Appendices

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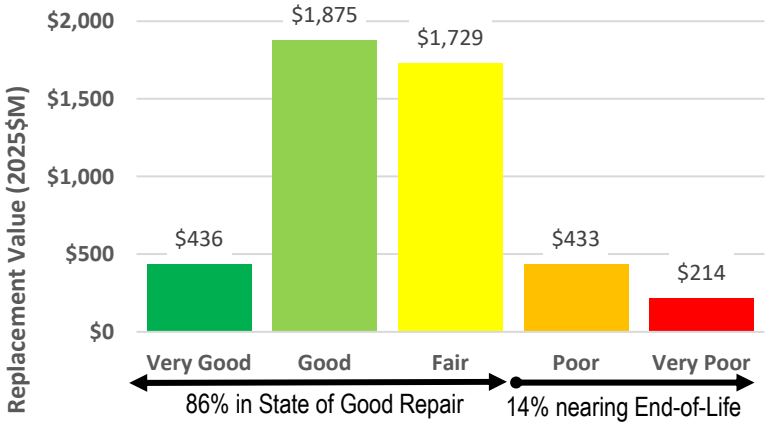
A. APPENDIX A – WATER AND WASTEWATER SERVICES

A.1 State of Local Infrastructure

The following figure shows the asset inventory replacement value by condition grade.



Total Asset Valuation (2025$)
$4.69 billion

Average Asset Condition (2024)
GOOD-FAIR

Replacement Value and Condition

The Water and Wastewater Services asset inventory includes water system assets: trunk and dual watermains in both urban integrated system as well as in the Townships of Wellesley and North Dumfries, elevated storage tanks, water reservoirs, booster systems and flow chambers as well as wastewater system assets: wastewater treatment facilities, a biosolids processing facility, pumping stations and two (2) collection systems in North Dumfries and Wellesley. The 13 Wastewater Treatment Plants, Watermains, Ground Water and Surface Water Supply Systems account for almost 85% of the Water and Wastewater Services asset portfolio, by replacement value.

With over $4.6 billion dollars in assets, the ability to manage infrastructure repair, rehabilitation and replacement, in conjunction with upgrades and expansions requires a detailed inventory of assets, physical condition and performance data to accurately determine both short term and long term needs. Asset condition is mainly determined by visual condition assessments for the majority of assets. Water and Wastewater Services strives to undertake formal condition assessment on assets on a five to seven year frequency; however, this often excludes most buried infrastructure, as well as assets located in confined spaces or that cannot be taken out of service at the time of the assessment. Gravity sewers are an exception where inspections on this type of buried infrastructure have recently occurred via Closed Circuit Television (CCTV).

For assets that have not undergone a recent formal condition assessment, age based condition is applied.

Inspection and rehabilitation programs for asset portfolios that are more difficult to inspect are continuously being improved. This includes in-ground and elevated water storage, production wells and other large structures such as tanks and clarifiers where inspection requires significant advanced planning and may require isolation, draining, cleaning and confined space entry to undertake the inspection. The Region is currently formalizing the condition assessment and rehabilitation process to enable consistent data collection that supports advanced asset management planning, reporting, operations and maintenance and capital needs forecasting.

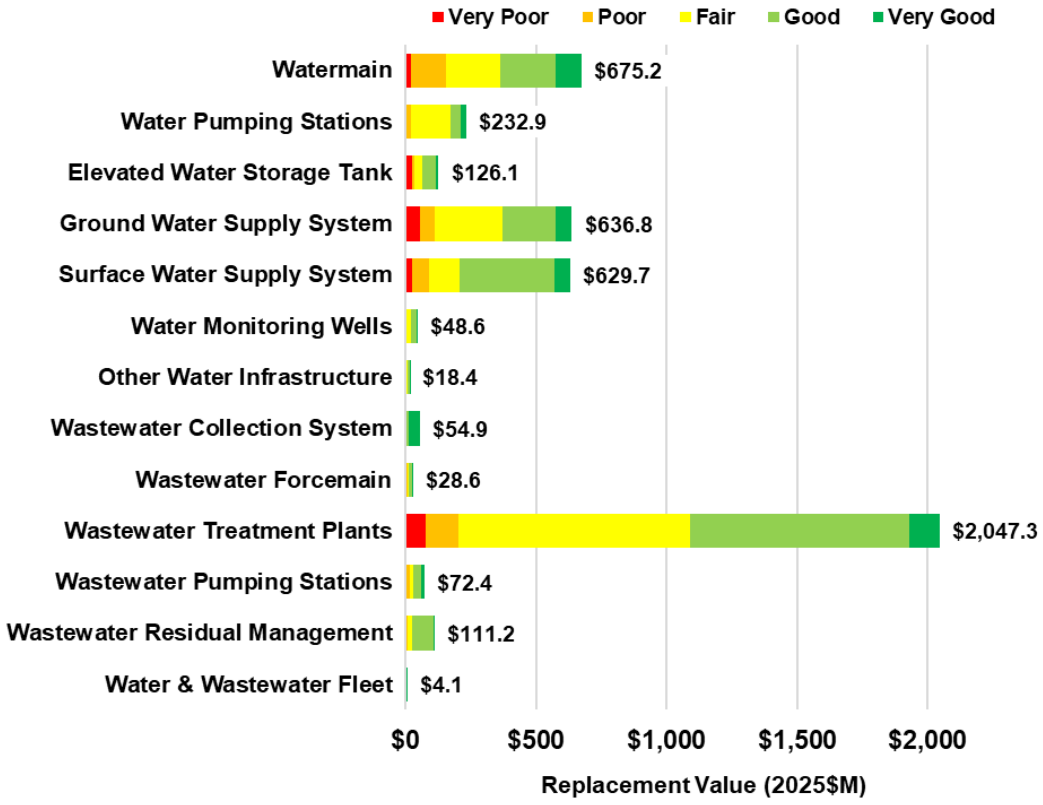
It is an acceptable industry practice to have some assets in poor or very poor condition. A “run to failure strategy” is an intentional practice that considers the following:

- cost of continued maintenance versus replacement cost
- risk or consequence of asset failure (e.g. risks are minimized where redundancy is in place)
- availability of “shelf spares” or equipment that is readily available and can be quickly and easily replaced
- when a failure occurs on gradual basis and replacement or intervention can be planned (e.g., the slow decline of supply from a production well)

Essentially, the failure of the asset and subsequent replacement will not impact service delivery and supports lowest lifecycle costing.

The following figure presents the condition profile for Water and Wastewater Services:

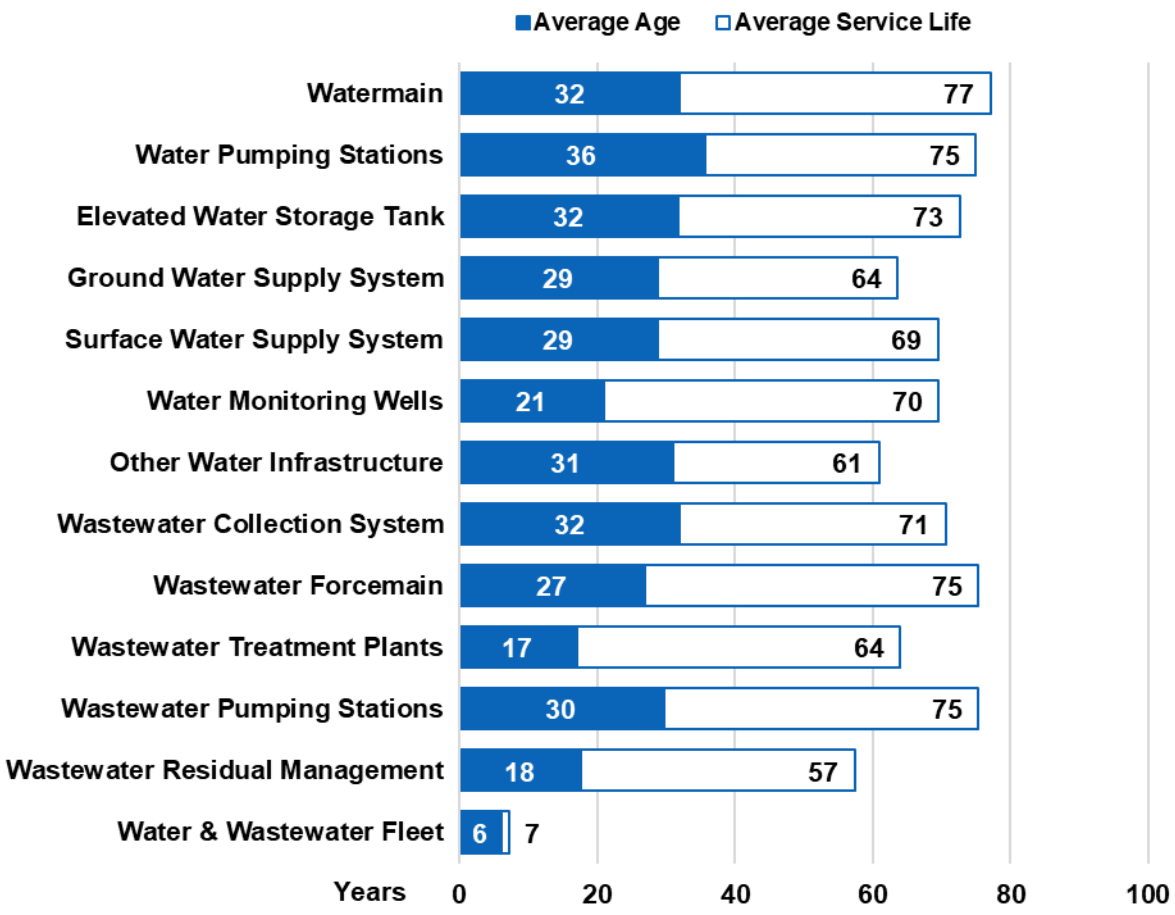
Figure A.1: Asset Condition Profile – Water and Wastewater Services



Average Age

The average age of water service assets, weighted by replacement value, is summarized in the following figure by asset class. The majority of Water and Wastewater Services' assets are in the first half of their expected service life.

Figure A.2: Asset Age Profile – Water and Wastewater Services



A.2 Levels of Service

The following table provides information on customer and technical LOS. These LOS focus on those relevant to asset operations, maintenance and renewal to maintain current LOS. LOS pertaining to growth and upgrading services are generally covered in Master Plans and are not repeated in this AM Plan. LOS measures that are required by Ontario Regulation 588/17 are indicated by (O.Reg.588).

Summary:

- The water system maintains high compliance with drinking water standards and has minimal service disruptions.
- Wastewater services are generally stable, with a low percentage of bypass events and high compliance with environmental regulations.
- Aging infrastructure, coupled with anticipated growth pose an increasing risk to service reliability.
- Recommendation: Increase investment in preventative maintenance and renewal programs for aging assets to sustain long-term service reliability.

Water Current Levels of Service

Customer LOS	Technical Measure	Asset Type	Current Performance (2024)	Target Performance (2025-2034)
Water Assets				
Region is responsible for supply of safe drinking water through treatment, storage and the watermain network (trunk, dual ownership and local watermains) *	Percentage of properties connected to the municipal water system (O.Reg.588)	Water Service Area	93.34%	N/A - Regulatory metric required under O.Reg. 588/17; values to be updated in future Corporate AMP cycles
Region's Integrated Urban System (IUS) and Wellesley, Ayr, Conestogo Golf and St. Clements are designed to meet fire flow demands *	Percentage of properties where fire flow is available (O.Reg.588)	Water Service Area	92.84%	
In rare instances, boil water advisories are issued when conditions or concerns may adversely affect the quality or safety of the potable water supply - Refer to detailed description below.	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 (O.Reg.588)	All Water Asset Classes	0	0
	The number of connection-days per year due to watermain breaks compared to the total number of properties connected to the municipal water system (O.Reg.588)	Watermains	Not available *	N/A
	Percent of Compliance to Drinking Water Standards	All Water Asset Classes	100%	100%
Wastewater Assets				
Region has undertaken initiatives to identify and remedy I/I issues, including flow monitoring, CCTV inspections and rehabilitation and repair work - Refer to detailed description below.	Percentage of properties connected to the municipal wastewater system (O.Reg.588)	All Wastewater Asset Classes	79%	O.Reg. 588/17; values to be updated in future Corporate AMP cycles
	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system. (North Dumfries and Wellesley) (O.Reg.588)	All Wastewater Asset Classes	0.01%	<0.1
	Percentage of Final Effluent Samples Exceeding ECA Limits	All Wastewater Asset Classes	2.59%	5%
The Region monitors the treated water leaving each wastewater treatment plant to	Percentage of Wastewater Estimated to have Bypassed Treatment (Raw)	Wastewater Treatment Plants	0%	0%

Customer LOS	Technical Measure	Asset Type	Current Performance (2024)	Target Performance (2025-2034)
ensure regulatory requirements are met *	Percentage of Wastewater Estimated to have Bypassed Treatment (Partially Treated)	Wastewater Treatment Plants	0.067 %	5%
	Percentage of Wastewater Estimated to have Bypassed Treatment (Total)	Wastewater Treatment Plants	0.067%	5%

* Refer to detailed description below.

Areas Connected to Municipal Water System

The Region is responsible for the supply of safe drinking water. The Region's water systems include one surface water treatment plant, ground water supply systems, elevated water storage, water reservoirs, pumping stations and transmission, dual ownership and local watermains. The Region also provides distribution services in North Dumfries and Wellesley Townships. The Water Supply Strategy Update provides a long-term, coordinated strategy to drinking water supply to meet current and future population growth.

Areas with Fire Flow

The Region's Integrated Urban System (IUS) services the Tri-Cities (Cambridge, Kitchener and Waterloo) as well as some towns and settlement areas within surrounding Townships, including Woolwich (Elmira, St. Jacobs, West Montrose, Conestogo Plains and Breslau), Wilmot (St. Agatha, Mannheim and Shingletown) and North Dumfries (Lloyd Brown). The Region also services 13 smaller rural communities located in the four Townships. These communities are supplied by smaller communal systems independent of the IUS.

The IUS system is designed to meet fire flow demands; however, fire protection services are the jurisdiction of the local municipalities who operate and maintain the distribution system. Wellesley, Ayr, St. Clements and parts of the Conestogo Golf Course are the only small rural systems that are designed to meet and provide fire flow demands.

Description of Boil Water Advisories and Service Interruptions

The Region's Water and Wastewater Services Division, in collaboration with the Public Health Department, manages water services to ensure a safe water supply. Boil water advisories are issued when conditions or concerns may adversely affect the quality or safety of the potable water supply. Boil water advisories protect the community from potentially harmful organisms that may be in the water that may be detrimental to the health of the community. Most boil water advisories are issued because the equipment and processes used to treat, store or distribute drinking water break down, require maintenance, or have been affected by environmental conditions. Potential causes include broken water mains, planned system maintenance, power failures or equipment problems. Also, extreme weather or heavy rains may cause the quality of surface or ground water sources to temporarily worsen, challenging the drinking water treatment system.

Service Interruptions (Breaks)

The “number of connection-days per year due to watermain breaks compared to total number of properties connected to the municipal water system” is challenging to report for an upper tier municipality. The Regional transmission watermain network provides redundancy to the supply of the local distribution system. While the entire system may experience impacts of the break, an isolation of a transmission main due to a break does not directly impact a number of properties in a way that an isolation of a local distribution system watermain would. Therefore, it is more appropriate for the lower tier municipality that operates the distribution system to provide data on this metric instead of the upper tier.

As previously discussed, the Region does provide distribution services in North Dumfries and Wellesley Townships. In 2019, there was one break that occurred in Wellesley that impacted approximately 125 properties for 2 hours.

Inflow and Infiltration (I/I)

Inflow occurs when stormwater enters the sanitary sewer systems at points of direct connection to the systems (e.g., rain leaders, basement sump pumps, foundation drains). Infiltration occurs when groundwater enters the sanitary sewer systems through cracks and/or leaky joints in the pipes, service connections or maintenance holes. These cracks or leaky joints may be caused by physical deterioration, poor design, installation or maintenance errors, or root infiltration. I/I increases flow to the sanitary collection system which is ultimately received by the wastewater treatment plants. Extraneous I/I flow increases the risk of sanitary sewage backups in homes and businesses as well as the risk of upset to wastewater treatment plant processes, including a higher chance of requiring bypass. In the Region’s Wastewater Treatment Master Plan, I/I extraneous flows were identified as an issue at Wellesley WWTP, St. Jacobs WWTP and Elmira WWTP, which historically have had higher than typical I/I rates. Initiatives have been undertaken by the Region to identify and remedy I/I issues, including flow monitoring, CCTV inspections and rehabilitation and repair work. The Region is also continuing to encourage I/I identification and reduction opportunities, such as sewer collection system modeling studies and promotion and education on impacts of private side connections on the sewer system.

Wastewater Treatment Effluent Discharge

The Region monitors the treated water leaving each wastewater treatment plant to ensure all legislative requirements are met. In the 2018 Wastewater Treatment Master Plan, the future effluent objectives are outlined as well as the recommended level of treatment for each facility. Effluent objectives are established to support protection of the receiving natural environment as well as meet current and projected future regulatory trends.

A.3 Asset Management Strategy

Background

The Drinking Water Quality Management System (DWQMS) framework is used to manage risk to the water supply system by identifying possible hazards, assigning risk scores and identifying procedures to mitigate the risk. In combination with legislated regulations, the wastewater treatment system has procedures, process objectives and preventative measures to help assess and mitigate risk to the environment. In circumstances of non-compliance, the Region reports incidents to the MECP, outlining mitigating measures. In addition, Master Planning supports the development of comprehensive, long-range plans for infrastructure requirements according to the Municipal Class EA Planning Process.

Risks relating to infrastructure failure are mitigated through inspection and maintenance programs which provide the necessary data to ensure that the work required to achieve the established LOS is identified, planned, funded and completed. Annual capital and maintenance programs and associated budgets ensure that funding to undertake the necessary work is provided. Water and Wastewater Services continues to manage demand through education and initiative such as monitoring and reduction strategies for water loss and inflow and infiltration.

Linear Assets

For gravity sewers, the Region is currently piloting a 6-year flushing, cleaning, inspection and rehabilitation schedule within the Townships of Wellesley and North Dumfries. System-wide inspection, flushing and cleaning is undertaken to identify required rehabilitation for the 6-year timeframe, as well as identify and track sewers that are observed to have significant operation and maintenance defects such as grease build-up. Historically, system wide flushing has been undertaken every two years; however, the Region is evaluating a more frequent cleaning and inspection schedule for sewers that have been observed to have significant operation and maintenance defects (e.g. grease build-up). Targeted outreach is also undertaken where operation and maintenance defects are observed, such as education about proper disposal of fats and grease to businesses and residents.

The Region operates two small collection systems that were constructed between 1970 to today. These systems have been assessed and are in good condition. To date, only minor rehabilitation has been required. Condition will continue to be monitored to support future forecasted renewal requirements.

