
WWTPLT-SSP-PUMPNG-INS2		15
WWTPLT-SSP-PUMPNG-INS3		25

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-SSP-PUMPNG-INST	15	New Other Category
WWTPLT-SSP-PUMPNG-MECH1		10
WWTPLT-SSP-PUMPNG-MECH2		15
WWTPLT-SSP-PUMPNG-MECH3		25
WWTPLT-SSP-PUMPNG-MECH4		40
WWTPLT-SSP-SLGPIP-MPIP	44	New Other Category
WWTPLT-SSP-SLGPIP-PIP1		15
WWTPLT-SSP-SLGPIP-PIP2		25
WWTPLT-SSP-SLGPIP-PIP3		40
WWTPLT-SSP-SLGPIP-PIP4		65
WWTPLT-SSP-TANKS-STR2		20
WWTPLT-SUPSYS-CNTSYS-HW	10	10
WWTPLT-SUPSYS-CNTSYS-SWI	10	10
WWTPLT-SUPSYS-COMM-ELE1		5
WWTPLT-SUPSYS-COMM-ELE2		15
WWTPLT-SUPSYS-COMM-ELE3		25
WWTPLT-SUPSYS-COMM-ELE4		40
WWTPLT-SUPSYS-COMM-ELEC	25	New Other Category
WWTPLT-SUPSYS-COMM-INS1		5
WWTPLT-SUPSYS-COMM-INS2		15
WWTPLT-SUPSYS-COMM-INS3		25
WWTPLT-SUPSYS-COMM-MECH1		10
WWTPLT-SUPSYS-COMM-MECH2		15
WWTPLT-SUPSYS-COMM-MECH3		25
WWTPLT-SUPSYS-COMM-MECH4		40
WWTPLT-SUPSYS-LABEQP-10 Year		10
WWTPLT-SUPSYS-LABEQP-5 Year		5
WWTPLT-SUPSYS-LABEQP-NONE	10	New Other Category
WWTPLT-UTL-BOILER-ELE1		5
WWTPLT-UTL-BOILER-ELE2		15
WWTPLT-UTL-BOILER-ELE3		25
WWTPLT-UTL-BOILER-ELE4		40
WWTPLT-UTL-BOILER-ELEC	25	New Other Category
WWTPLT-UTL-BOILER-MECH	45	New Other Category
WWTPLT-UTL-BOILER-MECH1		10
WWTPLT-UTL-BOILER-MECH2		15
WWTPLT-UTL-BOILER-MECH3		25
WWTPLT-UTL-BOILER-MECH4		40
WWTPLT-UTL-BOILER-TUBE	5	5
WWTPLT-UTL-COMAIR-MECH1		10
WWTPLT-UTL-COMAIR-MECH2		15
WWTPLT-UTL-COMAIR-MECH3		25

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-UTL-COMAIR-MECH4		40
WWTPLT-UTL-COMAIR-MPIP	45	New Other Category
WWTPLT-UTL-COMAIR-PIP1		15
WWTPLT-UTL-COMAIR-PIP2		25
WWTPLT-UTL-COMAIR-PIP3		40
WWTPLT-UTL-COMAIR-PIP4		65
WWTPLT-UTL-EPSD-CABL	65	45
WWTPLT-UTL-EPSD-ELE1		5
WWTPLT-UTL-EPSD-ELE1		5
WWTPLT-UTL-EPSD-ELE2		15
WWTPLT-UTL-EPSD-ELE2		15
WWTPLT-UTL-EPSD-ELE3		25
WWTPLT-UTL-EPSD-ELE3		25
WWTPLT-UTL-EPSD-ELE4		40
WWTPLT-UTL-EPSD-ELE4		40
WWTPLT-UTL-EPSD-ELEC	25	New Other Category
WWTPLT-UTL-EPSD-GEN	25	New Other Category
WWTPLT-UTL-EPSD-GEN1	25	15
WWTPLT-UTL-EPSD-GEN2	25	25
WWTPLT-UTL-EPSD-SWGR	35	New Other Category
WWTPLT-UTL-EPSD-TRAN	35	New Other Category
WWTPLT-UTL-FEWAT-ELE1		5
WWTPLT-UTL-FEWAT-ELE2		15
WWTPLT-UTL-FEWAT-ELE3		25
WWTPLT-UTL-FEWAT-ELE4		40
WWTPLT-UTL-FEWAT-ELEC	25	New Other Category
WWTPLT-UTL-FEWAT-INS1		5
WWTPLT-UTL-FEWAT-INS2		15
WWTPLT-UTL-FEWAT-INS3		25
WWTPLT-UTL-FEWAT-INST	15	New Other Category
WWTPLT-UTL-FEWAT-MECH	25	New Other Category
WWTPLT-UTL-FEWAT-MECH1		10
WWTPLT-UTL-FEWAT-MECH2		15
WWTPLT-UTL-FEWAT-MECH3		25
WWTPLT-UTL-FEWAT-MECH4		40
WWTPLT-UTL-FEWAT-MPIP	45	New Other Category
WWTPLT-UTL-FEWAT-PIP1		15
WWTPLT-UTL-FEWAT-PIP2		25
WWTPLT-UTL-FEWAT-PIP3		40
WWTPLT-UTL-FEWAT-PIP4		65
WWTPLT-UTL-GLYCOL-INS1		5
WWTPLT-UTL-GLYCOL-INS2		15

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-UTL-GLYCOL-INS3		25
WWTPLT-UTL-GLYCOL-INST	15	New Other Category
WWTPLT-UTL-GLYCOL-MECH	25	New Other Category
WWTPLT-UTL-GLYCOL-MECH1		10
WWTPLT-UTL-GLYCOL-MECH2		15
WWTPLT-UTL-GLYCOL-MECH3		25
WWTPLT-UTL-GLYCOL-MECH4		40
WWTPLT-UTL-GLYCOL-MPIP	45	New Other Category
WWTPLT-UTL-GLYCOL-PIP1		15
WWTPLT-UTL-GLYCOL-PIP2		25
WWTPLT-UTL-GLYCOL-PIP3		40
WWTPLT-UTL-GLYCOL-PIP4		65
WWTPLT-UTL-GLYCO-MECH	25	New Other Category
WWTPLT-UTL-GLYCO-MECH1		10
WWTPLT-UTL-GLYCO-MECH2		15
WWTPLT-UTL-GLYCO-MECH3		25
WWTPLT-UTL-GLYCO-MECH4		40
WWTPLT-UTL-NATGAS-MPIP	65	New Other Category
WWTPLT-UTL-NATGAS-PIP1		15
WWTPLT-UTL-NATGAS-PIP2		25
WWTPLT-UTL-NATGAS-PIP3		40
WWTPLT-UTL-NATGAS-PIP4		65
WWTPLT-UTL-POWA-INS1		5
WWTPLT-UTL-POWA-INS2		15
WWTPLT-UTL-POWA-INS3		25
WWTPLT-UTL-POWA-INST	15	New Other Category
WWTPLT-UTL-POWA-MECH	25	New Other Category
WWTPLT-UTL-POWA-MECH1		10
WWTPLT-UTL-POWA-MECH2		15
WWTPLT-UTL-POWA-MECH3		25
WWTPLT-UTL-POWA-MECH4		40
WWTPLT-UTL-POWAT-INS1		5
WWTPLT-UTL-POWAT-INS2		15
WWTPLT-UTL-POWAT-INS3		25
WWTPLT-UTL-POWAT-INST	15	New Other Category
WWTPLT-UTL-POWAT-MECH	25	New Other Category
WWTPLT-UTL-POWAT-MECH1		10
WWTPLT-UTL-POWAT-MECH2		15
WWTPLT-UTL-POWAT-MECH3		25
WWTPLT-UTL-POWAT-MECH4		40
WWTPLT-UTL-POWAT-MPIP	45	New Other Category
WWTPLT-UTL-POWAT-PIP1		15

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-UTL-POWAT-PIP2		25
WWTPLT-UTL-POWAT-PIP3		40
WWTPLT-UTL-POWAT-PIP4		65
WWTPLT-WAS-BOOSTR-ELE1		5
WWTPLT-WAS-BOOSTR-ELE2		15
WWTPLT-WAS-BOOSTR-ELE3		25
WWTPLT-WAS-BOOSTR-ELE4		40
WWTPLT-WAS-BOOSTR-ELEC	25	New Other Category
WWTPLT-WAS-BOOSTR-INS1		5
WWTPLT-WAS-BOOSTR-INS2		15
WWTPLT-WAS-BOOSTR-INS3		25
WWTPLT-WAS-BOOSTR-INST	15	New Other Category
WWTPLT-WAS-BOOSTR-MECH	25	New Other Category
WWTPLT-WAS-BOOSTR-MECH1		10
WWTPLT-WAS-BOOSTR-MECH2		15
WWTPLT-WAS-BOOSTR-MECH3		25
WWTPLT-WAS-BOOSTR-MECH4		40
WWTPLT-WAS-BOOSTR-MPIP	45	New Other Category
WWTPLT-WAS-BOOSTR-PIP1		15
WWTPLT-WAS-BOOSTR-PIP2		25
WWTPLT-WAS-BOOSTR-PIP3		40
WWTPLT-WAS-BOOSTR-PIP4		65
WWTPLT-WAS-DEWAT-ELE1		5
WWTPLT-WAS-DEWAT-ELE2		15
WWTPLT-WAS-DEWAT-ELE3		25
WWTPLT-WAS-DEWAT-ELE4		40
WWTPLT-WAS-DEWAT-ELEC	25	New Other Category
WWTPLT-WAS-DEWAT-INS1		5
WWTPLT-WAS-DEWAT-INS2		15
WWTPLT-WAS-DEWAT-INS3		25
WWTPLT-WAS-DEWAT-INST	15	New Other Category
WWTPLT-WAS-DEWAT-MECH	25	New Other Category
WWTPLT-WAS-DEWAT-MECH1		10
WWTPLT-WAS-DEWAT-MECH2		15
WWTPLT-WAS-DEWAT-MECH3		25
WWTPLT-WAS-DEWAT-MECH4		40
WWTPLT-WAS-DEWAT-MPIP	45	New Other Category
WWTPLT-WAS-DEWAT-PIP1		15
WWTPLT-WAS-DEWAT-PIP2		25
WWTPLT-WAS-DEWAT-PIP3		40
WWTPLT-WAS-DEWAT-PIP4		65
WWTPLT-WAS-FLOSYS-ELE1		5

