

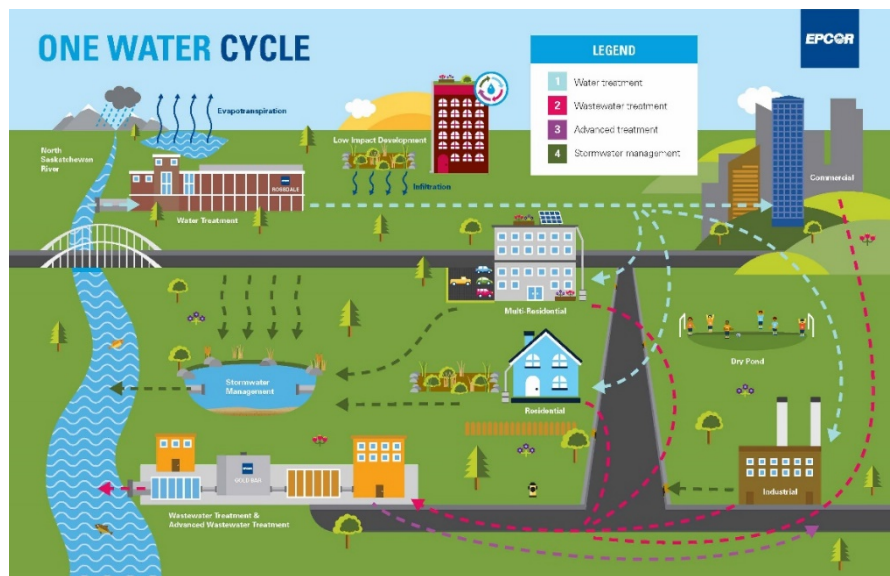
Edmonton's Changing Water Use

Report Purpose – For Information

This report is provided for Information at Utility Committee and provides an update on how EPCOR is modernizing our design standards to reflect our customers' declining water consumption and sanitary generation patterns. Conservation, efficiency and changing technology for toilets and washing machines has fundamentally changed how our customers interact with the municipal water and sanitary sewer systems. As such, it is beneficial for all planning partners to be aware of the changing water consumption trends and to align with, and apply, modern assumptions moving forward to ensure prudent capital investment for water and sanitary infrastructure, prevent system overdesign, and minimize operational issues. The Water Use Discussion Paper (Appendix 1) has been prepared to summarize the changing water use and sanitary generation patterns of EPCOR's residential, multi-residential, commercial and regional customers.

Background

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.



With the integration of Drainage Services, EPCOR has taken the opportunity to leverage One Water techniques to enhance the integrated resource plans that are in place in the different business units within EWSI. In addition, the recent approval of the City of Edmonton City Plan, the Edmonton Regional Municipal Board long range development plans, and the active Climate

Change Adaptation initiatives, also support the movement towards a holistic integration of these strategies.

The following areas have been a focus from a One Water Planning perspective for the last few years:

- i) **Consumption Patterns** – modernizing the design standards for water and sanitary to reflect changing water consumption patterns in Edmonton. This report provides the results of this review and how the information will be applied to support development within the Edmonton region
- ii) **Situational Awareness** – Implementation of technology to improve real time knowledge of system conditions and improving responses to emerging events. This work continues in 2022 and most recently new dashboard tools were implemented for both the water and drainage utility
- iii) **SanIRP / SSSF / Future Wastewater Plants Expansions** – Implementation of the Sanitary Integrated Resource Plan (SanIRP) to bring all parts of the water cycle into an IRP planning approach. IRPs currently exist for the water system, the Gold Bar wastewater treatment plant, and the stormwater systems. The Sanitary IRP is a primary focus for 2022.
- iv) **Growth Strategies for City and Region** – EPCOR is currently working closely with the City of Edmonton growth management teams assessing the infrastructure needs to support the nodes and corridors and land zoning updates as part of City Plan.