Theoretical service lives for both linear water and wastewater assets are based on diameter (which informs criticality), and then adjusted based on other factors such as material. Where possible, linear capital works projects are coordinated with other corridor assets, such as roads.

Linear Water Asset Management Strategies

Asset Class	Asset Criteria	Asset Criticality	Service Life (Years)	Other Service Life Variables	Technical LOS
Gravity Sewers / Watermains	Diameter >900 mm	Very High	90	1) Concrete pipe - add 10 years to base life expectancy 2) Cement lined pipe - add 10 years to base life expectancy 3) Plastic pipe - 75 years overrides all base life expectancy 4) Cast Iron pipe constructed before 1930 - 100 years life expectancy overrides all base life expectancy 5) Clay pipes - 100 years life expectancy overrides all base life expectancy	Gravity Sewers: The number of connection-days per year due to wastewater backup Watermains: Number of connection-days per year due to water main breaks
	Diameter >=675 mm and <= 900 mm	High	80		
	Diameter >= 300 mm and <= 600 mm	Moderate	70		
	Diameter >= 250 mm and <300 mm	Low	70		
	Diameter < 250 mm	Very Low	60		
Outfalls, Forcemains (all)		Very High	75	None	

The Region has started assessing inspection technologies and their associated costs to identify where their use would be most effective within the water network. In addition, for some of the

most critical watermains, chamber inspections are being undertaken to determine condition and rehabilitation and renewal requirements. The Watermain Working Group was formed to focus improvement efforts, including reviewing and updating response plans and procedures to emergency watermain breaks.

Vertical Assets

The Region regularly inspects its vertical assets to monitor condition and performance, according to Water Service's Inventory and Condition Assessment Protocol. These assessments are performed to identify and update all major building, process and site works assets and components, and to assess their current physical condition and performance. Assets are replaced at the end of service life, and rehabilitated as necessary, to ensure the continued intended operation of the water and wastewater systems. Asset renewal requirements are bundled into capital projects based on the type of renewal required and the required timing, and a prioritization framework is used to help define project priorities. The Region conducts annual inspections of water storage tanks and is developing an optimized capital plan for elevated tanks that aligns service levels with inspection schedules, coating maintenance or replacement and other related capital projects.

Common asset rehabilitation activities include the following:

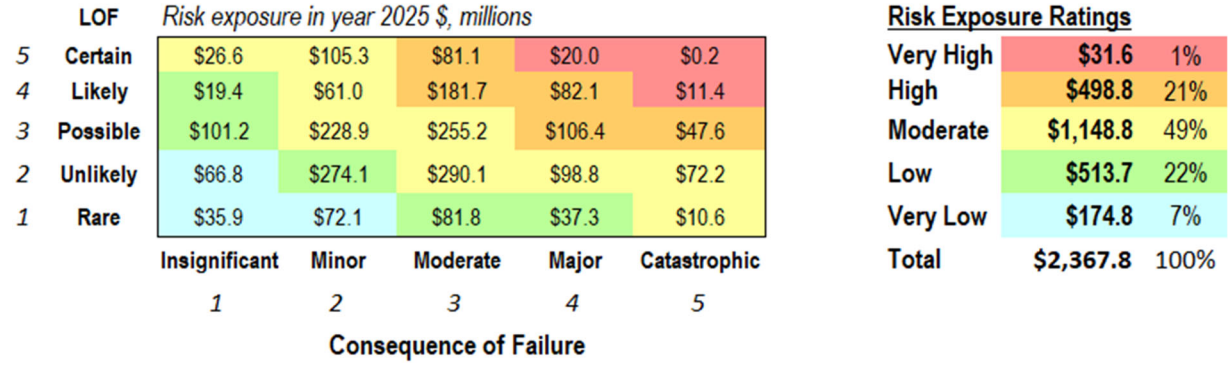
- Well rehabilitation accomplished by physical agitation alone and/or in combination with chemical scouring to remove articulates, corrosion and precipitation build up on screens and/or open rock formations
- Coatings and rehabilitation (e.g. crack injection) of concrete structures (e.g. concrete floors, clarifiers and reservoir hatches)
- Cleaning and painting/coating of metallic process equipment that has surficial corrosion (e.g. piping, valves, filter vessels, clarifier mechanisms)
- Assessment and top-up of media (e.g water treatment filters, odour control systems)
- Cleaning, painting and coatings for elevated tanks
- Pump rebuilds

For wastewater, compliance to Environmental Compliance Approvals (ECAs) and to emission levels of air and discharges drive many of the O&M and renewal activities. Similarly, for water, Safe Drinking Water Act compliance to Drinking Water Licenses and Ontario Drinking Water Standards guides asset operations and renewal needs. Best management practices, such as business case evaluations that determine optimum decision-making between rehabilitation versus replacement also drive the timing and choice of lifecycle activities. Theoretical service lives for both vertical water and wastewater assets are based on asset type (which informs criticality). The typical service lives are used to inform full lifecycle costs and long term forecasting. Actual condition assessment information overrides any planning that is performed based on typical service lives.

Criticality for vertical Water and Wastewater Services assets was assigned for each element type within a facility and for the facility, and combined with redundancy.

Risk maps enable the identification and prioritization of Very High risk assets that need to become candidates for closer inspection (to verify if they truly are Very High risk), renewal or replacement. Risk maps showing both replacement value and percentage of assets by replacement value are shown below.

Figure A.3: Risk Exposure Matrix Total – Water (in $M & %)

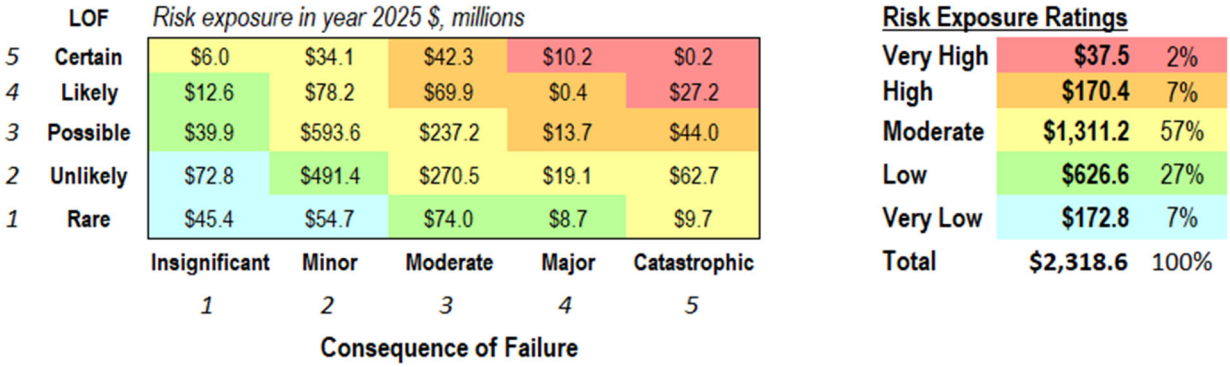


LOF		Risk exposure in year 2025 $, millions				
5	Certain	$26.6	$105.3	$81.1	$20.0	$0.2
4	Likely	$19.4	$61.0	$181.7	$82.1	$11.4
3	Possible	$101.2	$228.9	$255.2	$106.4	$47.6
2	Unlikely	$66.8	$274.1	$290.1	$98.8	$72.2
1	Rare	$35.9	$72.1	$81.8	$37.3	$10.6
		Insignificant	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5

Consequence of Failure

Risk Exposure Ratings		
Very High	$31.6	1%
High	$498.8	21%
Moderate	$1,148.8	49%
Low	$513.7	22%
Very Low	$174.8	7%
Total	$2,367.8	100%

Figure A.4: Risk Exposure Matrix Total – Wastewater (in $M & %)



LOF		Risk exposure in year 2025 $, millions				
5	Certain	$6.0	$34.1	$42.3	$10.2	$0.2
4	Likely	$12.6	$78.2	$69.9	$0.4	$27.2
3	Possible	$39.9	$593.6	$237.2	$13.7	$44.0
2	Unlikely	$72.8	$491.4	$270.5	$19.1	$62.7
1	Rare	$45.4	$54.7	$74.0	$8.7	$9.7
		Insignificant	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5

Consequence of Failure

Risk Exposure Ratings		
Very High	$37.5	2%
High	$170.4	7%
Moderate	$1,311.2	57%
Low	$626.6	27%
Very Low	$172.8	7%
Total	$2,318.6	100%

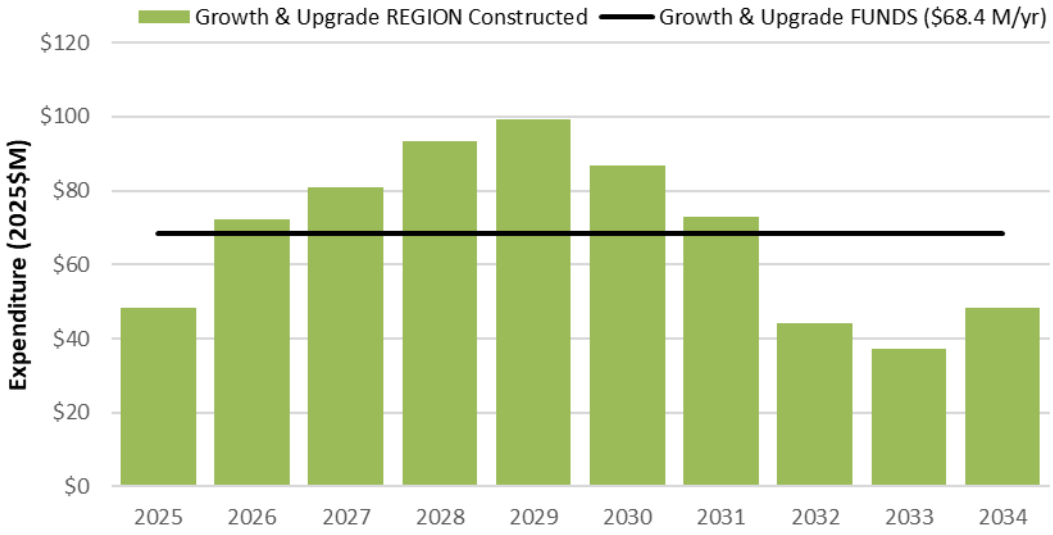
The Region's risk mitigation plans for the assets identified as Very High risk are included in the 2025 Budget Plan.

A.4 Expenditure Forecasts

Expansion (Growth) and Upgrade Investments

To maintain the current capacity and functional levels of service, the Region has planned expansion and upgrade works for each of the next 10 years and outlined the costs of providing these activities in the 2025-2034 Capital Program. The following graph shows these planned growth and upgrade investments over the next ten years.

Figure A.5: Growth and Upgrade Forecast – Water and Wastewater Services

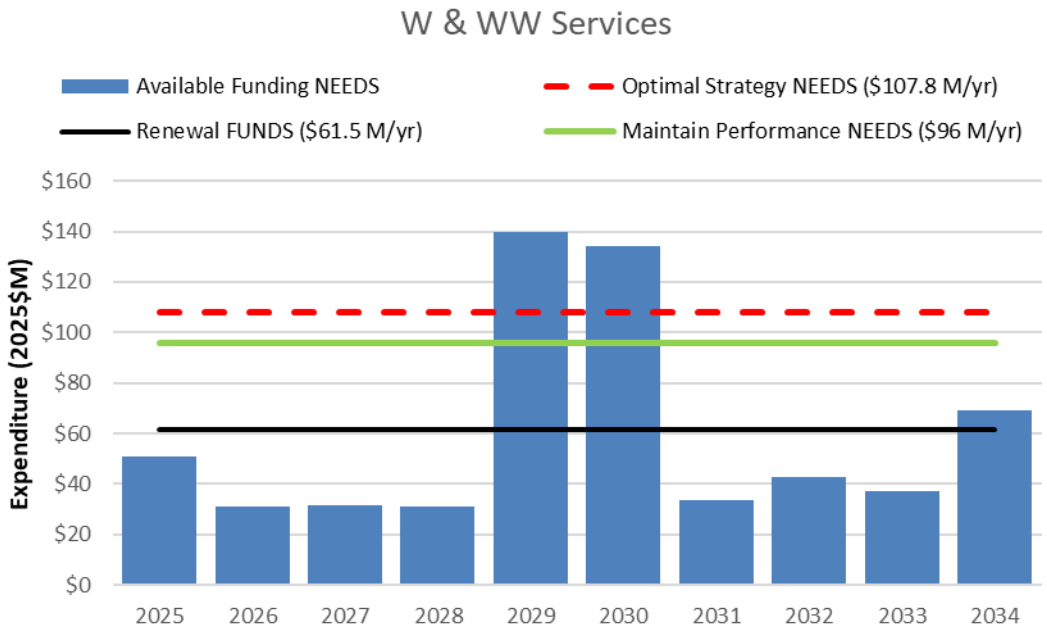


Renewals Investments

The primary performance measures for reliability are asset physical condition and associated risk. Based on the asset condition and risk information outlined in the preceding sections, three renewal needs scenarios are considered and analyzed over the next 10 year period (2025 to 2034), as required by O.Reg. 588/17.

The following figure shows the projected renewal needs for Scenario 2, the LOS that the Region proposes to provide for each of the next 10 years (blue bars) and the associated available funding (solid black line). The figure also shows the funding required to maintain current performance (Scenario 1 as the solid green line) and to undertake the optimal renewal strategy (Scenario 3 as the dashed red line).

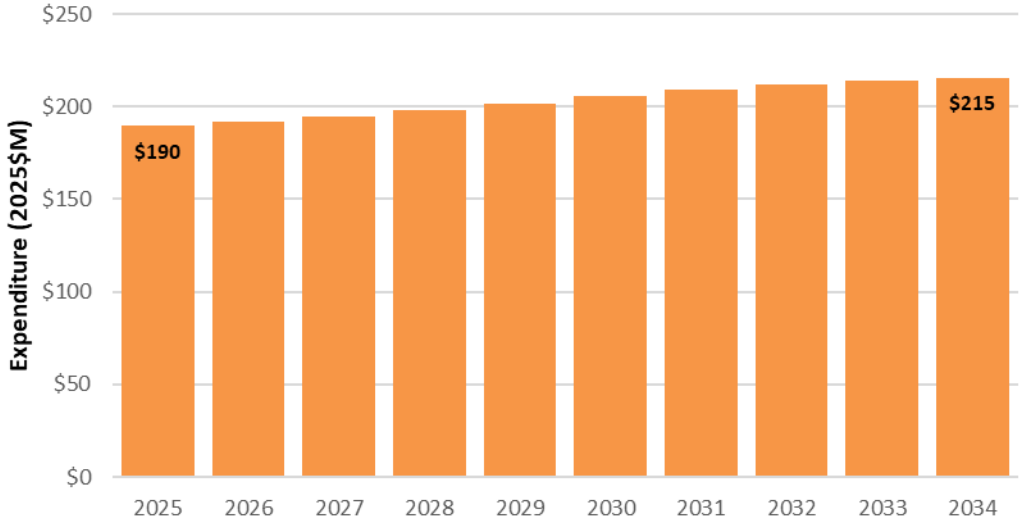
Figure A.6: Renewal Needs Forecast – Water and Wastewater Services



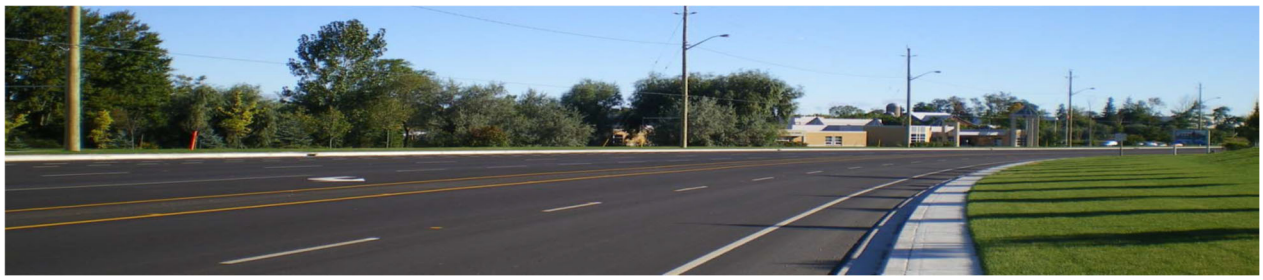
Operating Expenditures

To maintain the current levels of service, the Region includes planned maintenance and operations works in its annual operating budget. Operating expenditures include those related to infrastructure operation and maintenance and capital financing (reserve transfers and debt servicing costs). The operating expenditures related to infrastructure operation and maintenance are shown in the following graph, which shows these costs increasing proportionately with growth and upgrade of the asset portfolio.

Figure A.7: Operating Needs Forecast – Water and Wastewater Services

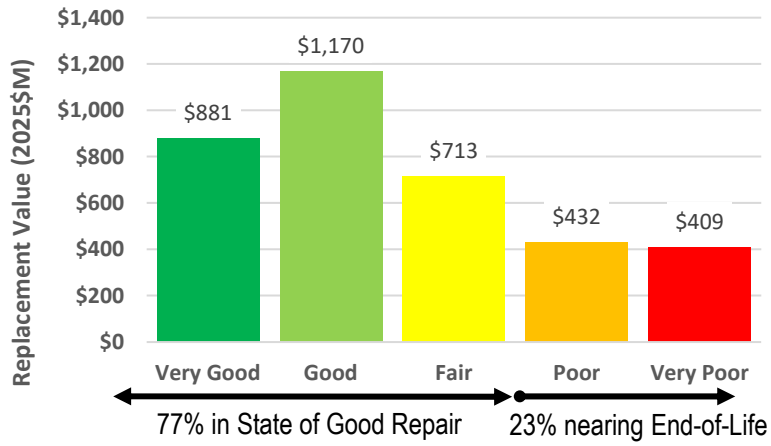


B. APPENDIX B – TRANSPORTATION SERVICES



B.1 State of Local Infrastructure

The following figure shows the asset inventory replacement value by condition grade.