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-WAS-FLOSYS-ELE2		15
WWTPLT-WAS-FLOSYS-ELE3		25
WWTPLT-WAS-FLOSYS-ELE4		40
WWTPLT-WAS-FLOSYS-ELEC	25	New Other Category
WWTPLT-WAS-FLOSYS-INS1		5
WWTPLT-WAS-FLOSYS-INS2		15
WWTPLT-WAS-FLOSYS-INS3		25
WWTPLT-WAS-FLOSYS-INST	15	New Other Category
WWTPLT-WAS-FLOSYS-MECH	25	New Other Category
WWTPLT-WAS-FLOSYS-MECH1		10
WWTPLT-WAS-FLOSYS-MECH2		15
WWTPLT-WAS-FLOSYS-MECH3		25
WWTPLT-WAS-FLOSYS-MECH4		40
WWTPLT-WAS-FLOSYS-MPIP	45	New Other Category
WWTPLT-WAS-FLOSYS-PIP1		15
WWTPLT-WAS-FLOSYS-PIP2		25
WWTPLT-WAS-FLOSYS-PIP3		40
WWTPLT-WAS-FLOSYS-PIP4		65
WWTPLT-WAS-PUMPNG-ELE1		5
WWTPLT-WAS-PUMPNG-ELE2		15
WWTPLT-WAS-PUMPNG-ELE3		25
WWTPLT-WAS-PUMPNG-ELE4		40
WWTPLT-WAS-PUMPNG-ELEC	25	New Other Category
WWTPLT-WAS-PUMPNG-INS1		5
WWTPLT-WAS-PUMPNG-INS2		15
WWTPLT-WAS-PUMPNG-INS3		25
WWTPLT-WAS-PUMPNG-INST	15	New Other Category
WWTPLT-WAS-PUMPNG-MECH1		10
WWTPLT-WAS-PUMPNG-MECH2		15
WWTPLT-WAS-PUMPNG-MECH3		25
WWTPLT-WAS-PUMPNG-MECH4		40
WWTPLT-WAS-PUMPNG-MPIP	45	New Other Category
WWTPLT-WAS-PUMPNG-PIP1		15
WWTPLT-WAS-PUMPNG-PIP2		25
WWTPLT-WAS-PUMPNG-PIP3		40
WWTPLT-WAS-PUMPNG-PIP4		65
WWTPLT-WAS-TANKS-ELE1		5
WWTPLT-WAS-TANKS-ELE2		15
WWTPLT-WAS-TANKS-ELE3		25
WWTPLT-WAS-TANKS-ELE4		40
WWTPLT-WAS-TANKS-ELEC	25	New Other Category
WWTPLT-WAS-TANKS-INS1		5

EPCOR Life Parameters
Wastewater Treatment Operations

Asset Category	Current Life	Proposed Life
WWTPLT-WAS-TANKS-INS2		15
WWTPLT-WAS-TANKS-INS3		25
WWTPLT-WAS-TANKS-INST	15	New Other Category
WWTPLT-WAS-TANKS-MECH	25	New Other Category
WWTPLT-WAS-TANKS-MECH1		10
WWTPLT-WAS-TANKS-MECH2		15
WWTPLT-WAS-TANKS-MECH3		25
WWTPLT-WAS-TANKS-MECH4		40
WWTPLT-WAS-TANKS-STR2		20
WWTPLT-WAS-TANKS-STRU	65	65

EPCOR

Wastewater Collection Plant Assets

DEPRECIATION STUDY

at DECEMBER 31, 2022

http://www.utilityalliance.com

EPCOR
WASTEWATER COLLECTION PLANT ASSETS

DEPRECIATION STUDY

EXECUTIVE SUMMARY

EPCOR (the “Company”) engaged Alliance Consulting Group to conduct a depreciation study of its depreciable assets related to Wastewater Collection operations as of December 31, 2022.

Overall, this study proposes the use of 151 asset categories to depreciate fixed assets used to support wastewater collection operations. Seven new asset categories were developed with unique service lives, 69 asset categories retained the existing service lives, 36 asset categories recommend a decreased service life and the remaining 39 asset categories propose an increased service life. Current investment will continue to use the existing service life assigned and the asset categories with revised lives will be applied prospectively to future investment.

Appendix A contains a table that lists the existing and proposed service life by asset category for Wastewater Collection operations.

EPCOR
WASTEWATER COLLECTION PLANT ASSETS
DEPRECIATION STUDY
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PURPOSE

The purpose of this study is to review the mix of assets and current asset service lives assigned to each major asset category for depreciable property related to Wastewater Collection operations as recorded on EPCOR's books at December 31, 2022. EPCOR directed Alliance to review the currently approved service lives for the mix of assets in each major asset category, propose revised service lives and recommend additional asset categories where appropriate to be applied prospectively to future plant investment. The study also recommends consistent asset categories and service lives for similar assets, such as tools and vehicles, utilized in both Wastewater Collection and Wastewater Treatment operations.

The Company currently calculates depreciation using a straight line, broad life group depreciation system that is designed to recover the total remaining undepreciated investment for the analyzed accounts, over the life of the property on a straight-line basis. Assets are retired when they are no longer used or useful in utility operations. EPCOR's methodology for handling the cost of retired assets that have not been fully accrued is to amortize the unrecovered balance over the original remaining life of the asset. This approach is in essence using the group depreciation principle of recovering the full cost of retired assets from accumulated depreciation on retirement of an asset. EPCOR informed Alliance that the Company will retain its current depreciation system and calculate depreciation using the proposed lives on a prospective basis for future investment.

The Company's wastewater collection service operations conveys sanitary wastewater and stormwater through sanitary and stormwater collection infrastructure. At the end of 2022, the sanitary collection infrastructure includes 3,707 kilometers of sanitary sewer pipes and 269,886 service connections that connect all customers to sanitary and combined trunk sewer systems, which includes 820 kilometers of combined sewers which convey both sanitary wastewater and stormwater, 44,157 manholes and 77 pump stations. Sanitary and combined trunks then deliver wastewater directly to the Gold Bar wastewater treatment plant (Gold Bar). The stormwater collection infrastructure includes 3,373 kilometers of storm sewer pipes, 176,988 storm service connections, 63,379 catch basins, 44,743 manholes, 18 pump stations and 319 stormwater management facilities. Stormwater collection infrastructure is connected to the stormwater trunk sewers. Stormwater trunks then deliver stormwater to natural watercourses, creeks, and the North Saskatchewan River (NSR).

STUDY RESULTS

This is the first depreciation study the Company has completed since the transfer of EPCOR's wastewater collection service from the City of Edmonton in 2017, resulting in limited retirement experience available to conduct life analysis. Therefore, the service lives developed in this study rely on the limited retirement experience available, as well as information obtained from subject matter experts from finance, management, and operational areas of the Company, and incorporate professional judgement of the Managing Partner as a professional engineer and obtained while performing depreciation studies for similar assets across North America for more than 35 years. The table below is a summary of the seven new asset categories arising due to identification of asset components with different lives and lists the asset categories with the largest increase and decrease in proposed lives.

Asset Category	Current Life	Proposed Life
DRAIN-BLDGS-LAB-SUPC		10
DRAIN-BLDGS-OFF-SUPC		10
LID-STORM-PLANTS-NONE	25	50
PUMP-COM-NONE-INST	44	15
PUMP-COM-NONE-SUPA		45
PUMP-SAN-NONE-INST	44	15
PUMP-SAN-NONE-SUPA		45
PUMP-STORM-NONE-INST	44	15
PUMP-STORM-NONE-SUPA		45
TOOLS-10YEAR		10
TOOLS-15YEAR		15

Appendix A contains a table comparing the current and proposed lives for each major asset category. The mix of assets and information provided by Company subject matter experts related to each asset category are discussed in more detail in the Life Analysis portion of this report.

GENERAL DISCUSSION

Definition

The term "depreciation" as used in this study is considered in the accounting sense, that is, a system of accounting that distributes the cost of assets, less net salvage (if any), over the estimated useful life of the assets in a systematic and rational manner. It is a process of allocation, not valuation. This expense is systematically allocated to accounting periods over the life of the properties. The amount allocated to any one accounting period does not necessarily represent the loss or decrease in value that will occur during that particular period. EPCOR accrues depreciation on the basis of the original cost of all depreciable property by functional property group.

Judgment

Any depreciation study requires informed judgment by the analyst conducting the study. A knowledge of the property being studied, company policies and procedures, general trends in technology and industry practice, and a sound basis of understanding depreciation theory are needed to apply this informed judgment. Judgment was used in areas such as individual asset life selection.

Judgment is not defined as being used in cases where there are specific, significant pieces of information that influence the choice of a life. Those cases would simply be a reflection of specific facts into the analysis. Where there are multiple factors, activities, actions, property characteristics, property mix in accounts, or a multitude of other considerations that impact the analysis (potentially in various directions), judgment is used to consider all of these factors and synthesize them into a general direction or understanding of the characteristics of the property. Individually, no one factor in these cases may have a substantial impact on the analysis, but, overall, may shed light on the utilization and characteristics of assets. Judgment may also be defined as deduction, inference, wisdom, common sense, or the ability to make sensible decisions. There is no answer absent judgment. At the very least, for example, any analysis requires choosing upon which facts and information to place more emphasis.

The establishment of appropriate average service lives for Wastewater Collection Operations accounts requires judgment to incorporate the understanding of the operation of the system with the available accounting, manufacturing, and operational information incorporated in life analysis. The appropriateness of lives assigned to various assets depends not only on current experience, but also on how well future life expectations for the assets will match past experience.

Current applications and trends in use of the equipment also need to be factored into life recommendations to ensure appropriate capital recovery to occur.

DETAILED DISCUSSION

Depreciation Study Process

This depreciation study encompassed four distinct phases. The first phase involved data collection and field interviews. The second phase was where the initial data analysis occurred. The third phase was where the information and analysis were evaluated. Once the first three stages were complete, the fourth phase began. This phase involved documenting the corresponding recommendations. The Company will use the existing lives to calculate straight line depreciation for current investment and the proposed lives will be used to calculate depreciation for future investment.

During the Phase 1 data collection process, historical data was compiled from continuing property records and general ledger systems. Data was validated for accuracy by extracting and comparing to multiple financial system sources. Audit of this data was validated against historical data from prior periods, historical general ledger sources, and field personnel discussions. This data was reviewed extensively to be put in the proper format for a depreciation study. Also as part of the Phase 1 data collection process, numerous discussions were conducted with operations personnel to obtain information that would assist in formulating life recommendations in this study. One of the most important elements of performing a proper depreciation study involved understanding how EPCOR utilized assets and the environment of those assets. Interviews with operations personnel served as important ways to allow the analyst to obtain information that was beneficial when evaluating EPCOR's asset utilization and environment. Information that was gleaned in these discussions is found both in the life analysis section of this study and also in workpapers.

