2021 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, 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
	Revenue and Return on Equity	2021		2017-2021*	
		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
	Summary of Revenue Requirement	**2021**		**2017-2021**	
		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
In-City Water Revenue		**2021**		**2017-2021**	
		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)

	Function and Sub-function	A	B	C	D
		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
	Cost Category	2021		2017-2021	
		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

	Cost Category	A	B	C	D
		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)

	Depreciation and Amortization	A	B	C	D
		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

	Affiliate and Service	A	B	C	D
		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

	Affiliate and Service	A	B	C	D
		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**

2021 Highlights

- **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.

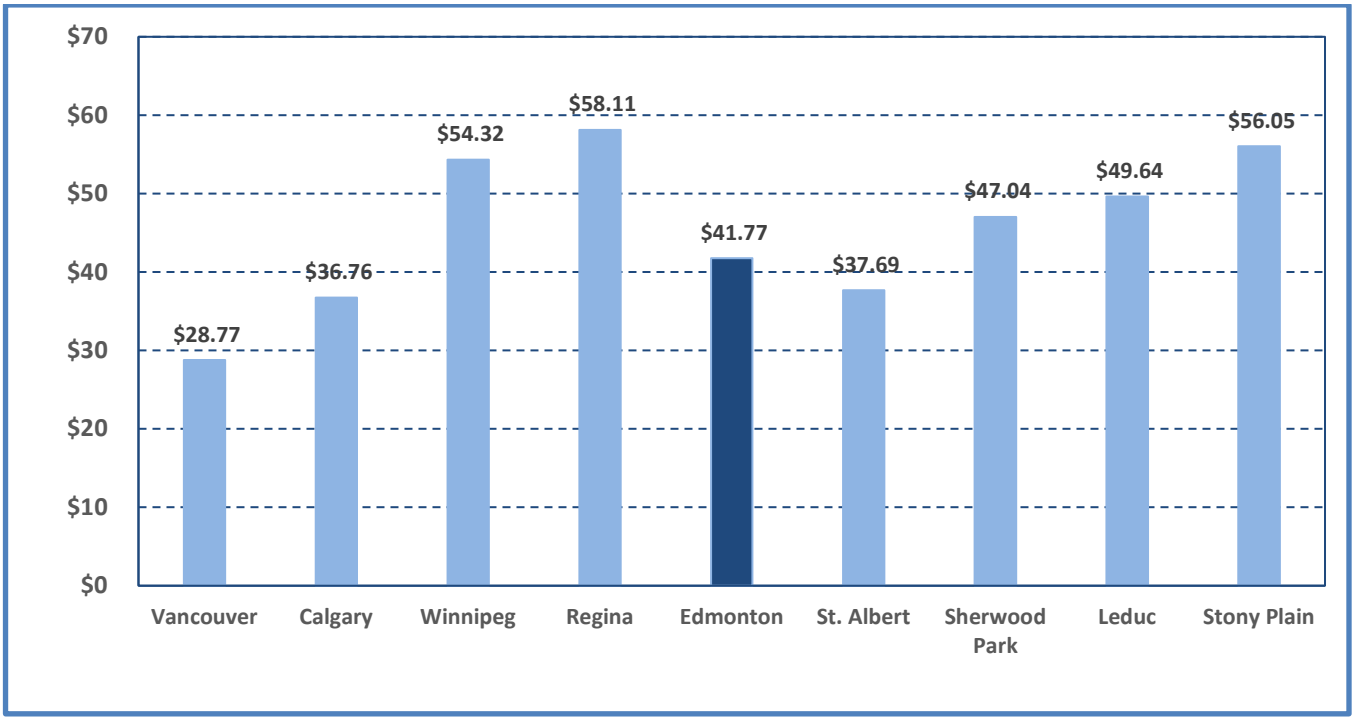
2.5 Rates and Bill Comparisons

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
	Summary of Revenue Requirements	**2021**		**2017-2021**	
		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				