2021 Water Use Analysis

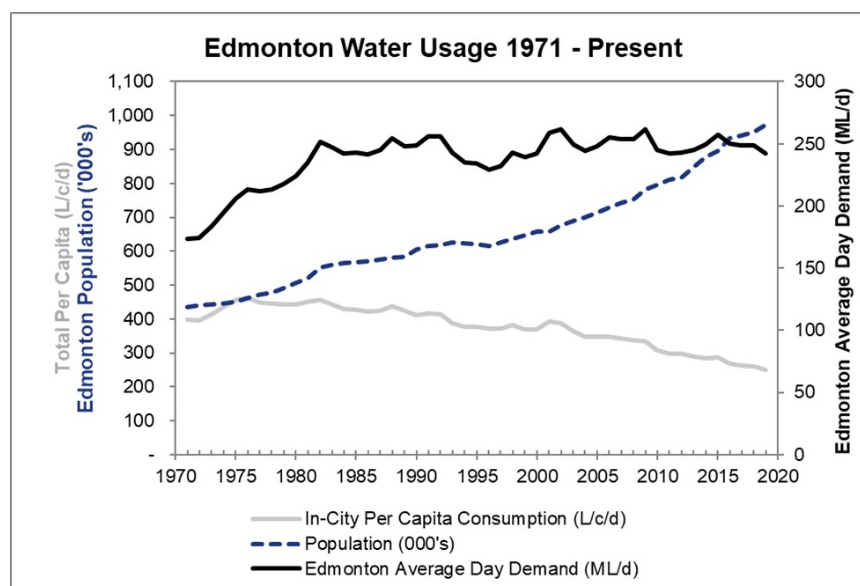
In 2021, EPCOR One Water Planning undertook a detailed review of urban water consumption to understand the changing water use patterns of Edmonton's customers and project future changes. The full report is included as Appendix 1 of this document.

Since completion of the analysis in mid-2021, EPCOR has hosted a number of engagement sessions with various City of Edmonton departments including Planning and Development Services and external stakeholders such as the Urban Development Institute (UDI), the development community, SSSF Committees and Regional Water Customer Group (RWCG). These sessions have been used to share the findings of the analysis and obtain direction on how to apply this information to modernize the design standards. Modernization of the design standards will support both greenfield and infill development within the City of Edmonton and support the communities in the EMRB region with their long range planning.

Water usage trends across Canada and North America have dramatically changed over the last 20 years. EPCOR, as one of the early adopters of an Integrated Resource Planning approach for planning its water system, has included water conservation and improved water efficiency as a focus for long-range utility planning since 1997. Decreased water use is advantageous for

many reasons including the sustainability of water supply and delay or deferral of major water and wastewater utility infrastructure expansions. For example, the \$140 million E.L. Smith Water Treatment Plant expansion was delayed from 1992 to 2006 due to a meaningful focus on conservation and efficiency in the early 1990's. More efficient water use can also delay expansions to major water transmission and sewer trunk lines. Declining flows can also mean that existing infrastructure, in many cases, can accommodate future population growth in Edmonton. This is especially important as the city continues to grow inward and upward, with a focus on densification.

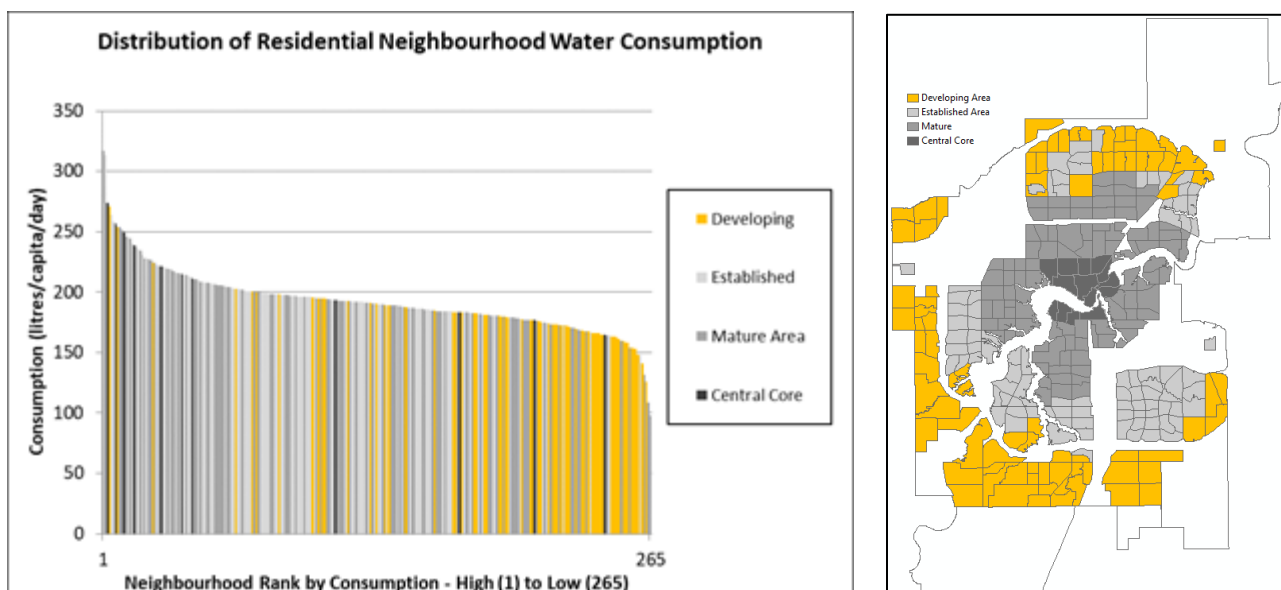
Year-over-year, EPCOR has experienced a declining trend of water consumption per customer in Edmonton. Over the last twenty years, average overall residential consumption per account has fallen 36% from 21.4 m³/account/month (in 2002) to 13.8 m³/account/month (in 2019, the last full year pre COVID-19). Similarly, average overall commercial consumption per account has fallen 46% from 180 m³/account/month (in 2002) to just below 100 m³/account/month (in 2019).