Phase 2 is where the review of the lives of each asset is performed. EPCOR personnel reviewed the account records and determined if any asset should be classified in a different asset category. Phase 2 and 3 overlap to a significant degree. The detailed property records information was used in phase 2 to develop revised asset lives for each asset in service in EPCOR's depreciable property. This information was then carried forward into phase 3 for the evaluation process.

Phase 3 was the evaluation process that synthesized analysis, interviews, and operational characteristics into a final selection of asset lives. The analysis and interviews were further enhanced by the incorporation of recent or future changes in the characteristics or operations of assets that were revealed in Phase 1. Phases 2 and 3 allowed the depreciation analyst to validate the asset characteristics as seen in the accounting transactions with actual EPCOR operational experience.

Finally, Phase 4 involved making recommendations and documenting the conclusions in a final report. Recommendations for the various accounts are contained within the Detailed Discussion of this report. The depreciation study flow diagram (shown as Figure 1[1]) documents the steps used in conducting this study. Depreciation Systems, page 289 documents the same basic processes in performing a depreciation study that are: statistical analysis, evaluation of statistical analysis, discussions with management, forecasting assumptions, writing the logic supporting estimates, and writing the final report.

[1] Public Utility Finance & Accounting, A Reader

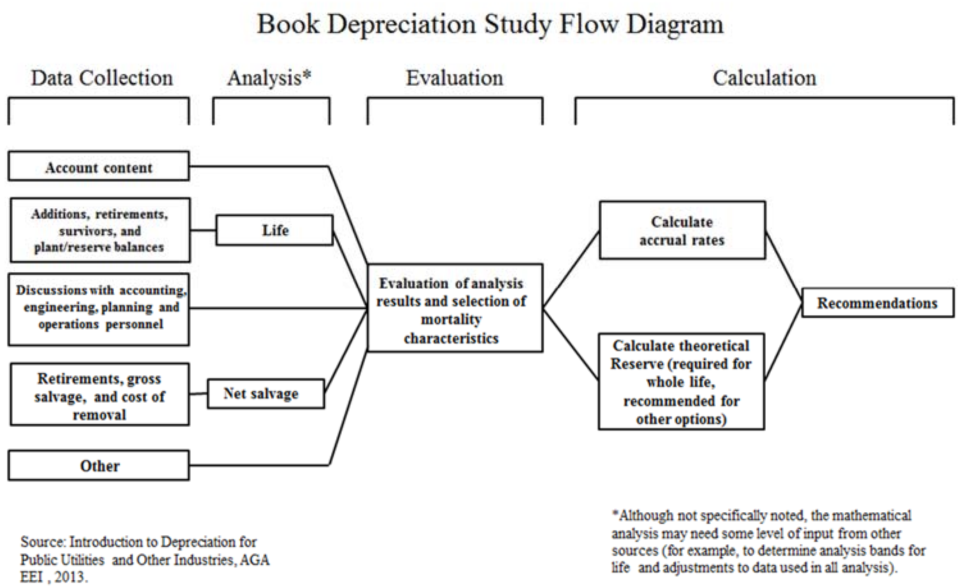


Figure 1

EPCOR WASTEWATER COLLECTION PLANT DEPRECIATION STUDY PROCESS

Depreciation Accrual Calculation

EPCOR Wastewater Collections historically has used a broad group approach to depreciating assets. This study uses the same approach. Annual depreciation expense amounts for the depreciable property for EPCOR Wastewater Collections will continue to be calculated using the straight-line method, broad group procedure. With this approach, asset lives are assigned to each major, minor, and sub-category of assets. Annual accrual amounts for current investment in each existing asset category will be computed and validated to ensure no category is over-accrued in the annual computation. Current investment accrual amounts will continue to use the existing service lives and annual accrual amounts for future investment will be computed using the revised lives and new asset categories while using the same methodology.

LIFE ANALYSIS

By interviewing operational personnel to better understand the operations and expectations for each asset group, as well as using judgment as a professional engineer and gained through analyzing like assets over 35 years, asset categories and mix of assets were reviewed and assigned a life based on its major, minor, and subcategories along with the asset description and usage. The listing below shows the major asset categories reviewed in this depreciation study.

Catch Basin
Catch Basin Manhole
Culverts
Wastewater Collection Buildings & Support Systems
Wastewater Collection Mains – Combined, Sanitary, Storm
Equipment Construction
Furniture
Hardware
Inlets and Outlets
Lagoons
Low Impact Development
Main Connections – Storm and Sanitary
Manholes
Outfalls
Pump Stations
Software
Storage
Storm Water Management Facility
Structure
Swales

Tools

Vehicles

ASSET CATEGORY SPECIFIC INFORMATION

WASTEWATER COLLECTION OPERATIONS

Catch Basin and Catch Basin Manholes

These major asset categories consist of catch basins and catch basin manholes associated with wastewater collection operations. The existing life for these asset categories is 75 years. Operational subject matter experts stated the Company is currently experiencing some failures due to snowplows damaging the manhole covers, but the existing 75-year life is still reasonable for the storm water catch basins and manholes. Based on the current mix of assets, information provided by Company personnel and professional judgement, this study recommends retaining the existing service life of 75 years for these asset categories.

Culverts

This major asset category consists of storm culverts associated with wastewater collection operations. The existing lives for this asset category are 35 and 75 years depending on the material used for the culvert. Operational subject matter experts estimate the operational life of a metal culvert is 35 years and a concrete or plastic culverts are estimated to last up to 75 years. Based on information provided by Company personnel and professional judgement, this study recommends retaining the existing life of 35 years for metal culverts and 75 years for concrete and plastic culverts in this asset category.

Wastewater Collection Buildings & Support Systems

This major asset category consists of various types of buildings and other related support systems used in wastewater collection operations. The existing lives assigned to these asset categories range from 5 years for lab equipment to 44 years for buildings. Discussions with Company subject matter experts identified minor asset categories and subcategories that consistently apply a service life to types of assets related to structures throughout the Company. For example, substructure building assets are typically concrete and steel and have a long life of 65 years. Superstructure building assets are divided into 10-year, 25-year, and 45-year life categories. Existing superstructure A and B assets such as HVAC, fences, laboratory buildings, various wood and metal structures will use a 45-year life and 25-year life respectively. A new 10-year superstructure category, superstructure C, will be used for future investment in fire protection devices, thermostats, lab equipment, dehumidifiers, and other short-lived equipment within the building's minor asset category.

Wastewater Collection Mains

This major asset category consists of three separate types of assets related to wastewater collection mains: Storm, Combined, and Sanitary mains. The existing life for all drainage mains is 75 years. Company subject matter experts stated the operational life of the mains depends on the material and usage of the mains. Concrete mains have an estimated operational life up to 100 years, metal can last 40-50 years, and plastic mains can last around 75 years. The Company is consistently seeing storm mains last 10 years longer than sanitary and sewer mains. Asset subcategories for forced mains and liners will use a 50-year life for future investment within this asset category. Based on the mix of assets, information provided by Company personnel and judgement, this study recommends using a 75-year life for Sanitary and Combined mains and using an 85-year life for the Storm mains. This study also recommends using a 50-year life for forced mains and liners in this asset category.

Equipment Construction

This major asset category consists of construction equipment used for wastewater collection operations. The existing life for these assets is 10 years. The Company does not anticipate future investment in this asset category. Based on information provided by Company personnel and judgement, this study recommends retaining the existing 10-year life for this asset category.

Furniture

This major asset category consists of chairs, tables, and workstations used to support wastewater collection operations. The existing life is 6 years. Operations feels existing furniture assets are lasting slightly longer than that. Other operating areas of the Company are using a longer life of 15 years for furniture. The Company is looking to consistently assign the same life to similar assets used in wastewater collections and wastewater treatment operations in the future. Based on information provided by Company personnel and to be consistent across these areas of the Company, this study recommends using a life of 8 years for future investment in this asset category.

Hardware

This major asset category consists of laptops, desktop computers, cellphones, and other related computer equipment. The existing life is 5 years. The Company is currently using a 5-year lifecycle for replacing laptops. Other hardware assets, such as multi-functional printers last around 8 years and servers are being replacing around 5 years. Based on information provided by Company personnel and the assets in this category, this study recommends retaining the existing life of 5 years for this asset category.

Inlets and Outlets

This major asset category consists of storm inlet and outlets used to support wastewater collection operations. The existing life is 75 years. Operational subject matter experts stated these are fairly protected compared to the outfalls that have a 75-year life and would expect the inlets and outlets to have a life similar to the storm mains. Based on information provided by Company personnel and judgement, this study recommends increasing to an 85-year life for this asset category.

Lagoons

This major asset category consists of lagoons used for wastewater collection operations. The existing life for the assets in this category is 75 years. The assets in this category consist of lagoons at the Clover Bar site which were transferred to the Wastewater Treatment business at the start of 2022. The Company does not anticipate future investment in this asset category within Wastewater Collection. Based on information provided by Company personnel and judgement, this study recommends retaining the existing 75-year life for this asset category.

Low Impact Development

This major asset category consists of concrete, soil, plants, and other related development assets used for wastewater collection operations. The existing lives for assets in this category are 25 and 75 years. Operational personnel stated the materials being used for low impact development are made to last between 40 and 50 years. They estimate the overall operational life for most of the assets in this category to be around 50 years. Based on judgement and information provided by Company personnel, this study recommends moving to a life of 50 years for this asset category.

Main Connections – Storm and Sanitary

This major asset category consists of sanitary and storm main connections used in wastewater collection operations. The existing life for these assets is 75 years. Operational subject matter experts expect the main connection assets to have the same operational life as storm and sanitary mains throughout the system. Storm mains are experiencing a longer life than sanitary mains. Based on information provided by Company personnel and judgement, this study recommends using a 75-year life for sanitary main connections and an 85-year life for storm main connections.

Manholes

This major asset category consists of manholes used to support wastewater collection operations. The existing lives for the assets in this category range from

25 to 75 years. Many of the assets in this account consist of concrete and steel and are estimated to have an operational life of 75 years. Operational subject matter experts stated the seals on the manholes are being replaced around 25 years. The manhole covers are easily broken and corroded due to the harsh environment and are also estimated to have an operational life around 25 years. Based on the information provided by Company personnel and judgement, this study recommends using a 75-year life for the storm manholes and 25-year life for the seals and top of the manholes in this asset category.

Outfalls

This major asset category consists of outfalls used in wastewater collection operations. The existing life for the assets in this category is 75 years. Operational subject matter experts stated ice can damage some of the wing walls and other subsidiary assets. The outfalls discharge into a natural water resource, and they expect the outfall to have a shorter life than the other storm piping. Based on judgement and information provided by Company personnel, this study recommends retaining the existing life of 75 years for this asset category.

