

Using Data to Inform Decision Making

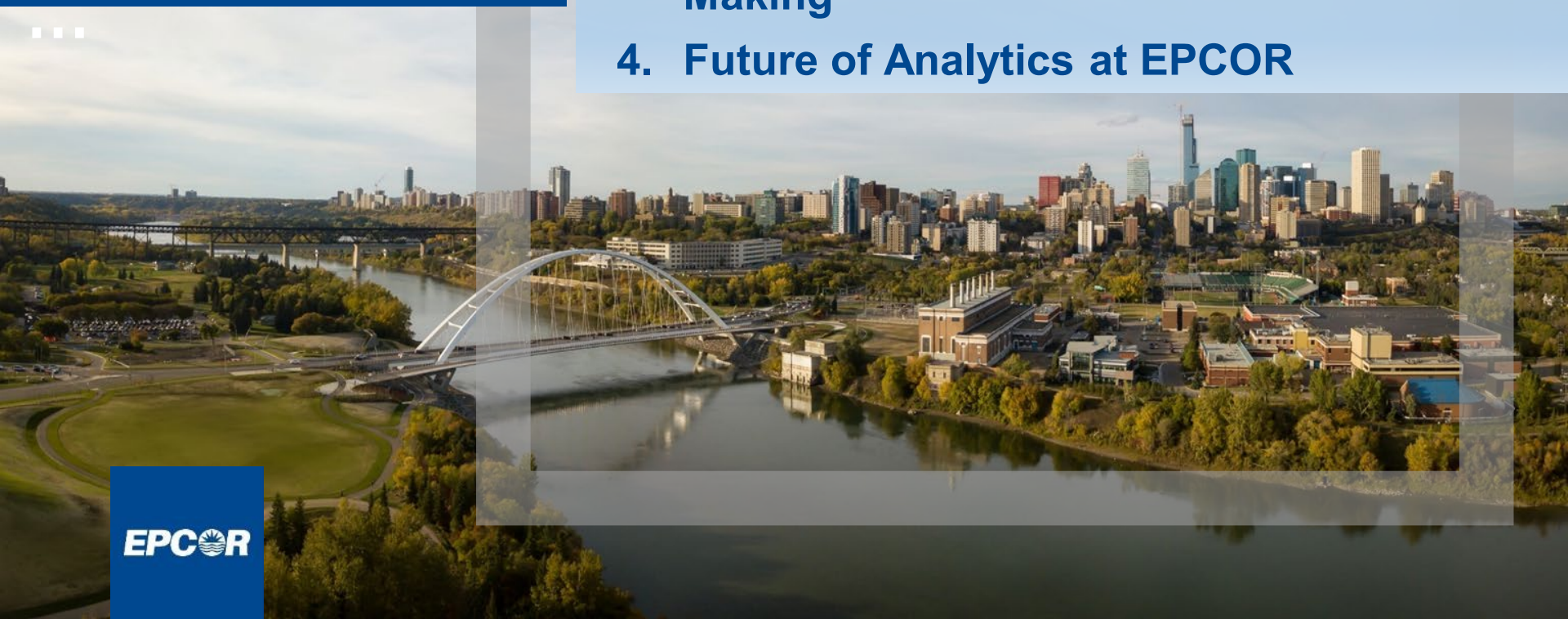
Edmonton's Changing Water Use

CWWA National Conference
November 7, 2022
Heather Zarski, P. Eng.



WHAT I WILL COVER

1. Edmonton Municipal Water System
2. Water Consumption Analytics Journey
3. Case Studies – Data to Inform Decision Making
4. Future of Analytics at EPCOR



EPCOR Overview



City of Edmonton - Wholly owned subsidiaries, build own and operate water and wastewater facilities and infrastructure, electrical transmission and distribution networks and gas distribution infrastructure.

**\$ 1,988
MILLION**
Gross revenue
2020


Gross assets:
\$12.2 BILLION


3,500+
employees


**A-
CREDIT
RATING**
EUI is rated by DBRS:
(A low) stable
and Standard
and Poor's



Over 130
communities and
industrial sites
served

CORPORATE VALUES

We put safety first in everything we do
We act with integrity
We work as a team
We are trusted by our customers
We create shareholder value
We are environmental leaders

Over
130 YEARS
of experience


Largest water
distribution network
4,229 KM
of pipe in Edmonton


6,300 KM
of electrical
distribution lines

Gross assets:
**\$12.2
BILLION**



Among the largest private utilities
in the U.S. Southwest


263 KM
of
transmission lines

Edmonton One Water System

- North Saskatchewan River Source
- Integrated water, wastewater & drainage system
- Fully metered since the early 1900s
- Water treatment demand = 375 ML/d
- Residential per capita consumption = 177 lpcd
- Population served
 - Edmonton: > 1 M
 - Greater Edmonton Region: > 1.3 M



Municipal Utility Data Collection

Insight: Utilities collect and manage high quantities of data from various utility systems and customers. **Next step: get better at using and sharing the data.**

- Environmental and hydrology
- Water quality and regulatory
- Operational (SCADA, Pi)
- Asset/GIS
- Operations and maintenance records
- **Customer: billing, consumption, wastewater surcharge**
- Financial



Water Consumption Analytics Journey at EPCOR

Insight: Move from top-down Business Intelligence approach (where we wait in the IT queue), to a modern self-service BI approach where multiple users can make customized dashboards and create reports.

