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VERSION 2.0

Wastewater Services
Asset Management Plan

Introduction

1.1 BACKGROUND

Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure (Sections 5 and 6) requires all municipalities to prepare asset management plans for all their assets. The purpose of this legislation is to have municipalities demonstrate they can maintain their assets, balancing affordability, risk, and service levels for the next ten years.

To meet the provincial requirements, the City has created this latest version of its Wastewater Services Asset Management Plan. It reports the current state of the assets, target and expected levels of service, strategies and activities applied by the City, historical and forecasted financial details, risks and non-financial strategies, 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.

1.2 SUPPORT FOR CITY GOALS

This Asset Management Plan supports the City's 2023-2026 City Strategic Plan and the strategic priority of *a city that is green and resilient*. Specifically, it aligns with the strategic objectives to:

- Reduce emissions associated with the City's operations and facilities.
- Increase resiliency to extreme weather and changing climate conditions.
- Improve key infrastructure through asset management.

1.3 ASSET CLASSES AND TYPES

The regulation requires that for each asset category a summary of the assets is provided. The Wastewater Services Asset Management Plan includes assets that relate to the collection, transmission, treatment or disposal of wastewater discharged by homes, businesses, industries and institutions. This also includes any wastewater asset that from time to time manages stormwater. This includes collection and conveyance assets (sewers and forcemains), the Robert O. Pickard Environmental Centre wastewater treatment facility (ROPEC), other wastewater facilities and fleet.

Wastewater Services Asset Classes and Types

Collection and Conveyance	
• Collection Pipes	• Forcemains
• Collectors	• Trunk Sewers

Wastewater Treatment Facility (ROPEC)	
• Primary treatment	• Biosolids Process
• Secondary Treatment	• Common Services

Other Wastewater Facilities	
• Combined Sewage Storage Tunnel (CSST) Storage	• Pump Stations
• Lagoons	• Regulators/ Flow Diversion Sites
• Odour Control Facilities	• Wastewater Tanks

Wastewater Fleet
• Fleet

There are limitations, gaps and assumptions in the data and analysis underlying this Asset Management Plan, which affect the findings that are presented. These data quality issues are particularly prevalent for wastewater facilities, for which the data is known to include gaps in condition data, understated replacement costs, and underestimated enhancement and renewal needs. These in turn impact the levels of service and financial analysis, as noted elsewhere in the plan. The City is actively working to address data and analysis issues for future versions of the Asset Management Plan.

State of Local Infrastructure

The regulation requires that for each asset category a summary of the replacement costs, average age of the assets, information available on the condition and a description of the municipality's approach to assessing condition is provided. The values in this section are based on asset data from April 2024.

2.1 ASSET INVENTORY AND VALUATION

The total replacement cost of Wastewater Services assets is approximately $15.8 billion as summarized in the table below.

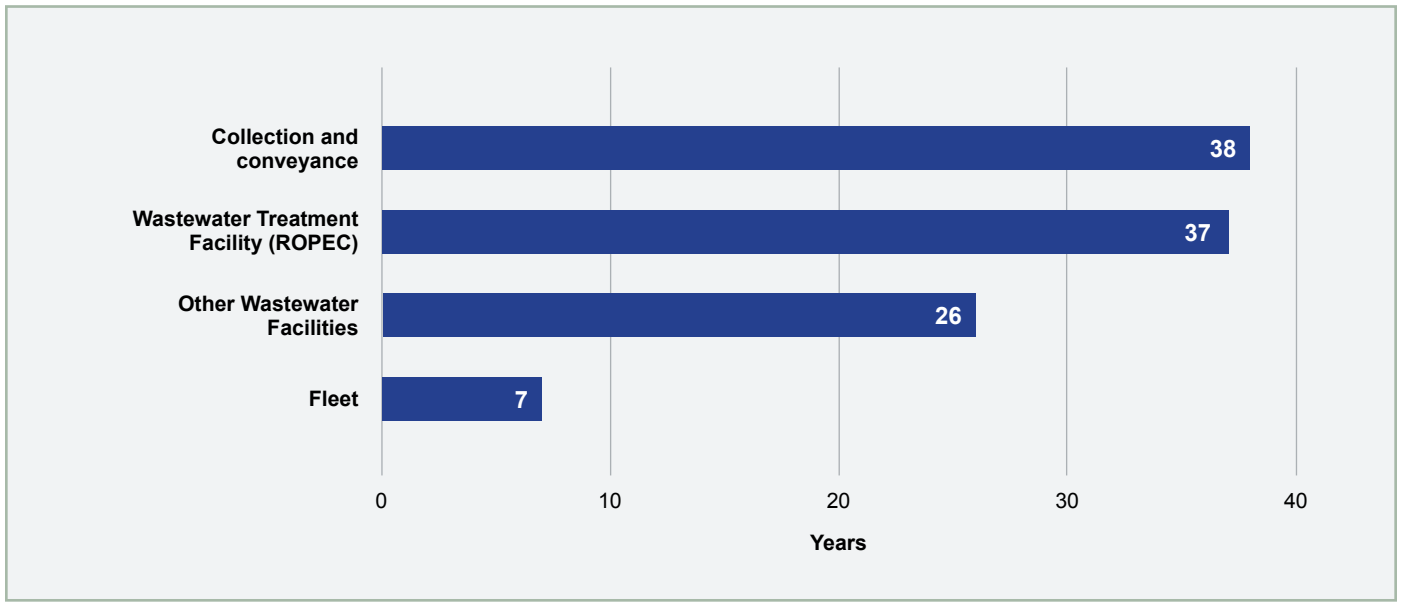
Wastewater Services Asset Inventory and Replacement Cost

Asset Class	Inventory	Replacement Cost (millions; 2024$)
Collection and Conveyance	3,132 km	$12,350.2
Wastewater Treatment Facility (ROPEC)	1	$2,970.1
Other Wastewater Facilities	75	$431.3
Fleet	125	$9.7

2.2 ASSET 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 Wastewater Services assets is shown in the figure below.

Average Age of Wastewater Services Assets



The City uses a range of techniques and solutions to collect and assess condition data, and at various frequencies, which is summarized in the following table.

Data Collection Methods for Wastewater Services Assets

Asset Class	Condition Data Collection Technique	Frequency
Collection pipes, trunk sewers and collectors	CCTV and multi-sensor inspection data converted into Pipeline Assessment Certification Program (PACP) scoring stored in the GIS database. Percentage of life remaining for assets with no PACP scoring.	15-20 years
Forcemains	Hydraulic analysis	Varies
Wastewater Treatment Facility (ROPEC) and Other Wastewater Facilities	A high-level, visual condition assessment and lifecycle model program is being initiated for wastewater facilities. To date, this work has been completed for the wastewater treatment facility. Detailed, component level condition assessments are done at the wastewater facilities where a need is identified, or an opportunity arises. Condition ratings reflect this detailed information, where available. Condition is based on a desktop assessment, maintenance history, and subject matter expert opinion, where condition assessments were not available.	Varies
Fleet	Fleet assets are subject to a regular informal inspection by the client group and regularly scheduled formal inspection by Fleet Services	6 months and original equipment manufacturer maintenance schedule

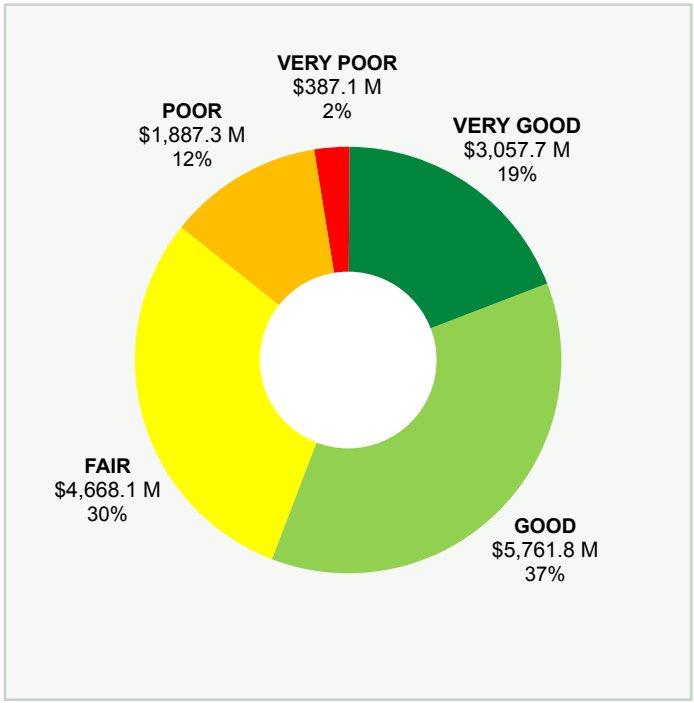
Based on condition data, supplemented by subject matter expert knowledge and professional judgment, the condition of assets is rated on a scale from "Very Good" to "Very Poor" as shown in the table below.