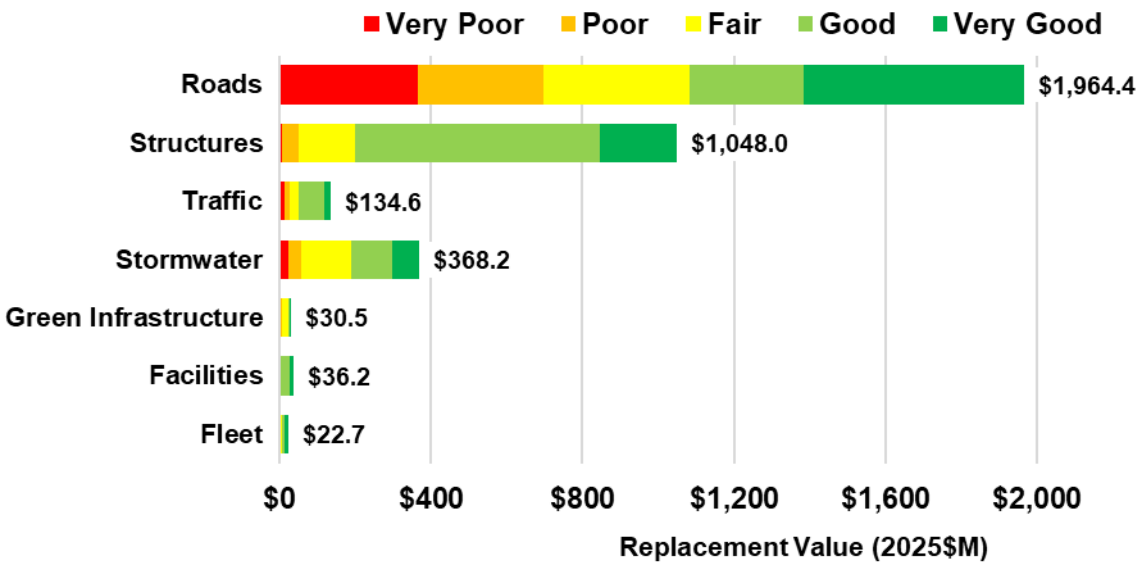
Total Asset Valuation (2025$)
$3.60 billion

Average Asset Condition (2024)
GOOD-FAIR

Replacement Value and Condition

Asset condition is determined by visual condition assessments for roadway pavement, structures, noise walls, retaining walls, culverts and facilities. The overall GOOD-FAIR condition rating for the transportation portfolio is driven in large part to the condition of roadway pavement (pavement condition index or PCI) and structures (bridge condition index or BCI) as these assets comprise the majority of the transportation asset portfolio by replacement value.

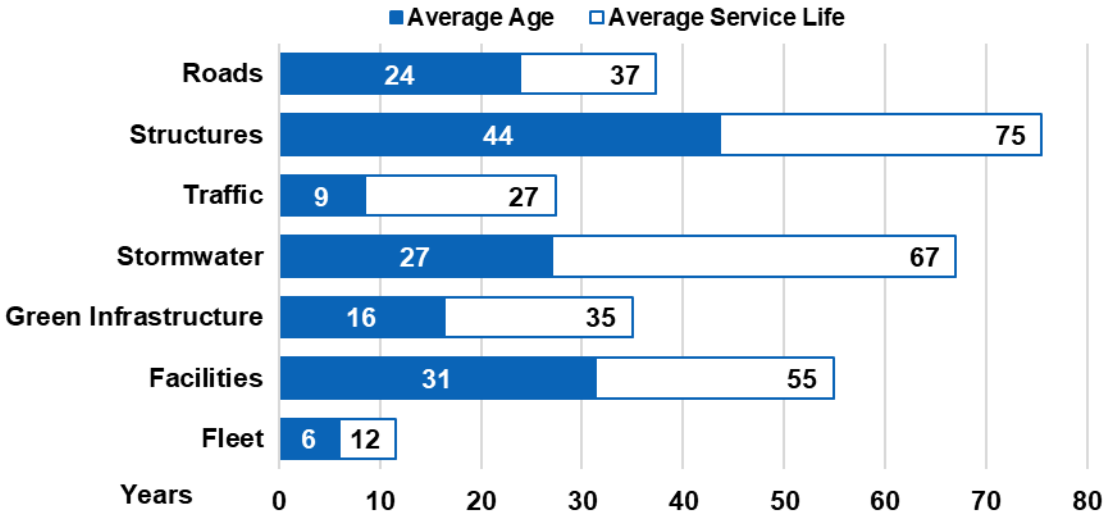
Figure B.1: Asset Condition Profile – Transportation Services



Average Age

The average age of this service area's assets, weighted by replacement value, is summarized in the following figure by asset class. The majority of assets are in the first half of their expected service life.

Figure B.2: Asset Age Profile – Transportation Services



B.2 Levels of Service

The following table provides information on corporate, legislated, customer and technical LOS. These LOS focus on those relevant to asset operations, maintenance and renewal to maintain current LOS. LOS pertaining to growth and upgrading services are generally covered in Master Plans and are not repeated in this AM Plan. LOS measures that are required by Ontario Regulation 588/17 are indicated by (O.Reg.588).

Summary:

- The transportation LOS data indicates that existing road and bridge assets are performing well, with low instances of restrictions and high pavement condition index values.
- There is a lack of data on active transportation infrastructure (cycling lanes, separated pathways), highlighting a gap in mobility planning.
- Climate adaptation remains a challenge, with stormwater resilience data still incomplete.
- **Recommendation:** Enhance monitoring of active transportation infrastructure and integrate climate adaptation measures in asset planning to mitigate long-term risks.

Transportation Current Levels of Service

Customer LOS	Technical Measure	Asset Type	Current Performance (2024)	Target Performance (2025-2034)
Region manages an extensive network of roads that serve a variety of purposes including local access, regional travel and access to provincial highways * (O.Reg.588)	Number of lane-kilometres of each of arterial roads and collector roads as a proportion of square kilometres of land area of the municipality (O.Reg.588)	Roadways	Arterial: 0.72 Collector: 0.55	N/A – Regulatory metric required under O.Reg. 588/17; values to be updated in future Corporate AMP cycles
Municipal bridges support various vehicle types including heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians and cyclists. (O.Reg.588)	Percentage of bridges in the municipality with loading or dimensional restrictions (O.Reg.588)	Bridges & Culverts	1 bridge	0%
An overall Pavement Condition Index is calculated, scaled from zero to 100 and then divided into 1 to 5 scale to report condition - Refer to scale and associated photos below.	For paved roads in the municipality, the average pavement condition index value (O.Reg.588)	Roadway Pavement	67.7	N/A – Regulatory metric required under O.Reg. 588/17; values to be updated in future Corporate AMP cycles
Regional Roads provide safe, direct, accessible and multi-modal transportation links for moving people and goods throughout Waterloo Region (Official Plan)	% assets rated Fair, Good or Very Good (by replacement value)	Roadway Pavement	63.8%	≥ 70%
		Bridges & Culverts	96.9%	≥ 98%
		Noise Walls	98.5%	≥ 98%
		Retaining Walls	98.6%	≥ 98%
		Guide Rails / Safety Devices	52.4%	≥ 85%
An overall Bridge Condition Index is calculated, scaled from zero to 100 and then divided into 1 to 5 scale to report condition - Refer to scale and associated photos below. (O.Reg.588)	Bridges: average bridge condition index value (O.Reg.588)	Bridges	78.3	N/A – Regulatory metric required under O.Reg. 588/17; values to be updated in
	Culverts: average bridge condition index value (O.Reg.588)	Culverts	73.3	

Customer LOS	Technical Measure	Asset Type	Current Performance (2024)	Target Performance (2025-2034)
				future Corporate AMP cycles
The Region manages stormwater assets to support the stormwater networks managed by local area municipalities that protect urban areas from flooding. (O.Reg.588)	% of properties in municipality resilient to a 100-year storm (O.Reg.588)	Stormwater Management Service Area	TBD	TBD
	% of the municipal stormwater management system resilient to a 5-year storm (O.Reg.588)	Stormwater Management Service Area	TBD	TBD
	% assets rated Fair, Good or Very Good (by replacement value)	Stormwater assets	86.3%	≥ 85%

* Refer to detailed description below.

TBD: Performance for these measures will be provided when available as an addendum to this AM Plan.

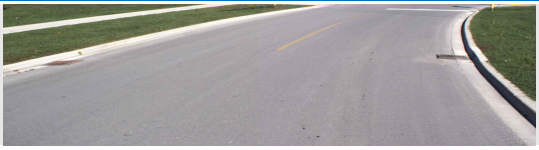
Customer LOS: Road Network Description and its Connectivity

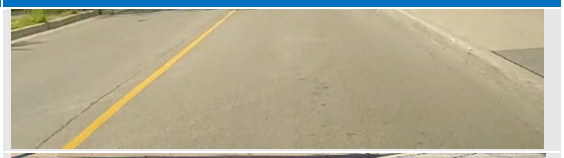
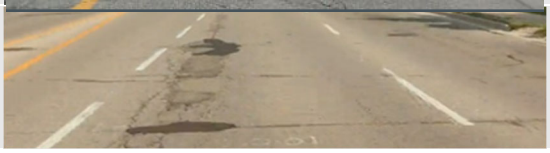
The Region manages an extensive network of Regional roads that serve a variety of purposes including local access, regional travel and access to provincial highways. The Regional Official Plan states that the purpose of Regional roads is to provide safe, direct, accessible and multi-modal transportation links for moving people and goods throughout the Region and to adjacent municipalities.

There are five provincial highways within the Region, including portions of Highway 401, Highway 7, Highway 8, Highway 24 and Highway 85. Provincial highways are regulated by MTO, and development and access in close proximity to these highways are subject to provincial permitting and approval. At the local level, each city and township in the Region operates and maintains its own municipal road network, which connects to the Regional road network. These roads provide connections to and within neighbourhoods, city centres, commercial sites and industrial lands.

Customer LOS: The different levels of road class pavement condition

Pavement condition data is collected on the entire road network every two years. Data collected includes the type, extent and severity of distresses (cracks and rutting) and smoothness or ride comfort of the road. An overall PCI is calculated from all collected data and is used as input into the annual road resurfacing and reconstruction program. The index is scaled from zero to 100 and has been divided into ranges to assess condition. Examples of roads in each of the PCI rating categories are provided in the following table:

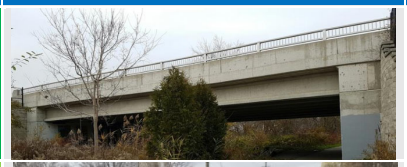
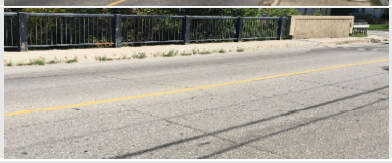
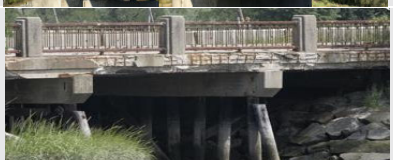
Condition Grade	Urban Road Example
Very Good (PCI = 90 to 100)	

Condition Grade	Urban Road Example
Good (PCI = 80 to 89)	
Fair (PCI = 65 to 79)	
Poor (PCI = 55 to 64)	
Very Poor (PCI < 55)	

Customer LOS: The levels of bridge and structural culvert condition and the impact on use

The need for mobility requires that the Region's roadway system be kept in a state of good repair. Structures are a vital part of this system. An effective structure management system involving the systematic inspection of the structures on the roadway network is required to maintain structures in a state of good repair. In accordance with O. Reg. 104/97 Standards for Bridges, the Region conducts detailed inspections of all of its bridges every two years. All inspections are supervised by a trained, professional engineer following the guidelines in Ontario's Structure Inspection Manual (OSIM) which sets standards for the visual inspection and condition rating of bridges and their elements. The inspector assesses each bridge element and records the amount of the element in each of four condition states: Excellent, Good, Fair and Poor. The inspector also records suspected performance deficiencies and recommends maintenance and renewal activities, with costs. The typical follow-up action for a suspected load carrying capacity deficiency would be to carry out a strength evaluation of the structure (or element) to determine the load carrying capacity in accordance with the requirements of the Canadian Highway Bridge Design Code.

An overall Bridge Condition Index (BCI) or Culvert Condition Index (CCI) is calculated from all collected data and informs the annual bridge and structural culvert rehabilitation and reconstruction program. The index is scaled from zero to 100 and has been divided into ranges to assess condition. The BCI is not used to rate or indicate the safety of a bridge or structural culvert. Any safety issues are immediately reported by the inspector to supervising engineers and maintenance crews. Condition grade examples are provided in the following table:

Condition Grade	Bridge Examples	Culvert Examples
Very Good BCI = >85 to 100		
Good BCI = >70 to 85		
Fair BCI = >60 to 70		
Poor BCI = >50 to 60		
Very Poor BCI = 0 to 50		

B.3 Asset Management Strategy

Within Transportation Services, risks relating to infrastructure failure are mitigated through inspection and maintenance programs, and ensuring compliance with O.Reg. 239/02 Minimum Maintenance Standards and bridge inspection regulations. The Region operates and maintains the regional road network including asphalt repairs, grass cutting, landscape maintenance and winter maintenance (snow and ice control). It also completes operations and maintenance activities for all traffic signals and street lighting on Regional roads.

Annual capital and maintenance programs are developed considering asset criticality, such as Road Class which accounts for the amount of daily traffic. The Region balances rehabilitation costs against increasing maintenance of aging infrastructure to meet user needs and expectations. Major capital rehabilitations are typically planned for pavement, bridges, culverts, retaining walls and traffic signals to extend service lives and reduce lifecycle costs. Typical rehabilitation frequencies replacement service lives and O&M activities are summarized in the following table. The Region also pursues non-asset solutions such as encouraging programs for the use of public transit, active transportation and projects optimizing signal timing.

Transportation Asset Management Strategies

Asset	Asset Criticality	Capital			O&M	Technical LOS
		Service Life (Years)	Rehab Frequency (Years)	Rehab Cost (% of Replace Cost)		
Roadway Pavement						
Urban Cross Section	High	48	16	68%	Inspections (every 2 years) Crack Seal (year 7, 23, 39)	Pavement Condition Index
Rural Cross Section	Moderate	25	-	-	Crack Seal (year 7, 14)	Pavement Condition Index
Bridges & Culverts (Bridges)						
Road Class 1 to 3, Deck Area >= 500m^2	Very High	80	20	25%	Inspections (every 2 years)	Bridge Condition Index
Road Class 1 to 3, Deck Area < 500m^2	High	80	20	25%	Inspections (every 2 years)	Bridge Condition Index
Road Class 4 to 6, Deck Area >= 500m^2	Moderate	80	20	25%	Inspections (every 2 years)	Bridge Condition Index
Road Class 4 to 6, Deck Area < 500m^2	Low	80	20	25%	Inspections (every 2 years)	Bridge Condition Index
Bridges & Culverts (Culverts)						
	High	80	30	15%	Inspections (every 2 years)	Bridge Condition Index
Guide Rails						
	High	25	-	-	Repairs/Maintenance	% assets rated F, G or VG
Noise Walls						
	Moderate	25	-	-	Repairs/Maintenance	% assets rated F, G or VG
Roadside Retaining Walls						
Height >= 3m	Moderate	50	25	25%	Inspections (every 2 years), Repairs/Maintenance	% assets rated F, G or VG
1m >= Height < 3m	Low	50	-	-	Repairs/Maintenance	% assets rated F, G or VG
Height < 1m	Very Low	50	-	-	Repairs/Maintenance	% assets rated F, G or VG

Asset	Asset Criticality	Capital			O&M	Technical LOS
		Service Life (Years)	Rehab Frequency (Years)	Rehab Cost (% of Replace Cost)		
Illumination						
	High	40	-	-	Repairs/Maintenance	% uptime of assets
Traffic Signals						-
	Low	21	7	10%	Preventive maintenance, Emergency repairs	-
Ponds						
	Moderate	-	15 (Cleanout)	10%	Debris removal, landscaping	% of stormwater system resilient to a 5-year storm
Sewers						
Concrete	Moderate	80	-	-	Repairs/Maintenance	% assets rated F, G or VG
CSP	Moderate	50	-	-	Repairs/Maintenance	% assets rated F, G or VG
Culverts (Stormwater)						
Concrete	Moderate	80	-	-	Repairs/Maintenance	% assets rated F, G or VG
CSP	Moderate	50	-	-	Repairs/Maintenance	% assets rated F, G or VG
Manholes						
	Very Low	80	-	-	Cleaning (every 3 years)	% assets rated F, G or VG
Catchbasins						
	Moderate	50	-	-	Cleaning (every 3 years)	% assets rated F, G or VG

Risk maps enable the identification and prioritization of Very High risk assets that need to become candidates for closer inspection (to verify if they truly are Very High risk), renewal or replacement. Risk maps showing both replacement value and percentage of assets by replacement value are shown below.

Figure B.3: Risk Exposure Matrix Total - Transportation (in $M & %)

LOF		*Risk exposure in year 2025 $, millions*				
5	**Certain**	$7.6	$216.7	$51.1	$164.7	$0.0
4	**Likely**	$0.8	$161.6	$33.7	$177.0	$15.0
3	**Possible**	$2.3	$291.4	$178.4	$183.2	$42.6
2	**Unlikely**	$6.9	$209.1	$124.8	$461.1	$418.9
1	**Rare**	$5.6	$236.2	$95.8	$376.8	$140.8
		Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
		1	*2*	*3*	*4*	*5*

Consequence of Failure

Risk Exposure Ratings		
Very High	**$179.7**	5%
High	**$487.7**	14%
Moderate	**$2,001.1**	56%
Low	**$684.7**	18%
Very Low	**$248.7**	7%
Total	**$3,601.8**	100%

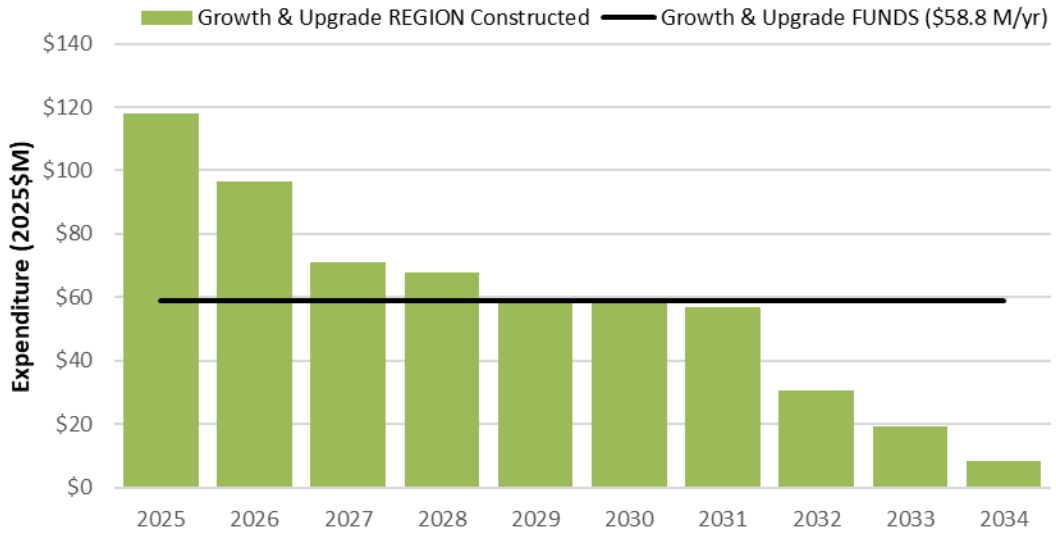
The Region's risk mitigation plans for the assets identified as very high risk are addressed in the 2025 Budget Plan.

B.4 Expenditure Forecasts

Expansion (Growth) and Upgrade Investments

To maintain the current capacity and functional levels of service, the Region has planned expansion and upgrade works for each of the next 10 years and outlined the costs of providing these activities in the 2025-2034 Capital Program. The following graph shows these planned growth and upgrade investments over the next ten years.

