Ottawa

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Drinking Water
Asset Management Plan

March 2022

Version 1.1

TABLE OF CONTENTS






Introduction

Background

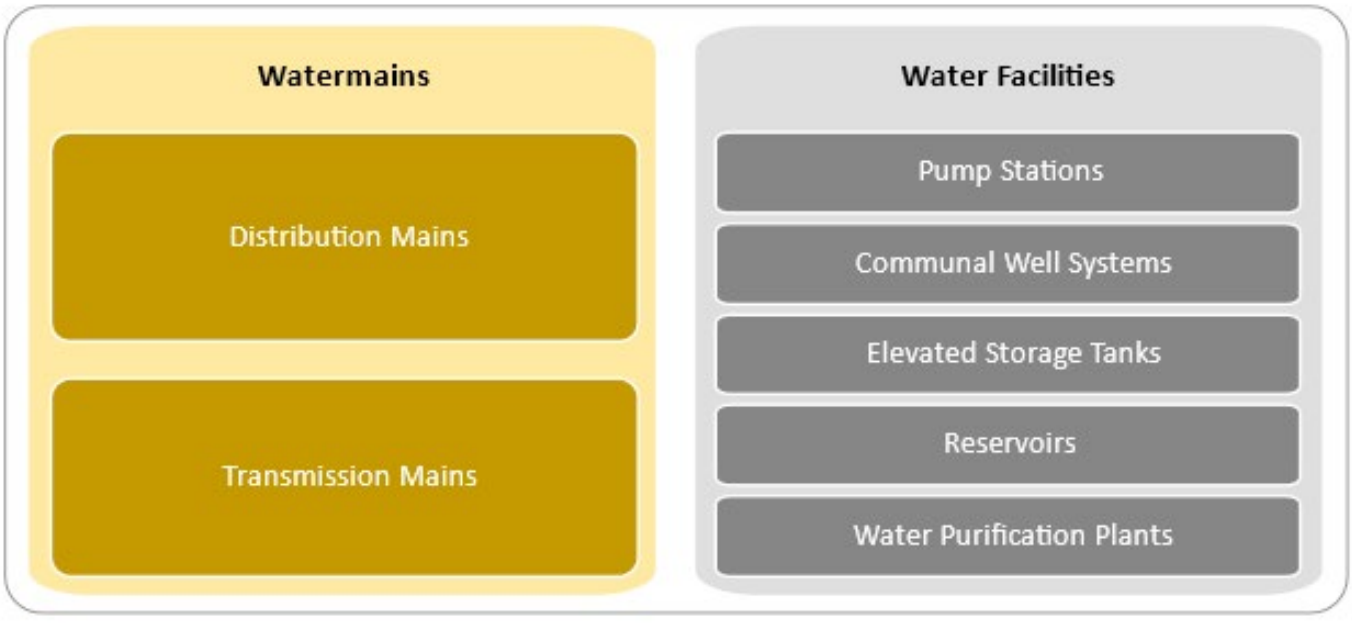
Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure requires all municipalities to prepare baseline asset management plans for their core municipal infrastructure assets supporting the delivery of drinking water, wastewater, stormwater and transportation. The City of Ottawa has a well-developed Comprehensive Asset Management program that is well beyond the baseline and over the past 20 years has established a clear picture of its infrastructure assets and maintained them responsibly, balancing affordability, risk and service levels. The Provincial regulation requires the City shift its reporting slightly to present the cost of maintaining all core assets in their present state, with no changes to the service level, for the next 10 years.

To meet the Provincial requirements, the City of Ottawa has created this first version of its **Drinking Water Asset Management Plan (Drinking Water AMP)**. It reports the current state of the assets, levels of service provided, strategies and activities applied by the City, historical and forecasted financial details, and potential improvement actions. It is a strategic document that provides a snapshot of current conditions and establishes a basis for future asset management planning and decision making.

Asset Categories and Types

The Drinking Water AMP satisfies the Provincial requirements for water assets that relate to the collection, production, treatment, storage, supply or distribution of water. This includes water purification plants, watermains, pump stations, communal well systems and storage structures. These assets support the treatment and provision of safe drinking water to residents, businesses and visitors within the City.