	Function and Sub-function	A	B	C	D
		2021		2017-2021	
		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
	Components of Mid-Year Rate Base, net of Contributions	**2021**	
		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)

	Return on Rate Base	2021		2017-2021	
		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

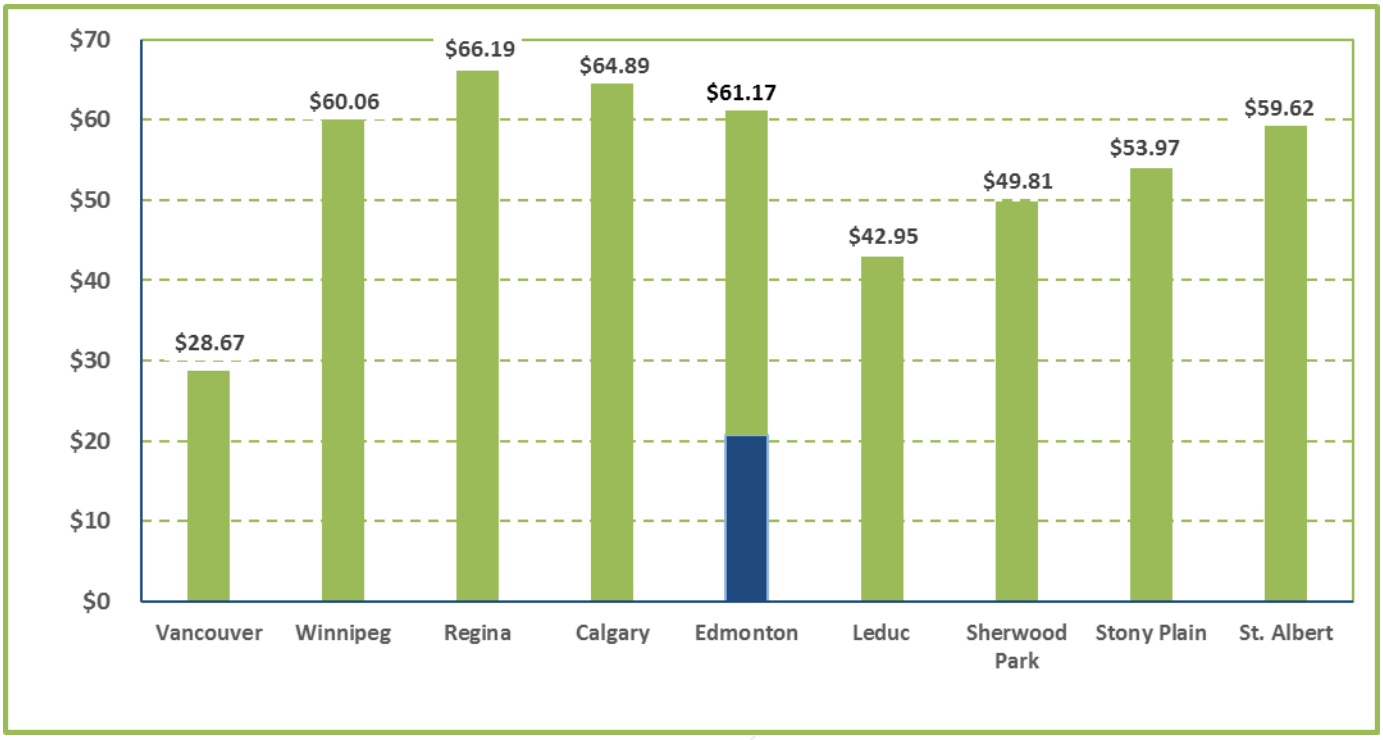
EWSI's wastewater (combined wastewater treatment, sanitary and stormwater) bill comparisons for 2021 are based on the published sanitary and stormwater rates for Calgary, Vancouver, Winnipeg and Regina, as well as four local communities. These bill comparisons represent the total cost to the customer 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)