Figure B.4: Growth and Upgrade Forecast – Transportation Services

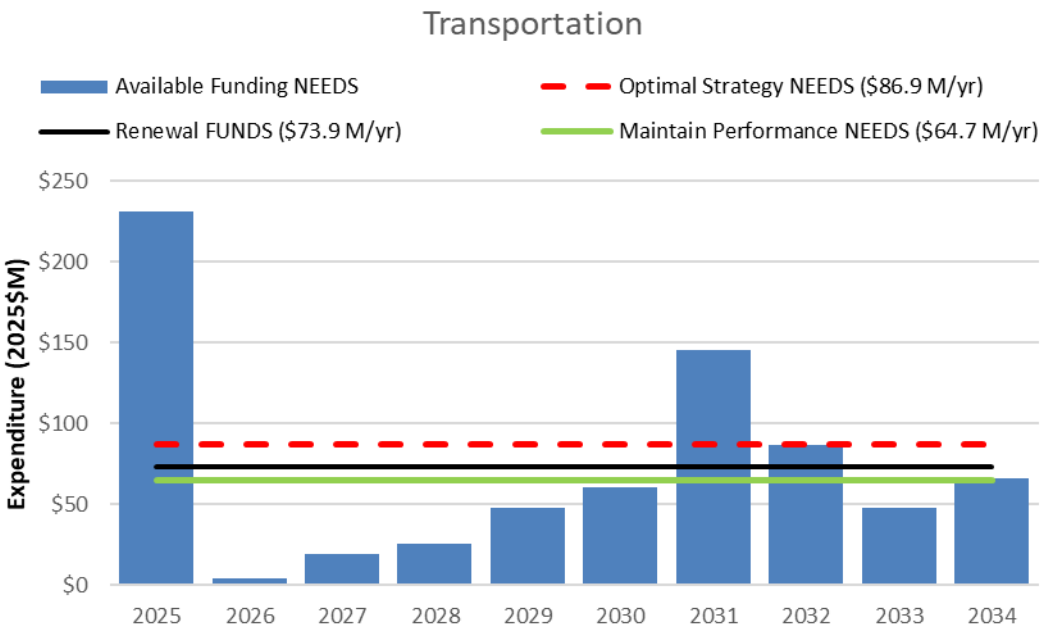


Renewals Investments

The primary performance measures for reliability are asset physical condition and associated risk. Based on the asset condition and risk information outlined in the preceding sections, three renewal needs scenarios are considered and analyzed over the next 10 year period (2025 to 2034), as required by O.Reg. 588/17.

The following figure shows the projected renewal needs for Scenario 2, the LOS that the Region proposes to provide for each of the next 10 years (blue bars) and the associated available funding (solid black line). The figure also shows the funding required to maintain current performance (Scenario 1 as the solid green line) and to undertake the optimal renewal strategy (Scenario 3 as the dashed red line).

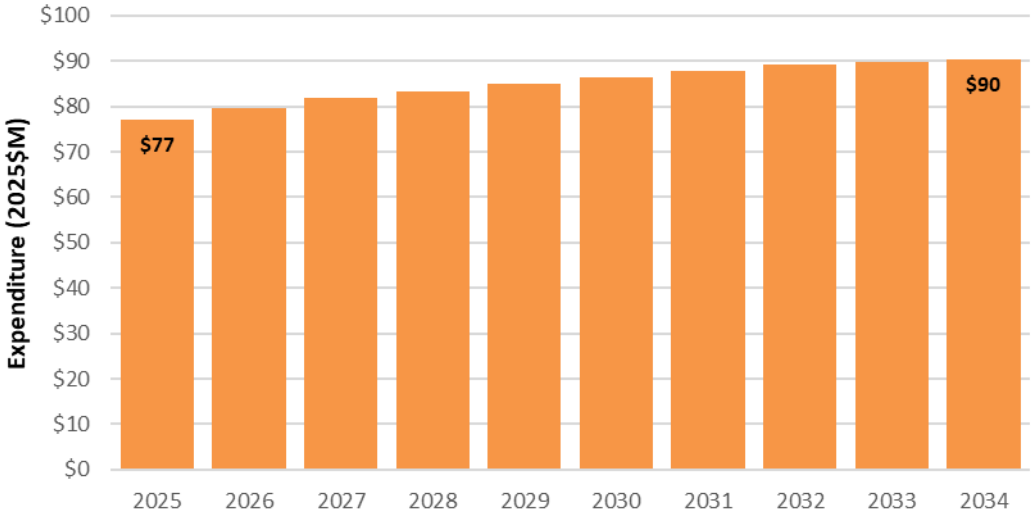
Figure B.5: Renewal Need Forecast – Transportation services



Operating Expenditures

To maintain the current levels of service, the Region includes planned maintenance and operations works in its annual operating budget. Operating expenditures include those related to infrastructure operation and maintenance and capital financing (reserve transfers and debt servicing costs). The operating expenditures related to infrastructure operation and maintenance are shown in the following graph, which shows these costs increasing proportionately with growth and upgrade of the asset portfolio.

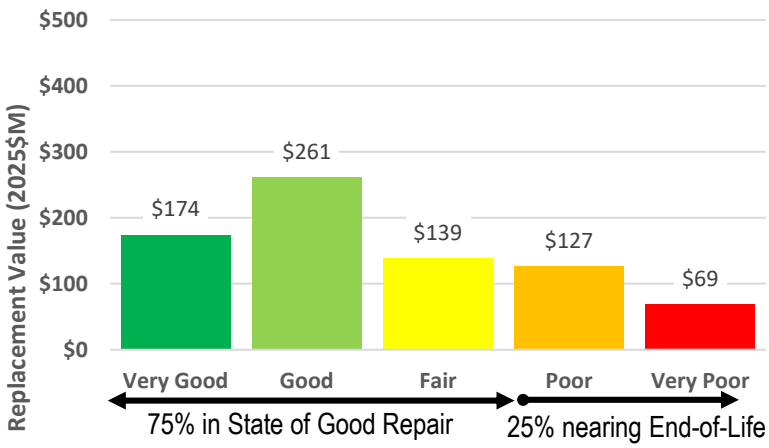
Figure B.6: Operating Needs Forecast – Transportation Services



C. APPENDIX C – TRANSIT SERVICES

C.1 State of Local Infrastructure

The following figure shows the asset inventory replacement value by condition grade.



Total Asset Valuation (2025$)

$770.2 million

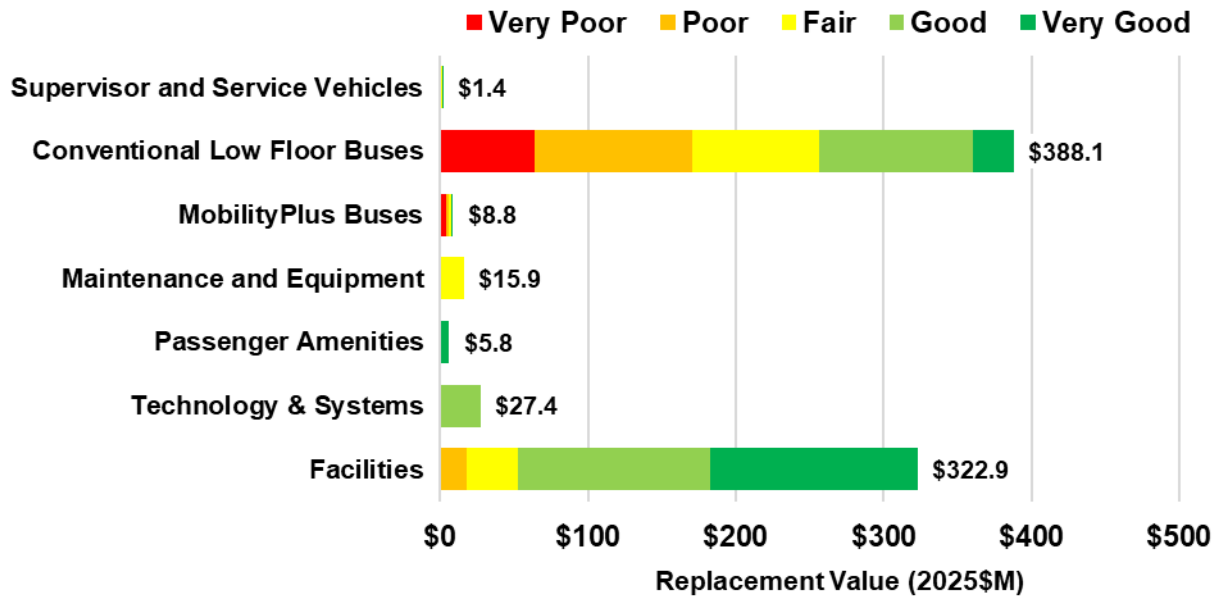
Average Asset Condition (2024)

GOOD-FAIR

Replacement Value and Condition

Conventional Low Floor Buses account for a significant portion of the replacement value, as summarized in the following figure. The condition of the bus shelters (approximately $46.9 million dollars in value) is unknown.

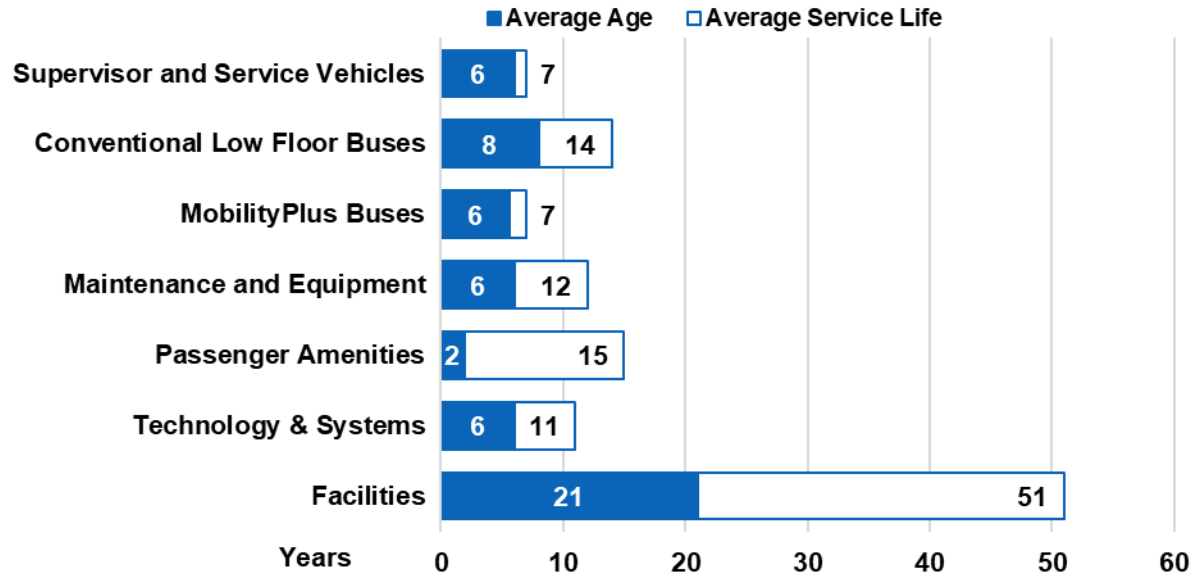
Figure C.1: Asset Condition Profile - Transit Services



Average Age

The average age of transit assets, weighted by replacement value, is summarized by asset class. Supervisor and Service Vehicles assets, as well as MobilityPlus Buses are nearing the end of their useful lives.

Figure C.2: Asset Age Profile - Transit Services



C.2 Levels of Service

The following table provides information on corporate, legislated, customer and technical LOS. These LOS focus on those relevant to asset operations, maintenance and renewal to maintain current LOS. LOS pertaining to growth and upgrading services are generally covered in Master Plans and are not repeated in this AM Plan.

Summary Analysis:

- While transit services are reliable, key data gaps exist in fleet electrification targets and preventive maintenance compliance.
- The shift toward sustainable transit, including electrification, lacks clearly defined performance benchmarks.
- **Recommendation:** Establish clear electrification adoption metrics and enhance preventive maintenance tracking to optimize fleet lifecycle costs.

Transit Current Levels of Service

Customer LOS	Technical Measure	Asset Type	Performance (2019)	Target Performance (2025-2034)
GRT provides transit service in Kitchener, Waterloo, Cambridge, Elmira, St. Jacobs and New Hamburg. GRT operates conventional buses, an express bus network, busPLUS service for community routes and door-to-door transit service for riders with disabilities using specialized vehicles. GRT assets are maintained in a safe, reliable and available condition to support continued delivery of transit services.	Standby Fleet Pool Ratio	Service Area	91%	25%
	# FTEs (service hours) required / supplied to meet demand (PSE) (vehicle to mechanic ratio)	Fleet Assets	TBD	4.5
	Preventive Maintenance Compliance (Percentage of On-Time PMs)	Fleet Assets	TBD	100%
	Annual Fleet Fuel Consumption	Fleet Assets	TBD	2% annual increase
	% assets rated Fair, Good or Very Good (by replacement value)	Conventional Low Floor Buses	56.0%	≥ 80%
		MobilityPlus	32.4%	≥ 80%
		Inspector Vans / Service Vehicles	34.6%	≥ 80%
	Percentage of Critical Assets in Fair or Better Condition	Conventional Low Floor Buses	100%	≥ 95%
The Region has a long-standing commitment to environmental sustainability and is committed to reducing greenhouse gas emissions	Percentage of Electric Fleet in Total Fleet	Fleet assets	TBD	3.7%

TBD: Performance for these measures will be provided when available as an addendum to this AM Plan.

C.3 Asset Management Strategy

GRT renews its assets to enable continued provision of services such as meeting published transit schedules and providing safe vehicles in a state of good repair to maintain public confidence. These assets are repaired as required and replaced at appropriate service lives to reduce lifecycle costs. Typical replacement service lives are summarized in the table below. In addition to maintenance and renewal, GRT is planning for adoption and deployment of low and zero emission vehicles to reduce operational costs and is focused on identifying, evaluating and implementing Transit Priority Measures to improve transit travel times and service reliability. Another focus area is continuing to grow transit ridership and the use of active transportation through GRT's Transportation Demand Management programs and incentives, such as the discounted Corporate Transit Pass.

Transit Asset Management Strategies

Asset Category	Asset Type	Asset Criticality	Service Life (Years)
Conventional Low Floor Buses		Moderate	14
Maintenance and Equipment	Equipment	Minor	11
	Furniture / Office Equipment	Minor	10
	Hoist	Moderate	12
	Transit General	Major	15
MobilityPlus Buses		Moderate	7
Passenger Amenities	Bus Shelters / Landing Pads	Insignificant	15
	iXpress Stations	Insignificant	15
	Land Improvements-Transit	Moderate	20
Supervisor and Service Vehicles	Lift	Minor	20
	Other Vehicles	Minor	5
	Service Truck	Minor	10
	Service Truck	Minor	10
	Sweeper	Minor	6
	Vehicles-Transit	Major	31
Technology and Systems		Minor	22
Facilities		Major	36

*Facility and Element Criticality are combined (see section 4.2 Criticality Assessment to Inform Lifecycle Strategies)

Risk maps enable the identification and prioritization of Very High risk assets that need to become candidates for closer inspection (to verify if they truly are Very High risk), renewal or replacement. Risk maps showing both replacement value and percentage of assets by replacement value are shown below.

Figure C.3: Risk Exposure Matrix Total – Transit (in $M & %)

LOF		*Risk exposure in year 2025 $, millions*				
5	Certain	$0.0	$0.8	$68.3	$0.0	$0.0
4	Likely	$0.0	$0.2	$126.6	$0.0	$0.0
3	Possible	$1.8	$16.8	$102.2	$18.2	$0.0
2	Unlikely	$15.6	$103.5	$110.6	$31.6	$0.0
1	Rare	$31.0	$92.2	$30.9	$20.1	$0.0
		Insignificant	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5

Consequence of Failure

Risk Exposure Ratings		
Very High	$0.0	0%
High	$213.1	28%
Moderate	$262.1	34%
Low	$156.3	20%
Very Low	$138.8	18%
Total	$770.2	100%

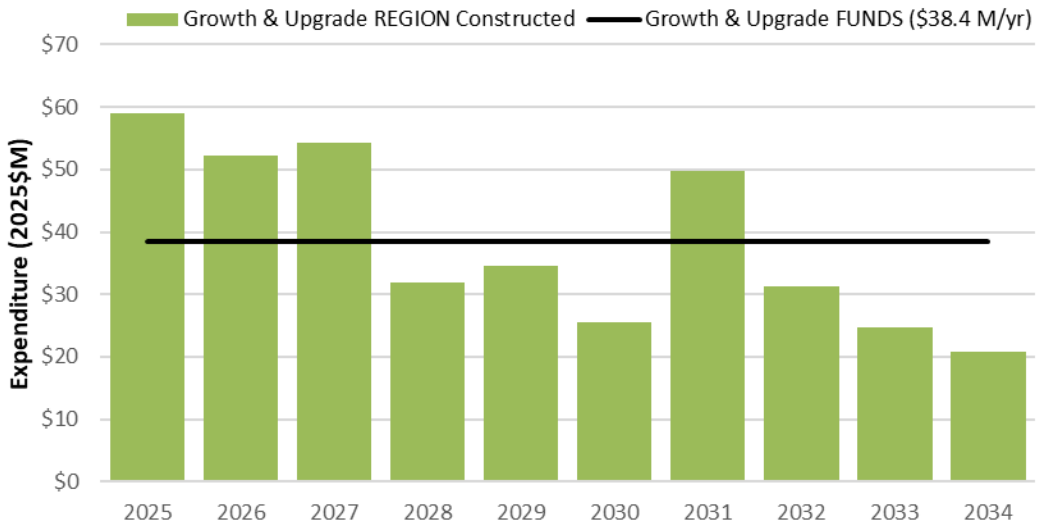
There are no assets identified as very high risk.

C.4 Expenditure Forecasts

Expansion (Growth) and Upgrade Investments

To maintain the current capacity and functional levels of service, the Region has planned expansion and upgrade works for each of the next 10 years and outlined the costs of providing these activities in the 2025-2034 Capital Program. The following graph shows these planned growth and upgrade investments over the next ten years.