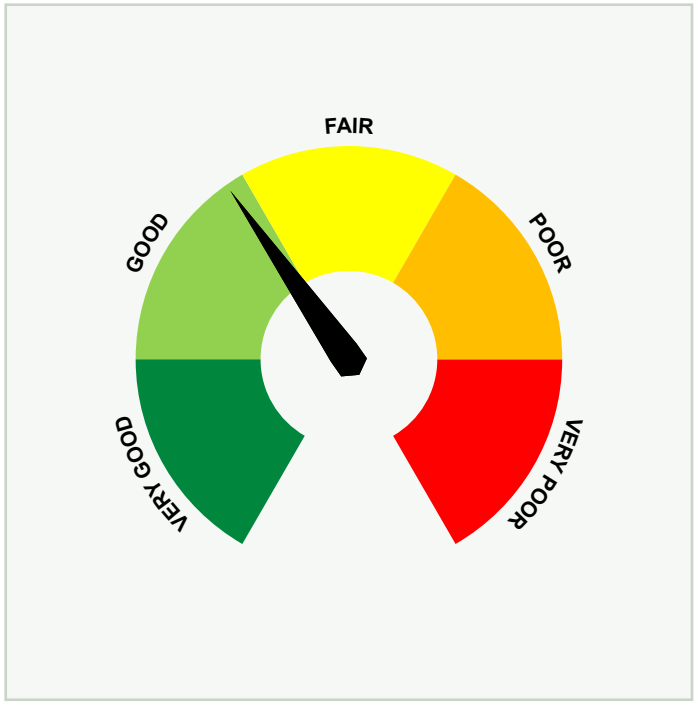
Five-point Scale for Wastewater Services Asset Condition

Rating	Rating Description	Condition Score (Collection and Conveyance)	Condition Rating (Wastewater Facilities)	Life Remaining (Fleet)
Very Good	**Sound Physical Condition** No short-term failure risk and no work required	79-100	Expert Opinion	>75%
Good	**Adequate for Now** Acceptable, generally in mid stage of expected service life	59-78		51% - 75%
Fair	**Requires Attention** Signs of deterioration, requires attention, some elements exhibit deficiencies	39-58		26% - 50%
Poor	**Increasing Potential of Affecting Service** Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	19-28		0% - 25%
Very Poor	**Unfit for Sustained Service (built infrastructure) / Nearing End of Life (fleet)** Near or beyond expected service life, widespread signs of advanced deterioration, some built assets may be unusable	<19		<0% (outside of lifecycle)

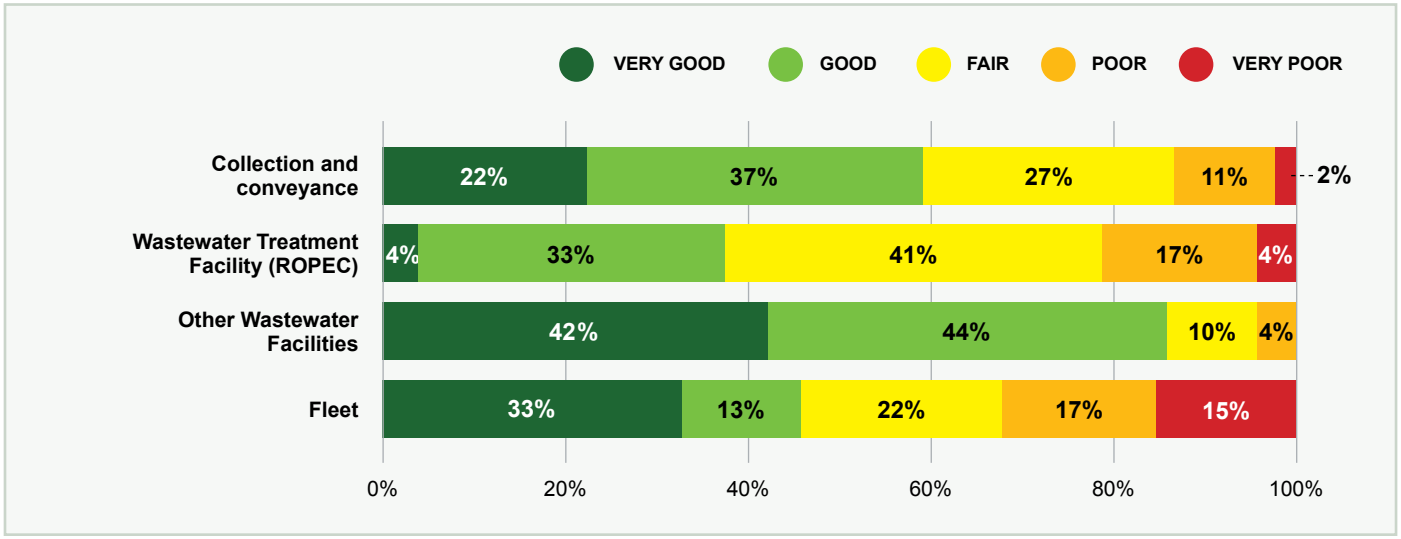
The overall condition rating for Wastewater Services assets is Good to Fair and a breakdown for the various asset classes is shown in the figures below. Condition distribution percentages are weighted based on replacement cost.

Overall Condition Profile of Wastewater Services Assets





Condition Profile of Wastewater Services Assets



Levels of Service

3.1 LEVEL OF SERVICE CONTEXT

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 regulation requires that the Asset Management Plan includes for each asset category the levels of service that the municipality proposes to provide for each of the 10 years following the year in which the plan is published.

The Wastewater Services Asset Management Plan establishes level of service measures and reports the current levels of service being provided. The measures align with City goals and recognize that Wastewater Services assets should be managed in a way that should:

- Reliably capture, convey and treat wastewater while minimizing overflows and backups (to protect properties and maintain effective drainage for residents).
- Reduce emissions associated with the City's operations and facilities.
- Increase resiliency to extreme weather and changing climate conditions.
- Protect local waterways by treating sewage before discharge into the river.
- Maintain wastewater assets in a state of good repair.
- Be periodically inspected to identify needs.
- Provide sustainable and affordable services over the long-term.

3.2 HISTORICAL AND CURRENT LEVELS OF SERVICE

The levels of service for Wastewater Services are shown in the table below. The performance reported includes:

- Historical performance, showing the service levels reported in the previous version of the Asset Management Plan.
- Current performance, showing the service levels being provided by the City based on the latest available information.

Levels of Service for Wastewater Services

Service Attribute	Community Level of Service	Technical Level of Service	Historical Performance (2019)	Current Performance (2023)
Capacity and use	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system*	Percentage of properties connected to the municipal wastewater system*	Refer to 2022 Asset Management Plan	73%
	Local waterways are protected by treating sewage before discharge to the river	Wastewater Treatment Plant average operating capacity	80%	83%
Function	Reduce emissions associated with the City's operations and facilities	Annual GHG emissions from wastewater treatment per megalitre of wastewater treated (tonnes CO_2e)	Not reported	0.019 t/ML
		Annual GHG emissions from wastewater fleet (tonnes CO_2e)	Not reported	553 t
	Increase resiliency to extreme weather and changing climate conditions	Percent of critical assets with a completed climate risk assessment	Not reported	100%
		Percent of Wastewater Treatment Plant with backup power for critical systems	Not reported	Not available[1]

1: The wastewater treatment plant has backup power for some systems, however current performance is not available for this metric because it has not yet been determined for which systems backup power is critical. Existing backup power is not sufficient to support the entire plant.