1990s

- Manual data extract from billing system
- Computer simulation of water system

2012

- Oracle BI tool
- Limited update ability

Future

- Big Data/ Data Science
- AMI data

Early 2000s

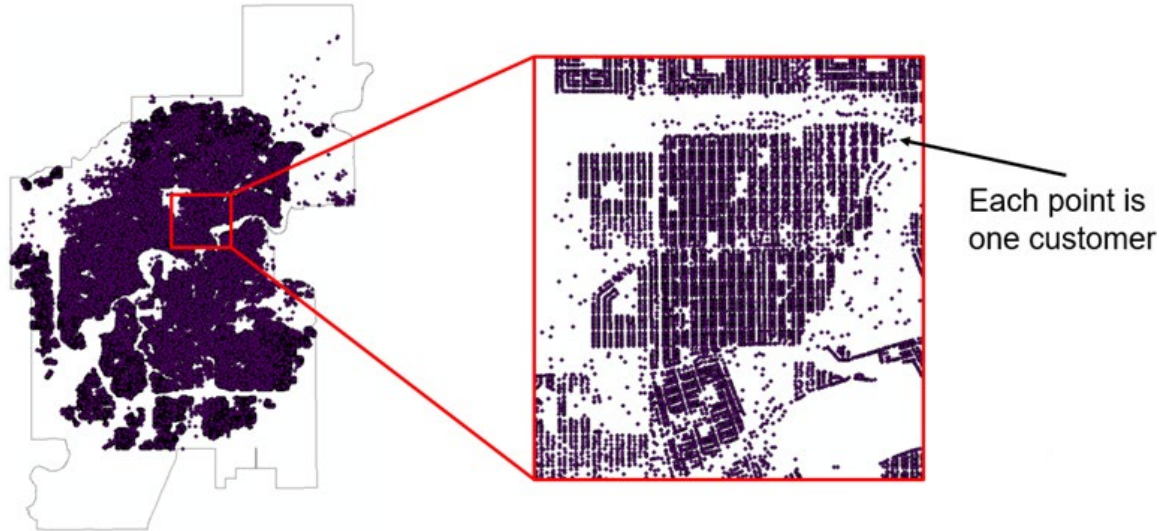
- GIS integration:
 - Maps, spatial analysis

2021

- Power BI selected as enterprise analytics tool
- Cloud based storage
- Customer Dashboard created

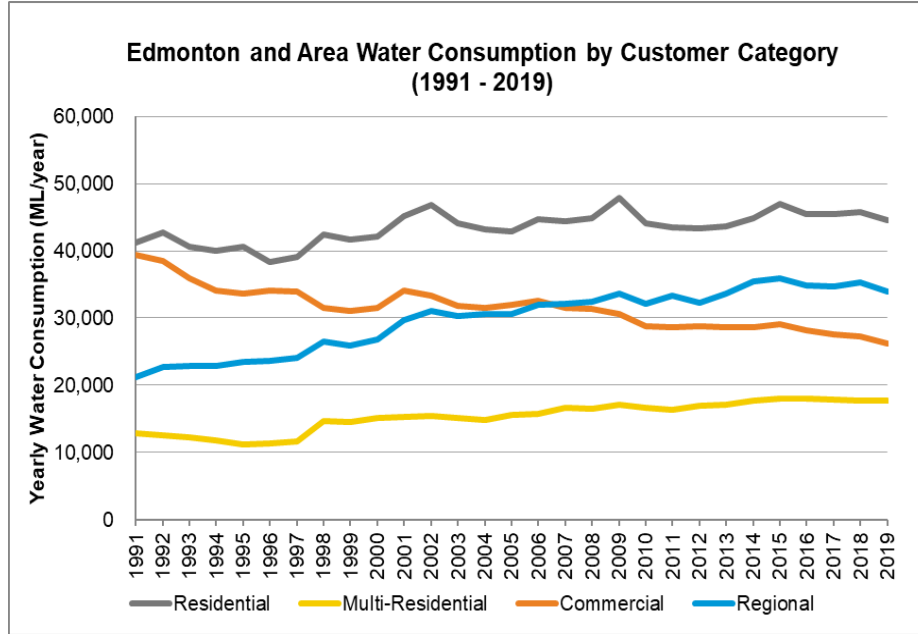
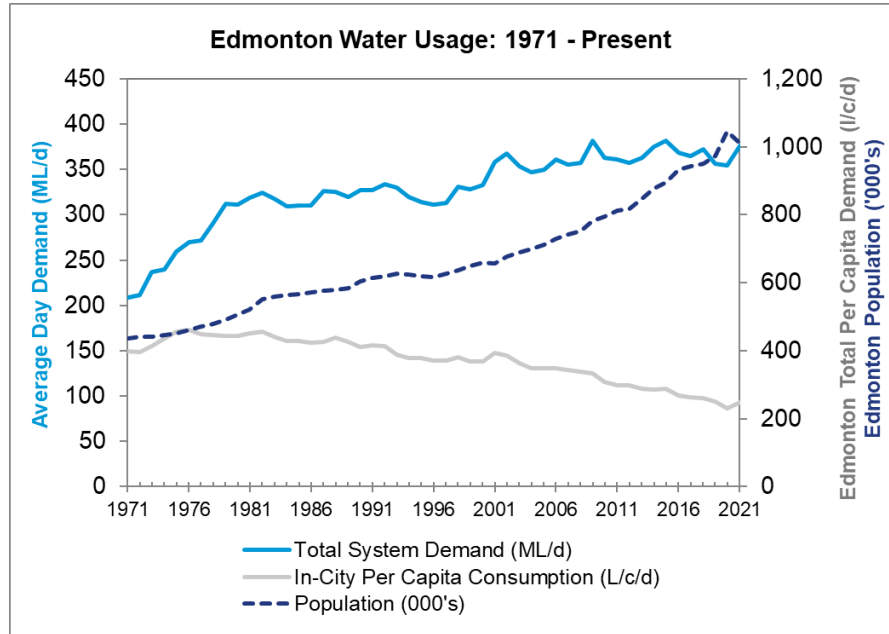
Using Data to Inform Decision Making