Figure C.4: Growth and Upgrade Forecast - Transit Services



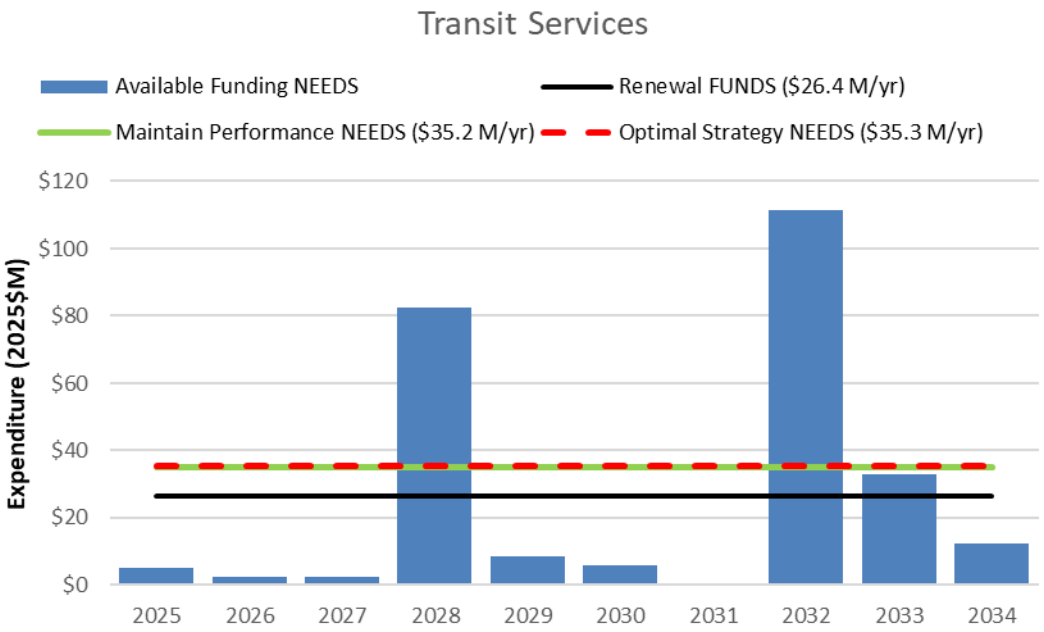
Renewals Investments

The primary performance measures for reliability are asset physical condition and associated risk. Based on the asset condition and risk information outlined in the preceding sections, three renewal needs scenarios are considered and analyzed over the next 10 year period (2025 to 2034), as required by O.Reg. 588/17.

The following figure shows the projected renewal needs for Scenario 2, the LOS that the Region proposes to provide for each of the next 10 years (blue bars) and the associated available funding (solid black line). The figure also shows the funding required to maintain current

performance (Scenario 1 as the solid green line) and to undertake the optimal renewal strategy (Scenario 3 as the dashed red line).

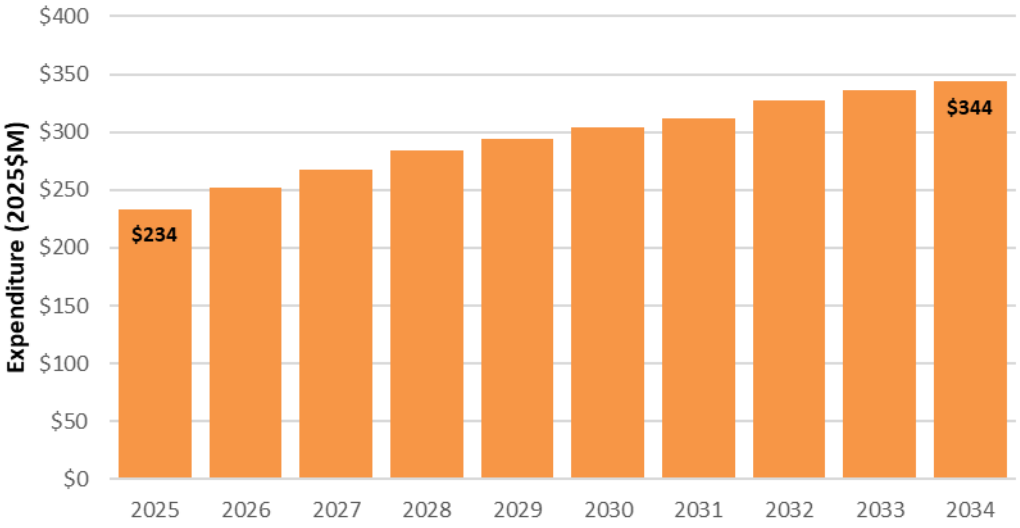
Figure C.5: Renewal Needs Forecast - Transit Services



Operating Expenditures

To maintain the current levels of service, the Region includes planned maintenance and operations works in its annual operating budget. Operating expenditures include those related to infrastructure operation and maintenance and capital financing (reserve transfers and debt servicing costs). The operating expenditures related to infrastructure operation and maintenance are shown in the following graph, which shows these costs increasing proportionately with growth and upgrade of the asset portfolio.

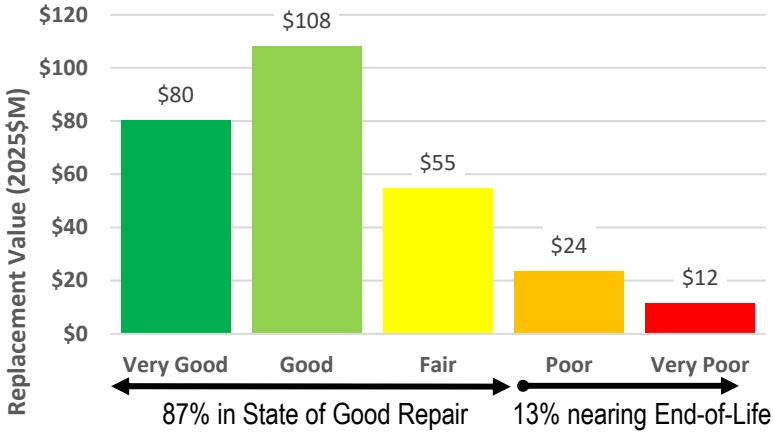
Figure C.6: Operating Needs Forecast - Transit Services



D. APPENDIX D – AIRPORT SERVICES

D.1 State of Local Infrastructure

The following figure shows the asset inventory replacement value by condition grade.



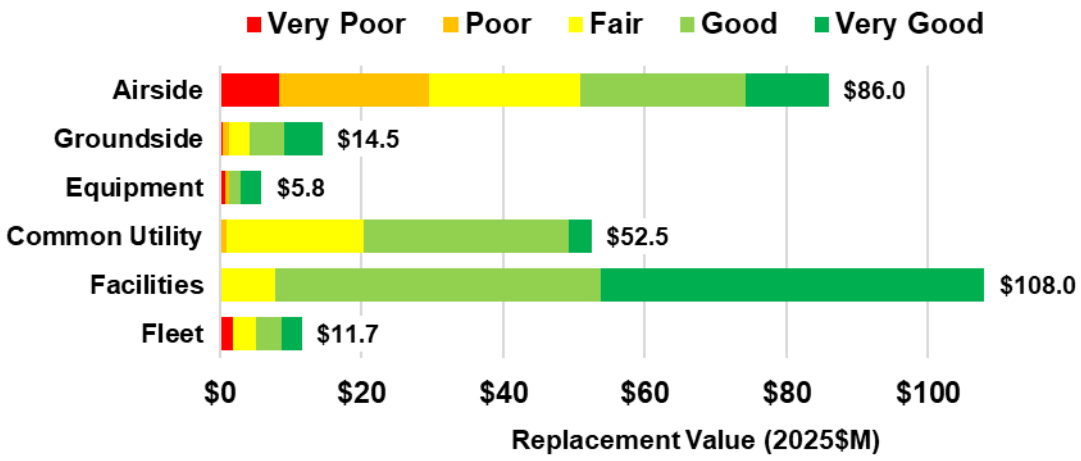
Total Asset Valuation (2025$)
$278.4 million

Average Asset Condition (2024)
GOOD-FAIR

Replacement Value and Condition

Airside assets and Facilities account for a significant portion of the replacement value, as summarized in the following figure.

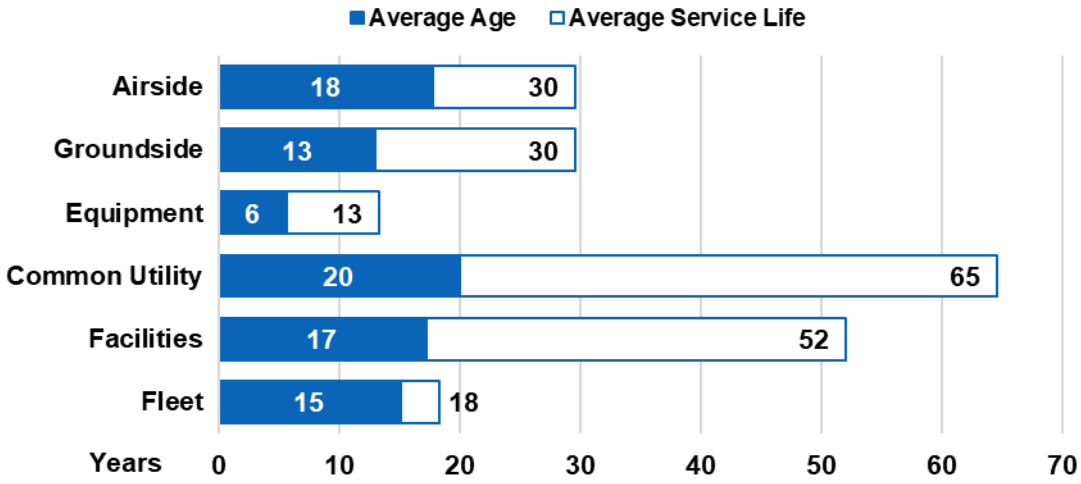
Figure D.1: Asset Condition Profile - Airport Services



Average Age

The average age of airport assets, weighted by replacement value, is summarized by asset class. Fleet assets are nearing end of life but represent a very low proportion of the asset portfolio.

Figure D.2: Asset Age Profile - Airport Services



D.2 Levels of Service

The following table provides information on corporate, legislated, customer and technical LOS. These LOS focus on those relevant to asset operations, maintenance and renewal to maintain current LOS. LOS pertaining to growth and upgrading services are generally covered in Master Plans and are not repeated in this AM Plan.

From the Region's 2019 – 2023 Strategic Plan, the main objective associated with the airport is to 'grow passenger air service and aviation related activities". Though this objective is more focused on growth, it is understood that growth is only achievable while maintaining compliance to Canadian Aviation Regulations and maintaining assets in a state of good repair.

Summary:

- Airport assets are performing well and align with expected demand, but future growth projections necessitate expansion planning.
- Pavement condition ratings are stable but require a more structured long-term monitoring approach.
- **Recommendation:** Implement a lifecycle management strategy to optimize long-term airport infrastructure maintenance and expansion investments.

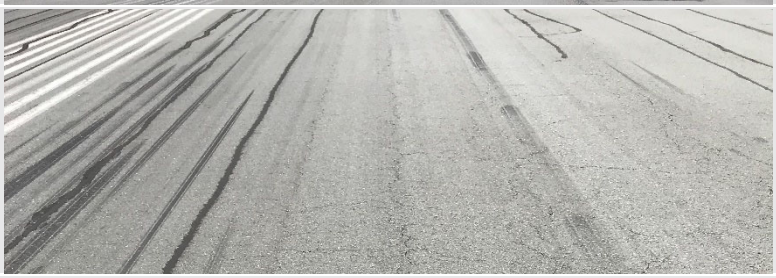
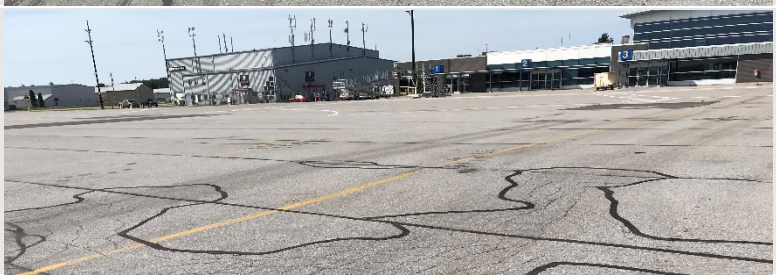
Airport Current Levels of Service

Customer LOS	Technical Measure	Asset Type	Current Performance (2024)	Target Performance (2025-2034)
The Region operates the airport in accordance with Transport Canada regulations. In 2024, scheduled carriers included Westjet, Flare and Sunwing. The airport is currently a landlord for approximately 53 privately owned and operated buildings on the airport campus.	YKF Passengers per annum	Airport Service Area, All Airport Asset Classes	523,210	TBD
Assets are maintained in a state of good repair to ensure continued operation of the airport to required regulations.	% Assets rated Fair or Better Condition	All Airport Asset Classes	74.5%	TBD
An overall Surface Condition Rating is determined, scaled from zero to 10 and then mapped into 1 to 5 scale to report condition - Refer to scale below.	The average surface condition rating	Aircraft Movement System Pavement, Airside Roadway, Groundside Roadway	6.9	6.9

TBD: Performance for these measures will be provided when available as an addendum to this AM Plan.

Customer LOS: The different levels of airport pavement condition

The Region conducts condition surveys every year and determines a Surface Condition Rating for each pavement asset. Examples of pavement condition in each of the rating categories are provided in the following table:

Condition Grade	Airport Pavement Example
Very Good (SCR >8 to 10)	
Good (SCR >6 to 8)	
Fair (SCR >4 to 6)	
Poor (SCR >2 to 4)	
Very Poor (SCR >0 to 2)	

E.3 Asset Management Strategy

Within the Airport, risks relating to infrastructure failure are mitigated through inspection and maintenance programs which provide the necessary data to ensure that the work required maintains compliance with Canadian Aviation Regulations. In prioritizing work, Airport Services considers the private businesses located at the Airport as impacts to common utilities, and Airside infrastructure can have further reaching impacts on those third party companies.

Airport Asset Management Strategies

Asset Class		Asset Type	Asset Criticality	Capital			O&M	Technical LOS
				Service Life (Years)	Rehab Frequency (Years)	Rehab Cost (% of Replace Cost)		
Airside								
Aircraft Movement System	Pavement	Runway (Primary)	High	38	16	67%	Condition surveys every 1 to 3 years in accordance with Transport Canada advisory circulars*	Surface Condition Rating
		Runway (Secondary)	Moderate	38	16	67%		
		Apron, Taxiway	Low	38	16	67%	Condition survey every year	
Airside Roadway	Pavement		Low	38	16	67%	Condition survey every year Crack Sealing (5 years)	
Glycol Collection System	Drainage	Glycol Drain	Very Low	75	-	-	Conduct routine and preventative maintenance activities according to published Transport Canada advisory circulars*	Compliance with Provincial MECP Requirements
		Glycol Diversion Tank	Very Low	75	-	-		
		STM Apron 3 (250mmΦ PVC Glycol)	Very Low	50	-	-		
Security	Fences & Security Gates		Moderate	30	-	-		Canadian Aviation Regulations Compliance /% F/G/VG
Visual Aids	Lighting & Electrical		Moderate	20	-	-		

* AC 302-016 (2014-10-10) Airfield Pavement Management System, AC 302-017 (2014-10-31) Runway Friction Measurement, AC 302-008 (2015-12-07) Maintenance of Runway and Taxiway Lighting Systems, AC 300-006 (2012-10-12) Precision Approach Path Indicator Maintenance and Inspection

Airport Asset Management Strategies

Asset Class		Asset Type	Asset Criticality	Capital			O&M	Technical LOS
				Service Life (Years)	Rehab Frequency (Years)	Rehab Cost (% of Replace Cost)		
Groundside								
Illumination	Lighting & Electrical	Hydro Poles	Very Low	40	-	-	Conduct routine/PM activities according to Transport Canada advisory circulars	Canadian Aviation Regulations Compliance / % F/G/VG
		Street Lights	Very Low	20	-	-		
Miscellaneous	Pavement	Concrete Sidewalks	Low	30	-	-		
Roadway	Pavement	B - Access Road	Low	30	15	67%	Surface condition survey every year	Pavement Condition Index
		B - Parking Lot	Low	30	15	67%		
		Concrete Curb/Island/Slabs	Low	30	-	-		
Equipment								
Airport Equipment			Low	6 to 15	-	-		
Common Utility								
Communication		Communication Equipment		40 to 75	-	-	Conduct routine and PM activities on common utilities to ensure compliance with	Compliance with Provincial MECP Requirements
Electrical Distribution	Lighting & Electrical	Genset	Low	30	-	-		
		Cables, Conduit	Low	20	-	-		
		Transformers	Low	25	-	-		
		Pipes, Manholes, Wet Well	Low	75	-	-		

Asset Class		Asset Type	Asset Criticality	Capital			O&M	Technical LOS
				Service Life (Years)	Rehab Frequency (Years)	Rehab Cost (% of Replace Cost)		
Sanitary Sewer Collection	Sanitary Sewer	Septic Tank	Low	50	-	-	Provincial and Federal Regulatory requirements Pump out sceptic tank every five years	
Stormwater Management	Drainage	Drains, Manholes, Concrete & PVC pipes	Low	75	-	-		
		Subdrains	Low	50	-	-		
		Corrugated Steel Pipe, PE	Low	50	-	-		
		Pond	Low	-	-	-		
Water Distribution	Water Main	Pipes, Manholes, Curb Stops, Fire Hydrants, Valves, Wells	Low	75	-	-		

Risk maps enable the identification and prioritization of Very High risk assets that need to become candidates for closer inspection (to verify if they truly are Very High risk), renewal or replacement. Risk maps showing both replacement value and percentage of assets by replacement value are shown below.

Figure D.3: Risk Exposure Matrix Total - Airport (in $M & %)

LOF		*Risk exposure in year 2025 $, millions*				
5	**Certain**	$2.1	$1.0	$14.1	$0.2	$11.1
4	**Likely**	$0.0	$2.2	$0.3	$16.0	$25.9
3	**Possible**	$6.0	$4.6	$15.1	$20.1	$16.6
2	**Unlikely**	$23.0	$20.0	$9.1	$17.2	$0.0
1	**Rare**	$30.1	$18.6	$19.1	$5.9	$0.0
		Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
		1	*2*	*3*	*4*	*5*

Consequence of Failure

Risk Exposure Ratings		
Very High	**$37.2**	13%
High	**$67.2**	24%
Moderate	**$51.4**	18%
Low	**$50.9**	18%
Very Low	**$71.7**	27%
Total	**$278.4**	100%

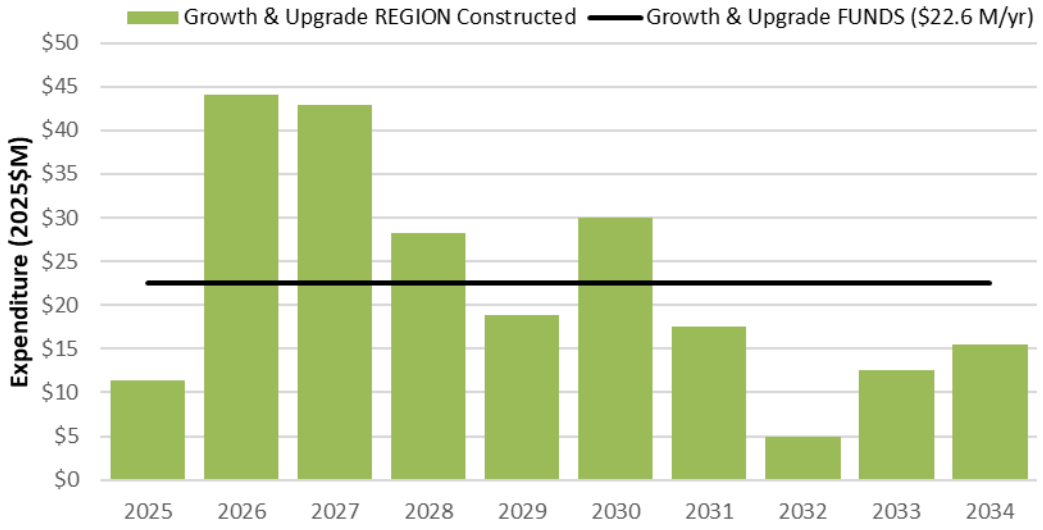
The Region's risk mitigation plans for the assets identified as very high risk are addressed in the 2025 Budget Plan.