Service Attribute	Community Level of Service	Technical Level of Service	Historical Performance (2019)	Current Performance (2023)
Reliability	Assets are periodically inspected to identify needs	Percentage of wastewater network inspected annually with CCTV	6%	8%
	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes* Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches*	The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system*	74 events (5-year average 2015-2019), 234,000 service connections[2]	31 events (5-year average 2019-2023), 259,569 service connections
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes* Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described above*	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system*	Refer to 2022 Asset Management Plan[3]	35 connection-days, 259,569 service connections
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system*	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system*	Refer to 2022 Asset Management Plan[4]	4 violations, 259,569 connections
	The sewer system is maintained in a state of good repair	Percentage of Wastewater Collection and Conveyance assets in fair or better condition	Not reported	87%
		Percentage of Wastewater Treatment Facility (ROPEC) assets in Fair or Better Condition	Not reported	79%
		Percentage of other Wastewater Facilities (excluding ROPEC) in Fair or Better Condition	Not reported	96%
		Percent of Wastewater Fleet assets in fair or better condition	Not reported	68%
		Percentage of wastewater pipes that were hydraulically cleaned	30%	29%

**Required by Ontario Regulation 588/17 – see Appendix A for additional information.*

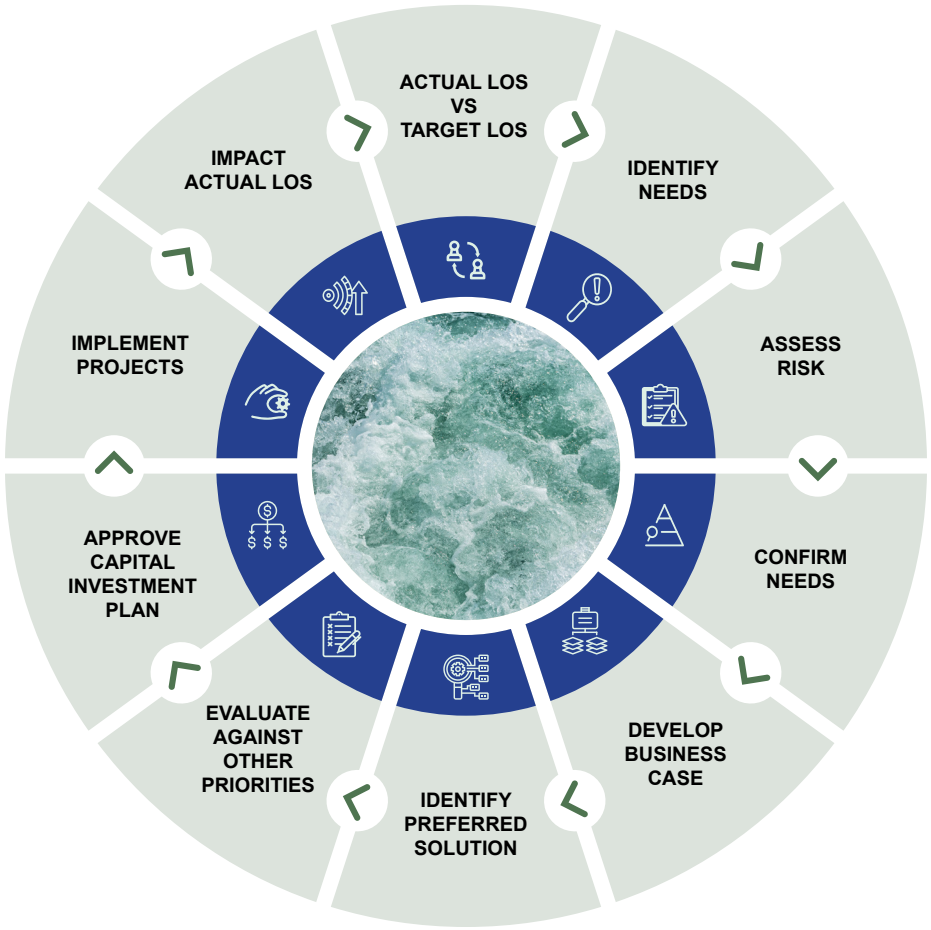
2: The number of events per year where combined sewer flow exceeds system capacity has been updated since the previous Asset Management Plan; the values reported are an annual average based on a five-year period.
3: The method for calculating the number of connection-days per year due to wastewater backups changed between the previous Asset Management Plan and this report, so the historical performance should not be compared to current performance.
4: The method for calculating the number of effluent violations due to wastewater discharge has been revised since the previous Asset Management Plan, so the historical performance should not be compared to current performance.

Service Attribute	Community Level of Service	Technical Level of Service	Historical Performance (2019)	Current Performance (2023)
Affordability	Provide sustainable and affordable services over the long-term	Asset renewal funding ratio (renewal funding as a share of replacement cost) for Wastewater Collection and Conveyance assets	Not reported	0.2%
		Asset renewal funding ratio (renewal funding as a share of replacement cost) for Wastewater Treatment Facility (ROPEC)	Not reported	1.0%
		Asset renewal funding ratio (renewal funding as a share of replacement cost) for other Wastewater Facilities (excluding ROPEC)	Not reported	2.7%
		Asset renewal funding ratio (renewal funding as a share of replacement cost) for Wastewater Fleet assets	Not reported	6.7%

Asset Management Strategy

4.1 PRACTICES, PROCEDURES AND TOOLS

The regulation requires that the Asset Management Plan defines a lifecycle management strategy with respect to the assets in each asset category for the 10-year period. One of the key objectives of asset management is to recognize the objectives of the City and align them with the City's long term financial plans. This will allow Council to make informed decisions and provide clear direction on how the City will balance service levels, risks, and costs.



The City has well-established practices to assess the risk of not meeting community and technical level of service standards and to determine the lowest lifecycle cost activities to reduce the risks to acceptable levels and the associated costs of undertaking them. The Asset Management Plan provides the needs forecast associated with achieving target levels of service and compares it to the planned budget to determine service area gaps or surpluses.

The various lifecycle activities are delivered by different parts of the organization. The asset management process is an opportunity to take a holistic view of the asset lifecycle and identify any assets that would benefit from coordinated implementation of lifecycle strategies. It is important that each type of asset has an appropriate blend of activities across its lifecycle and that staff interacting with the asset understand the interrelations between the various activities and their impact on cost, risk and service level.

4.2 GROWTH, ENHANCEMENT AND RENEWAL

In developing the Wastewater Services Asset Management Plan, a preliminary estimate was prepared of the cost of achieving the target levels of service. The estimates are based on 2024 data and include forecasts of:

- Growth needs based on the Development Charge Background Study Amendment Report and By-laws for water projects and water-related studies (October 2024), required to serve the city's growing population.
- Enhancement needs identified by subject matter experts or through various reports and studies for Wastewater Facilities (including modernization improvements), and accessibility needs for ROPEC based on an accessibility audit.
- Regulatory needs for Pump Stations identified by subject matter experts or through various reports and studies, and for ROPEC assumed to be equal to the planned budget.
- Renewal needs based on lifecycle modelling, building condition audits, condition assessments, detailed inspections and input from subject matter experts, required to maintain assets in a state of good repair. These activities include major repairs, rehabilitation and replacement.
- Other renewal needs for the opportunistic renewal of sewers coordinated as part of other projects, as well as renewal-related activities that do not contribute directly to improvements in asset condition (such as planning, condition assessment, inspections, etc.), which are categorized as "Renewal – Other" to distinguish them in the funding analysis, and which are assumed to be equal to the planned budget.
- Disposal needs tied to the decommissioning of facilities.

Ottawa's population is expected to increase to 1.4 million people by 2046, a significant increase of 40% since 2018, as summarized in the table below. This growth will put pressure on existing assets and services, and may require new or expanded assets to meet growing needs.

City of Ottawa Population Projections for 2046

	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

The table below summarizes the future growth, enhancement, regulatory, renewal and disposal needs forecast for Wastewater Services assets.

Growth, Enhancement, Regulatory, Renewal and Disposal Needs Forecast for Wastewater Services

	10-Year Needs (millions; 2024$)						
Asset Class	**Growth**	**Enhancement**	**Regulatory**	**Renewal**	**Renewal - Other**	**Disposal**	**Total**
Collection and Conveyance	$1,282.8	Not applicable	Not applicable	$523.3	$319.3	Not applicable	$2,125.3
Wastewater Treatment Plant[5]	$291.8	$34.7	$1.2	$489.3	$16.7	Not applicable	$833.6
Other Wastewater Facilities[6]	$198.6	$7.8	$4.4	$113.1[6]	$17.0	$9.9	$350.7
Wastewater Fleet	$1.7	Not applicable	Not applicable	$7.6	Not applicable	Not applicable	$9.3
Total	**$1,774.9**	**$42.4**	**$5.5**	**$1,133.3**	**$352.9**	**$9.9**	**$3,318.9**

Totals may not sum exactly due to rounding.