Insight: EPCOR has used demand and consumption analysis to modernize design and construction standards, inform conservation and efficiency program design, financial / operational forecasting, rate design, and short / long term infrastructure design.



Edmonton Total Water Use: In-City and Region

Edmonton is a leader in water efficiency in Canada

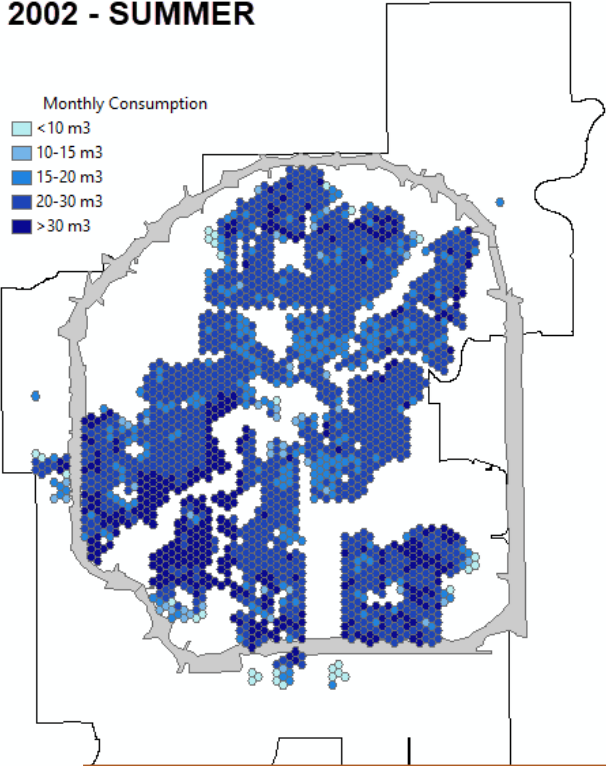


Geographic Trends in Domestic Water Use

2002 - SUMMER

Monthly Consumption

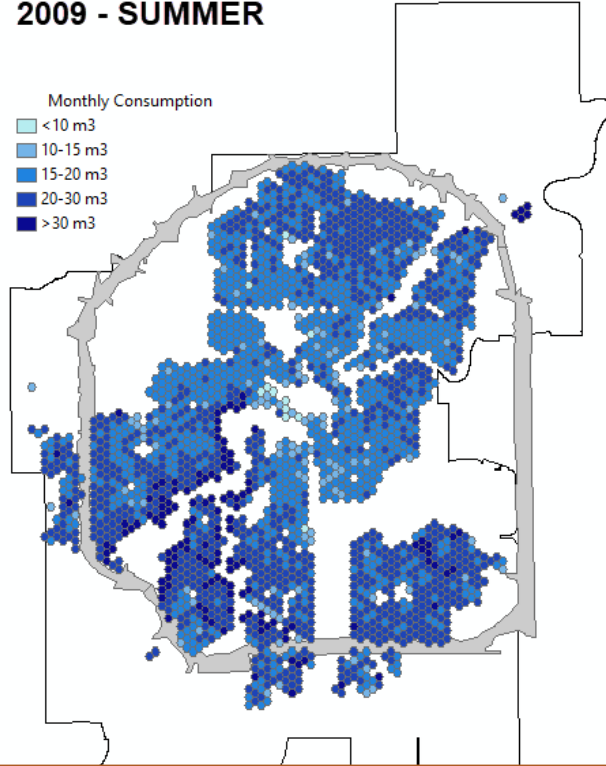
- <10 m³
- 10-15 m³
- 15-20 m³
- 20-30 m³
- >30 m³



2009 - SUMMER

Monthly Consumption

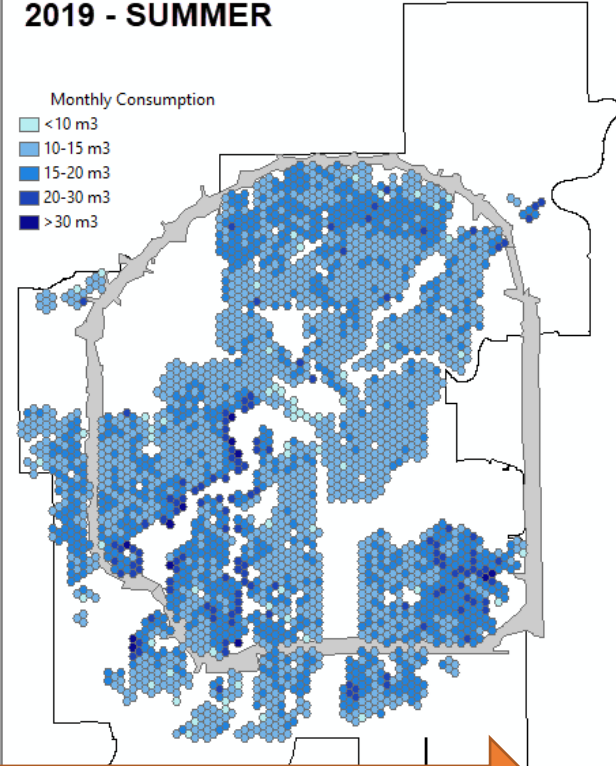
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2019 - SUMMER