Pump Stations

This major asset category consists of pump stations and other related equipment used in wastewater collection operations. The existing life for the assets in this category is 44 years. The assets in this major category have different lives based on the material and usage. Operational personnel expect the concrete substructure to have an operating life of 65 years. They Company has been replacing controls and other electronic equipment between 15 and 20 years due to deterioration from the corrosive and wet operating environment. Pumps are experiencing an operational life of 20 years with the motors being replaced as an operating expense. Based on the mix of assets in this category and information provided by Company personnel, this study recommends using a 65-year life for substructure assets, a 20-year life for electrical assets, a 20-year life for mechanical assets, and a 15-year life for instrumentation in this asset category.

Software

This major asset category consists of software used to support wastewater collection operations. The existing life for the assets in this category is 5 years. The Company currently has software assets that require upgrades on a more frequent basis and have an operating life between 3 and 5 years. Other software, such as a large ERP system has an estimated operating life between 10 and 15 years. Company subject matter experts feel the existing 10-year life is a reasonable average for the software assets. Based on the mix of assets in this account, information provided by Company personnel, and judgement, this study recommends increasing the life to 10-years for this asset category.

Storage

This major asset category consists of storage tanks and other related storage equipment used to support wastewater collection operations. The existing life for the assets in this category is 75 years. Operational subject matter experts expect the storage tanks to have a life similar to the storm and sanitary mains, which have a proposed life of 85 and 75 years respectively. The assets in this account consist of buried, rectangular, concrete structures, which have an estimated operating life of 75 years or more. Operational personnel stated the surge tanks storing sanitary materials are more susceptible to deterioration and have a shorter operating life than the storm water storage tanks. Based on the information provided by Company personnel and the proposed lives for Storm and Sanitary Mains, this study recommends increasing the life for Storm Storage assets to 85 years and retaining the existing 75-year life for Sanitary Storage assets in this major asset category.

Storm Water Management Facility

This major asset category consists of storm water management facilities such as flood plains and ponds used to support wastewater collection operations. The existing lives for the assets in this category is 75 years. Operational subject matter experts feel the existing 75-year life is reasonable for the assets in this category. Signs and fences located at the facilities have a shorter life, but the Company intends to use a different asset category for these short-lived assets in the future. Based on information provided by Company personnel and the mix of assets in this asset category, this study recommends retaining the existing 75-year life for the assets in this major asset category.

Structure

This major asset category consists of storm, sanitary, and combined structures used to support wastewater collection operations. The existing life for the assets in this category is 75 years. Operational personnel expect both storm and sanitary structures to have an estimated operating life of 75 years. The structures include concrete tunnels, control structures, and piping at the monitoring stations. Based on information provided by Company personnel and the mix of assets in this asset category, this study recommends retaining the existing 75-year life for the assets in this major asset category.

Swales

This major asset category consists of concrete swales used in wastewater collection operations. The existing life for the assets in this category is 75 years. Swales consist of concrete gutters on top of the ground at the edge of customer property lines. The Company has only had to replace a few of the existing swales and often the replacements were treated as an operating expense. Based on information provided by Company personnel and the mix of assets in this asset category, this study recommends retaining the existing 75-year life for the assets in this major asset category.

Tools

This major asset category consists of various tools used to support wastewater collection operations. The existing lives for the assets in this category are 3 and 5 years. Operational personnel stated the estimated operating life for tools varies based on the type of tool and usage. For example, monitoring devices and electronic tools experience a relatively short operating life between 3 and 5 years, while a boring machine or drill rig typically experiences a longer operating life between 10 and 15 years. Operational personnel expect similar tools used in both wastewater collection and wastewater treatment operations to have the same operational life. The Company is looking to consistently assign tools to unique life groups based on the type of tool and usage across both operating areas. Based on information provided by Company personnel and the mix of assets in this asset category, this study recommends using 3-year, 5-year, 10-year, and 15-year lives for the tools in this major asset category.

Vehicles

This major asset category consists of vehicles, pickup trucks, and other related construction equipment used in wastewater collection operations. The existing lives for the assets in this category range from 5 to 25 years. Operational subject matter experts stated the existing assets have relatively low mileage and the operating lives are primarily impacted by idle time and maintenance costs. Cars and light duty trucks are currently being replaced around 7 years. Heavy trucks and vans are estimated to have an operating life between 10 and 12 years. Trailers have an operating life between 15 and 20 years. Operational personnel expect vehicles used in both wastewater collection and wastewater treatment operations to have the same operational life. The Company is looking to assign the same life to each type of vehicle consistently across both operating areas. Based on information provided by Company personnel and the mix of assets in this asset category, this study recommends using 5-year, 7- year, 9-year, 10-year, 12-year, 15-year, and 20-year lives for the vehicles in this major asset category.

APPENDIX A
Current versus Proposed Life Parameter Table
Wastewater Collection Asset Categories

Asset Category	Current Life	Proposed Life
CBMH-STORM-NONE-NONE	75	75
CB-STORM-NONE-NONE	75	75
CULVRT-STORM-35Year	35	35
CULVRT-STORM-NONE-NONE	75	75
DRAIN-BLDGS-LAB-SUBS	44	65
DRAIN-BLDGS-LAB-SUPA	44	45
DRAIN-BLDGS-LAB-SUPB	44	25
DRAIN-BLDGS-LAB-SUPC		10
DRAIN-BLDGS-OFF-SUBS	44	65
DRAIN-BLDGS-OFF-SUPA	44	45
DRAIN-BLDGS-OFF-SUPB	44	25
DRAIN-BLDGS-OFF-SUPC		10
DRAIN-BLDGS-TRAILR-NONE	10	10
DRAIN-BLDGS-WAREH-NONE	10	10
DRAIN-SUPSYS-CNTSYS-HW	10	10
DRAIN-SUPSYS-CNTSYS-SWI	10	10
DRAIN-SUPSYS-LABEQP-NONE	5	10
EQPCON-NONE-NONE-NONE	10	10
FURN-NONE-NONE-NONE	6	8
HRDWRE-IT-NONE-NONE	5	5
INOUT-STORM-NONE-NONE	75	85
LAGOON-SAN-NONE-NONE	75	75
LAND-NONE-NONE-NONE	1	1
LANDRT-NONE-NONE-NONE	1	1
LEAIMP-NONE-NONE-NONE	10	10
LID-STORM-CONCRT-NONE	75	50
LID-STORM-CONRT-NONE	75	50
LID-STORM-PLANTS-NONE	25	50
MANHOL-COM-NONE-NONE	75	75
MANHOL-COM-SEAL-NONE	50	25
MANHOL-COM-TOP-NONE	25	25
MANHOL-SAN-NONE-NONE	75	75
MANHOL-SAN-SEAL-NONE	50	25
MANHOL-SAN-TOP-NONE	25	25
MANHOL-STM-SEAL-NONE	50	25
MANHOL-STORM-NONE-NONE	75	75
MANHOL-STORM-TOP-NONE	25	25
OUTFLL-STORM-NONE-NONE	75	75
PIPCOM-CLAY-1199-NONE	75	75
PIPCOM-CLAY-1200-NONE	75	75
PIPCOM-CLAY-599-NONE	75	75
PIPCOM-CONCRT-1199-NONE	75	75
PIPCOM-CONCRT-1200-NONE	75	75

Asset Category	Current Life	Proposed Life
PIPCOM-CONCRT-599-NONE	75	75
PIPCOM-FRCMN-NONE-NONE	75	50
PIPCOM-LINER-NONE-NONE	75	50
PIPCOM-OTH-1199-NONE	75	75
PIPCOM-OTH-1200-NONE	75	75
PIPCOM-OTH-599-NONE	75	75
PIPCOM-PLASTC-1199-NONE	75	75
PIPCOM-PLASTC-1200-NONE	75	75
PIPCOM-PLASTC-599-NONE	75	75
PIPSAN-CLAY-1199-NONE	75	75
PIPSAN-CLAY-1200-NONE	75	75
PIPSAN-CLAY-599-NONE	75	75
PIPSAN-CONCRT-1199-NONE	75	75
PIPSAN-CONCRT-1200-NONE	75	75
PIPSAN-CONCRT-599-NONE	75	75
PIPSAN-FRCMN-NONE-NONE	75	50
PIPSAN-LINER-NONE-NONE	75	50
PIPSAN-OTH-1199-NONE	75	75
PIPSAN-OTH-1200-NONE	75	75
PIPSAN-OTH-599-NONE	75	75
PIPSAN-PLASTC-1199-NONE	75	75
PIPSAN-PLASTC-1200-NONE	75	75
PIPSAN-PLASTC-599-NONE	75	75
PIPSTM-CBL-NONE-NONE	75	85
PIPSTM-CLAY-1199-NONE	75	85
PIPSTM-CLAY-1200-NONE	75	85
PIPSTM-CLAY-599-NONE	75	85
PIPSTM-CONCRT-1199-NONE	75	85
PIPSTM-CONCRT-1200-NONE	75	85
PIPSTM-CONCRT-599-NONE	75	85
PIPSTM-FRCMN-NONE-NONE	75	50
PIPSTM-LINER-NONE-NONE	75	50
PIPSTM-OTH-1199-NONE	75	85
PIPSTM-OTH-1200-NONE	75	85
PIPSTM-OTH-599-NONE	75	85
PIPSTM-PLASTC-1199-NONE	75	85
PIPSTM-PLASTC-1200-NONE	75	85
PIPSTM-PLASTC-599-NONE	75	85
PUMP-COM-NONE-BLDG	44	65
PUMP-COM-NONE-ELEC	44	20
PUMP-COM-NONE-INST	44	15
PUMP-COM-NONE-MECH	44	20
PUMP-COM-NONE-SUBS	44	65