5: There is low confidence in the accuracy of the needs forecasts for Wastewater Treatment Plant and Other Wastewater Facilities because there are known data gaps, which the City is working to address, as noted in Section 1.3.
6: Excludes Lagoons and CSST Storage because a forecast of renewal needs for these asset types was not available.

As per the regulation, asset management planning also needs to consider the City's Climate Change Master Plan goals for both mitigation strategies to slow climate change impacts, such as reducing greenhouse gas emissions, and adaptation strategies to reduce negative impacts associated with existing and future climate change. The Asset Management Plan estimates the additional future costs due to climate change shown in the table below. These are preliminary estimates based on the latest information available, which will be refined over time.

Estimated Additional Future Costs Due to Climate Change for Wastewater Services

Additional Costs Due to Climate Change	Estimated 10-year Total Additional Cost (millions; 2024$)
Increased operations and maintenance costs due to gradual, long-term impacts of climate change[7]	$17.5
Increased capital renewal costs due to gradual, long-term impacts of climate change[7]	$94.9
Increased operations and maintenance costs due to extreme weather events[8]	$3.4
Increased capital costs to implement climate change adaptation and mitigation actions including extreme weather resiliency, flood protection, municipal fleet electrification and building retrofits[9]	$58.1
Total	**$173.9**

The estimates do not capture damage to capital infrastructure due to catastrophic/extreme weather events (e.g., tornadoes); increased capital renewal needs due to accelerated asset deterioration; increased growth costs to meet climate change requirements; increased capital renewal costs for assets other than buildings (such as fleet and equipment); and gradual, long-term impacts due to climate hazards other than extreme heat and extreme rainfall (such as drought, ice storms and wildfires).

7: Estimated costs due to gradual, long-term impacts of climate change are based on the Financial Accountability Office of Ontario's "Costing Climate Impacts to Public Infrastructure" study.
8: Estimated operations and maintenance costs due to extreme weather events are based on historical City financial data and Task Force on Climate-Related Financial Disclosures (TCFD) reporting for recent significant weather events.
9: Estimated capital costs to implement climate change mitigation actions are based on the Energy Evolution study (2020) and subsequent detailed studies such as the Green Fleet Strategy.

4.3 OPERATIONS AND MAINTENANCE

Operations strategies are developed to deliver the services and involve consumption of resources such as human resources, energy, chemicals and materials. Maintenance strategies are the regular ongoing activities necessary to keep assets operating, including instances where portions of the asset fail and need immediate repair to make the asset operational again.

New assets acquired or constructed by the City due to growth will incur additional future operations and maintenance costs beyond current expenditures. It is crucial for the City to evaluate these prospective costs and their affordability when making decisions regarding new asset acquisition or construction.

Financing Strategy

The regulation requires that the Asset Management Plan defines a financial strategy with respect to the assets in each asset category for the 10-year period. The City continues to invest responsibly in maintaining infrastructure and has been increasing its capital investments to align with long-range financial plans. Funding targets recommended in the 2017 Comprehensive Asset Management Program were focused on maintaining critical infrastructure in a state of good repair. There will be a need to update the long range financial plans once new service levels are defined to ensure financial sustainability.

5.1 EXPENDITURE HISTORY

For information on historical operating and capital expenditures, refer to the City's historical annual budget documents. Note that historical budget values function as estimates for expenditures, and actual spending may differ from the budgeted amounts shown.

5.2 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. The planned operating budget is based on Financial Service's 2024 operating budget forecast for Wastewater Services and the planned capital budget is based on the City's 2024 10-year capital budget forecast.

Budget Forecast for Wastewater Services

Component	Budget Forecast (millions; 2024$)										
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Operating Budget[10]	$83.9	$88.8	$94.0	$99.6	$105.4	$111.6	$118.2	$125.1	$132.4	$140.2	**$1,099.2**
Capital Budget – Growth	$26.7	$31.8	$12.7	$45.4	$55.4	$22.3	$30.4	$54.3	$12.8	$12.8	**$304.7**
Capital Budget – Enhancement	$0.1	$0.2	$0.0	$0.3	$0.3	$0.0	$0.6	$0.0	$0.0	$0.6	**$2.2**
Capital Budget – Regulatory	$2.4	$1.2	$1.2	$1.2	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	**$6.0**
Capital Budget – Renewal	$68.9	$69.0	$44.1	$56.8	$57.6	$58.0	$81.3	$68.2	$75.2	$77.5	**$656.6**
Capital Budget – Renewal - Other	$31.0	$32.2	$31.6	$29.1	$33.1	$31.2	$34.4	$36.7	$38.7	$42.0	**$340.0**
Capital Budget – Disposal	$0.0	$8.4	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	**$8.4**

Totals may not sum exactly due to rounding.

10: Values shown are net operating budget requirement after expenditure recoveries and revenues.

Funding Analysis

The regulation requires that an identification of the annual funding projected to be available to undertake lifecycle activities is summarized in the Asset Management Plan. If, based on the funding projected to be available, the municipality identifies a service area shortfall for the lifecycle activities identified, the regulation requires an explanation of how the municipality will manage the risks associated with not undertaking any of the lifecycle activities needed.

The future capital funding needs are compared to planned budgets in order to identify potential service area shortfalls (or "gaps"), the risks to service that could result, and possible strategies to mitigate them.

6.1 SERVICE AREA GAP

An Asset Management Plan provides a forecast of where the City will be in 10 years with respect to some service level targets based on historic decisions on how the City invests in and manages assets. The service area gap is the difference between the forecasted capital investment needs and the investment that the City has budgeted. As a result, service area gaps can and will change as a result of future changes to policy, masterplans, population, service delivery, asset inventory, or investment by the City and other orders of government. Over the next 10 years, the total needs for Wastewater Services assets exceed the planned budget, leading to a service area gap. The forecasted investment needs, planned budgets and service area gaps are summarized in the table and figures below.

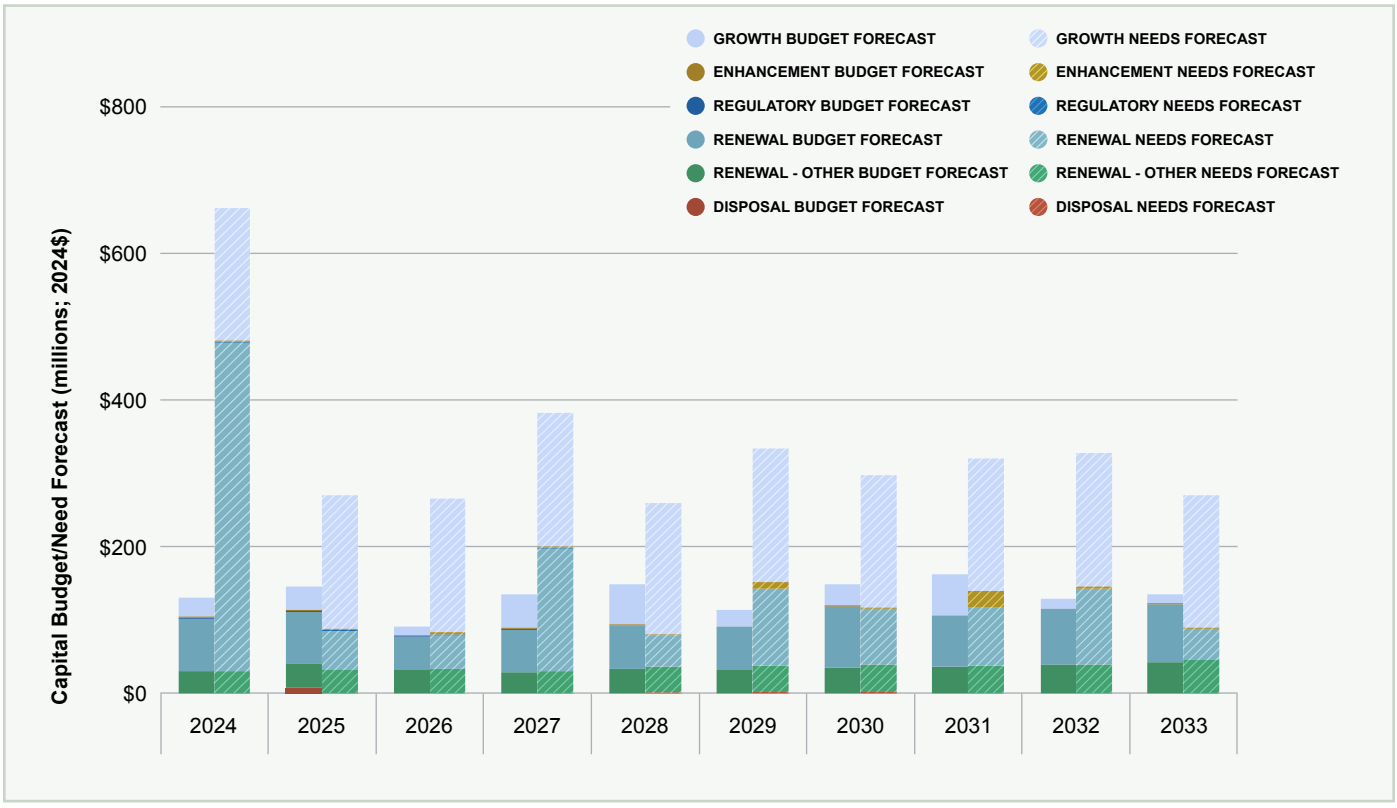
Capital Service Area Gap for Wastewater Services