Monthly Consumption

- <10 m³
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Increasing Efficiency

Design Standards Modernization

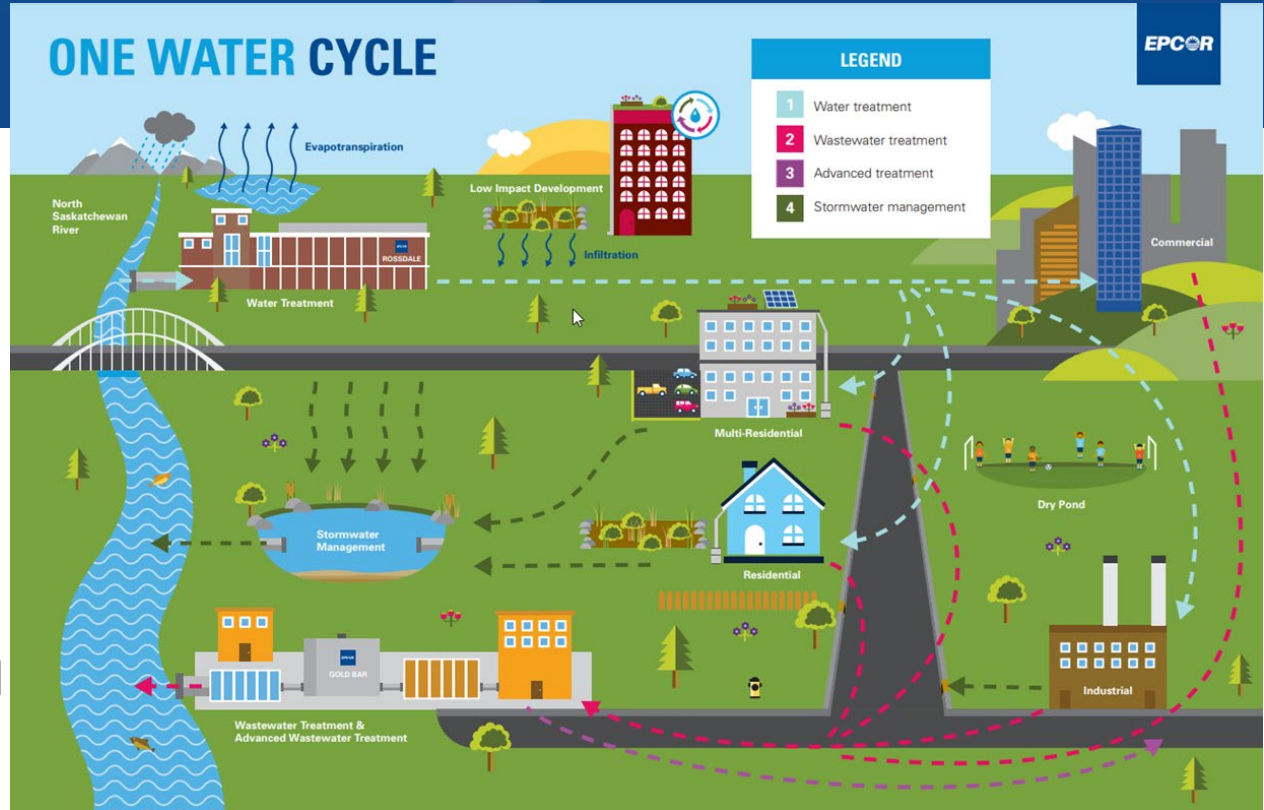
Declining Demand Effects on the One Water System