E.4 Expenditure Forecasts

Expansion (Growth) and Upgrade Investments

To maintain the current capacity and functional levels of service, the Region has planned expansion and upgrade works for each of the next 10 years and outlined the costs of providing these activities in the 2025-2034 Capital Program. The following graph shows these planned growth and upgrade investments over the next ten years.

Figure D.4: Growth and Upgrade Forecast - Airport Services



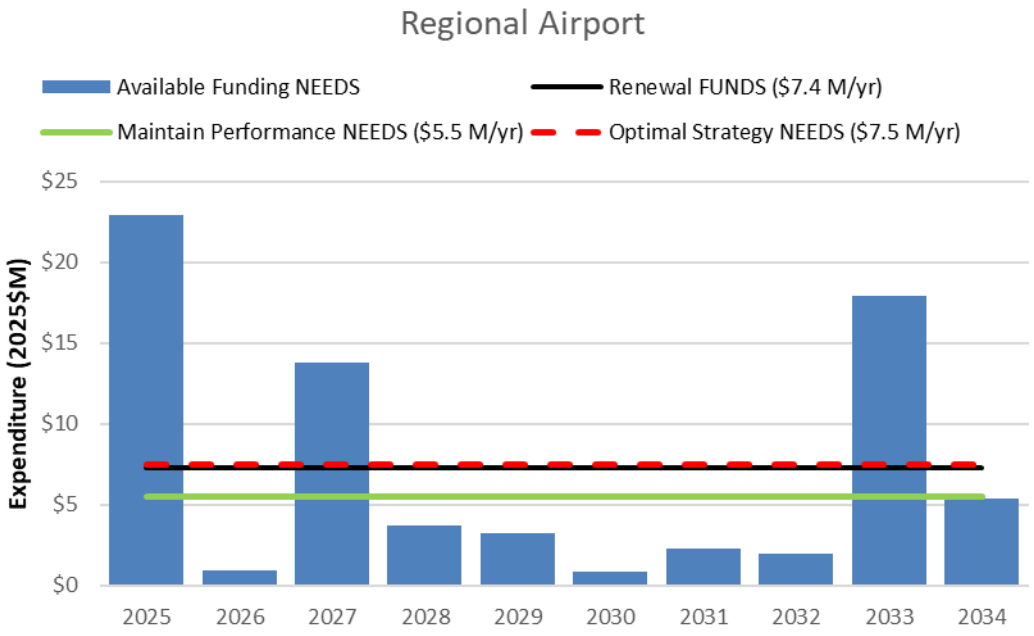
Renewals Investments

The primary performance measures for reliability are asset physical condition and associated risk. Based on the asset condition and risk information outlined in the preceding sections, three renewal needs scenarios are considered and analyzed over the next 10 year period (2025 to 2034), as required by O.Reg. 588/17.

The Airport manages infrastructure that must be maintained to a high standard to ensure aircraft safety and airport certification. The consequence of failure for an airport asset is generally significant. Therefore critical airport infrastructure cannot deteriorate to a poor condition without significant risk. Budgets must be maintained at or near the optimal strategy to mitigate this risk and ensure the airport can continue to operate safely and effectively.

The following figure shows the projected renewal needs for Scenario 2, the LOS that the Region proposes to provide for each of the next 10 years (blue bars) and the associated available funding (solid black line). The figure also shows the funding required to maintain current performance (Scenario 1 as the solid green line) and to undertake the optimal renewal strategy (Scenario 3 as the dashed red line).

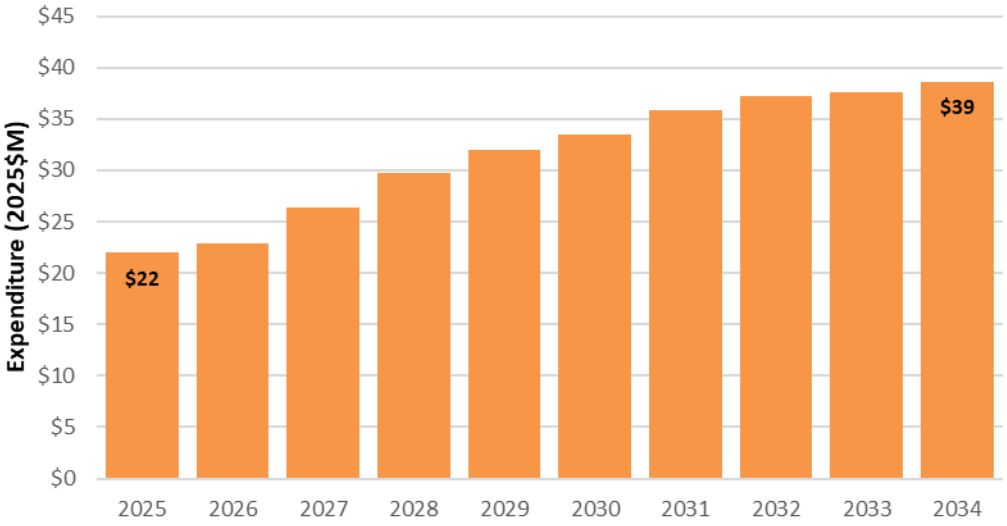
Figure D.5: Renewal Needs Forecast - Airport Services



Operating Expenditures

To maintain the current levels of service, the Region includes planned maintenance and operations works in its annual operating budget. Operating expenditures include those related to infrastructure operation and maintenance and capital financing (reserve transfers and debt servicing costs). The operating expenditures related to infrastructure operation and maintenance are shown in the following graph, which shows these costs increasing proportionately with growth and upgrade of the asset portfolio.

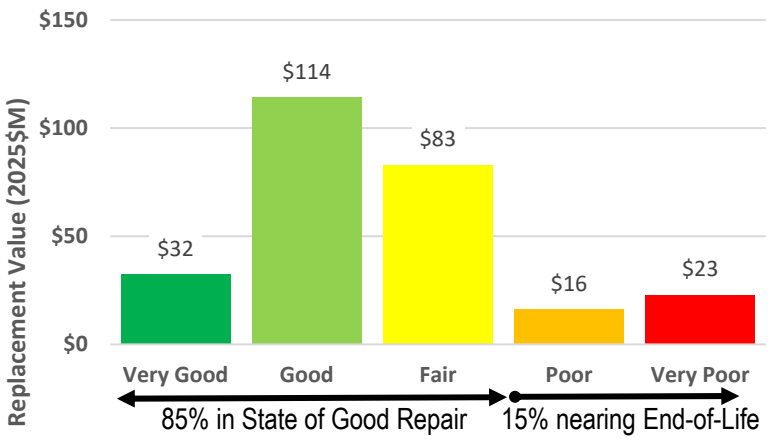
Figure D.6: Operating Needs Forecast - Airport Services



E. APPENDIX E – WASTE MANAGEMENT SERVICES

E.1 State of Local Infrastructure

The following figure shows the asset inventory replacement value by condition grade.



Total Asset Valuation (2025$)
$268.8 million

Average Asset Condition (2024)
GOOD-FAIR

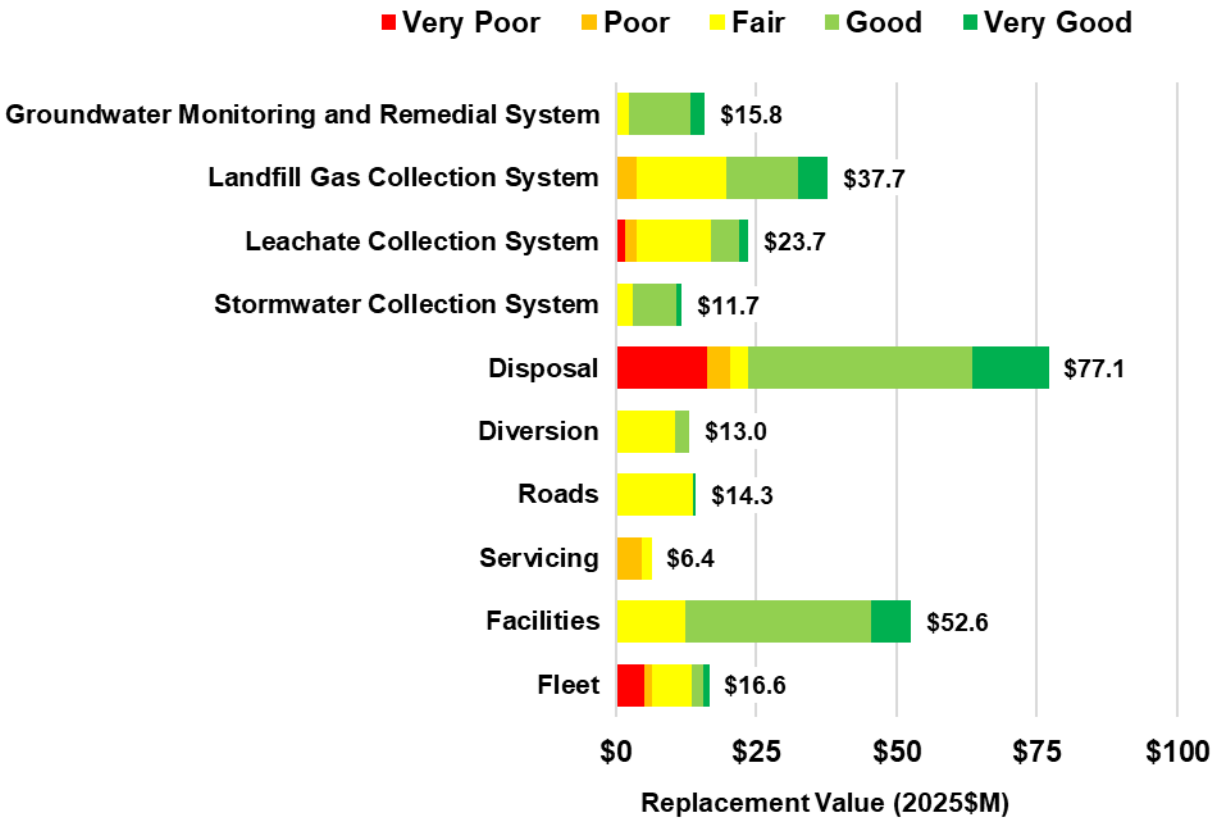
Replacement Value and Condition

The Waste Management asset inventory includes solid waste management system assets: one active engineered landfill, five closed landfill sites, linear and vertical environmental control assets under the leachate, landfill gas, groundwater extraction systems, site servicing and roadways at the Waterloo and Cambridge Waste Management Centres, scales and transfer assets, diversion assets, composting pads and stormwater management facilities. The Waste Management Fleet is composed of vehicles and heavy equipment in support of solid waste management system operations. Facilities include administration and operations buildings, leachate pump stations, gas control buildings, groundwater extraction metering buildings, electrical substation buildings, a bulk transfer station, a material recovery facility, scale houses and household hazardous waste facilities. All architectural, structural, mechanical and electrical building elements are included in Waste Management Facilities.

Asset condition is determined by Region staff knowledge and visual condition assessments for the majority of assets. Routine monitoring, inspection and maintenance of assets are also performed by operations staff.

The replacement value and condition are shown in the graph below.

Figure E.1: Asset Condition Profile - Waste Management Services

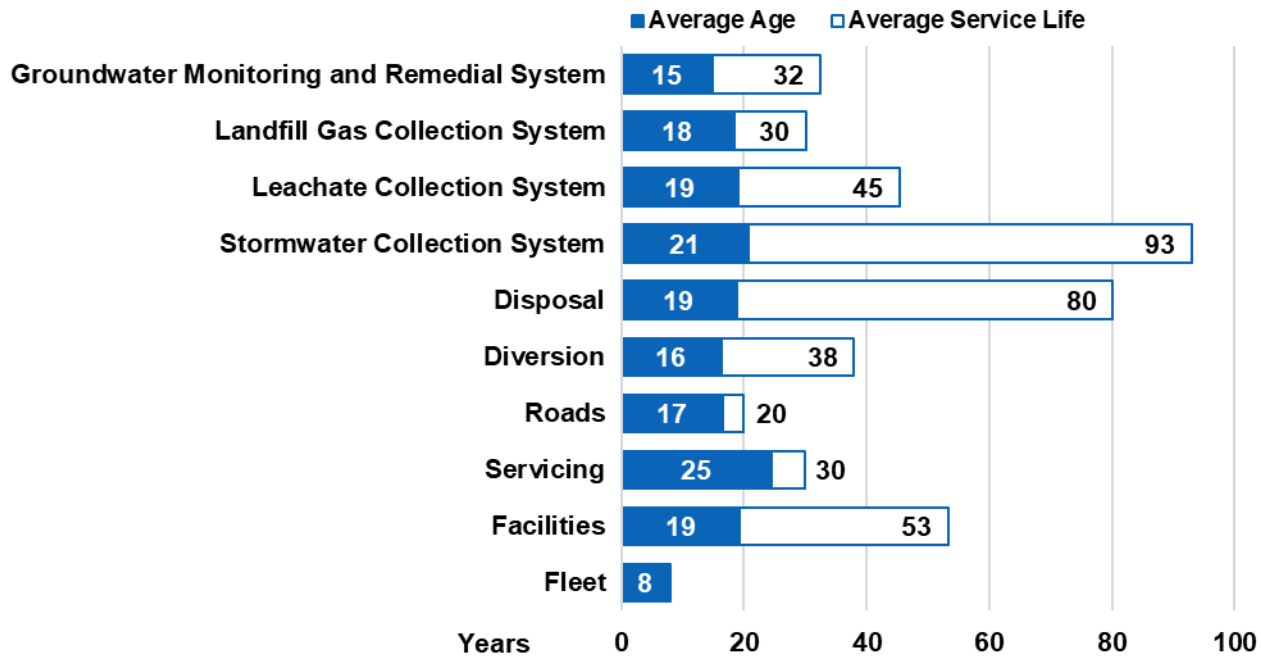


Average Age

The majority of Waste Management assets are in the first half of their expected service life, with the exception of fleet, which make up a relatively small amount of the overall portfolio value.

Passed expected Service Life of 6 years

Figure E.2: Asset Age Profile - Waste Management Services



E.2 Levels of Service

The following table provides information on corporate, legislated, customer and technical LOS. These LOS focus on those relevant to asset operations, maintenance and renewal to maintain current LOS. LOS pertaining to growth and upgrading services are generally covered in Master Plans and are not repeated in this AM Plan.

Summary Analysis:

- Compliance with environmental regulations is high; Waste Management ensures all landfill facilities and environmental systems are in compliance with all environmental compliance approvals (ECA) requirements and other regulations as required.
- Waste Management strives to ensure assets are maintained in a state of good repair so the Waterloo Landfill and Cambridge Transfer Station continue to receive waste, and that all closed landfills are regularly maintained and operating efficiently.
- Waste diversion rates are not represented in 2024 as the Region transitioned the blue box collection program to the new resource recovery framework under the regulatory framework of O.Reg.391/21, on March 4, 2024. For the remainder of 2024, collected blue box materials was no longer fully processed by the Region's Material MRC. The operation of the MRC transitioned to a transfer station. Blue box material received at the Recovery Facility is consolidated for pickup by one or more Producer Responsibility Organizations.
- **Recommendation:** Develop key performance indicators (KPIs) for technology adoption and innovation in waste management operations to improve efficiency and sustainability.

Waste Management Current Levels of Service

Customer LOS	Technical Measure	Asset Type	Current Performance (2024)	Target Performance (2025-2034)
Waste Management (WM) is responsible for providing residential waste collection, diversion and disposal services. WM operates the Waterloo Landfill, the closed Cambridge Landfill and bulk waste transfer station, the Closed Kitchener Landfill and three rural closed landfill sites. Site operations include running composting pads and small vehicle transfer stations including drop-off areas, as well as operating environmental control systems (landfill gas, leachate and storm-water) and monitoring/ maintenance of open and closed landfill sites.	Compliance Rate of Solid Waste Facilities with Environmental Approvals and Regulations	Service Area, All Asset Types	100%	100%
	Percentage of remaining landfill capacity available	Service Area, All Asset Types	31%	>20%
Assets are maintained in a state of good repair to ensure continued operation of waste management services.	% Assets rated Fair, Good, Very Good	Operations	75.9%	>80%
		Site Works	83.1%	>80%
	% Critical Assets in Fair or Better Condition	Operations	75%	>95%
		Site Works		>95%
	Environmental Control System Uptime Percentage	Environmental Controls	100%	100%

TBD: Performance for these measures will be provided when available as an addendum to this AM Plan.

E.3 Asset Management Strategy

The Region manages its landfill capacity by balancing commercial revenue with conserving landfill capacity and investigating new potential diversion programs to make best use of available capacity. These diversion programs require associated activities for promotion, education and community outreach.

For Waste Management assets, lifecycle activities are driven by legislated compliance to regulatory bodies such as the MECP, ECCC and TSSA, and maintaining assets in a state of good repair for continued operation. Risks include unforeseen legislative requirements and unforeseen political directions. These risks are evaluated on an ongoing basis to ensure proper action can be taken to reduce the potential impact. Risks relating to infrastructure failure are mitigated through inspection and maintenance programs which provide the necessary data to ensure that the work required to achieve the established LOS is identified, planned, funded and completed. Annual capital and maintenance programs and associated budgets ensure that funding to undertake the necessary work is provided. The Region renews aging infrastructure at appropriate service lives that reduce lifecycle costs. Typical replacement service lives are summarized in the table below for Waste Management Operations and Site Works assets.

Operations and Site Works Asset Management Strategies

Asset Type	Asset Criticality	Service Life (Years)

Operations		
Disposal		
Landfill Cap	High	50
Landfill Liner	High	100
Diversion		
Compost Pad	Moderate	50
Scales		
Scales	Low	20
Site Works		
Roadway	Moderate	20
Security & Alarms	Low	25
Servicing	Low	30

The Region operates and maintains environmental control systems, including landfill gas, leachate, groundwater, odour and stormwater controls. It also oversees the monitoring and maintenance of its landfill sites. These assets are repaired as required and replaced at appropriate service lives to reduce lifecycle costs. Typical replacement service lives are summarized in the table below for Waste Management Environmental Controls assets.