Asset Class	10-Year Need (millions; 2024$)	10-Year Funding (millions; 2024$)	10-Year Gap (millions; 2024$)
Growth			
Wastewater Collection & Conveyance	$1,282.8	$110.8	($1,172.0)
Wastewater Treatment Facility (ROPEC)	$291.8	$52.3	($239.5)
Other Wastewater Facilities	$198.6	$139.9	($58.7)
Fleet	$1.7	$1.7	$0.0
Growth Total	**$1,774.9**	**$304.7**	**($1,470.3)**

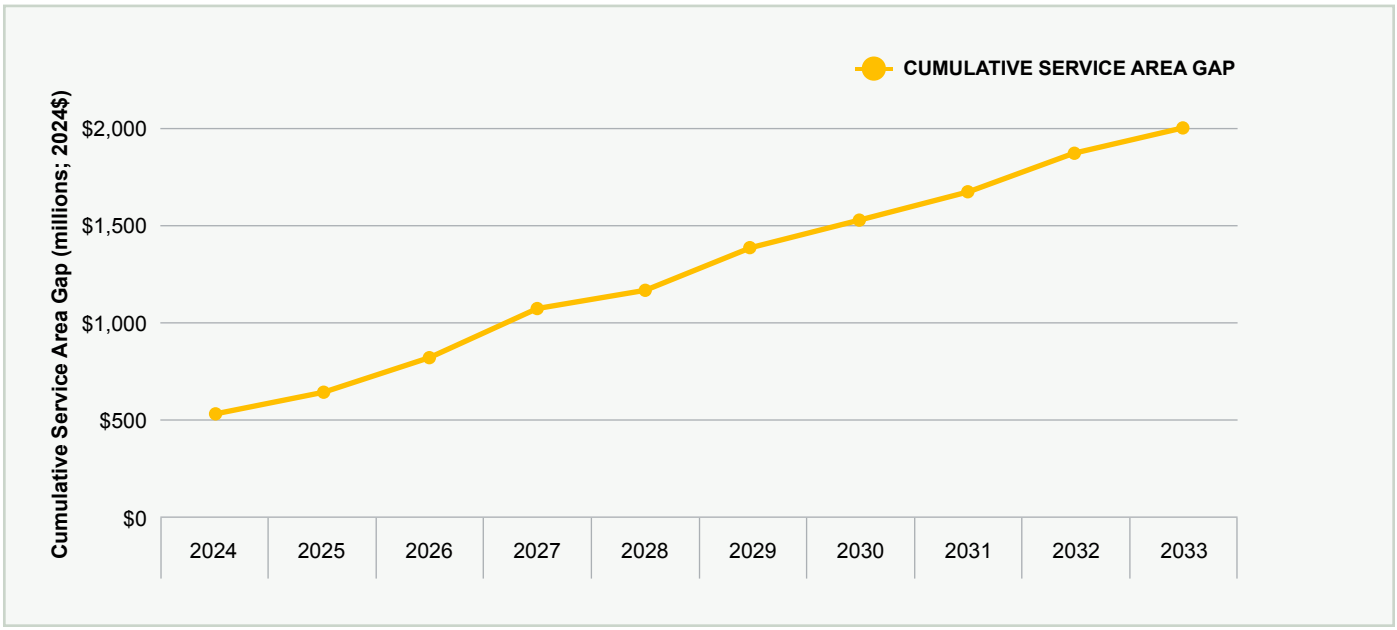
Asset Class	10-Year Need (millions; 2024$)	10-Year Funding (millions; 2024$)	10-Year Gap (millions; 2024$)
Enhancement			
Wastewater Collection & Conveyance	Not Applicable	Not Applicable	-
Wastewater Treatment Facility (ROPEC)	$34.7	$0.0	($34.7)
Other Wastewater Facilities	$7.8	$2.2	($5.6)
Fleet	Not Applicable	Not Applicable	-
Enhancement Total	**$42.4**	**$2.2**	**($40.2)**
Regulatory			
Wastewater Collection & Conveyance	Not Applicable	Not Applicable	-
Wastewater Treatment Facility (ROPEC)	$1.2	$1.2	$0.0
Other Wastewater Facilities	$4.4	$4.8	$0.5
Fleet	Not Applicable	Not Applicable	-
Regulatory Total	**$5.5**	**$6.0**	**$0.5**
Renewal			
Wastewater Collection & Conveyance	$523.3	$249.2	($274.1)
Wastewater Treatment Facility (ROPEC)	$489.3	$286.3	($203.0)
Other Wastewater Facilities	$113.1	$114.7	$1.5
Fleet	$7.6	$6.5	($1.0)
Renewal Total	**$1,133.3**	**$656.6**	**($476.7)**
Renewal - Other			
Wastewater Collection & Conveyance	$319.3	$319.3	$0.0
Wastewater Treatment Facility (ROPEC)	$16.7	$11.6	($5.0)
Other Wastewater Facilities	$17.0	$9.1	($7.8)
Fleet	Not Applicable	Not Applicable	-
Renewal - Other Total	**$352.9**	**$340.0**	**($12.9)**
Disposal			
Wastewater Collection & Conveyance	Not Applicable	Not Applicable	-
Wastewater Treatment Facility (ROPEC)	Not Applicable	Not Applicable	-
Other Wastewater Facilities	$9.9	$8.4	($1.4)
Fleet	Not Applicable	Not Applicable	-
Disposal Total	**$9.9**	**$8.4**	**($1.4)**
Grand Total	**$3,318.9**	**$1,317.9**	**($2,001.0)**

Totals may not sum exactly due to rounding.

Capital Budget and Capital Needs Forecast for Wastewater Services



Cumulative Capital Service Area Gap for Wastewater Services



The above capital service area gap does not include the estimated additional future costs due to climate change outlined in Section 4.2. The City has planned dedicated funding over the next 10 years to support climate change needs through the Climate Change Master Plan and annual GHG and Emissions program. The funding supports not only wastewater services, but all other services provided by the City. The climate change capital funding needs identified for the various City services and the total planned capital funding for climate change initiatives are summarized in the table below. These are preliminary estimates that are being refined and prioritized through various initiatives, but they give a sense of the order-of-magnitude of future planned budget and potential needs. These estimates do not include infrastructure repair or replacement costs for extreme weather events such as tornadoes, riverine flooding or ice storms. The analysis does not capture funding from external sources such as other levels of government. Capital funding will need to be integrated across departmental budgets.

The analysis is based on the City's 2024 ten-year capital budget forecast. It is important to note that the 2024 funding forecast shown is $155 million higher than the final approved 2025 budget forecast, which allocates $91.2 million over 10 years (versus $246.4 million as shown in the table).