Benefits

- Defer expansion
- Extend water supplies
- Reduce environmental impacts

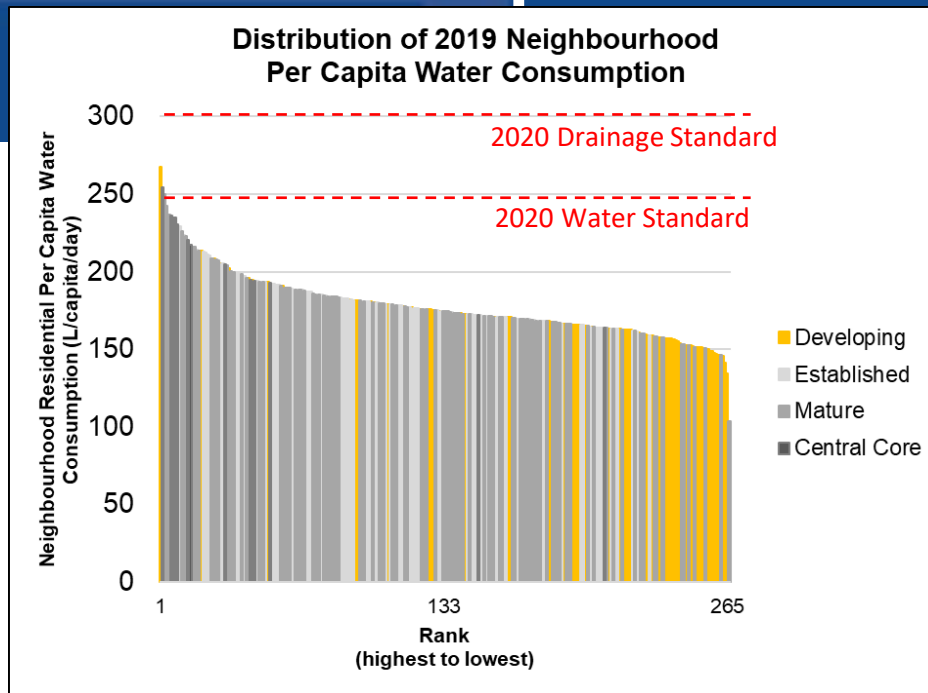
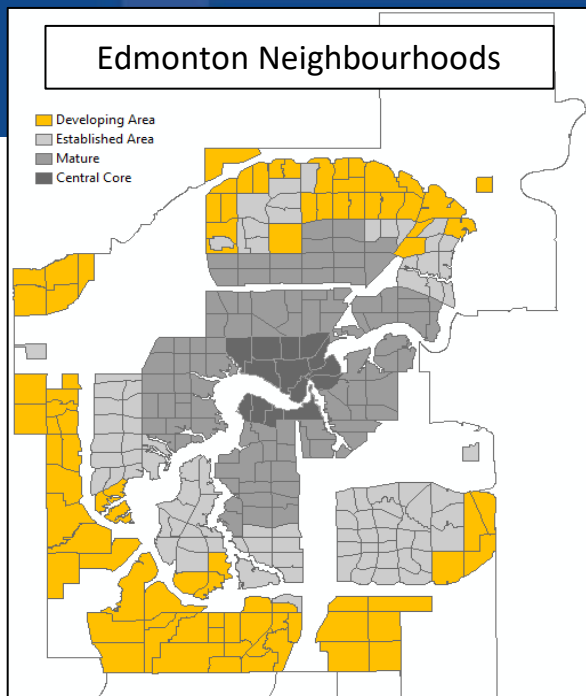
Risks

- Water: Quality/age
- Wastewater: Increased odour, corrosion, settling/blockages



Action: Modernize our water & sanitary design standards to mitigate impacts!

Residential Water Consumption Standards



Historic

- Water = 300 l/c/d
- Sanitary = 350 l/c/d

2013

- Water = 250 l/c/d
- Sanitary = 300 l/c/d

2021

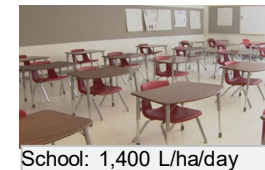
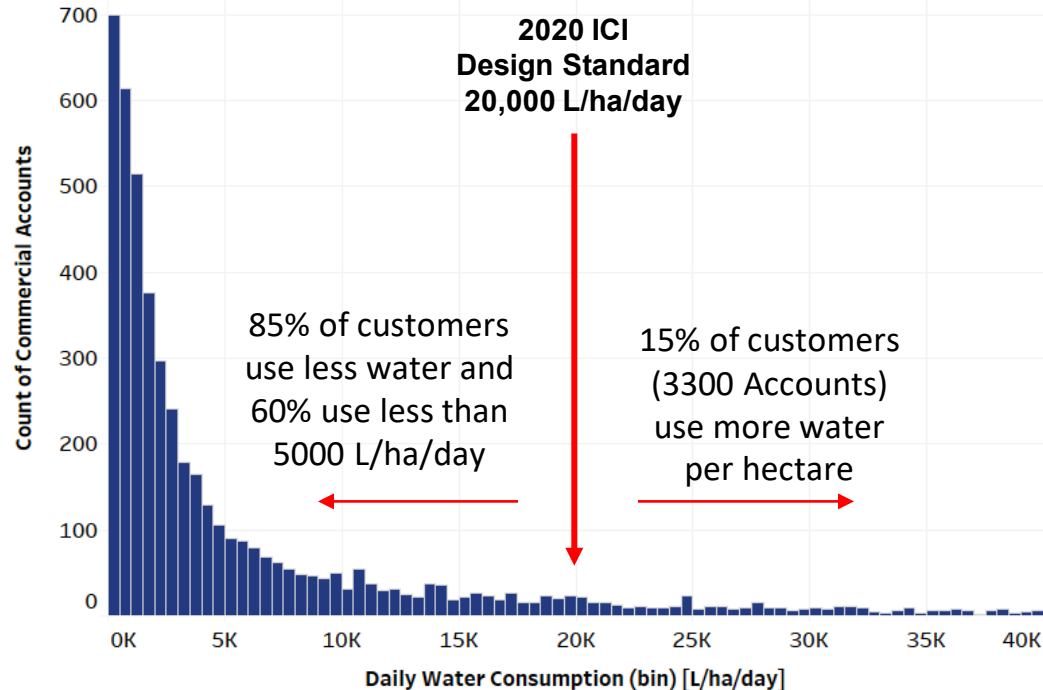
- Water = 220 l/c/d
- Sanitary = 220 l/c/d