Asset Category	Current Life	Proposed Life
PUMP-COM-NONE-SUPA		45
PUMP-SAN-NONE-BLDG	44	65
PUMP-SAN-NONE-ELEC	44	20
PUMP-SAN-NONE-INST	44	15
PUMP-SAN-NONE-MECH	44	20
PUMP-SAN-NONE-SUBS	44	65
PUMP-SAN-NONE-SUPA		45
PUMP-STORM-NONE-BLDG	44	65
PUMP-STORM-NONE-ELEC	44	20
PUMP-STORM-NONE-INST	44	15
PUMP-STORM-NONE-MECH	44	20
PUMP-STORM-NONE-SUBS	44	65
PUMP-STORM-NONE-SUPA		45
SANCON-NONE-NONE-NONE	75	75
SFTWRE-IT-NONE-SWI	5	10
STMCON-NONE-NONE-NONE	75	85
STORG-SAN-PIPE-NONE	75	75
STORG-SAN-TANK-NONE	75	75
STORG-STORM-PIPE-NONE	75	85
STORG-STORM-TANK-NONE	75	85
STRUC-COM-NONE-NONE	75	75
STRUC-SAN-NONE-NONE	75	75
STRUC-STORM-NONE-NONE	75	75
SWALE-STORM-NONE-NONE	75	75
SWMF-STORM-CONST-NONE	75	75
SWMF-STORM-DRY-NONE	75	75
SWMF-STORM-WET-NONE	75	75
TOOLS-10YEAR		10
TOOLS-15YEAR		15
TOOLS-3YEAR-NONE-NONE	3	3
TOOLS-5YEAR-NONE-NONE	5	5
TOOLS-NONE-NONE-NONE	5	5
VEHICL-CARS-MEDIUM-NONE	7	7
VEHICL-CARS-SUBCPT-NONE	9	7
VEHICL-EQPCON-BKHOEW-NONE	5	7
VEHICL-EQPCON-CRANE-NONE	10	10
VEHICL-EQPCON-FRKHVY-NONE	15	12
VEHICL-EQPCON-FRKLFT-NONE	15	12
VEHICL-EQPCON-SKDSTR-NONE	7	7
VEHICL-EQPCON-TRENCH-NONE	8	7
VEHICL-HVYTRK-DIGGER-NONE	10	10
VEHICL-HVYTRK-DUMP-NONE	11	9
VEHICL-HVYTRK-DUMPW-NONE	9	9

Asset Category	Current Life	Proposed Life
VEHICL-HVYTRK-FLTCRN-NONE	10	10
VEHICL-LGTTRK-F150-NONE	9	7
VEHICL-LGTTRK-F250-NONE	9	7
VEHICL-LGTTRK-F350-NONE	8	7
VEHICL-LGTTRK-F450-NONE	8	12
VEHICL-LGTTRK-F550-NONE	12	12
VEHICL-LGTTRK-QTRTON-NONE	7	7
VEHICL-NONE-NONE-NONE	10	7
VEHICL-TRAILR-CABOFF-NONE	25	15
VEHICL-TRAILR-FLTDEC-NONE	10	20
VEHICL-TRAILR-HYDROV-NONE	10	12
VEHICL-TRAILR-REEL-NONE	15	15
VEHICL-TRAILR-TILT-NONE	15	20
VEHICL-TRAILR-UTILIT-NONE	15	20
VEHICL-VAN-E2CCRG-NONE	8	7
VEHICL-VAN-E2CMET-NONE	5	7
VEHICL-VAN-E3CCRG-NONE	12	7
VEHICL-VAN-E3CMET-NONE	10	7
VEHICL-VAN-E4CCUB-NONE	12	12
VEHICL-VAN-E4CMET-NONE	7	12
VEHICL-VAN-E5CCUB-NONE	12	12
VEHICL-VAN-MNVVAN-NONE	10	7

Appendix N

EPCOR WATER SERVICES

Performance Based Regulation Background

May 31, 2024

1.0 INTRODUCTION

1. This is a companion document to Schedule 3 of the Wastewater Services Bylaw. It is intended to provide an in-depth explanation of the various components of the performance based regulation to enhance the understanding of City Council, the City's Utility Committee and the public.

2. Under EWS' Performance Based Regulation (PBR), EWS typically submits an application every five years to its regulator, Edmonton City Council, to extend the PBR methodology for a subsequent five-year period. With each five-year application, EWS applies the same general performance based regulation methodology and principles which underpin the Waterworks Bylaw originally developed in 2002. The PBR model was initially approved by Edmonton City Council in 2001 and has been utilized to determine water rates charged to City of Edmonton customers since January, 2002.

3. Beginning with the 2012-2016 PBR term, EWS incorporated the wastewater treatment operations provided at the Gold Bar Wastewater Treatment Plant into the PBR structure and beginning with the 2022-2024 PBR term, EWS incorporated the wastewater collection operations (also known as drainage services) into the PBR structure. Water, wastewater treatment and wastewater collection services are each provided to customers under separate rate structures.

4. EWS has submitted applications to set rates over the years 2025-2027 for Wastewater Collection and Wastewater Treatment Services. A three-year PBR term is proposed for Wastewater Collection and Wastewater Treatment services to align the timing for a consolidated PBR application for Water, Wastewater Collection and Wastewater Treatment services in 2028 with a one year extension of the Water PBR in 2027.

5. Section 2.0 of this document presents the principles upon which the PBR Applications have been designed. Section 3.0 provides a high-level overview of the operations being funded through the PBR Applications. Section 4.0 describes the rate structure, Section 5.0 describes performance measures and penalties, and Section 6.0 contains the reporting requirements of the PBR.

2.0 RATE CALCULATION PRINCIPLES

6. Water and Wastewater rate standards set by the AWWA and WEF are based upon a number of common principles. The purpose of these principles is to balance the interests of the

customers with the utility. EWS continues to set its water, wastewater treatment and wastewater collection rates in accordance with these principles.

- Rates are based upon the cost of service.
- No cross-subsidization of rates between customer classes.
- No cross-subsidization of rates between generations of customers.
- Equity of rates to customers who are within a single customer class.
- Rate stability and predictability.

3.0 PERFORMANCE-BASED REGULATION METHODOLOGY

7. EWS' PBR methodology reflects several key components described below.

3.1 Cost of Service

8. The cost allocation process is based on a Cost of Service Study (COSS). Costs reflect the total amount that must be collected through rates for the utility to recover its prudently incurred costs for maintaining, operating and investing in the utility system plus earn a fair return on investment.

3.2 Revenue Requirement

9. The components of the revenue requirement are listed in Table 3.2-1.

Table 3.2-1
Components of the Revenue Requirement

Item	A **Description**
1 Operating Costs	Costs broken down by operating cost categories (salaries and benefits, contractors and consultants, power and chemicals, materials and supplies, etc.) and by the different functional areas within Water Services, Wastewater Treatment Services and Wastewater Collection Services.
2 Revenue Offsets	Includes revenues for various service charges and fees, penalties and miscellaneous revenues.
3 Taxes and Franchise Fees	Taxes payable by EWS (property taxes, linear taxes and business taxes) and franchise fees payable to the City of Edmonton
4 Depreciation	Capital assets are depreciated over the shortest of the assets' physical, technological, commercial or legal life. Depreciation expense is a non-cash expense reflecting the portion of a tangible capital asset that is deemed to have been consumed or expired.
5 Interest	The cost for EWS to service its existing debt and to finance new debt requirements.

Item	A Description
6 Return on Equity	New capital projects are financed by a combination of debt and equity. Just as debt attracts an interest cost for borrowing, equity investment attracts a cost as well. The regulator determines the fair rate of return that the utility is allowed to earn on their investment in utility assets (rate base). A cost of capital experts recommends the appropriate return on equity for EWS based on its business and financial risk.

3.3 Routine Adjustment

10. The annual rate adjustment is applied to each class of customer contained in Section 1 of the Wastewater Services Bylaw 20865. Each year, certain components appear as an adjustment to the fixed monthly service charge and/or consumption charge. The categories falling under this heading are inflation, the efficiency factor and special rate adjustments.

3.4 Inflation

11. As set out in Sections 1 and 2 of Schedule 3 to the Wastewater Services Bylaw, consumption charges and fixed monthly service charges are adjusted annually by the forecast rate of inflation for the upcoming year plus an adjustment for the difference between actual and forecast inflation rate for the prior year.

3.5 Efficiency Factor

12. As set out in Sections 1 and 2 of Schedule 3 to the Wastewater Services Bylaw, the efficiency factor is a reduction to the inflation factor applied to the rates on an annual basis. The efficiency factor reduces the increase in rates to customers. It recognizes that as a business grows, it should become more efficient, and the efficiency factor therefore represents the minimum amount by which EWS must improve operational efficiency to maintain its net income.

13. For the 2025-2027 PBR term, EWS proposes to maintain the 0.25% efficiency factor as the underlying industry parameters have not changed since its calculation.

3.6 Special Rate Adjustments

14. The special rate adjustments are outlined in Section 2.3 of Schedule 3 of the Wastewater Services Bylaw. The special rate adjustments are added to the consumption charge and/or fixed monthly service charge for both water rates, wastewater treatment rates, sanitary rates and stormwater rates. Special rate adjustments are required for increases to rates above inflation

and includes a special rate adjustment for re-basing which is required to recover the difference between EWS' revenue requirement forecast for the PBR term and the revenue that would be realized if annual rate increases were limited to PBR inflation. Other special rate adjustments may be required for programs or initiatives that are in addition to EWS' core utility operations.

3.7 Non-Routine Adjustments

15. EWS assumes the risk on all operating and capital related costs. However, there are certain cost factors that are unusual in nature and beyond the scope of control of EWS. In such situations where the unusual factors result in a significant impact to EWS, costs can be passed on to customers upon receiving City Council or City Manager approval. If EWS anticipates making a request for one or more non-routine adjustments, EWS will submit its request to the City Manager and will include with such request sufficient information to enable the City Manager / City Council to evaluate and approve the request.

16. All amounts approved as a non-routine adjustment are funded on an interim basis and charged to EWS' Adjustment Deferral Account for Water, Wastewater Treatment or Wastewater Collection as applicable. The purpose of this is to minimize the financial impact non-routine adjustments could have on customers or EWS and promote rate stability over time. The Adjustment Deferral Account balance will be treated as a working capital item.

17. EWS will recover/credit the deferral account balance over a reasonable time frame through an adjustment to the fixed monthly meter charge in Schedule 1 of the Water Services Bylaw and the Wastewater Services Bylaw.

3.8 Off-ramps

18. In the event that this performance-based regulation does not work in the way EWS and its regulator intended, then the performance-based regulation can be terminated with the mutual consent and agreement of both parties prior to the expiration of its term.

19. In the event of termination of the performance-based regulation, it is necessary to wind-down the plan. Any balance of the Adjustment Deferral Account must be cleared within a one-year period from the date of termination.

4.0 PBR RATE STRUCTURE

20. EWS' in-city customers pay both a consumption charge and a fixed monthly service charge. The fixed charge recovers costs that are directly attributable to a customer including the cost of the water meter, customer service and billing. The consumption charge captures all the costs of operations, maintenance, administration and capital investment associated with operating the water, wastewater treatment or wastewater collection utility.

21. **Water Services** includes the production, treatment and supply of potable water to a customer, for which EWS charges water rates. **Wastewater Treatment Services** includes the treatment of wastewater and the storage, pumping and disposal of treated wastewater, for which EWS charges wastewater treatment rates. **Wastewater Collection Services** includes operation of the sanitary, stormwater and combined sewer systems.