Drinking Water Asset Categories and Types



State of Local Infrastructure

Inventory and Valuation

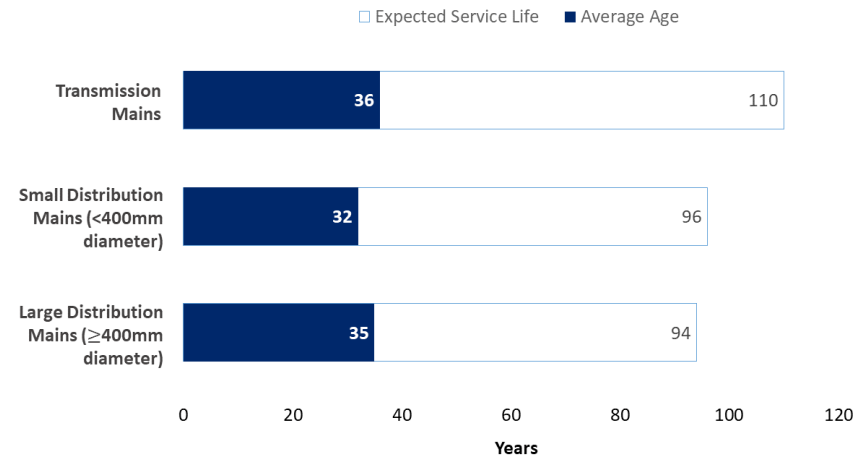
The assets covered in the Drinking Water AMP have a replacement value of approximately $15.7 billion. This includes an inventory of over 3,200 kilometres of watermains, 16 pump stations, 6 communal well systems, 2 water purification plants, 4 elevated storage tanks, and 5 reservoirs.

	Watermains	Water Facilities
Inventory	• 2,966 kilometres of distribution mains • 259 kilometres of transmission mains	• 16 pump stations • 6 communal well systems • 2 water purification plants • 4 elevated storage tanks • 5 reservoirs
Replacement Costs	$14.8 Billion	$918 Million

Age and Condition

The age of an asset gives a sense of how close it is to the end of its service life and what renewal interventions may be appropriate. The average age of the City's watermains is shown in the figure below. The majority of the City's water facilities construction dates range from the 1950's to the late 2000's; the Lemieux and Britannia Water Purification Plants were constructed in 1931 and 1961 respectively. Since construction, various assets within the facilities have been renewed, replaced or otherwise maintained to ensure reliable operation, so the average age of facilities cannot be calculated on a per-asset basis.

Average Age – Watermains



State of Local Infrastructure

The City assesses the condition of its drinking water assets on a regular basis using a variety of techniques, as summarized in the table below.

Asset Category	Condition data collection techniques	Frequency
Watermains	Leak detections; electromagnetic inspections on prestressed concrete pipe for wire breaks; forensic analysis (including measurements and material testing) on pipes removed through construction; break data	20 to 40 year cycles for large diameter pipes
Water facilities	Various condition assessment programs: • Vibrations Program • Lubrication Program • Piping Inspection Program • Electrical Low Voltage Condition • Electrical Transformer Oil Condition • Electrical Infrared Thermography Program • Annual TSSA Fuel System Inspections • Annual TSSA Quality Program • Structural Inspection Program	Varies depending on the condition assessment program type

State of Local Infrastructure

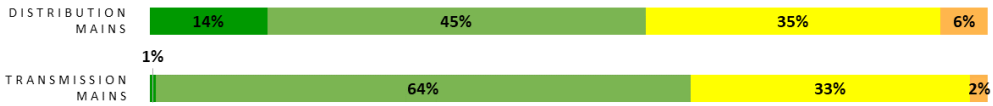
Based on condition data, supplemented by subject matter expert knowledge and professional judgment, the condition of assets is rated on a scale from "Very Good" to "Very Poor" as shown in the table below.