	Function	A	B	C	D
		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)

	Interest Expense and Cost of Debt	A	B	C	D
		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)

	Affiliate and Service	A	B	C	D
		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
Capital Expenditures							
Drainage Neighbourhood Renewal	51.8	29.1	(22.7)	175.8	116.2	(59.6)	1
Drainage System Expansion	26.9	23.4	(3.5)	84.2	91.1	6.9	2a
Drainage System Rehabilitation							
Groat Rd Trunk S OP-001639-01	-	0.1	0.1	-	34.6	34.6	3a
High Priority Replacement Program	14.1	21.2	7.1	54.2	74.2	20.1	3b
Projects under $15 million	17.0	45.4	28.4	65.0	129.5	64.5	3c
Drainage System Rehabilitation	31.1	66.7	35.6	119.2	238.4	119.2	
Environmental Quality Enhancement							
Kinnard OSS	-	7.8	7.8	-	10.3	10.3	
Projects under $15 million	26.1	6.7	(19.4)	100.8	32.8	(68.0)	
Environmental Quality Enhance	26.1	14.5	(11.6)	100.8	43.1	(57.7)	4
Flood Mitigation							
Tweddle Place OP-001334-01	0.0	4.3	4.3	29.6	18.8	(10.8)	5a
Malcolm Twed & Ed OP-001695-01	9.8	20.6	10.8	58.4	24.6	(33.8)	5a
Kenilworth Dry Pond	-	0.5	0.5	-	1.1	1.1	
Lauderdale West Dry Pond	-	0.0	0.0	-	0.0	0.0	
Projects under $15 million	50.8	22.9	(27.9)	159.5	66.2	(93.3)	5b
Flood Mitigation	60.6	48.3	(12.2)	247.5	110.7	(136.8)	
SSSF Projects							
SESS SW4 OP-001336-01	-	2.6	2.6	-	20.2	20.2	
NEST NC2 & NC3 OP-001795-01	-	9.9	9.9	-	33.5	33.5	
SESS SA10A CP-002993-01	-	7.8	7.8	-	36.5	36.5	
SW5	-	0.1	0.1	-	0.4	0.4	
Projects under $15 million	34.9	2.9	(32.0)	137.8	6.0	(131.8)	
SSSF Projects	34.9	23.3	(11.6)	137.8	96.6	(41.3)	6
NRA - LRT							
West Valley LRT	41.5	35.8	(5.7)	55.4	52.2	(3.2)	
Metro LRT	0.7	0.2	(0.5)	5.5	7.4	2.0	
NRA-LRT Projects	42.2	36.0	(6.2)	60.9	59.6	(1.2)	7
NRA - CORe							
151S/99A SanTrunk OP-001940-01	-	15.1	15.1	-	23.8	23.8	
Duggan Tunnel Replacement	8.3	0.4	(7.9)	10.4	1.2	(9.2)	
Mill Creek Combined	-	0.4	0.4	-	1.1	1.1	
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.

Initiatives and Objectives	Year End Status
needs to be accomplished to reduce the impact of stormwater flow on Edmonton residents and businesses.	
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.	**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
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 and will continued for several years as additional modules are developed and implemented.
Employee Development	
Develop Great Leaders Who Embody EPCOR’s Values	**On-going -** Drainage created functional area business plans that outline two year objectives