22. Customers are categorized into three rate classes for the purpose of determining which specific water and wastewater rate applies to each customer. The rate classes include Residential, Multi-residential and Commercial.

23. Table 4.0-1 provides an overview of the rate structure for Water Services, Wastewater Treatment Services and Wastewater Collection Services.

Table 4.0-1
EWS Rate Components

	A **Water**	B **Wastewater Treatment**	C **Sanitary**	D **Stormwater**
1	Consumption Charges	Consumption Charges	Consumption Charges	
2	Fixed Monthly Service Charges	Fixed Monthly Service Charges	Fixed Monthly Service Charges	Fixed Monthly Service Charges based on Stormwater Equivalent
3	Rate Riders	Wastewater Overstrength Surcharges		
4	Miscellaneous Service Charges			

5.0 PERFORMANCE MEASURES AND PENALTIES

24. The water system service quality measures, wastewater treatment service quality measures and wastewater collection service quality measures reflect the results of EWS'

operational performance. These measures ensure that EWS does not compromise customer service levels as it seeks to identify cost-saving opportunities during the PBR period.

25. Water, Wastewater Treatment and Wastewater Collection individually have a 100 point benchmark. Total points are determined by the summation of points available for each performance measure. When service or quality drops below an established standard, EWS is financially penalized, and that penalty amount is refunded to customers through a rebate on their water, wastewater treatment or wastewater collection utility bill.

6.0 ANNUAL REPORTING AND FILING REQUIREMENTS

26. Annual **Rate Filing** - On March 1st of the year following the reporting year, EWS will file with its regulator, the City of Edmonton, an Annual Water, Wastewater Treatment and Wastewater Collection Rate Filing. The filing will contain five parts:

- An audit report - An independent internal or external accountant will review the Annual Water, Wastewater Treatment and Wastewater Collection Rate Filing, conduct an audit and prepare an audit report in accordance with the recommendations contained within Section 5805 of the Canadian Institute of Chartered Accountants Handbook, as amended from time to time.
- Rates Sheets - The water rate and wastewater treatment rate forecast for each customer class of service for the period following the reporting period; and,
- Water System Service Quality Results - The results of each of the components of the water system service quality indices.
- Wastewater Treatment Service Quality Results - The results of each of the components of the wastewater treatment service quality indices.
- Wastewater Collection Services System Quality Results – The results of each of the components of the wastewater collection system service quality indices.

27. **Annual Progress Reports** - A PBR Progress Report to City Council, outlining in detail EWS' performance in the prior year with regards to its operational performance against its service quality standards, its financial results for the year compared to the PBR plan, and opportunities and challenges expected in the upcoming year.

28. **Minimum Filing Requirements** - In March 2013, City Council approved EWS' proposed Minimum Filing Requirements (MFR) to be used for the next PBR application. The MFR includes both financial and non-financial filing requirements and takes guidance from the Alberta Utilities

Commission MFR. The intent of EWS' MFR is to provide: (i) greater visibility and transparency; (ii) improved consistency and comparability in terms of structure and format of application consistent with filings by other regulated entities in Alberta; and (iii) better functionality in terms of decision-useful information in a readily extractable form.

Appendix O

EPCOR WATER SERVICES

Bill Comparison Report

May 31, 2024

1.0 PURPOSE

1. This report outlines the components of EPCOR Water Services' (EWS) wastewater treatment rates, sanitary rates and stormwater rates and provides a comparison with surrounding communities and other regions based on monthly wastewater bills.

2.0 OVERVIEW

2. For the purposes of preparing this report, EWS compared its rates with the water utilities of Calgary, Regina, Saskatoon, Vancouver and Winnipeg as well as a representative selection of communities surrounding Edmonton. These communities are collectively referred to in this report as the Alberta Capital Region communities and are comprised of St. Albert, Sherwood Park, Sturgeon County and Spruce Grove.

3.0 TOTAL WASTEWATER RATE

3. It is not feasible to conduct a direct comparison of EWS' wastewater treatment rates or EWS' sanitary and stormwater rates with those of other communities because unlike EWS, all other communities charge a combined rate for the operation of their wastewater collection and wastewater treatment system. In order to provide a meaningful comparison, EWS has combined its wastewater treatment rates with its sanitary and stormwater rates for the collection system.

4. The combination of wastewater treatment rates and sanitary and stormwater rates is herein referred to as "total wastewater" with comparisons presented on a total wastewater basis.

5. Based on this comparison of EWS' total wastewater rates with other communities, EWS highlights certain key factors which lead to differences in rates, such as:

- **Franchise fees** – EWS and certain wastewater utilities in other communities pay franchise fees, whereas some others do not;
- **Investments in resilience** – EWS' stormwater rates include significant investment in flood protection to ensure Edmonton's resilience. In a February 2021 Report from Intact Centre on Climate Change Adaptation[1], Edmonton received a B+ score for flood

[1] https://www.intactcentreclimateadaptation.ca/wp-content/uploads/2021/02/16-Cities-Flood-Preparedness.pdf

preparedness, tied with Regina and Toronto for the top rank of the 16 major Canadian cities included in the report;

- ageing Infrastructure – the drainage system in Edmonton is older than in surrounding communities, requiring a higher level of maintenance and renewal including corrosion and odour reduction (CORe);
- extent of treatment – while some municipalities apply similar treatment processes as EWS, others are able to treat wastewater to a less extent; and
- full cost recovery approach – while EWS' wastewater rates are based on full cost recovery, it is not clear if other communities take this same approach in determining their rates.

6. Despite these upward pressures on rates, the results show that EWS' total wastewater rates are within range of the sampled utilities surrounding Edmonton and in other jurisdictions.

4.0 WASTEWATER BILL COMPARISONS

7. Surrounding communities and other regions' wastewater rates are compared to EWS' based on calculated monthly wastewater bills. While a rate comparison of this nature provides a good overview, it has inherent limitations, as discussed in the Canadian Municipal Water Consortium's "2015 Canadian Municipal Water Priorities Report":

> *... these types of comparisons don't often highlight more complex and variable structures being used to support full cost recovery... When comparing costs between municipalities, there are disparities and local realities for each system. Each municipality has chosen a different way of covering costs and has a unique combination of level of service, treatment processes, maintenance and upgrade requirements, fire protection, average consumption, population size, energy for distribution and collection, type and quality of source water and receiving water.*[2]

4.1 Approach to Total Wastewater Bill Comparisons

8. The comparative 2025 total wastewater bill information is based on the other utilities' wastewater treatment, wastewater collection and stormwater rates as of 2024, escalated by the

[2] Canadian Municipal Water Consortium. "2015 Canadian Municipal Water Priorities Report: Towards Sustainable and Resilient Water Management," page 23.

I factor (inflation) of 2.5% to determine a 2025 rate. With the exception of Saskatoon, Winnipeg and Calgary, 2025 rates are not yet published for the other jurisdictions and therefore published 2024 rates have been escalated by the I factor as a conservative measure. The bill comparisons generally reflect 2025 wastewater rates for comparable communities and are based on the total cost to the customer including fixed charges, consumption charges plus any tax levies. EWS notes that it has included the consumption deferral amounts proposed to be refunded over the 2025-2027 PBR term in the calculation of the EWS bill.

9. Three levels of usage/consumption are provided for comparing residential wastewater bills:

- Low use residential consumer (10 m^3/month);
- Average use residential consumer (15 m^3/month) based on the average consumption for an Edmonton household; and
- High use residential consumer (40 m^3/month).

10. Comparisons are not made for the multi-residential customer class because many jurisdictions do not have a similar rate class.

11. Comparisons are made for three sizes of commercial customers:

- A small commercial business representative of a typical car wash (325 m^3/month).
- A medium commercial business representative of a large hotel or large shopping center (6,000 m^3/month).
- A large commercial business representative of a large-scale commercial enterprise, like a brewery or food processing plant (20,000 m^3/month).

4.2 Residential Total Wastewater Bill Comparison

Figure 3.3-1
Low Use Monthly Residential Total Wastewater Bill
(10 m^3/month)

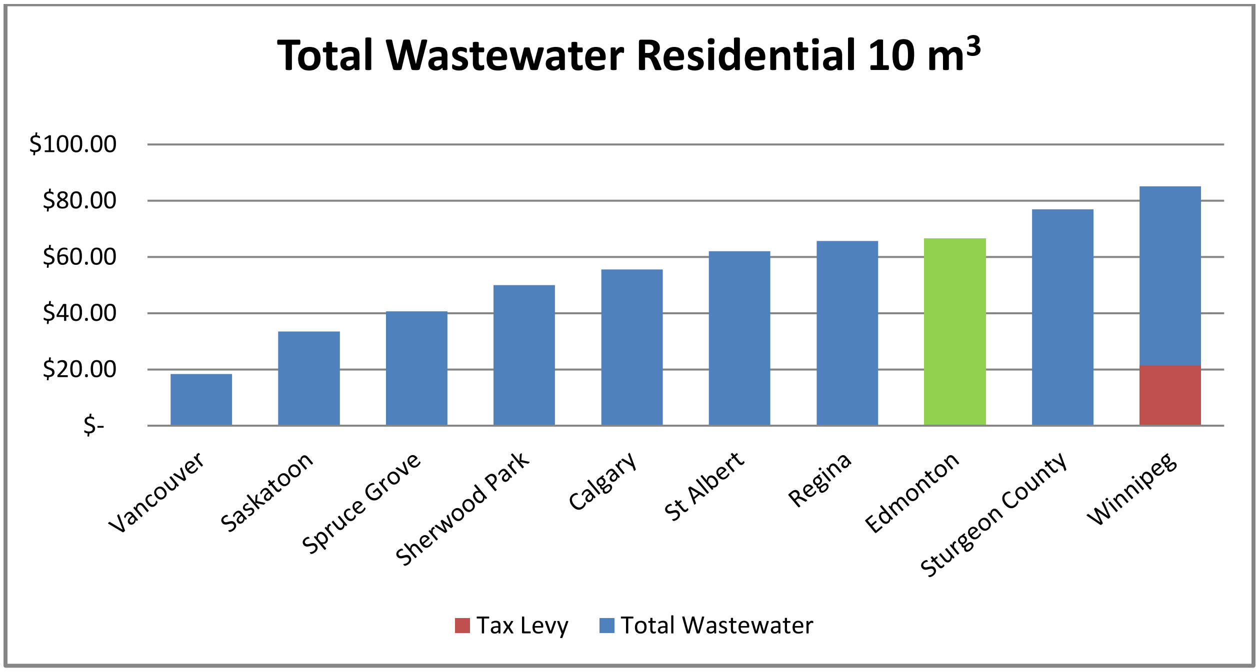


Figure 3.3-2
Average Edmonton Monthly Residential Total Wastewater Bill
(15 m^3/month)