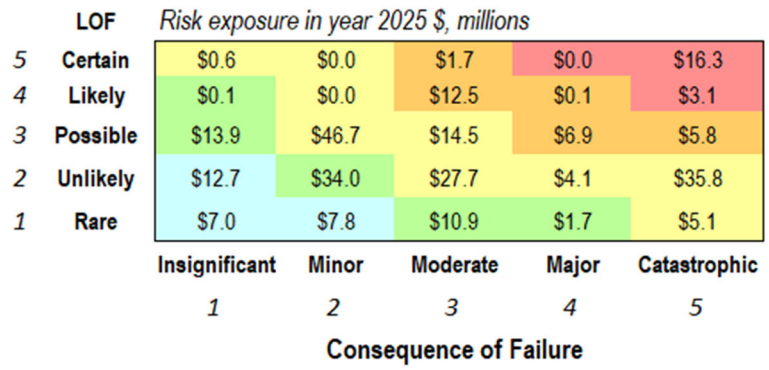
Environmental Controls Asset Management Strategies

Asset Type	Asset Criticality	Service Life (Years)
Environmental Controls		
Groundwater Monitoring & Remedial System		
Purge Well	Moderate	20
Monitoring Wells	Moderate	30
Extraction Wells	Moderate	20
Flowmeter	Moderate	20
Valves	Moderate	20
Other Process Equipment	Moderate	30
Landfill Gas Collection System		
Gas Flare	Very High	20
Gas Analyzers	Moderate	10
Linear System	Moderate	50
Monitoring Probes	Moderate	30

Asset Type	Asset Criticality	Service Life (Years)
Extraction Wells	Moderate	30
Blowers (Waterloo)	Moderate	15
Blowers (Kitchener, Cambridge)	Moderate	20
Pneumatic Pump	Moderate	10
Other Process Equipment	Moderate	25
Leachate Collection System		
Collection System	Low	50
Pump Station - Electrical	Low	20 to 25
Pump Station - Instrumentation	Low	20 to 25
Pump Station - Lifting Device	Low	25
Pump Station - Submersible Pump and Motor	Low	10
Pump Station - Wet Well	Low	25
Pump Station - Other	Low	25
Grinder Pump	Low	20
Stormwater Collection System		
Pond	Low	50
Oil Grit Separator	Low	25

Risk maps enable the identification and prioritization of Very High risk assets that need to become candidates for closer inspection (to verify if they truly are Very High risk), renewal or replacement. Risk maps showing both replacement value and percentage of assets by replacement value are shown below.

Figure E.3: Risk Exposure Matrix Total - Waste Management (in $M & %)



Risk Exposure Ratings		
Very High	$19.4	7%
High	$27.0	10%
Moderate	$134.5	50%
Low	$60.6	23%
Very Low	$27.4	10%
Total	$268.8	100%

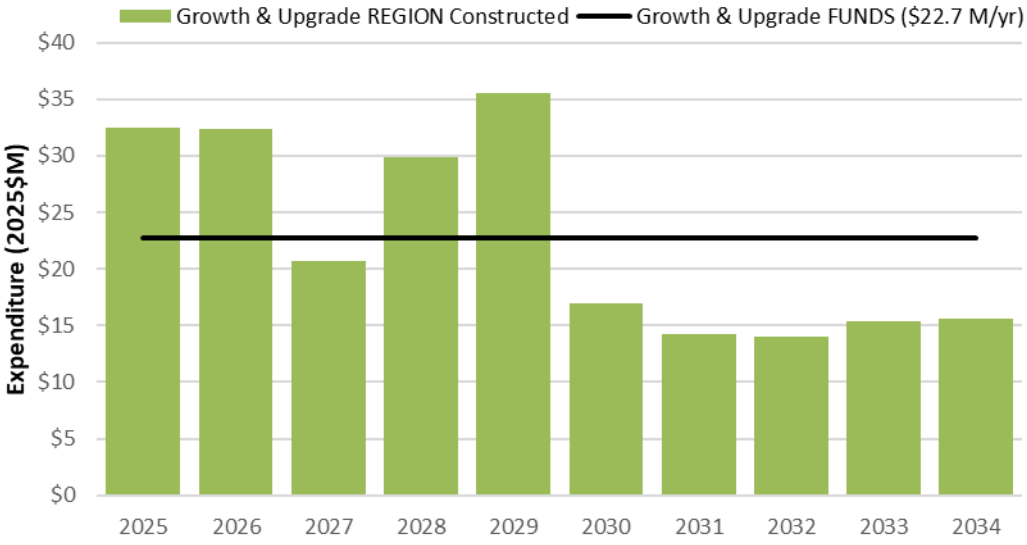
The Region's risk mitigation plans for the assets identified as very high risk are addressed in the 2025 Budget Plan.

E.4 Expenditure Forecasts

Expansion (Growth) and Upgrade Investments

To maintain the current capacity and functional levels of service, the Region has planned expansion and upgrade works for each of the next 10 years and outlined the costs of providing these activities in the 2025-2034 Capital Program. The following graph shows these planned growth and upgrade investments over the next ten years.

Figure E.4: Growth and Upgrade Forecast - Waste Management Services

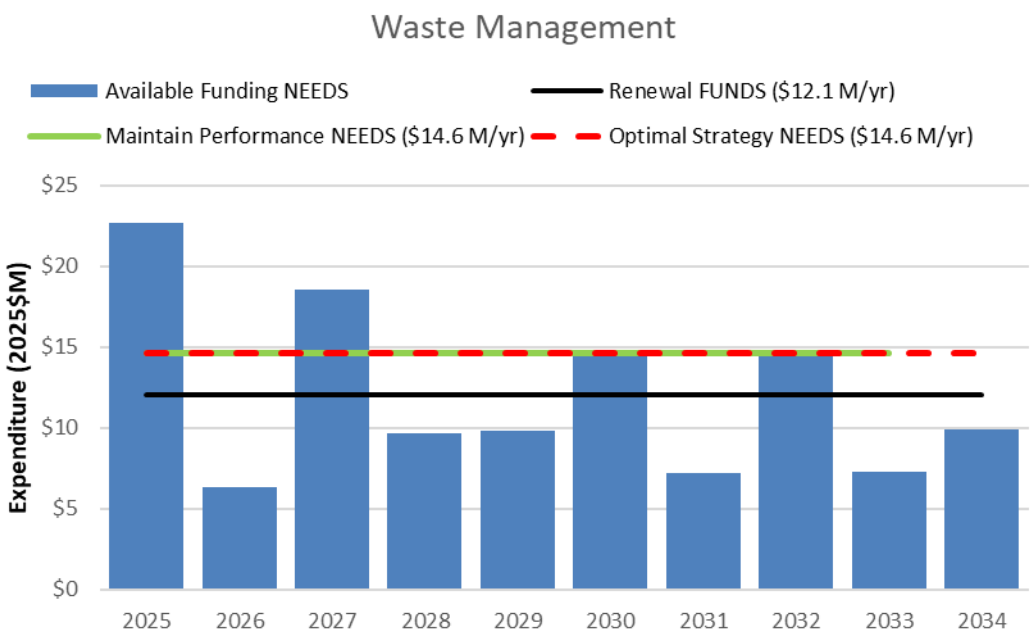


Renewals Investments

The primary performance measures for reliability are asset physical condition and associated risk. Based on the asset condition and risk information outlined in the preceding sections, three renewal needs scenarios are considered and analyzed over the next 10 year period (2025 to 2034), as required by O.Reg. 588/17.

The following figure shows the projected renewal needs for Scenario 2, the LOS that the Region proposes to provide for each of the next 10 years (blue bars) and the associated available funding (solid black line). The figure also shows the funding required to maintain current performance (Scenario 1 as the solid green line) and to undertake the optimal renewal strategy (Scenario 3 as the dashed red line).

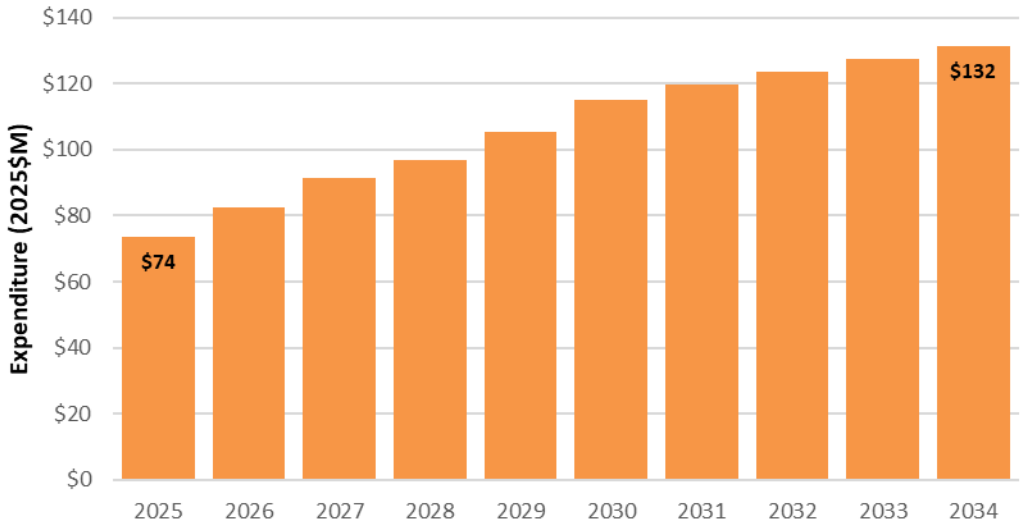
Figure E.5: Renewal Needs Forecast - Waste Management Services



Operating Expenditures

To maintain the current levels of service, the Region includes planned maintenance and operations works in its annual operating budget. Operating expenditures include those related to infrastructure operation and maintenance and capital financing (reserve transfers and debt servicing costs). The operating expenditures related to infrastructure operation and maintenance are shown in the following graph, which shows these costs increasing proportionately with growth and upgrade of the asset portfolio.

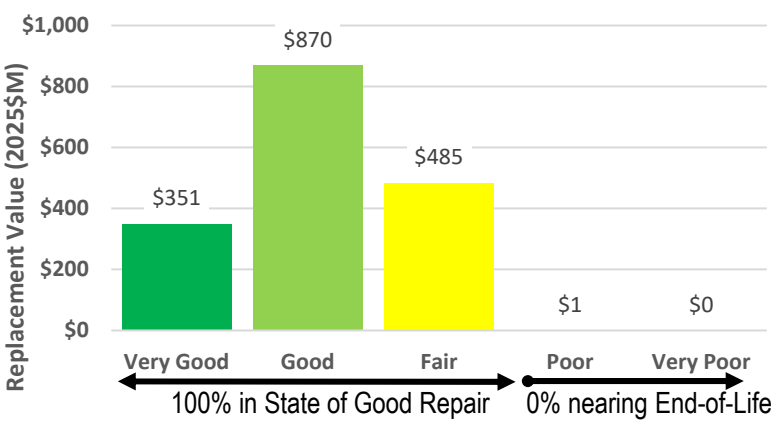
Figure E.6: Operating Needs Forecast - Waste Management Services



F. APPENDIX F – CORPORATE & OTHER SERVICES

F.1 State of Local Infrastructure

The following figure shows the asset inventory replacement value by condition grade.



Total Asset Valuation (2025$)

$1,706.3 million

Average Asset Condition (2024)

GOOD

Replacement Value and Condition

The replacement value and condition of Facilities and Fleet assets, by service area, are as summarized in the following figure. Housing Services account for a significant portion of the replacement value.

Figure F.1: Asset Condition Profile – Corporate Services

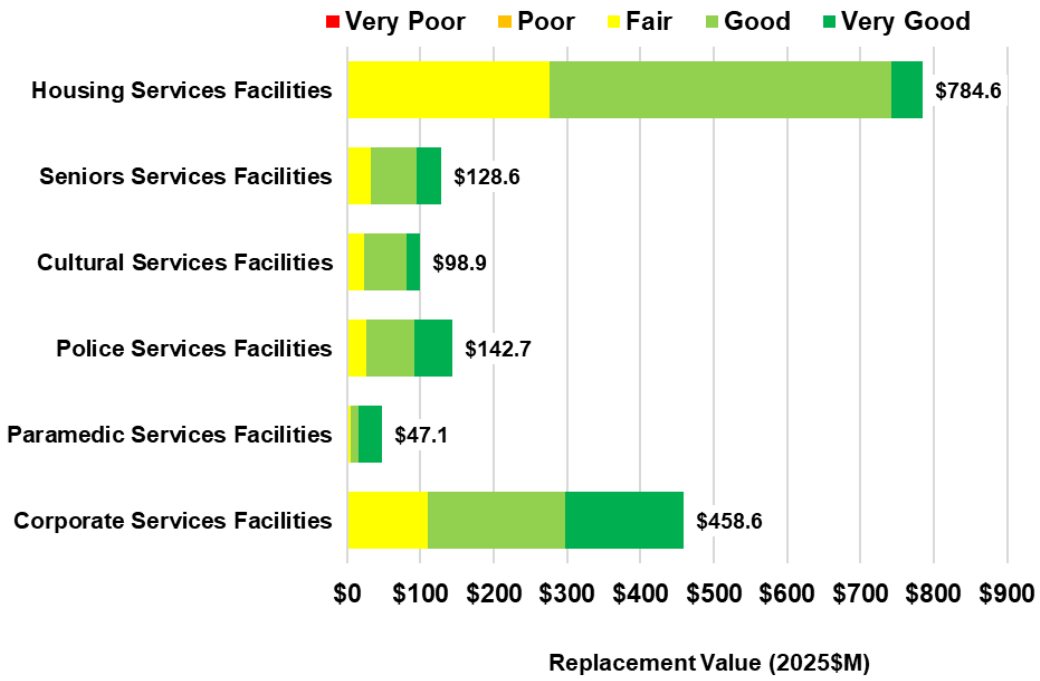
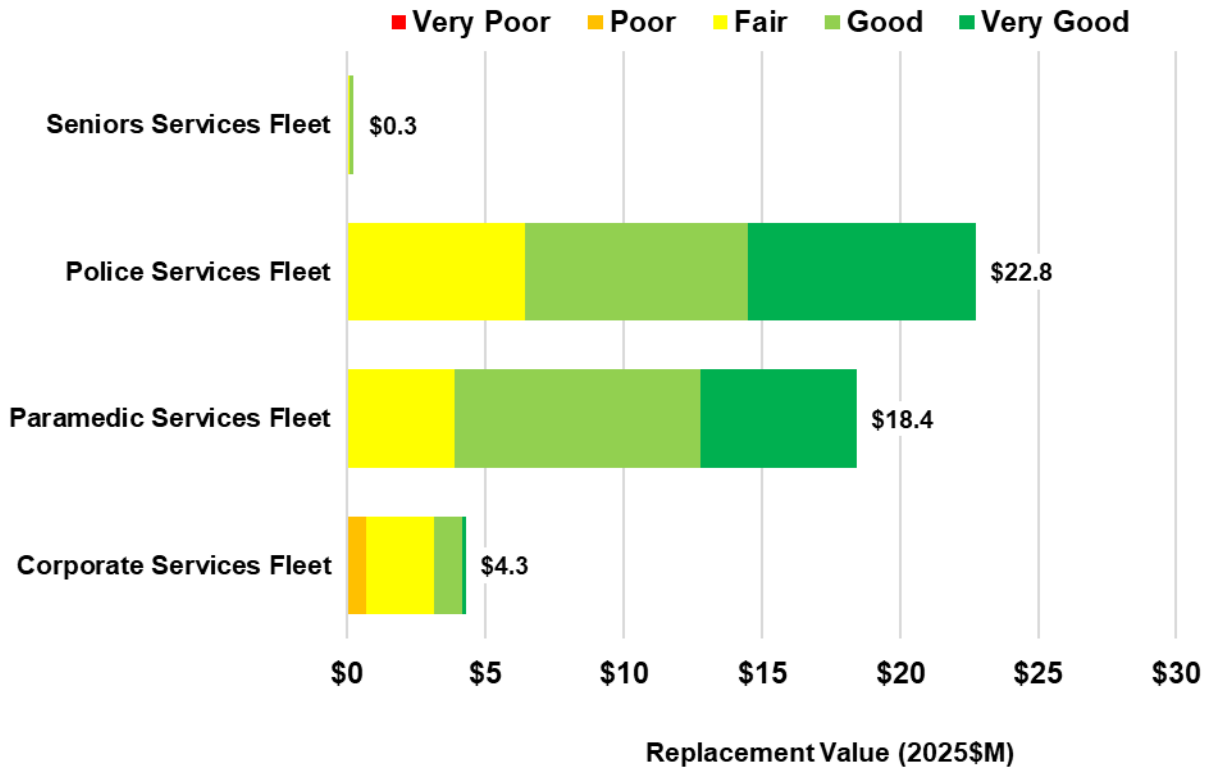


Figure F.2: Asset Condition Profile – Other Services



Average Age

The average age of this service area's assets, weighted by replacement value, is summarized in the following figure by asset class. Many of the Fleet assets are nearing end of life.

Figure F.3: Asset Age Profile – Corporate Services

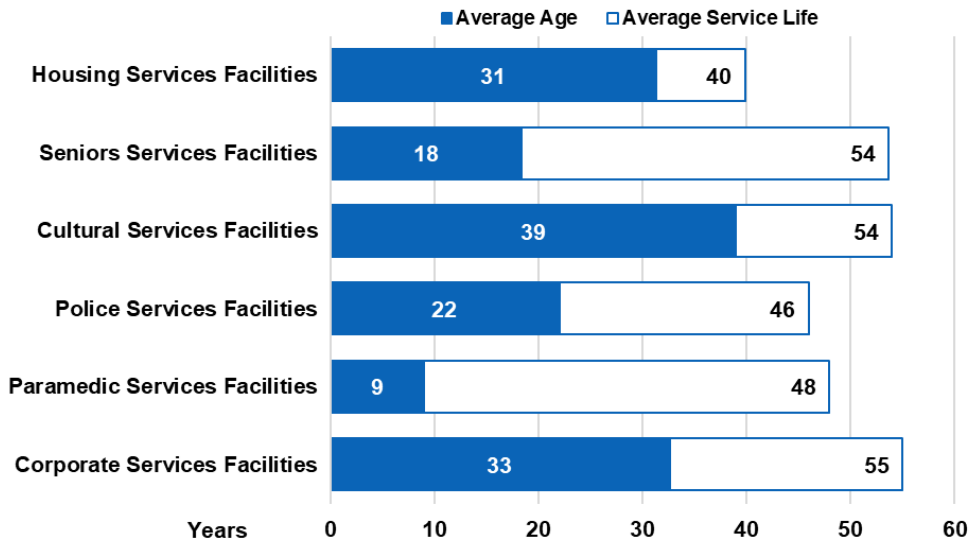
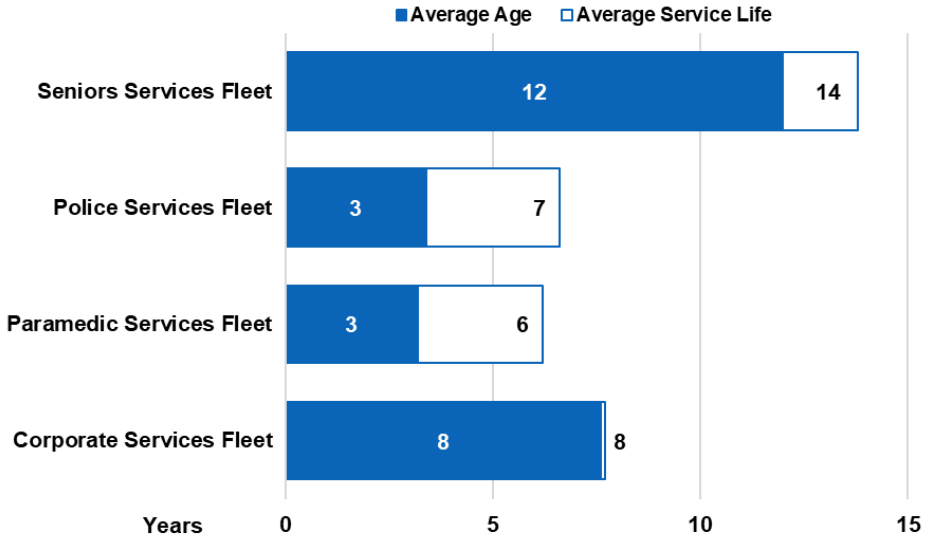


Figure F.4: Asset Age Profile – Other Services



F.2 Levels of Service

The following table provides information on corporate, legislated, customer and technical LOS. These LOS focus on those relevant to asset operations, maintenance and renewal to maintain current LOS. LOS pertaining to growth and upgrading services are generally covered in Master Plans and are not repeated in this AM Plan.