Future

- Water = \leq **160** l/c/d
- Sanitary = \leq **160** l/c/d

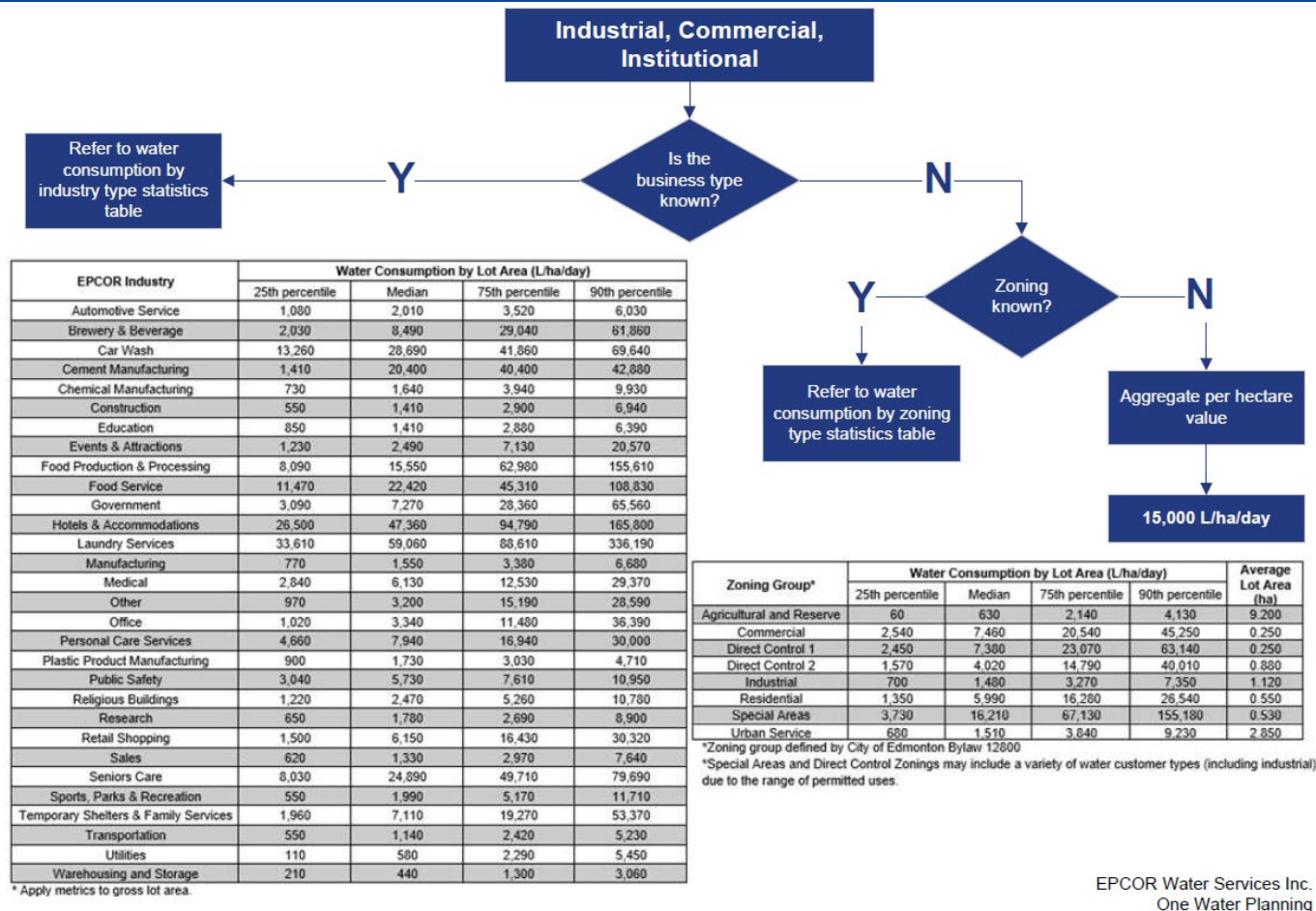
Industrial, Commercial, Institutional

Histogram of 2019 Commercial Accounts (Lot Area)



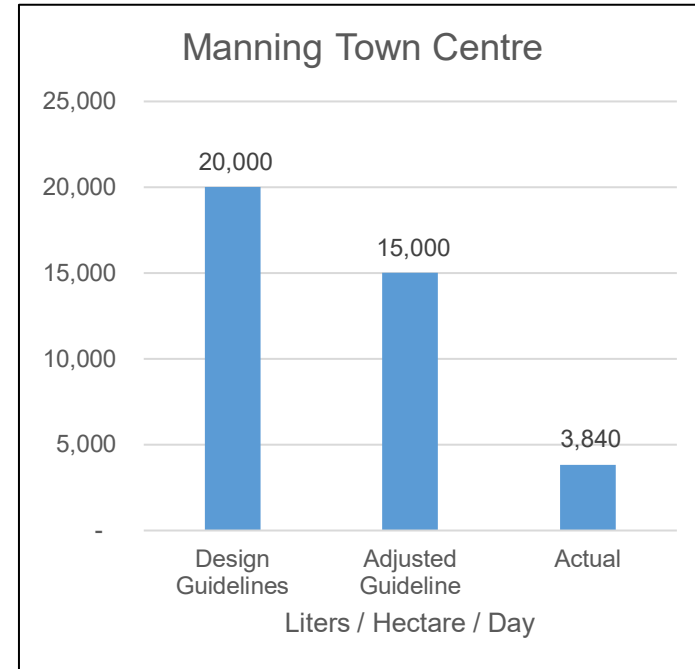
Alternative Design Guideline if Zoning or Building Use is Known

EPCOR has robust data by industry and development characteristics and can provide customized generation metrics.