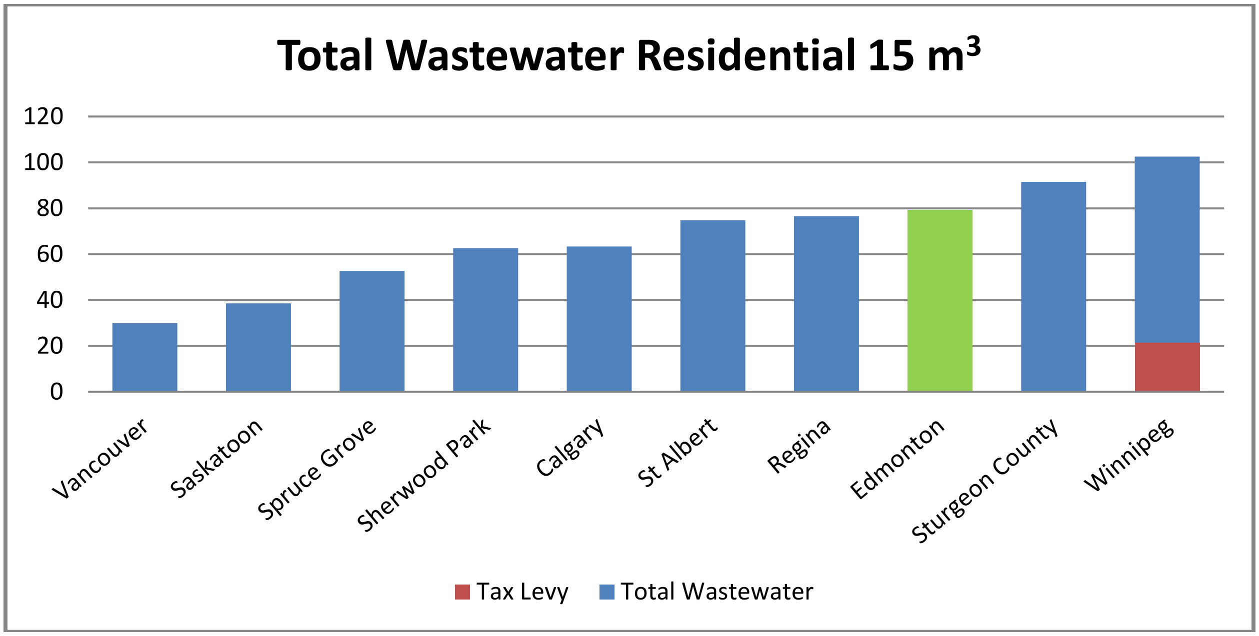
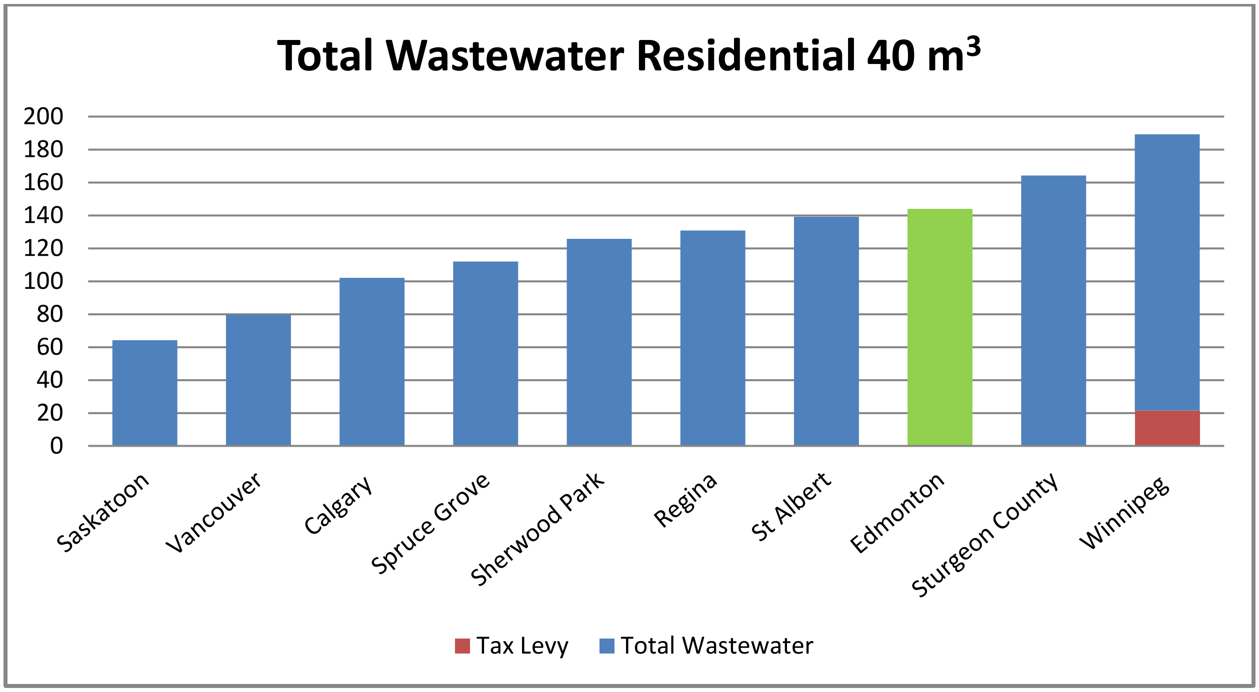
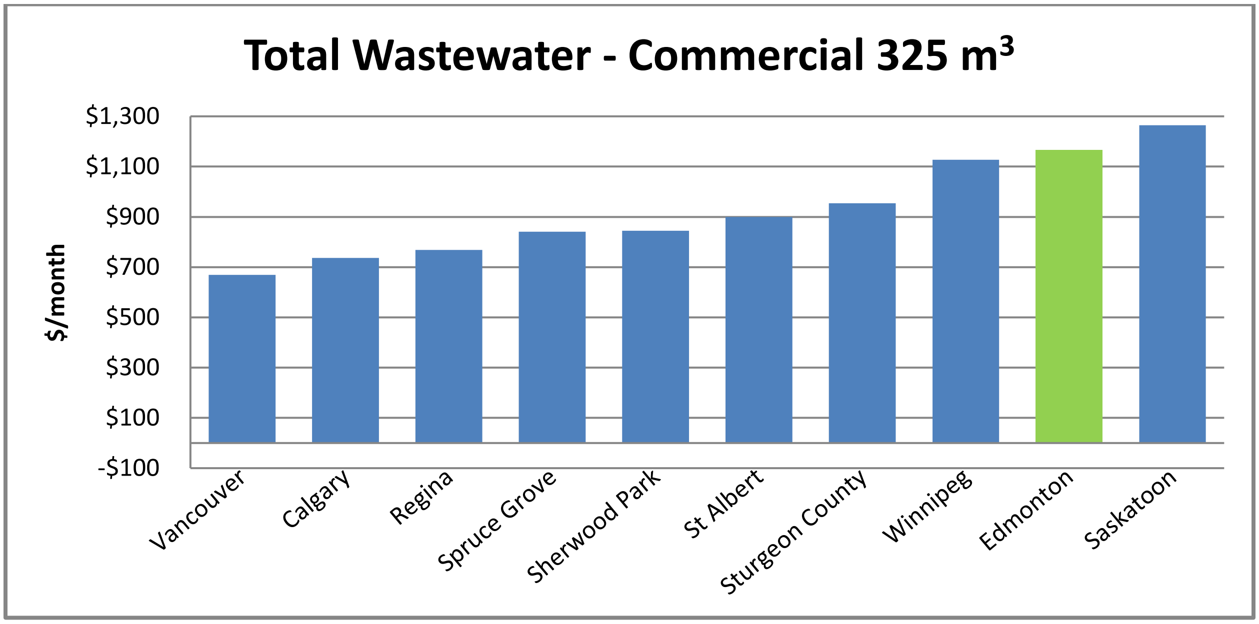


Figure 3.3-3
High Use Monthly Residential Total Wastewater Bill
(40 m^3/month)



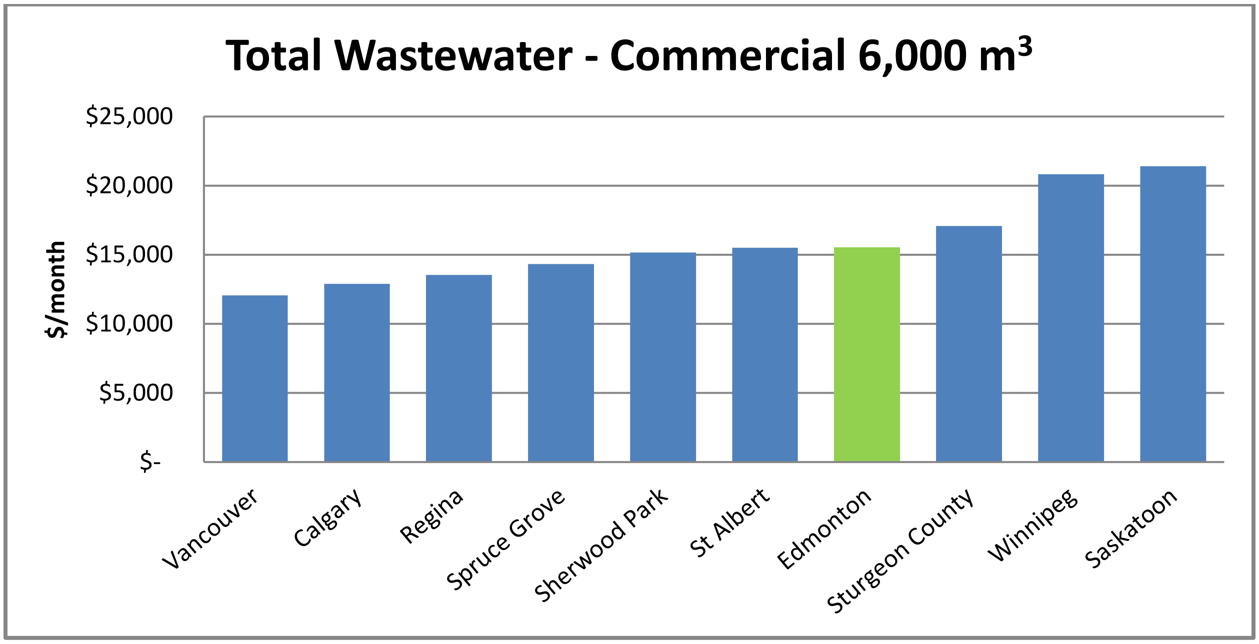
4.3 Commercial Total Wastewater Bill Comparison