Corporate Current Levels of Service

Customer LOS	Technical Measure	Asset Type	Performance (2023)	Target Performance (2025-2034)
Facilities				
Facilities Management manages the planning, construction, maintenance, asset management and protective services for owned or leased Regional buildings.	Response time compliance for regulatory preventative maintenance work orders (30 days)*	Facility assets	23.3	30 days
	Response time compliance for non-regulatory preventative maintenance work orders (45 days)*	Facility assets	19.8%	45 days
	Median response time compliance for emergency demand work orders (1hr)	Facility assets	1 day	1 hour
	Median response time compliance for urgent demand work orders (same day)*	Facility assets	1 day	Same day
	Median response time compliance for high priority demand work orders (1-2 days)*	Facility assets	4 days	1-2 days
	Median response time compliance for medium priority demand work orders (1 week)*	Facility assets	2 days	1 week
	Median response time compliance for low priority demand work orders (1 month)*	Facility assets	N/A	1 month
	After hours emergency demand work orders*	Facility assets	4	TBD
	% of outstanding demand work orders*	Facility assets	1.5%	0%
	% of outstanding preventative maintenance work orders*	Facility assets	0%	0%
	Condition of assets (% in fair or better condition by replacement cost)	Facility assets	100%	100%
The Region has a long-standing commitment to environmental sustainability and is committed to reducing greenhouse gas emissions.	Efficiency of non-water buildings (eKWh/sq.ft)	Facility assets	N/A	TBD
	GHG Emissions (Tonnes)	Facility assets	N/A	TBD
Fleet				
Fleet Services plans, maintains and supports	Preventive Maintenance	Fleet assets	TBD	100%

Customer LOS	Technical Measure	Asset Type	Performance (2023)	Target Performance (2025-2034)
services for over 800 vehicles and moving equipment in the Region's corporate fleet. It maintains fleet vehicle assets in a safe, reliable and available condition to support department programs in the delivery of their services.	Compliance (Percentage of On-Time PMs)			
The Region has a long-standing commitment to environmental sustainability and is committed to reducing greenhouse gas emissions.	Number of greening vehicle solutions implemented	Fleet assets	TBD	TBD

TBD: Performance for these measures will be provided when available as an addendum to this AM Plan.

F.3 Asset Management Strategy

Facilities

For facilities, risks relating to building infrastructure failure are mitigated through inspection and maintenance programs, which provide the necessary data to ensure that the work required to achieve the established LOS is identified. Timing and prioritization of work considers the criticality of the asset as well as the criticality of the overall facility (Service Area and occupied versus unoccupied facilities). Renewal of assets is driven by the level of service to maintain facilities in a state of good repair to ensure continued provision of facility use.

Non-asset solutions include energy conservation and demand management initiatives such as process optimization and education and Master Accommodation Planning for space saving initiatives.

Facilities Asset Management Strategies

Uniformat Level	Asset Criticality	Capital			O&M	Technical LOS
		Service Life (Years)	Rehab Frequency (Years)	Rehab Cost (% of Replace Cost)		
A - Substructure						
A10 - Foundations	High (Occupied: Very High)	150	30	15%	Condition assessments every 4 years	% assets rated Fair, Good, or Very Good
A20 - Subgrade Enclosures	High (Occupied: Very High)	150	30	20%		
A40 - Slabs-On-Grade	High	150	30	15%		
A60 - Water and Gas Mitigation	High	50	25	5%		
A90 - Substructure Related	High (Occupied: Very High)	150	30	5%		
B – Superstructure						
B10 - Superstructure	High (Occupied: Very High)	150	30	20%	Condition assessments every 4 years	% assets rated Fair, Good, or Very Good
B20 - Exterior Vertical Enclosures	Moderate	50	25	20%		
B30 - Exterior Horizontal Enclosures	Moderate	20	10	10%		
C - Interior Construction						
C10 - Interior Construction	Low	50	25	20%	Condition assessments every 4 years	% assets rated Fair, Good, or Very Good

Facilities Asset Management Strategies

Uniformat Level	Asset Criticality	Capital			O&M	Technical LOS
		Service Life (Years)	Rehab Frequency (Years)	Rehab Cost (% of Replace Cost)		
D - Services						
D10 - Conveying	Very High	30	15	30%	Condition assessments every 4 years	% assets rated Fair, Good, or Very Good
D20 - Plumbing	Moderate	75	25	25%		
D30 - HVAC	High (Occupied: Very High)	30	15	25%		
D40 - Fire Protection	High (Occupied: Very High)	40	20	20%		
D50 - Electrical	High (Occupied: Very High)	60	30	20%		
D60 - Communications	High (Occupied: Very High)	40	20	20%		
D70 - Electronic Safety and Security	High (Occupied: Very High)	20	10	10%		
E - Equipment & Furnishings						
E10 - Equipment	Very Low	30	15	10%	Condition assessments every 4 years	% assets rated Fair, Good, or Very Good
E20 - Furnishings	Very Low	15	-	-		
F - Special Constr. & Demo.						
F10 - Special Construction	High	40	20	15%	Condition assessments every 4 years	

Uniformat Level	Asset Criticality	Capital			O&M	Technical LOS
		Service Life (Years)	Rehab Frequency (Years)	Rehab Cost (% of Replace Cost)		
						% assets rated Fair, Good, or Very Good
G - Building Site Work						
G10 - Site Preparation	Low	60	-	-	Condition assessments every 4 years	
G20 - Site Improvements	Low	20	10	15%		
G30 - Liquid and Gas Utilities	Moderate	60	30	15%		
G40 - Electrical Site Improvements	Moderate	60	30	15%		
G50 - Site Communications	Moderate	60	20	15%		
G90 - Miscellaneous Site Construction	Low	60	20	5%		

Fleet

Fleet renewal is driven by maintaining the low operating costs over the lifecycle and maintaining assets in a state of good condition. Most vehicles and equipment are renewed without intermediate capital rehabilitations. Rehabilitations may be performed for compactors and bulldozers, which cost approximately 50% of the replacement cost; however, for budgeting and lifecycle strategy planning, full replacements are assumed because the possibility of rehabilitation can only be determined at the time of inspection. Routine and preventative maintenance activities are performed to extend asset life and minimize the operating lifecycle costs. Renewal service lives consider asset criticality, but criticality scores have not been specifically assigned to each asset type.

Risk maps enable the identification and prioritization of Very High risk assets that need to become candidates for closer inspection (to verify if they truly are Very High risk), renewal or replacement. Risk maps showing both replacement value and percentage of assets by replacement value are shown below.

Figure F.5: Risk Exposure Matrix Total – Corporate and Other (in $M & %)

Risk exposure in year 2025 $, millions

LOF		Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
5	Certain	$0.0	$0.0	$0.0	$0.0	$0.0
4	Likely	$0.0	$0.0	$0.0	$0.0	$0.0
3	Possible	$3.3	$0.0	$0.0	$0.0	$10.4
2	Unlikely	$167.9	$930.9	$133.4	$87.5	$24.9
1	Rare	$77.0	$110.9	$25.6	$101.3	$33.3

Consequence of Failure

Risk Exposure Ratings		
Very High	$0.0	0%
High	$10.4	1%
Moderate	$279.1	16%
Low	$1,061.0	62%
Very Low	$355.8	21%
Total	$1,706.3	100%

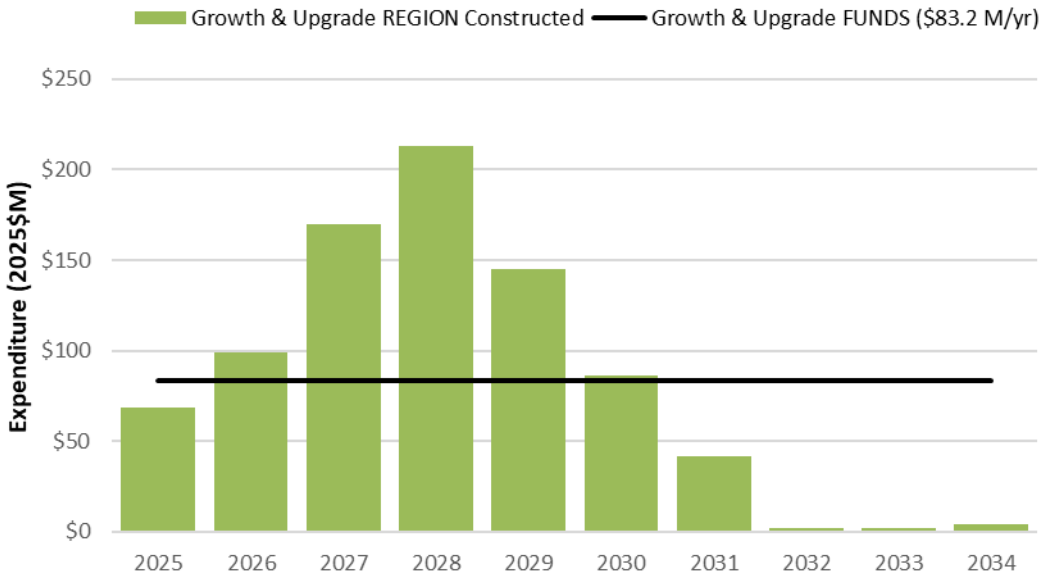
The Region's risk mitigation plans for the assets identified as very high risk are addressed in the 2025 Budget Plan.

F.4 Expenditure Forecasts

Expansion (Growth) and Upgrade Investments

To maintain the current capacity and functional levels of service, the Region has planned expansion and upgrade works for each of the next 10 years and outlined the costs of providing these activities in the 2025-2034 Capital Program. The following graph shows these planned growth and upgrade investments over the next ten years.

Figure F.6: Growth and Upgrade Forecast – Corporate and Other Services



Renewals Investments

The primary performance measures for reliability are asset physical condition and associated risk. Based on the asset condition and risk information outlined in the preceding sections, three renewal needs scenarios are considered and analyzed over the next 10 year period (2025 to 2034), as required by O.Reg. 588/17.

The following figure shows the projected renewal needs for Scenario 2, the LOS that the Region proposes to provide for each of the next 10 years (blue bars) and the associated available funding (solid black line). The figure also shows the funding required to maintain current performance (Scenario 1 as the solid green line) and to undertake the optimal renewal strategy (Scenario 3 as the dashed red line).

Figure F.7: Renewal Needs Forecast – Corporate Services

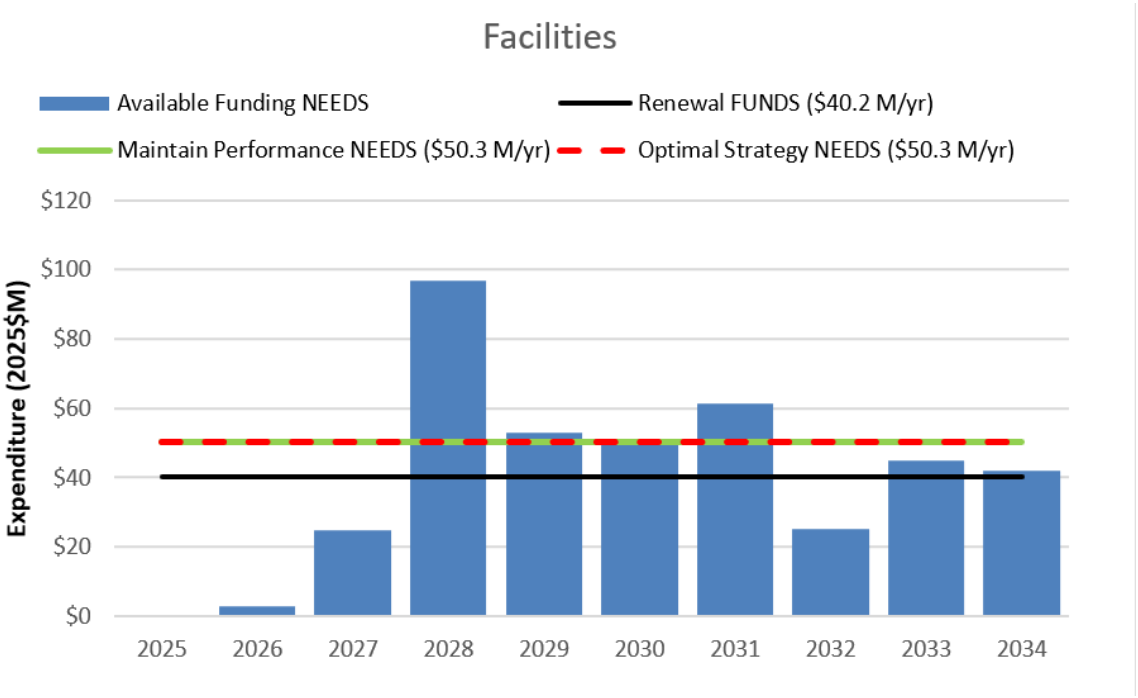
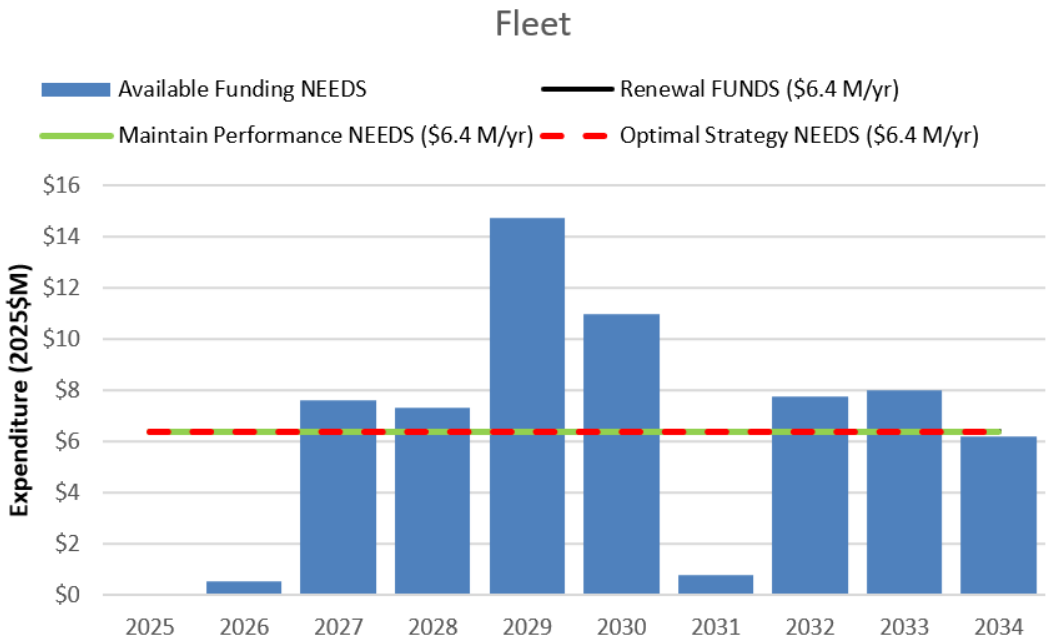


Figure F.8: Renewal Needs Forecast – Other Services

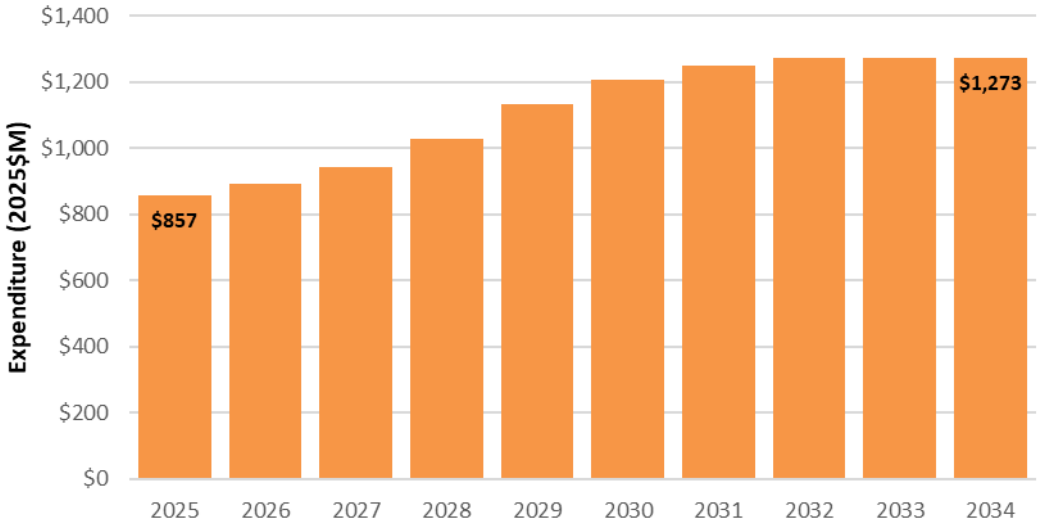


Operating Expenditures

To maintain the current levels of service, the Region includes planned maintenance and operations works in its annual operating budget. Operating expenditures include those related to infrastructure operation and maintenance and capital financing (reserve transfers and debt servicing costs). The operating expenditures related to infrastructure operation and maintenance

are shown in the following graph, which shows these costs increasing proportionately with growth and upgrade of the asset portfolio.

Figure F.9: Operating Needs Forecast – Corporate and Other Services



Region of Waterloo

2025 ASSET MANAGEMENT PLAN