EPCOR Water Services Inc.
One Water Planning

Example 1: Manning Town Centre Analysis



Forecasting & COVID Analysis

Residential Forecast



Core

Oldest neighbourhoods



Mature

Prior to 1970



Established

1970-1990



Developing

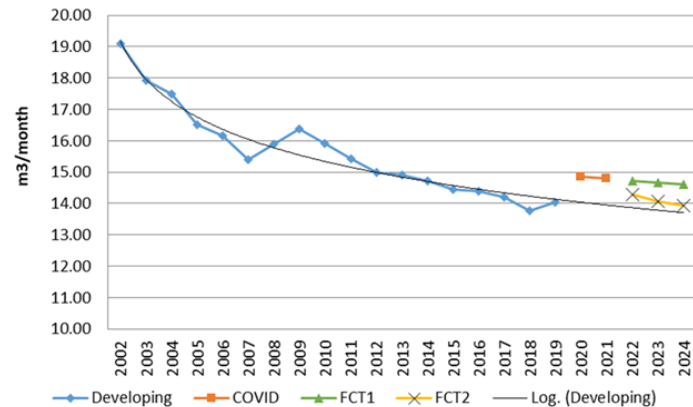
1990+



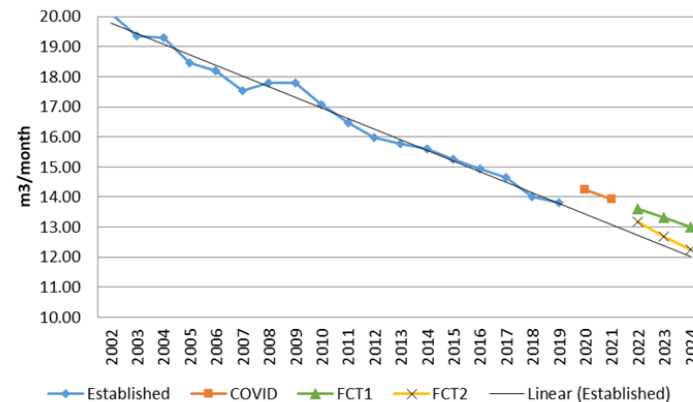
Planned

2020+

Base - Developing

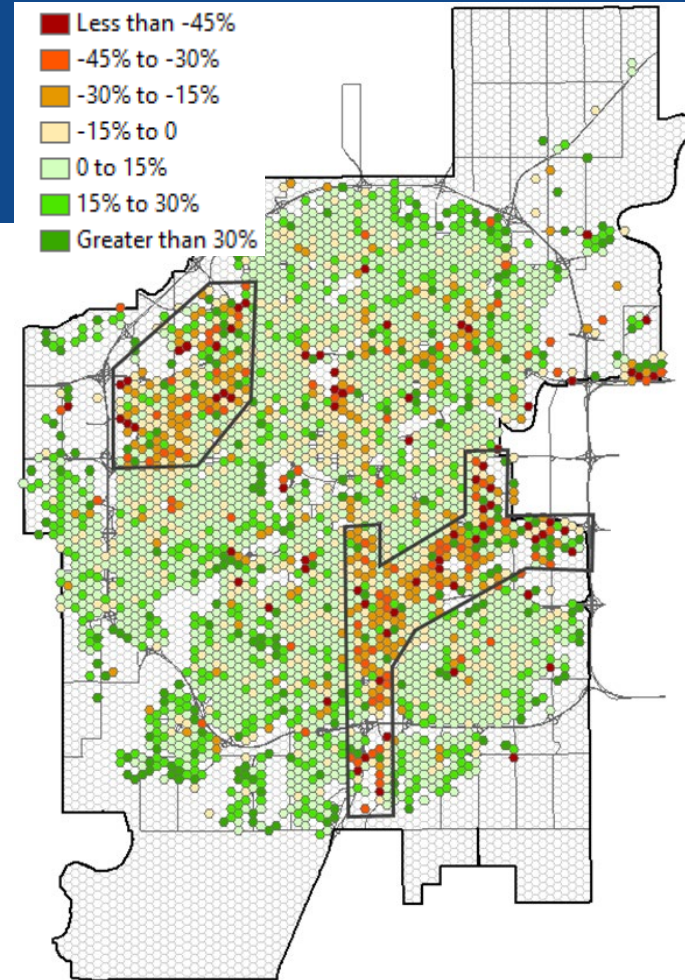
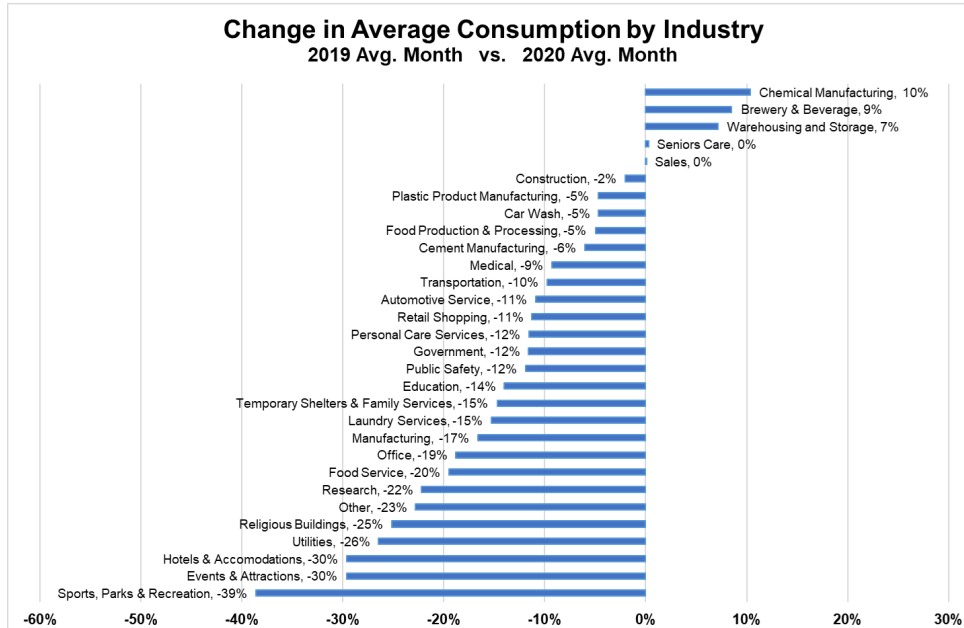