Estimated Future Climate Change Capital Budgets and Capital Needs for All City Services[11]

	10-Year Need (millions; 2024$)	10-Year Funding (millions; 2024$)	10-Year Gap (millions; 2024$)
Climate Change	$1,700	$246.4	($1,453.6)

6.2 EXPECTED AND TARGET LEVELS OF SERVICE

For levels of service, the City has established performance targets as well as anticipated performance. These metrics can be compared to assess the alignment between expected and target performance. The table below includes:

- Current performance, showing the service levels being provided by the City based on the latest available information.
- Arrows to show whether the measure is expected to trend upward, downward, or remain relatively stable, with colours to show whether that trend is positive (green) or negative (red) relative to the target level of service.
- Expected performance, showing the service levels expected to be achieved based on the City's planned budget.
- Target performance, showing the City's target level of service based on Council direction, City policy, strategy or master plan, or other reference.

11: The estimates exclude Solid Waste and Transit services because all financial analysis for these services is captured in the respective Long Range Financial Plan.

Expected and Target Levels of Service for Wastewater Services

Service Attribute	Community Level of Service	Technical Level of Service	Current Performance (2023)	Trend (2024-2033)	Expected Performance (2033)	Target Performance (2033)	Source for Target
Capacity and use	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system*	Percentage of properties connected to the municipal wastewater system*	73%	↑	Increase	Increase	Infrastructure Master Plan
	Local waterways are protected by treating sewage before discharge to the river	Wastewater Treatment Plant average operating capacity	83%	↑	Increase	3-year average 80%	Ontario Ministry of the Environment, Conservation and Parks
Function	Reduce emissions associated with the City's operations and facilities	Annual GHG emissions from wastewater treatment per megalitre of wastewater treated (tonnes CO_2e)	0.019 t/ML	↓[12]	Decrease[12]	Decrease	Climate Change Master Plan
		Annual GHG emissions from wastewater fleet (tonnes CO_2e)	553 t	Refer to Green Fleet Strategy		Refer to Green Fleet Strategy	
	Increase resiliency to extreme weather and changing climate conditions	Percent of critical assets with a completed climate risk assessment	100%	→	Maintain	Maintain	Climate Ready Ottawa
		Percent of Wastewater Treatment Plant with backup power for critical systems	Not available[13]	Expected performance not available		No set target	

12: Emissions are expected to trend downward, however planned funding levels are not expected to be sufficient to reach 2030 and 2040 GHG emissions reduction targets.
13: The wastewater treatment plant has backup power for some systems, however current performance is not available for this metric because it has not yet been determined for which systems backup power is critical. Existing backup power is not sufficient to support the entire plant.

Service Attribute	Community Level of Service	Technical Level of Service	Current Performance (2023)	Trend (2024-2033)	Expected Performance (2033)	Target Performance (2033)	Source for Target
Reliability	Assets are periodically inspected to identify needs	Percentage of wastewater network inspected annually with CCTV	8%	→	Maintain	Maintain	Water Linear & Customer Services staff
	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes* Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches*	The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system*	31 events (5-year average 2019-2023), 259,569 service connections	↑	Increase	As few as possible	Water Linear & Customer Services staff
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes* Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described above*	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system*	35 connection-days, 259,569 service connections	↑	Increase	As few as possible	Water Linear & Customer Services staff
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system*	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system*	4 violations, 259,569 service connections	→	Maintain	As few as possible	Water Facilities & Treatment Services staff
	The sewer system is maintained in a state of good repair	Percentage of Wastewater Collection and Conveyance assets in fair or better condition	87%	↓	73%	90%	Lifecycle modelling
		Percentage of Wastewater Treatment Facility (ROPEC) assets in Fair or Better Condition	79%	↓	Decrease	88%	ROPEC Master Plan
		Percentage of other Wastewater Facilities (excluding ROPEC) in Fair or Better Condition	96%	↓	Decrease	Maintain	Water Facilities Asset Management staff
		Percent of Wastewater Fleet assets in fair or better condition	68%	↓	62%	80%	Lifecycle modelling
		Percentage of wastewater pipes that were hydraulically cleaned	29%	↑	Increase	>20%	Water Linear & Customer Services staff

Service Attribute	Community Level of Service	Technical Level of Service	Current Performance (2023)	Trend (2024-2033)	Expected Performance (2033)	Target Performance (2033)	Source for Target
Affordability	Provide sustainable and affordable services over the long-term	Asset renewal funding ratio (renewal funding as a share of replacement cost) for Wastewater Collection and Conveyance assets	0.2%	Not applicable		0.4%	Lifecycle modelling
		Asset renewal funding ratio (renewal funding as a share of replacement cost) for Wastewater Treatment Facility (ROPEC)	1.0%	Not applicable		1.7%	Lifecycle modelling
		Asset renewal funding ratio (renewal funding as a share of replacement cost) for Other Wastewater Facilities (excluding ROPEC)[14,15]	2.7%	Not applicable		2.6%	Lifecycle modelling
		Asset renewal funding ratio (renewal funding as a share of replacement cost) for Wastewater Fleet assets	6.7%	Not applicable		7.8%	Lifecycle modelling

**Required by Ontario Regulation 588/17.*

Positive upward trend	**Negative upward trend**	**Positive downward trend**	**Negative downward trend**	**Positive stable trend**	**Negative stable trend**

14: There is low confidence in the estimates of asset renewal funding ratios for Other Wastewater Facilities because there are gaps in the data used to estimate replacement costs and forecast renewal needs, as noted in Section 1.3. This is why target performance is shown to be lower than expected performance.
15: Excludes Lagoons and CSST Storage because a forecast of renewal needs for these asset types was not available.

6.3 RISK MANAGEMENT

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.

Ontario Regulation 588/17 requires an analysis of the risks associated with the proposed levels of service and implementation of the Asset Management Plan. These key risks and how the City mitigates the most critical risks are summarized in the tables below.

Key Risks and Risk Mitigation for Levels of Service

Risk Area[16]	Potential Impacts	City Response
Funding for Growth	Underfunding may reduce ability to build new infrastructure to support growth in a timely fashion. This could put increased demand on existing infrastructure, reduced redundancy, higher reactive repair costs, and delayed development.	The City regularly updates the master plans and Development Charges By-law that address growth funding needs. Increased growth needs can be incorporated into these updates, and into future updates of the Asset Management Plan.
Lifecycle Renewal Funding	Delays in renewal activities could impact service reliability and increase long-term costs (including operations and maintenance costs).	The City prioritizes capital projects by assessing the condition of infrastructure assets, using a risk-based approach to evaluate the potential impact on service levels, and coordinating with other projects to minimize disruptions. This structured approach prioritizes critical assets and within affordability constraints.

16: As per section 6 of Ontario Regulation 588/17: the Asset Management Plan shall identify the risks associated with the options for which lifecycle activities could potentially be undertaken to achieve the proposed levels of service as well as the risks associated with those options to the long term sustainability of the municipality.

Risk Area	Potential Impacts	City Response
Operations & Maintenance Funding	Underfunding may reduce service reliability and increase emergency repairs.	Operating budget allocations are optimized such that funds are directed towards essential operations, emphasize preventive measures to maintain service levels, and consider public feedback to align with community needs and within affordability constraints.
Climate Change Mitigation & Resilience	Delaying climate-resilient upgrades, retrofits or initiatives may affect long-term asset performance, increase costs, and impact service delivery.	The Climate Change Master Plan (CCMP) and its supporting strategies provide direction for prioritizing climate investments in both mitigation and adaptation. The CCMP also identifies the need to apply a climate lens to asset management and capital projects, including through departmental capital planning and prioritization processes. Implementation of the CCMP and its supporting plans is a shared responsibility across all departments. The response to the 2024 CCMP audit will provide further direction on priorities.
Rising Asset Replacement Costs	Higher costs may lead to project delays and increased financial pressure. Less projects could be completed with the same amount of money.	The City uses comprehensive asset management, emphasizing preventive maintenance, and prioritizes investments based on risk and within affordability constraints. It also conducts long-term financial planning and explores innovative solutions to reduce costs and enhance service delivery.