Efficient fixtures and appliances have contributed to significant water reductions in indoor residential water usage. Historically, prior to the implementation of the IRP and EPCOR's focus on water conservation and efficiency, total water use in Edmonton grew proportionately with population and economic growth. This trend has been broken over the last 20 years, as Edmonton residents have been using less water on a per capita (per person) basis. In-city total annual water consumption is roughly equivalent to what it was in the late 1970s, even as the city has added four hundred thousand new people.

Citywide averages can hide changes that are occurring within individual commercial business categories and different residential housing vintages in the Edmonton region. The detailed analysis completed by EPCOR gives a better understanding of changing water use trends from multiple angles. The modernized approach for the design standards proposed through this analysis will allow for a more accurate representation of existing system capacity and capital needs for the future to support the City Plan objectives.

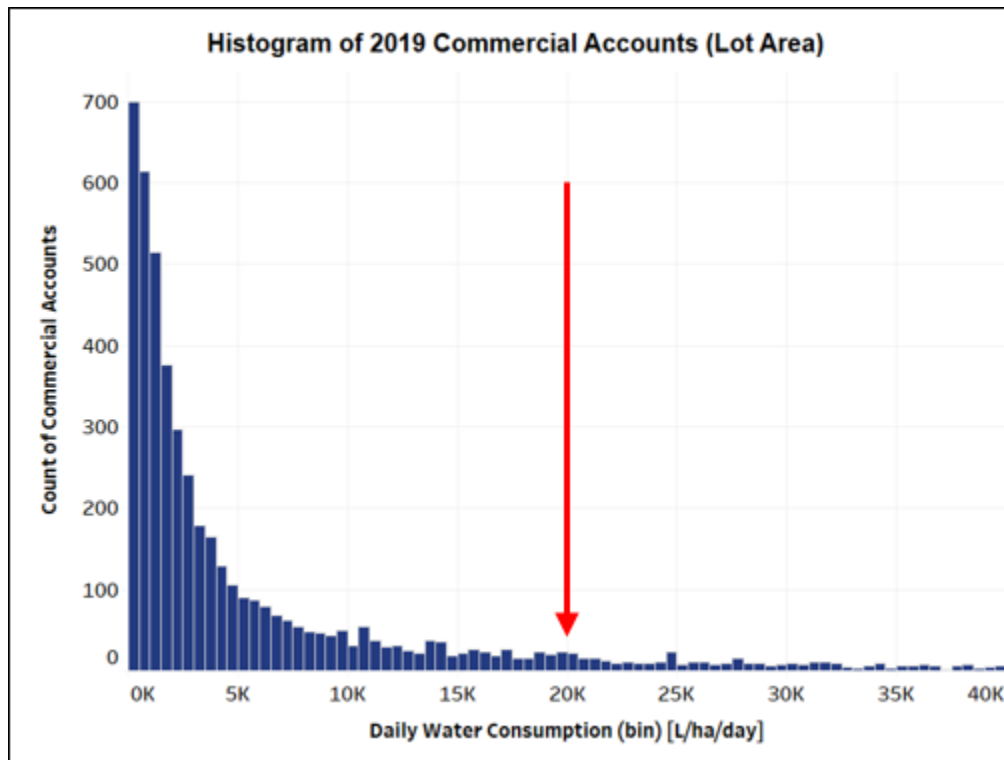
Residential average per capita water use in Edmonton in 2019 was 176 Litres/capita/day. Per capita water use in some of the newest developing neighbourhoods is below 150 Litres/capita/day, reflecting more modern, water-efficient fixtures and smaller lot sizes. The impact of renovations in older houses and introduction of more efficient infill housing is also resulting in reductions in overall neighbourhood water use across the City. Water consumption reductions are occurring across all neighbourhood vintages of central, mature, established and developing. The current design standard for residential areas is 220 Litres/capita/day. The figure below shows that most neighbourhoods in Edmonton already use less water than this standard value, especially in developing areas.