Category	Rating Description	Life Consumed	Asset Class / Type Metric (Condition Indices)	
			Watermains (Probability of Failure Score)	Water Facilities
Very Good	**Very Good – Fit for Future** Well maintained, good condition, new or recently rehabilitated	0 to 19%	1	Subject matter expert knowledge and professional judgment
Good	**Good – Adequate for Now** Acceptable, generally in mid stage of expected service life	20% to 39%	> 1 to ≤ 2	
Fair	**Fair – Requires Attention** Signs of deterioration, requires attention, some elements exhibit deficiencies	40% to 59%	> 2 to ≤ 3	
Poor	**Poor – Increasing potential of affecting service** Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	60% to 79%	> 3 to ≤ 4	
Very Poor	**Very Poor – Unfit for Sustained Service** Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable.	80% or more	> 4 to ≤ 5	

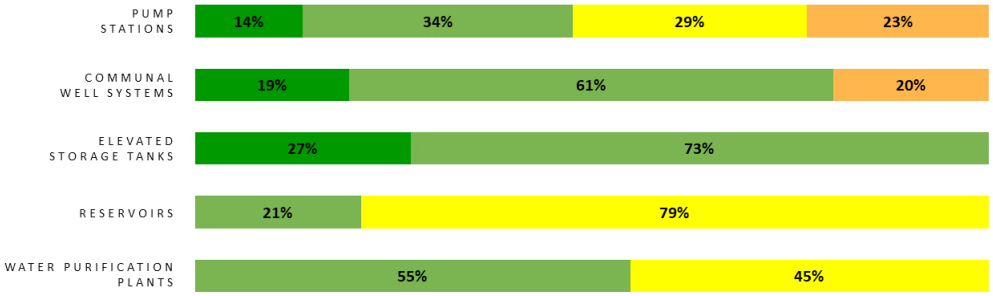
State of Local Infrastructure

The overall condition of drinking water assets is Good and a breakdown for the various asset types is shown in the figures below.

Watermains



Water Facilities



Legend:

- Very Good
- Good
- Fair
- Poor
- Very Poor
- Condition Data not Available

Levels of Service

The City's assets exist to deliver service to customers. Levels of service measure the actual service delivered so that decisions can be made about the assets based on the service that they provide rather than simply on their condition.

The Drinking Water AMP establishes preliminary level of service measures and the current level of service being provided. The measures align with both City goals and Provincial requirements and recognize that drinking water assets should:

- Provide reliable water services for community use and fire fighting
- Maintain consistent and high-quality water supply
- Ensure water is safe for domestic purposes and for consumption
- Provide and use potable water in a sustainable manner.

A future version of the Drinking Water AMP will go a step further and include Council's target service levels for each measure.

"Levels of service measure the actual service delivered so that decisions can be made about the assets based on the service that they provide rather than simply on their condition."

Levels of Service

Preliminary Drinking Water Level of Service Measures

Service attribute	Community levels of service	Technical levels of service	Detailed measure	Current
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system(1)*	Percentage of properties connected to the municipal water system*		72.5% of properties / 91% of City population
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow*	Percentage of properties where fire flow is available*		All customers connected to the City water system have supply for fire fighting
Reliability	Description of boil water advisories and service interruptions*	Number of Drinking Water Advisory (DWA) events and total properties affected		2 events affecting 74 properties
		Number of watermain breaks and average service interruption for repair		229 watermain breaks with an average service interruption for repair of 9.9 hours
		The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system*		162 connection days / 251,441 connections
		The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system*		1,050 connection days / 251,441 connections
	Maintain consistent and high-quality water supply by investing in infrastructure, maintaining assets and ensuring assets are in good condition	Percentage of watermains that are likely in poor or very poor condition		5%
		Percentage of facilities that are likely in poor or very poor condition		4%
		Average number of hours per water service interruption		9.9

Levels of Service

Service attribute	Community levels of service	Technical levels of service	Detailed measure	Current
Safety	Water is safe for domestic purposes and for consumption	Incidents of non-compliance per reporting year		4
		# of households affected by drinking water advisories (DWA)		74
		Incidents of Adverse Drinking Water Tests		21
Sustainability	Providing and using potable water in a sustainable manner	Residential Water consumption (litres per capita per day)		200

** Required by Ontario Regulation 588/17.*

(1) See Appendix 1 for a map of the areas of the municipality that are connected to the municipal water system.