Risk Area	Potential Impacts	City Response
Fleet Maintenance & Electrification	Higher maintenance costs or insufficient electrical infrastructure could affect fleet reliability and emergency response.	The Green Fleet Strategy recommends an approach that ensures the City has adequate infrastructure in place as it moves forward with vehicle electrification. The strategy recommends proactively developing energy supply and refueling infrastructure ahead of electrification as well as initiating building-level upgrades and civil infrastructure upgrades prior to the purchase of electric vehicles.
Extreme Weather Impacts	More frequent events may damage assets, disrupt services, and increase maintenance needs.	Climate Ready Ottawa – the City's draft climate resiliency strategy – is a long-term strategy and implementation plan that will guide City-wide action and investment to prepare for a much warmer, wetter and unpredictable climate. It includes conducting climate risk assessments for critical infrastructure to prioritize investments and actions. Insurance and City reserves are also available for unplanned costs due to extreme weather.
Operational Pressures from Climate Change	Increased demands on staff and resources may affect other service delivery or increase costs.	Climate Ready Ottawa considers future increased operating budget needs due to climate change by guiding long-term action and investment to ensure the city's resilience by 2050. Implementation of priority Energy Evolution projects may result in increases or decreases to operating budgets. Changes in operating budget pressures are considered annually as part of the budget process for specific projects and programs.

Risk Area	Potential Impacts	City Response
Non-Urgent Regulatory & Equity Needs	Delays may impact inclusivity, accessibility, and workplace suitability. Workforce pressures may impact staff retention and morale, which can affect continuity and capacity for emergency response.	The City strives to ensure that critical needs are met and within affordability constraints by prioritizing essential needs and services, seeking grants and partnerships, improving efficiency, engaging with the community, and conducting long-term financial planning. Accessibility and equity upgrades will be prioritized based on identified needs and risks.

Key Risks and Risk Mitigation for Asset Management Plan Implementation

Key Risks to Asset Management Plan Implementation	Response
Population forecasts may change.	Changes to population forecasts will impact the growth needs forecasts, which will be reviewed and updated at least every 5 years as part of the Asset Management Plan update. Key issues can be identified as part of the annual review of the City's progress in implementing the asset management plan and in the "Asset Management Implications" section of individual reports to Council.
Future approved budgets may vary from the planned budgets assumed in the Asset Management Plan financial analysis.	The Asset Management Plan will be updated at least every 5 years, including an updated budget analysis. This will allow for a reassessment of future needs, expected levels of service, and risk. Key impacts due to budget changes can be addressed in the annual review of the City's progress in implementing the asset management plan and in the "Asset Management Implications" section of individual reports to Council.

Key Risks to Asset Management Plan Implementation	Response
Council may take on more assets than planned in the Asset Management Plan.	Additional assets will most impact the operations and renewal forecast. Key impacts can be addressed annually as part of the review of the City's progress in implementing the Asset Management Plan and in the "Asset Management Implications" section of individual reports to Council.
Council or changes in legislation/regulation may mandate higher/different target service levels.	Higher or different proposed service levels will impact spending needs which could result in a need to consider alternative approaches to service delivery, increases in revenue to support increased service levels, or a shifting of funding that re-prioritizes service levels and possibly increases risk in other areas. This will be reviewed and updated at least every 5 years as part of the Asset Management Plan update. As indicated above, key impacts can be addressed annually as part of the review of the City's progress in implementing the Asset Management Plan and in the "Asset Management Implications" section of individual reports to Council.
Changes in asset or financial data, which may affect the findings presented in the Asset Management Plan.	Changes in the data used to produce the Asset Management Plan will be reflected in the Asset Management Plan update at least every 5 years. As indicated above, key impacts can be addressed annually as part of the review of the City's progress in implementing the asset management plan and in the "Asset Management Implications" section of individual reports to Council.

6.4 NON-FINANCIAL STRATEGIES

Given that planned budgets are not expected to be sufficient to fully fund all forecasted asset lifecycle needs, alternative methods must be employed to mitigate the risks associated with underfunding. A variety of non-financial strategies exist or can be implemented to address this issue, including:

- Improve condition assessments and asset data to better inform planning and decision-making.
- Contingency planning to manage intervention timing and risk.
- Extending the operational lifespan of assets beyond their expected useful life.
- Implement initiatives from the Fleet Service Review.

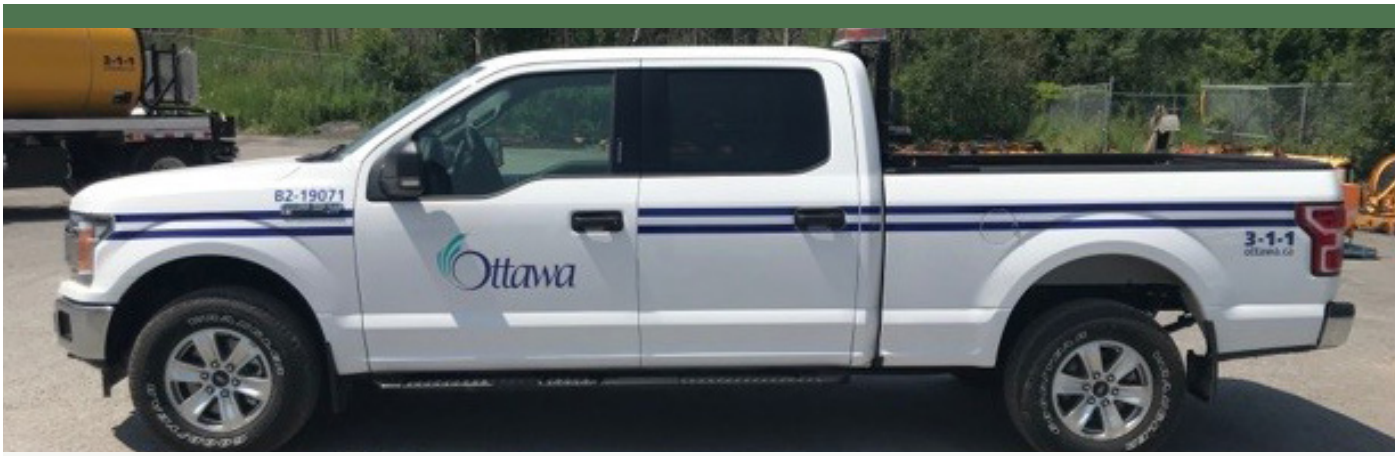
Any new strategies may have impacts on residents and services and should be subject to further study prior to being pursued.

Improvement Plan

The regulation requires that the Asset Management Plan demonstrate the municipality's approach to continuous improvement and adoption of appropriate practices regarding asset management planning. Based on the snapshot of current conditions and existing plans presented in this Asset Management Plan, areas of potential improvement include:

- Continue to address data gaps, data management, and record keeping
- Update cost estimates
- Review, track and report levels of service
- Improve and expand needs forecasts, financial forecasts and funding analysis
- Continue populating expected level of service projections
- Further integrate climate change mitigation and adaptation
- Expand the application of an equity and inclusion lens

The Asset Management Plan 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 the Asset Management Plan, and the background information and reports upon which it is based, please visit ottawa.ca or contact the City of Ottawa Asset Management Service.

Appendix A:

Descriptions of Provincially Legislated Community Levels of Service

Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system:

The City's wastewater collection system consists of combined sewers, partially separated sewers and sanitary sewers. The wastewater collection system gathers wastewater from homes, businesses and industrial sites, transporting it through a network of sewers, pumping stations and forcemains to trunk sewers. The wastewater then flows to the Robert O. Pickard Environmental Centre for treatment.

Ottawa's wastewater collection system covers over 2,700 square kilometres and extends from West-Carleton to Cumberland. In the rural areas, a variety of collection methods are used: Richmond, Munster Hamlet and Carp are connected to the municipal trunk system; elsewhere individual septic systems are used and the sludge from septic tanks is transported to the Robert O. Pickard Centre for treatment.

A map illustrating the extent of the wastewater network across the geographic area is provided below.

Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes; and description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches

The City of Ottawa has implemented the following plan to mitigate the impact of combined sewer overflows into the Ottawa River:

- The Combined Sewage Storage Tunnel (CSST) is the most significant infrastructure project that the City has undertaken to mitigate the impact of CSOs into the Ottawa River.
- Real time controls to ensure maximum capture of overflows before they occur.
- Ongoing sewer separation projects.

- Review of the effectiveness of the current sewer separation program, in comparison to other projects.
- Development and implementation of a Wet Weather Infrastructure Management Plan.

There are 13 locations in Ottawa where sewer overflows may enter the river. Frequency and volume vary based on intensity and duration of wet weather events. In 2023, there were 5 combined sewer overflow events. Most of these did not occur in habitable areas or beaches.