Figure 3.4-1
Small Commercial Monthly Total Wastewater Bill
(325 m^3/month)



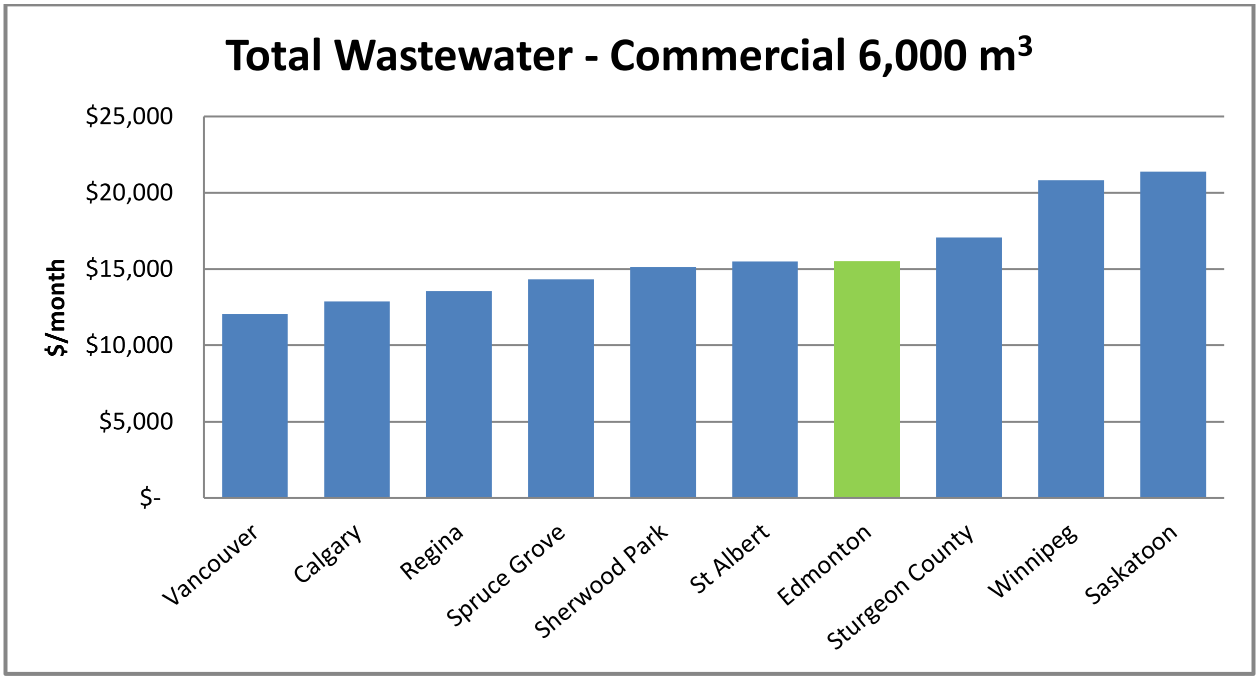
12. Figure 3.4-1 provides a comparison of the monthly total wastewater bill for small commercial customers consuming 325 m^3 per month, which is representative of a typical car wash.

Figure 3.4-2
Medium Commercial Monthly Total Wastewater Bill
(6,000 m³/month)



13. Figure 3.4-2 provides a comparison of the monthly total wastewater bill for medium commercial customers consuming 6,000 m³ per month, which is intended to represent a large hotel or large shopping center. In this category, the Edmonton 2025 water bill is competitive when comparing with surrounding communities

Figure 3.4-3
Large Commercial Monthly Total Wastewater Bill
(20,000 m³/month)



14. Figure 3.4-3 provides the comparison of the monthly total wastewater bill for large commercial customers consuming 20,000 m³ per month, which is representative of a large scale commercial or industrial enterprise, like a brewery or food processing plant. In this category, the Edmonton 2025 water bill is competitive when comparing with surrounding communities.

15. Overall in the commercial segment EWS' charges are within range when compared to the other utilities.

Appendix P

EPCOR WATER SERVICES

Stormwater Management Rebate Program

May 31, 2024

1.0 STORMWATER REBATE PROGRAM OVERVIEW

1. EPCOR Water Services (EWS) is implementing an expansion to its rebate program that will help to further reduce extraneous inflow into the wastewater collection system during significant storm events and decrease the risk of flooding. The proposed Stormwater Management Rebate Program is intended to help incentivize stormwater management practices on private properties, as well as assist customers mitigate sewer back-ups and other damage caused by flooding.

2. The current rebate program for Backwater valve installations will continue to be available to eligible customers to reduce their risk from sewer line backups (up to $800/property). EWS will also continue to offer free home flood inspections to customers within Edmonton.

3. The expanded rebate program is to support additional private side property modifications to reduce the impact of stormwater runoff from parcels on the overall system and reduce risks of overland flooding. Eligible customers would be able to apply for rebates for stormwater management installations, (in addition to the rebate for backwater valve installation) up to a combined maximum of:

- $2,000/property for single-family residential homes;
- $5,000/property for multi-family residential homes; and
- $10,000/property for Industrial, Commercial and Institutional (ICI) properties.

2.0 QUALIFYING PROJECTS

4. Customers may qualify for rebates for the installation of Low Impact Developments (LIDs) on their property. See Section 4.0 for a list of qualifying LIDs.

5. In addition, based on pre-approval from EWS, customers may also be eligible for rebates for disconnecting downspouts that are directly connected to a property's sanitary or stormwater service.

- **LIDs** are a type of green infrastructure that reduce the volume and speed of flows into the collection system by capturing and retaining water for later/slower release. LIDs, such as rain barrels, bioretention basins, rain gardens, soil cells, soakaway pits and more can improve property drainage and reduce the risk of sewer backups. Rebates for the installation of new LIDs will be determined using a cost-of-service calculation that considers the volume of stormwater it can manage. The total rebate for LIDs on individual properties will be assessed based on the area and depth of impervious surface that the stormwater can be diverted per m3.

- **Downspouts** channel water from a property's roof to local storm drains or sewers. Properties (typically ones built more than 30 years ago) with downspouts connected directly to a property's sanitary or storm service add increased pressure on the wastewater collection system, especially during times of heavy rain and snowmelt. Based on system requirements, and where identified and approved by EWS, customers with downspouts that are connected directly to the wastewater collection or stormwater system (i.e. to pipes running underground) may be eligible for a rebate of up to $100 per downspout to cover the costs of rerouting roof leaders to run above ground where water can be absorbed into a permeable surface (e.g. grass), or collected in a rain barrel/storage tank.

3.0 RATIONALE

6. The proposed program was developed based on a number of factors, including the number of different property types in the City of Edmonton (CoE), historical flooding reports, similar programs in other jurisdictions, as well as local programming with comparable target audiences (e.g. the City of Edmonton's Boulevard Gardening Program).

7. In addition to flood mitigation and alignment with the SLOW theme of the Stormwater Integrated Resource Plan (SIRP), the proposed rebate program will also help provide system capacity for future community growth. Furthermore, effective stormwater management practices have been shown to help reduce peak runoff periods and improve the water quality of flows. This not only helps reduce the costs to operate and maintain the wastewater collection system (e.g. reduces the need for large-piped infrastructure investments) but helps maintain reasonable rates for customers.

8. Research also shows that natural hazard mitigation, such as green infrastructure, saves much more than it costs. For riverine flooding, the big-picture average is about $6 USD saved per $1 USD invested. Also, engagement with third-party stakeholder organizations such as the Institute for Catastrophic Loss Reduction have shown that stormwater management installations can potentially reduce insurance premiums. Many LIDs are also often lower maintenance, saving property owners time and money. LIDs also bring broader environmental benefits, helping generate clean air, combat heat island effects, increase biodiversity, and protect the groundwater table through natural filtration.

4.0 ELIGIBLE LOW IMPACT DEVELOPMENTS

9. Pending pre-approval from EWS, customers that opt to install new LIDs on their property may be eligible for a rebate under the proposed Stormwater Management Rebate Program.

10. Eligible LID installations include:

- **RAIN BARRELS AND STORAGE TANKS** that capture water run-off from roofs via a downspout connection, providing the opportunity to reuse rainwater, save money on potable water usage, and care for lawns and gardens with more nutrient rich water. To be eligible for the rebate a slow drain system must be installed in order to have storage capacity available for subsequent rain events.
- **RAIN GARDENS** (a.k.a. bioretention gardens) are shallow, depressed native plant gardens that promote the infiltration of rainwater. They may look like a typical flower or shrub bed, however, these gardens have specially blended soils and a storage component to filter and hold water during and after a rainfall. Rain gardens work by allowing rain water to enter the garden and then be filtered by the soil and plants.
- **BIORETENTION BASINS** look a lot like rain gardens on the surface, however these basins have their own inlet and a perforated pipe beneath the surface where water is collected, allowing rain water to enter the basin and be filtered by the soil before going to the stormwater system.
- **PERMEABLE PAVEMENTS** provide an alternative to asphalt or cement and allow rainfall to percolate into the ground.
- **SOAKAWAY PITS** are below-ground reservoirs of permeable material that collect rainwater, allowing for infiltration to the ground. These pits provide a good option for properties where there is limited surface space available for a rain garden.
- **ABSORBENT LANDSCAPING** is a depressed landscaped area that looks similar to grassed areas, and can include other vegetation or trees. The landscaped area contains a surface inlet and outlet and may contain a small depression. The area is built with deeper topsoil and sand mixture to hold water during and after a rainfall.
- **BOX PLANTERS** have specially blended soils and rock layers, along with plants, to hold water during and after a rainfall. Box planters can look very different depending where they are installed but are typically used in urban areas.
- **SOIL CELLS** are plastic milk crate-like structures, containing specially blended, uncompact soils, designed to be installed beneath hardscape surfaces like sidewalks

and roads. Once the soil cells are installed, you often cannot tell they are there. These soil cells have their own inlet and a perforated pipe where water is collected, allowing rainwater to enter the soil cells to encourage plant root growth, which helps hold water during and after a rainfall. The water is then filtered by the soil before going to the stormwater system.

5.0 NEXT STEPS

11. EWS plans to work with the City of Edmonton, Community Leagues, Green Infrastructure Proponents and the Insurance sector representatives to promote the program.

12. A new Stormwater Rebate Projects performance measure will track the participation of customers in this proposed stormwater rebate program related to LID installations and downspout disconnections, with the number of qualifying installations reported to EWS' regulator as part of the annual PBR Progress Report. The existing performance measure related to property flood inspections will continue to be tracked and aligns with the installation of backflow valves; however, the number of backwater valves installed is excluded from the stormwater rebate tracking measure to avoid double counting.