Climate change is a significant factor affecting the City's long-term ability to deliver levels of service and the Drinking Water AMP considers the potential impacts of a changing climate. The effects of climate change include more extreme temperatures, increased domestic water usage and increased risk of extreme events such as windstorms, freezing rain, or flooding that may impact facility operations.

Asset Management Strategy

Practices, Procedures and Tools

The City has well-established overall principles, framework and decision-making approaches for asset management and these are presented in the 2017 Strategic Asset Management Plan. They provide a holistic approach to asset management as demonstrated by the capital investment prioritization process that drives the decision-making towards meeting the desired levels of service at the lowest lifecycle cost.

Future Demand and Service Enhancement

Ottawa's population is expected to increase to 1.4 million people by 2046, a significant increase of 40% over the next 25 years. The City's Official Plan provides the vision for the future growth of the City including areas identified for intensification. The Official Plan is supported by an Infrastructure Master Plan that is currently being updated to ensure that drinking water services will be available to support future growth.

	2046 Projection	Growth since 2018
Population	1,409,650	402,150
Private Households	590,600	194,800
Jobs	827,000	189,500

Source: New Official Plan report to Council (ACS2021-PIE-EDP-0036), October 2021

In addition to the growth and enhancement objectives of the City's master plans, asset management planning also needs to consider the Climate Change Master Plan goals for both resiliency to changing climate and reduction of greenhouse gas emissions. Existing assets must be maintained and new assets brought into service, to meet these various growth and service enhancement objectives.

Asset Management Strategy

Lifecycle Management and Risk

Lifecyle management activities refer to the set of planned activities and actions undertaken to maintain the current levels of service and achieve good economic life of the assets. The activities undertaken range from operations and maintenance activities, including planned and reactive maintenance, renewal activities (such as condition assessments and rehabilitations), disposal activities and non-infrastructure solutions (such as policies and processes that reduce costs, mitigate risks or maintain/enhance service delivery).

In developing the Drinking Water AMP, a preliminary estimate of future costs was generated based on the City's budgeted 10-year capital forecast which, at this time, provides the best available information for generating this estimate. It was developed through a collaborative effort of staff input and aligns with the City's current decision-making and asset capital expenditure processes. The lifecycle activities that will be required over the 10-year period are based on the asset management strategies detailed in Chapter 4 of the City's Strategic Asset Management Plan. For drinking water assets, this includes operational and maintenance strategies, asset management decision making, intervention strategies, lifecycle cost and value optimisation, options analysis, ageing assets strategy, non-infrastructure solutions, capital investment planning, condition assessment programs, shutdowns/outage strategy and optimisation, as well as consideration of mobility impacts, water service impacts, facility shutdowns and impacts to other services.

The City applies a risk-based approach to prioritizing asset renewals. The risk assessment frameworks and methods vary across the different types of assets, but are generally based on the importance of each asset in terms of service delivery/ continuity and the number of users who could be impacted.

Financing Strategy

The City continues to invest responsibly in maintaining infrastructure and has been increasing its capital investments to align with long-range financial plans. The City's existing funding model keeps the City on track to maintain critical infrastructure in a state of good repair. There is no immediate need to change the current funding model until new service levels are defined in the next version of the asset management plans, which are due in 2025.

Expenditure History

The City has made significant investments on all types of infrastructure and has put a priority on investing in critical infrastructure.

	Expenditure/Budget (millions)				
	2016	2017	2018	2019	2020
Operating Expenditures	$62.4	$54.6	$57.5	$59.6	$60.9
Capital Budget – Renewal, Growth & Service Enhancement	$78.4	$83.1	$55.6	$87.1	$98.8

Expenditure Forecast

Over the next 10 years, the City will continue investing in infrastructure to support operational expenses, respond to renewal needs, serve growth and provide enhancements.