The performance objective for the CSST is compliance with the City Council mandated CSO control objectives for ORAP and the MECP CSO control policy defined in Procedure F-5-5. The City Council mandated CSO control objectives for ORAP are based on capturing and treating all of the potential overflows during the swimming season (June 1 to September 30) in an average year while accepting some overflows during years with more severe wet weather than the design year and/or during very large rain events. The Beach Protection overflow frequency requirements of the MOE Procedure F-5-5 is less stringent than the City Council mandated CSO control objective and allows two overflow events per swimming season for an average year with the combined total duration of the CSOs at any single CSO location being less than 48 hours.

This objective is achieved by storing excess combined sewage originating from four (4) overflow locations associated with four (4) major collectors (Booth Street Sewer, Cave Creek Collector, Rideau Canal Interceptor and Rideau River Collector) and the Kent Street Sewer and releasing the sewage by gravity back to the Interceptor Outfall Sewer (IOS) when capacity is available.

Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes; and description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described above

Stormwater can enter sanitary sewers via extraneous flow. Extraneous flow has two distinct components: Inflow and infiltration. Infiltration is water entering the sanitary system through defects and damage, such as cracks in sewers, maintenance hole, and laterals. Infiltration typically enters the system slowly over time with gradual changes in flow rates. Inflow is typically water entering the sanitary system through direct connections to sewers through floor drains, foundation drains, roof drains, cross-connections, internal overflows, maintenance hole covers, building catch basins, and unsealed openings in a construction site. Inflow typically enters the system rapidly and can cause fast and extreme changes in flow rates. Infiltration uses baseline sewer capacity but rarely causes flooding or overflows by itself. Inflow is the primary cause for sewer capacity to be exceeded for short periods of time, causing flooding and overflows to occur.

Stormwater enters combined sewer systems via all the above means and via catch basins as it is designed as a storm drainage system as well. To prevent flooding from the combined system, strategically placed overflows are used to direct excess flow to outlets, such as rivers or lakes.

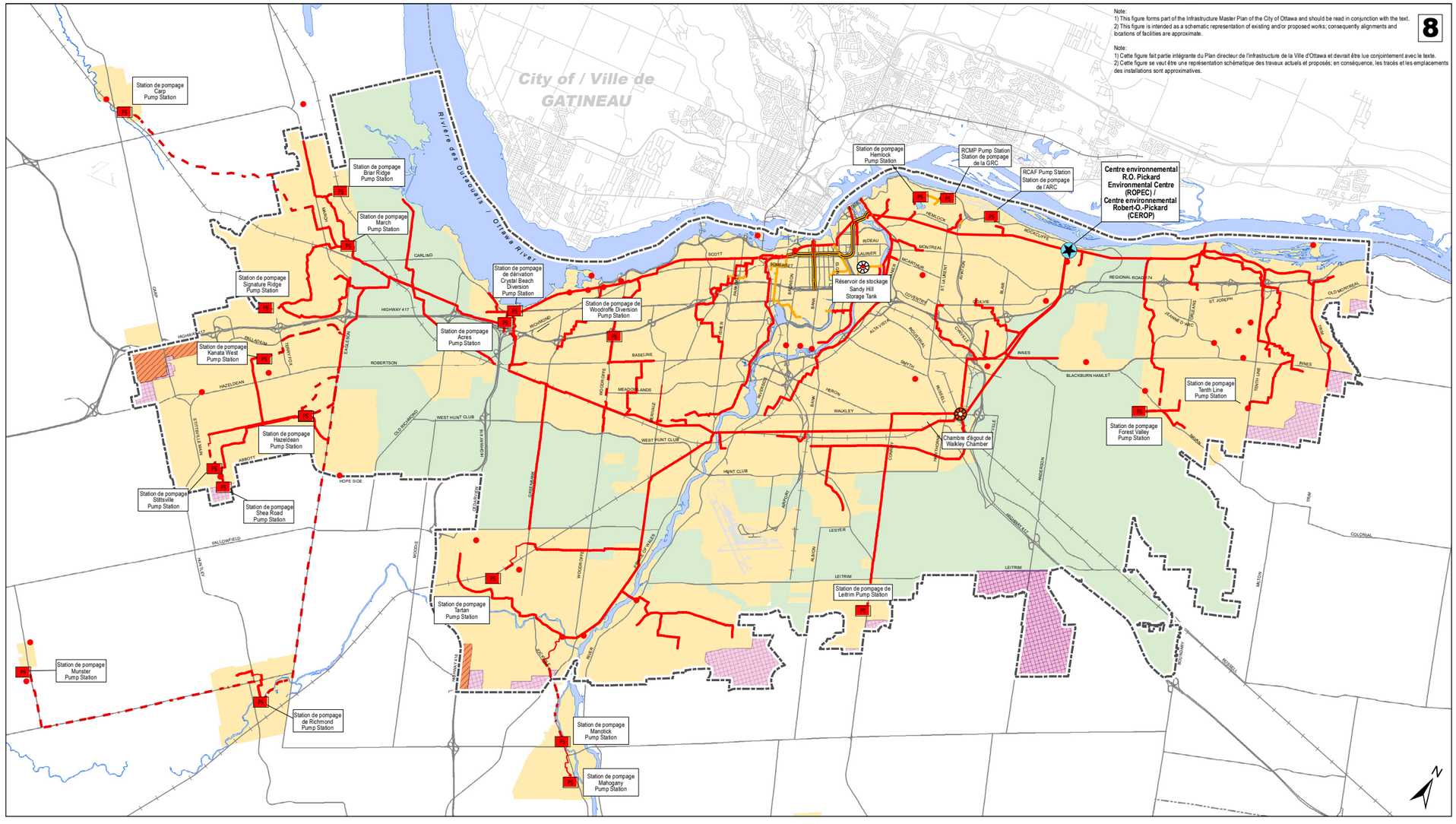
Note that the City has made significant investments to reduce CSOs and to reduce the impacts on rivers and other receiving watercourses. These investments include the construction of the CSST.

To minimize sewage overflow and flooding, the City of Ottawa has established comprehensive design standards and specifications, and established approaches to infrastructure planning to ensure resilience and avoidance of overflow and flooding events. For new construction, sanitary sewer systems are designed and constructed to be resilient in a number of ways (such as upgraded trunk sewers to accommodate future growth). The City continues to review the effectiveness of resiliency measures as part of continuous improvement.

Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system

All final effluent from the City's wastewater treatment plant have documented compliance limits and objectives. Provincially regulated parameters are Carbonaceous Biochemical Oxygen Demand, Total Suspended Solids, Total Phosphorus, E. coli, pH, Dissolved Oxygen, and Total Residual Chlorine; federally regulated parameters are Carbonaceous Biochemical Oxygen Demand, Total Suspended Solids, Total Residual Chlorine, Unionized Ammonia, and Non-Acutely lethal effluent (Acute Lethality of Effluents to Rainbow Trout). All compliance limits and design objectives were met in 2023.

MAP OF OTTAWA'S WASTEWATER ASSET NETWORK



EXISTING INFRASTRUCTURE / INFRASTRUCTURES EXISTANTES

- Combined Sewage Storage Tunnel / Tunnel de stockage des égouts unitaires
- Combined Trunk Sewer / Égout unitaire collecteur
- Sanitary Trunk Sewer / Égout sanitaire collecteur
- Forcemain / Conduite de refoulement
- Chamber / Chambre
- Storage Tank / Réservoir de stockage
- Treatment Plant / Usine de traitement
- Main Pump Station / Station de pompage principale
- Local Pump Station / Station de pompage locale
- Urban Boundary / Périmètre d'urbanisation
- Greenbelt / Ceinture de verdure
- Public Service Area / Zone de desserte

URBAN EXPANSION AREAS / ZONES D'EXPANSION URBAINE

- Future Neighbourhood / Futur quartier
- Industrial and Logistics / Industrie et Logistique

Ottawa

INFRASTRUCTURE MASTER PLAN - Schedule 8
Existing Wastewater Collection System

PLAN DIRECTEUR DE L'INFRASTRUCTURE - Annexe 8
Réseau de collecte des eaux usées existant

0 1.25 2.5 5 7.5 10 km

Planning, Development and Building Services, Geospatial Analytics, Technology and Solutions
Direction générale des services de planification, de l'aménagement se du bâtiment, Analyse géospatiale, technologie et solutions