Base - Established



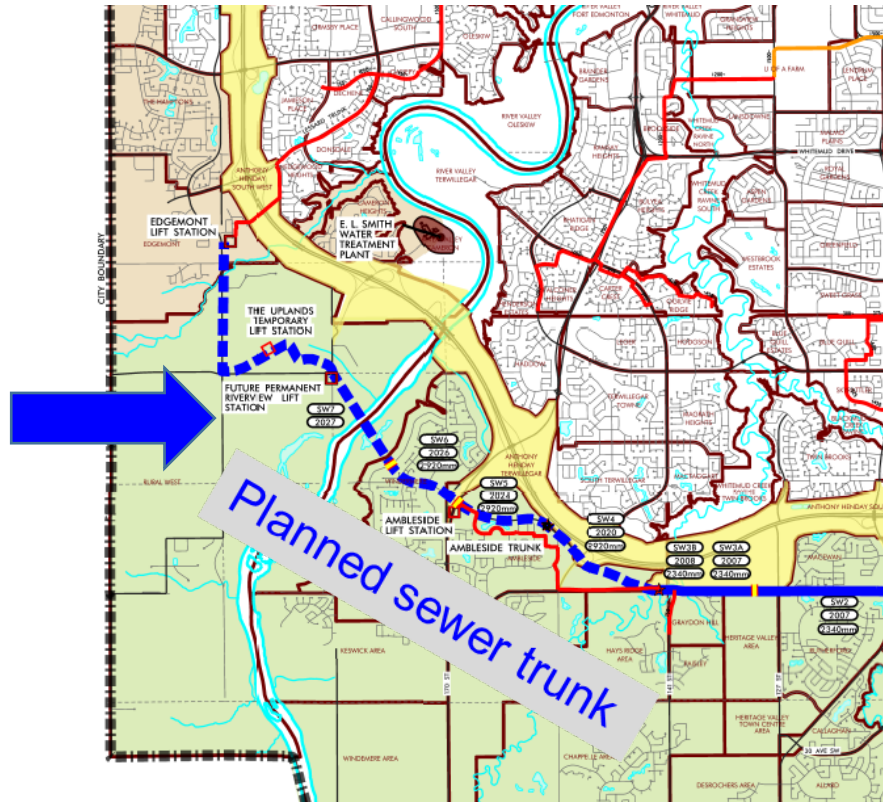
Adjusting to COVID Using Data

- Residential: **increase** in water consumption
- Commercial: **decrease** in water consumption



Sanitary Master Planning Updates

Impact of Reduced Generation in Sanitary Master Planning



Edmonton has a network of large and deep sanitary trunk sewer lines to serve growth.

Deep trunks are costly to construct, inspect, clean and repair.

To service a new growth node, a new river crossing was originally proposed.

Adjusted design standards (generation, I/I) reduced infrastructure requirements (\$50 M in cost savings).

Sanitary Bypass Planning

Consumption Data to Inform Sanitary Bypass Planning

- EPCOR has a number of deep and high flow trunks in the system
- Bypass planning (emergent and planned) typically has been reliant on modeled flows - can lead to oversized bypass systems
- With access to consumption data, dry weather flows are validated where monitoring data isn't available
- Leads to prudently designed bypass systems



Future of Analytics at EPCOR

	B	C	D	E	F	
1	Sum of De Sum of De Sum of De 2017 - 201					2020
2	2358.4	2407.3	2361.3	2375.667	2361.4	
3	2382.3	2421.4	2368.2	2390.633	2368.9	
4	2409.1	2421.2	2361.8	2397.367	2413.8	
5	2380.8	2377.3	2370.2	2376.1	2437.6	
6	2380.1	2398.5	2347.8	2375.467	2425	
7	2372.3	2442.2	2371.2	2395.233	2417.5	
8	2381.6	2442.3	2402.8	2408.9	2384.5	
9	2401.6	2491.3	2396	2429.633	2395.6	
10	2387	2456.4	2435.8	2426.4	2415.4	
11	2376.6	2499.4	2463.3	2446.433	2426.9	
12	2379.1	2502.8	2552.7	2478.2	2436.4	
13	2378.1	2441.6	2439.6	2419.767	2400	



BI Tools

- Continue to advance consumption analytics
 - Improved dashboarding and data exploration with Business Intelligence tools
 - 2026: AMI smart meters
- Investigations for:
 - inflow/infiltration (I/I) data
 - stormwater billing data and
 - overstrength sewer surcharge (OSS) data
- Machine Learning (ML) applications



“... stories are just data with a soul.”

-Brené Brown