	Expenditure/Budget Forecast (millions)										
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Operating Expenditure	$63.4	$65.5	$67.6	$69.7	$71.8	$73.9	$76.0	$78.1	$80.2	$82.3	$728.5
Capital Budget – Renewal	$58.2	$62.7	$100.7	$85.6	$73.0	$90.7	$93.3	$86.1	$100.1	$88.7	$839.1
Capital Budget - Growth	$9.8	$52.0	$20.3	$84.7	$18.4	$2.4	$8.8	$0.4	$17.7	$0.5	$215.0
Capital Budget - Service Enhancement	$18.8	$22.5	$13.8	$10.2	$16.4	$16.7	$18.1	$21.4	$21.1	$22.1	$181.1
Non-Infrastructure	$1.4	$1.9	$1.9	$2.6	$1.9	$1.9	$1.9	$2.7	$1.9	$1.9	$20.0

Financing Strategy

Renewal Funding Difference

The City's current asset management investment strategy, based on the 2017 Long Range Financial Plan, focuses on the cost of keeping critical infrastructure assets (such as arterial roads, bridges, trunk sewers, primary watermains and key facilities) in a state of good repair.

As required by Provincial legislation, the Drinking Water AMP forecasts the cost to keep all drinking water infrastructure assets in their present state for the next 10 years. This forecast is based on the City's budgeted or allocated 10-year capital forecast, which provides the best available information for generating this estimate. Therefore, this Drinking Water AMP does not identify a renewal funding difference at this time. Future investments will be required to address the wave of renewal costs expected for infrastructure built in the post-war era (beyond the 10-year horizon). In addition, other impacts, such as climate change, have the potential to impact long-term costs.

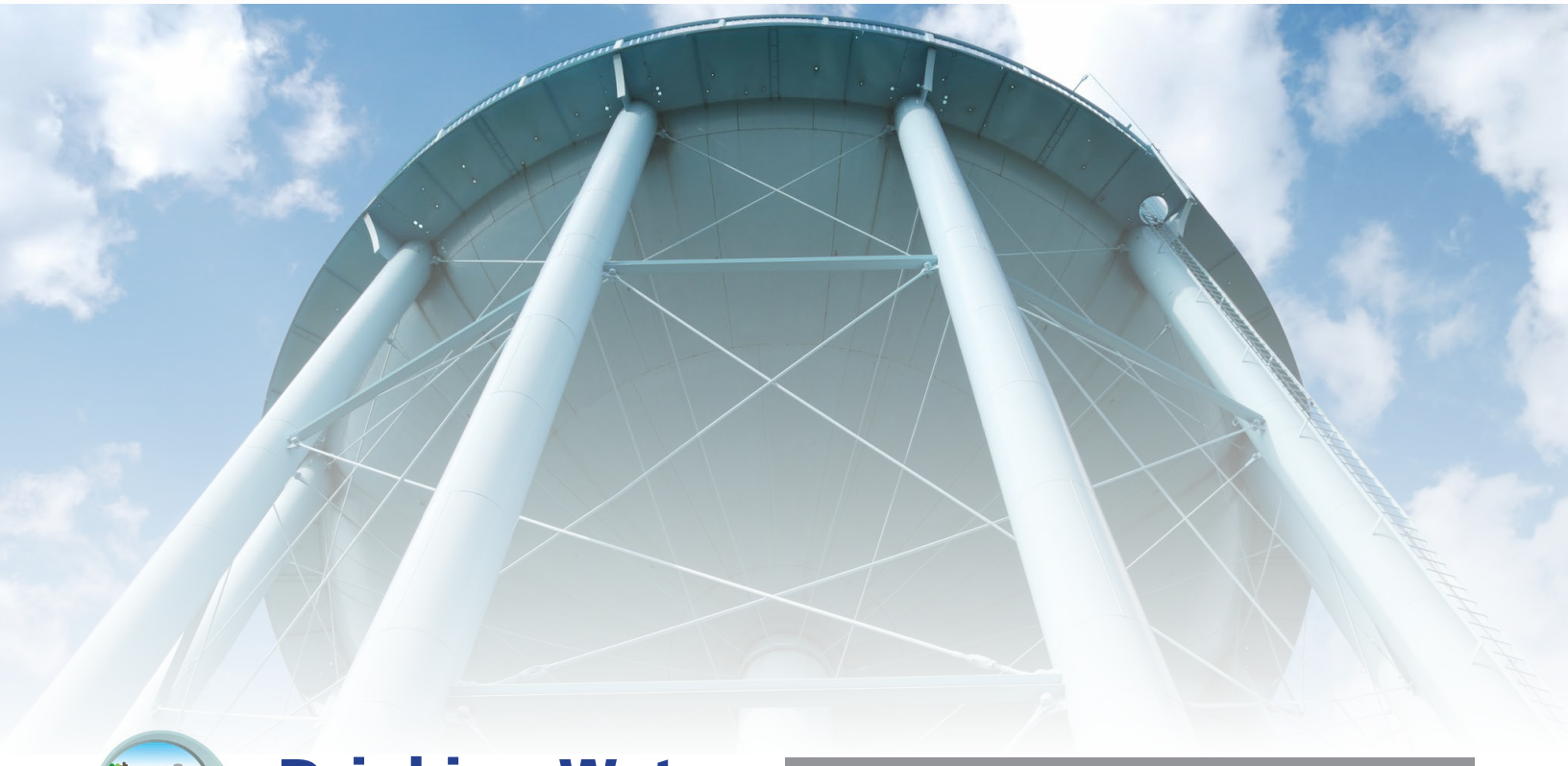
Drinking water facilities and their associated assets are managed through a program that combines the expertise and knowledge of the City's facilities asset specialists, with external subject matter expertise, through periodic inspections and assessments, to obtain an understanding of condition and asset needs. Work is currently being undertaken to further assess the drinking water facilities' future capital needs. However at this time there is insufficient information to project an estimated preliminary cost beyond the allocated 10-year capital forecast.