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

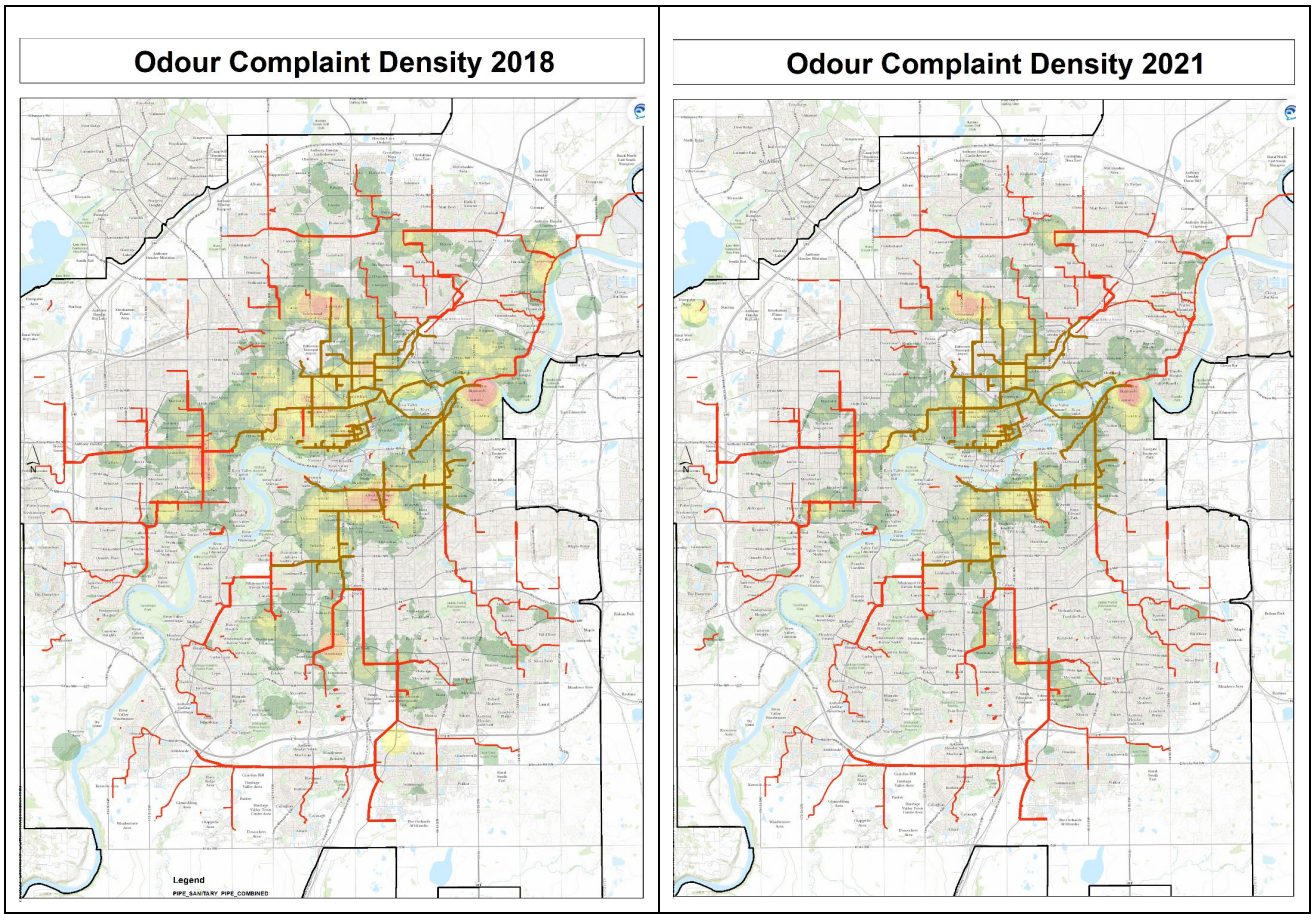
SIRP Theme Description	A 2021 Accomplishments
	response protocols and to allow for identification of opportunities to align the SIRP-SLOW and SIRP SECURE initiatives not only for property protection but to also identify opportunities to incorporate these initiatives into the curriculum at each school.

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. o 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. o 151 South Large Trunk Rehabilitation The trunk inspection was completed in 2021 to determine rehabilitation scope requirements. Concept design began in 2022. o 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 o 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. o 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.