Using information from the City of Edmonton for the number of dwelling units per multi-residential customer, EPCOR was able to confirm that multi-residential consumption per dwelling unit is also decreasing across the city. The water consumption per multi-residential dwelling unit ($10 \text{ m}^3/\text{dwelling unit}/\text{month}$) is lower than a typical single-family residential customer ($13.8 \text{ m}^3/\text{account}/\text{month}$). This is due to a combination of less lawn watering, fewer people per unit, and smaller size of dwelling spaces. For multi-residential dwellings, the recommended design metric is 160 Litres/capita/day (for area-level planning), which reflects the low consumption expected in multi-residential buildings. Alternatively, the developer can choose to use $10 \text{ m}^3/\text{dwelling unit}/\text{month}$ if the number of dwelling units in the building is known.

When planning water consumption for a future commercial development, a one-size-fits-all design value is used for high-level commercial water consumption estimates. The current design standard applied to planned commercial areas is 20,000 Litres/hectare/day. The figure below shows how few commercial customers within Edmonton use this much water per hectare

based on actual customer data. A reduced design metric of 15,000 Litres/hectare/day is being recommended for greenfield commercial areas.



*Excludes lot consumption over 40,000 L/ha/day for clarity.

EPCOR also expanded its analysis of industrial and commercial customers to include the specific business type and zoning type of each customer. This allowed for a detailed analysis of various industry types and their water consumption trends. This also gives EPCOR the ability to provide the development community with more specific water use metrics for specific business types. This data will be kept current to the City of Edmonton Zoning Bylaw and will be updated as new zoning classifications are applied to existing lots. EPCOR will continue to provide the necessary technical support to developers to select the most suitable design metrics for their specific building and its water use needs.

Design Standard Updates

EPCOR's customer analysis has led to updates to the City of Edmonton Design and Construction Standards for both drainage and water (Volumes 3 and 4, respectively). Updates were published in February 2022.



Previous residential design standards were 250 Litres/capita/day (water consumption) and 300 Litres/capita/day (sewage generation). Both values have been decreased to 220 Litres/capita/day in the current design standards.

The water use discussion paper (Appendix 1) recommends utilizing a further reduced per capita guideline of 160 litres/capita/day for large area/neighbourhood-level planning estimates of water consumption and sewage generation. The water use discussion paper also provides data to allow consultants flexibility when designing water and sanitary infrastructure for commercial and industrial development. The recommendations found in the water use discussion paper have not yet been implemented in the design and construction standards, but developers are being encouraged by EPCOR to use these recommended metrics where applicable.

Additional work is also continuing with the City of Edmonton and the development community to align the required fire flow standards with the latest approaches for fire suppression, fire fighting, and the new zoning bylaw. This work will be reviewed with the development community and updates will be provided to City Council as the work progresses with City administration.

EPCOR is also assessing the design standards for inflow and infiltration (I&I). I&I is excess water that flows into sewer pipes from groundwater and stormwater. I&I impacts the sizing of sanitary sewer infrastructure. EPCOR's ongoing I&I analysis requires collection and monitoring of I&I data to verify assumptions on seasonal variation and storm events. The analysis is expected to result in design recommendations similar to the water use discussion paper. It is expected that I&I will vary based on geographic area and age of neighbourhood. This information will be combined with a better understanding of how the groundwater table impacts with foundation drains. This work is funded as part of the SIRP-SECURE strategy and will be aligned in the upcoming Sanitary IRP.

EMRB Coordination

EPCOR has also shared this information with members of the EMRB communities that are also in the process of modernizing their design standards. In particular, we have been supporting the County of Strathcona in the water servicing options for the Bremner growth node to identify options to supplement the current single wholesale supply location to this community.

Next Steps

EWSI will continue to monitor consumption trends and make future changes to design standards and guidelines. Following the Zoning Bylaw review, EWSI will complete additional analysis on commercial water demands, and will recommend design standard updates. The changes in how Edmontonians utilize water will also inform future updates on the Integrated

Resource Plans for the Water, Sanitary and Gold Bar infrastructure required in the coming years.

Discussion

Is there any additional information or analysis that Utility Committee would like to see regarding changing water and sewer consumption patterns in Edmonton?

Any other suggestions for outreach to the development community and or the EMRB region?

Appendix 1 – Edmonton’s Changing Water Use – Discussion Paper