Improvement and Monitoring Plan

Based on the snapshot of current conditions and existing plans presented in the Drinking Water AMP, areas of potential improvement include:

- Asset information and data quality
- Condition data tracking and asset valuation
- Lifecycle renewal needs forecasting
- Climate change resiliency
- Equity and inclusion

The Drinking Water AMP will be reviewed and updated on a regular basis and over time these improvements will be reflected in future versions of the plan.

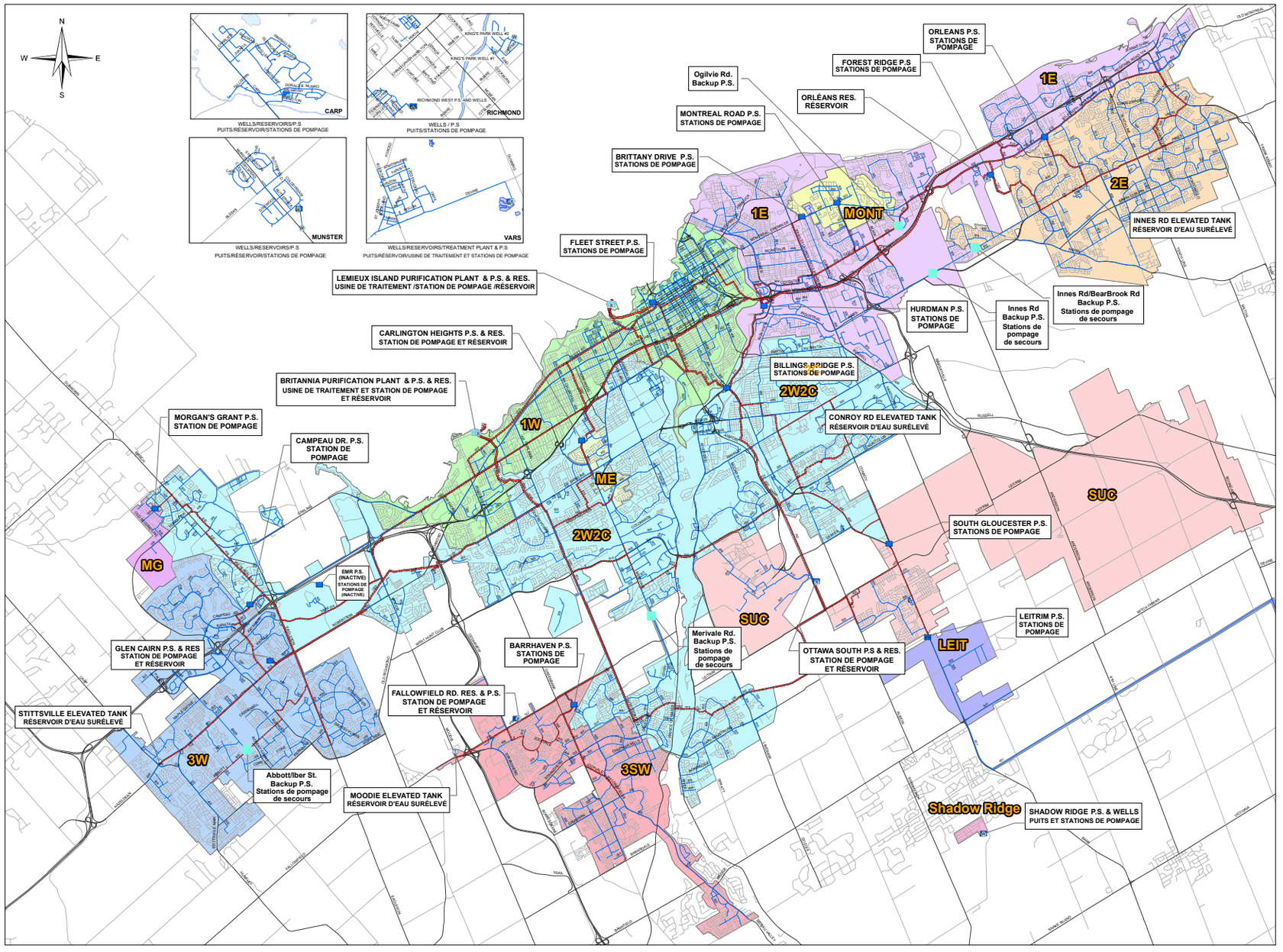


More Information

For more information about comprehensive asset management, or to learn more about the City's Comprehensive Asset Management Program, please visit Ottawa.ca.

Appendix 1:

Areas of the Municipality Connected to the Municipal Water System



Water Distribution System Facilities & Feedermains
Réseau de distribution de l'eau, infrastructures et conduites d'amenée principales

Geospatial Analytics, Technology and Solutions
Direction de l'analyse géospatiale, de la technologie et des solutions
June 2020 / Juin 2020

Metres / Mètres 0 1,000 2,000 4,000 6,000

Planning, Real Estate and Economic Development
Right of Way, Heritage & Urban Design Services
Infrastructure Services

Direction générale de la planification, de l'immobilier et du développement économique
Services des emprises, du patrimoine et du design urbain
Direction des services d'infrastructure

LEGEND / LÉGENDE

Water System Structure
Structure du réseau d'aqueduc

Structure Type, Life Cycle Status
Type de structure et statut dans le cycle de la durée utile

- WTP — DWTP, In Service /UMTE, en service
- PS — DWPS, In Service /SPEP, en service
- DWPS, Proposed /SPEP, projetée
- W — DWWS, In Service /RPEP, en service
- T — RESE, In Service /RESH, en service
- R — RESI, In Service /RESS, en service

Watermains
Conduites d'eau principales

Priority, Internal Diameter
Priorité : diamètre interne

- Backbone 1524mm - 1981mm / Centrale : 1 524 mm – 1 981 mm
- Backbone 1067mm - 1372mm / Centrale : 1 067 mm – 1 372 mm
- Backbone 610mm - 914mm / Centrale : 610 mm – 914 mm
- Backbone 406mm - 508mm / Centrale : 406 mm – 508 mm
- Backbone 152mm - 305mm / Centrale : 152 mm – 305 mm
- Distribution 1676mm - 1981mm / Distribution : 1 676 mm – 1 981 mm
- Distribution 1067mm - 1372mm / Distribution : 1 067 mm – 1 372 mm
- Distribution 610mm - 914mm / Distribution : 610 mm – 914 mm
- Distribution 406mm - 508mm / Distribution : 406 mm – 508 mm
- Distribution 305mm - 381mm / Distribution : 305 mm – 381 mm

Water Pressure Zone
Zone de pression de l'eau

Zone IDs / Identifiants des zones

- 1E
- 1W
- 2E
- 2W2C
- 3SW
- 3W
- LEIT
- ME
- MG
- MONT
- SHADOW RIDGE
- SUC